UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C., 20460

MEMORANDUM

DP Barcode: 365085
PC Code: 122804
February 24, 2010

SUBJECT: Ecological risk assessment evaluating Abamectin for the registration of a new end-use product (Agri-Mek®SC Miticide/Insecticide) for use on almonds, walnuts, apples, avocados, celeriac, citrus, cotton, cucurbit, fruiting vegetables, grapes, herbs, hops, leafy vegetables, mint, pears, plums, prunes and potatoes

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The Environmental Fate and Effects Division (EFED) has completed the baseline ecological risk assessment for the proposed use of abamectin (PC Code 122804) as a new end-use product (Agri-Mek®SC Miticide/Insecticide) for use on almonds, walnuts, apples, avocados, celeriac, citrus, cotton, cucurbit, fruiting vegetables, grapes, herbs, hops, leafy vegetables, mint, pears, plums, prunes and potatoes. Conclusions regarding the environmental fate and ecological effects and ecological risks associated with the proposed uses of the chemical can be found in the executive summary of the attached document.

ENVIRONMENTAL FATE AND EFFECTS SCIENCE CHAPTER

For The Proposed Registration of

ABAMECTIN AS A NEW END-USE PRODUCT (AGRI-MEK®SC MITICIDE/INSECTICIDE) FOR ALMONDS, WALNUTS, APPLES, AVOCADOS, CELERIAC, CITRUS, COTTON, CUCURBIT, FRUITING VEGETABLES, GRAPES, HERBS, HOPS, LEAFY VEGETABLES, MINT, PEARS, PLUMS, PRUNES AND POTATOES

USEPA PC Code: 122804

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1.0 Executive Summary

Syngenta Crop Protection, Inc. is seeking a registration of abamectin (PC Code 122804) and its new end-use product Agri-Mek®SC Miticide/Insecticide) for almonds, walnuts, apples, avocados, celeriac, citrus, cotton, cucurbit, fruiting vegetables, grapes, herbs, hops, leafy vegetables, mint, pears, plums, prunes and potatoes for control of mites, thrips, leafminers, leafhoppers, psyllids, potato beetles, skeletonizer, and pinworms.

The new end-use product may be applied by ground application and also aerially for some crops, except for in New York. The maximum single application rate ranges from 0.014 to 0.023 lb ai/A, and the maximum seasonal application rate ranges from 0.038 to 0.056 lb ai/A.

1.1 Nature of Chemical Stressor

Abamectin (also known as avermectin) is a mixture of macrocyclic lactones and is a fermentation product of the soil fungus, *Streptomyces avermitilis*. The active ingredient abamectin is a mixture of avermectins containing at least 80% avermectin B_{1a} (5-0-demethyl avermectin A_{1a}) and at most 20% avermectin B_{1b} (5-0-demethyl-25-de(1-methylpropyl)-25-(1-methylethyl) avermectin A_{1a}). A major soil degrade is a mixture of 8-α-hydroxy and a ring opened aldehyde derivative.

Abamectin is a miticide/insecticide registered for use on almonds, walnuts, apples, avocados, citrus fruits, cucurbits, grapes, fruiting vegetables and other crops. It is also registered as a nematicide for use as a seed treatment for corn and cotton (Avicta™ 500FS) and as a seed treatment for cucurbits and tomatoes (Avicta™ 400 FS). It is also registered as a treatment for as an indoor and outdoor bait for insects such as ants and roaches, waterbugs, and palmetto bugs.

The proposed registration action is for a new formulation, Agri-Mek® SC Miticide/Insecticide, an aqueous suspension concentrate that contains abamectin (avermectin B1a & B1b), for use on almonds, walnuts, apples, avocados, celeriac, citrus, cotton, cucurbit, fruiting vegetables, grapes, herbs, hops, leafy vegetables, mint, pears, plums, prunes and potatoes for control of mites, thrips, leafminers, leafhoppers, psyllids, potato beetles, skeletonizer, and pinworms. According to the registrant, abamectin is not dissolved in the new end-use product, rather the particles of abamectin are suspended in water. Also, depending on the crop, Agri-Mek SC must be mixed with a horticulture oil (not a dormant oil), non-ionic surfactant, spreading and penetrating surfactant, cucurbit approved adjuvant or organosilicone adjuvant (potatoes only) to avoid the possibility of exceeded established crop tolerances. Agri-Mek SC may be applied by ground application and by aerial application for avocados, cucurbit, fruiting and leafy vegetables, mint, and potatoes and for control of citrus leafminer in citrus fruit (not in California). Aerial application is not approved in New York. Agri-Mek SC can not be applied within 25 ft for ground application or 150 ft for aerial application of lakes, reservoirs, rivers, permanent streams, marshes, pot holes, natural ponds, estuaries or commercial fish farm ponds. In addition, the label restricts cultivation within 25 ft of the aquatic area to allow growth of a vegetative filter strip. The label states not to apply Agri-Mek SC or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

Abamectin acts as a chlorine channel agonist in invertebrates (Fritz, *et al.*, 1979, Mellin *et al.*, 1983 and Arena *et al.*, 1991 in Sherma and Cairns, 1993), and may function as a gamma-aminobutyric acid (GABAergic) agonist (Kass et al., 1980, 1984 in Sherma and Cairns, 1993). It acts by stimulating the release of gamma-aminobutyric acid, an inhibitory neurotransmitter, thus causing paralysis (Tomlin, 1994). The difference in toxicity between invertebrates and mammals may be partially due to different distribution of the GABAergic neurons (Turner and Schaeffer, 1989 in Sherma and Cairns, 1993).

1.2 Conclusions – Exposure Characterization

The new proposed use of abamectin may result in drift onto plants, soil, or water adjacent to a treated field. Any abamectin on the soil surface or in clear, shallow surface water should undergo rapid photodegradation (half-life <1 day). However, photodegradation is not likely to be significant where abamectin is incorporated or under canopy. In addition, in most surface waters, suspended sediments and lack of mixing would decrease the rate of photodegradation. In natural waters, abamectin residues are expected to be associated with the sediment, reducing aqueous concentrations. Abamectin slowly biodegrades in soil (90% upper confidence bound of mean half-life = 80.6 days). Abamectin is stable to hydrolytic degradation. Due to its low vapor pressure (1.5×10^{-9} Torr); it is not likely that volatilization will be a transport process for abamectin.

Laboratory studies indicate that abamectin has moderate to low mobility (K_{ads} = 9.7 to 160 mg kg^{-1}); adsorption was correlated with soil organic matter content. Submitted field dissipation studies are unacceptable; therefore, EFED can not determine if the behavior of abamectin in the laboratory is demonstrated in the field. Based upon the laboratory data, ground water effects are expected to be minimal.

1.3 Conclusions – Effects Characterization

Aquatic invertebrates are the aquatic species most sensitive to abamectin. It is very highly acutely toxic to aquatic invertebrates, with a 48-h EC_{50} value of 0.34 µg ai/L in the freshwater waterflea, *Daphnia magna*, and a 96-h LC_{50} of 0.020 µg ai/L (20 parts-per-trillion) in the estuarine/marine mysid shrimp, *Americamysis bahia.* Abamectin is highly toxic to the embryo/larval stages of mollusks with a 48-h EC_{50} of 430 µg ai/L (total form (both dissolved and undissolved abamectin)) in the Eastern Oyster. This value is above the water solubility of abamectin (7.8 ppb in distilled water; <1 ppb in tap water) without the presence of a vehicle such as acetone to increase its water solubility. The life-cycle toxicity test with the *Daphnia magna* resulted in a reproductive NOAEC of 0.030 µg ai/L which was the lowest concentration tested, but the adults in the two lowest treatment groups were observed to be pale and smaller compared to the controls (MRID 00153570) and growth was not measured in the study. Therefore, the reproductive NOAEC appears to underestimate the true no-effect concentration for Daphnia from chronic exposure to abamectin, as the NOAEC appears to be lower than 0.030 µg ai/L (30 parts-per-trillion). An acute to chronic ratio using the mysid shrimp toxicity data was used to calculate a chronic no-effect concentration for the daphnia and is 0.006 µg ai/L (6 parts-per-trillion). The NOAEC value for the life-cycle toxicity test with the mysid shrimp (*Americamysis bahia*) was previously reported as 0.0035 µg ai/L based on reproduction when compared to the solvent control, but is 0.00035 µg ai/L (0.35 parts-per-trillion) based on reproduction when compared to the negative control as there was a difference between the negative and solvent control for reproduction. Current EFED policy is to compare treatment groups to the negative control, therefore, the NOAEC value of 0.00035 µg ai/L was used in the assessment.

Abamectin is also very highly toxic to freshwater fish with an acute 96-h LC_{50} value of 3.2 µg ai/L (total form) for rainbow trout (*Oncorhynchus mykiss)*, a 96-h LC_{50} value of 9.6 ai µg/L (total form) for bluegill sunfish (*Lepomis macrochirus*) and an acute 96-h LC_{50} value of 15.0 µg ai/L (total form) for sheepshead minnow (*Cyprinodon variegatus*). These values are above the water solubility of abamectin (7.8 µg/L in distilled water; <1 µg/L in tap water) without the presence of a solvent such as acetone or DMF to increase its water solubility. The freshwater fish chronic toxicity NOAEC is 0.52 µg ai/L, based on an early life stage study in rainbow trout based on growth (wet weight). There is no chronic estuarine-marine fish study for abamectin, therefore an acute to chronic ratio was used to determine a no-effect concentration. The extrapolated estuarine/marine fish chronic toxicity NOAEC is 2.41 µg/L.

In birds, the acute oral LD_{50} for bobwhite quail (*Colinus virginianus*)is >2,000 mg/kg-bw (practically nontoxic), whereas the acute oral LD_{50} for mallard ducks (*Anas platyrhynchos*) is 85 mg/kg-bw (highly toxic). The dietary LC_{50} values obtained in short-term toxicity tests in bobwhite quail and mallard ducks are >3,102 and 383 mg ai/kg-diet, respectively. There were no statistically significant effects on growth, survival or reproduction in the mallard duck reproduction study at the highest concentration tested, 12 mg ai/kg-diet, therefore, the no observed adverse effect concentration (NOAEC) is at least 12 mg ai/kg-diet for the mallard duck chronic reproduction study (MRID 40318601). During the pilot study for the mallard duck reproduction study, the average number of eggs laid was markedly less in the 64 mg ai/kg treatment group.

In laboratory rats, abamectin has an acute toxicity LD_{50} value of 13.6 mg/kg-bw, when dosed using a sesame oil vehicle, and a 2-generation reproductive NOAEC value of 0.12 mg/kg-bw based on increased retinal folds, increased dead pups at birth, decreased viability and lactation indices, and decreased pup body weight. Based on two rat carcinogenicity studies abamectin is not a carcinogen and based on five mutagenicity and a cytogenetics test abamectin is not a mutagen.

Abamectin is highly toxic to the Honey Bee with an acute dermal LD_{50} of 0.41 µg/bee. A foliar residue study on citrus, demonstrates that residues are toxic for approximately 48 hours.

Abamectin has been tested for phytotoxicity in only two aquatic plant species. The growth or biomass inhibition nominal concentration IC_{50} values obtained in these studies are >100 mg ai/L (total form) and 3.9 mg ai/L (total form) for the green alga *Selenastrum capricornutum* and the vascular aquatic plant *Lemma gibba*, respectively. These values are above the water solubility of abamectin (7.8 μg/L distilled water; <1 μg/L in tap water) without the presence of a solvent such as acetone or DMF to increase its water solubility. These studies were conducted using acetone, which is a potential photosensitizer and abamectin is subject to photolysis. Bioavailable dissolved concentrations are unknown, as test solutions were not analyzed.

Abamectin does not bioaccumulate significantly in fish or in mammals. Terrestrial plant toxicity data was not available.

1.4 Potential Risks to Non-target Organisms

Non-Listed Organisms

Acute risk is not expected for non-listed fish, birds or mammals from application of the new end-use abamectin product. Acute risk is expected for non-listed freshwater and estuarine/marine invertebrates. The potential for adverse risk also exists for terrestrial invertebrates and plants from use of abamectin. The RQ values did not exceed the non-listed LOC for aquatic plants, but data for only two of the five recommended species were submitted, and there are technical issues with the submitted data.

Listed Organisms

There is a potential for adverse risk to listed freshwater fish, freshwater and estuarine/marine invertebrates, birds, reptiles, amphibians, and mammals. The potential for adverse risk also exists for terrestrial invertebrates and plants from use of abamectin. The RQ values did not exceed the listed LOC for aquatic plants, but data for only two of the five recommended species were submitted, and there are technical issues with the submitted data.

<u>Aquatic Organisms</u>

<u>Acute</u>

Non-Listed Species

- There were no acute non-listed LOC exceedances for either freshwater or estuarine/marine fish.
- RQ values did exceed the acute non-listed LOC of 0.5 for estuarine/marine invertebrates for all crops (RQs 1.45-32.6), and for freshwater aquatic invertebrates from abamectin use on apples, celeriac, citrus, cotton, cucurbit, fruiting and leafy vegetables, grapes and potatoes.

Listed Species

- There were no acute listed LOC exceedances for estuarine/marine fish for any crop scenario.
- The acute freshwater and estuarine/marine invertebrate RQ values exceed the Agency's acute listed LOC of 0.05 for all crop scenarios (RQs 0.085-1.91 for freshwater and 1.45-32.6 for estuarine/marine).
- The acute freshwater fish RQ values exceed the Agency's acute listed LOC for abamectin application to apples, celeriac, citrus, cotton, cucurbit, fruiting and leafy vegetables, grapes, and potatoes (RQs 0.087-0.203).
- RQ values for aquatic plants did not exceed the listed or non-listed LOC. However, data for only two of the five required species was available for review. In addition, submitted studies were conducted as nominal concentrations with the use of a potential photosensitizing solvent; therefore, risk may be underestimated.

<u>*Chronic*</u>

- The chronic RQ values for fish did not exceed the LOC for any crop scenario.
- Chronic freshwater and estuarine/marine invertebrate RQ's exceed the chronic LOC (1.0) for all crop scenarios (RQs 3.83-94.0 for freshwater and 65.7-1611 for estuarine/marine).
- The life-cycle toxicity test with the *Daphnia magna* resulted in a reproductive NOAEC of 0.030 µg ai/L which was the lowest concentration tested, but the adults in the two lowest treatment groups were observed to be pale and smaller compared to the controls (MRID 00153570) and length and weight were not measured. Therefore, the reproductive NOAEC appears to underestimate the true no-effect concentration for Daphnia from chronic exposure to abamectin, as the NOAEC appears to be lower than 0.030 µg ai/L which may be underestimating risk. Therefore, an extrapolated NOAEC value, based on an acute to chronic ratio using the mysid shrimp toxicity data

<u>Terrestrial Organisms</u>

<u>*Acute*</u>

Non-Listed Species

- The acute dose-based and dietary-based RQ values for birds and dose-based RQ values for mammals did not exceed the non-listed LOC of 0.5 for any crop scenario. However, regurgitation was observed in all the mallard duck acute oral treatment groups, therefore, the reported acute oral LD_{50} might be underestimating toxicity.

Listed Species

- The avian acute dietary-based RQ values did not exceed the acute listed LOC of 0.1 for any crop scenario.
- The acute avian dose-based RQ values exceed the acute listed LOC for small birds feeding on small and tall grass, broadleaf plants and small insects for all

crop scenarios, except for tall grasses for cotton, grapes and hops, and the LOC was exceeded for medium birds consuming short grasses for all crops except cotton, grapes and hops (RQs 0.10-0.30).

- Since birds are surrogates for reptiles and land-phase amphibians, the potential for direct effects may exist for these taxa as well.
- Acute dose-based RQ values exceeded the LOC for small and medium mammals consuming short and tall grass, broadleaf plants and small insects for all crops, except for medium mammals consuming tall grass for cotton, grapes and hops (RQs 0.11-0.38).
- The acute dose-based listed LOC was also exceeded for large mammals feeding on short grasses for all crop scenarios and broadleaf plants and small insects for abamectin application to celeriac, cucurbit, fruiting and leafy vegetables, herbs and potatoes (RQs 0.10-0.17).
- There are no data regarding the toxicity of abamectin to terrestrial plants, therefore RQ values were not calculated. Due to the lack of data, and reported incidences for almonds and grapes indicated possible plant injury due to abamectin, risk can not be precluded.
- Abamectin is highly toxic to the honeybee. Calculated EECs were greater than the honeybee acute contact toxicity value, and there was an incidence reported that indicated honeybee mortality from abamectin use on avocados. Therefore, the proposed abamectin use is expected to be toxic to terrestrial invertebrates and beneficial insects.

Chronic

- Chronic dose-based and dietary-based RQ values exceed the Agency's chronic LOC (1.0) for mammals feeding on short and tall grass, broadleaf plants and small insects (RQs 5.74-42.64 for dose-based and 1.45-4.92 for dietary based).
- Chronic dose-based RQ values also exceeded the LOC for small and medium mammals consuming fruits, pods or large insects for all crops and for large mammals from abamectin use on celeriac, cucurbit, fruiting and leafy vegetables, herbs and potatoes (RQs 1.22-2.67).
- No chronic dietary-based RQ values exceeded the chronic LOC for mammals consuming fruits, pods, seeds, or large insects or for seeds on a chronic dose basis.
- Chronic risk to birds is not expected as the calculated EECs are lower than the highest concentration tested in the mallard reproduction study.

Table 1. Potential Risks to Nonlisted and Listed Species Associated with Direct or Indirect Effects from the Proposed Application of abamectin for use on Crops

Taxonomic Group	Effects Endpoint	Direct Effects		Indirect Effects to Listed Species	
		Non-listed	Listed	Potential	Indirect Effects Due to Direct Effect to:[2]
Dicot terrestrial plants	Survival and Growth	Data not available, risk can not be precluded		Yes	Mammals and birds

Taxonomic Group	Effects Endpoint	Direct Effects		Indirect Effects to Listed Species	
		Non-listed	Listed	Potential	Indirect Effects Due to Direct Effect to:[2]
Monocot terrestrial plants	Survival and Growth	Data not available, risk can not be precluded		Yes	Mammals and birds
Mammals	Acute oral dose: mortality Chronic: growth and survival of offspring	Acute: No Chronic: Yes	Acute: Yes Chronic: Yes	Yes	Terrestrial plants, terrestrial insects
Birds[2]	Acute oral dose: mortality Chronic: growth & reproduction	Acute: No Chronic: No	Acute: Yes Chronic: No	Yes	Terrestrial plants, terrestrial insects
Terrestrial invertebrates	Acute contact: mortality	Acute: Yes	Acute: Yes	Yes	Terrestrial plants, birds
Freshwater Fish	Acute dose: mortality Chronic: growth & survival	Acute: No Chronic: No	Acute: Yes Chronic: No	Yes	Freshwater invertebrates, terrestrial plants
Freshwater Invertebrates	Acute dose: mortality Chronic: growth & reproduction	Acute: Yes Chronic: Yes	Acute: Yes Chronic: Yes	Yes	Freshwater fish, birds, terrestrial plants
Estuarine-marine fish	Acute dose: mortality Chronic: growth & survival	Acute: No Chronic: No[3]	Acute: No Chronic: No[3]	Yes	Estuarine/marine invertebrates, terrestrial plants
Estuarine-marine Invertebrates	Acute dose: mortality Chronic: survival	Acute: Yes Chronic: Yes	Acute: Yes Chronic: Yes	Yes	Birds, terrestrial plants
Aquatic Vascular Plants	Growth[4]	Acute: No Chronic: No	Acute: No Chronic: No	Yes	Birds, terrestrial plants
Aquatic Non-Vascular Plants	Growth[4]	Acute: No Chronic: No	Acute: No Chronic: No	Yes	Freshwater & estuarine/marine invertebrates, terrestrial plants

[1] Direct effects to species may result in indirect effects to other species by changing availability of prey, habitat, and other factors important to survival and reproduction.

[2] Since birds are surrogates for reptiles and land-phase amphibians, potential risk to these groups may occur due to direct effects to birds.

[3] RQ value calculated using ACR using freshwater fish chronic NOAEC and LC50 value.

[4] Studies conducted as nominal concentrations with the use of a potential photosensitizer solvent, so risk may be underestimated.

1.5 Key Uncertainties and Data Gaps

1.5.1 Key Uncertainties

- A number of the acute toxicity tests were conducted as nominal concentration static studies and were above the reported solubility limit for abamectin (7.8 µg/L in distilled water (MRID 47051904) and <1.0 µg/L in tap water (D235416)). In addition, the studies were conducted with acetone which is a potential photosensitizer, and abamectin has an aqueous photolysis half-life of 12 hours. Therefore, the use of acetone may have contributed to possible degradation of abamectin in the test solutions especially in the aquatic plant studies. Overall, the dissolved bioavailable concentration of abamectin in these toxicity tests is unknown. Risk quotients calculated from these values may underestimate risks. The acute static daphnia study was also conducted using nominal concentrations. The current OPPTS 850.1075 (acute fish) guideline states that there must be evidence that test concentrations remained at least 80 percent of the nominal concentrations throughout the test or that mean measured concentrations are an accurate representation of exposure levels. The OPPTS 850.1010 (acute daphnia) guideline indicates that the concentration of the test chemical in the chambers should be measured as often as is feasible during the test. Also, the 850.5400 (algal toxicity) indicates the concentration of test chemical in the test containers is to be determined at the beginning and end of the definitive test by standard analytical methods which have been validated prior to the test. Since test solutions were not measured in the acute fish, daphnia, oyster and aquatic plant studies, the actual bioavailable abamectin concentration these organisms were exposed to is not known which increases the uncertainty of the toxicity values. Therefore, it is recommended that the acute fish (rainbow trout, bluegill, and sheepshead minnow), daphnia, oyster, and aquatic plant (duckweed and green algae) studies be repeated under current guidance which would involve the measurement of dissolved (bioavailable) abamectin in the test solutions.

- The registrant submitted *Daphnia magna* chronic life-cycle study with abamectin did not measure growth in the parental generation at the end of the study (total length or dry weight) (MRID 00153570). The current no-effect concentration is the lowest concentration tested based on survival. The study does indicate that at test termination, the surviving adult daphnia in the two lowest treatment groups were pale and appeared smaller compared to the controls which may suggest that the actual no-effect concentration is less than the lowest treatment group tested. Risk quotients calculated from the current no adverse effect concentration may underestimate risk. The current OPPTS 850.1300 guideline states that growth for each surviving adult should be determined (total body length or dry weight, or both). It is preferred that both measures be taken. Therefore, it is recommended that the chronic Daphnia magna life-cycle study be repeated. Since the actual no-effect concentration may be less than the lowest treatment group tested, the acute and chronic toxicity values from the mysid shrimp studies were used to calculate an acute to chronic ration for the daphnia. This ratio was used to determine a chronic no-effect concentration for the daphnia and was used to calculate risk quotients which may be overestimating or underestimating risk.

- In the registrant submitted mysid chronic toxicity study with abamectin, reproduction in the solvent control was statistically significant compared to the negative control which may indicate that the solvent may have interfered with the integrity of the test. In the study, reproduction in the treatment groups was compared to the solvent control, but current EFED policy is to compare to the negative control regardless if the controls are statistically different. Comparison of reproduction resulted in a lower no-effect concentration than previously reported, and the lower no-effect concentration was used in this assessment.

- An early life-cycle study for estuarine-marine fish with abamectin was not available. Therefore, the acute and chronic toxicity values from the rainbow trout studies were used to develop an acute to chronic ratio for the sheepshead minnow. This ratio was used to determine a chronic no-effect concentration for the sheepshead and was used to calculate risk quotients which may overestimate or underestimate risk.

- Regurgitation was observed in all the mallard duck acute oral treatment groups, therefore, the reported acute oral LD_{50} might be underestimating toxicity.

- The label states that for a number of crops (celeriac, cucurbit, fruiting vegetable, leafy vegetable, mint and potatoes (for potato psyllid) not to make more than two sequential applications of Agri-Mek SC or any other foliar applied abamectin containing product, but the maximum seasonal amount allowed for these crops is greater than two applications at the maximum single application rate. The application interval for these crops is 7 days, and the label does not state how long to wait between the second sequential application and subsequent applications. Also, the maximum amount allowed per season for these crops, except mint, is slightly less (0.001 lb ai/A) than the amount applied using three applications at the maximum single application rate. Since the label does not specifically state the interval between the second sequential application and subsequent applications, three applications at seven day intervals using the maximum seasonal rate divided by three was modeled for environmental exposure.

- For application to herbs, the label states not to make more than two applications of Agri-Mek SC per single cutting (harvest), but the maximum amount allowed per cropping season is greater than two applications at the maximum single application rate but slightly less than three applications at the maximum single application rate. Therefore, environmental exposure concentrations were modeled in the same manner as discussed above.

- For application to almonds, walnuts, apples, avocados, citrus, pears, plums and prunes, the label states that for the maximum amount per season, not to apply more than 8.5 fl oz/A (or 0.047 lb ai/A) of Agri-Mek SC or any other foliar applied abamectin containing product in a growing season. Based on the density of the formulation, 8.5 fl oz/A calculates to 0.04648 lb ai/A, therefore, it is not known if the reported 0.047 lb ai/A is a rounding issue or if another abamectin product can be applied at 0.001 lb ai/A. In addition, the single maximum application rate reported is 0.023 lb ai/A, and two applications would be 0.046 lb ai/A. For this assessment, abamectin was modeled at 0.0235 lb ai/A (0.047 divided by two applications). Abamectin was also modeled at 0.023 lb ai/A which resulted in the same LOC exceedances as the 0.0235 lb ai/A application.

- The maximum seasonal application rate for cotton, potatoes (for Colorado potato beetle) and grapes on the label is reported as 0.038 lb ai/A, but the label also indicates not to apply more than 6.75 fl oz/A of Agri-Mek SC per season which calculates to 0.0369 (0.037) lb ai/A. The maximum single application rate for cotton, potatoes and grapes is 0.019 lb ai/A, and if applied twice per season, the maximum seasonal application rate would be 0.038 lb ai/A. Therefore, a maximum seasonal application rate of 0.038 lb ai/A was used for determining environmental exposure concentrations.

- EFED believes that the inclusion of the suggested buffer zone of (25 ft, for ground application; and 150 ft for aerial application) will not appreciably change the outcome of the risk assessment.

1.5.2 Data Gaps

This assessment is potentially underestimating risk to both terrestrial and aquatic organisms from exposure to abamectin. This potential underestimation is due to a lack of available toxicity data as well as technical issues with the data submitted for some species. Therefore, the following toxicity studies are requested.

- OPPTS 850.1400- Early Life-Stage Toxicity Test. There are no chronic toxicity data available for the Agency to assess chronic risk of abamectin to estuarine/marine fish.

- OPPTS 850.4225 – Seedling Emergence, Tier II and OPPTS 850.4250 – Vegetative Vigor, Tier II. Seedling emergence and vegetative vigor toxicity data are not available for terrestrial plants.

- OPPTS 850.2300 - Avian reproduction Study. A reproduction study with bobwhite quail is not available.

- OPPTS 850.2100 - Acute Oral Toxicity with a Passerine Bird. An acute oral toxicity study with a passerine bird is not available. No species recommended at this point. Protocol should be submitted prior to test initiation.

- Whole Sediment Toxicity Test: Chronic Invertebrates Freshwater and Marine. Based on the physiochemical properties, abamectin may sorb to organic materials in sediment and may be toxic to organisms that dwell in and ingest sediment as abamectin is very highly toxic to other aquatic invertebrates. Since abamectin is a foliar application, spray drift to both freshwater and estuarine-marine environments is possible. The concentration of abamectin in water from spray drift from ground or aerial application is greater than the acute EC_{50} value for the estuarine/marine mysid shrimp. 40 CFR Part 158.630 requires a chronic freshwater sediment study if the half-life is greater than or equal to 10 days and any of the following conditions exist: i. Kd $\geq$ 50, ii. the log Kow $\geq$ 3, or iii. the Koc$\geq$ 1000. Abamectin meets these criteria. A protocol should be submitted to the Agency for review prior to testing.

- OPPTS 850.1075 – Fish Acute Toxicity Test, freshwater and marine; 850.1010-Aquatic Invertebrate Acute Toxicity test with Daphnia; 850.1025 or 1055 – Oyster Acute Toxicity Test (shell deposition) or Bivalve Acute Toxicity Test (embryo-larvae). The registrant submitted test were conducted as static tests that were conducted above the reported water solubility, conducted using a potential photosensitizing solvent and test concentrations were not measured. As a result, the actual test concentrations (dissolved bioavailable abamectin) are not known which may be underestimating risk. Therefore, a new acute toxicity study for a coldwater and warmwater freshwater fish, estuarine-marine fish and *Daphnia magna* is requested. An oyster shell deposition or a bivalve embryo-larvae toxicity study is also requested.

- OPPTS 850.1300 – Daphnia Chronic Toxicity Test. The registrant submitted chronic daphnia toxicity test did not measure growth for the surviving adults at test termination. The study indicates that the surviving daphnia in the two lowest concentrations tested were pale and smaller than the control. Measurement of growth is required under the current guidance. Therefore, a new study is requested.

- OPPTS 850.5400 – Algal Toxicity and 850.4400 Aquatic Plant Toxicity Test using Lemna spp. There are limited studies (data on two of the five species available (duckweed and a green alga study)) addressing the toxicity of abamectin to aquatic plants; the studies conducted with duckweed and green algae were conducted above solubility, with a potential photosensitizing solvent, and test concentrations were not measured. Abamectin toxicity studies with a marine diatom, freshwater diatom and blue-green algae are requested as well as new studies for the green algae and duckweed.

- Submitted field dissipation studies are unacceptable; therefore, the behavior of abamectin in the field as compared to the laboratory cannot be demonstrated. In most cases we would expect dissipation in the field to be greater than that predicted by laboratory studies due to pesticide transport.

2.0 Problem Formulation

2.1 Nature of Regulatory Action

This ecological risk assessment evaluates the use of the insecticide/miticide abamectin (PC 122804) as a new aqueous suspension concentrate end-use product, Agri-Mek®SC Miticide/Insecticide. The assessment is based on the proposed label use of the new end-use product on almonds, walnuts, apples, avocados, celeriac, citrus, cotton, cucurbit, fruiting vegetables, grapes, herbs, hops, leafy vegetables, mint, pears, plums, prunes and potatoes for control of mites, thrips, leafminers, leafhoppers, psyllids, potato beetles, skeletonizers, and pinworms. The proposed label is listed as a restricted use pesticide and may only be used by certified applicators or persons under their direct supervision, and only for the uses covered by the certified applicator's certificate.

The new end-use product may be applied by ground application and also aerially for some crops, except for in New York. The maximum single application rate ranges from 0.014 to 0.023 lb ai/A, and the maximum seasonal application rate ranges from 0.038 to 0.056 lb ai/A.

2.2 Stressor Source and Distribution

Abamectin (Figure 1) is a fermentation product of the soil fungus, *Streptomyces avermitilis.* Abamectin has been registered since the 1980s as an insecticide/miticide to be used for crop protection in numerous fruit and vegetable crops. Some of the active registrations are under trade names Avid®, Zephyr®, Agri-Mek®, Abamectin, Epi-Mek®, Abacide™, and Abasol™. It is also registered as a treatment for Fire Ants (Varsity™); turf, lawns, and other non-crop areas such as parks and golf courses, and in and around residential, commercial (food and non-food establishments) and industrial structures[1] for Fire Ants, Pharaoh Ants and related ants (Ascend and TC); as an indoor and outdoor ant[2] and insect pest[3] crack and crevice treatment for residential, commercial (food and non-food establishments) and industrial structures[4], and transportation equipment[5] (AVERT® and TC); as an indoor and outdoor bait for ants and pests[6] (Raid Baits); and for use as a cotton and corn seed treatment (Avicta™ 500 F) and as a seed

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[1] Warehouses, hotels, food storage areas, meat packing plants, motels, schools, supermarkets, hospitals and nursing homes

[2] Includes but not limited to acrobat, allegheny, argentine, bigheaded, carpenter, soybeans field, crazy, fire, ghost, harvester, little black, odorous house, pavement, pharaoh, and pyramid

[3] Booklice, carpet bettles, cockroaches, crickets, drugstore beetles, earwigs, flour beetles, grain weevils, pillbugs, and sowbugs

[4] Apartments, campgrounds, garages, food storage areas, homes, hospitals and nursing homes (non-occupied patient ares), hotels, meat packing and food processing plants, motels, resorts, restaurants and other food handling establishments, schools, supermarkets, utilities, warehouses, and other commercial and industrial buildings

[5] Buses, boats, ships, trains, trucks, planes

[6] Roaches, waterbugs, palmetto bugs

treatment for cucurbits and tomatoes (Avicta™ 400 FS) to control nematodes. It is also used as a veterinary antihelmintic (destroys or causes expulsion of parasitic intestinal worms).

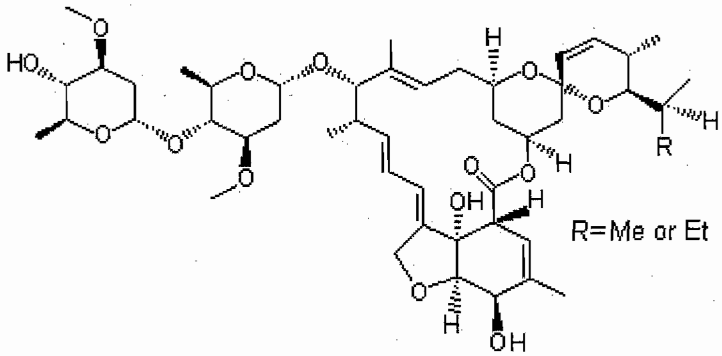


Figure 1. Chemical Structure of Abamectin

The proposed registration action is for a new formulation, Agri-Mek® SC Miticide/Insecticide, an aqueous suspension concentrate that contains abamectin (avermectin B1a & B1b), for use on almonds, walnuts, apples, avocados, celeriac, citrus, cotton, cucurbit, fruiting vegetables, grapes, herbs, hops, leafy vegetables, mint, pears, plums, prunes and potatoes for control of mites, thrips, leafminers, leafhoppers, psyllids, potato beetles, skeletonizers, and pinworms. According to the registrant, abamectin is not dissolved in the new end-use product, rather the particles of abamectin are suspended in water. Also, depending on the crop, Agri-Mek SC must be mixed with a horticulture oil (not a dormant oil), non-ionic surfactant, spreading and penetrating surfactant, cucurbit approved adjuvant or organosilicone adjuvant (potatoes only) to avoid the possibility of exceeding established crop tolerances. Agri-Mek SC may be applied by ground application and by aerial application for avocados, cucurbit, fruiting and leafy vegetables, mint, and potatoes and for control of citrus leafminer in citrus fruit (not in California). Aerial application is not approved in New York. Agri-Mek SC can not be applied within 25 ft for ground application or 150 ft for aerial application of lakes, reservoirs, rivers, permanent streams, marshes, pot holes, natural ponds, estuaries or commercial fish farm ponds. In addition, the label restricts cultivation within 25 ft of the aquatic area to allow growth of a vegetative filter strip. The label states not to apply Agri-Mek SC or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

2.2.1 Nature of the Chemical Stressor

The active ingredient abamectin is a mixture of avermectins containing at least 80% avermectin B_{1a} (5-0-demethyl avermectin A_{1a}) and up to 20% avermectin B_{1b} (5-0-demethyl-25-de(1-methylpropyl)-25-(1-methylethyl) avermectin A_{1a}).

Abamectin acts as a chlorine channel agonist in invertebrates (Fritz, *et al.*, 1979, Mellin *et al.*, 1983 and Arena *et al.*, 1991 in Sherma and Cairns, 1993), and may function as a gamma-aminobutyric acid (GABAergic) agonist (Kass et al., 1980, 1984 in Sherma and Cairns, 1993). It acts by stimulating the release of gamma-aminobutyric acid, an inhibitory neurotransmitter, thus causing paralysis (Tomlin, 1994). The difference in toxicity between invertebrates and mammals may be partially due to different distribution of the GABAergic neurons (Turner and Schaeffer, 1989 in Sherma and Cairns, 1993).

2.2.2 Proposed Label Crop Use Rates

The new end-use product may be applied by ground application and also aerially for some crops, except for in New York. The maximum single application rate ranges from 0.014 to 0.023 lb ai/A, and the maximum seasonal application rate ranges from 0.038 to 0.056 lb ai/A. Agri-Mek SC must be mixed with a horticulture oil (not a dormant oil), non-ionic surfactant, spreading and penetrating surfactant, cucurbit approved adjuvant or organosilicone adjuvant (potatoes only) to avoid the possibility of exceeding established crop tolerances.

There are a few uncertainties regarding the label language in terms of maximum seasonal application rate and application intervals:

- The label states that for a number of crops (celeriac, cucurbit, fruiting vegetable, leafy vegetable, mint and potatoes (for potato psyllid) not to make more than two sequential applications of Agri-Mek SC or any other foliar applied abamectin containing product, but the maximum seasonal amount allowed for these crops is greater than two applications at the maximum single application rate. The application interval for these crops is 7 days, and the label does not state how long to wait between the second sequential application and subsequent applications. Also, the maximum amount allowed per season for these crops, except mint, is slightly less (0.001 lb ai/A) than the amount applied using three applications at the maximum single application rate. Since the label does not specifically state the interval between the second sequential application and subsequent applications, three applications at seven day intervals using the maximum seasonal rate divided by three was modeled for environmental exposure.
- For application to herbs, the label states not to make more than two applications of Agri-Mek SC per single cutting (harvest), but the maximum amount allowed per cropping season is greater than two applications at the maximum single application rate but slightly less than three applications at the maximum single application rate. Therefore, environmental exposure concentrations were modeled in the same manner as discussed above.
- For application to almonds, walnuts, apples, avocados, citrus, pears, plums and prunes, the label states that for the maximum amount per season, not to apply more than 8.5 fl oz/A (or 0.047 lb ai/A) of Agri-Mek SC or any other foliar applied abamectin containing product in a growing season. Based on the density of the formulation, 8.5 fl oz/A calculates to 0.04648 lb ai/A, therefore, it is not known if the reported 0.047 lb ai/A is a rounding issue or if another abamectin product can be applied at 0.001 lb ai/A. In addition, the single maximum application rate reported is 0.023 lb ai/A, and two applications would be 0.046 lb ai/A. For this assessment, abamectin was modeled at 0.0235 lb ai/A (0.047

divided by two applications). Abamectin was also modeled at 0.023 lb ai/A which resulted in the same LOC exceedances as the 0.0235 lb ai/A application.

- The maximum seasonal application rate for cotton, potatoes (for Colorado potato beetle) and grapes on the label is reported as 0.038 lb ai/A, but the label also indicates not to apply more than 6.75 fl oz/A of Agri-Mek SC per season which calculates to 0.0369 (0.037) lb ai/A. The maximum single application rate for cotton, potatoes and grapes is 0.019 lb ai/A, and if applied twice per season, the maximum seasonal application rate would be 0.038 lb ai/A. Therefore, a maximum seasonal application rate of 0.038 lb ai/A was used for determining environmental exposure concentrations.

The maximum single and seasonal application rate, application rate interval and method of application for each of the crops listed in the Agri-Mek SC label is presented below in Table 1.

Table 1. Proposed Application Rates for Crops Listed in Agri-Mek SC Label

Crop	Max. Application rate lbs. a.i./A	No. Applications	Max. Seasonal Application rate lb ai/A[1]	Application Interval (days)	Application Method[3]
Almonds & Walnuts	0.023	2	0.047 (Max seasonal app of 8.5 fl oz/A)	21	Ground
Apples	0.023	2	0.047 (Max seasonal app of 8.5 fl oz/A)	21	Ground
Avocados	0.023	2	0.047 (Max seasonal app of 8.5 fl oz/A)	30	Ground & Aerial
Celeriac	0.019	*[2]	0.056 (Max seasonal app of 10.25 fl oz/A)	7	Ground
Citrus (calamondin, citrus citron, citrus hybrids, grapefruit, kumquat, lemon, lime, mandarin, sour orange, sweet orange, pummelo, Satsuma mandarin)	0.023	3	0.047 (Max seasonal app of 8.5 fl oz/A)	30	Ground; Aerial (citrus leafminer, not in CA)
Cotton	0.019	Not Reported	0.038 (reported on	21	Ground & Aerial

			label) (Max seasonal app of 6.75 fl oz/A)		
Cucurbits (Chayote, chinese waxgourd, citron melon, cucumber, gherkin, edible gourd, momordica spp, muskmelon, pumpkin, summer and winter squash, watermelon)	0.019	*[2]	0.056 (Max seasonal app of 10.25 fl oz/A)	7	Ground & Aerial
Fruiting Vegetables (eggplant, groundcherry, pepino, peppers, tomatillo, tomato)	0.019	*[2]	0.056 (Max seasonal app of 10.25 fl oz/A)	7	Ground & Aerial
Grapes	0.019	Not Reported	0.038 (reported on label) (Max seasonal app of 6.75 fl oz/A)	21	Ground & Aerial
Herb Crop Subgroup (except chives)	0.019	2 (per single cutting)	0.056 (Max seasonal app of 10.25 fl oz/A)	7	Ground
Hops (not in CA)	0.019	2	0.038	21	Ground
Leafy vegetables (amaranth, arugula, cardoon, celery, celtuce, chervil, chinese celery, chrysanthemum edible, corn salad, cress, dandelion, dock, endive, fennel, lettuce, New Zealand spinach, orach, parsley, purslane, radicchio, rhubarb, spinach, Swiss chard)	0.019	*[2]	0.056 (Max seasonal app of 10.25 fl oz/A)	7	Ground & Aerial
Mint	0.014	*[2] only 3 per season	0.042 (Max seasonal app of 7.75 fl oz/A)	7	Ground & Aerial
Pears (including Oriental pear trees)	0.023	2	0.047 (Max seasonal app of 8.5 fl oz/A)	21	Ground
Plums and Prunes	0.023	2	0.047 (Max seasonal app of 8.5 fl oz/A)	21	Ground
Potatoes	0.019	*[2]	0.038;	7	Ground &

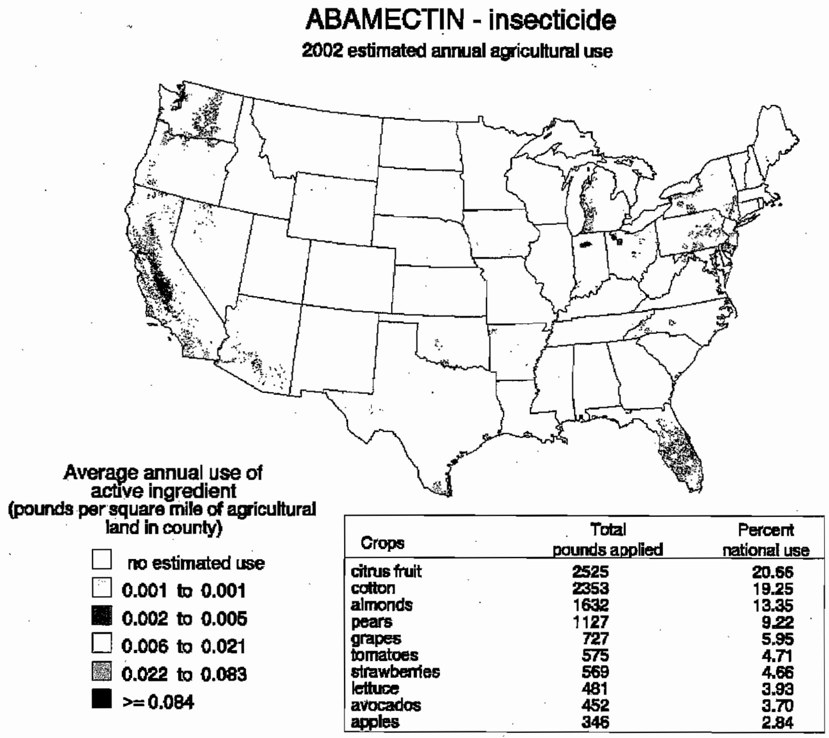
			0.056 (Max seasonal app of 6.75fl oz/A for CO beetle, 10.25 fl oz/A for leafminer		Aerial

[1] One gallon of Agri-Mek SC contains 0.7 lb abamectin
[2] * = label states not to make more than 2 sequential applications of Agri-Mek SC or any other foliar applied abamectin containing product.
[3] Aerial application not approved in New York.

2.2.3 Overview of Pesticide Use

The current proposed registration is for the new end-use product Agri-Flex for use on almonds, walnuts, apples, avocados, celeriac, citrus, cotton, cucurbit, fruiting vegetables, grapes, herbs, hops, leafy vegetables, mint, pears, plums, prunes and potatoes. Abamectin is currently registered for use on these crops, except cotton, using the emulsifiable concentrate end-use product Agri-Mek 0.15 EC (EPA Reg. # 100-898) which was first registered in 1989.

Data are available which display the estimated annual use of abamectin (Figure 2).



Crops	Total pounds applied	Percent national use
citrus fruit	2525	20.66
cotton	2353	19.25
almonds	1632	13.35
pears	1127	9.22
grapes	727	5.95
tomatoes	575	4.71
strawberries	569	4.66
lettuce	481	3.93
avocados	452	3.70
apples	346	2.84

Figure 2 Estimated use of abamectin in 2002 (USGS)

2.2.4 Environmental Properties of Abamectin

A summary of the physical and chemical properties are listed in Table 2. Based on fate properties and application methods, it is expected that abamectin will persist long enough to be available for transport to non-target environments. However, strong sorption to soil is expected to significantly reduce concentrations in the water column and in runoff water.

The results from reviewed studies indicate that abamectin should undergo rapid photodegradation (half-life <1 day) on the soil surface and in clear, shallow surface water. Photodegradation is not likely to be significant where abamectin is incorporated or under canopy. In addition, in most surface waters, suspended sediments and lack of mixing would decrease the rate of photodegradation. In natural waters, abamectin residues are expected to be associated with the sediment, reducing aqueous concentrations. Abamectin slowly biodegrades in soil (90% upper confidence bound of mean half-life = 80.6 days). Abamectin is stable to hydrolytic degradation. Due to its low vapor pressure (1.5×10^{-9} Torr); it is not likely that volatilization will be a transport process for abamectin.

Abamectin is nearly insoluble in water (7.8 ppb at pH 9 in distilled water; <1 ppb in tap water (D235416)). Laboratory studies indicate that abamectin has moderate to low mobility (K_{ads} = 9.7 to 160 mg kg^{-1}); adsorption was correlated with soil organic matter content. Submitted field dissipation studies are unacceptable; therefore, EFED can not determine if the behavior of abamectin in the laboratory is demonstrated in the field. Based upon the laboratory data, ground water effects are expected to be minimal. Surface water contamination could occur from runoff events that occur soon after application.

Table 2 Physical and Chemical Properties of Abamectin

	Value	Source
Common name	Abamectin, Avermectin	
Pesticide type	Insecticide, Acaricide, Nematicide	
CAS number	71751-41-2	
Empirical formula	$C_{48}H_{72}O_{14} + C_{47}H_{70}O_{14}$	
Molecular mass (g/mol)	866.6	
Vapor pressure (Torr)	1.5×10^{-9}	MRID# 47051904
Henry's Law Constant (atm-m^3/mol)	2.6×10^{-8}	MRID# 47051904
Solubility in water (µg/L)	7.8 (distilled water); <1 (tap water)	MRID# 47051904; D235416
Log Kow	4.4 at 25°C (pH aqueous phase 7.2)	MRID# 47051904
pK_a	No pKa in aqueous solutions in the range of 1-12	MRID# 47051904

2.3 Receptors

2.3.1 Aquatic and Terrestrial Effects

In order for a chemical to pose an ecological risk, it must reach ecological receptors in biologically significant concentrations. An exposure pathway is the means by which a contaminant moves in the environment from a source to an ecological receptor. For an ecological exposure pathway to be complete, it must have a source, a release mechanism, an environmental transport medium, a point of exposure for ecological receptors, and a feasible route of exposure. In addition, the potential mechanisms of transformation (i.e., which degradates may form in the environment, in which media, and how much) must be known, especially for a chemical whose metabolites/degradates are of greater toxicological concern. The assessment of ecological exposure pathways, therefore, includes an examination of the source and potential migration pathways for constituents, and the determination of potential exposure routes (e.g., ingestion, inhalation, and dermal absorption).

Ecological receptors that may potentially be exposed to abamectin on-field or off-field from spray drift or run-off include terrestrial wildlife (i.e., invertebrates, mammals, birds, and reptiles), and terrestrial and semi-aquatic plants. In addition to terrestrial ecological receptors, aquatic receptors (e.g., freshwater and estuarine/marine fish and invertebrates, amphibians, aquatic plants) may also be exposed to potential migration of pesticides from the site of application to various watersheds and other aquatic environments via runoff and drift.

Consistent with the process described in the Overview Document (EPA, 2004), this risk assessment uses a surrogate species approach in its evaluation of the proposed new end-use product of abamectin. Data generated from surrogate test species, which are intended to be representative of broad taxonomic groups, are used to extrapolate to potential effects on a variety of species (receptors) included under these taxonomic groupings.

A summary of the assessment and measurement endpoints selected to characterize potential ecological risks associated with exposure to abamectin is provided in Table 3.

Table 3. Measures of Ecological Effects and Exposure for Abamectin

Assessment Endpoint		Selected Surrogate Species and Measure of Ecological Effect[1]	Measures of Exposure
Birds[2]	Acute Survival	Mallard (*Anas platyrhynchos*) acute oral LD_{50} (most sensitive avian acute oral LD_{50})	Maximum residues on dietary food items (dietary Estimated Environmental Concentrations (EEC))
	Survival, reproduction and growth	Mallard (*A. platyrhynchos*) Reproduction NOAEC (no statistical effects noted at highest concentration tested) (single study available)	
Mammals	Acute Survival	Lab Rat (*Rattus norvegicus*) acute oral LD_{50} (most sensitive acute oral study)	
	Survival, reproduction and growth	Lab Rat (*Rattus norvegicus*) 2-generation reproductive NOAEC (based on increased retinal folds, increased dead pups at birth, decreased viability and lactation indices, decreased pup body weight) (most sensitive reproduction NOAEC)	
Terrestrial Invertebrates	Acute Survival	Honey Bee (*Apis millefera*) acute contact study (single study available)	µg abamectin /Animal
Freshwater fish[3]	Acute Survival	Rainbow Trout (*Oncorhynchus mykiss*) 96-h LC_{50} (most sensitive 96-h fish acute LC_{50})	Surface water peak concentration (EEC)[4]
	Survival, reproduction[5] and growth	Rainbow Trout (*Oncorhynchus mykiss*) Early Life-Stage NOAEC (wet weight) (single freshwater vertebrate early life-cycle study available)	Surface water 60-d average concentration (EEC)[4]
Freshwater invertebrates	Acute Survival	Water Flea (*Daphnia magna)* 46-h EC_{50} (most sensitive freshwater invertebrate 48-h EC_{50} or 96-h LC_{50})	Surface water peak concentration (EEC)[4]
	Survival, reproduction[5] and growth	Water Flea (*D. magna)* Life cycle NOAEC (reproduction) (single freshwater invertebrate life cycle study available)	Surface water 21-d average concentration (EEC)[4]
Estuarine/ marine fish	Acute Survival	Sheepshead Minnow (*Cyprinodon variegatus*) 96-h LC_{50} (single estuarine/marine fish acute 96-h LC_{50} available)	Surface water peak concentration (EEC)[4]
	Survival, reproduction[5] and growth	No data available; used acute to chronic ratio using rainbow trout data	Surface water 60-d average concentration (EEC)[4]
Estuarine/ marine invertebrates	Acute Survival	Mysid Shrimp (*Americamysis bahia)* 96-h EC_{50} (most sensitive estuarine/marine acute 96-h LC_{50} or IC_{50} available)	Surface water peak concentration (EEC)[4]
	Survival, reproduction and growth	Mysid Shrimp (*A. bahia)* Life cycle NOAEC (reproduction) (single estuarine/marine life cycle study available)	Surface water 21-d average concentration(EEC)[4]
Aquatic plants	Biomass and Growth Rate	Vascular plant Duckweed (*Lemna gibba*) 14 day IC_{50} (single vascular aquatic plant study available)	Surface water peak concentration (EEC)[4]
	Biomass and Growth Rate	Nonvascular plant Freshwater alga (*Selenastrum capricornutum*) 9 day EC_{50} (single alga study available)	

LD_{50} = Lethal dose to 50% of the exposed test population; NOAEC = No observed adverse effect concentration; NOAEL = No observed adverse effect level; LC_{50} = Lethal concentration to 50% of the exposed test population; EC_{50} = Effect concentration to 50% of the test population; IC_{50}= inhibition concentration resulting in a 50% inhibition in the test population response (e.g., growth rate, biomass)

[1]Values listed in this table represent the most sensitive study result within the taxonomic group and for the measurement endpoint identified to evaluate attribute changes.

[2] Birds represent surrogates for amphibians (terrestrial-phase) and reptiles.

[3] Freshwater fish are used here as surrogates for amphibians (aquatic-phase).

[4] One in 10-year return frequency.

[5] Sensitive early-life stage embryo development, hatching success, and survival and growth of the young are used as a measure of reproduction success.

2.3.2 Incident Database Review

A review of the Ecological Incident Information System (EIIS, version 2.1), which is maintained by the Agency's Office of Pesticide Programs, and the Avian Monitoring Information System (AIMS), which is maintained by the American Bird Conservancy, indicates a total of seven reported ecological incidents associated with the use of abamectin, which are summarized below.

All of the abamectin reported incidents occurred between 1998 and 2003. Two of the abamectin incidents involved aquatic animals, one involved terrestrial animals, and four involved plants. The certainty categories on the likelihood that the use of abamectin caused the seven incidents ranged from possible (4 incidents) to probable (3 incidents). The incidents were considered registered uses at the time of the incident. The one incident with the bees was from the Section 18 use of abamectin for avocados in California. One of the incidents involved an additional chemical besides abamectin. Six reported incidents for abamectin involved uses that are currently Section 3 registrations (almonds, grapes, citrus, and fire ant control). In the report for the incident with the Section 18 for avocados in California, it was reported that the abamectin was not being applied in accordance with the label. The reported incidents associated with the six currently registered uses had certainty categories of possible and probable. A summary of the reported incidences are listed in Appendix A.

According to Office of Pesticides Program Ecological Incident Information System (EIIS), seven incident reports exist in EFED's database. Three of the incidents occurred in June 1998 from direct application of Agri-Mek to almonds in California (I007644-001, 002, 003). The type of injury to the almonds was not reported, but was reported to occur to all applied (34-106 acres). Agri-Mek was applied directly to 34 acres of grapes in June 2000 in California, with all 34 acres affected (I10837-019). They type of injury was not reported, and in the report, the inspector stated "Questionable" in regards to the question "Application within Label". There were two incidents involving freshwater fish. The first incident occurred in April 2000 in Texas, where 100 catfish died two days after 1/8 of a pound of both the pesticide Ascend Fire Ant Stopper (abamectin) and Award (fenoxycarb) were applied to areas around the pond (I010221-001) was reported. The next day one to one and a half inches of rain fell. No other fish species in the pond were observed to be affected. The second fish incident occurred in June 2003 in Florida where a citrus grove was treated with Agri-Mek less than 25 feet from a lake in the morning and then it rained in the afternoon (I014237-001). One week after the application, the reported indicated that "tons" of dead small bait fish were observed around the pond edges. The last incident involved the spraying of abamectin (Agri-Mek) to avocados in California (I008611-001) under a Section 18 label in April 1999. Southern California beekeepers indicated that the abamectin was aerially sprayed during the daytime during full bloom which was not consistent with favored County instructions. They indicated that it is common to keep bee colonies in avocado fields. The report indicated that 100 colonies were affected.

In addition to the incidents recorded in EIIS and AIMS, additional incidents have been reported to the Agency in aggregated incident reports. Pesticide registrants report certain types of incidents to the Agency as aggregate counts of incidents occurring per product per quarter. Ecological incidents reported in aggregate reports include those categorized as 'minor fish and wildlife' (W-B), 'minor plant' (P-B), and 'other non-target' (ONT) incidents. 'Other non-target' incidents include reports of adverse effects to insects and other terrestrial invertebrates. For abamectin, registrants have reported one minor fish and wildlife incident and four other non-target incidents. Unless additional information on this aggregated incident becomes available, it will be assumed to be representative of registered uses of abamectin in the risk assessment.

A major incident report for abamectin has not been received by the Agency since 2003 and twelve incidents total (7 major and 5 minor) have been reported to the Agency. Incident reports for non-target organisms typically provide information only on mortality events and plant damage. Sublethal effects in organisms such as abnormal behavior, reduced growth and/or impaired reproduction are rarely reported, except for phytotoxic effects in terrestrial plants. EPA's changes in the registrant reporting requirements for incidents in 1998 may account for a reduced number of reported incidents. Registrants are now only required to submit detailed information on 'major' fish, wildlife, and plant incidents. Minor fish, wildlife, and plant incidents, as well as all other non-target incidents, are generally reported aggregately and are not included in EIIS. In addition, there have been changes in state monitoring efforts due to a lack of resources.

2.4 Ecosystems Potentially at Risk

The ecosystems at risk are often extensive in scope, and as a result it may not be possible to identify specific ecosystems during the development of a baseline risk assessment. However, in general terms, terrestrial ecosystems potentially at risk could include the treated field and areas immediately adjacent to the treated field that may receive drift or runoff. Areas adjacent to the treated field could include cultivated fields, fencerows and hedgerows, meadows, fallow fields or grasslands, woodlands, riparian habitats and other uncultivated areas.

Aquatic ecosystems potentially at risk include water bodies adjacent to, or down stream from, the treated field and might include impounded bodies such as ponds, lakes and reservoirs, or flowing waterways such as streams or rivers. For uses in coastal areas, aquatic habitat also includes marine ecosystems, including estuaries.

2.5 Conceptual Model

A conceptual model provides a written description and visual representation of the predicted relationships between abamectin, potential routes of exposure, and the predicted effects for the assessment endpoint. A conceptual model consists of two major components: risk hypothesis and a conceptual diagram (EPA, 1998).

2.5.1 Risk Hypothesis

For abamectin, the following ecological risk hypothesis is being employed for this baseline risk assessment:

> Abamectin, when used in accordance with the label, results in potential adverse effects upon the survival, growth, and reproduction of non-target terrestrial and aquatic organisms.

2.5.2 Conceptual Diagram

For a pesticide to pose an ecological risk, it must reach ecological receptors in toxicologically significant concentrations. An exposure pathway is the means by which the pesticide moves in the environment from a source to reach the receptor. For an ecological exposure pathway to be complete, it must have a source, a release mechanism, an environmental transport medium, a point of exposure for ecological receptors, and a feasible route of exposure. The assessment of ecological exposure pathways, therefore, includes an examination of the source and potential fate and transport pathways for the pesticide, and the determination of potential exposure routes, (*e.g.*, ingestion, inhalation, and dermal contact).

Figure 3 depicts the potential exposure pathways associated with the proposed use of abamectin. The conceptual model generically depicts the potential source of abamectin, release mechanisms, abiotic and biotic receiving media, biological receptors, and attribute changes of potential concern and the measurement endpoints used to evaluate them.

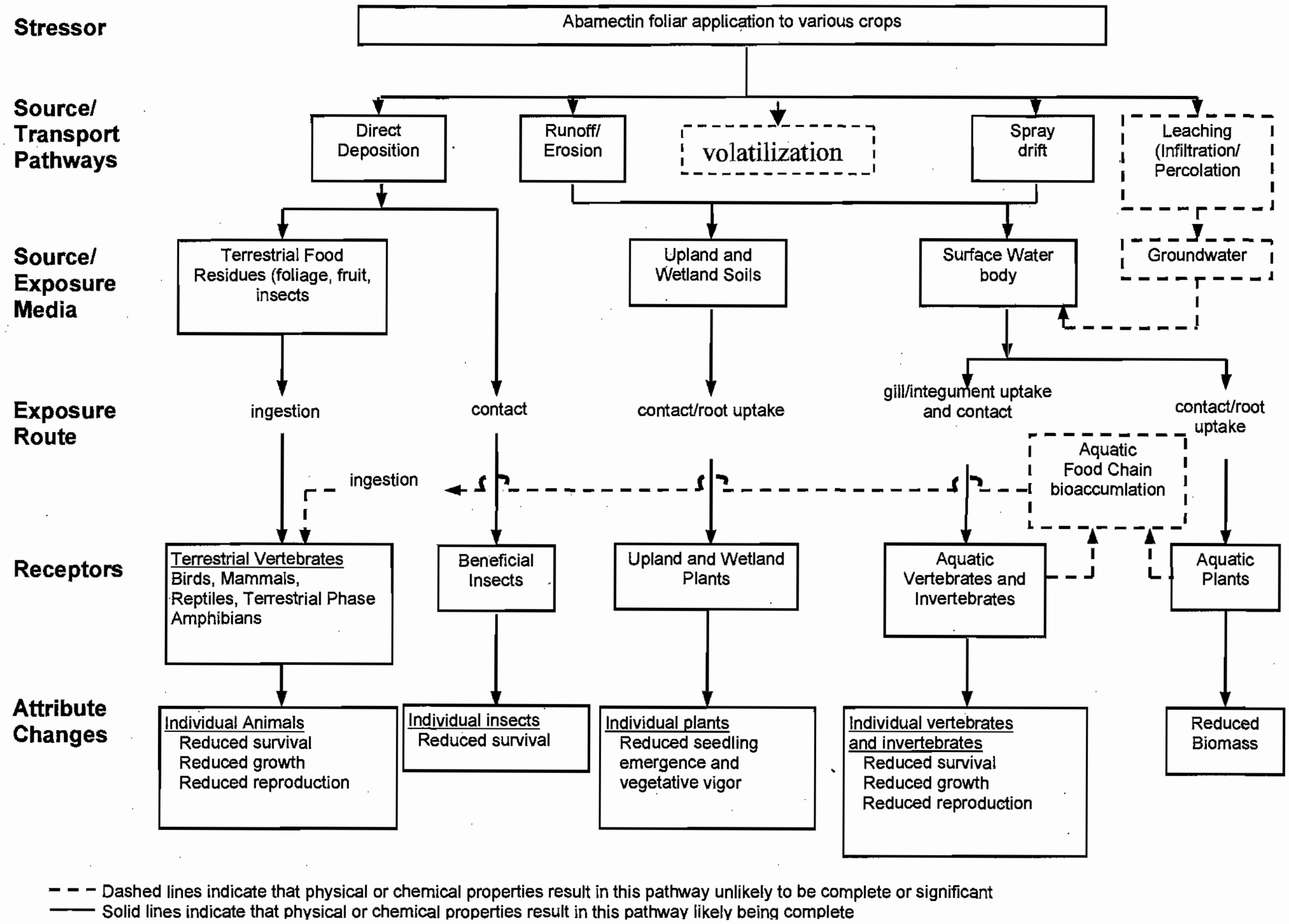


Figure 3 Conceptual diagram for assessment of risks from abamectin use on various crops

Figure 3 depicts the potential exposure pathways associated with abamectin used as a foliar application to almonds, walnuts, apples, avocados, celeriac, citrus, cotton, cucurbit, fruiting vegetables, grapes, herbs, hops, leafy vegetables, mint, pears, plums, prunes and potatoes. Based on the use pattern for abamectin, the main exposure pathways for terrestrial organisms are direct exposure to abamectin via consumption of food items. In the figure above, the dashed line represents the pathways of exposure that are unlikely to occur because of physical or chemical properties. Although abamectin has a log K_{OW} of 4.4, BCF in bluegill sunfish were in the range of 19-69 (whole fish) and 6.6-33 (fillet); indicating that bioconcentration in aquatic organisms is low. Volatilization is also not expected to be a concern based on the vapor pressure of abamectin (1.5×10^{-9} Torr).

2.6 Analysis Plan

This assessment focuses on adverse acute and chronic reproductive effects to terrestrial and aquatic wildlife associated with proposed abamectin foliar application use on almonds, walnuts, apples, avocados, celeriac, citrus, cotton, cucurbit, fruiting vegetables, grapes, herbs, hops, leafy vegetables, mint, pears, plums, prunes and potatoes. This analysis plan identifies the approach, methods, specific models, information, and data that will be used to estimate and evaluate risks from proposed labeled uses of abamectin based on the conceptual model and risk hypotheses.

This assessment focuses on adverse acute and chronic reproductive effects to terrestrial and aquatic wildlife associated with proposed abamectin use. This analysis plan identifies the approach, methods, specific models, information, and data that will be used to estimate and evaluate risks from proposed labeled uses of abamectin based on the conceptual model and risk hypotheses.

2.6.1 Conclusions from Previous Risk Assessments

An ecological risk assessment evaluating abamectin for foliar ground application on citrus (DP 210767) concluded that the abamectin may pose acute and chronic risks to birds and small herbivorous mammals. This assessment also concluded that ground applications of abamectin to citrus may pose acute and chronic risks to freshwater and estuarine/marine invertebrates.

2.6.2 Preliminary Identification of Data Gaps

This assessment is potentially underestimating risk to both terrestrial and aquatic organisms from exposure to abamectin. This potential underestimation is due to a lack of available toxicity data as well as technical issues with the data submitted for some species. Therefore, the following toxicity studies are requested:

- <u>OPPTS 850.1400- Early Life-Stage Toxicity Test</u>. There are no chronic toxicity data available for the Agency to assess chronic risk of abamectin to estuarine/marine fish.

- <u>OPPTS 850.4225 – Seedling Emergence, Tier II and OPPTS 850.4250 – Vegetative Vigor, Tier II.</u> Seedling emergence and vegetative vigor toxicity data are not available for terrestrial plants.

- <u>OPPTS 850.2300 - Avian reproduction Study</u>. A reproduction study with bobwhite quail is not available.

- <u>OPPTS 850.2100 - Acute Oral Toxicity with a Passerine Bird</u>. An acute oral toxicity study with a passerine bird is not available. No species recommended at this point. Protocol should be submitted prior to test initiation.

- <u>Whole Sediment Toxicity Test: Chronic Invertebrates Freshwater and Marine</u>. Based on the physiochemical properties, abamectin may sorb to organic materials in sediment and may be toxic to organisms that dwell in and ingest sediment as abamectin is very highly toxic to other aquatic invertebrates. Since abamectin is a foliar application, spray drift to both freshwater and estuarine-marine environments is possible. The concentration of abamectin in water from spray drift from ground or aerial application is greater than the acute EC_{50} value for the estuarine/marine mysid shrimp. 40 CFR Part 158.630 requires a chronic freshwater sediment study if the half-life is greater than or equal to 10 days and any of the following conditions exist: i. $Kd \geq 50$, ii. the $\log Kow \geq 3$, or iii. the $Koc \geq 1000$. Abamectin meets these criteria. A protocol should be submitted to the Agency for review prior to testing.

- OPPTS 850.1075 – Fish Acute Toxicity Test, freshwater and marine; 850.1010- Aquatic Invertebrate Acute Toxicity test with Daphnia; 850.1025 or 1055 – Oyster Acute Toxicity Test (shell deposition) or Bivalve Acute Toxicity Test (embryo-larvae). The registrant submitted test were conducted as static tests that were conducted above the reported water solubility, conducted using a potential photosensitizing solvent (acetone), and test concentrations were not measured. As a result, the actual test concentrations (dissolved bioavailable abamectin) are not known which may be underestimating risk. Therefore, a new acute toxicity study for a coldwater and warmwater freshwater fish, estuarine-marine fish and *Daphnia magna* is requested. An oyster shell deposition or a bivalve embryo-larvae toxicity study is also requested.

- OPPTS 850.1300 – Daphnia Chronic Toxicity Test. The registrant submitted chronic daphnia toxicity test did not measure growth for the surviving adults at test termination. The study indicates that the surviving daphnia in the two lowest concentrations tested were pale and smaller than the control. Measurement of growth is required under the current guidance. Therefore, a new study is requested.

- OPPTS 850. 5400 – Algal Toxicity and 850.4400 Aquatic Plant Toxicity Test using Lemna spp. There are limited studies (data on two of the five species available (duckweed and a green alga study)) addressing the toxicity of abamectin to aquatic plants; the studies conducted with duckweed and green algae were conducted above solubility, with a potential photosensitizing solvent (acetone), and test concentrations were not measured. Abamectin toxicity studies with a marine diatom, freshwater diatom and blue-green algae are requested as well as new studies for the green algae and duckweed.

- Submitted field dissipation studies are unacceptable; therefore, the behavior of abamectin in the field as compared to the laboratory cannot be demonstrated. In most cases we would expect dissipation in the field to be greater than that predicted by laboratory studies due to pesticide transport.

3.0 Analysis

3.1 Exposure Characterization

Abamectin is moderately persistent in the environment. The reported laboratory soil aerobic half-life was 115 days. Abamectin is relatively stable to hydrolysis but may undergo direct photolysis (photolysis half-life in surface soil = 21 hours). Abamectin has low vapor pressure (1.5×10^{-9} Torr), indicating that volatilization from dry soil surfaces will not be an important environmental fate process. An estimated Henry's Law constant of 2.6×10^{-8} atm-m^3/mol was derived from the vapor pressure and water solubility values provided by the registrant. This value suggests that volatilization from moist soil is not expected to be an important fate process. Abamectin adsorbs strongly to soil surfaces (reported K_{oc} values range from 2,531-12,051), and according to the FAO classification, abamectin is slightly to hardly mobile in soil and that leaching to groundwater will not be an important route of dissipation.

If abamectin was to contaminate surface water, photolysis in sunlit surface waters would be an important environmental fate process based on an aqueous photolysis half-life of 12 hours. Volatilization from water is not expected to be an important fate process based on the estimated Henry's Law constant. The large K_{oc} values suggest that adsorption to suspended solids and sediment in the water column will occur. Bioconcentration factors (BCF) in bluegill sunfish were in the range of 19-69 (whole fish) and 6.6-33 (fillet); suggesting bioconcentration in aquatic organisms is low.

3.1.1 Measures of Aquatic Exposure

3.1.1.1 Aquatic Exposure Modeling

At the screening risk assessment level for aquatic organisms, such as plants, fish, aquatic-phase amphibians, and invertebrates, computer simulation models are used to estimate acute (annual instantaneous peak) and chronic (21 and 60 day weighted average annual peaks for aquatic invertebrates and fish, respectively) residue levels of the dissolved pesticide active ingredient in surface water and sediment pore water and in bulk sediment from runoff and spray drift. These models calculate EECs in surface water and sediment using environmental fate data for abamectin. Monitoring data, if available, may also be used to determine EECs or to support the model's exposure estimates. PRZM-EXAMS as documented at www.epa.gov/oppefed1/models/water/index.htm is the model used to simulate the fate and transport of abamectin from a treated field to and in a receiving water body adjacent to the treated field. Cropping patterns, soil structure, and weather input data for the simulation modeling has been standardized for a number of crops, referred to as crop scenarios, to provide high-end estimates of runoff and soil erosion representative of the primary growing area for a given crop. The quality control checked crop scenarios and associated meteorological files available for use in a risk analysis are also found at the same web address under the bullet "PRZM crop scenario metadata".

PRZM-EXAMS model inputs for abamectin and its major degradate (a mixture of 8-α-hydroxy and a ring opened aldehyde derivative fate parameters (e.g., aerobic metabolism, photolysis, etc.) are listed in Table 4. The scenarios modeled reflect differences in weather and cropping patterns, soil structure, and abamectin application dates in different major growing areas. A screening assessment of estimated environmental concentrations (EECs) for abamectin and its major soil degradate (a mixture of 8-α-hydroxy and a ring opened aldehyde derivative) in surface water resulting from the proposed label uses was performed.

PRZM/EXAMS modeling output files are listed in Appendix B. Tier II Surface Water 1-in10 Year EECs (ppb) of abamectin in surface water from its new proposed uses from PRZM/EXAMS modeling are shown in Table 6.

Table 4 Surface water exposure inputs for PRZM/EXAMS

MODEL INPUT VARIABLE	INPUT VALUE	SOURCE and COMMENTS
Application rate (kg ai/hectare) and application interval	See Table 6	Some crops were modeled at 0.023 and 0.0235 lb ai/A but 0.0235 lb ai/A used to determine risk quotients
K_d (mL/g)	82 (average)	MRID 40856301; no data for degradate; Input guideline, 2002
Aerobic Soil Metabolic Half-life (days)	150	Total toxic residue half-life for parent and degradate (a mixture of 8-α-hydroxy and a ring opened aldehyde derivative)
Is the pesticide wetted-in?	No	EPA Reg. No. 100-RGLR
Spray Drift Fraction	0.05	Input guideline, 2002
Application Efficiency	0.95	Input guideline, 2002
Solubility (µg/L)	78	10x reported value (7.8 µg/L) per guidance (Input guideline, 2002); as there is no data for degradate it was assumed that it was no more soluble than the parent.
Aerobic Aquatic Metabolic Half-life (days)	300	No acceptable aerobic aquatic metabolism data were available, therefore 2x the aerobic soil metabolism half-life (identified above) was used per guidance (Input guideline, 2002).
Hydrolysis (pH 7) half-life (days)	0	Stable. No MRID available. Review dated 4/18/83; no data for degradate.
Aquatic Photolysis Half-life (days)	0.5	Dark-control adjusted half-life. Ku and Jacob, 1983 (Public literature, EFED Review dated 3/28/84); no data for degradate.

Table 5. Tier II Surface Water 1-in10 Year EECs (ppb) of abamectin and its major soil degradate (a mixture of 8-α-hydroxy and a ring opened aldehyde derivative

Crop	Application Rate (lb ai/acre); (# Applications/ Application interval)	PRZM Scenario; method of application	Peak EEC (ppb)	21-day avg EEC (ppb)	60-day avg EEC (ppb)
Almonds & Walnuts	0.0235; (2/21)[1]	CAalmond_WirrigSTD	0.075	0.059	0.048
Apples	0.0235; (2/21)[1]	PAApplesSTD	0.339	0.266	0.214
Avocados	0.0235; (2/30)[1]	FLAvocadoSTD	0.142	0.111	0.102
Celeriac	0.0187; (3/7)[2]	FLCarrotSTD	0.429	0.351	0.298
Citrus	0.0235; (2/30)	FLCitrusSTD	0.394	0.318	0.278
Cotton	0.019; (2/21)	MScottonSTD	0.420	0.348	0.291
Cucurbit	0.0187; (3/7)[2]	FLcucumberSTD	0.540	0.446	0.386
Fruiting Veg	0.0187; (3/7)[2]	FLpepperSTD	0.493	0.410	0.373
Grapes	0.019; (2/21)	NYgrapesstd	0.466	0.404	0.361
Herb	0.0187; (3/7)[2]	ORmintSTD	0.084	0.075	0.065
Hops	0.019; (2,21)	ORhopsSTD	0.158	0.136	0.130
Leafy Veg	0.0187; (3/7)[2]	FLcabbageSTD	0.277	0.217	0.174
Mint	0.014; (3/7)	ORmintSTD	0.156	0.129	0.107
Pears	0.0235; (2/21)[1]	WAorchards	0.029	0.023	0.020
Plums & Prunes	0.0235; (2/21)[1]	WAorchards	0.040	0.031	0.023
Potatoes	0.0187; (3/7)[2]	MEpotatoSTD	0.651	0.564	0.498

[1] These crops were modeled using the maximum seasonal application rate divided by 2 applications.
[2] These crops were modeled using the maximum seasonal application rate divided by 3 applications.

3.1.1.2 Aquatic Exposure Monitoring and Field Data

Groundwater and surface water monitoring data are not available. Screening models were used to determine estimated concentrations for abamectin in groundwater and surface water for the proposed uses.

3.1.2 Measures of Terrestrial Exposure

Avian and Mammalian Dietary Exposure

The Terrestrial Exposure (T-REX) model (Version 1.4. l), an EFED computer model that uses a first-order dissipation relationship to account for residue dissipation between applications, was used to estimate exposure concentrations of abamectin to terrestrial wildlife. The T-REX simulation model incorporates the nomogram (Fletcher *et al.,* 1994; Hoerger and Kenaga, 1972; Pfleeger *et al.,* 1996) relationship between the amount of pesticide applied and the amount of pesticide residue present on a given food item. In addition to exposure concentrations (dose and diet-based), the T-REX model calculates risk quotients based on food items for mammals and birds, including herbivores, insectivores, and granivores. For dose-based exposures, three weight classes of mammals (15, 35, and 1000 g) and birds (20, 100, and 1000 g) are considered (Appendix C).

A default foliar dissipation half-life of 35 days was used in this assessment, although, residue concentrations may be lower as a honey-bee foliar residue study on citrus, demonstrates that residues are toxic above background levels for approximately 48 hours.

Since the label does not specifically state the interval between the second sequential application and subsequent applications for a number of crops (celeriac, cucurbit, fruiting vegetable, leafy vegetable, mint, herbs and potatoes (for potato psyllid), three applications at seven day intervals using the maximum seasonal rate divided by three (which is slightly less than three applications at the maximum single application rate, 0.0187 vs. 0.019 lb ai/A) was modeled for environmental exposure. The dietary exposure model T-REX can not model different application intervals or application rates at the same time. In addition, the application rate for almonds, walnuts, apples, citrus, avocados, pears, plums and prunes was modeled using the maximum seasonal application rate divided by two applications (0.0235 lb ai/A).

Input parameters, such as application rate, interval, and number of applications, used in T-REX model are presented with corresponding EECs in Table 6, Table 7, and Table 8.

Table 6. Avian Dose-Based Estimated Environmental Concentrations (EECs) for Terrestrial Dietary Items from Foliar Application of Abamectin

Crop; (Application Rate (lb ai/A); # of Applications; Application Interval (days))	Size Class (g)[1]	Avian Dose-Based EECs (ppm)				
		Dietary Item				
		Short Grass	Tall Grass	Broadleaf plants/ sm insects	Fruits/pods/ seeds/ lg insects	Granivore
Celeriac, cucurbit, fruiting and leafy	20	13.43	6.16	7.56	0.84	0.19
	100	7.66	3.51	4.31	0.48	0.11

vegetables, herbs, potato; (0.0187;3;7)[2]	1000	3.43	1.57	1.93	0.21	0.05
Cotton, grapes, hops; (0.019;2;21)	20	8.62	3.95	4.85	0.54	0.12
	100	4.92	2.25	2.76	0.31	0.07
	1000	2.20	1.01	1.24	0.14	0.03
Almonds, walnuts, apple, pears, plums, prunes ; (0.0235;2;21)[2]	20	10.66	4.89	6.00	0.67	0.15
	100	6.08	2.79	3.42	0.38	0.08
	1000	2.72	1.25	1.53	0.17	0.04
Avocados, citrus; (0.0235;2;30)[2]	20	9.97	4.57	5.61	0.62	0.14
	100	5.68	2.61	3.20	0.36	0.08
	1000	2.55	1.17	1.43	0.16	0.04
Mint; (0.014;3;7)	20	10.06	4.61	5.66	0.63	0.14
	100	5.74	2.63	3.23	0.36	0.08
	1000	2.57	1.18	1.44	0.16	0.04

[1] Adjusted LD_{50} (mg/kg-bw) based on avian body weight: 20 g = 44.13, 100 g = 56.18, 1000 g = 79.36
[2] These crops were modeled using the maximum seasonal application rate divided by 3 applications.
These crops were modeled using the maximum seasonal application rate divided by 2 applications.

Table 7. Mammalian Dose-Based Estimated Environmental Concentrations (EECs) for Terrestrial Dietary Items from Foliar Application of Abamectin

Crop; (Application Rate (lb ai/A); # of Applications; Application Interval (days))	Size Class (g)[1]	Mammalian Dose-Based EECs (ppm)				
		Dietary Item				
		Short Grass	Tall Grass	Broadleaf plants/ sm insects	Fruits/pods/ seeds/ lg insects	Granivore
Celeriac, cucurbit, fruiting and leafy vegetables, herbs, potato; (0.0187;3;7)[2]	15	11.25	5.15	6.33	0.70	0.16
	35	7.77	3.56	4.37	0.49	0.11
	1000	1.80	0.83	1.01	0.11	0.03
Cotton, grapes, hops; (0.019;2;21)	15	7.22	3.31	4.06	0.45	0.10
	35	4.99	2.29	2.81	0.31	0.07
	1000	1.16	0.53	0.65	0.07	0.02

Almonds, walnuts, apple, pears, plums, prunes ; (0.0235;2;21)[3]	15	8.93	4.09	5.02	0.56	0.12
	35	6.17	2.83	3.47	0.39	0.09
	1000	1.43	0.66	0.80	0.09	0.02
Avocados, citrus; (0.0235;2;30)[3]	15	8.35	3.83	4.69	0.52	0.12
	35	5.77	2.64	3.24	0.36	0.08
	1000	1.34	0.61	0.75	0.08	0.02
Mint; (0.014;3;7)	15	8.42	3.86	4.74	0.53	0.12
	35	5.82	2.67	3.27	0.36	0.08
	1000	1.35	0.62	0.76	0.08	0.02

[1] Adjusted LD_{50} (mg/kg-bw) based on mammalian body weight: 15 g = 29.89, 35 g = 24.18, 1000 g = 10.46; Adjusted NOAEL: 15 g = 0.26, 35 g = 0.21, 1000 g = 0.09
[2]These crops were modeled using the maximum seasonal application rate divided by 3 applications.
[3] These crops were modeled using the maximum seasonal application rate divided by 2 applications.

Table 8. Dietary Based Estimated Environmental Concentrations (EECs) for Terrestrial Dietary Items from Foliar Exposure to Abamectin

Crop; (Application Rate (lb ai/A); # of Applications; Application Interval (days))	Dietary-Based EECs (ppm)			
	Dietary Item			
	Short Grass	Tall Grass	Broadleaf plants/ sm insects	Fruits/pods/seeds/ lg insects
Celeriac, cucurbit, fruiting and leafy vegetables, herbs, potato; (0.0187;3;7)[1]	11.80	5.41	6.64	0.74
Cotton, grapes, hops; (0.019;2;21)	7.57	3.47	4.26	0.47
Almonds, walnuts, pears, apple, plums, prunes ; (0.0235;2;21)[2]	9.36	4.29	5.27	0.59
Avocados, citrus; (0.0235;2;30)[2]	8.75	4.01	4.92	0.55
Mint; (0.014;3;7)	8.83	4.05	4.97	0.55

[1]These crops were modeled using the maximum seasonal application rate divided by 3 applications.
[2]These crops were modeled using the maximum seasonal application rate divided by applications

Terrestrial Plants

There are no data regarding the explicit toxicity of abamectin to terrestrial plants. Therefore, no modeling of exposure for soil or foliar residues for terrestrial and semi-aquatic plants was performed.

3.2 Ecological Effects Characterization

In screening-level ecological risk assessments, effects characterization describes the types of effects a pesticide can produce in an organism or plant. This characterization is based on registrant-submitted studies that describe acute and chronic effects toxicity information for various aquatic and terrestrial animals and plants. All acceptable or supplemental guideline study data for technical grade abamectin, formulations, and degradates are summarized in Appendix D.

3.2.1.1 Terrestrial Animals

The most sensitive avian and mammalian acute and chronic toxicity test results and terrestrial invertebrates toxicity data selected for use in assessing baseline risk from abamectin are summarized in Table 9.

Birds

In birds, the acute toxicity of abamectin technical varies, depending on the species tested. The acute oral LD_{50} for bobwhite quail (*Colinus virginianus*) is >2,000 mg ai/kg-bw (MRID 00129879, practically nontoxic), whereas the acute oral LD_{50} for mallard ducks (*Anas platyrhynchos*) is 85 mg ai/kg-bw (MRID 00097859, moderately toxic). Regurgitation was observed in all the mallard duck acute oral treatment groups, therefore, the reported acute oral LD_{50} might be underestimating toxicity. The LC_{50} values obtained in acceptable sub-acute dietary toxicity tests with bobwhite quail and mallard duck are >3,102 (MRID 00129880, slightly toxic) and 383 mg ai/kg-diet, respectively (MRID 00129520, highly toxic). A reproduction toxicity study with the bobwhite quail was not available. There were no statistically significant effects on growth, survival or reproduction in the mallard duck reproduction study at the highest concentration tested, 12 mg ai/kg-diet, therefore, the no observed adverse effect concentration (NOAEC) is at least 12 mg ai/kg-diet for the mallard duck chronic reproduction study (MRID 40318601). During the pilot study for the mallard duck reproduction study, the average number of eggs laid was markedly less in the 64 mg ai/kg treatment group.

Mammals

Based on data for laboratory rats, abamectin technical has an acute toxicity LD_{50} value of 13.6 mg/kg-bw when using sesame oil as a delivery vehicle but 214 – 232 mg/kg-bw using a methyl cellulose delivery vehicle (MRID 0006894, 45607202). There are three prenatal developmental studies, three 1-generation reproduction studies and a 2-generation study with laboratory rats (Appendix D). The most sensitive reproductive endpoint was the 2-generation reproduction toxicity NOAEL value of 0.12 mg/kg-bw/day based on increased retinal folds, increased dead pups at birth, decreased viability and lactation indices, and decreased pup body weight (MRID 00265576).

Although data exists for other routes of exposure (Appendix D), given the proposed application and the physical properties of the chemical, the expected significant route of exposure is oral. Therefore the focus of the risk estimation is on this route of exposure.

Terrestrial Invertebrates

Based on the honey bee LD_{50} value of 0.41 µg/bee toxicity value, abamectin is highly toxic to terrestrial invertebrates (MRID 00159162). There was 13% mortality at 48-hrs at the lowest concentration tested for the acute contact study. A honey bee foliar exposure study indicated that exposure to abamectin treated citrus foliage is toxic for approximately 48 hours after application to the foliage (MRID 00159161). The proposed label states not to apply Agri-Flex SC or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

Table 9. Summary of Most Sensitive Acute and Chronic Toxicity Data for Birds, Mammals and Terrestrial Invertebrates Exposed to Abamectin

Assessment Endpoint	Measurement Endpoint	Selected Measurement Endpoint Value and Source				
		Species	Study Duration	Toxicity Value	Most Sensitive Endpoint	Source and Study Classification
Survival and Reproduction of Birds	Most sensitive avian acute oral toxicity, LD_{50} (single-dose)	Mallard duck (*A. platyrhynchos*)	Single Oral Dose, post 14 day	LD_{50} =85 mg a.i./kg-bw[1]	Mortality	00097859 Supplemental
	Most sensitive acute avian dietary toxicity	Mallard duck (*A. platyrhynchos*)	8 d (5 d exposure, post 3 d)	LC_{50} =383 (mg ai/kg-diet)	Mortality	00129520 Acceptable
	Most sensitive avian reproductive toxicity NOAEC	Mallard duck (*A. platyrhynchos*)	18 Weeks	NOAEL ≥12 (mg ai/kg-diet), highest conc. tested[2]	No statistically significant effect at highest conc. tested.	40318601 Acceptable
Survival and Reproduction of Terrestrial Mammals	Most sensitive acute oral toxicity, LD_{50} (single-dose)	Rat	Single oral dose	LD_{50} 13.6 mg /kg-bw	Mortality	00006894
	Most sensitive reproduction NOAEL	Rat	2-gen reproduction	0.12 mg a.i./kg-bw/d	Reproduction[3]	00265576
Survival of Terrestrial Invertebrates and beneficial insects	Most sensitive acute contact LD_{50} (µg/bee)	Honey bee (*Apis mellifera*)	96-hr	LD_{50} = 0.41 µg per bee	Mortality	00159162 Acceptable

[1] Regurgitation observed in all treatment groups, therefore actual LD50 may be lower.
[2] In pilot test, marked decrease in average number of eggs laid at 64 ppm.
[3] increased retinal folds, increased dead pups at birth, decreased viability and lactation indices, and decreased pup body weight.

3.2.1.2 Terrestrial Plants

Registrant submitted seedling emergence or vegetative vigor toxicity data are not available for avermectin components, abamectin, or major degradates.

3.2.2 Aquatic Effects Characterization

3.2.2.1 Aquatic Animals

Abamectin is very highly toxic to both freshwater and estuarine/marine fish (Table 10). The 96-hr LC_{50} values for rainbow trout (*Oncorhynchus mykiss*) and bluegill sunfish (*Lepomis macrochirus*) are 3.2 and 9.6 µg ai/L (total form (dissolved and undissolved abamectin)), respectively (MRID 00088780 and 00088782). For the estuarine/marine fish, sheepshead minnow (*Cyprinodon variegatus*), the 96-hr LC_{50} value is 15 µg ai/L (total form) (MRID 00150910). All three of these reported fish studies were conducted above the reported limit of solubility for abamectin (7.8 ppb in distilled water; <1 ppb in tap water); acetone was used to increase abamectin solubility in water, and acetone can be a potential photosensitizer and abamectin undergoes rapid photolysis. These studies were based on nominal concentrations, as test solutions were not measured in these studies. Therefore, the actual concentrations of abamectin these organisms were exposed to are not known. An early life-cycle toxicity study was conducted with rainbow trout, and the reported no observed adverse effect concentration (NOAEC) was 0.52 µg ai/L (MRID 40069609) based on growth (wet weight).

An early life stage value for estuarine/marine fish has not been submitted to the Agency. However, an ACR of 6.2[7] was calculated from the rainbow trout (*O. mykiss)* acute and chronic toxicity data, and was used to extrapolate from an acute 96-h LC_{50} value for the sheepshead minnow to an early-life stage NOAEC. An acute to chronic ratio is available for both rainbow trout and aquatic invertebrates, but since abamectin is an insecticide, the mode of action is expected to be different for fish and invertebrates. Therefore the rainbow trout toxicity values were used to calculate the ACR. The extrapolated sheepshead NOAEC is 2.4 µg/L[8].

Aquatic invertebrates are the aquatic species most sensitive to abamectin. It is very highly acutely toxic to aquatic invertebrates, with a 48-hr EC_{50} value of 0.34 µg ai/L in the freshwater waterflea , *Daphnia magna* (MRID 00088784), and a 96-hr LC_{50} of 0.020 µg ai/L in the estuarine/marine mysid shrimp, *Americamysis bahia* (MRID 40856305) Abamectin is highly toxic to the embryo/larval stages of mollusks with a 48-h EC_{50} of 430 µg ai/L (total form) in the Eastern oyster (*Crassostrea virginica*) (MRID 00159158). The oyster embryo/larvae study was conducted above the water solubility limit of abamectin (7.8 ppb in distilled water; <1 ppb in tap water); acetone was used to increase solubility in water. Again, the daphnia and oyster larvae studies were evaluated using

[7] *O. mykiss* ACR = 96-h LC_{50}/early-life stage NOAEC = 3.2 ppb/0.52 ppb = 6.2

[8] Sheepshead Minnow early life stage NOAEC = 96-h LC50/fish ACR = 15 ppb/6.2 = 2.4 ppb.

nominal concentrations, therefore, the actual concentrations these organisms were exposed to are not known. The life-cycle toxicity test with the *Daphnia magna* resulted in a reproductive NOAEC of 0.030 μg ai/L which was the lowest concentration tested, but the adults in the two lowest treatment groups were observed to be pale and smaller compared to the controls and growth was not analyzed (MRID 00153570). Therefore, the reproductive NOAEC appears to underestimate the true no-effect concentration for Daphnia from chronic exposure to abamectin, as the NOAEC appears to be lower than 0.030 μg ai/L (30 parts-per-trillion). An acute to chronic ration using the mysid shrimp toxicity data was used to calculate a chronic no-effect concentration for the daphnia and is 0.006 μg ai/L (6 parts-per-trillion)[9]. The NOAEC value for the life-cycle toxicity test with the mysid shrimp (*Americamysis bahia*) was previously reported as 0.0035 μg ai/L based on reproduction when compared to the solvent control, but is 0.00035 μg ai/L (0.35 parts-per-trillion) based on reproduction when compared to the negative control as there was a difference between the negative and solvent control for reproduction. Current EFED policy is to compare treatment groups to the negative control, therefore, the NOAEC value of 0.00035 μg ai/L was used in the assessment.

Table 10. Summary of Selected Acute and Chronic Toxicity Data for Fish and Aquatic Invertebrates Exposed to Abamectin for use in Determining Risk

Assessment Endpoint	Measurement Endpoint	Selected Measurement Endpoint Value and Source				
		Species	**Study Duration**	**Toxicity Value**	**Most Sensitive Endpoint**	**Source and Study Classification**
Survival and reproduction of freshwater vertebrates (fishes, etc)	Most sensitive acute freshwater fish LC_{50}	Rainbow trout (*Oncorhynchus mykiss*)	96 hr LC_{50}, Static	3.2 μg ai/L (total form)[1]	Mortality	00088780 Acceptable
	Most sensitive freshwater fish early life stage or life cycle NOAEC	Rainbow trout *(Oncorhynchus mykiss)*	60-day	NOAEC = 0.52 μg ai/L	Growth	40069609 Acceptable
Survival and reproduction of freshwater invertebrates	Most sensitive acute freshwater invertebrate LC_{50} (or EC_{50})	Water flea, (*Daphnia magna*)	48 hr EC_{50}, Static	0.34 μg ai/L	Immobilization and mortality	00088784 Acceptable
	Most sensitive aquatic invertebrate life cycle NOAEC	Water flea, (*Daphnia magna*)	21 day Flow-through	ACR = 0.006 μg ai/L[2]	Reproduction and growth	00153570 Acceptable
Survival and reproduction of marine/ estuarine vertebrates (fishes, etc)	Most sensitve acute marine/ estuarine vertebrate LC_{50}	Sheepshead minnow (*Cyprinodon variegatus*)	96 hr Static-renewal	15 μg ai/L (total form)[1]	Mortality	00150910 Supplemental
	Most sensitive marine/estuarine fish early life stage or life cycle NOAEC	Sheepshead minnow (*Cyprinodon variegatus*)	28 day	No data available; ACR used value = 2.4 μg ai/L	NA	NA

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[9] Mysid shrimp ACR = 96-h EC_{50}/reproduction NOAEC = 0.020 ppb/0.00035 ppb = 57
Daphnia chronic NOAEC= 48-hr EC50/mysid ACR = 0.34 ppb/57 = 0.006 ppb

Assessment Endpoint	Measurement Endpoint	Selected Measurement Endpoint Value and Source				
		Species	Study Duration	Toxicity Value	Most Sensitive Endpoint	Source and Study Classification
Survival and reproduction of marine/estuarine invertebrates	Most sensitive marine/estuarine acute mollusk shell deposition or embryo larval EC_{50}	Eastern oyster (*Crassostrea virginica*) embryo/larvae	96 hr EC_{50} Static	430 µg ai/L (total form)[1]	Embryo development	00159158 Supplemental
	Most sensitive marine/estuarine acute invertebrate EC_{50}	Mysids (*Americamysis bahia*)	96 hour EC_{50} Flow-through	0.020 µg ai/L	Mortality	40856305 Acceptable
	Most sensitive marine/estuarine life cycle invertebrate NOAEC	Mysids (*Americamysis bahia*)	28 day Flow-through	NOAEC = 0.00035 µg ai/L	Reproduction	40856306 Supplemental

[1] Study conducted above limit of solubility for abamectin so value may contain both dissolved and undissolved abamectin. Studies used acetone to increase water solubility.
[2] Adult daphnia in two lowest treatment groups were reported as pale in coloration and small compared to controls (NOAEC may be less than 0.030 ppb) so an acute to chronic ratio was calculated using mysid shrimp toxicity data.

3.2.2.2 *Aquatic Plants*

Abamectin has been tested for phytotoxicity with only two aquatic plant species of the five listed for testing under guideline testing. The IC_{50} values based on biomass or growth rate measures obtained in these two studies are >100,000 ppb and 3,900 ppb for the green alga *Selenastrum capricornutum* and the vascular aquatic plant *Lemma gibba*, respectively (MRID 00088787 and 00088788) (Table 11). These studies were evaluated using nominal concentrations since test solutions were not measured. Also, the studies were conducted using acetone which is a potential photosensitizer and abamectin is subject to photolysis. Therefore, the actual test concentrations these organisms were exposed to are not known (Table 11).

Table 11. Summary of Acute Toxicity Data for Aquatic Plants Exposed to Abamectin

Assessment Endpoint	Measurement Endpoint	Selected Measurement Endpoint Value and Source				
		Species	Study Duration	Toxicity Value	Most Sensitive Endpoint	Source and Study Classification
Reduced biomass and growth rate of aquatic plants	Most sensitive vascular plant biomass and area under curve NOAEL and IC_{50}	Duckweed (*Lemna gibba*)	14 day Static EC_{50}	3,900 µg ai/L (total form)[1] NOAEC 1,200 µg ai/L	Frond number	00088787
	Most sensitive nonvascular plant biomass and growth rate NOAEL and IC_{50}	Green algae (*Selenastrum capricornutum*)	9 days static	>100,000 µg ai/L (total form)[1,2] NOAEC = Not Available	Biomass	00088788

Assessment Endpoint	Measurement Endpoint	Selected Measurement Endpoint Value and Source				
		Species	Study Duration	Toxicity Value	Most Sensitive Endpoint	Source and Study Classification
[1] Concentrations tested were above the solubility in water (7.8 ppb in distilled) so test solutions may contain both dissolved and undissolved abamectin. Acetone was used to increase solubility in water. [2] Precipitate was observed at concentrations of 25,000 ppb and above.						

4.0 Risk Characterization

Risk characterization is the integration of exposure and effects characterization to determine the ecological risk from the use of abamectin and the likelihood of effects on aquatic life, wildlife, and plants based on varying pesticide-use scenarios. The risk characterization provides estimation and a description of the risk; articulates risk assessment assumptions, limitations, and uncertainties; synthesizes an overall conclusion; and provides the risk managers with information to make regulatory decisions.

4.1 Risk Estimation – Integration of Exposure and Effects Data

Results of the exposure and toxicity effects data are used to evaluate the likelihood of adverse ecological effects on non-target species. For the assessment of abamectin risks, the risk quotient (RQ) method is used to compare exposure and measured toxicity values. Estimated environmental concentrations (EECs) are divided by acute and chronic toxicity values. The RQ's are compared to the Agency's levels of concern (LOCs). These LOCs are the Agency's interpretive policy and are used to analyze potential risk to non-target organisms and the need to consider regulatory action. These criteria are used to indicate when a pesticide's use as directed on the label has the potential to cause adverse effects on non-target organisms. The LOC's are listed in Appendix E.

4.1.1 Non-target Aquatic Animals and Plants

4.1.1.1 Non-target Aquatic Animals

Surface water concentrations resulting from abamectin application were predicted with the PRZM-EXAMS model. These aquatic estimated environmental concentrations (EEC's) are listed in Table 6. Peak EECs were then compared to acute toxicity endpoints to derive acute RQ's. The 60- day EECs were compared to chronic toxicity endpoints (NOAEC values) to derive chronic RQ's for fish, and 21-day EECs were compared to chronic toxicity endpoints (NOAEC values) for aquatic invertebrates. Acute RQ's for freshwater and estuarine/marine organisms for different exposure scenarios are presented in Table 12 and chronic RQ's for these species are presented in Table 13.

Fish and Aquatic Invertebrates

Acute

Non-Listed Species

There were no acute non-listed LOC exceedances for either freshwater or estuarine/marine fish. RQ values did exceed the acute non-listed LOC of 0.5 for freshwater aquatic invertebrates from abamectin use on apples, celeriac, citrus, cotton, cucurbit, fruiting and leafy vegetables, grapes and potatoes. The acute estuarine/marine invertebrates RQ values also exceeded the acute non-listed LOC for all crop scenarios.

Listed Species

The acute freshwater and estuarine/marine invertebrate RQ values exceed the Agency's acute listed LOC of 0.05 for all crop scenarios. The acute freshwater fish RQ values exceed the Agency's acute listed LOC for abamectin application to apples, celeriac, citrus, cotton, cucurbit, fruiting and leafy vegetables, grapes, and potatoes. None of the crop scenario RQ values exceeded the listed LOC for estuarine/marine fish.

Chronic

Chronic freshwater and estuarine/marine invertebrate RQ's exceed the chronic LOC (1.0) for all crop scenarios. Freshwater fish and estuarine/marine fish chronic RQ values do exceed the chronic LOC for any crop scenario.

Table 12. Acute Risk Quotients for Fish and Aquatic Invertebrates from Abamectin Applied to Various Crops

Crop Scenario	Application Rate (lb ai/acre); (# Applications/ Application interval)	Calculated EECs	Freshwater Fish[a]	Freshwater Invertebrates[b]	Estuarine/ Marine Fish[c]	Estuarine/ Marine Invertebrates[d]
		Peak (µg/L)	LC_{50} = 3.2 µg/L	LC_{50} = 0.34 µg/L	LC_{50} = 15.0 µg/L	LC_{50} = 0.02 µg/L
Almonds & Walnuts	0.0235; (2/21)[1]	0.075	0.023	**0.219**	0.005	**3.73***
Apples	0.0235; (2/21)[1]	0.339	**0.106**	**0.997***	0.023	**17.0***
Avocados	0.0235; (2/30)[1]	0.142	0.044	**0.418**	0.009	**7.10***
Celeriac	0.0187; (3/7)[2]	0.429	**0.134**	**1.26***	0.029	**21.5***
Citrus	0.0235; (2/30)[1]	0.394	**0.123**	**1.16***	0.026	**19.7***

Crop Scenario	Application Rate (lb ai/acre); (# Applications/ Application interval)	Calculated EECs	Freshwater Fish[a]	Freshwater Invertebrates[b]	Estuarine/ Marine Fish[c]	Estuarine/ Marine Invertebrates[d]
		Peak (µg/L)	LC_{50} = 3.2 µg/L	LC_{50} = 0.34 µg/L	LC_{50} = 15.0 µg/L	LC_{50} = 0.02 µg/L
Cotton	0.019; (2/21)	0.420	**0.131**	**1.24***	0.028	**21.0***
Cucurbit	0.0187; (3/7)[2]	0.540	**0.169**	**1.59***	0.036	**27.0***
Fruiting Veg	0.0187; (3/7)[2]	0.493	**0.154**	**1.45***	0.033	**24.7***
Grapes	0.019; (2/21)	0.466	**0.146**	**1.37***	0.031	**23.3***
Herb	0.0187; (3/7)[2]	0.084	0.026	**0.247**	0.006	**4.20***
Hops	0.019; (2,21)	0.158	0.049	**0.465**	0.011	**7.90***
Leafy Veg	0.0187; (3/7)[2]	0.277	**0.087**	**0.815***	0.018	**13.9***
Mint	0.014; (3/7)	0.156	0.049	**0.459**	0.010	**7.80***
Pears	0.0235; (2/21)[1]	0.029	0.009	**0.085**	0.002	**1.45***
Plums & Prunes	0.0235; (2/21)[1]	0.040	0.013	**0.118**	0.003	**2.00***
Potatoes	0.0187; (3/7)[2]	0.651	**0.203**	**1.91***	0.043	**32.6***

[1] These crops were modeled using the maximum seasonal application rate divided by 2 applications.
[2] These crops were modeled using the maximum seasonal application rate divided by 3 applications
Bolded RQ values exceed the Agency's acute listed LOC (0.05) for direct effects to listed species
* = RQ values exceed the Agency's non-listed acute LOC (0.5) for non-listed species
[a] Based on Rainbow Trout (*Oncorhynchus mykiss*)
[b] Based on Water Flea (*Daphnia magna*)
[c] Based on Sheepshead Minnow (*Cyprinodon variegatus*)
[d] Based on Mysid Shrimp (*Americamysis bahia*)

Table 13. Chronic Risk Quotients for Fish and Aquatic Invertebrates from Abamectin Applied to Various Crops

Crop Scenario	Application Rate (lb ai/acre); (# Applications/ Application interval)	Calculated EECs (µg/L)		Freshwater Fish[a]	Estuarine/ Marine Fish[b]	Freshwater Invertebrates[c]	Estuarine/ Marine Invertebrates[d]
		21-d[3]	60-d[3]	NOAEC = 0.52 µg/L	NOAEC = 2.4 µg/L	NOAEC = 0.006 µg/L	NOAEC = 0.00035 µg/L
Almonds & Walnuts	0.0235; (2/21)[1]	0.059	0.048	0.09	0.02	**9.83**	**169**
Apples	0.0235; (2/21)[1]	0.266	0.214	0.41	0.09	**44.3**	**760**

Avocados	0.0235; (2/30)[1]	0.111	0.102	0.20	0.04	**18.5**	**317**
Celeriac	0.0187; (3/7)[2]	0.351	0.298	0.57	0.12	**58.5**	**1003**
Citrus	0.0235; (2/30)[1]	0.318	0.278	0.53	0.12	**53.0**	**909**
Cotton	0.019; (2/21)	0.348	0.291	0.56	0.12	**58.0**	**994**
Cucurbit	0.0187; (3/7)[2]	0.446	0.386	0.74	0.16	**74.3**	**1274**
Fruiting Veg	0.0187; (3/7)[2]	0.410	0.373	0.72	0.15	**68.3**	**1171**
Grapes	0.019; (2/21)	0.404	0.361	0.69	0.15	**67.3**	**1154**
Herb	0.0187; (3/7)[2]	0.075	0.065	0.13	0.03	**12.5**	**214**
Hops	0.019; (2,21)	0.136	0.130	0.25	0.05	**22.7**	**389**
Leafy Veg	0.0187; (3/7)[2]	0.217	0.174	0.33	0.07	**36.2**	**620**
Mint	0.014; (3/7)	0.129	0.107	0.21	0.04	**21.5**	**369**
Pears	0.0235; (2/21)[1]	0.023	0.020	0.04	0.01	**3.83**	**65.7**
Plums & Prunes	0.0235; (2/21)[1]	0.031	0.023	0.04	0.01	**5.17**	**88.6**
Potatoes	0.0187; (3/7)[2]	0.564	0.498	0.96	0.21	**94.0**	**1611**

[1] These crops were modeled using the maximum seasonal application rate divided by 3 applications.
[2] These crops were modeled using the maximum seasonal application rate divided by 3 applications
[3] Freshwater and estuarine/marine invertebrates NOAEC values were compared to the 21-day EEC, and freshwater and estuarine/marine fish NOAEC values were compared to the 60-day EEC.
Bolded RQ values exceed the Agency's chronic LOC (1.0)
[a] Based on Rainbow Trout (*Oncorhynchus mykiss*)
[b] Estimated early life stage NOAEC using an ACR of 6.2
[c] Estimated using an ACR of 57 (Based on Water Flea (*Daphnia magna*)) and mysid shrimp)
[d]Based on Mysid Shrimp (*Americamysis bahia*)

4.1.1.2 Aquatic Plants

Calculated peak EECs were compared to IC_{50} endpoints for to derive aquatic vascular and non-vascular plant RQ's for non-listed species, and the peak EECs were compared to the aquatic vascular NOAEC value to derive RQ's for listed species. Listed species RQ values were not calculated for the non-vascular species (*Selenastrum capricornutm*) as a NOAEC value was not available. Acute RQ's for aquatic vascular and nonvascular plants are summarized in Table 14. RQ values did not exceed the plant LOC of 1.0 for any crop. However, data for only two of the five species was available for review. In addition, submitted studies were conducted as nominal concentrations with the use of a potential photosensitizing solvent; therefore, risk may be underestimated.

Table 14. Risk quotients for Aquatic Plants Exposed to Foliar Applications of Abamectin

Crop Scenario	Application Rate (lb ai/acre); (# Applications/ Application interval)	Calculated EECs Peak (µg/L)	Vascular	Vascular	Non-Vascular
			Non-Listed[a]	Listed[a]	Non-Listed[b]
			IC_{50} = 3,900 ppb	NOAEC = 1,200 ppb	IC_{50} >100,000 ppb
Almonds & Walnuts	0.0235; (2/21)[1]	0.075	<0.01	<0.01	<0.01
Apples	0.0235; (2/21)[1]	0.339	<0.01	<0.01	<0.01
Avocados	0.0235; (2/30)[1]	0.142	<0.01	<0.01	<0.01
Celeriac	0.0187; (3/7)[2]	0.429	<0.01	<0.01	<0.01
Citrus	0.0235; (2/30)[1]	0.394	<0.01	<0.01	<0.01
Cotton	0.019; (2/21)	0.420	<0.01	<0.01	<0.01
Cucurbit	0.0187; (3/7)[2]	0.540	<0.01	<0.01	<0.01
Fruiting Veg	0.0187; (3/7)[2]	0.493	<0.01	<0.01	<0.01
Grapes	0.019; (2/21)	0.466	<0.01	<0.01	<0.01
Herb	0.0187; (3/7)[2]	0.084	<0.01	<0.01	<0.01
Hops	0.019; (2,21)	0.158	<0.01	<0.01	<0.01
Leafy Veg	0.0187; (3/7)[2]	0.277	<0.01	<0.01	<0.01
Mint	0.014; (3/7)	0.156	<0.01	<0.01	<0.01
Pears	0.0235; (2/21)[1]	0.029	<0.01	<0.01	<0.01
Plums & Prunes	0.0235; (2/21)[1]	0.040	<0.01	<0.01	<0.01
Potatoes	0.0187; (3/7)[2]	0.651	<0.01	<0.01	<0.01

[1] These crops were modeled using the maximum seasonal application rate divided by 2 applications.
[2] These crops were modeled using the maximum seasonal application rate divided by 3 applications.
[a] Based on Duckweed (*Lemna gibba*)
[b] Based on (*Selenastrum capricornutum*)

4.1.1.3 Non-target Terrestrial Animals

The RQ's for avian species are summarized in Table 15 through Table 17, and mammalian RQ's are summarized in Table 18 through Table 20. EEC comparisons to terrestrial invertebrate toxicity are summarized in Table 21.

Acute Avian Risk

Non-Listed Species

The acute dose-based and dietary-based RQ values for birds did not exceed the non-listed LOC of 0.5 for any crop scenario (Table 15 and Table 16). However, regurgitation was observed in all the mallard duck acute oral treatment groups, therefore, the reported acute oral LD_{50} might be underestimating toxicity.

Listed Species

Acute avian dietary-based RQ values did not exceed the acute endangered LOC of 0.1 for any crop scenario. However, the acute avian dose-based RQ values exceeded the acute listed LOC for small birds feeding on small and tall grass, broadleaf plants and small insects for all crop scenarios, except for tall grasses for cotton, grapes and hops. Acute avian dose-based RQ values also exceed the acute listed LOC for medium birds consuming short grasses for all crops except cotton, grapes and hops (Table 15 and Table 16).

Chronic Avian Risk

For the mallard duck chronic reproduction toxicity study, the highest concentration tested (12 mg ai/kg) resulted in no statistically significant effect for survival, growth or reproduction, therefore, chronic RQ values were not calculated. This highest tested concentration, 12 mg ai/kg, was compared to the calculated EECs, and all EECs were lower than this tested concentration (Table 17).

Table 15. Upper bound acute dose-based RQ values for birds for foliar application of abamectin

Crop and Application Rate	Functional Feeding Group Dietary Item	20 g bird Acute[1]	100 g bird Acute[1]	1000 g bird Acute[1]
Celeriac, cucurbit, fruiting and leafy veg., herbs, potato[2] 0.0187 lb ai/A/ 3 apps/7-d interval	*Herbivores/Insectivores*			
	Short Grass	**0.30**	**0.14**	0.04
	Tall Grass	**0.14**	0.06	0.02
	Broadleaf plants/ sm insects	**0.17**	0.08	0.02
	Fruits/pods/lg insects	0.02	0.01	<0.01
	Granivore			
	Seeds	<0.01	<0.01	<0.01
Cotton, grapes, hops	*Herbivores/Insectivores*			
	Short Grass	**0.20**	0.09	0.03
	Tall Grass	0.09	0.04	0.01

Crop and Application Rate	Functional Feeding Group Dietary Item	20 g bird Acute[1]	100 g bird Acute[1]	1000 g bird Acute[1]
0.019 lb ai/A/ 2 Apps/21-d interval	Broadleaf plants/ sm insects	**0.11**	0.05	0.02
	Fruits/pods/lg insects	0.01	0.01	<0.01
	Granivore			
	Seeds	<0.01	<0.01	<0.01
<u>Almonds, walnuts, apple, pears, plums, prunes[3]</u> 0.0235 lb ai/A/ 2 apps/21-d interval	*Herbivores/Insectivores*			
	Short Grass	**0.24**	**0.11**	0.03
	Tall Grass	**0.11**	0.05	0.02
	Broadleaf plants/ sm insects	**0.14**	0.06	0.02
	Fruits/pods/lg insects	0.02	0.01	<0.01
	Granivore			
	Seeds	<0.01	<0.01	<0.01
<u>Avocado, citrus[3]</u> 0.0235 lb ai/A/ 2 apps/30-d interval	*Herbivores/Insectivores*			
	Short Grass	**0.23**	**0.10**	0.03
	Tall Grass	**0.10**	0.05	0.01
	Broadleaf plants/ sm insects	**0.13**	0.06	0.02
	Fruits/pods/lg insects	0.01	0.01	<0.01
	Granivore			
	Seeds	<0.01	<0.01	<0.01
<u>Mint</u> 0.014 lb ai/A/ 3 apps/7-d interval	*Herbivores/Insectivores*			
	Short Grass	**0.23**	**0.10**	0.03
	Tall Grass	**0.10**	0.05	0.01
	Broadleaf plants/ sm insects	**0.13**	0.06	0.02
	Fruits/pods/lg insects	0.01	0.01	<0.01
	Granivore			
	Seeds	<0.01	<0.01	<0.01

Bolded RQ values exceed the listed LOC of 0.1;

1 Acute RQ = (upper bound dose-based EEC, mg/kg-bw) / (LD$_{50}$; mg/kg-bw). The upper bound EECs for a given body weight and LD$_{50}$ values adjusted for the given body weight are in Table 6.

2 These crops were modeled using the maximum seasonal application rate divided by 3 applications.

3 These crops were modeled using the maximum seasonal application rate divided by 3 applications

Table 16. Upper Bound Acute Avian Dietary-based RQ values from Foliar Application of Abamectin to Celeriac, Cucurbit, Fruiting and Leafy Vegetables, Herbs and Potato

Crop and Application Rate	Dietary Item	EEC (mg/kg-diet) [1]	Acute Dietary RQ [2]
Celeriac, cucurbit, fruiting and leafy veg., herbs, potato 0.0187 lb ai/A/ 3 apps/7-d interval	Short Grass	11.80	0.03
	Tall Grass	5.41	0.01
	Broadleaf plants/sm Insects	6.64	0.02
	Fruits/pods/seeds/lg insects	0.74	<0.01

[1] Dietary-based residue levels for application from Table 8.
[2] Acute RQ = (EEC, mg/kg-diet) / acute dietary LC50, mg/kg-diet; where the acute dietary LC50 is 383 mg/kg-diet for the mallard duck from Table 9.

Table 17. Comparison of the Dietary EECs from Foliar Application of Abamectin to the Chronic Avian NOAEC

Crop and Application Rate	Dietary Item	EEC (mg/kg-diet) [1]	Chronic Avian NOAEC[2] (mg ai/kg-diet)
Celeriac, cucurbit, fruiting and leafy veg., herbs, potato 0.0187 lb ai/A/ 3 apps/7-d interval	Short Grass	11.80	< 12
	Tall Grass	5.41	<12
	Broadleaf plants/sm Insects	6.64	<12
	Fruits/pods/seeds/lg insects	0.74	<12

[1] Dietary-based residue levels for applications from Table 8.
[2] the chronic NOAEC is 12 mg ai/kg-diet for the mallard duck, the highest dose tested Table 9.

Acute Mammalian Risk

Non-Listed Species

No acute dose-based RQ values exceeded the acute LOC (0.5) for non-listed mammalian species in any scenario tested (Table 18).

Listed Species

Acute dose-based RQ values exceed the Agency's listed LOC of 0.1 for small and medium mammals consuming short and tall grass, broadleaf plants and small insects for all crops except for medium mammals consuming tall grass for cotton, grapes and hops. The acute dose-based listed LOC was also exceeded for large mammals feeding on short grasses for all crop scenarios and broadleaf plants and small insects for abamectin application to celeriac, cucurbit, fruiting and leafy vegetables, herbs and potatoes (Table 18).

Chronic Mammalian Risk

Chronic dose-based RQ values exceed the Agency's chronic LOC (1.0) for small, medium and large mammals feeding on short grass, tall grass, broadleaf plants, small insects, fruits, pods or large insects for all crops, except for large mammals consuming fruits, pods and large insects in which only abamectin use on celeriac, cucurbit, fruiting and leafy vegetables, herbs and potatoes exceeded the LOC for fruits, pods and large insects. No chronic dose-based RQ values exceeded the Agency's chronic LOC for mammals feeding on seeds (Table 19).

Chronic dietary-based RQ values exceeded the LOC for mammals consuming short and tall grass, broadleaf plants and small insects for all crops. No chronic dietary-based RQ values exceeded the chronic LOC for mammals consuming fruits, pods, seeds, or large insects (Table 20).

Table 18. Upper bound Mammalian Acute Dose-based RQ values for Foliar Application of Abamectin

Crop	Functional Feeding Group Dietary Item	15 g mammals Acute[1]	35 g mammals Acute[1]	1000 g mammals Acute[1]
Celeriac, cucurbit, fruiting and leafy veg., herbs, potato[2] 0.0187 lb ai/A/ 3 apps/7-d interval	*Herbivores/Insectivores*			
	Short Grass	**0.38**	**0.32**	**0.17**
	Tall Grass	**0.17**	**0.15**	0.08
	Broadleaf plants/ sm insects	**0.21**	**0.18**	**0.10**
	Fruits/pods/lg insects	0.02	0.02	0.01
	Granivore			
	Seeds	0.01	<0.01	<0.01
Cotton, grapes, hops 0.019 lb ai/A/ 2 Apps/21-d interval	*Herbivores/Insectivores*			
	Short Grass	**0.24**	**0.21**	**0.11**
	Tall Grass	**0.11**	0.09	0.05
	Broadleaf plants/ sm insects	**0.14**	**0.12**	0.06
	Fruits/pods/lg insects	0.02	0.01	0.01
	Granivore			
	Seeds	<0.01	<0.01	<0.01
Almonds, walnuts, apple, pears, plums, prunes[3] 0.0235 lb ai/A/ 2 apps/21-d interval	*Herbivores/Insectivores*			
	Short Grass	**0.30**	**0.26**	**0.14**
	Tall Grass	**0.14**	**0.12**	0.06
	Broadleaf plants/ sm insects	**0.17**	**0.14**	0.08
	Fruits/pods/lg insects	0.02	0.02	0.01
	Granivore			
	Seeds	<0.01	<0.01	<0.01
Avocado, citrus[3] 0.0235 lb ai/A/ 2	*Herbivores/Insectivores*			
	Short Grass	**0.28**	**0.24**	**0.13**
	Tall Grass	**0.13**	**0.11**	0.06
	Broadleaf plants/	**0.16**	**0.13**	0.07

Crop	Functional Feeding Group Dietary Item	15 g mammals Acute[1]	35 g mammals Acute[1]	1000 g mammals Acute[1]
apps/30-d interval	sm insects			
	Fruits/pods/lg insects	0.02	0.01	0.01
	Granivore			
	Seeds	<0.01	<0.01	<0.01
Mint 0.014 lb ai/A/ 3 apps/7-d interval	*Herbivores/Insectivores*			
	Short Grass	**0.28**	**0.24**	**0.13**
	Tall Grass	**0.13**	**0.11**	0.06
	Broadleaf plants/ sm insects	**0.16**	**0.14**	0.07
	Fruits/pods/lg insects	0.02	0.02	0.01
	Granivore			
	Seeds	<0.01	<0.01	<0.01

Bolded RQ values exceed the listed LOC of 0.1;
[1] Acute RQ = (upper bound dose-based EEC, mg/kg-bw) / (LD_{50}; mg/kg-bw). The upper bound EECs for a given body weight and LD_{50} values adjusted for the given body weight are in Table 6.
[2] These crops were modeled using the maximum seasonal application rate divided by 3 applications.
[3] These crops were modeled using the maximum seasonal application rate divided by 2 applications.

Table 19. Upper bound Mammalian Chronic Dose-based RQ values for Foliar Application of Abamectin

Crop	Functional Feeding Group Dietary Item	15 g mammals Acute[1]	35 g mammals Acute[1]	1000 g mammals Acute[1]
Celeriac, cucurbit, fruiting and leafy veg., herbs, potato[2] 0.0187 lb ai/A/ 3 apps/7-d interval	*Herbivores/Insectivores*			
	Short Grass	**42.64**	**36.43**	**19.53**
	Tall Grass	**19.55**	**16.70**	**8.95**
	Broadleaf plants/ sm insects	**23.99**	**20.49**	**10.98**
	Fruits/pods/lg insects	**2.67**	**2.28**	**1.22**
	Granivore			
	Seeds	0.59	0.51	0.27
Cotton, grapes, hops 0.019 lb ai/A/ 2 Apps/21-d interval	*Herbivores/Insectivores*			
	Short Grass	**27.36**	**23.37**	**12.53**
	Tall Grass	**12.54**	**10.71**	**5.74**
	Broadleaf plants/ sm insects	**15.39**	**13.15**	**7.05**
	Fruits/pods/lg insects	**1.71**	**1.46**	0.78
	Granivore			
	Seeds	0.38	0.32	0.17
Almonds, walnuts, pears,	*Herbivores/Insectivores*			
	Short Grass	**33.84**	**28.91**	**15.49**

Crop	Functional Feeding Group Dietary Item	15 g mammals Acute[1]	35 g mammals Acute[1]	1000 g mammals Acute[1]
apple, plums, prunes[3] 0.0235 lb ai/A/ 2 apps/21-d interval	Tall Grass	**15.51**	**13.25**	**7.10**
	Broadleaf plants/ sm insects	**19.04**	**16.26**	**8.72**
	Fruits/pods/lg insects	**2.12**	**1.81**	0.97
	Granivore			
	Seeds	0.47	0.40	0.22
Avocado, citrus[3] 0.0235 lb ai/A/ 2 apps/30-d interval	*Herbivores/Insectivores*			
	Short Grass	**31.64**	**27.03**	**14.49**
	Tall Grass	**14.50**	**12.39**	**6.64**
	Broadleaf plants/ sm insects	**17.80**	**15.20**	**8.15**
	Fruits/pods/lg insects	**1.98**	**1.69**	0.91
	Granivore			
	Seeds	0.44	0.38	0.20
Mint 0.014 lb ai/A/ 3 apps/7-d interval	*Herbivores/Insectivores*			
	Short Grass	**31.93**	**27.27**	**14.62**
	Tall Grass	**14.63**	**12.50**	**6.70**
	Broadleaf plants/ sm insects	**17.96**	**15.34**	**8.22**
	Fruits/pods/lg insects	**2.00**	**1.70**	0.91
	Granivore			
	Seeds	0.44	0.38	0.20

Bolded RQ values exceed the listed LOC of 1

[1] Chronic RQ = (upper bound dose-based EEC, mg/kg-bw) / (NOAEL; mg/kg-bw). The upper bound EECs for a given body weight and NOAEL values adjusted for the given body weight are in Table 6.

[2] These crops were modeled using the maximum seasonal application rate divided by 3 applications.

[3] These crops were modeled using the maximum seasonal application rate divided by 2 applications

Table 20. Upper bound Chronic Dietary-based RQ Values for Mammals for Foliar Application of Abamectin

Crop and Application Rate	Dietary Item	EEC (mg/kg-diet)[1]	Chronic Mammalian RQ Value[1]
Celeriac, cucurbit, fruiting and leafy veg., herbs, potato[2] 0.0187 lb ai/A/ 3 apps/7-d interval	Short Grass	11.80	**4.92**
	Tall Grass	5.41	**2.25**
	Broadleaf plants/sm Insects	6.64	**2.76**
	Fruits/pods/seeds/lg insects	0.75	0.31
Cotton, grapes, hops 0.019 lb ai/A/ 2 Apps/21-d interval	Short Grass	7.57	**3.15**
	Tall Grass	3.47	**1.45**
	Broadleaf plants/sm Insects	4.26	**1.77**
	Fruits/pods/seeds/lg insects	0.47	0.20

Almonds, walnuts, apple, pears, plums, prunes[3] 0.0235 lb ai/A/ 2 apps/21-d interval	Short Grass	9.36	**3.90**
	Tall Grass	4.29	**1.79**
	Broadleaf plants/sm Insects	5.27	**2.19**
	Fruits/pods/seeds/lg insects	0.59	0.24
Avocado, citrus[3] 0.0235 lb ai/A/ 2 apps/30-d interval	Short Grass	8.75	**3.65**
	Tall Grass	4.01	**1.67**
	Broadleaf plants/sm Insects	4.92	**2.05**
	Fruits/pods/seeds/lg insects	0.55	0.23
Mint 0.014 lb ai/A/ 3 apps/7-d interval	Short Grass	8.83	**3.68**
	Tall Grass	4.05	**1.69**
	Broadleaf plants/sm Insects	4.97	**2.07**
	Fruits/pods/seeds/lg insects	0.55	0.23

Bolded RQ values exceed the listed LOC of 1

[1] Chronic RQ = (upper bound dietary-based EEC, mg/kg-diet) / (NOAEL; mg/kg-diet). The upper bound EECs for a crop are in Table 8 and chronic dietary NOAEL value is 2.40 mg/kg-diet, calculated from dose-based NOAEL of 0.12 mg/kg-bw

[2] These crops were modeled using the maximum seasonal application rate divided by 3 applications.

[3] These crops were modeled using the maximum seasonal application rate divided by 3 applications

Terrestrial Invertebrates

Currently, there is not a method to quantify risk to non-listed terrestrial invertebrates. Abamectin is registered for use to control terrestrial invertebrates such as leafminers, mites, beetles, and ants; therefore, abamectin exposure to non-target terrestrial invertebrates is expected to also impact these non-target species. The acute contact abamectin LD_{50} value for the honeybee is 0.41 μg ai/bee. This acute contact LD_{50} value was converted to a body weight value using 0.128 g as the body weight of a bee. The extrapolated acute contact toxicity value for terrestrial invertebrates is 3.20 ppm.[10] For the acute contact honeybee study, there was 13% mortality at the lowest concentration tested. Risk to insects were evaluated by comparing abamectin toxicity, as determined in the submitted honeybee acute contact study, with the residue levels from abamectin use on small and large insects generated as dietary-based EECs for birds and mammals using T-REX. Comparisons of the EECs for abamectin uses and the extrapolated acute toxicity are presented in Table 21. The small insect EECs are greater than the extrapolated acute contact value for all crops. So while the large insect EECs are less than the extrapolated LD_{50} value, abamectin may still have the potential to cause adverse effects to terrestrial invertebrates as the acute contact toxicity data indicates that abamectin is highly toxic to

[10] $$Extrapolated\ LD50_{terrestrial\ insect} = \frac{LD50_{honey bee}}{BW_{honey\ bee}} = \frac{0.41}{0.128}\frac{\mu g}{g} = 3.20\ \text{ppm}$$

the honeybee. Also, a foliage toxicity study indicated that foliar residues of abamectin may remain toxic to bees for two days following application.

Table 21. Comparisons of Small and Large Insect EECs from Foliar Application of Abamectin to the Extrapolated Acute Contact Honeybee Concentration

Application Rate (Crop)	Dietary Item	EEC (mg/kg-diet)	Extrapolated Acute Contact Value 3.20 (mg/kg)
Celeriac, cucurbit, fruiting and leafy veg., herbs, potato[1] 0.0187 lb ai/A/ 3 apps/7-d interval	Small insects	6.64	**>3.20**
	Large insects	0.74	<3.20
Cotton, grapes, hops 0.019 lb ai/A/ 2 Apps/21-d interval	Small insects	4.26	**>3.20**
	Large insects	0.47	<3.20
Almonds, walnuts, apple, pears, plums, prunes[2] 0.0235 lb ai/A/ 2 apps/21-d interval	Small insects	5.27	**>3.20**
	Large insects	0.59	<3.20
Avocado, citrus[2] 0.0235 lb ai/A/ 2 apps/30-d interval	Small insects	4.92	**>3.20**
	Large insects	0.55	<3.20
Mint 0.014 lb ai/A/ 3 apps/7-d interval	Small insects	4.97	**>3.20**
	Large insects	0.55	<3.20

Bold values indicate the EEC exceeds the extrapolated acute contact value.

[1]These crops were modeled using the maximum seasonal application rate divided by 3 applications.

[2] These crops were modeled using the maximum seasonal application rate divided by 3 applications

4.1.1.4 Non-target Terrestrial and Semi-Aquatic Plants

There are no toxicity data available to calculate RQ values for terrestrial and semi-aquatic plants.

4.2 Risk Description

The results of this risk assessment indicate that there are potential effects to listed freshwater fish species, listed and non-listed freshwater and estuarine/marine invertebrates, listed bird species, listed and non-listed mammalian species and terrestrial invertebrates from proposed new end-use abamectin product.

4.2.1 Risks to Aquatic Organisms

The proposed label indicates that Agri-Mek SC can not be applied within 25 ft for ground application or 150 ft for aerial application of lakes, reservoirs, rivers, permanent streams, marshes, pot holes, natural ponds, estuaries or commercial fish farm ponds. In addition, the label restricts cultivation within 25 ft of the aquatic area to allow growth of a vegetative filter strip.

4.2.1.1 Fish and Aquatic Invertebrates

Calculated estimated exposure concentrations EECs from run-off and spray drift, based on modeling, potentially pose acute and chronic risks to listed and non-listed freshwater and estuarine/marine invertebrates and potentially acute risks to listed freshwater fish.

<u>Acute</u>

Non-Listed Species
Acute risk to non-listed fish is not expected as there were no acute non-listed LOC exceedances for either freshwater or estuarine/marine fish. RQ values did exceed the acute non-listed LOC of 0.5 for estuarine/marine invertebrates for all crops (RQs 1.45-32.6) and for freshwater aquatic invertebrates from abamectin use on apples, celeriac, citrus, cotton, cucurbit, fruiting and leafy vegetables, grapes and potatoes.

Listed Species
Acute risk to listed estuarine/marine fish is not expected, as none of the crop scenario RQ values exceeded the listed LOC. The acute freshwater and estuarine/marine invertebrate RQ values exceed the Agency's acute listed LOC of 0.05 for all crop scenarios (RQs 0.085-1.91 for freshwater and 1.45-32.6 for estuarine/marine). The acute freshwater fish RQ values exceed the Agency's acute listed LOC for abamectin application to apples, celeriac, citrus, cotton, cucurbit, fruiting and leafy vegetables, grapes, and potatoes (RQs 0.087-0.203). In addition, fish are used as surrogates for aquatic phase amphibians and since there is potential risk to freshwater fish, risk to these species is also assumed.

Based on the calculated RQ values and a default concentration-response slope of 4.5, the probability of an individual mortality was calculated using the model IEC v1.1 (EPA, 2004a). For freshwater fish RQ values, this corresponds to a probability of mortality of less than 1 in 1 million to 1 in 1090, and for freshwater invertebrates, the probability of mortality ranges from less than 1 in 1.4 million to 1 in 1. Based on the calculated RQ's for estuarine/marine invertebrates, the probability of mortality is 1 in 1.

<u>Chronic</u>

Chronic risk to fish from abamectin use is not expected because the chronic RQ values did not exceed the LOC for any crop scenario. Chronic freshwater and estuarine/marine invertebrate RQ's exceed the chronic LOC (1.0) for all crop scenarios, except freshwater invertebrates exposed from abamectin application to pears (RQs 3.83-94.0 for freshwater and 65.7 -1611 for estuarine/marine).

The life-cycle toxicity test with the *Daphnia magna* resulted in a reproductive NOAEC of 0.030 µg ai/L which was the lowest concentration tested, but the adults in the two lowest treatment groups were observed to be pale and smaller compared to the controls (MRID 00153570). Therefore, the reproductive NOAEC appears to underestimate the true no effect concentration for Daphnia from chronic exposure to abamectin, as the NOAEC appears to be lower than 0.030 µg ai/L which may be underestimated risk. An extrapolated NOAEC value was calculated using the mysid shrimp toxicity data, but there is uncertainty as this extrapolated value may underestimate or overestimate risk.

4.2.1.2 Aquatic Plants

The aquatic plant RQ values did not exceed the acute non-listed or listed LOCs, however this is based on only two of the five guideline studies. These studies were conducted without measuring test concentrations, so the actual toxicity concentrations are not known. In addition, submitted studies were conducted with the use of a potential photosensitizing solvent; therefore, risk may be underestimated. If the nominal concentrations tested in the duckweed and green algae were maintained throughout the study, these untested species would have to be about 1,800 times more sensitive than current data indicate in order to exceed listed LOC's.

4.2.2 Risks to Terrestrial Organisms

4.2.2.1 Terrestrial Animals

<u>Birds and Mammals</u>

<u>Acute</u>

Non-Listed Species

Acute risk to non-listed birds and mammals from abamectin use is not expected, as the acute dose-based and dietary-based RQ values for birds and dose-based RQ values for mammals did not exceed the non-listed LOC of 0.5 for any crop scenario. However, regurgitation was observed in all the mallard duck acute oral treatment groups, therefore, the reported acute oral LD_{50} might be underestimating toxicity

Listed Species

Acute dietary risk for birds is not expected as the avian acute dietary-based RQ values did not exceed the acute endangered LOC of 0.1 for any crop scenario. However, the acute avian dose-based RQ values exceed the acute listed LOC for small birds feeding on small and tall grass, broadleaf plants and small insects for all crop scenarios, except for tall grasses for cotton, grapes and hops, and the LOC was exceeded for medium birds consuming short grasses for all crops except for cotton, grapes and hops (RQs 0.10-0.30). Since birds are surrogates for reptiles and land-phase amphibians, the potential for direct effects may exist for these taxa as well.

Acute dose-based RQ values exceeded the LOC for small and medium mammals consuming short and tall grass, broadleaf plants and small insects for all crops except for medium mammals consuming tall grass for cotton, grapes and hops (RQs 0.11-0.38). The acute dose-based listed LOC was also exceeded for large mammals feeding on short grasses for all crop scenarios and broadleaf plants and small insects for abamectin application to celeriac, cucurbit, fruiting and leafy vegetables, herbs and potatoes (RQs 0.10-0.17).

Based on the calculated RQ values and a concentration-response slope of 7.3 for the acute oral bird study and default concentration-response slope of 4.5 for mammals, the probability of an individual mortality was calculated using the model IEC v1.1 (EPA, 2004a). For the bird RQ values, this corresponds to a probability of mortality of less than 1 in seven trillion to 1 in 14,800, and for mammals, the probability of mortality ranges from less than 1 in 294,000 to 1 in 34.

Chronic

Chronic dose-based and dietary-based RQ values exceed the Agency's chronic LOC (1.0) for mammals feeding on short and tall grass, broadleaf plants and small insects (RQs 5.74-42.64 for dose-based and 1.45-4.92 for dietary based). Chronic dose-based RQ values also exceeded the LOC for small and medium mammals consuming fruits, pods or large insects for all crops and for large mammals for celeriac, cucurbit, fruiting and leafy vegetables, herbs and potatoes (RQs 1.22-2.67). No chronic dietary-based RQ values exceeded the chronic LOC for mammals consuming fruits, pods, seeds, or large insects or for seeds on a chronic dose basis.

For the mallard duck chronic reproduction toxicity study, the highest concentration tested (12 mg ai/kg) resulted in no statistically significant effect for survival, growth or reproduction, therefore, chronic RQ values were not calculated. This highest tested concentration, 12 mg ai/kg, was compared to the EECs, and all EECs were lower than this tested concentration.

The label states not to make more than two sequential applications of Agri-Mek SC, but the maximum seasonal amount allowed for these crops is greater than two applications at the maximum single application rate. Also, the maximum amount allowed per season for these crops is slightly less (0.0187 lb ai/A) than the amount applied using three applications at the maximum single application rate of 0.19 lb ai/A. Since the label does not specifically state the interval between the second sequential application and subsequent applications, three applications at seven day intervals using the maximum seasonal rate divided by three (0.0187 lb ai/A) was modeled for environmental exposure as the dietary exposure model T-REX can not model different application intervals or application rates at the same time. In addition, the application rate for almonds, walnuts, apples, citrus, avocados, pears, plums and prunes was modeled using the maximum seasonal application rate, 0.047 lb ai/A, divided by two applications (0.0235 lb ai/A).

The label indicates that the maximum single application rate for these crops is 0.023 lb ai/A, and with a maximum number of 2 applications, calculates 0.046. The label also indicates that the maximum seasonal application rate is 8.5 fl oz/A which calculates to 0.04648 lb ai/A, therefore it is not known if the reported 0.047 lb ai/A is due to rounding. Whether abamectin was modeled at 0.0235 or 0.023 lb ai/A, it resulted in exactly the same LOC exceedances.

In an effort to compare avian and mammalian acute and chronic dietary RQ's for other application scenarios, applications were modeled using the maximum single rate of 0.019 lb ai/A and three applications applied seven days apart. In addition, EECs were calculated using the maximum single application rate applied twice seven days apart with the assumption that subsequent applications would be applied at a later date in which the residues from the previous applications would have dissipated. For both birds and mammals using these two alternative application scenarios, the acute RQ values exceeded the listed LOC for exactly the same dietary items and body classes as the maximum seasonal application rate divided by three applications, except for large mammals consuming broadleaf plants and small insects for the two application scenario. Also, the chronic RQ values for mammals using the two alternative application methods exceeded the LOC for the same dietary items and body classes, except for large mammals consuming fruits, pods and large insects for the two application scenario. Therefore, except for large mammals consuming broadleaf plants, small and large insects, fruits and pods, acute and chronic RQ values will exceed the LOC whether abamectin is applied two or three times at the maximum single application rate or whether it is applied at the maximum seasonal rate divided by three applications.

Only the short grass EEC modeled using the maximum single rate of 0.019 lb ai/A and three applications applied every seven days was equal to the highest concentration tested in the mallard reproduction study (EEC = 11.99 vs. 12 ppm), but this modeling scenario is very slightly more (0.001 lb ai/A) than the maximum seasonal rate allowed (0.057 vs. 0.056 lb ai/A). In addition, EECs were calculated using the maximum single application rate applied twice seven days, and these EECs were lower than the mallard study concentration. Moreover, the level in which an adverse effect will not occur is not known but is observed to be at least 12 mg ai/kg. During the pilot study for the mallard reproduction study, the average number of eggs laid was markedly less in the 64 mg ai/kg treatment group. Overall, if two sequential applications at the single maximum application rate are applied seven days apart, and any subsequent application, even at the single maximum application rate, is applied more than seven days after the last application, the calculated EECs will be less than the highest concentration tested in the mallard reproduction study. Therefore, the potential for chronic risk to birds is not anticipated.

Terrestrial Invertebrates

Abamectin is highly toxic to the honeybee. The calculated EECs for small insects were greater than the extrapolated acute contact value (LD50) for the honeybee. Additionally, an incident was reported in EFED's Ecological Incident Information System (EIIS) database (Incident No. I008611-001), where thousands of bees were killed during a registered use of abamectin on avocados in San Diego County CA in 1999. A foliar residue study on citrus demonstrated that foliar residues of abamectin are toxic to honeybees for approximately 48 hours after application (Appendix D). In addition, abamectin is registered for use to control terrestrial invertebrates such as leafminers, mites, beetles, and ants; therefore, abamectin exposure to non-target terrestrial invertebrates is expected to also impact these non-target species. Therefore, the proposed abamectin use is expected to be toxic to terrestrial invertebrates and beneficial insects.

The proposed label has environmental hazard labeling regarding bees and indicates not to apply when weather conditions favor drift from target areas, and that the product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. It also indicates not to apply the product or allow it to drift to blooming crops or weds if bees are visiting the treatment area.

4.2.2.2 Terrestrial Plants

There are no data regarding the toxicity of abamectin to terrestrial plants, therefore RQ values were not calculated.

According to the EIIS incidence database there were three incidents for almonds in June 1998 from direct application of Agri-Mek in California (I007644-001, 002, 003). The type of injury to the almonds was not reported, but was reported to occur to all applied (34-106 acres). In addition, Agri-Mek was applied directly to 34 acres of grapes in June 2000 in California, with all 34 acres affected (I10837-019). They type of injury was not reported, and in the report, the inspector stated "Questionable" in regards to the question "Application within Label". All of these incidences were classified as possible.

Since there is no submitted toxicity data to evaluate terrestrial plants, and there are reported possible incidences for almonds and grapes, adverse risk to terrestrial plants can not be precluded.

4.2.3 Federally Threatened and Endangered (Listed) Species Concerns

4.2.3.1 Taxonomic Groups potentially at Risk

The Agency's LOC is exceeded for Federally listed Endangered and Threatened birds, mammals, and freshwater and estuarine/marine invertebrates for this proposed new end-use abamectin product for all listed crops (almonds, walnuts, apples, avocados, celeriac, citrus, cotton, cucurbit, fruiting vegetables, grapes, herbs, hops, leafy vegetables, mint, pears, plums, prunes and potatoes). The acute listed LOC is also exceeded for freshwater fish for abamectin use on apples, celeriac, citrus, cotton, cucurbit, fruiting and leafy vegetable, grapes, and potatoes. Since there is no data for reptiles and land-phase amphibians, birds were used as surrogates for these species, and due to potential risk to birds, risk to these species are assumed. In addition, fish are used as surrogates for aquatic phase amphibians and since there is potential risk to freshwater fish, risk to these species is also assumed. Abamectin is highly toxic to bees, and the potential for adverse risk may occur from abamectin use. In addition, because of the lack of submitted terrestrial plant toxicity data and reported possible incidences involving almonds and grapes, adverse risk to terrestrial and semi-aquatic plants can not be precluded. A list of endangered/threatened species at the state level for these taxonomic groups and crops is attached to this assessment (Appendix F).

4.2.3.2 Direct and Indirect Effects

Due to the potential for direct effects to listed birds, reptiles, amphibians, mammals, fish, aquatic and terrestrial invertebrates, the potential for indirect effects may exist. The indirect effects may be from loss of the above species due to impacts on survival, growth, and reproduction. This loss may result in structural and functional changes of both the aquatic and terrestrial ecosystems. Changes may be manifested in the form of disruption of food chain and reduced biodiversity.

4.3 Description of Assumptions, Limitations, Uncertainties and Data Gaps.

4.3.1 Related to Exposure for All Species

4.3.1.1 General Exposure Parameters

- This screening-level risk assessment relies on labeled statements of the maximum rate of abamectin application, the maximum number of applications, and the shortest interval between applications. Together, these assumptions constitute a maximum use scenario. The frequency at which actual uses approach these maximums is dependant on resistance to the insecticide, timing of applications, and market forces.

- The label states that for a number of crops (celeriac, cucurbit, fruiting vegetable, leafy vegetable, mint and potatoes (for potato psyllid) not to make more than two sequential applications of Agri-Mek SC or any other foliar applied abamectin containing product, but the maximum seasonal amount allowed for these crops is greater than two applications at the maximum single application rate. The application interval for these crops is 7 days, and the label does not state how long to wait between the second sequential application and subsequent applications. Also, the maximum amount allowed per season for these crops, except mint, is slightly less (0.001 lb ai/A) than the amount applied using three applications at the maximum single application rate. Since the label does not specifically state the interval between the second sequential application and subsequent applications, three applications at seven day intervals using the maximum seasonal rate divided by three was modeled for environmental exposure. In addition, alternative application scenarios were also modeled and described in the Risk Characterization section (section 4.0)

- For application to herbs, the label states not to make more than two applications of Agri-Mek SC per single cutting (harvest), but the maximum amount allowed per cropping season is greater than two applications at the maximum single application rate but slightly less than three applications at the maximum single application rate. Therefore, environmental exposure concentrations were modeled in the same manner as discussed above.

- For application to almonds, walnuts, apples, avocados, citrus, pears, plums and prunes, the label states that for the maximum amount per season, not to apply more than 8.5 fl oz/A (or 0.047 lb ai/A) of Agri-Mek SC or any other foliar applied abamectin containing product in a growing season. Based on the density of the formulation, 8.5 fl oz/A calculates to 0.04648 lb ai/A, therefore, it is not known if the reported 0.047 lb ai/A is a rounding issue or if another abamectin product can be applied at 0.001 lb ai/A. In addition, the single maximum application rate reported is 0.023 lb ai/A, and two applications would be 0.046 lb ai/A. For this assessment, abamectin was modeled at 0.0235 lb ai/A (0.047 divided by two applications). Abamectin was also modeled at 0.023 lb ai/A which resulted in the same LOC exceedances as the 0.0235 lb ai/A application.

- The maximum seasonal application rate for cotton, potatoes (for Colorado potato beetle) and grapes on the label is reported as 0.038 lb ai/A, but the label also indicates not to apply more than 6.75 fl oz/A of Agri-Mek SC per season which calculates to 0.0369 (0.037) lb ai/A. The maximum single application rate for cotton, potatoes and grapes is 0.019 lb ai/A, and if applied twice per season, the maximum seasonal application rate would be 0.038 lb ai/A. Therefore, a maximum seasonal application rate of 0.038 lb ai/A was used for determining environmental exposure concentrations.

4.3.2 Related to Exposure Assessment

4.3.2.1 Related to Exposure for Aquatic Species

For an acute risk assessment, there is no averaging time for exposure. An instantaneous peak concentration, with a 1 in 10 year return frequency, is assumed. The use of the instantaneous peak assumes that instantaneous exposure is of sufficient duration to elicit acute effects comparable to those observed over more protracted exposure periods tested in the laboratory, typically 48 to 96 hours. In the absence of data regarding time-to-toxic event analyses and latent responses to instantaneous exposure, the degree to which risk is overestimated cannot be quantified.

4.3.2.2 Related to Exposure for Terrestrial Species

Screening-level risk assessments for applications of pesticides consider dietary exposure alone. Other routes of exposure, not considered in this assessment, are discussed below:

Incidental soil ingestion exposure - This risk assessment does not consider incidental soil ingestion. Available data suggests that up to 15% of the diet can consist of incidentally ingested soil depending on the species and feeding strategy (Beyer et al., 1994). Being that the proposed new use is a granular formulation, significant exposure via this scenario is not expected.

Inhalation Exposure - The screening risk assessment does not consider inhalation exposure. Such exposure may occur through three potential sources: (1) spray material in droplet form at the time of application (2) vapor phase pesticide volatilizing from treated surfaces, and (3) airborne particulate (soil, vegetative material, and pesticide dusts). Being that the proposed new use is a granular formulation, significant inhalation exposure is not expected.

Dermal Exposure - The screening assessment does not consider dermal exposure, except as it is indirectly included in calculations of RQ's based on lethal doses per unit of pesticide treated area. Dermal exposure may occur through three potential sources: (1) direct application of spray to terrestrial wildlife in the treated area or within the drift footprint, (2) incidental contact with contaminated vegetation, or (3) contact with contaminated water or soil. Being that the proposed new use is a use is a granular formulation, significant exposure via these scenarios is not expected.

Drinking Water Exposure - Drinking water exposure to a pesticide active ingredient may be the result of consumption of surface water or consumption of the pesticide in dew or other water on the surfaces of treated vegetation. For pesticide active ingredients with a potential to dissolve in runoff, puddles on the treated field may contain the chemical.

4.3.3 Related to Effects Assessment

4.3.3.1 Age class and sensitivity of effects thresholds

It is generally recognized that test organism age may have a significant impact on the observed sensitivity to a toxicant. The screening risk assessment acute toxicity data for fish are collected on juvenile fish between 0.1 and 5 grams. Aquatic invertebrate acute testing is performed on recommended immature age classes (e.g., first instar for daphnids, second instar for amphipods, stoneflies and mayflies, and third instar for midges). Similarly, acute dietary testing with birds is also performed on juveniles, with mallard being 5-10 days old and quail 10-14 days old.

Testing of juveniles may overestimate toxicity at older age classes for active ingredients, such as abamectin, that act directly (without metabolic transformation) because younger age classes may not have the enzymatic systems associated with detoxifying xenobiotics. The screening risk assessment has no current provisions for a generally applied method that accounts for this uncertainty. Insofar as the available toxicity data may provide ranges of sensitivity information with respect to age class, the risk assessment uses the most sensitive life-stage information as the conservative screening endpoint.

4.3.3.2 Aquatic Studies Conducted Above Water Solubility

A number of the acute toxicity tests, primarily for fish, oyster and aquatic plants, were conducted as nominal and were above the known solubility limit for abamectin (<1.0 µg/L in tap water). Therefore, the dissolved bioavailable form in these toxicity tests is unknown. Risk quotients calculated from these values may underestimate risks.

4.3.3.3 Lack of Effect Studies and Complete Review of Aquatic Plant Data

There are no chronic toxicity data available for the Agency to access chronic risk of abamectin to marine and estuarine fish. There is also no registered submitted data for vegetative vigor and seedling emergence toxicity data for terrestrial plants. An acute oral toxicity study with a passerine bird species and a chronic reproduction study with the bobwhite quail are also not available. Toxicity tests with sediment organisms are also not available, and the potential for abamectin to be present in the sediment exists. There are only two of the five studies addressing the acute toxicity of abamectin to aquatic plants available.

4.3.3.4 Uncertainty in LD50 for Mallards and NOAEC for Chronic Daphnia Study

The acute oral LD_{50} for mallard ducks (*Anas platyrhynchos*) is 85 mg ai/kg-bw (MRID 00097859, moderately toxic). However, regurgitation was observed in all the mallard duck acute oral treatment groups, therefore, the reported acute oral LD_{50} might be underestimating toxicity.

The life-cycle toxicity test with the *Daphnia magna* resulted in a reproductive NOAEC of 0.030 µg ai/L which was the lowest concentration tested, but the adults in the two lowest treatment groups were observed to be pale and smaller compared to the controls (MRID 00153570). Therefore, the reproductive NOAEC appears to underestimate the true no effect concentration for Daphnia from chronic exposure to abamectin, as the NOAEC appears to be lower than 0.030 µg ai/L which may be underestimating risk.

4.3.3.5 Use of the Most Sensitive Species Tested

Although the screening risk assessment relies on a selected toxicity endpoint from the most sensitive species tested, it does not necessarily mean that the selected toxicity endpoints reflect sensitivity of the most sensitive species existing in a given environment. The relative position of the most sensitive species tested in the distribution of all possible species is a function of the overall variability among species to a particular chemical. In the case of listed species, there is uncertainty regarding the relationship of the listed species' sensitivity and the most sensitive species tested.

5.0 Literature Cited

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Appendix A. EIIS Incident Reports

Incident No.	Year	State	Organism Affected	No. Acres/Animal Affected	Mixture – if mixture; abamectin plus names of others chemicals	Certainty index	Comments
I007644-001	June 1998	CA	Almonds	All 65	Agri-Mek (EPA# 100-898) abamectin	possible	Almond field treated directly w/Agri-Mek. Type of injury not reported.
I007644-002	June 1998	CA	Almonds	All 34	Agri-Mek (EPA# 100-898) abamectin	possible	Almond field treated directly w/Agri-Mek. Type of injury not reported.
I007644-003	June 1998	CA	Almonds	All 106	Agri-Mek (EPA# 100-898) abamectin	possible	Almond field treated directly w/Agri-Mek. Type of injury not reported.
I008611-001	April 1999	CA	Bees	100 colonies	Agri-Mek (EPA# 100-898) abamectin	probable	Section 18 exemption for avocados for thrip problem. Southern California beekeepers reported bee kills where beehives kept in avocado groves. Report indicates that contrary to recommendation helicopters have been spraying during the day instead of at night as County instructions favored; also the labels warn of drift if bees are visiting crops. Report indicated that thousands of dead bees littered the bee yard. The County sent a representative to take samples.
I010221-001	April 2000	TX	Catfish	100 dead (1/8 acre pond)	PT 370 Ascend Fire Ant Stopper (EPA# 499-370) abamectin; Award (EPA#100-722) fenoxycarb	probable	1/8 lb of both Ascend and Award to applied to areas around pond. 1 to 1 ½ in. of rain fell the next day. 100 catfish of varying sizes and age died 2 days after application. No other species in pond observed dead. Pond located in woods w/little to no runoff or stream flow, and is filled w/well water.
I-10837-019	June 2000	CA	Grapes	All 34	Agri-Mek (EPA# 100-898) abamectin	possible	Applied at 10 gal/A directly to foliar crop by airblast (broadcast). Type of injury not reported.

							Registrant inspector in responding to question "Application within Label" stated "Questionable".
I014237-001	June 2003	FL	Bait Fish (small)	"tons"	Agri-Mek 0.15 (EPA# 100-898) abamectin	probable	Agri-Mek applied to citrus grove less than 25 ft from lake at a reported rate of 10 oz. Application made in morning and rain fell in afternoon. One week after application, "tons" of dead small bait fish observed around edges of lake.

Appendix B. PRZM/EXAMS Output Files

Almonds & Walnuts

stored as A49nd.out
Chemical: Abamectin
PRZM environment:
CAalmond_WirrigSTD.txt modified Tueday, 26 August 2008 at 05:16:36
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w23232.dvf modified Tueday, 26 August 2008 at 05:15:38
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.04042	0.03762	0.02937	0.01716	0.01382	0.007031
1962	0.1863	0.1721	0.1305	0.09103	0.0762	0.0358
1963	0.0782	0.07558	0.06845	0.06027	0.05784	0.04969
1964	0.06302	0.06128	0.05414	0.04567	0.0432	0.03916
1965	0.05042	0.04893	0.04575	0.03988	0.03742	0.03374
1966	0.04619	0.04444	0.04009	0.03475	0.03128	0.02794
1967	0.05962	0.05763	0.05198	0.04225	0.03895	0.03318
1968	0.04064	0.03904	0.03608	0.03243	0.03128	0.0257
1969	0.04048	0.03924	0.03552	0.03225	0.0311	0.02682
1970	0.07429	0.0704	0.05852	0.04059	0.03467	0.02976
1971	0.04454	0.04288	0.03889	0.03565	0.03428	0.0292
1972	0.04066	0.03907	0.03449	0.03069	0.02964	0.02529
1973	0.04234	0.04112	0.03759	0.03409	0.03264	0.02961
1974	0.04055	0.03859	0.036	0.03547	0.03502	0.02774
1975	0.03886	0.03724	0.03331	0.03013	0.02918	0.02381
1976	0.03948	0.03754	0.03411	0.02954	0.02858	0.02099
1977	0.03813	0.03658	0.03265	0.02888	0.02769	0.02172
1978	0.05851	0.05568	0.04864	0.04252	0.03918	0.03234
1979	0.04474	0.04354	0.03824	0.035	0.03424	0.02998
1980	0.04284	0.04167	0.03884	0.03696	0.03562	0.03011
1981	0.06692	0.06301	0.05304	0.04275	0.03634	0.02852
1982	0.07453	0.071	0.0596	0.04866	0.04527	0.041
1983	0.05544	0.05408	0.04511	0.04347	0.0423	0.03868
1984	0.04931	0.04785	0.04341	0.0384	0.0362	0.03178
1985	0.04294	0.04086	0.03631	0.03017	0.02883	0.02434
1986	0.05697	0.05398	0.04572	0.0369	0.03431	0.02965
1987	0.03928	0.03727	0.03335	0.02981	0.02853	0.0232
1988	0.03674	0.03521	0.03225	0.02849	0.02733	0.02119
1989	0.04267	0.0405	0.03414	0.02889	0.02756	0.02245
1990	0.04835	0.04679	0.03988	0.03336	0.03189	0.02694

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258065	0.1863	0.1721	0.1305	0.09103	0.0762	0.04969
0.064516129	0.0782	0.07558	0.06845	0.06027	0.05784	0.041

0.096774194	0.07453	0.071	0.0596	0.04866		0.04527	0.03916
0.129032258	0.07429	0.0704	0.05852	0.04567		0.0432	0.03868
0.161290323	0.06692	0.06301	0.05414	0.04347		0.0423	0.0358
0.193548387	0.06302	0.06128	0.05304	0.04275		0.03918	0.03374
0.225806452	0.05962	0.05763	0.05198	0.04252		0.03895	0.03318
0.258064516	0.05851	0.05568	0.04864	0.04225		0.03742	0.03234
0.290322581	0.05697	0.05408	0.04575	0.04059		0.03634	0.03178
0.322580645	0.05544	0.05398	0.04572	0.03988		0.0362	0.03011
0.35483871	0.05042	0.04893	0.04511	0.0384		0.03562	0.02998
0.387096774	0.04931	0.04785	0.04341	0.03696		0.03502	0.02976
0.419354839	0.04835	0.04679	0.04009	0.0369		0.03467	0.02965
0.451612903	0.04619	0.04444	0.03988	0.03565		0.03431	0.02961
0.483870968	0.04474	0.04354	0.03889	0.03547		0.03428	0.0292
0.516129032	0.04454	0.04288	0.03884	0.035		0.03424	0.02852
0.548387097	0.04294	0.04167	0.03824	0.03475		0.03264	0.02794
0.580645161	0.04284	0.04112	0.03759	0.03409		0.03189	0.02774
0.612903226	0.04267	0.04086	0.03631	0.03336		0.03128	0.02694
0.64516129	0.04234	0.0405	0.03608	0.03243		0.03128	0.02682
0.677419355	0.04066	0.03924	0.036	0.03225		0.0311	0.0257
0.709677419	0.04064	0.03907	0.03552	0.03069		0.02964	0.02529
0.741935484	0.04055	0.03904	0.03449	0.03017		0.02918	0.02434
0.774193548	0.04048	0.03859	0.03414	0.03013		0.02883	0.02381
0.806451613	0.04042	0.03762	0.03411	0.02981		0.02858	0.0232
0.838709677	0.03948	0.03754	0.03335	0.02954		0.02853	0.02245
0.870967742	0.03928	0.03727	0.03331	0.02889		0.02769	0.02172
0.903225806	0.03886	0.03724	0.03265	0.02888		0.02756	0.02119
0.935483871	0.03813	0.03658	0.03225	0.02849		0.02733	0.02099
0.967741935	0.03674	0.03521	0.02937	0.01716		0.01382	0.007031
0.1	0.074506	0.07094	0.059492	0.048361		0.045063	0.039112
						Average of yearly averages:	0.028912

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:

Output File: CAAlmond

Metfile:	w23232.dvf			
PRZM scenario:	CAalmond_WirrigSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	

Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.0263	kg/ha	
Application Efficiency:	APPEFF	0.99	fraction	
Spray Drift	DRFT	0.01	fraction of application rate applied to pond	
Application Date	Date	6-May	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	21	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Apples

stored as PAApples.out
Chemical: Abamectin
PRZM environment:
PAappleSTD.txt modified Tueday, 26 August 2008 at 05:16:42
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w14751.dvf modified Tueday, 26 August 2008 at 05:15:00
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.1297	0.1202	0.09809	0.08633	0.07887	0.03257
1962	0.1091	0.1048	0.09207	0.08378	0.08291	0.06465
1963	0.08413	0.08276	0.08112	0.08014	0.07843	0.06935
1964	0.1102	0.1058	0.09275	0.08206	0.07893	0.07167
1965	0.08485	0.08388	0.08044	0.07455	0.07202	0.06443
1966	0.2341	0.22	0.1795	0.1396	0.1277	0.07623
1967	0.1997	0.1925	0.1709	0.1447	0.1349	0.109
1968	0.2175	0.2059	0.1717	0.1402	0.132	0.1061
1969	0.4276	0.4026	0.3431	0.2618	0.2348	0.1472
1970	0.2222	0.2152	0.1944	0.1863	0.1818	0.1615
1971	0.283	0.2684	0.2253	0.1945	0.1802	0.14
1972	0.6103	0.5716	0.4606	0.3474	0.3116	0.1998
1973	0.2601	0.2502	0.2208	0.2035	0.2009	0.1769
1974	0.212	0.2058	0.1902	0.1769	0.1688	0.1446
1975	0.3447	0.3255	0.27	0.2154	0.197	0.1434
1976	0.2086	0.2012	0.181	0.1611	0.155	0.1432

1977	0.1525	0.1522	0.1494	0.1485	0.1466	0.1193
1978	0.1635	0.1575	0.1447	0.1267	0.1195	0.1039
1979	0.1498	0.1443	0.133	0.1203	0.114	0.09969
1980	0.0978	0.09458	0.09239	0.09027	0.08997	0.07791
1981	0.1141	0.1102	0.09913	0.091	0.08601	0.07523
1982	0.1074	0.1034	0.09186	0.08491	0.08043	0.07089
1983	0.09096	0.08812	0.07998	0.06195	0.0573	0.05515
1984	0.1063	0.1024	0.09483	0.08547	0.07987	0.06588
1985	0.09061	0.08677	0.07597	0.06727	0.0667	0.05932
1986	0.1731	0.1646	0.1424	0.1172	0.1091	0.07807
1987	0.1499	0.1441	0.1288	0.1115	0.1074	0.0899
1988	0.1514	0.1451	0.1263	0.108	0.1015	0.09059
1989	0.1653	0.1591	0.1406	0.1269	0.1208	0.0931
1990	0.1436	0.1387	0.1241	0.11	0.1081	0.09543

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258	0.6103	0.5716	0.4606	0.3474	0.3116	0.1998
0.064516	0.4276	0.4026	0.3431	0.2618	0.2348	0.1769
0.096774	0.3447	0.3255	0.27	0.2154	0.2009	0.1615
0.129032	0.283	0.2684	0.2253	0.2035	0.197	0.1472
0.16129	0.2601	0.2502	0.2208	0.1945	0.1818	0.1446
0.193548	0.2341	0.22	0.1944	0.1863	0.1802	0.1434
0.225806	0.2222	0.2152	0.1902	0.1769	0.1688	0.1432
0.258065	0.2175	0.2059	0.181	0.1611	0.155	0.14
0.290323	0.212	0.2058	0.1795	0.1485	0.1466	0.1193
0.322581	0.2086	0.2012	0.1717	0.1447	0.1349	0.109
0.354839	0.1997	0.1925	0.1709	0.1402	0.132	0.1061
0.387097	0.1731	0.1646	0.1494	0.1396	0.1277	0.1039
0.419355	0.1653	0.1591	0.1447	0.1269	0.1208	0.09969
0.451613	0.1635	0.1575	0.1424	0.1267	0.1195	0.09543
0.483871	0.1525	0.1522	0.1406	0.1203	0.114	0.0931
0.516129	0.1514	0.1451	0.133	0.1172	0.1091	0.09059
0.548387	0.1499	0.1443	0.1288	0.1115	0.1081	0.0899
0.580645	0.1498	0.1441	0.1263	0.11	0.1074	0.07807
0.612903	0.1436	0.1387	0.1241	0.108	0.1015	0.07791
0.645161	0.1297	0.1202	0.09913	0.091	0.08997	0.07623
0.677419	0.1141	0.1102	0.09809	0.09027	0.08601	0.07523
0.709677	0.1102	0.1058	0.09483	0.08633	0.08291	0.07167
0.741935	0.1091	0.1048	0.09275	0.08547	0.08043	0.07089
0.774194	0.1074	0.1034	0.09239	0.08491	0.07987	0.06935
0.806452	0.1063	0.1024	0.09207	0.08378	0.07893	0.06588
0.83871	0.0978	0.09458	0.09186	0.08206	0.07887	0.06465
0.870968	0.09096	0.08812	0.08112	0.08014	0.07843	0.06443
0.903226	0.09061	0.08677	0.08044	0.07455	0.07202	0.05932
0.935484	0.08485	0.08388	0.07998	0.06727	0.0667	0.05515
0.967742	0.08413	0.08276	0.07597	0.06195	0.0573	0.03257
0.1	0.33853	0.31979	0.26553	0.21421	0.20051	0.16007

Average of yearly averages: 0.100832

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: PAApples

Description	Variable Name	Value	Units	Comments
Metfile:	w14751.dvf			
PRZM scenario:	PAappleSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.0263	kg/ha	
Application Efficiency:	APPEFF	0.99	fraction	
Spray Drift	DRFT	0.01	fraction of application rate applied to pond	
Application Date	Date	15-06	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	21	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Avocado

stored as FLAvocado.out
Chemical: Abamectin
PRZM environment: modified Tueday, 26 August 2008 at 05:16:38

FLavocadoSTD.txt
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w12839.dvf modified Tueday, 26 August 2008 at 05:14:20
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.08559	0.07854	0.05815	0.04895	0.04471	0.02267
1962	0.0994	0.09215	0.07112	0.05737	0.05277	0.03224
1963	0.1122	0.1042	0.08108	0.06411	0.05753	0.03613
1964	0.1057	0.0986	0.08067	0.06656	0.06339	0.04367
1965	0.1107	0.1035	0.08255	0.06902	0.06265	0.04452
1966	0.1126	0.1055	0.08778	0.08032	0.07547	0.0513
1967	0.1333	0.1254	0.1052	0.0844	0.07945	0.05455
1968	0.119	0.1144	0.1038	0.08812	0.08123	0.05369
1969	0.1151	0.108	0.08723	0.07354	0.06721	0.0449
1970	0.1236	0.1161	0.09566	0.08259	0.07511	0.04773
1971	0.1095	0.1023	0.08199	0.06817	0.06359	0.04208
1972	0.1252	0.1173	0.09597	0.08014	0.07283	0.04585
1973	0.1104	0.1033	0.08259	0.06883	0.06229	0.04094
1974	0.1059	0.09874	0.07793	0.06439	0.06025	0.03785
1975	0.1044	0.09731	0.07669	0.06283	0.05643	0.03503
1976	0.103	0.09601	0.07565	0.06181	0.05588	0.03494
1977	0.1895	0.175	0.1344	0.1144	0.09966	0.05722
1978	0.1186	0.1115	0.09066	0.07714	0.07016	0.04766
1979	0.3626	0.3324	0.2721	0.1868	0.1573	0.08354
1980	0.1429	0.1351	0.1121	0.1031	0.09322	0.06416
1981	0.117	0.1096	0.08832	0.07509	0.06799	0.04728
1982	0.1315	0.1227	0.09684	0.08019	0.07318	0.04522
1983	0.1084	0.1012	0.08001	0.0666	0.06126	0.03958
1984	0.1108	0.1043	0.08523	0.07678	0.07005	0.04372
1985	0.1087	0.1014	0.08023	0.06697	0.06062	0.04117
1986	0.1066	0.09954	0.07983	0.06589	0.05971	0.03763
1987	0.1042	0.09704	0.07626	0.06255	0.05713	0.037
1988	0.1049	0.09785	0.0772	0.06339	0.05933	0.03724
1989	0.1037	0.09634	0.07504	0.06166	0.05524	0.03438
1990	0.109	0.1016	0.07992	0.06982	0.06428	0.03898

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258	0.3626	0.3324	0.2721	0.1868	0.1573	0.08354
0.064516	0.1895	0.175	0.1344	0.1144	0.09966	0.06416
0.096774	0.1429	0.1351	0.1121	0.1031	0.09322	0.05722
0.129032	0.1333	0.1254	0.1052	0.08812	0.08123	0.05455
0.16129	0.1315	0.1227	0.1038	0.0844	0.07945	0.05369
0.193548	0.1252	0.1173	0.09684	0.08259	0.07547	0.0513
0.225806	0.1236	0.1161	0.09597	0.08032	0.07511	0.04773
0.258065	0.119	0.1144	0.09566	0.08019	0.07318	0.04766
0.290323	0.1186	0.1115	0.09066	0.08014	0.07283	0.04728
0.322581	0.117	0.1096	0.08832	0.07714	0.07016	0.04585
0.354839	0.1151	0.108	0.08778	0.07678	0.07005	0.04522

0.387097	0.1126	0.1055	0.08723	0.07509	0.06799	0.0449
0.419355	0.1122	0.1043	0.08523	0.07354	0.06721	0.04452
0.451613	0.1108	0.1042	0.08259	0.06982	0.06428	0.04372
0.483871	0.1107	0.1035	0.08255	0.06902	0.06359	0.04367
0.516129	0.1104	0.1033	0.08199	0.06883	0.06339	0.04208
0.548387	0.1095	0.1023	0.08108	0.06817	0.06265	0.04117
0.580645	0.109	0.1016	0.08067	0.06697	0.06229	0.04094
0.612903	0.1087	0.1014	0.08023	0.0666	0.06126	0.03958
0.645161	0.1084	0.1012	0.08001	0.06656	0.06062	0.03898
0.677419	0.1066	0.09954	0.07992	0.06589	0.06025	0.03785
0.709677	0.1059	0.09874	0.07983	0.06439	0.05971	0.03763
0.741935	0.1057	0.0986	0.07793	0.06411	0.05933	0.03724
0.774194	0.1049	0.09785	0.0772	0.06339	0.05753	0.037
0.806452	0.1044	0.09731	0.07669	0.06283	0.05713	0.03613
0.83871	0.1042	0.09704	0.07626	0.06255	0.05643	0.03503
0.870968	0.1037	0.09634	0.07565	0.06181	0.05588	0.03494
0.903226	0.103	0.09601	0.07504	0.06166	0.05524	0.03438
0.935484	0.0994	0.09215	0.07112	0.05737	0.05277	0.03224
0.967742	0.08559	0.07854	0.05815	0.04895	0.04471	0.02267
0.1	0.14194	0.13413	0.11141	0.101602	0.092021	0.056953
					Average of yearly averages:	0.044096

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: FLAvocado

Metfile:	w12839.dvf			
PRZM scenario:	FLavocadoSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.0263	kg/ha	

Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	4-May	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	30	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Celeriac

stored as FLCeleriac.out
Chemical: Abamectin
PRZM environment:
FLcarrotSTD.txt modified Tueday, 26 August 2008 at 05:16:38
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w12844.dvf modified Tueday, 26 August 2008 at 05:14:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
1961	0.05137	0.04779	0.03901	0.02904		0.02987	0.01335
1962	0.2173	0.2056	0.1831	0.1507		0.1453	0.07778
1963	0.2796	0.267	0.231	0.1774		0.1589	0.1002
1964	0.3291	0.3171	0.2823	0.2533		0.2411	0.1621
1965	0.379	0.3599	0.3211	0.2751		0.2479	0.1966
1966	0.5594	0.5311	0.4475	0.3731		0.3554	0.2479
1967	0.3088	0.2977	0.2767	0.2504		0.243	0.2108
1968	0.4022	0.388	0.3507	0.2999		0.2884	0.2167
1969	0.5095	0.4777	0.4064	0.3401		0.3185	0.2442
1970	0.2504	0.243	0.2289	0.2168		0.2126	0.1928
1971	0.2942	0.2778	0.2504	0.1961		0.1837	0.147
1972	0.431	0.4132	0.3511	0.2761		0.2499	0.174
1973	0.2746	0.2622	0.2373	0.2214		0.2161	0.1698
1974	0.2463	0.239	0.2186	0.1977		0.1893	0.154
1975	0.2522	0.239	0.216	0.178		0.164	0.1359
1976	0.2291	0.2194	0.1902	0.176		0.1687	0.129
1977	0.3443	0.3279	0.2792	0.2161		0.1933	0.1369
1978	0.3669	0.344	0.2902	0.2391		0.2163	0.161
1979	0.3784	0.356	0.3187	0.2627		0.2376	0.172
1980	0.223	0.2137	0.2023	0.1816		0.1783	0.1543
1981	0.284	0.2673	0.2337	0.2159		0.2008	0.1391
1982	0.3897	0.3722	0.3228	0.2527		0.235	0.1805

1983	0.2748	0.2626	0.2301	0.2105		0.2049	0.1786
1984	0.2796	0.2673	0.2306	0.1921		0.1876	0.1649
1985	0.3228	0.3076	0.2669	0.2248		0.2173	0.16
1986	0.2509	0.2393	0.2255	0.2119		0.1982	0.1514
1987	0.2639	0.2498	0.2208	0.2046		0.192	0.1498
1988	0.4108	0.3877	0.3198	0.2826		0.2695	0.183
1989	0.1981	0.1907	0.1692	0.1531		0.1466	0.1343
1990	0.3108	0.2958	0.2648	0.2325		0.2216	0.1443

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
0.032258	0.5594	0.5311	0.4475	0.3731		0.3554	0.2479
0.064516	0.5095	0.4777	0.4064	0.3401		0.3185	0.2442
0.096774	0.431	0.4132	0.3511	0.2999		0.2884	0.2167
0.129032	0.4108	0.388	0.3507	0.2826		0.2695	0.2108
0.16129	0.4022	0.3877	0.3228	0.2761		0.2499	0.1966
0.193548	0.3897	0.3722	0.3211	0.2751		0.2479	0.1928
0.225806	0.379	0.3599	0.3198	0.2627		0.243	0.183
0.258065	0.3784	0.356	0.3187	0.2533		0.2411	0.1805
0.290323	0.3669	0.344	0.2902	0.2527		0.2376	0.1786
0.322581	0.3443	0.3279	0.2823	0.2504		0.235	0.174
0.354839	0.3291	0.3171	0.2792	0.2391		0.2216	0.172
0.387097	0.3228	0.3076	0.2767	0.2325		0.2173	0.1698
0.419355	0.3108	0.2977	0.2669	0.2248		0.2163	0.1649
0.451613	0.3088	0.2958	0.2648	0.2214		0.2161	0.1621
0.483871	0.2942	0.2778	0.2504	0.2168		0.2126	0.161
0.516129	0.284	0.2673	0.2373	0.2161		0.2049	0.16
0.548387	0.2796	0.2673	0.2337	0.2159		0.2008	0.1543
0.580645	0.2796	0.267	0.231	0.2119		0.1982	0.154
0.612903	0.2748	0.2626	0.2306	0.2105		0.1933	0.1514
0.645161	0.2746	0.2622	0.2301	0.2046		0.192	0.1498
0.677419	0.2639	0.2498	0.2289	0.1977		0.1893	0.147
0.709677	0.2522	0.243	0.2255	0.1961		0.1876	0.1443
0.741935	0.2509	0.2393	0.2208	0.1921		0.1837	0.1391
0.774194	0.2504	0.239	0.2186	0.1816		0.1783	0.1369
0.806452	0.2463	0.239	0.216	0.178		0.1687	0.1359
0.83871	0.2291	0.2194	0.2023	0.1774		0.164	0.1343
0.870968	0.223	0.2137	0.1902	0.176		0.1589	0.129
0.903226	0.2173	0.2056	0.1831	0.1531		0.1466	0.1002
0.935484	0.1981	0.1907	0.1692	0.1507		0.1453	0.07778
0.967742	0.05137	0.04779	0.03901	0.02904		0.02987	0.01335
0.1	0.42898	0.41068	0.35106	0.29817		0.28651	0.21611
					Average of yearly averages:		0.159408

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: FLCeleriac
Metfile: w12844.dvf

PRZM scenario: FLcarrotSTD.txt
EXAMS environment file: pond298.exv
Chemical Name: Abamectin

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.021	kg/ha	
Application Efficiency:	APPEFF	0.99	fraction	
Spray Drift	DRFT	0.01	fraction of application rate applied to pond	
Application Date	Date	6-May	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	7	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Interval 2	interval	7	days	Set to 0 or delete line for single app.
app. rate 2	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Citrus

stored as FLCitrustets.out
Chemical: Abamectin
PRZM environment:
FLcitrusSTD.txt modified Tueday, 26 August 2008 at 05:16:38
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w12844.dvf modified Tueday, 26 August 2008 at 05:14:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
1961	0.09614	0.08833	0.07048	0.051		0.04599	0.02746
1962	0.1561	0.1466	0.136	0.1139		0.1088	0.07214
1963	0.2106	0.2017	0.1756	0.1406		0.1292	0.09892
1964	0.2915	0.279	0.233	0.2026		0.1897	0.1495
1965	0.2907	0.2755	0.2414	0.2213		0.2066	0.1671
1966	0.4028	0.3871	0.3319	0.2902		0.2724	0.1956
1967	0.2709	0.2588	0.2354	0.2076		0.1988	0.1662
1968	0.436	0.4091	0.3843	0.3202		0.2935	0.1994
1969	0.3951	0.3735	0.3187	0.2656		0.2516	0.2008
1970	0.333	0.3157	0.2746	0.238		0.2183	0.1696
1971	0.2409	0.2317	0.211	0.1846		0.1755	0.1375
1972	0.3593	0.3399	0.3078	0.2787		0.2689	0.1836
1973	0.2359	0.229	0.2131	0.2041		0.198	0.1624
1974	0.1917	0.1851	0.1699	0.158		0.1546	0.133
1975	0.2129	0.201	0.1778	0.1626		0.1491	0.1204
1976	0.2815	0.2641	0.2171	0.1739		0.1635	0.127
1977	0.3038	0.2878	0.2526	0.2279		0.205	0.1525
1978	0.3213	0.304	0.2595	0.2298		0.2119	0.1587
1979	0.297	0.2804	0.2368	0.2014		0.1863	0.1568
1980	0.2446	0.2322	0.2149	0.1865		0.1759	0.1436
1981	0.2212	0.2108	0.1883	0.1745		0.1641	0.1304
1982	0.3421	0.3247	0.2861	0.2271		0.2088	0.1571
1983	0.28	0.269	0.2576	0.2125		0.1976	0.1562
1984	0.2755	0.2598	0.2214	0.1999		0.1883	0.1488
1985	0.2327	0.2248	0.2001	0.1783		0.1697	0.1373
1986	0.1996	0.1914	0.1726	0.1678		0.1591	0.1242
1987	0.197	0.1882	0.1671	0.1546		0.1502	0.1258
1988	0.3873	0.3627	0.2953	0.2684		0.2542	0.1708
1989	0.1844	0.1766	0.1597	0.1498		0.147	0.1264
1990	0.249	0.2351	0.2165	0.1896		0.1801	0.1298

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
0.032258	0.436	0.4091	0.3843	0.3202		0.2935	0.2008
0.064516	0.4028	0.3871	0.3319	0.2902		0.2724	0.1994
0.096774	0.3951	0.3735	0.3187	0.2787		0.2689	0.1956
0.129032	0.3873	0.3627	0.3078	0.2684		0.2542	0.1836
0.16129	0.3593	0.3399	0.2953	0.2656		0.2516	0.1708
0.193548	0.3421	0.3247	0.2861	0.238		0.2183	0.1696
0.225806	0.333	0.3157	0.2746	0.2298		0.2119	0.1671
0.258065	0.3213	0.304	0.2595	0.2279		0.2088	0.1662
0.290323	0.3038	0.2878	0.2576	0.2271		0.2066	0.1624
0.322581	0.297	0.2804	0.2526	0.2213		0.205	0.1587
0.354839	0.2915	0.279	0.2414	0.2125		0.1988	0.1571
0.387097	0.2907	0.2755	0.2368	0.2076		0.198	0.1568
0.419355	0.2815	0.269	0.2354	0.2041		0.1976	0.1562
0.451613	0.28	0.2641	0.233	0.2026		0.1897	0.1525
0.483871	0.2755	0.2598	0.2214	0.2014		0.1883	0.1495

0.516129	0.2709	0.2588	0.2171	0.1999		0.1863	0.1488
0.548387	0.249	0.2351	0.2165	0.1896		0.1801	0.1436
0.580645	0.2446	0.2322	0.2149	0.1865		0.1759	0.1375
0.612903	0.2409	0.2317	0.2131	0.1846		0.1755	0.1373
0.645161	0.2359	0.229	0.211	0.1783		0.1697	0.133
0.677419	0.2327	0.2248	0.2001	0.1745		0.1641	0.1304
0.709677	0.2212	0.2108	0.1883	0.1739		0.1635	0.1298
0.741935	0.2129	0.2017	0.1778	0.1678		0.1591	0.127
0.774194	0.2106	0.201	0.1756	0.1626		0.1546	0.1264
0.806452	0.1996	0.1914	0.1726	0.158		0.1502	0.1258
0.83871	0.197	0.1882	0.1699	0.1546		0.1491	0.1242
0.870968	0.1917	0.1851	0.1671	0.1498		0.147	0.1204
0.903226	0.1844	0.1766	0.1597	0.1406		0.1292	0.09892
0.935484	0.1561	0.1466	0.136	0.1139		0.1088	0.07214
0.967742	0.09614	0.08833	0.07048	0.051		0.04599	0.02746
0.1	0.39432	0.37242	0.31761	0.27767		0.26743	0.1944
					Average of yearly averages:		0.144301

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: FLCitrustets

Metfile:	w12844.dvf			
PRZM scenario:	FLcitrusSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.0263	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	30-04	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	30	days	Set to 0 or delete line for single app.

app. rate 1	apprate		kg/ha
Record 17:	FILTRA		
	IPSCND	1	
	UPTKF		
Record 18:	PLVKRT		
	PLDKRT		
	FEXTRC	0.5	
Flag for Index Res. Run	IR	EPA Pond	
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)

Cotton

stored as MSCotton.out
Chemical: Abamectin
PRZM environment:
MScottonSTD.txt modified Tueday, 26 August 2008 at 05:16:40
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w03940.dvf modified Tueday, 26 August 2008 at 05:14:14
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.1998	0.19	0.1671	0.1376	0.1086	0.03978
1962	0.1758	0.1692	0.1497	0.1387	0.134	0.1156
1963	0.1838	0.1753	0.1578	0.1239	0.1183	0.1054
1964	0.4204	0.3953	0.3215	0.2588	0.2533	0.1659
1965	0.5373	0.5064	0.4192	0.3295	0.2991	0.2168
1966	0.3168	0.3085	0.2859	0.2529	0.2399	0.2125
1967	0.2961	0.2832	0.252	0.2162	0.2059	0.1755
1968	0.2596	0.2484	0.223	0.1882	0.1801	0.1636
1969	0.3521	0.3316	0.2718	0.2139	0.1964	0.1538
1970	0.3415	0.3281	0.3046	0.2734	0.2619	0.1885
1971	0.3651	0.3478	0.2969	0.2444	0.241	0.2033
1972	0.2499	0.2455	0.2385	0.2236	0.2159	0.1823
1973	0.2144	0.2072	0.1965	0.1834	0.1758	0.1614
1974	0.2794	0.2676	0.2429	0.2254	0.2132	0.1777
1975	0.4144	0.3952	0.3396	0.2907	0.275	0.2099
1976	0.3367	0.3272	0.3099	0.2722	0.2561	0.2161
1977	0.298	0.2886	0.2598	0.232	0.2236	0.1935
1978	0.2634	0.2538	0.2254	0.2079	0.2009	0.1776
1979	0.4249	0.4077	0.356	0.3253	0.3096	0.2515
1980	0.3067	0.3021	0.2947	0.2807	0.2744	0.23
1981	0.2521	0.2435	0.2176	0.1957	0.1949	0.1686
1982	0.4053	0.3878	0.349	0.2909	0.2865	0.2018
1983	0.3336	0.3247	0.3006	0.2845	0.2729	0.2413
1984	0.3439	0.3343	0.291	0.2662	0.2441	0.2085
1985	0.3483	0.3306	0.2867	0.24	0.236	0.1986
1986	0.2496	0.2444	0.2276	0.2153	0.2057	0.1691
1987	0.2262	0.2174	0.1938	0.1906	0.1889	0.1625

1988	0.263	0.2499	0.2142	0.2037	0.1976	0.1559
1989	0.258	0.2491	0.2296	0.2078	0.2035	0.1682
1990	0.2558	0.2463	0.2288	0.218	0.209	0.1818

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258	0.5373	0.5064	0.4192	0.3295	0.3096	0.2515
0.064516	0.4249	0.4077	0.356	0.3253	0.2991	0.2413
0.096774	0.4204	0.3953	0.349	0.2909	0.2865	0.23
0.129032	0.4144	0.3952	0.3396	0.2907	0.275	0.2168
0.16129	0.4053	0.3878	0.3215	0.2845	0.2744	0.2161
0.193548	0.3651	0.3478	0.3099	0.2807	0.2729	0.2125
0.225806	0.3521	0.3343	0.3046	0.2734	0.2619	0.2099
0.258065	0.3483	0.3316	0.3006	0.2722	0.2561	0.2085
0.290323	0.3439	0.3306	0.2969	0.2662	0.2533	0.2033
0.322581	0.3415	0.3281	0.2947	0.2588	0.2441	0.2018
0.354839	0.3367	0.3272	0.291	0.2529	0.241	0.1986
0.387097	0.3336	0.3247	0.2867	0.2444	0.2399	0.1935
0.419355	0.3168	0.3085	0.2859	0.24	0.236	0.1885
0.451613	0.3067	0.3021	0.2718	0.232	0.2236	0.1823
0.483871	0.298	0.2886	0.2598	0.2254	0.2159	0.1818
0.516129	0.2961	0.2832	0.252	0.2236	0.2132	0.1777
0.548387	0.2794	0.2676	0.2429	0.218	0.209	0.1776
0.580645	0.2634	0.2538	0.2385	0.2162	0.2059	0.1755
0.612903	0.263	0.2499	0.2296	0.2153	0.2057	0.1691
0.645161	0.2596	0.2491	0.2288	0.2139	0.2035	0.1686
0.677419	0.258	0.2484	0.2276	0.2079	0.2009	0.1682
0.709677	0.2558	0.2463	0.2254	0.2078	0.1976	0.1659
0.741935	0.2521	0.2455	0.223	0.2037	0.1964	0.1636
0.774194	0.2499	0.2444	0.2176	0.1957	0.1949	0.1625
0.806452	0.2496	0.2435	0.2142	0.1906	0.1889	0.1614
0.83871	0.2262	0.2174	0.1965	0.1882	0.1801	0.1559
0.870968	0.2144	0.2072	0.1938	0.1834	0.1758	0.1538
0.903226	0.1998	0.19	0.1671	0.1387	0.134	0.1156
0.935484	0.1838	0.1753	0.1578	0.1376	0.1183	0.1054
0.967742	0.1758	0.1692	0.1497	0.1239	0.1086	0.03978
0.1	0.4198	0.39529	0.34806	0.29088	0.28535	0.22868
					Average of yearly averages:	0.179899

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: MSCotton

Metfile:	w03940.dvf
PRZM scenario:	MScottonSTD.txt
EXAMS environment file:	pond298.exv
Chemical Name:	Abamectin

Description	Variable Name	Value	Units	Comments

Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.0213	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	28-07	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	21	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Cucurbit

stored as FLCucumber.out
Chemical: Abamectin
PRZM environment:
FLcucumberSTD.txt modified Tueday, 26 August 2008 at 05:16:38
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w12844.dvf modified Tueday, 26 August 2008 at 05:14:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.1287	0.1185	0.09315	0.07863	0.06947	0.02037
1962	0.3477	0.329	0.2647	0.1881	0.1633	0.07786
1963	0.5249	0.4996	0.423	0.3204	0.2823	0.1396
1964	0.5414	0.5172	0.4485	0.3885	0.3656	0.2242
1965	0.6089	0.5683	0.5133	0.421	0.367	0.2428
1966	0.3609	0.347	0.3143	0.3011	0.2827	0.2519

1967	0.4399	0.4188	0.3478	0.2995		0.2718	0.1988
1968	0.6154	0.5842	0.5041	0.4006		0.3538	0.2182
1969	0.4415	0.4238	0.3885	0.3595		0.3333	0.24
1970	0.3299	0.3143	0.2985	0.256		0.2434	0.2137
1971	0.3794	0.3574	0.2967	0.2324		0.2236	0.1591
1972	0.3461	0.3276	0.2731	0.2171		0.2084	0.1736
1973	0.2903	0.2791	0.2475	0.2277		0.2072	0.1589
1974	0.3951	0.3702	0.3061	0.2441		0.2273	0.1625
1975	0.3965	0.3696	0.3308	0.2553		0.2279	0.1531
1976	0.3115	0.2967	0.27	0.2345		0.2184	0.1557
1977	0.2938	0.2784	0.2433	0.2064		0.1941	0.1594
1978	0.3434	0.3296	0.2884	0.2424		0.2305	0.1647
1979	0.4792	0.4592	0.4258	0.3488		0.3098	0.1948
1980	0.2773	0.2634	0.2329	0.2078		0.2038	0.1785
1981	0.3819	0.3611	0.2897	0.2378		0.223	0.1478
1982	0.4169	0.399	0.3547	0.2952		0.2807	0.2001
1983	0.4808	0.4501	0.3689	0.3176		0.29	0.2221
1984	0.4765	0.4508	0.3758	0.2917		0.2865	0.2132
1985	0.3875	0.3645	0.3208	0.2589		0.2329	0.1919
1986	0.2638	0.2527	0.2219	0.2009		0.1958	0.1658
1987	0.4465	0.4169	0.3594	0.321		0.2962	0.1858
1988	0.2678	0.256	0.2218	0.2111		0.1993	0.1798
1989	0.2255	0.2126	0.1841	0.1718		0.1577	0.1277
1990	0.4437	0.4113	0.3601	0.2707		0.2364	0.1378

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
0.032258	0.6154	0.5842	0.5133	0.421		0.367	0.2519
0.064516	0.6089	0.5683	0.5041	0.4006		0.3656	0.2428
0.096774	0.5414	0.5172	0.4485	0.3885		0.3538	0.24
0.129032	0.5249	0.4996	0.4258	0.3595		0.3333	0.2242
0.16129	0.4808	0.4592	0.423	0.3488		0.3098	0.2221
0.193548	0.4792	0.4508	0.3885	0.321		0.2962	0.2182
0.225806	0.4765	0.4501	0.3758	0.3204		0.29	0.2137
0.258065	0.4465	0.4238	0.3689	0.3176		0.2865	0.2132
0.290323	0.4437	0.4188	0.3601	0.3011		0.2827	0.2001
0.322581	0.4415	0.4169	0.3594	0.2995		0.2823	0.1988
0.354839	0.4399	0.4113	0.3547	0.2952		0.2807	0.1948
0.387097	0.4169	0.399	0.3478	0.2917		0.2718	0.1919
0.419355	0.3965	0.3702	0.3308	0.2707		0.2434	0.1858
0.451613	0.3951	0.3696	0.3208	0.2589		0.2364	0.1798
0.483871	0.3875	0.3645	0.3143	0.256		0.2329	0.1785
0.516129	0.3819	0.3611	0.3061	0.2553		0.2305	0.1736
0.548387	0.3794	0.3574	0.2985	0.2441		0.2279	0.1658
0.580645	0.3609	0.347	0.2967	0.2424		0.2273	0.1647
0.612903	0.3477	0.3296	0.2897	0.2378		0.2236	0.1625
0.645161	0.3461	0.329	0.2884	0.2345		0.223	0.1594
0.677419	0.3434	0.3276	0.2731	0.2324		0.2184	0.1591
0.709677	0.3299	0.3143	0.27	0.2277		0.2084	0.1589
0.741935	0.3115	0.2967	0.2647	0.2171		0.2072	0.1557

0.774194	0.2938	0.2791	0.2475	0.2111	0.2038	0.1531
0.806452	0.2903	0.2784	0.2433	0.2078	0.1993	0.1478
0.83871	0.2773	0.2634	0.2329	0.2064	0.1958	0.1396
0.870968	0.2678	0.256	0.2219	0.2009	0.1941	0.1378
0.903226	0.2638	0.2527	0.2218	0.1881	0.1633	0.1277
0.935484	0.2255	0.2126	0.1841	0.1718	0.1577	0.07786
0.967742	0.1287	0.1185	0.09315	0.07863	0.06947	0.02037
0.1	0.53975	0.51544	0.44623	0.3856	0.35175	0.23842
					Average of yearly averages:	0.175324

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: FLCucumber

Description	Variable Name	Value	Units	Comments
Metfile:	w12844.dvf			
PRZM scenario:	FLcucumberSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.021	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	9-May	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	7	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Interval 2	interval	7	days	Set to 0 or delete line for single app.
app. rate 2	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			

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

Fruiting Vegetables

stored as FLPepper.out
Chemical: Abamectin
PRZM environment:
FLpeppersSTD.txt modified Tueday, 26 August 2008 at 05:16:38
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w12844.dvf modified Tueday, 26 August 2008 at 05:14:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.1199	0.1119	0.09474	0.08143	0.07086	0.03974
1962	0.2091	0.2004	0.1846	0.1583	0.1515	0.1002
1963	0.248	0.2353	0.2118	0.1673	0.1496	0.1206
1964	0.3968	0.379	0.3203	0.2981	0.2758	0.2006
1965	0.3597	0.3453	0.3023	0.2792	0.2615	0.2129
1966	0.4966	0.476	0.4102	0.3624	0.3435	0.2481
1967	0.3309	0.319	0.2936	0.2583	0.2495	0.2107
1968	0.5813	0.5485	0.5146	0.4479	0.408	0.2691
1969	0.4705	0.4469	0.3911	0.337	0.3244	0.2634
1970	0.4022	0.3843	0.3454	0.3087	0.2885	0.2229
1971	0.3851	0.3697	0.3004	0.2716	0.2547	0.1896
1972	0.474	0.4461	0.409	0.3802	0.3749	0.2467
1973	0.3125	0.2984	0.2788	0.2708	0.2689	0.2177
1974	0.2444	0.2382	0.2213	0.2068	0.1997	0.1745
1975	0.2607	0.2477	0.2236	0.2137	0.2052	0.1574
1976	0.4753	0.4447	0.3632	0.291	0.2618	0.1846
1977	0.4953	0.477	0.4203	0.3742	0.3349	0.2324
1978	0.3953	0.3765	0.3298	0.2933	0.2759	0.2177
1979	0.3406	0.3238	0.2774	0.2535	0.2394	0.198
1980	0.3891	0.3672	0.3205	0.2731	0.2572	0.1931
1981	0.2786	0.2666	0.2418	0.2198	0.2062	0.1738
1982	0.429	0.4064	0.3632	0.3003	0.2787	0.2053
1983	0.36	0.3459	0.3247	0.2766	0.2619	0.2075
1984	0.445	0.4227	0.3508	0.3044	0.2837	0.212
1985	0.3131	0.3018	0.2711	0.2404	0.2317	0.1889
1986	0.2414	0.2354	0.2235	0.212	0.2025	0.1638
1987	0.3257	0.306	0.2538	0.2188	0.2108	0.1651
1988	0.4691	0.4402	0.3627	0.3348	0.3189	0.2158
1989	0.2498	0.2392	0.2159	0.1874	0.1826	0.1554
1990	0.3257	0.3061	0.277	0.2528	0.2459	0.1705

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258	0.5813	0.5485	0.5146	0.4479	0.408	0.2691
0.064516	0.4966	0.477	0.4203	0.3802	0.3749	0.2634
0.096774	0.4953	0.476	0.4102	0.3742	0.3435	0.2481
0.129032	0.4753	0.4469	0.409	0.3624	0.3349	0.2467
0.16129	0.474	0.4461	0.3911	0.337	0.3244	0.2324
0.193548	0.4705	0.4447	0.3632	0.3348	0.3189	0.2229
0.225806	0.4691	0.4402	0.3632	0.3087	0.2885	0.2177
0.258065	0.445	0.4227	0.3627	0.3044	0.2837	0.2177
0.290323	0.429	0.4064	0.3508	0.3003	0.2787	0.2158
0.322581	0.4022	0.3843	0.3454	0.2981	0.2759	0.2129
0.354839	0.3968	0.379	0.3298	0.2933	0.2758	0.212
0.387097	0.3953	0.3765	0.3247	0.291	0.2689	0.2107
0.419355	0.3891	0.3697	0.3205	0.2792	0.2619	0.2075
0.451613	0.3851	0.3672	0.3203	0.2766	0.2618	0.2053
0.483871	0.36	0.3459	0.3023	0.2731	0.2615	0.2006
0.516129	0.3597	0.3453	0.3004	0.2716	0.2572	0.198
0.548387	0.3406	0.3238	0.2936	0.2708	0.2547	0.1931
0.580645	0.3309	0.319	0.2788	0.2583	0.2495	0.1896
0.612903	0.3257	0.3061	0.2774	0.2535	0.2459	0.1889
0.645161	0.3257	0.306	0.277	0.2528	0.2394	0.1846
0.677419	0.3131	0.3018	0.2711	0.2404	0.2317	0.1745
0.709677	0.3125	0.2984	0.2538	0.2198	0.2108	0.1738
0.741935	0.2786	0.2666	0.2418	0.2188	0.2062	0.1705
0.774194	0.2607	0.2477	0.2236	0.2137	0.2052	0.1651
0.806452	0.2498	0.2392	0.2235	0.212	0.2025	0.1638
0.83871	0.248	0.2382	0.2213	0.2068	0.1997	0.1574
0.870968	0.2444	0.2354	0.2159	0.1874	0.1826	0.1554
0.903226	0.2414	0.2353	0.2118	0.1673	0.1515	0.1206
0.935484	0.2091	0.2004	0.1846	0.1583	0.1496	0.1002
0.967742	0.1199	0.1119	0.09474	0.08143	0.07086	0.03974
0.1	0.4933	0.47309	0.41008	0.37302	0.34264	0.24796
					Average of yearly averages:	0.191935

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: FLPepper

Metfile:	w12844.dvf			
PRZM scenario:	FLpeppersSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	

Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.021	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	28-04	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	7	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Interval 2	interval	7	days	Set to 0 or delete line for single app.
app. rate 2	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Grapes

stored as NYGrapes.out
Chemical: Abamectin
PRZM environment:
NYGrapesSTD.txt modified Tueday, 26 August 2008 at 05:16:42
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w14860.dvf modified Tueday, 26 August 2008 at 05:15:12
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.0802	0.07444	0.06301	0.04638	0.04103	0.01936
1962	0.3028	0.2853	0.2356	0.1892	0.1765	0.09046
1963	0.1978	0.19	0.1793	0.1638	0.1552	0.1381
1964	0.3999	0.381	0.3249	0.2673	0.2471	0.1727
1965	0.318	0.3059	0.2816	0.2484	0.2384	0.2059
1966	0.3005	0.29	0.2583	0.2263	0.2151	0.1949
1967	0.3468	0.3319	0.2976	0.2575	0.2433	0.1938
1968	0.2259	0.2192	0.2062	0.2019	0.1977	0.1755
1969	0.2175	0.21	0.1887	0.1743	0.1684	0.1529
1970	0.3218	0.3077	0.2791	0.24	0.2364	0.1755

1971	0.3432	0.33	0.2901	0.2535		0.2423	0.209
1972	0.2991	0.289	0.2652	0.2445		0.2337	0.2066
1973	0.2306	0.2246	0.2065	0.2019		0.198	0.1804
1974	0.3054	0.293	0.2644	0.242		0.2353	0.1882
1975	0.3639	0.3549	0.3274	0.3008		0.2907	0.2304
1976	0.3091	0.3003	0.2857	0.2713		0.2584	0.2312
1977	0.4075	0.3929	0.3721	0.3352		0.3212	0.2481
1978	0.4711	0.4531	0.4074	0.3628		0.3456	0.2901
1979	0.4767	0.4586	0.4067	0.386		0.3757	0.3103
1980	0.5089	0.4926	0.4434	0.4036		0.3896	0.3311
1981	0.3877	0.3767	0.3541	0.3454		0.3381	0.3054
1982	0.3551	0.3438	0.3117	0.2954		0.2889	0.2598
1983	0.4178	0.403	0.379	0.3358		0.321	0.2567
1984	0.3358	0.3263	0.2984	0.2763		0.2722	0.2466
1985	0.3208	0.3093	0.2773	0.2453		0.2335	0.2209
1986	0.3276	0.3155	0.2933	0.2545		0.2416	0.2137
1987	0.3822	0.3675	0.3249	0.3067		0.2936	0.2306
1988	0.3432	0.3307	0.2935	0.2713		0.263	0.2347
1989	0.2624	0.2555	0.2348	0.2278		0.2238	0.2076
1990	0.3417	0.3286	0.3055	0.2694		0.2563	0.1976

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
0.032258	0.5089	0.4926	0.4434	0.4036		0.3896	0.3311
0.064516	0.4767	0.4586	0.4074	0.386		0.3757	0.3103
0.096774	0.4711	0.4531	0.4067	0.3628		0.3456	0.3054
0.129032	0.4178	0.403	0.379	0.3454		0.3381	0.2901
0.16129	0.4075	0.3929	0.3721	0.3358		0.3212	0.2598
0.193548	0.3999	0.381	0.3541	0.3352		0.321	0.2567
0.225806	0.3877	0.3767	0.3274	0.3067		0.2936	0.2481
0.258065	0.3822	0.3675	0.3249	0.3008		0.2907	0.2466
0.290323	0.3639	0.3549	0.3249	0.2954		0.2889	0.2347
0.322581	0.3551	0.3438	0.3117	0.2763		0.2722	0.2312
0.354839	0.3468	0.3319	0.3055	0.2713		0.263	0.2306
0.387097	0.3432	0.3307	0.2984	0.2713		0.2584	0.2304
0.419355	0.3432	0.33	0.2976	0.2694		0.2563	0.2209
0.451613	0.3417	0.3286	0.2935	0.2673		0.2471	0.2137
0.483871	0.3358	0.3263	0.2933	0.2575		0.2433	0.209
0.516129	0.3276	0.3155	0.2901	0.2545		0.2423	0.2076
0.548387	0.3218	0.3093	0.2857	0.2535		0.2416	0.2066
0.580645	0.3208	0.3077	0.2816	0.2484		0.2384	0.2059
0.612903	0.318	0.3059	0.2791	0.2453		0.2364	0.1976
0.645161	0.3091	0.3003	0.2773	0.2445		0.2353	0.1949
0.677419	0.3054	0.293	0.2652	0.242		0.2337	0.1938
0.709677	0.3028	0.29	0.2644	0.24		0.2335	0.1882
0.741935	0.3005	0.289	0.2583	0.2278		0.2238	0.1804
0.774194	0.2991	0.2853	0.2356	0.2263		0.2151	0.1755
0.806452	0.2624	0.2555	0.2348	0.2019		0.198	0.1755
0.83871	0.2306	0.2246	0.2065	0.2019		0.1977	0.1727
0.870968	0.2259	0.2192	0.2062	0.1892		0.1765	0.1529

0.903226	0.2175	0.21	0.1887	0.1743		0.1684	0.1381
0.935484	0.1978	0.19	0.1793	0.1638		0.1552	0.09046
0.967742	0.0802	0.07444	0.06301	0.04638		0.04103	0.01936
0.1	0.46577	0.44809	0.40393	0.36106		0.34485	0.30387
					Average of yearly averages:		0.210604

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:

Output File: NYGrapes				
Metfile:	w14860.dvf			
PRZM scenario:	NYGrapesSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.0213	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	25-06	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	21	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Herb

stored as ORHerb.out
Chemical: Abamectin
PRZM environment:
ORmintSTD.txt modified Tueday, 26 August 2008 at 05:16:42
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w24232.dvf modified Tueday, 26 August 2008 at 05:15:54
Water segment concentrations (ppb)

Year		Peak	96 hr	21 Day	60 Day	90 Day		Yearly
	1961	0.02616	0.02416	0.01956	0.01466		0.01249	0.007133
	1962	0.04646	0.04367	0.0399	0.03379		0.03005	0.02157
	1963	0.08679	0.08177	0.07761	0.06896		0.0629	0.04317
	1964	0.07416	0.07171	0.05398	0.04802		0.04544	0.0395
	1965	0.06217	0.06019	0.05607	0.05099		0.04892	0.0419
	1966	0.06179	0.05965	0.05498	0.04862		0.04605	0.03986
	1967	0.05849	0.05644	0.05176	0.04571		0.04351	0.03636
	1968	0.05648	0.05446	0.05081	0.04498		0.0438	0.03883
	1969	0.06019	0.05823	0.05358	0.04767		0.04532	0.04243
	1970	0.06596	0.06449	0.05943	0.0531		0.05137	0.04336
	1971	0.1289	0.1223	0.1006	0.07842		0.07104	0.05501
	1972	0.08285	0.07988	0.07128	0.06399		0.06082	0.05053
	1973	0.07338	0.07045	0.06405	0.05633		0.04822	0.04311
	1974	0.08226	0.07931	0.07484	0.065		0.06035	0.05027
	1975	0.06429	0.06221	0.05752	0.05136		0.04863	0.04175
	1976	0.05914	0.05701	0.05232	0.04605		0.04343	0.03463
	1977	0.05038	0.04813	0.04255	0.03352		0.03102	0.02657
	1978	0.05133	0.04935	0.04462	0.04146		0.03956	0.03253
	1979	0.05077	0.0488	0.04416	0.03866		0.03584	0.03213
	1980	0.07322	0.06961	0.05993	0.04969		0.04597	0.03747
	1981	0.07239	0.06939	0.06132	0.05322		0.05027	0.04474
	1982	0.07457	0.07225	0.06599	0.05812		0.05425	0.04513
	1983	0.08109	0.07764	0.07287	0.06112		0.0563	0.04597
	1984	0.08368	0.08	0.06892	0.05906		0.05513	0.04519
	1985	0.06204	0.05984	0.05513	0.04881		0.04789	0.04017
	1986	0.05576	0.05372	0.04905	0.04349		0.04117	0.03387
	1987	0.0662	0.063	0.05666	0.04031		0.03736	0.03371
	1988	0.05995	0.05775	0.05299	0.04661		0.04351	0.03645
	1989	0.05612	0.05355	0.04638	0.0404		0.03762	0.03223
	1990	0.05599	0.05395	0.04928	0.04421		0.04153	0.03625

Sorted results

Prob.		Peak	96 hr	21 Day	60 Day	90 Day		Yearly
	0.032258	0.1289	0.1223	0.1006	0.07842		0.07104	0.05501
	0.064516	0.08679	0.08177	0.07761	0.06896		0.0629	0.05053
	0.096774	0.08368	0.08	0.07484	0.065		0.06082	0.05027
	0.129032	0.08285	0.07988	0.07287	0.06399		0.06035	0.04597
	0.16129	0.08226	0.07931	0.07128	0.06112		0.0563	0.04519
	0.193548	0.08109	0.07764	0.06892	0.05906		0.05513	0.04513
	0.225806	0.07457	0.07225	0.06599	0.05812		0.05425	0.04474

0.258065	0.07416	0.07171	0.06405	0.05633		0.05137	0.04336
0.290323	0.07338	0.07045	0.06132	0.05322		0.05027	0.04317
0.322581	0.07322	0.06961	0.05993	0.0531		0.04892	0.04311
0.354839	0.07239	0.06939	0.05943	0.05136		0.04863	0.04243
0.387097	0.0662	0.06449	0.05752	0.05099		0.04822	0.0419
0.419355	0.06596	0.063	0.05666	0.04969		0.04789	0.04175
0.451613	0.06429	0.06221	0.05607	0.04881		0.04605	0.04017
0.483871	0.06217	0.06019	0.05513	0.04862		0.04597	0.03986
0.516129	0.06204	0.05984	0.05498	0.04802		0.04544	0.0395
0.548387	0.06179	0.05965	0.05398	0.04767		0.04532	0.03883
0.580645	0.06019	0.05823	0.05358	0.04661		0.0438	0.03747
0.612903	0.05995	0.05775	0.05299	0.04605		0.04351	0.03645
0.645161	0.05914	0.05701	0.05232	0.04571		0.04351	0.03636
0.677419	0.05849	0.05644	0.05176	0.04498		0.04343	0.03625
0.709677	0.05648	0.05446	0.05081	0.04421		0.04153	0.03463
0.741935	0.05612	0.05395	0.04928	0.04349		0.04117	0.03387
0.774194	0.05599	0.05372	0.04905	0.04146		0.03956	0.03371
0.806452	0.05576	0.05355	0.04638	0.0404		0.03762	0.03253
0.83871	0.05133	0.04935	0.04462	0.04031		0.03736	0.03223
0.870968	0.05077	0.0488	0.04416	0.03866		0.03584	0.03213
0.903226	0.05038	0.04813	0.04255	0.03379		0.03102	0.02657
0.935484	0.04646	0.04367	0.0399	0.03352		0.03005	0.02157
0.967742	0.02616	0.02416	0.01956	0.01466		0.01249	0.007133
0.1	0.083597	0.079988	0.074643	0.064899		0.060773	0.04984
					Average of yearly averages:		0.038394

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: ORHerb

Metfile:	w24232.dvf
PRZM scenario:	ORmintSTD.txt
EXAMS environment file:	pond298.exv
Chemical Name:	Abamectin

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life

Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.021	kg/ha	
Application Efficiency:	APPEFF	0.99	fraction	
Spray Drift	DRFT	0.01	fraction of application rate applied to pond	
Application Date	Date	25-03	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.
app. rate 1	apprate		kg/ha	
Interval 2	interval	7	days	Set to 0 or delete line for single app.
app. rate 2	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Hops

stored as ORHops.out
Chemical: Abamectin
PRZM environment:
ORhopsSTD.txt modified Tueday, 26 August 2008 at 05:16:42
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w24232.dvf modified Tueday, 26 August 2008 at 05:15:54
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
1961	0.07536	0.06927	0.05153	0.03893		0.03338	0.01445
1962	0.09738	0.09131	0.07827	0.06806		0.06613	0.04389
1963	0.122	0.1157	0.09715	0.0877		0.08129	0.06832
1964	0.138	0.1343	0.1072	0.09401		0.08675	0.07821
1965	0.1368	0.1306	0.1121	0.1018		0.09604	0.087
1966	0.1394	0.1329	0.1138	0.1016		0.09761	0.08948
1967	0.136	0.1294	0.11	0.09803		0.09202	0.0866
1968	0.1385	0.1324	0.1247	0.1161		0.1151	0.09585
1969	0.1547	0.1497	0.1364	0.1304		0.1286	0.1081
1970	0.1585	0.152	0.1344	0.13		0.1254	0.1119
1971	0.1612	0.1562	0.1387	0.1276		0.124	0.1089
1972	0.1533	0.1468	0.1294	0.1208		0.1171	0.1043
1973	0.1484	0.1439	0.1337	0.1211		0.1084	0.0956
1974	0.1512	0.1447	0.1254	0.1164		0.1121	0.1025
1975	0.146	0.1398	0.1212	0.1085		0.1021	0.09596
1976	0.141	0.1348	0.1164	0.1038		0.0961	0.08499
1977	0.1215	0.1152	0.1012	0.08607		0.07887	0.0685

1978	0.1305	0.1243	0.1059	0.09427		0.08846	0.07715
1979	0.1328	0.1277	0.1127	0.1074		0.1037	0.08465
1980	0.1497	0.1448	0.1259	0.1063		0.09729	0.09261
1981	0.1542	0.151	0.1423	0.1356		0.1341	0.1058
1982	0.159	0.1526	0.1334	0.1258		0.1221	0.1089
1983	0.152	0.1455	0.1261	0.1163		0.1089	0.1009
1984	0.1405	0.1342	0.1245	0.1182		0.1085	0.09448
1985	0.1398	0.1335	0.1149	0.1026		0.0955	0.08863
1986	0.1326	0.126	0.1066	0.0947		0.08829	0.0788
1987	0.1468	0.1413	0.1308	0.1002		0.09143	0.07967
1988	0.1397	0.1332	0.114	0.1018		0.09708	0.08868
1989	0.1353	0.1298	0.1165	0.09926		0.09201	0.08371
1990	0.1425	0.1362	0.1174	0.105		0.09959	0.09224

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
0.032258	0.1612	0.1562	0.1423	0.1356		0.1341	0.1119
0.064516	0.159	0.1526	0.1387	0.1304		0.1286	0.1089
0.096774	0.1585	0.152	0.1364	0.13		0.1254	0.1089
0.129032	0.1547	0.151	0.1344	0.1276		0.124	0.1081
0.16129	0.1542	0.1497	0.1337	0.1258		0.1221	0.1058
0.193548	0.1533	0.1468	0.1334	0.1211		0.1171	0.1043
0.225806	0.152	0.1455	0.1308	0.1208		0.1151	0.1025
0.258065	0.1512	0.1448	0.1294	0.1182		0.1121	0.1009
0.290323	0.1497	0.1447	0.1261	0.1164		0.1089	0.09596
0.322581	0.1484	0.1439	0.1259	0.1163		0.1085	0.09585
0.354839	0.1468	0.1413	0.1254	0.1161		0.1084	0.0956
0.387097	0.146	0.1398	0.1247	0.1085		0.1037	0.09448
0.419355	0.1425	0.1362	0.1245	0.1074		0.1021	0.09261
0.451613	0.141	0.1348	0.1212	0.1063		0.09959	0.09224
0.483871	0.1405	0.1343	0.1174	0.105		0.09761	0.08948
0.516129	0.1398	0.1342	0.1165	0.1038		0.09729	0.08868
0.548387	0.1397	0.1335	0.1164	0.1026		0.09708	0.08863
0.580645	0.1394	0.1332	0.1149	0.1018		0.0961	0.087
0.612903	0.1385	0.1329	0.114	0.1018		0.09604	0.0866
0.645161	0.138	0.1324	0.1138	0.1016		0.0955	0.08499
0.677419	0.1368	0.1306	0.1127	0.1002		0.09202	0.08465
0.709677	0.136	0.1298	0.1121	0.09926		0.09201	0.08371
0.741935	0.1353	0.1294	0.11	0.09803		0.09143	0.07967
0.774194	0.1328	0.1277	0.1072	0.0947		0.08846	0.0788
0.806452	0.1326	0.126	0.1066	0.09427		0.08829	0.07821
0.83871	0.1305	0.1243	0.1059	0.09401		0.08675	0.07715
0.870968	0.122	0.1157	0.1012	0.0877		0.08129	0.0685
0.903226	0.1215	0.1152	0.09715	0.08607		0.07887	0.06832
0.935484	0.09738	0.09131	0.07827	0.06806		0.06613	0.04389
0.967742	0.07536	0.06927	0.05153	0.03893		0.03338	0.01445
0.1	0.15812	0.1519	0.1362	0.12976		0.12526	0.10882

Average of yearly averages: 0.087359

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:				
Output File: ORHops				
Metfile:	w24232.dvf			
PRZM scenario:	ORhopsSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.0213	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	17-07	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	21	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Leafy Vegetables

stored as FLCabbage.out
Chemical: Abamectin
PRZM environment:
FLcabbageSTD.txt modified Tueday, 26 August 2008 at 05:16:38
EXAMS environment: modified Tueday, 26 August 2008 at 05:14:08

pond298.exv
Metfile: w12842.dvf modified Tueday, 26 August 2008 at 05:14:20
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
1961	0.1176	0.1076	0.08497	0.06842		0.04618	0.01139
1962	0.1584	0.1481	0.1249	0.09757		0.08099	0.05529
1963	0.2818	0.2625	0.2268	0.1653		0.1298	0.08723
1964	0.215	0.2046	0.1812	0.1622		0.1441	0.1327
1965	0.2001	0.1896	0.1662	0.141		0.125	0.1128
1966	0.1886	0.1781	0.1547	0.127		0.1112	0.1028
1967	0.1864	0.1759	0.1524	0.127		0.1112	0.09251
1968	0.2111	0.1986	0.1723	0.1367		0.1172	0.09265
1969	0.2372	0.2283	0.1931	0.1746		0.1483	0.1169
1970	0.1989	0.1885	0.1651	0.1474		0.1462	0.1224
1971	0.2044	0.1938	0.1703	0.1415		0.1277	0.1102
1972	0.198	0.1875	0.1655	0.1419		0.1227	0.1054
1973	0.1902	0.1792	0.1574	0.1342		0.1152	0.1002
1974	0.1873	0.1764	0.1527	0.1302		0.1121	0.09744
1975	0.1893	0.1786	0.1552	0.1266		0.1121	0.09294
1976	0.1942	0.184	0.1607	0.1326		0.1156	0.09789
1977	0.173	0.1628	0.1429	0.1183		0.09916	0.08415
1978	0.1752	0.1647	0.1413	0.1152		0.09833	0.08759
1979	0.3299	0.3124	0.2526	0.1892		0.17	0.139
1980	0.2094	0.1985	0.174	0.1449		0.1249	0.1149
1981	0.1933	0.1826	0.1592	0.1363		0.12	0.1097
1982	0.2097	0.199	0.1755	0.1482		0.1337	0.1201
1983	0.2044	0.194	0.1757	0.1598		0.1386	0.1257
1984	0.1873	0.1769	0.1535	0.1277		0.1235	0.1057
1985	0.1943	0.1834	0.1599	0.1309		0.1142	0.09152
1986	0.1804	0.1698	0.1464	0.1233		0.1052	0.09182
1987	0.2162	0.2044	0.1719	0.1423		0.1281	0.1103
1988	0.2888	0.2703	0.2197	0.1787		0.148	0.1087
1989	0.1915	0.1809	0.1588	0.1391		0.1204	0.1064
1990	0.1805	0.1699	0.1465	0.1185		0.1057	0.09499

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
0.032258	0.3299	0.3124	0.2526	0.1892		0.17	0.139
0.064516	0.2888	0.2703	0.2268	0.1787		0.1483	0.1327
0.096774	0.2818	0.2625	0.2197	0.1746		0.148	0.1257
0.129032	0.2372	0.2283	0.1931	0.1653		0.1462	0.1224
0.16129	0.2162	0.2046	0.1812	0.1622		0.1441	0.1201
0.193548	0.215	0.2044	0.1757	0.1598		0.1386	0.1169
0.225806	0.2111	0.199	0.1755	0.1482		0.1337	0.1149
0.258065	0.2097	0.1986	0.174	0.1474		0.1298	0.1128
0.290323	0.2094	0.1985	0.1723	0.1449		0.1281	0.1103
0.322581	0.2044	0.194	0.1719	0.1423		0.1277	0.1102
0.354839	0.2044	0.1938	0.1703	0.1419		0.125	0.1097
0.387097	0.2001	0.1896	0.1662	0.1415		0.1249	0.1087

0.419355	0.1989	0.1885	0.1655	0.141	0.1235	0.1064
0.451613	0.198	0.1875	0.1651	0.1391	0.1227	0.1057
0.483871	0.1943	0.184	0.1607	0.1367	0.1204	0.1054
0.516129	0.1942	0.1834	0.1599	0.1363	0.12	0.1028
0.548387	0.1933	0.1826	0.1592	0.1342	0.1172	0.1002
0.580645	0.1915	0.1809	0.1588	0.1326	0.1156	0.09789
0.612903	0.1902	0.1792	0.1574	0.1309	0.1152	0.09744
0.645161	0.1893	0.1786	0.1552	0.1302	0.1142	0.09499
0.677419	0.1886	0.1781	0.1547	0.1277	0.1121	0.09294
0.709677	0.1873	0.1769	0.1535	0.127	0.1121	0.09265
0.741935	0.1873	0.1764	0.1527	0.127	0.1112	0.09251
0.774194	0.1864	0.1759	0.1524	0.1266	0.1112	0.09182
0.806452	0.1805	0.1699	0.1465	0.1233	0.1057	0.09152
0.83871	0.1804	0.1698	0.1464	0.1185	0.1052	0.08759
0.870968	0.1752	0.1647	0.1429	0.1183	0.09916	0.08723
0.903226	0.173	0.1628	0.1413	0.1152	0.09833	0.08415
0.935484	0.1584	0.1481	0.1249	0.09757	0.08099	0.05529
0.967742	0.1176	0.1076	0.08497	0.06842	0.04618	0.01139
0.1	0.27734	0.25908	0.21704	0.17367	0.14782	0.12537
					Average of yearly averages:	0.10071

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:

Output File: FLCabbage

Metfile:	w12842.dvf			
PRZM scenario:	FLcabbageSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.021	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	

Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	11-Jan	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	7	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Interval 2	interval	7	days	Set to 0 or delete line for single app.
app. rate 2	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Mint

stored as ORMint.out
Chemical: Abamectin
PRZM environment:
ORmintSTD.txt modified Tueday, 26 August 2008 at 05:16:42
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w24232.dvf modified Tueday, 26 August 2008 at 05:15:54
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.09218	0.08504	0.06781	0.04882	0.04129	0.02091
1962	0.1176	0.1098	0.09242	0.07316	0.06431	0.04089
1963	0.1528	0.1438	0.126	0.1043	0.09359	0.06201
1964	0.1374	0.1301	0.1128	0.09251	0.08395	0.06203
1965	0.1396	0.1324	0.1155	0.09595	0.08714	0.06472
1966	0.1401	0.1326	0.1152	0.09438	0.08537	0.06353
1967	0.1383	0.131	0.1136	0.09312	0.08418	0.06103
1968	0.1361	0.1287	0.1114	0.09106	0.08252	0.06302
1969	0.1395	0.1324	0.115	0.09478	0.08597	0.06631
1970	0.1435	0.1372	0.1196	0.09894	0.08976	0.06678
1971	0.1866	0.1764	0.1461	0.116	0.105	0.07566
1972	0.1569	0.149	0.1285	0.1074	0.0983	0.07234
1973	0.1413	0.1339	0.1165	0.09582	0.08698	0.06664
1974	0.156	0.1482	0.1307	0.108	0.09799	0.072
1975	0.1427	0.1354	0.118	0.09748	0.08848	0.06574
1976	0.1389	0.1315	0.1142	0.09355	0.08466	0.06042
1977	0.1286	0.1213	0.1039	0.08391	0.07564	0.0543
1978	0.1335	0.1263	0.109	0.09042	0.0827	0.05931
1979	0.1341	0.1269	0.1096	0.08955	0.0807	0.05968
1980	0.1465	0.1403	0.1189	0.09656	0.08747	0.06294
1981	0.1403	0.1355	0.1199	0.099	0.0904	0.06799

1982	0.1442	0.1373	0.123	0.1019	0.09246	0.06791
1983	0.1539	0.1463	0.1286	0.1041	0.09402	0.06877
1984	0.1511	0.1434	0.1242	0.1033	0.09409	0.0685
1985	0.1408	0.1334	0.116	0.09542	0.08817	0.0642
1986	0.1358	0.1285	0.1112	0.0912	0.08253	0.05945
1987	0.1332	0.1259	0.1088	0.0886	0.07975	0.05886
1988	0.1385	0.1311	0.1137	0.09327	0.08455	0.06098
1989	0.1342	0.1268	0.1094	0.08893	0.08022	0.05834
1990	0.1362	0.1289	0.1116	0.09202	0.08367	0.0617

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258	0.1866	0.1764	0.1461	0.116	0.105	0.07566
0.064516	0.1569	0.149	0.1307	0.108	0.0983	0.07234
0.096774	0.156	0.1482	0.1286	0.1074	0.09799	0.072
0.129032	0.1539	0.1463	0.1285	0.1043	0.09409	0.06877
0.16129	0.1528	0.1438	0.126	0.1041	0.09402	0.0685
0.193548	0.1511	0.1434	0.1242	0.1033	0.09359	0.06799
0.225806	0.1465	0.1403	0.123	0.1019	0.09246	0.06791
0.258065	0.1442	0.1373	0.1199	0.099	0.0904	0.06678
0.290323	0.1435	0.1372	0.1196	0.09894	0.08976	0.06664
0.322581	0.1427	0.1355	0.1189	0.09748	0.08848	0.06631
0.354839	0.1413	0.1354	0.118	0.09656	0.08817	0.06574
0.387097	0.1408	0.1339	0.1165	0.09595	0.08747	0.06472
0.419355	0.1403	0.1334	0.116	0.09582	0.08714	0.0642
0.451613	0.1401	0.1326	0.1155	0.09542	0.08698	0.06353
0.483871	0.1396	0.1324	0.1152	0.09478	0.08597	0.06302
0.516129	0.1395	0.1324	0.115	0.09438	0.08537	0.06294
0.548387	0.1389	0.1315	0.1142	0.09355	0.08466	0.06203
0.580645	0.1385	0.1311	0.1137	0.09327	0.08455	0.06201
0.612903	0.1383	0.131	0.1136	0.09312	0.08418	0.0617
0.645161	0.1374	0.1301	0.1128	0.09251	0.08395	0.06103
0.677419	0.1362	0.1289	0.1116	0.09202	0.08367	0.06098
0.709677	0.1361	0.1287	0.1114	0.0912	0.0827	0.06042
0.741935	0.1358	0.1285	0.1112	0.09106	0.08253	0.05968
0.774194	0.1342	0.1269	0.1096	0.09042	0.08252	0.05945
0.806452	0.1341	0.1268	0.1094	0.08955	0.0807	0.05931
0.83871	0.1335	0.1263	0.109	0.08893	0.08022	0.05886
0.870968	0.1332	0.1259	0.1088	0.0886	0.07975	0.05834
0.903226	0.1286	0.1213	0.1039	0.08391	0.07564	0.0543
0.935484	0.1176	0.1098	0.09242	0.07316	0.06431	0.04089
0.967742	0.09218	0.08504	0.06781	0.04882	0.04129	0.02091
0.1	0.15579	0.14801	0.12859	0.10709	0.0976	0.071677
					Average of yearly averages:	0.061899

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: ORMint

Metfile:	w24232.dvf			
PRZM scenario:	ORmintSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.0158	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	25-03	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.
app. rate 1	apprate		kg/ha	
Interval 2	interval	7	days	Set to 0 or delete line for single app.
app. rate 2	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Pears

stored as WAPears.out
Chemical: Abamectin
PRZM environment:
WAorchardsNMC.txt modified Thuday, 14 June 2007 at 10:19:00
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08

Metfile: w24243.dvf modified Tueday, 26 August 2008 at 05:15:56
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.01885	0.01738	0.01308	0.009906	0.00844	0.004075
1962	0.02178	0.02029	0.01593	0.01281	0.01127	0.006875
1963	0.02382	0.02236	0.01797	0.01471	0.01307	0.008392
1964	0.02417	0.02267	0.01825	0.0151	0.01352	0.009127
1965	0.02713	0.02564	0.02116	0.01798	0.01624	0.01167
1966	0.02644	0.02493	0.02044	0.0173	0.01562	0.01089
1967	0.02573	0.02425	0.01983	0.01663	0.01493	0.009979
1968	0.02595	0.02445	0.01999	0.01684	0.01516	0.01068
1969	0.02664	0.02515	0.0207	0.01751	0.01578	0.01089
1970	0.02855	0.02705	0.02252	0.01934	0.01753	0.01273
1971	0.0277	0.02621	0.02171	0.01854	0.01681	0.01194
1972	0.02662	0.02512	0.02064	0.01749	0.0158	0.01103
1973	0.02617	0.02465	0.02016	0.01706	0.01539	0.0111
1974	0.03401	0.03219	0.02758	0.02252	0.02056	0.01468
1975	0.02903	0.02752	0.02301	0.01984	0.01807	0.0141
1976	0.02882	0.02733	0.02286	0.01967	0.01791	0.01288
1977	0.02723	0.0257	0.02125	0.01821	0.01652	0.01214
1978	0.0292	0.02772	0.02325	0.02005	0.01824	0.01336
1979	0.02772	0.02623	0.02175	0.01856	0.01678	0.01185
1980	0.02672	0.02521	0.02077	0.01765	0.016	0.01142
1981	0.02702	0.02554	0.02111	0.01792	0.01624	0.01142
1982	0.02686	0.02536	0.02088	0.01775	0.01605	0.01253
1983	0.02869	0.02716	0.02258	0.01947	0.01768	0.01325
1984	0.02866	0.02717	0.02272	0.01956	0.01785	0.0131
1985	0.02852	0.027	0.02247	0.01935	0.01756	0.01282
1986	0.02802	0.02652	0.02211	0.01897	0.01722	0.01282
1987	0.02826	0.02675	0.02223	0.01912	0.01732	0.01295
1988	0.03297	0.03124	0.02611	0.02204	0.0202	0.01481
1989	0.02885	0.02733	0.02281	0.01971	0.01792	0.01282
1990	0.02842	0.02694	0.02251	0.01829	0.01662	0.01391

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258	0.03401	0.03219	0.02758	0.02252	0.02056	0.01481
0.064516	0.03297	0.03124	0.02611	0.02204	0.0202	0.01468
0.096774	0.0292	0.02772	0.02325	0.02005	0.01824	0.0141
0.129032	0.02903	0.02752	0.02301	0.01984	0.01807	0.01391
0.16129	0.02885	0.02733	0.02286	0.01971	0.01792	0.01336
0.193548	0.02882	0.02733	0.02281	0.01967	0.01791	0.01325
0.225806	0.02869	0.02717	0.02272	0.01956	0.01785	0.0131
0.258065	0.02866	0.02716	0.02258	0.01947	0.01768	0.01295
0.290323	0.02855	0.02705	0.02252	0.01935	0.01756	0.01288
0.322581	0.02852	0.027	0.02251	0.01934	0.01753	0.01282
0.354839	0.02842	0.02694	0.02247	0.01912	0.01732	0.01282
0.387097	0.02826	0.02675	0.02223	0.01897	0.01722	0.01282
0.419355	0.02802	0.02652	0.02211	0.01856	0.01681	0.01273

0.451613	0.02772	0.02623	0.02175	0.01854		0.01678	0.01253
0.483871	0.0277	0.02621	0.02171	0.01829		0.01662	0.01214
0.516129	0.02723	0.0257	0.02125	0.01821		0.01652	0.01194
0.548387	0.02713	0.02564	0.02116	0.01798		0.01624	0.01185
0.580645	0.02702	0.02554	0.02111	0.01792		0.01624	0.01167
0.612903	0.02686	0.02536	0.02088	0.01775		0.01605	0.01142
0.645161	0.02672	0.02521	0.02077	0.01765		0.016	0.01142
0.677419	0.02664	0.02515	0.0207	0.01751		0.0158	0.0111
0.709677	0.02662	0.02512	0.02064	0.01749		0.01578	0.01103
0.741935	0.02644	0.02493	0.02044	0.0173		0.01562	0.01089
0.774194	0.02617	0.02465	0.02016	0.01706		0.01539	0.01089
0.806452	0.02595	0.02445	0.01999	0.01684		0.01516	0.01068
0.83871	0.02573	0.02425	0.01983	0.01663		0.01493	0.009979
0.870968	0.02417	0.02267	0.01825	0.0151		0.01352	0.009127
0.903226	0.02382	0.02236	0.01797	0.01471		0.01307	0.008392
0.935484	0.02178	0.02029	0.01593	0.01281		0.01127	0.006875
0.967742	0.01885	0.01738	0.01308	0.009906		0.00844	0.004075
0.1	0.029183	0.0277	0.023226	0.020029		0.018223	0.014081
					Average of yearly averages:		0.011675

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: WAPears

Metfile:	w24243.dvf			
PRZM scenario:	WAorchardsNMC.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.0263	kg/ha	
Application Efficiency:	APPEFF	0.99	fraction	
Spray Drift	DRFT	0.01	fraction of application rate applied to pond	

Application Date	Date	31-03	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	21	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Plums & Prunes

stored as WAPrunestest.out
Chemical: Abamectin
PRZM environment:
WAorchardsNMC.txt modified Thuday, 14 June 2007 at 10:19:00
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w24243.dvf modified Tueday, 26 August 2008 at 05:15:56
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
1961	0.01818	0.01669	0.01235	0.009318		0.007918	0.002808
1962	0.02107	0.01959	0.01525	0.01219		0.01104	0.006381
1963	0.02295	0.02143	0.01701	0.01401		0.01248	0.008281
1964	0.02858	0.0273	0.01764	0.01459		0.01304	0.009267
1965	0.0275	0.02599	0.02154	0.01852		0.01688	0.0141
1966	0.02627	0.02473	0.02022	0.01726		0.01564	0.01226
1967	0.02484	0.02329	0.01877	0.01582		0.01425	0.01062
1968	0.02557	0.0241	0.02051	0.01721		0.01564	0.01177
1969	0.02574	0.0242	0.0197	0.01679		0.01525	0.01173
1970	0.03202	0.03064	0.02725	0.02123		0.01909	0.01564
1971	0.02749	0.02593	0.02136	0.01847		0.01684	0.01391
1972	0.02611	0.02457	0.02006	0.01714		0.01556	0.01211
1973	0.02538	0.02385	0.01937	0.01643		0.01489	0.01213
1974	0.02967	0.02814	0.02551	0.02074		0.019	0.01635
1975	0.03907	0.03673	0.03027	0.02365		0.02171	0.01627
1976	0.02847	0.02697	0.02254	0.01944		0.01771	0.01441
1977	0.03614	0.0341	0.02695	0.01763		0.01607	0.01345
1978	0.02962	0.02812	0.02369	0.02068		0.01903	0.01622
1979	0.02734	0.02582	0.02135	0.01833		0.01668	0.01343
1980	0.02627	0.02475	0.02028	0.0173		0.01569	0.01275
1981	0.02674	0.02519	0.02063	0.01772		0.01645	0.01305
1982	0.02689	0.02535	0.02085	0.01852		0.01685	0.0139
1983	0.02872	0.02719	0.02267	0.01966		0.01794	0.01575
1984	0.02856	0.02701	0.02247	0.01956		0.01795	0.01556
1985	0.02844	0.02692	0.02245	0.01947		0.01788	0.01514

1986	0.02769	0.02614	0.02159	0.01996	0.01916	0.01488
1987	0.04104	0.03912	0.03334	0.0203	0.01791	0.01524
1988	0.03128	0.02971	0.0251	0.02257	0.02116	0.01833
1989	0.02861	0.0271	0.02264	0.01958	0.01788	0.01476
1990	0.05318	0.04967	0.03929	0.02948	0.02635	0.01689

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258	0.05318	0.04967	0.03929	0.02948	0.02635	0.01833
0.064516	0.04104	0.03912	0.03334	0.02365	0.02171	0.01689
0.096774	0.03907	0.03673	0.03027	0.02257	0.02116	0.01635
0.129032	0.03614	0.0341	0.02725	0.02123	0.01916	0.01627
0.16129	0.03202	0.03064	0.02695	0.02074	0.01909	0.01622
0.193548	0.03128	0.02971	0.02551	0.02068	0.01903	0.01575
0.225806	0.02967	0.02814	0.0251	0.0203	0.019	0.01564
0.258065	0.02962	0.02812	0.02369	0.01996	0.01795	0.01556
0.290323	0.02872	0.0273	0.02267	0.01966	0.01794	0.01524
0.322581	0.02861	0.02719	0.02264	0.01958	0.01791	0.01514
0.354839	0.02858	0.0271	0.02254	0.01956	0.01788	0.01488
0.387097	0.02856	0.02701	0.02247	0.01947	0.01788	0.01476
0.419355	0.02847	0.02697	0.02245	0.01944	0.01771	0.01441
0.451613	0.02844	0.02692	0.02159	0.01852	0.01688	0.0141
0.483871	0.02769	0.02614	0.02154	0.01852	0.01685	0.01391
0.516129	0.0275	0.02599	0.02136	0.01847	0.01684	0.0139
0.548387	0.02749	0.02593	0.02135	0.01833	0.01668	0.01345
0.580645	0.02734	0.02582	0.02085	0.01772	0.01645	0.01343
0.612903	0.02689	0.02535	0.02063	0.01763	0.01607	0.01305
0.645161	0.02674	0.02519	0.02051	0.0173	0.01569	0.01275
0.677419	0.02627	0.02475	0.02028	0.01726	0.01564	0.01226
0.709677	0.02627	0.02473	0.02022	0.01721	0.01564	0.01213
0.741935	0.02611	0.02457	0.02006	0.01714	0.01556	0.01211
0.774194	0.02574	0.0242	0.0197	0.01679	0.01525	0.01177
0.806452	0.02557	0.0241	0.01937	0.01643	0.01489	0.01173
0.83871	0.02538	0.02385	0.01877	0.01582	0.01425	0.01062
0.870968	0.02484	0.02329	0.01764	0.01459	0.01304	0.009267
0.903226	0.02295	0.02143	0.01701	0.01401	0.01248	0.008281
0.935484	0.02107	0.01959	0.01525	0.01219	0.01104	0.006381
0.967742	0.01818	0.01669	0.01235	0.009318	0.007918	0.002808
0.1	0.038777	0.036467	0.029968	0.022436	0.02096	0.016342
					Average of yearly averages:	0.013246

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: WAPrunestest

Metfile:	w24243.dvf
PRZM scenario:	WAorchardsNMC.txt
EXAMS environment file:	pond298.exv
Chemical Name:	Abamectin

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.0258	kg/ha	
Application Efficiency:	APPEFF	0.99	fraction	
Spray Drift	DRFT	0.01	fraction of application rate applied to pond	
Application Date	Date	25-07	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	21	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

Potato

stored as MEPotato.out
Chemical: Abamectin
PRZM environment:
MEpotatoSTD.txt modified Tueday, 26 August 2008 at 05:16:40
EXAMS environment:
pond298.exv modified Tueday, 26 August 2008 at 05:14:08
Metfile: w14607.dvf modified Tueday, 26 August 2008 at 05:14:52
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.4108	0.3921	0.3188	0.243	0.2184	0.1197
1962	0.2887	0.2794	0.2595	0.2297	0.2201	0.1962
1963	0.3106	0.2996	0.2768	0.2466	0.2371	0.217
1964	0.3865	0.3714	0.3337	0.2859	0.2776	0.2371
1965	0.327	0.3168	0.2948	0.2652	0.2532	0.2261

1966	0.2852	0.275	0.2517	0.2372		0.2277	0.2009
1967	0.354	0.3419	0.3123	0.2762		0.2689	0.2307
1968	0.3324	0.3219	0.2985	0.2682		0.2592	0.2464
1969	0.4322	0.4176	0.3732	0.3389		0.3225	0.2822
1970	0.4817	0.4649	0.4359	0.3951		0.3742	0.318
1971	0.4112	0.3995	0.376	0.3397		0.3295	0.2922
1972	0.4887	0.474	0.4431	0.4049		0.3893	0.3233
1973	0.6691	0.6505	0.5972	0.5377		0.5105	0.4125
1974	0.5244	0.5148	0.4885	0.4542		0.4398	0.3952
1975	0.5885	0.5749	0.5191	0.4616		0.4413	0.3736
1976	0.5814	0.5632	0.51	0.4702		0.4563	0.3945
1977	0.5343	0.5257	0.51	0.4634		0.4533	0.4022
1978	0.4601	0.4484	0.4257	0.4008		0.4008	0.3715
1979	0.6269	0.6055	0.5445	0.4765		0.45	0.3822
1980	0.4589	0.4473	0.4204	0.3859		0.3809	0.3499
1981	0.5447	0.5252	0.4679	0.4122		0.3958	0.3677
1982	0.4516	0.4399	0.4159	0.3905		0.3831	0.3629
1983	0.6535	0.6358	0.5667	0.5005		0.4822	0.4003
1984	0.658	0.638	0.5788	0.5317		0.5128	0.4285
1985	0.5236	0.5093	0.4679	0.4292		0.4156	0.374
1986	0.4764	0.4636	0.4282	0.3967		0.3804	0.3505
1987	0.4108	0.4011	0.3784	0.3692		0.3606	0.3284
1988	0.3936	0.3823	0.3585	0.3281		0.3227	0.2891
1989	0.4743	0.4614	0.413	0.3686		0.3459	0.2946
1990	0.5784	0.5598	0.4952	0.454		0.434	0.3608

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day		Yearly
0.032258	0.6691	0.6505	0.5972	0.5377		0.5128	0.4285
0.064516	0.658	0.638	0.5788	0.5317		0.5105	0.4125
0.096774	0.6535	0.6358	0.5667	0.5005		0.4822	0.4022
0.129032	0.6269	0.6055	0.5445	0.4765		0.4563	0.4003
0.16129	0.5885	0.5749	0.5191	0.4702		0.4533	0.3952
0.193548	0.5814	0.5632	0.51	0.4634		0.45	0.3945
0.225806	0.5784	0.5598	0.51	0.4616		0.4413	0.3822
0.258065	0.5447	0.5257	0.4952	0.4542		0.4398	0.374
0.290323	0.5343	0.5252	0.4885	0.454		0.434	0.3736
0.322581	0.5244	0.5148	0.4679	0.4292		0.4156	0.3715
0.354839	0.5236	0.5093	0.4679	0.4122		0.4008	0.3677
0.387097	0.4887	0.474	0.4431	0.4049		0.3958	0.3629
0.419355	0.4817	0.4649	0.4359	0.4008		0.3893	0.3608
0.451613	0.4764	0.4636	0.4282	0.3967		0.3831	0.3505
0.483871	0.4743	0.4614	0.4257	0.3951		0.3809	0.3499
0.516129	0.4601	0.4484	0.4204	0.3905		0.3804	0.3284
0.548387	0.4589	0.4473	0.4159	0.3859		0.3742	0.3233
0.580645	0.4516	0.4399	0.413	0.3692		0.3606	0.318
0.612903	0.4322	0.4176	0.3784	0.3686		0.3459	0.2946
0.645161	0.4112	0.4011	0.376	0.3397		0.3295	0.2922
0.677419	0.4108	0.3995	0.3732	0.3389		0.3227	0.2891
0.709677	0.4108	0.3921	0.3585	0.3281		0.3225	0.2822

0.741935	0.3936	0.3823	0.3337	0.2859	0.2776	0.2464
0.774194	0.3865	0.3714	0.3188	0.2762	0.2689	0.2371
0.806452	0.354	0.3419	0.3123	0.2682	0.2592	0.2307
0.83871	0.3324	0.3219	0.2985	0.2652	0.2532	0.2261
0.870968	0.327	0.3168	0.2948	0.2466	0.2371	0.217
0.903226	0.3106	0.2996	0.2768	0.243	0.2277	0.2009
0.935484	0.2887	0.2794	0.2595	0.2372	0.2201	0.1962
0.967742	0.2852	0.275	0.2517	0.2297	0.2184	0.1197
0.1	0.65084	0.63277	0.56448	0.4981	0.47961	0.40201
					Average of yearly averages:	0.317607

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: MEPotato

Metfile:	w14607.dvf			
PRZM scenario:	MEpotatoSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	Abamectin			
Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	873.11	g/mol	
Henry's Law Const.	henry	2.60E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.50E-09	torr	
Solubility	sol	78	mg/L	
Kd	Kd	82	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0.5	days	Half-life
Aerobic Aquatic Metabolism	kbacw	300	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	150	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.021	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	28-04	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	7	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Interval 2	interval	7	days	Set to 0 or delete line for single app.
app. rate 2	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		

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

Appendix C. T-REX Outputs

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	abamectin
Use	eleriac, cucurbit,fruit veg, herb,leafy veg,pota
Formulation	agri-mek SC
Application Rate	0.0187 lbs a.i./acre
Half-life	35 days
Application Interval	7 days
Maximum # Apps./Year	3
Length of Simulation	1 year

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

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

RQs reported as "0.00" in the RQ tables belo <0.01 in your assessment. This is due to rou figure issues in Excel.

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	85.00
	Mallard duck)	LC50 (mg/kg-diet)	383.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	0.00
Mammals		LD50 (mg/kg-bw)	13.60
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	0.12
		NOAEC (mg/kg-diet)	2.40

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	11.80
Tall Grass	5.41
Broadleaf plants/sm Insects	6.64
Fruits/pods/seeds/lg insects	0.74

Avian Results

Avian Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	20	5	23	114	2.28E-02
Mid	100	13	65	65	6.49E-02
Large	1000	58	291	29	2.91E-01
Granivores	20	5	5	25	5.06E-03
	100	13	14	14	1.44E-02
	1000	58	65	6	6.46E-02

Avian Body Weight (g)	Adjusted LD50 (mg/kg-bw)
20	44.13
100	56.18
1000	79.36

Dose-based EECs (mg/kg-bw)	Avian Classes and Body Weights (grams)					
	small 20	mid 100	large 1000	Granivores(grams) 20	100	1000
Short Grass	13.43	7.66	3.43			
Tall Grass	6.16	3.51	1.57			
Broadleaf plants/sm Insects	7.56	4.31	1.93			
Fruits/pods/seeds/lg insects	0.84	0.48	0.21	0.19	0.11	0.05

Dose-based RQs (Dose-based EEC/adjusted LD50)	Avian Acute RQs Size Class (grams)		
	20	100	1000
Short Grass	0.30	0.14	0.04
Tall Grass	0.14	0.06	0.02
Broadleaf plants/sm insects	0.17	0.08	0.02
Fruits/pods/seeds/lg insects	0.02	0.01	0.00
Seeds (granivore)	0.00	0.00	0.00

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.03	#DIV/0!
Tall Grass	0.01	#DIV/0!
Broadleaf plants/sm Insects	0.02	#DIV/0!
Fruits/pods/seeds/lg insects	0.00	#DIV/0!

Mammalian Results

Mammalian Class	Body Weight	Ingestion (Fdry) (g bwt/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
	15	3	14	95	1.43E-02
Herbivores/ insectivores	35	5	23	66	2.31E-02
	1000	31	153	15	1.53E-01
	15	3	3	21	3.18E-03
Grainvores	35	5	5	15	5.13E-03
	1000	31	34	3	3.40E-02

Mammalian Class	Body Weight	Adjusted LD50	Adjusted NOAEL
	15	29.89	0.26
Herbivores/ insectivores	35	24.18	0.21
	1000	10.46	0.09
	15	29.89	0.26
Grainvores	35	24.18	0.21
	1000	10.46	0.09

Dose-Based EECs (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores (grams)			Granivores(grams)		
	15	35	1000	15	35	1000
Short Grass	11.25	7.77	1.80			
Tall Grass	5.15	3.56	0.83			
Broadleaf plants/sm Insects	6.33	4.37	1.01			
Fruits/pods/seeds/lg insects	0.70	0.49	0.11	0.16	0.11	0.03

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	Small mammal 15 grams		Medium mammal 35 grams		Large mammal 1000 grams	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.38	42.64	0.32	36.43	0.17	19.53
Tall Grass	0.17	19.55	0.15	16.70	0.08	8.95
Broadleaf plants/sm insects	0.21	23.99	0.18	20.49	0.10	10.98
Fruits/pods/lg insects	0.02	2.67	0.02	2.28	0.01	1.22
Seeds (granivore)	0.01	0.59	0.00	0.51	0.00	0.27

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	4.92
Tall Grass	#DIV/0!	2.25
Broadleaf plants/sm insects	#DIV/0!	2.76
Fruits/pods/seeds/lg insects	#DIV/0!	0.31

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	abamectin
Use	almonds, walnuts,pears,plums,prunes, apples
Formulation	agri-mek SC
Application Rate	0.0235 lbs a.i./acre
Half-life	35 days
Application Interval	21 days
Maximum # Apps./Year	2
Length of Simulation	1 year

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

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

RQs reported as "0.00" in the RQ tables belo <0.01 in your assessment. This is due to rou figure issues in Excel.

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	85.00
	Mallard duck)	LC50 (mg/kg-diet)	383.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	0.00
Mammals		LD50 (mg/kg-bw)	13.60
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	0.12
		NOAEC (mg/kg-diet)	2.40

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	9.36
Tall Grass	4.29
Broadleaf plants/sm Insects	5.27
Fruits/pods/seeds/lg insects	0.59

Avian Results

Avian Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	20	5	23	114	2.28E-02
Mid	100	13	65	65	6.49E-02
Large	1000	58	291	29	2.91E-01
Granivores	20	5	5	25	5.06E-03
	100	13	14	14	1.44E-02
	1000	58	65	6	6.46E-02

Avian Body Weight (g)	Adjusted LD50 (mg/kg-bw)
20	44.13
100	56.18
1000	79.36

Dose-based EECs (mg/kg-bw)	Avian Classes and Body Weights (grams)					
	small 20	mid 100	large 1000	Granivores(grams) 20	100	1000
Short Grass	10.66	6.08	2.72			
Tall Grass	4.89	2.79	1.25			
Broadleaf plants/sm Insects	6.00	3.42	1.53			
Fruits/pods/seeds/lg insects	0.67	0.38	0.17	0.15	0.08	0.04

Dose-based RQs (Dose-based EEC/adjusted LD50)	Avian Acute RQs Size Class (grams)		
	20	100	1000
Short Grass	0.24	0.11	0.03
Tall Grass	0.11	0.05	0.02
Broadleaf plants/sm insects	0.14	0.06	0.02
Fruits/pods/seeds/lg insects	0.02	0.01	0.00
Seeds (granivore)	0.00	0.00	0.00

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.02	#DIV/0!
Tall Grass	0.01	#DIV/0!
Broadleaf plants/sm Insects	0.01	#DIV/0!
Fruits/pods/seeds/lg insects	0.00	#DIV/0!

Mammalian Results

Mammalian Class	Body Weight	Ingestion (Fdry) (g bwt/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Herbivores/ insectivores	15	3	14	95	1.43E-02
	35	5	23	66	2.31E-02
	1000	31	153	15	1.53E-01
Grainvores	15	3	3	21	3.18E-03
	35	5	5	15	5.13E-03
	1000	31	34	3	3.40E-02

Mammalian Class	Body Weight	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09
Grainvores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09

Dose-Based EECs (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores (grams)			Granivores(grams)		
	15	35	1000	15	35	1000
Short Grass	8.93	6.17	1.43			
Tall Grass	4.09	2.83	0.66			
Broadleaf plants/sm Insects	5.02	3.47	0.80			
Fruits/pods/seeds/lg insects	0.56	0.39	0.09	0.12	0.09	0.02

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	Small mammal 15 grams		Medium mammal 35 grams		Large mammal 1000 grams	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.30	33.84	0.26	28.91	0.14	15.49
Tall Grass	0.14	15.51	0.12	13.25	0.06	7.10
Broadleaf plants/sm insects	0.17	19.04	0.14	16.26	0.08	8.72
Fruits/pods/lg insects	0.02	2.12	0.02	1.81	0.01	0.97
Seeds (granivore)	0.00	0.47	0.00	0.40	0.00	0.22

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	3.90
Tall Grass	#DIV/0!	1.79
Broadleaf plants/sm insects	#DIV/0!	2.19
Fruits/pods/seeds/lg insects	#DIV/0!	0.24

US EPA ARCHIVE DOCUMENT

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	abamectin
Use	almonds, walnuts,pears,plums,prunes
Formulation	agri-mek SC
Application Rate	0.023 lbs a.i./acre
Half-life	35 days
Application Interval	21 days
Maximum # Apps./Year	2
Length of Simulation	1 year

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

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

RQs reported as "0.00" in the RQ tables belo <0.01 in your assessment. This is due to rou figure issues in Excel.

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	85.00
	Mallard duck)	LC50 (mg/kg-diet)	383.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	0.00
Mammals		LD50 (mg/kg-bw)	13.60
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	0.12
		NOAEC (mg/kg-diet)	2.40

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	9.16
Tall Grass	4.20
Broadleaf plants/sm Insects	5.15
Fruits/pods/seeds/lg insects	0.57

Avian Results

Avian Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	20	5	23	114	2.28E-02
Mid	100	13	65	65	6.49E-02
Large	1000	58	291	29	2.91E-01
Granivores	20	5	5	25	5.06E-03
	100	13	14	14	1.44E-02
	1000	58	65	6	6.46E-02

Avian Body Weight (g)	Adjusted LD50 (mg/kg-bw)
20	44.13
100	56.18
1000	79.36

Dose-based EECs (mg/kg-bw)	Avian Classes and Body Weights (grams)					
	small 20	mid 100	large 1000	Granivores(grams) 20	100	1000
Short Grass	10.43	5.95	2.66			
Tall Grass	4.78	2.73	1.22			
Broadleaf plants/sm Insects	5.87	3.35	1.50			
Fruits/pods/seeds/lg insects	0.65	0.37	0.17	0.14	0.08	0.04

Dose-based RQs (Dose-based EEC/adjusted LD50)	Avian Acute RQs Size Class (grams)		
	20	100	1000
Short Grass	0.24	0.11	0.03
Tall Grass	0.11	0.05	0.02
Broadleaf plants/sm insects	0.13	0.06	0.02
Fruits/pods/seeds/lg insects	0.01	0.01	0.00
Seeds (granivore)	0.00	0.00	0.00

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.02	#DIV/0!
Tall Grass	0.01	#DIV/0!
Broadleaf plants/sm Insects	0.01	#DIV/0!
Fruits/pods/seeds/lg insects	0.00	#DIV/0!

Mammalian Results

Mammalian Class	Body Weight	Ingestion (Fdry) (g bwt/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Herbivores/ insectivores	15	3	14	95	1.43E-02
	35	5	23	66	2.31E-02
	1000	31	153	15	1.53E-01
Grainvores	15	3	3	21	3.18E-03
	35	5	5	15	5.13E-03
	1000	31	34	3	3.40E-02

Mammalian Class	Body Weight	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09
Grainvores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09

Dose-Based EECs (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores (grams)			Granivores(grams)		
	15	35	1000	15	35	1000
Short Grass	8.74	6.04	1.40			
Tall Grass	4.00	2.77	0.64			
Broadleaf plants/sm Insects	4.91	3.40	0.79			
Fruits/pods/seeds/lg insects	0.55	0.38	0.09	0.12	0.08	0.02

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	Small mammal 15 grams		Medium mammal 35 grams		Large mammal 1000 grams	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.29	33.12	0.25	28.29	0.13	15.17
Tall Grass	0.13	15.18	0.11	12.97	0.06	6.95
Broadleaf plants/sm insects	0.16	18.63	0.14	15.91	0.08	8.53
Fruits/pods/lg insects	0.02	2.07	0.02	1.77	0.01	0.95
Seeds (granivore)	0.00	0.46	0.00	0.39	0.00	0.21

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	3.82
Tall Grass	#DIV/0!	1.75
Broadleaf plants/sm insects	#DIV/0!	2.15
Fruits/pods/seeds/lg insects	#DIV/0!	0.24

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	abamectin
Use	avocados,citrus
Formulation	agri-mek SC
Application Rate	0.0235 lbs a.i./acre
Half-life	35 days
Application Interval	30 days
Maximum # Apps./Year	2
Length of Simulation	1 year

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

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

RQs reported as "0.00" in the RQ tables belo <0.01 in your assessment. This is due to rou figure issues in Excel.

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	85.00
	Mallard duck)	LC50 (mg/kg-diet)	383.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	0.00
Mammals		LD50 (mg/kg-bw)	13.60
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	0.12
		NOAEC (mg/kg-diet)	2.40

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	8.75
Tall Grass	4.01
Broadleaf plants/sm Insects	4.92
Fruits/pods/seeds/lg insects	0.55

Avian Results

Avian Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	20	5	23	114	2.28E-02
Mid	100	13	65	65	6.49E-02
Large	1000	58	291	29	2.91E-01
Granivores	20	5	5	25	5.06E-03
	100	13	14	14	1.44E-02
	1000	58	65	6	6.46E-02

Avian Body Weight (g)	Adjusted LD50 (mg/kg-bw)
20	44.13
100	56.18
1000	79.36

Dose-based EECs (mg/kg-bw)	Avian Classes and Body Weights (grams)					
	small 20	mid 100	large 1000	Granivores(grams) 20	100	1000
Short Grass	9.97	5.68	2.55			
Tall Grass	4.57	2.61	1.17			
Broadleaf plants/sm Insects	5.61	3.20	1.43			
Fruits/pods/seeds/lg insects	0.62	0.36	0.16	0.14	0.08	0.04

Dose-based RQs (Dose-based EEC/adjusted LD50)	Avian Acute RQs Size Class (grams)		
	20	100	1000
Short Grass	0.23	0.10	0.03
Tall Grass	0.10	0.05	0.01
Broadleaf plants/sm insects	0.13	0.06	0.02
Fruits/pods/seeds/lg insects	0.01	0.01	0.00
Seeds (granivore)	0.00	0.00	0.00

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.02	#DIV/0!
Tall Grass	0.01	#DIV/0!
Broadleaf plants/sm Insects	0.01	#DIV/0!
Fruits/pods/seeds/lg insects	0.00	#DIV/0!

abamectin avocados,citrus Upper bound Kenaga Residues

Mammalian Results

Mammalian Class	Body Weight	Ingestion (Fdry) (g bwt/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Herbivores/ insectivores	15	3	14	95	1.43E-02
	35	5	23	66	2.31E-02
	1000	31	153	15	1.53E-01
Grainvores	15	3	3	21	3.18E-03
	35	5	5	15	5.13E-03
	1000	31	34	3	3.40E-02

Mammalian Class	Body Weight	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09
Grainvores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09

Dose-Based EECs (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores (grams)			Granivores(grams)		
	15	35	1000	15	35	1000
Short Grass	8.35	5.77	1.34			
Tall Grass	3.83	2.64	0.61			
Broadleaf plants/sm Insects	4.69	3.24	0.75			
Fruits/pods/seeds/lg insects	0.52	0.36	0.08	0.12	0.08	0.02

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	Small mammal 15 grams		Medium mammal 35 grams		Large mammal 1000 grams	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.28	31.64	0.24	27.03	0.13	14.49
Tall Grass	0.13	14.50	0.11	12.39	0.06	6.64
Broadleaf plants/sm insects	0.16	17.80	0.13	15.20	0.07	8.15
Fruits/pods/lg insects	0.02	1.98	0.01	1.69	0.01	0.91
Seeds (granivore)	0.00	0.44	0.00	0.38	0.00	0.20

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	3.65
Tall Grass	#DIV/0!	1.67
Broadleaf plants/sm insects	#DIV/0!	2.05
Fruits/pods/seeds/lg insects	#DIV/0!	0.23

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	abamectin
Use	avocados,citrus
Formulation	agri-mek SC
Application Rate	0.023 lbs a.i./acre
Half-life	35 days
Application Interval	30 days
Maximum # Apps./Year	2
Length of Simulation	1 year

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

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

RQs reported as "0.00" in the RQ tables belo <0.01 in your assessment. This is due to rou figure issues in Excel.

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	85.00
	Mallard duck)	LC50 (mg/kg-diet)	383.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	0.00
Mammals		LD50 (mg/kg-bw)	13.60
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	0.12
		NOAEC (mg/kg-diet)	2.40

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	8.57
Tall Grass	3.93
Broadleaf plants/sm Insects	4.82
Fruits/pods/seeds/lg insects	0.54

Avian Results

Avian Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	20	5	23	114	2.28E-02
Mid	100	13	65	65	6.49E-02
Large	1000	58	291	29	2.91E-01
Granivores	20	5	5	25	5.06E-03
	100	13	14	14	1.44E-02
	1000	58	65	6	6.46E-02

Avian Body Weight (g)	Adjusted LD50 (mg/kg-bw)
20	44.13
100	56.18
1000	79.36

Dose-based EECs (mg/kg-bw)	Avian Classes and Body Weights (grams)					
	small 20	mid 100	large 1000	Granivores(grams) 20	100	1000
Short Grass	9.76	5.56	2.49			
Tall Grass	4.47	2.55	1.14			
Broadleaf plants/sm Insects	5.49	3.13	1.40			
Fruits/pods/seeds/lg insects	0.61	0.35	0.16	0.14	0.08	0.03

Dose-based RQs (Dose-based EEC/adjusted LD50)	Avian Acute RQs Size Class (grams)		
	20	100	1000
Short Grass	0.22	0.10	0.03
Tall Grass	0.10	0.05	0.01
Broadleaf plants/sm insects	0.12	0.06	0.02
Fruits/pods/seeds/lg insects	0.01	0.01	0.00
Seeds (granivore)	0.00	0.00	0.00

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.02	#DIV/0!
Tall Grass	0.01	#DIV/0!
Broadleaf plants/sm Insects	0.01	#DIV/0!
Fruits/pods/seeds/lg insects	0.00	#DIV/0!

Mammalian Results

Mammalian Class	Body Weight	Ingestion (Fdry) (g bwt/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Herbivores/ insectivores	15	3	14	95	1.43E-02
	35	5	23	66	2.31E-02
	1000	31	153	15	1.53E-01
Grainvores	15	3	3	21	3.18E-03
	35	5	5	15	5.13E-03
	1000	31	34	3	3.40E-02

Mammalian Class	Body Weight	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09
Grainvores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09

Dose-Based EECs (mg/kg-bw)	Mammalian Classes and Body weight: Herbivores/ insectivores (grams) 15	35	1000	Granivores(grams) 15	35	1000
Short Grass	8.17	5.65	1.31			
Tall Grass	3.74	2.59	0.60			
Broadleaf plants/sm Insects	4.59	3.18	0.74			
Fruits/pods/seeds/lg insects	0.51	0.35	0.08	0.11	0.08	0.02

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	Small mammal 15 grams Acute	Small mammal 15 grams Chronic	Medium mammal 35 grams Acute	Medium mammal 35 grams Chronic	Large mammal 1000 grams Acute	Large mammal 1000 grams Chronic
Short Grass	0.27	30.97	0.23	26.46	0.13	14.18
Tall Grass	0.13	14.19	0.11	12.13	0.06	6.50
Broadleaf plants/sm insects	0.15	17.42	0.13	14.88	0.07	7.98
Fruits/pods/lg insects	0.02	1.94	0.01	1.65	0.01	0.89
Seeds (granivore)	0.00	0.43	0.00	0.37	0.00	0.20

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs Acute	Mammal RQs Chronic
Short Grass	#DIV/0!	3.57
Tall Grass	#DIV/0!	1.64
Broadleaf plants/sm insects	#DIV/0!	2.01
Fruits/pods/seeds/lg insects	#DIV/0!	0.22

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	abamectin
Use	cotton,grapes,hops
Formulation	agri-mek SC
Application Rate	0.019 lbs a.i./acre
Half-life	35 days
Application Interval	21 days
Maximum # Apps./Year	2
Length of Simulation	1 year

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

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

RQs reported as "0.00" in the RQ tables belo <0.01 in your assessment. This is due to rou figure issues in Excel.

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	85.00
	Mallard duck)	LC50 (mg/kg-diet)	383.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	0.00
Mammals		LD50 (mg/kg-bw)	13.60
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	0.12
		NOAEC (mg/kg-diet)	2.40

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	7.57
Tall Grass	3.47
Broadleaf plants/sm Insects	4.26
Fruits/pods/seeds/lg insects	0.47

Avian Results

Avian Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	20	5	23	114	2.28E-02
Mid	100	13	65	65	6.49E-02
Large	1000	58	291	29	2.91E-01
Granivores	20	5	5	25	5.06E-03
	100	13	14	14	1.44E-02
	1000	58	65	6	6.46E-02

Avian Body Weight (g)	Adjusted LD50 (mg/kg-bw)
20	44.13
100	56.18
1000	79.36

Dose-based EECs (mg/kg-bw)	Avian Classes and Body Weights (grams)					
	small 20	mid 100	large 1000	Granivores(grams) 20	100	1000
Short Grass	8.62	4.92	2.20			
Tall Grass	3.95	2.25	1.01			
Broadleaf plants/sm Insects	4.85	2.76	1.24			
Fruits/pods/seeds/lg insects	0.54	0.31	0.14	0.12	0.07	0.03

Dose-based RQs (Dose-based EEC/adjusted LD50)	Avian Acute RQs Size Class (grams)		
	20	100	1000
Short Grass	0.20	0.09	0.03
Tall Grass	0.09	0.04	0.01
Broadleaf plants/sm insects	0.11	0.05	0.02
Fruits/pods/seeds/lg insects	0.01	0.01	0.00
Seeds (granivore)	0.00	0.00	0.00

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.02	#DIV/0!
Tall Grass	0.01	#DIV/0!
Broadleaf plants/sm Insects	0.01	#DIV/0!
Fruits/pods/seeds/lg insects	0.00	#DIV/0!

Mammalian Results

Mammalian Class	Body Weight	Ingestion (Fdry) (g bwt/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
	15	3	14	95	1.43E-02
Herbivores/ insectivores	35	5	23	66	2.31E-02
	1000	31	153	15	1.53E-01
	15	3	3	21	3.18E-03
Grainvores	35	5	5	15	5.13E-03
	1000	31	34	3	3.40E-02

Mammalian Class	Body Weight	Adjusted LD50	Adjusted NOAEL
	15	29.89	0.26
Herbivores/ insectivores	35	24.18	0.21
	1000	10.46	0.09
	15	29.89	0.26
Grainvores	35	24.18	0.21
	1000	10.46	0.09

Dose-Based EECs (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores (grams)			Granivores(grams)		
	15	35	1000	15	35	1000
Short Grass	7.22	4.99	1.16			
Tall Grass	3.31	2.29	0.53			
Broadleaf plants/sm Insects	4.06	2.81	0.65			
Fruits/pods/seeds/lg insects	0.45	0.31	0.07	0.10	0.07	0.02

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	Small mammal 15 grams		Medium mammal 35 grams		Large mammal 1000 grams	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.24	27.36	0.21	23.37	0.11	12.53
Tall Grass	0.11	12.54	0.09	10.71	0.05	5.74
Broadleaf plants/sm insects	0.14	15.39	0.12	13.15	0.06	7.05
Fruits/pods/lg insects	0.02	1.71	0.01	1.46	0.01	0.78
Seeds (granivore)	0.00	0.38	0.00	0.32	0.00	0.17

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	3.15
Tall Grass	#DIV/0!	1.45
Broadleaf plants/sm insects	#DIV/0!	1.77
Fruits/pods/seeds/lg insects	#DIV/0!	0.20

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	abamectin
Use	mint
Formulation	agri-mek SC
Application Rate	0.014 lbs a.i./acre
Half-life	35 days
Application Interval	7 days
Maximum # Apps./Year	3
Length of Simulation	1 year

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

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

RQs reported as "0.00" in the RQ tables belo <0.01 in your assessment. This is due to rou figure issues in Excel.

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	85.00
	Mallard duck)	LC50 (mg/kg-diet)	383.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	0.00
Mammals		LD50 (mg/kg-bw)	13.60
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	0.12
		NOAEC (mg/kg-diet)	2.40

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	8.83
Tall Grass	4.05
Broadleaf plants/sm Insects	4.97
Fruits/pods/seeds/lg insects	0.55

Avian Results

Avian Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	20	5	23	114	2.28E-02
Mid	100	13	65	65	6.49E-02
Large	1000	58	291	29	2.91E-01
Granivores	20	5	5	25	5.06E-03
	100	13	14	14	1.44E-02
	1000	58	65	6	6.46E-02

Avian Body Weight (g)	Adjusted LD50 (mg/kg-bw)
20	44.13
100	56.18
1000	79.36

Dose-based EECs (mg/kg-bw)	Avian Classes and Body Weights (grams)					
	small 20	mid 100	large 1000	Granivores(grams) 20	100	1000
Short Grass	10.06	5.74	2.57			
Tall Grass	4.61	2.63	1.18			
Broadleaf plants/sm Insects	5.66	3.23	1.44			
Fruits/pods/seeds/lg insects	0.63	0.36	0.16	0.14	0.08	0.04

Dose-based RQs (Dose-based EEC/adjusted LD50)	Avian Acute RQs Size Class (grams)		
	20	100	1000
Short Grass	0.23	0.10	0.03
Tall Grass	0.10	0.05	0.01
Broadleaf plants/sm insects	0.13	0.06	0.02
Fruits/pods/seeds/lg insects	0.01	0.01	0.00
Seeds (granivore)	0.00	0.00	0.00

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.02	#DIV/0!
Tall Grass	0.01	#DIV/0!
Broadleaf plants/sm Insects	0.01	#DIV/0!
Fruits/pods/seeds/lg insects	0.00	#DIV/0!

Mammalian Results

Mammalian Class	Body Weight	Ingestion (Fdry) (g bwt/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Herbivores/ insectivores	15	3	14	95	1.43E-02
	35	5	23	66	2.31E-02
	1000	31	153	15	1.53E-01
Grainvores	15	3	3	21	3.18E-03
	35	5	5	15	5.13E-03
	1000	31	34	3	3.40E-02

Mammalian Class	Body Weight	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09
Grainvores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09

Dose-Based EECs (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores (grams)			Granivores(grams)		
	15	35	1000	15	35	1000
Short Grass	8.42	5.82	1.35			
Tall Grass	3.86	2.67	0.62			
Broadleaf plants/sm Insects	4.74	3.27	0.76			
Fruits/pods/seeds/lg insects	0.53	0.36	0.08	0.12	0.08	0.02

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	Small mammal 15 grams		Medium mammal 35 grams		Large mammal 1000 grams	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.28	31.93	0.24	27.27	0.13	14.62
Tall Grass	0.13	14.63	0.11	12.50	0.06	6.70
Broadleaf plants/sm insects	0.16	17.96	0.14	15.34	0.07	8.22
Fruits/pods/lg insects	0.02	2.00	0.02	1.70	0.01	0.91
Seeds (granivore)	0.00	0.44	0.00	0.38	0.00	0.20

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	3.68
Tall Grass	#DIV/0!	1.69
Broadleaf plants/sm insects	#DIV/0!	2.07
Fruits/pods/seeds/lg insects	#DIV/0!	0.23

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	abamectin
Use	eleriac, cucurbit,fruit veg, herb,leafy veg,potat
Formulation	agri-mek SC
Application Rate	0.019 lbs a.i./acre
Half-life	35 days
Application Interval	7 days
Maximum # Apps./Year	3
Length of Simulation	1 year

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

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

RQs reported as "0.00" in the RQ tables belo <0.01 in your assessment. This is due to rou figure issues in Excel.

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	85.00
	Mallard duck)	LC50 (mg/kg-diet)	383.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	0.00
Mammals		LD50 (mg/kg-bw)	13.60
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	0.12
		NOAEC (mg/kg-diet)	2.40

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	11.99
Tall Grass	5.49
Broadleaf plants/sm Insects	6.74
Fruits/pods/seeds/lg insects	0.75

Avian Results

Avian Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	20	5	23	114	2.28E-02
Mid	100	13	65	65	6.49E-02
Large	1000	58	291	29	2.91E-01
Granivores	20	5	5	25	5.06E-03
	100	13	14	14	1.44E-02
	1000	58	65	6	6.46E-02

Avian Body Weight (g)	Adjusted LD50 (mg/kg-bw)
20	44.13
100	56.18
1000	79.36

Dose-based EECs (mg/kg-bw)	Avian Classes and Body Weights (grams)					
	small 20	mid 100	large 1000	Granivores(grams) 20	100	1000
Short Grass	13.65	7.78	3.48			
Tall Grass	6.26	3.57	1.60			
Broadleaf plants/sm Insects	7.68	4.38	1.96			
Fruits/pods/seeds/lg insects	0.85	0.49	0.22	0.19	0.11	0.05

Dose-based RQs (Dose-based EEC/adjusted LD50)	Avian Acute RQs Size Class (grams)		
	20	100	1000
Short Grass	0.31	0.14	0.04
Tall Grass	0.14	0.06	0.02
Broadleaf plants/sm insects	0.17	0.08	0.02
Fruits/pods/seeds/lg insects	0.02	0.01	0.00
Seeds (granivore)	0.00	0.00	0.00

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.03	#DIV/0!
Tall Grass	0.01	#DIV/0!
Broadleaf plants/sm Insects	0.02	#DIV/0!
Fruits/pods/seeds/lg insects	0.00	#DIV/0!

Mammalian Results

Mammalian Class	Body Weight	Ingestion (Fdry) (g bwt/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
	15	3	14	95	1.43E-02
Herbivores/ insectivores	35	5	23	66	2.31E-02
	1000	31	153	15	1.53E-01
	15	3	3	21	3.18E-03
Grainvores	35	5	5	15	5.13E-03
	1000	31	34	3	3.40E-02

Mammalian Class	Body Weight	Adjusted LD50	Adjusted NOAEL
	15	29.89	0.26
Herbivores/ insectivores	35	24.18	0.21
	1000	10.46	0.09
	15	29.89	0.26
Grainvores	35	24.18	0.21
	1000	10.46	0.09

Dose-Based EECs (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores (grams)			Granivores(grams)		
	15	35	1000	15	35	1000
Short Grass	11.43	7.90	1.83			
Tall Grass	5.24	3.62	0.84			
Broadleaf plants/sm Insects	6.43	4.44	1.03			
Fruits/pods/seeds/lg insects	0.71	0.49	0.11	0.16	0.11	0.03

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	Small mammal 15 grams		Medium mammal 35 grams		Large mammal 1000 grams	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.38	43.33	0.33	37.01	0.18	19.84
Tall Grass	0.18	19.86	0.15	16.96	0.08	9.09
Broadleaf plants/sm insects	0.22	24.37	0.18	20.82	0.10	11.16
Fruits/pods/lg insects	0.02	2.71	0.02	2.31	0.01	1.24
Seeds (granivore)	0.01	0.60	0.00	0.51	0.00	0.28

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	4.99
Tall Grass	#DIV/0!	2.29
Broadleaf plants/sm insects	#DIV/0!	2.81
Fruits/pods/seeds/lg insects	#DIV/0!	0.31

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	abamectin
Use	eleriac, cucurbit,fruit veg, herb,leafy veg,potat
Formulation	agri-mek SC
Application Rate	0.019 lbs a.i./acre
Half-life	35 days
Application Interval	7 days
Maximum # Apps./Year	2
Length of Simulation	1 year

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

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

RQs reported as "0.00" in the RQ tables belo <0.01 in your assessment. This is due to rou figure issues in Excel.

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	85.00
	Mallard duck)	LC50 (mg/kg-diet)	383.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	0.00
Mammals		LD50 (mg/kg-bw)	13.60
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	0.12
		NOAEC (mg/kg-diet)	2.40

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	8.53
Tall Grass	3.91
Broadleaf plants/sm Insects	4.80
Fruits/pods/seeds/lg insects	0.53

Avian Results

Avian Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	20	5	23	114	2.28E-02
Mid	100	13	65	65	6.49E-02
Large	1000	58	291	29	2.91E-01
Granivores	20	5	5	25	5.06E-03
	100	13	14	14	1.44E-02
	1000	58	65	6	6.46E-02

Avian Body Weight (g)	Adjusted LD50 (mg/kg-bw)
20	44.13
100	56.18
1000	79.36

Dose-based EECs (mg/kg-bw)	Avian Classes and Body Weights (grams)					
	small 20	mid 100	large 1000	Granivores(grams) 20	100	1000
Short Grass	9.71	5.54	2.48			
Tall Grass	4.45	2.54	1.14			
Broadleaf plants/sm Insects	5.46	3.12	1.40			
Fruits/pods/seeds/lg insects	0.61	0.35	0.16	0.13	0.08	0.03

Dose-based RQs (Dose-based EEC/adjusted LD50)	Avian Acute RQs Size Class (grams)		
	20	100	1000
Short Grass	0.22	0.10	0.03
Tall Grass	0.10	0.05	0.01
Broadleaf plants/sm insects	0.12	0.06	0.02
Fruits/pods/seeds/lg insects	0.01	0.01	0.00
Seeds (granivore)	0.00	0.00	0.00

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.02	#DIV/0!
Tall Grass	0.01	#DIV/0!
Broadleaf plants/sm Insects	0.01	#DIV/0!
Fruits/pods/seeds/lg insects	0.00	#DIV/0!

Mammalian Results

Mammalian Class	Body Weight	Ingestion (Fdry) (g bwt/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Herbivores/ insectivores	15	3	14	95	1.43E-02
	35	5	23	66	2.31E-02
	1000	31	153	15	1.53E-01
Grainvores	15	3	3	21	3.18E-03
	35	5	5	15	5.13E-03
	1000	31	34	3	3.40E-02

Mammalian Class	Body Weight	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09
Grainvores	15	29.89	0.26
	35	24.18	0.21
	1000	10.46	0.09

Dose-Based EECs (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores (grams)			Granivores(grams)		
	15	35	1000	15	35	1000
Short Grass	8.13	5.62	1.30			
Tall Grass	3.73	2.58	0.60			
Broadleaf plants/sm Insects	4.57	3.16	0.73			
Fruits/pods/seeds/lg insects	0.51	0.35	0.08	0.11	0.08	0.02

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	Small mammal 15 grams		Medium mammal 35 grams		Large mammal 1000 grams	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.27	30.84	0.23	26.34	0.12	14.12
Tall Grass	0.12	14.13	0.11	12.07	0.06	6.47
Broadleaf plants/sm insects	0.15	17.34	0.13	14.82	0.07	7.94
Fruits/pods/lg insects	0.02	1.93	0.01	1.65	0.01	0.88
Seeds (granivore)	0.00	0.43	0.00	0.37	0.00	0.20

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	3.55
Tall Grass	#DIV/0!	1.63
Broadleaf plants/sm insects	#DIV/0!	2.00
Fruits/pods/seeds/lg insects	#DIV/0!	0.22

Appendix D. Summary of Toxicity Data for Abamectin

Toxicity studies of technical grade abamectin with aquatic plants

Organism	% ai	Endpoint (ppb)	Source (Study Classification)
Duckweed (*Lemna gibba*), freshwater, static	91.4	14-d IC_{50} = 3900 (nominal, total form) [a] (95% CL 2300-6500) Visual Obsered NOAEC = 1,200	00088787 (Supplemental)
Green algae (Selenastrum capricornutum), freshwater, static	91.4	9-d IC_{50} >100,000 (nominal, total form) [a, b]	00088780 (Supplemental)

[a] Concentrations tested were above the solubility in water (7.8 ppb in distilled). Acetone was used to increase solubility in water.
[b] Precipitate was observed at concentrations of 25,000 ppb and above.

Acute toxicity studies of technical grade abamectin with aquatic invertebrates

Organism	% ai	Endpoint (ppb)	Source (Study Classification)
Water flea (*Daphnia magna*) age <24 hr, static	91.43	48 hr EC_{50} = 0.34 (effect measured is immobilization as surrogate for mortality) (95% CL 0.28-0.41) slope = 10.1	00088784 (Acceptable)
Mysid (Americamysis bahia) age N.R., static	91	96 hr LC_{50} = 0.21 (95% CL 0.1-0.32)	00150565 (Acceptable)
Eastern oyster (Crassostrea virginica), age embryos, static	90.5	48 hr IC_{50} = 430 (nominal, total form) [a] (95% CL 280-580)	00159158 (Supplemental)
Mysid (*Americamysis bahia*) age <24 hr, flow through	Tritium labeled	96 hr LC_{50} = 0.020 (measured) (95% CL 0.015-0.027)	40856305 (Acceptable)
Mysid (*Americamysis bahia*) age 4 days, flow through	Tritium labeled	96 hr LC_{50} = 0.024 (measured)	40856305 (Acceptable)
Mysid (*Americamysis bahia*) age 10 days, flow through	Tritium labeled	96 hr LC_{50} = 0.032 (measured)	40856305 (Acceptable)
Mysid (*Americamysis bahia*) age 21 days, flow through	Tritium labeled	96 hr LC_{50} = 0.033 (measured)	40856305 (Acceptable)

[a] Concentrations tested were above the solubility in water (7.8 ppb in distilled). Acetone was used to increase solubility in water.

Acute toxicity studies of abamectin formulations with aquatic invertebrates

Organism	Formulation % ai	Endpoint	Source (Study Classification)
Water flea (*D. magna*) age <24 hr, static	Fire Ant Bait 0.022 [a]	48 hr EC_{50} = 1.68 ppb ai (7600 ppb product) (95% CL 1.3 -2.18 ppb ai) slope = 5.0	00088785 (Supplemental)

[a] 100 mg abamectin/100 lbs of product * 100 = 0.022% abamectin

Acute toxicity studies of abamectin degradates with aquatic invertebrates

Organism	% Purity	Endpoint	Source (Study Classification)
Water flea (*D. magna*) age <24 hr, static	Moderately polar photodegradate group 87.7%	48 hr EC_{50} = 6.3 (95% CL 2.5-16) slope =1.3	ACC258746 (Acceptable)

Water flea (*D. magna*) age <24 hr, static	Polar photodegradate group 94.3%	48 hr EC_{50} = 4.2	ACC258746 (Acceptable)
Water flea (*D. magna*) age <24 hr, static	Non-polar photodegradate group 94.3%	48 hr EC_{50} = 25.9	ACC258746 (Acceptable)
Water flea (*D. magna*) age <24 hr, static	8α – hydroxy abermectin B1 (major soil metabolite)	48 hr EC_{50} = 25.54 (95% CL 18-32)	00153540 (Acceptable)

Acute toxicity studies of technical grade abamectin with freshwater and marine/ estuarine fish

Organism	% ai	Endpoint (ppb)	Source (Study Classification)
Carp (*Cyprinus carpio*), freshwater, size 5.34 g, flow through	97	96 hr LC_{50} = 42 (nominal, total form)[a] (95% CL =32-56)	00153797 (Supplemental)
Rainbow trout (*Oncorhynchus mykiss*), freshwater, size 0.31 g, static	91.4	96 hr LC_{50} = 3.6 (nominal, total form)[(b)] (95% CL =2.2-6)	00088780 (Supplemental)
Bluegill sunfish (*Lepomis macrochirus*), freshwater size 0.34 g, static	91	96 hr LC_{50} = 9.6 (nominal, total form)[(b)] (95% CL =5.8-16)	00088782 (Supplemental)
Sheepshead minnow (*Cyprinodon variegatus*), estuarine/marine, size 41 mg, static renewal	91	96 hr LC_{50} = 15 (nominal, total form)[(b)] (95% CL =11-20)	00150910 (Supplemental)
Channel catfish (*Ictalurus punctatus*), freshwater size 0.8 g, static	91	96 hr LC_{50} = 24 (nominal, total form)[(c)] (95% CL =18-32)	00153588 (Supplemental)

[(a)] Concentrations tested were above the solubility in water (7.8 ppb in distilled, <1 ppb in tap). No solvent was used to increase solubility in water.
[(b)] Concentrations tested were above the solubility in water (7.8 ppb in distilled, < 1 ppb in tap). Acetone was used to increase solubility in water.
[(c)] Concentrations tested were above the solubility in water (7.8 ppb in distilled, < 1 ppb in tap). DMF was used to increase solubility in water.

Acute toxicity studies of formulations of abamectin with fish

Organism	Formulation, % ai	Endpoint	Source (Study Classification)
Rainbow trout (*O. mykiss*), freshwater, size 0.14 g, static	Fire Ant Bait 0.022[(a)]	96 hr LC_{50} = 5.06 ppb ai (23,000 ppb product) (95% CL 3.52 -7.04 ppb ai) slope = 3.7	00088781 (Supplemental)
Bluegill sunfish (*L. macrochirus*), freshwater, size 0.34 g, static	Fire Ant Bait	96 hr LC_{50} = 57.2 ppb ai (260,000 ppb product) (95% CL 39.6-85.8 ppb ai) slope = 2.14	00088783 (Supplemental)

[(a)] 100 mg abamectin/100 lbs of product * 100 = 0.022% abamectin

Fish early life stage and invertebrate life cycle studies with abamectin

Organism	% ai	Endpoint (ppb)	Source (Study Classification)
Rainbow trout (*O. mykiss*), freshwater, flow through	Tech	NOAEC=0.52 LOAEC 0.96 Based on wet weight	40069609 (Acceptable)
Water flea (*D. magna*), freshwater, flow through	91.43 (tritium labeled)	21-d NOAEC = 0.03 LOAEC 0.093	00153570 (Acceptable)
Mysid (*A. bahia*), estuarine/marine, flow through	>99% (tritium labeled)	28-d NOAEC = 0.0035 LOAEC=0.0093	40856306 (Supplemental)

Acute and sub-acute toxicity studies with abamectin technical grade

Organism	% ai	Endpoint	Source (Study Classification)
Mallard duck (*Anas platyrhynchos*), age 5 months, oral dosing	91.4	14-d (post-dosing observation) LD_{50} = 85 mg/kg-bw (95% CL 67-120) slope = 7.3	ACC246358 (Supplemental)
Bobwhite quail (*C. virginianus*), age 12 months, oral dosing	91	14 D (post-dosing observation) LD_{50} = >2000 mg/kg-bw	ACC250762 (Acceptable)
Mallard duck (*Anas platyrhynchos*), age 10 days, dietary dosing	91	8-d (3-d post-dosing observation) LC_{50} = 383 ppm (95% CL 302-487) slope = 7.25	ACC250761 (Acceptable)
Bobwhite quail (*C. virginianus*), age 14 days, dietary dosing	91	8 D (3 day post-dosing observation) LC_{50} = 3102 ppm (95% CL 2344 - 4415) slope = 4.4	ACC250763 (Acceptable)

Avian reproduction studies with abamectin technical grade

Organism	% ai	Endpoint	Source (Study Classification)
Mallard duck (*Anas platyrhynchos*), dietary	94.7	NOAEL = 12 ppm LOAEL = 64 ppm (from pilot study)	40318601 (Acceptable)

Terrestrial invertebrate toxicity studies with abamectin

Organism	% ai	Endpoint	Source (Study Classification)
Honey bee (Honey bee), age Worker, contact	Tech	48 hr (3 day post-dosing observation) LD_{50} = 0.41 µg ai/bee	00159162 (Acceptable)
Honey bee (Honey bee), age Adult, foliar residues	FORM	8 hr (3 day post-dosing observation) LD_{50} = <0.05 lbs ai/A	00159161 (Acceptable)
Earthworm (Earthworm), age Adult, soil exposure	97	28-d LC_{50} = 18 ppm ai (95% CL 14 - 32)	40318603 (Supplemental)

Mammalian toxicity profile of abamectin[(a)]

Guideline No./ Study Type	Results	MRID #, Study Classification, Dosage

Guideline No./ Study Type	Results	MRID #, Study Classification, Dosage
81-1 Acute oral – rat (sesame oil vehicle)	LD_{50} = 13.6 mg/kg-bw	006894
81-1 Acute oral – rat (methyl cellulose vehicle)	LD_{50} = 214 – 232 mg/kg-bw	45607202
81-2 Acute Dermal – rabbit	LD_{50} = 2000 mg/kg-bw	0025978
81-3 Acute Inhalation – rat	LC_{50} ≤0.21 mg/L (nose only)	45623501
81-4 Primary Eye Irritation	Not an irritant	45063501
81-5 Primary Skin Irritation	Slight irritation	41123904
81-6 Dermal Sensitization	Negative in Buehler	--
81-8 Acute Neurotoxicity	None	None
870.3700a Prenatal developmental in rodents-rats	Maternal NOAEL > 1.6 mg/kg-bw/day Maternal LOAEL = not established Developmental NOAEL > 1.6 mg/kg-bw/day Developmental LOAEL = not established	Accession: 249152 (1982) Acceptable/guideline 0, 0.4, 0.8, 1.6 mg/kg-bw/day
870.3700a Prenatal developmental in rodents-CD-1 mouse	Maternal NOAEL = 1.5 mg/kg-bw/day Maternal LOAEL = 3.0 mg/kg-bw/day based on hind limb splay Developmental NOAEL < 0.75 mg/kg-bw/day Developmental LOAEL = 0.75 mg/kg-bw/day based on cleft palate and hindlimb extension	44179901 (1999) Acceptable/Non-Guideline 0, 0.75, 1.5, 3.0 mg/kg-bw/day
870.3700b Prenatal developmental in nonrodentsrabbits	Maternal NOAEL = 1.0 mg/kg-bw/day Maternal LOAEL = 2.0 mg/kg-bw/day based on decreased body weight, food consumption and water consumption Developmental NOAEL = 1.0 mg/kg-bw/day Developmental LOAEL = 2.0 mg/kg-bw/day based on cleft palate, clubbed foot, delayed ossification of sternebrae, metacarpals, phalanges	Accession: 249152 (1989) Acceptable./Guideline 0, 1.0, 2.0 mg/kg-bw/day
870.3800a 2-Generation Reproduction and fertility effects-rat	Parental/Systemic NOAEL = 0.40 mg/kg/day Parental/systemics LOAEL =not established Reproductive NOAEL = 0.40 mg/kg/day Reproductive LOAEL = not established Offspring NOAEL = 0.12 mg/kg-bw/day Offspring LOAEL = 0.40 mg/kg-bw/day based on increased retinal folds, increased dead pups at birth, decreased viability and lactation indices, decreased pup body weight	00164151 (1984) Acceptable/Guideline 0, 0.05, 0.12, 0.40 mg/kg-bw/day

Guideline No./ Study Type	Results	MRID #, Study Classification, Dosage
870.3800b 1-Generation Reproduction and fertility effects-rat	Parental/Systemic NOAEL = 1.0 mg/kg-bw/day. Parental/Systemic LOAEL=1.5/2.0 mg/kg-bw/day based on whole body tremors, ataxia, ptyalis, ocular/nasal discharges and mortality Reproductive NOAEL = 3.0 mg/kg-bw/day Offspring NOAEL < 0.5 mg/kg/day Offspring LOAEL = 0.5 mg/kg/day based on decreased pup survival and body weight between days 1-21 and delay in opening of eyes	00096450 Unacceptable/Non-Guideline 0, 0.5, 1.0, 1.5/2.0 mg/kg-bw/day
870.3800c 1-Generation Reproduction and fertility effects- rat	Parental/Systemic NOAEL = 0.4 mg/kg-bw/day Parental/Stemic LOAEL = not established Reproductive NOAEL = 0.4 mg/kg-bw/day Offspring NOAEL =0.1 mg/kg-bw/day Offspring LOAEL = 0.2 mg/kg-bw/day based on reduced pup weight, spastic movements, delayed incisor eruption	00096451 Unacceptable/Non-guideline 0, 0.1, 0.2, 0.4 mg/kg-bw/day
870.3800c 1-Generation Reproduction and fertility effects- rat	Parental/Systemic NOAEL = 0.4 mg/kg-bw/day Parental/Systemic LOAEL = not established Reproductive NOAEL = 0.4 mg/kg-bw/day Offspring NOAEL =0.4 mg/kg-bw/day LOAEL = not established	40713404 (1988) Acceptable/Nonguideline 0, 0.1, 0.2, 0.4 mg/kg-bw/day with delta-8,9 isomer 0, 0.06, 0.12, 0.40 mg/kg-bw/day
870.4300a Combined Chronic toxicity/carcinogenicity-rats	NOAEL = 1.5 mg/kg-bw/day LOAEL = 2.0 mg/kg-bw/day based on tremors **No evidence of carcinogenicity**	40069601, 40375511, 40517801 (1985) Acceptable/Guideline 0, 0.75, 1.5, 2.0 mg/kg-bw/day
870.3150a Subchronic toxicity dogs	NOAEL = 0.25 mg/kg-bw/day LOAEL = 0.50 mg/kg/day based on body tremors, one death, liver pathology, decreased body weight	00131082 Acceptable/Guideline 0, 0.25, 0.5, 2.0, 8.0 mg/kg/day
870.4100b Chronic toxicity dogs	40375510 (1987) Acceptable/Guideline 0, 0.25, 0.5, 1.0 mg/kg-bw/day	NOAEL = 0.25 mg/kg/day LOAEL = 0.5 mg/kg/day based on mydriasis, death at 1.0 mg/kg/day
870.4300b Combined Chronic toxicity/Carcinogenicity-mice	NOAEL = 4.0 mg/kg-bw/day LOAEL = 8.0 mg/kg-bw/day based on increased mortality in males, tremors, body weight decreases in females, dermatitis in males, extramedullary hematopoiesis in spleen of males **No evidence of carcinogenicity**	40069602, 40375512, 40517801 (1985) Acceptable/Guideline 0, 2, 4, 8 mg/kg-bw/day

Guideline No./ Study Type	Results	MRID #, Study Classification, Dosage
Gene Mutation 870.5100 Ames/Salmonella E.coli/mammalian gene mutation assay	negative both with and without S-9	Accession: 246894, 265568, 265569 (1986) Acceptable/Guideline Three studies: (1) 0, 3, 10, 30, 100, 1000 ug/plate, (2) 0, 100, 300, 1000, 3000, 10,000 ug/plate both with and without S-9, (3) doses not specified
Gene Mutation 870.5100 Ames/Salmonella E.coli/mammalian gene mutation assay	negative both with and without S-9 up to 3000 ug/plate	40713402 (1988) Acceptable/Guideline doses not specified up to 3000 ug/plate both with and without S-9 using delta-8,9 isomer
Gene Mutation 870.5100 Ames/SalmonellaE.coli/ mammalian gene mutation assay	negative both with and without S-9	40713405 (1988) Acceptable/Guideline doses up to 10,000 ug/plate both with and without S-9 using polar degradates
Gene Mutation 870.5300 CHO/HGPRT Forward Mutation Assay	Negative	265570 (1986) Acceptable/Guideline both with and without S-9
Gene Mutation 870.5300 Mammalian cells in culture in V79 cells	Not mutagenic for V79 cells in absence of S-9, but in the presence of S-9 appeared to have a mutagenic potential, provided the test cells had an appropriate level of sensitivity	MRID Unavailable 1983 Acceptable/Guideline
Cytogenetics 870.5395 in vivo micronucleus assay -male mice	No chromosomal aberrations in male mice, but females not tested	MRID Unavailable Acceptable/non-Guideline 0, 1.2, 12.0 mg/kg i.p.
Other Effects 870.5550	single strand DNA breaks at 0.3 and 0.6 mM in rat hepatocytes in vitro, but negative when hepatocytes from rat at LD50 dose level was used	MRID Unavailable (1983) 0.3 and 0.6 mM
Metabolism	Avermectin B1a did not bioaccumulate in rat tissues. Half-life slightly longer in females than in males for several tissues.	No MRID (1985) Nonguideline
Metabolism	The metabolism of avermectin B1 in rats results in the formation of 24-OH-Me-B1a and accounts for most of the radiolabeled residues. Avermectin B1a does not bioaccumulate.	No MRID (1985) Nonguideline

Guideline No./ Study Type	Results	MRID #, Study Classification, Dosage
870.7600 Dermal penetration	Dermal penetration is 1%	Accession: 265590 (1986) Acceptable/Nonguideline in Monkeys.

[a] Source: Rourke *et al*. November 2, 1994 Human Health Risk Assessment for New uses on Plums/Prunes, Leafy Vegetables, Fruiting Vegetables, Herb Subgroup (except chives), Avocado, Mint, and Food Handling Establishments. DB Barcode: D297225

Appendix E. RQ Method and LOCs

Risk Presumption	RQ	LOC
Birds and Wild Mammals		
Acute Risk	Dietary based: EEC[a] (ppm[b]) / LC_{50} (ppm) Dose based: EEC (mg/kg-bw/d) / LD_{50} (mg/kg-bw/d[c])	0.5
Acute Restricted Use	Dietary based: EEC (ppm) / LC_{50} (ppm) Dose based: EEC (mg/kg-bw/d) / LD_{50} (mg/kg-bw/d)	0.2
Acute Listed Species	Dietary based: EEC (ppm) / LC_{50} (ppm) Dose based: EEC (mg/kg-bw/d) / LD_{50} (mg/kg-bw/d)	0.1
Chronic Risk	Dietary based: EEC (ppm) / NOAEC (ppm) Dose based: EEC (mg/kg-bw/d) / NOAEL (mg/kg-bw/d)	1.0
Aquatic Animals		
Acute Risk	EEC (ppm) / (LC_{50} (ppm) or EC_{50} (ppm))	0.5
Acute Restricted Use	EEC (ppm) / (LC_{50} (ppm) or EC_{50} (ppm))	0.1
Acute Listed Species Chronic Risk	EEC (ppm) / (LC_{50} (ppm) or EC_{50} (ppm)) EEC (ppm) / NOAEC (ppm)	0.05 1.0
Terrestrial Plants and Plants Inhabiting Semi-Aquatic Areas		
Acute Risk	EEC (lbs ai/A) / EC_{25} (lbs ai/A)	1.0
Acute Listed Use	EEC (lbs ai/A) / (EC_{05} or NOAEC (lbs ai/A))	1.0
Aquatic Plants		
Risk	EEC (ppm) / EC_{50} (ppm)	1.0
Listed Species	EEC (ppm) / (EC_{05} or NOAEC (ppm))	1.0

[a] EEC = estimated environmental concentration
[b] ppm = parts per million
[c] mg/kg-bw/d = milligrams per kilogram of body weight per day

Appendix F. Locates Output

All Medium Types Reported

Mammal, Marine mml, Bird, Amphibian, Reptile, Crustacean, Bivalve, Gastropod, Arachnid, Insect, Dicot, Monocot, Ferns, Conf/cycds, Coral, Lichen

almonds, walnuts, english, apples, avocados, avocados (PR), citrus fruit, all, cotton, all, cantaloups, cucumbers and pickles, honeydew melons, pumpkins, squash, watermelons, eggplant, peppers, bell, peppers, chile (all peppers - excluding bell), pimientos, tomatoes, grapes, dill for oil, dill for oil (irrigated), herbs and spice plants harvested for sale (PR), herbs, dried, herbs, fresh cut, mustard seed, parsley, amaranth, celery, escarole and endive, lettuce, all, rhubarb, spinach, mint for oil, all (irrigated), mint for oil, peppermint (irrigated), mint for oil, spearmint (irrigated), pears, all, plums and prunes, potatoes

AL, AK, AZ, AR, CA, CO, CT, DE, DC, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, ME, MD, MA,
MI, MN, MS, MO, MT, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OK, OR, PA, PR, RI, SC, SD, TN, TX, UT, VT, VA, WA, WV, WI, WY

1145 Species Affected:

Inverse Name: Status:	Taxa:	Co. occurence:
Abalone, White Endangered	Gastropod	118
Abutilon eremitopetalum (ncn) Endangered	Dicot	20
Abutilon sandwicense (ncn) Endangered	Dicot	17
Achyranthes mutica (ncn) Endangered	Dicot	20
Achyranthes splendens var. rotundata (ncn) Endangered	Dicot	17
A'e (Zanthoxylum dipetalum var. tomentosum) Endangered	Dicot	20
A'e (Zanthoxylum hawaiiense) Endangered	Dicot	56
'Aiea (Nothocestrum breviflorum) Endangered	Dicot	20
'Aiea (Nothocestrum peltatum) Endangered	Dicot	16
'Akepa, Hawaii Endangered	Bird	20
'Akepa, Maui Endangered	Bird	20
'Akia Loa, Kauai (Hemignathus procerus) Endangered	Bird	16
'Akia Pola'au (Hemignathus munroi) Endangered	Bird	20
'Akoko (Chamaesyce celastroides var. kaenana) Endangered	Dicot	17
'Akoko (Chamaesyce deppeana) Endangered	Dicot	17
'Akoko (Chamaesyce herbstii) Endangered	Dicot	17
'Akoko (Chamaesyce kuwaleana) Endangered	Dicot	17
'Akoko (Chamaesyce rockii) Endangered	Dicot	17
'Akoko (Chamaesyce skottsbergii var. skottsbe Endangered	Dicot	37
'Akoko (Euphorbia haeleeleana)	Dicot	33

Endangered		
Alani (Melicope adscendens)	Dicot	20
Endangered		
Alani (Melicope balloui)	Dicot	20
Endangered		
Alani (Melicope haupuensis)	Dicot	16
Endangered		
Alani (Melicope knudsenii)	Dicot	36
Endangered		
Alani (Melicope lydgatei)	Dicot	17
Endangered		
Alani (Melicope mucronulata)	Dicot	20
Endangered		
Alani (Melicope munroi)	Dicot	20
Endangered		
Alani (Melicope ovalis)	Dicot	20
Endangered		
Alani (Melicope pallida)	Dicot	16
Endangered		
Alani (Melicope quadrangularis)	Dicot	16
Endangered		
Alani (Melicope reflexa)	Dicot	20
Endangered		
Alani (Melicope saint-johnii)	Dicot	17
Endangered		
Alani (Melicope zahlbruckneri)	Dicot	20
Endangered		
Albatross, Short-tailed	Bird	17
Endangered		
Allocarya, Calistoga	Dicot	21
Endangered		
Alopecurus, Sonoma	Monocot	44
Endangered		
Alsinidendron obovatum (ncn)	Dicot	17
Endangered		
Alsinidendron trinerve (ncn)	Dicot	17
Endangered		
Alsinidendron viscosum (ncn)	Dicot	16
Endangered		
Amaranthus brownii (ncn)	Dicot	17
Endangered		
Ambersnail, Kanab	Gastropod	23
Endangered		
Ambrosia, San Diego	Dicot	54
Endangered		
Ambrosia, South Texas	Dicot	43
Endangered		
Amphipod, Illinois Cave	Crustacean	27
Endangered		
Amphipod, Kauai Cave	Crustacean	16
Endangered		
Amphipod, Noel's	Crustacean	4
Endangered		
Amphipod, Peck's Cave	Crustacean	75
Endangered		
'Anaunau (Lepidium arbuscula)	Dicot	17
Endangered		
'Anunu (Sicyos alba)	Dicot	20
Endangered		
Aristida chaseae (ncn)	Monocot	3
Endangered		
Arrowhead, Bunched	Monocot	41
Endangered		
Asplenium fragile var. insulare (ncn)	Ferns	20
Endangered		
Aster, Florida Golden	Dicot	29
Endangered		

Aster, Ruth's Golden Endangered	Dicot	5
Auerodendron pauciflorum (ncn) Endangered	Dicot	2
Aupaka (Isodendrion hosakae) Endangered	Dicot	20
Aupaka (Isodendrion laurifolium) Endangered	Dicot	33
Avens, Spreading Endangered	Dicot	111
'Awikiwiki (Canavalia molokaiensis) Endangered	Dicot	20
'Awiwi (Centaurium sebaeoides) Endangered	Dicot	36
'Awiwi (Hedyotis cookiana) Endangered	Dicot	36
Ayenia, Texas Endangered	Dicot	41
Barberry, Island Endangered	Dicot	25
Barberry, Nevin's Endangered	Dicot	53
Bariaco Endangered	Dicot	7
Bat, Gray Endangered	Mammal	1801
Bat, Hawaiian Hoary Endangered	Mammal	73
Bat, Indiana Endangered	Mammal	9735
Bat, Lesser (=Sanborn's) Long-nosed Endangered	Mammal	154
Bat, Mexican Long-nosed Endangered	Mammal	28
Bat, Ozark Big-eared Endangered	Mammal	49
Bat, Virginia Big-eared Endangered	Mammal	259
Beardtongue, Penland Endangered	Dicot	2
Beargrass, Britton's Endangered	Monocot	51
Bear-poppy, Dwarf Endangered	Dicot	13
Bedstraw, El Dorado Endangered	Dicot	20
Bedstraw, Island Endangered	Dicot	25
Beetle, American Burying Endangered	Insect	450
Beetle, Coffin Cave Mold Endangered	Insect	16
Beetle, Comal Springs Dryopid Endangered	Insect	75
Beetle, Comal Springs Riffle Endangered	Insect	75
Beetle, Helotes Mold Endangered	Insect	17
Beetle, Hungerford's Crawling Water Endangered	Insect	17
Beetle, Kretschmarr Cave Mold Endangered	Insect	13
Beetle, Mount Hermon June Endangered	Insect	22
Beetle, Ohlone Tiger Endangered	Insect	22
Beetle, Salt Creek Tiger Endangered	Insect	35
Beetle, Tooth Cave Ground Endangered	Insect	29

Bellflower, Brooksville Endangered	Dicot	7
Bird's-beak, Palmate-bracted Endangered	Dicot	133
Bird's-beak, Pennell's Endangered	Dicot	27
Bird's-beak, salt marsh Endangered	Dicot	142
Bird's-beak, Soft Endangered	Dicot	62
Bittercress, Small-anthered Endangered	Dicot	39
Blackbird, Yellow-shouldered Endangered	Bird	19
Bladderpod, Kodachrome Endangered	Dicot	3
Bladderpod, San Bernardino Mountains Endangered	Dicot	25
Bladderpod, Spring Creek Endangered	Dicot	12
Bladderpod, White Endangered	Dicot	6
Bladderpod, Zapata Endangered	Dicot	12
Blazing Star, Scrub Endangered	Dicot	19
Bluegrass, Hawaiian Endangered	Monocot	16
Bluegrass, Mann's (Poa mannii) Endangered	Monocot	16
Bluegrass, Napa Endangered	Monocot	21
Bluegrass, San Bernardino Endangered	Monocot	51
Blue-star, Kearney's Endangered	Dicot	18
Bluet, Roan Mountain Endangered	Dicot	50
Boa, Puerto Rican Endangered	Reptile	24
Bobwhite, Masked Endangered	Bird	18
Bonamia menziesii (ncn) Endangered	Dicot	73

Boxwood, Vahl's Endangered	Dicot	4
Broom, San Clemente Island Endangered	Dicot	25
Buckwheat, Cushenbury Endangered	Dicot	25
Buckwheat, Ione (incl. Irish Hill) Endangered	Dicot	14
Buckwheat, Steamboat Endangered	Dicot	8
Bulrush, Northeastern (=Barbed Bristle) Endangered	Monocot	268
Bush-mallow, San Clemente Island Endangered	Dicot	25
Bush-mallow, Santa Cruz Island Endangered	Dicot	25
Buttercup, Autumn Endangered	Dicot	6
Butterfly, Behren's Silverspot Endangered	Insect	48
Butterfly, Callippe Silverspot Endangered	Insect	30
Butterfly, El Segundo Blue Endangered	Insect	25
Butterfly, Fender's Blue Endangered	Insect	83
Butterfly, Karner Blue Endangered	Insect	552
Butterfly, Lange's Metalmark Endangered	Insect	18
Butterfly, Lotis Blue Endangered	Insect	21
Butterfly, Mission Blue Endangered	Insect	36
Butterfly, Mitchell's Satyr Endangered	Insect	273
Butterfly, Myrtle's Silverspot Endangered	Insect	44
Butterfly, Palos Verdes Blue Endangered	Insect	25
Butterfly, Quino Checkerspot Endangered	Insect	54
Butterfly, Saint Francis' Satyr Endangered	Insect	25
Butterfly, San Bruno Elfin Endangered	Insect	19
Butterfly, Schaus Swallowtail Endangered	Insect	15
Butterfly, Smith's Blue Endangered	Insect	27
Butterfly, Uncompahgre Fritillary Endangered	Insect	23
Button-celery, San Diego Endangered	Dicot	54
Cactus, Arizona Hedgehog Endangered	Dicot	47
Cactus, Bakersfield Endangered	Dicot	25
Cactus, Black Lace Endangered	Dicot	33
Cactus, Brady Pincushion Endangered	Dicot	9
Cactus, Key Tree Endangered	Dicot	1
Cactus, Knowlton Endangered	Dicot	23
Cactus, Kuenzler Hedgehog Endangered	Dicot	29
Cactus, Nellie Cory Endangered	Dicot	15

Cactus, Nichol's Turk's Head Endangered	Dicot	38
Cactus, Peebles Navajo Endangered	Dicot	4
Cactus, Pima Pineapple Endangered	Dicot	25
Cactus, San Rafael Endangered	Dicot	5
Cactus, Sneed Pincushion Endangered	Dicot	43
Cactus, Star Endangered	Dicot	40
Cactus, Tobusch Fishhook Endangered	Dicot	47
Cactus, Wright Fishhook Endangered	Dicot	19
Campeloma, Slender Endangered	Gastropod	14
Campion, Fringed Endangered	Dicot	45
Capa Rosa Endangered	Dicot	4
Caribou, Woodland Endangered	Mammal	21
Catesbaea Melanocarpa (ncn) Endangered	Dicot	1
Cat's-eye, Terlingua Creek Endangered	Dicot	15
Cavesnail, Tumbling Creek Endangered	Gastropod	5
Ceanothus, Coyote Endangered	Dicot	20
Ceanothus, Pine Hill Endangered	Dicot	20
Chaffseed, American Endangered	Dicot	243
Chamaecrista glandulosa (ncn) Endangered	Dicot	5
Chamaesyce Halemanui (ncn) Endangered	Dicot	16
Checker-mallow, Keck's Endangered	Dicot	53
Checker-mallow, Kenwood Marsh Endangered	Dicot	27

Checker-mallow, Pedate Endangered	Dicot	25
Checker-mallow, Wenatchee Mountains Endangered	Dicot	10
Chupacallos Endangered	Dicot	6
Cladonia, Florida Perforate Endangered	Lichen	58
Clarkia, Pismo Endangered	Dicot	24
Clarkia, Presidio Endangered	Dicot	11
Clarkia, Vine Hill Endangered	Dicot	27
Cliffrose, Arizona Endangered	Dicot	68
Clover, Leafy Prairie Endangered	Dicot	140
Clover, Monterey Endangered	Dicot	27
Clover, Running Buffalo Endangered	Dicot	519
Clover, Showy Indian Endangered	Dicot	44
Combshell, Southern (=Penitent mussel) Endangered	Bivalve	30
Combshell, Upland Endangered	Bivalve	93
Condor, California Endangered	Bird	214
Coneflower, Smooth Endangered	Dicot	447
Coneflower, Tennessee Purple Endangered	Dicot	33
Coot, Hawaiian (=Alae keo keo) Endangered	Bird	73
Cordia bellonis (ncn) Endangered	Dicot	2
Coyote-thistle, Loch Lomond Endangered	Dicot	18
Crane, Mississippi Sandhill Endangered	Bird	13
Crane, Whooping Endangered	Bird	2256
Cranichis Ricartii Endangered	Monocot	4
Crayfish, Cave (Cambarus aculabrum) Endangered	Crustacean	18
Crayfish, Cave (Cambarus zophonastes) Endangered	Crustacean	3
Crayfish, Nashville Endangered	Crustacean	19
Crayfish, Shasta Endangered	Crustacean	22
Creeper, Hawaii Endangered	Bird	20
Creeper, Molokai (Kakawahie) Endangered	Bird	20
Creeper, Oahu (Alauwahio) Endangered	Bird	17
Crow, Hawaiian ('Alala) Endangered	Bird	20
Crownscale, San Jacinto Valley Endangered	Dicot	28
Curlew, Eskimo Endangered	Bird	42
Cyanea undulata (ncn) Endangered	Dicot	16
Cypress, Santa Cruz Endangered	Conf/cycds	41

Daisy, Willamette Endangered	Dicot	113
Daphnopsis hellerana (ncn) Endangered	Dicot	2
Dawn-flower, Texas Prairie (=Texas Bitterweed) Endangered	Dicot	42
Deer, Columbian White-tailed Endangered	Mammal	94
Deer, Key Endangered	Mammal	1
Delissea rhytodisperma (ncn) Endangered	Dicot	16
Diellia erecta (ncn) Endangered	Ferns	57
Diellia falcata (ncn) Endangered	Ferns	17
Diellia pallida (ncn) Endangered	Ferns	16
Diellia unisora (ncn) Endangered	Ferns	37
Diplazium molokaiense (ncn) Endangered	Ferns	20
Dogweed, Ashy Endangered	Dicot	16
Dragonfly, Hine's Emerald Endangered	Insect	163
Dropwort, Canby's Endangered	Dicot	272
Dubautia latifolia (ncn) Endangered	Dicot	16
Dubautia pauciflorula (ncn) Endangered	Dicot	16
Duck, Hawaiian (Koloa) Endangered	Bird	53
Duck, Laysan Endangered	Bird	17
Dudleya, Santa Clara Valley Endangered	Dicot	128
Elepaio, Oahu Endangered	Bird	17
Elktoe, Appalachian Endangered	Bivalve	97
Erubia Endangered	Dicot	2

Eugenia Woodburyana Endangered	Dicot	5
Evening-primrose, Antioch Dunes Endangered	Dicot	41
Evening-primrose, Eureka Valley Endangered	Dicot	6
Fairy Shrimp, Conservancy Fairy Endangered	Crustacean	133
Fairy Shrimp, Longhorn Endangered	Crustacean	105
Fairy Shrimp, Riverside Endangered	Crustacean	121
Fairy Shrimp, San Diego Endangered	Crustacean	26
Falcon, Northern Aplomado Endangered	Bird	305
Fanshell Endangered	Bivalve	676
Fern, Adiantum vivesii Endangered	Ferns	2
Fern, Aleutian Shield Endangered	Ferns	3
Fern, Elaphoglossum serpens Endangered	Ferns	2
Fern, Pendant Kihi (Adenophorus periens) Endangered	Ferns	56
Fern, Thelypteris inabonensis Endangered	Ferns	4
Fern, Thelypteris verecunda Endangered	Ferns	5
Fern, Thelypteris yaucoensis Endangered	Ferns	4
Ferret, Black-footed Endangered	Mammal	708
Fiddleneck, Large-flowered Endangered	Dicot	53
Finch, Laysan Endangered	Bird	17
Finch, Nihoa Endangered	Bird	17
Flannelbush, Mexican Endangered	Dicot	26
Flannelbush, Pine Hill Endangered	Dicot	20
Fly, Delhi Sands Flower-loving Endangered	Insect	76
Flycatcher, Southwestern Willow Endangered	Bird	641
Fox, San Joaquin Kit Endangered	Mammal	360
Fox, San Miguel Island Endangered	Mammal	25
Fox, Santa Catalina Island Endangered	Mammal	25
Fox, Santa Cruz Island Endangered	Mammal	25
Fox, Santa Rosa Island Endangered	Mammal	25
Frankenia, Johnston's Endangered	Dicot	16
Fringe Tree, Pygmy Endangered	Dicot	45
Fringepod, Santa Cruz Island Endangered	Dicot	25
Fritillary, Gentner's Endangered	Monocot	39
Frog, Dusky Gopher (Mississippi DPS) Endangered	Amphibian	12
Frog, Mountain Yellow-legged Endangered	Amphibian	78

Gahnia Lanaiensis (ncn) Endangered	Monocot	20
Gecko, Monito Endangered	Reptile	2
Geranium, Hawaiian Red-flowered Endangered	Dicot	20
Gerardia, Sandplain Endangered	Dicot	119
Gilia, Hoffmann's Slender-flowered Endangered	Dicot	25
Gilia, Monterey Endangered	Dicot	27
Goetzea, Beautiful (Matabuey) Endangered	Dicot	4
Golden Sunburst, Hartweg's Endangered	Dicot	76
Goldenrod, Short's Endangered	Dicot	63
Goldfields, Burke's Endangered	Dicot	66
Goldfields, Contra Costa Endangered	Dicot	166
Goose, Hawaiian (Nene) Endangered	Bird	56
Gouania hillebrandii (ncn) Endangered	Dicot	20
Gouania meyenii (ncn) Endangered	Dicot	33
Gouania vitifolia (ncn) Endangered	Dicot	17
Gourd, Okeechobee Endangered	Dicot	22
Grass, California Orcutt Endangered	Monocot	79
Grass, Eureka Dune Endangered	Monocot	6
Grass, Fosberg's Love Endangered	Monocot	17
Grass, Hairy Orcutt Endangered	Dicot	200
Grass, Sacramento Orcutt Endangered	Dicot	37
Grass, Solano Endangered	Monocot	48

Grass, Tennessee Yellow-eyed Endangered	Monocot	46
Grasshopper, Zayante Band-winged Endangered	Insect	22
Ground-plum, Guthrie's Endangered	Dicot	21
Haha (Cyanea acuminata) Endangered	Dicot	17
Haha (Cyanea asarifolia) Endangered	Dicot	16
Haha (Cyanea copelandii ssp. copelandii) Endangered	Dicot	20
Haha (Cyanea copelandii ssp. haleakalaensis) Endangered	Dicot	20
Haha (Cyanea Crispa) (=Rollandia crispa) Endangered	Dicot	17
Haha (Cyanea dunbarii) Endangered	Dicot	20
Haha (Cyanea glabra) Endangered	Dicot	20
Haha (Cyanea grimesiana ssp. grimesiana) Endangered	Dicot	37
Haha (Cyanea grimesiana ssp. obatae) Endangered	Dicot	17
Haha (Cyanea hamatiflora ssp. carlsonii) Endangered	Dicot	20
Haha (Cyanea hamatiflora ssp. hamatiflora) Endangered	Dicot	20
Haha (Cyanea humboldtiana) Endangered	Dicot	17
Haha (Cyanea koolauensis) Endangered	Dicot	17
Haha (Cyanea longiflora) Endangered	Dicot	17
Haha (Cyanea Macrostegia var. gibsonii) Endangered	Dicot	20
Haha (Cyanea mannii) Endangered	Dicot	20
Haha (Cyanea mceldowneyi) Endangered	Dicot	20
Haha (Cyanea pinnatifida) Endangered	Dicot	17
Haha (Cyanea platyphylla) Endangered	Dicot	20
Haha (Cyanea procera) Endangered	Dicot	20
Haha (Cyanea remyi) Endangered	Dicot	16
Haha (Cyanea shipmanii) Endangered	Dicot	20
Haha (Cyanea stictophylla) Endangered	Dicot	20
Haha (Cyanea St-Johnii) (=Rollandia St-Johnii) Endangered	Dicot	17
Haha (Cyanea superba) Endangered	Dicot	17
Ha'Iwale (Cyrtandra crenata) Endangered	Dicot	17
Ha'Iwale (Cyrtandra dentata) Endangered	Dicot	17
Ha'Iwale (Cyrtandra giffardii) Endangered	Dicot	20
Ha'Iwale (Cyrtandra munroi) Endangered	Dicot	20
Ha'Iwale (Cyrtandra polyantha) Endangered	Dicot	17
Ha'Iwale (Cyrtandra subumbellata) Endangered	Dicot	17
Ha'Iwale (Cyrtandra tintinnabula) Endangered	Dicot	17

Ha'Iwale (Cyrtandra viridiflora) Endangered	Dicot	17
Hala Pepe (Pleomele hawaiiensis) Endangered	Monocot	20
Haplostachys Haplostachya (ncn) Endangered	Dicot	20
Harebells, Avon Park Endangered	Dicot	19
Harperella Endangered	Dicot	260
Harvestman, Bee Creek Cave Endangered	Arachnid	41
Harvestman, Bone Cave Endangered	Arachnid	29
Harvestman, Robber Baron Cave Endangered	Arachnid	17
Hau Kauhiwi (Hibiscadelphus woodi) Endangered	Dicot	16
Hau Kuahiwi (Hibiscadelphus distans) Endangered	Dicot	16
Hawk, Hawaiian (Io) Endangered	Bird	20
Hawk, Puerto Rican Broad-winged Endangered	Bird	4
Hawk, Puerto Rican Sharp-shinned Endangered	Bird	6
Heau (Exocarpos luteolus) Endangered	Dicot	16
Hedyotis degeneri (ncn) Endangered	Dicot	17
Hedyotis parvula (ncn) Endangered	Dicot	17
Hedyotis St.-Johnii (ncn) Endangered	Dicot	16
Hesperomannia arborescens (ncn) Endangered	Dicot	37
Hesperomannia arbuscula (ncn) Endangered	Dicot	37
Hesperomannia lydgatei (ncn) Endangered	Dicot	16
Hibiscus, Clay's Endangered	Dicot	16
Higuero De Sierra Endangered	Dicot	7

Hilo Ischaemum (Ischaemum byrone) Endangered	Monocot	56
Holei (Ochrosia kilaueaensis) Endangered	Dicot	20
Holly, Cook's Endangered	Dicot	4
Honeycreeper, Crested ('Akohekohe) Endangered	Bird	20
Hypericum, Highlands Scrub Endangered	Dicot	19
'Ihi'Ihi (Marsilea villosa) Endangered	Ferns	37
Ilex sintenisii (ncn) Endangered	Dicot	4
Iliau (Wilkesia hobdyi) Endangered	Dicot	16
Ipomopsis, Holy Ghost Endangered	Dicot	7
Irisette, White Endangered	Monocot	51
Isopod, Lee County Cave Endangered	Crustacean	9
Isopod, Socorro Endangered	Crustacean	11
Jacquemontia, Beach Endangered	Dicot	40
Jaguar Endangered	Mammal	92
Jaguarundi, Gulf Coast Endangered	Mammal	156
Jaguarundi, Sinaloan Endangered	Mammal	108
Jewelflower, California Endangered	Dicot	146
Jewelflower, Tiburon Endangered	Dicot	17
Kamakahala (Labordia cyrtandrae) Endangered	Dicot	17
Kamakahala (Labordia lydgatei) Endangered	Dicot	16
Kamakahala (Labordia tinifolia var. lanaiensis) Endangered	Dicot	20
Kamakahala (Labordia tinifolia var. wahiawaen) Endangered	Dicot	16
Kamakahala (Labordia triflora) Endangered	Dicot	20
Kamanomano (Cenchrus agrimonioides) Endangered	Monocot	37
Kanaloa kahoolawensis (ncn) Endangered	Dicot	20
Kangaroo Rat, Fresno Endangered	Mammal	93
Kangaroo Rat, Giant Endangered	Mammal	219
Kangaroo Rat, Morro Bay Endangered	Mammal	24
Kangaroo Rat, San Bernardino Merriam's Endangered	Mammal	53
Kangaroo Rat, Stephens' Endangered	Mammal	79
Kangaroo Rat, Tipton Endangered	Mammal	68
Kauila (Colubrina oppositifolia) Endangered	Dicot	20
Kaulu (Pteralyxia kauaiensis) Endangered	Dicot	16
Kidneyshell, Triangular Endangered	Bivalve	167
Kio'Ele (Hedyotis coriacea) Endangered	Dicot	40

Kiponapona (Phyllostegia racemosa) Endangered	Dicot	20
Kite, Everglade Snail Endangered	Bird	179
Koki'o (Kokia drynarioides) Endangered	Dicot	20
Koki'o (Kokia kauaiensis) Endangered	Dicot	16
Koki'o Ke'oke'o (Hibiscus arnottianus ssp. immaculatus) Endangered	Dicot	20
Koki'o Ke'oke'o (Hibiscus waimeae ssp. hannerae) Endangered	Dicot	16
Kolea (Myrsine juddii) Endangered	Dicot	17
Ko'oko'olau (Bidens micrantha ssp. kalealaha) Endangered	Dicot	20
Ko'oko'olau (Bidens wiebkei) Endangered	Dicot	20
Ko'oloa'ula (Abutilon menziesii) Endangered	Dicot	40
Kopa (Hedyotis schlechtendahliana var. remyi) Endangered	Dicot	20
Kuawawaenohu (Alsinidendron lychnoides) Endangered	Dicot	16
Kulu'I (Nototrichium humile) Endangered	Dicot	37
Ladies'-tresses, Canelo Hills Endangered	Monocot	26
Ladies'-tresses, Navasota Endangered	Monocot	131
Larkspur, Baker's Endangered	Dicot	44
Larkspur, San Clemente Island Endangered	Dicot	25
Larkspur, Yellow Endangered	Dicot	44
Lau'ehu (Panicum niihauense) Endangered	Monocot	16
Laukahi Kuahiwi (Plantago hawaiensis) Endangered	Dicot	20
Laukahi Kuahiwi (Plantago princeps) Endangered	Dicot	53
Laulihilihi (Schiedea stellarioides) Endangered	Dicot	16

Layia, Beach Endangered	Dicot	89
Lead-plant, Crenulate Endangered	Dicot	14
Leather-flower, Alabama Endangered	Dicot	37
Leather-flower, Morefield's Endangered	Dicot	15
Lepanthes eltorensis (ncn) Endangered	Monocot	4
Lessingia, San Francisco Endangered	Dicot	19
Lichen, Rock Gnome Endangered	Lichen	125
Lily, Minnesota Trout Endangered	Monocot	44
Lily, Pitkin Marsh Endangered	Monocot	27
Lily, Western Endangered	Monocot	29
Limpet, Banbury Springs Endangered	Gastropod	29
Lipochaeta venosa (ncn) Endangered	Dicot	20
Liveforever, Santa Barbara Island Endangered	Dicot	25
Lizard, Blunt-nosed Leopard Endangered	Reptile	264
Lo`ulu (Pritchardia affinis) Endangered	Monocot	20
Lo`ulu (Pritchardia kaalae) Endangered	Monocot	17
Lo`ulu (Pritchardia munroi) Endangered	Monocot	20
Lo`ulu (Pritchardia napaliensis) Endangered	Monocot	16
Lo`ulu (Pritchardia remota) Endangered	Monocot	17
Lo`ulu (Pritchardia schattaueri) Endangered	Monocot	20
Lo`ulu (Pritchardia viscosa) Endangered	Monocot	16
Lobelia monostachya (ncn) Endangered	Dicot	17
Lobelia niihauensis (ncn) Endangered	Dicot	33
Lobelia oahuensis (ncn) Endangered	Dicot	17
Lomatium, Bradshaw's Endangered	Dicot	113
Lomatium, Cook's Endangered	Dicot	39
Loosestrife, Rough-leaved Endangered	Dicot	237
Lousewort, Furbish Endangered	Dicot	20
Lupine, Clover Endangered	Dicot	93
Lupine, Nipomo Mesa Endangered	Dicot	24
Lupine, Scrub Endangered	Dicot	19
Lyonia truncata var. proctorii (ncn) Endangered	Dicot	3
Lysimachia filifolia (ncn) Endangered	Dicot	33
Lysimachia lydgatei (ncn) Endangered	Dicot	37
Lysimachia maxima (ncn) Endangered	Dicot	20

Mahoe (Alectryon macrococcus) Endangered	Dicot	53
Malacothrix, Island Endangered	Dicot	25
Malacothrix, Santa Cruz Island Endangered	Dicot	50
Mallow, Kern Endangered	Dicot	25
Mallow, Peter's Mountain Endangered	Dicot	5
Manatee, West Indian Endangered	Marine mml	606
Manioc, Walker's Endangered	Dicot	28
Manzanita, Del Mar Endangered	Dicot	43
Manzanita, Santa Rosa Island Endangered	Dicot	25
Ma'o Hau Hele (Hibiscus brackenridgei) Endangered	Dicot	57
Ma'oli'oli (Schiedea apokremnos) Endangered	Dicot	16
Ma'oli'oli (Schiedea kealiae) Endangered	Dicot	17
Mapele (Cyrtandra cyaneoides) Endangered	Dicot	16
Mariscus fauriei (ncn) Endangered	Monocot	40
Mariscus pennatiformis (ncn) Endangered	Monocot	73
Marstonia, Royal (=Royal Snail) Endangered	Gastropod	5
Meadowfoam, Butte County Endangered	Dicot	43
Meadowfoam, Large-flowered Woolly Endangered	Dicot	21
Meadowfoam, Sebastopol Endangered	Dicot	27
Meadowrue, Cooley's Endangered	Dicot	66
Mehamehame (Flueggea neowawraea) Endangered	Dicot	73
Meshweaver, Braken Bat Cave Endangered	Arachnid	17

Milkpea, Small's Endangered	Dicot	14
Milk-vetch, Applegate's Endangered	Dicot	14
Milk-vetch, Braunton's Endangered	Dicot	67
Milk-vetch, Clara Hunt's Endangered	Dicot	48
Milk-vetch, Coachella Valley Endangered	Dicot	28
Milk-vetch, Coastal Dunes Endangered	Dicot	27
Milk-vetch, Cushenbury Endangered	Dicot	25
Milk-vetch, Holmgren Endangered	Dicot	27
Milk-vetch, Jesup's Endangered	Dicot	29
Milk-vetch, Lane Mountain Endangered	Dicot	25
Milk-vetch, Mancos Endangered	Dicot	29
Milk-vetch, Osterhout Endangered	Dicot	2
Milk-vetch, Sentry Endangered	Dicot	9
Milk-vetch, Shivwits Endangered	Dicot	13
Milk-vetch, Triple-ribbed Endangered	Dicot	53
Milk-vetch, Ventura Marsh Endangered	Dicot	50
Millerbird, Nihoa Endangered	Bird	17
Mint, Garrett's Endangered	Dicot	8
Mint, Lakela's Endangered	Dicot	11
Mint, Longspurred Endangered	Dicot	12
Mint, Otay Mesa Endangered	Dicot	54
Mint, San Diego Mesa Endangered	Dicot	26
Mint, Scrub Endangered	Dicot	8
Mitracarpus Maxwelliae Endangered	Dicot	4
Mitracarpus Polycladus Endangered	Dicot	4
Monardella, Willowy Endangered	Dicot	26
Monkey-flower, Michigan Endangered	Dicot	59
Moorhen, Hawaiian Common Endangered	Bird	53
Morning-glory, Stebbins Endangered	Dicot	20
Moth, Blackburn's Sphinx Endangered	Insect	40
Mountain Beaver, Point Arena Endangered	Mammal	21
Mountainbalm, Indian Knob Endangered	Dicot	24
Mountain-mahogany, Catalina Island Endangered	Dicot	25
Mouse, Alabama Beach Endangered	Mammal	18
Mouse, Anastasia Island Beach Endangered	Mammal	8

Mouse, Choctawhatchee Beach Endangered	Mammal	18
Mouse, Key Largo Cotton Endangered	Mammal	1
Mouse, Pacific Pocket Endangered	Mammal	68
Mouse, Perdido Key Beach Endangered	Mammal	25
Mouse, Salt Marsh Harvest Endangered	Mammal	156
Mucket, Pink (Pearlymussel) Endangered	Bivalve	1006
Munroidendron racemosum (ncn) Endangered	Dicot	16
Mussel, Acornshell Southern Endangered	Bivalve	48
Mussel, Black (=Curtus' Mussel) Clubshell Endangered	Bivalve	13
Mussel, Clubshell Endangered	Bivalve	732
Mussel, Coosa Moccasinshell Endangered	Bivalve	74
Mussel, Cumberland Combshell Endangered	Bivalve	174
Mussel, Cumberland Elktoe Endangered	Bivalve	66
Mussel, Cumberland Pigtoe Endangered	Bivalve	25
Mussel, Dark Pigtoe Endangered	Bivalve	41
Mussel, Dwarf Wedge Endangered	Bivalve	566
Mussel, Fine-rayed Pigtoe Endangered	Bivalve	239
Mussel, Flat Pigtoe (=Marshall's Mussel) Endangered	Bivalve	10
Mussel, Gulf Moccasinshell Endangered	Bivalve	145
Mussel, Heavy Pigtoe (=Judge Tait's Mussel) Endangered	Bivalve	72
Mussel, Heelsplitter Carolina Endangered	Bivalve	116
Mussel, Ochlockonee Moccasinshell Endangered	Bivalve	21

Mussel, Oval Pigtoe Endangered	Bivalve	184
Mussel, Ovate Clubshell Endangered	Bivalve	190
Mussel, Oyster Endangered	Bivalve	207
Mussel, Ring Pink (=Golf Stick Pearly) Endangered	Bivalve	416
Mussel, Rough Pigtoe Endangered	Bivalve	518
Mussel, Scaleshell Endangered	Bivalve	178
Mussel, Shiny Pigtoe Endangered	Bivalve	198
Mussel, Shiny-rayed Pocketbook Endangered	Bivalve	150
Mussel, Southern Clubshell Endangered	Bivalve	190
Mussel, Southern Pigtoe Endangered	Bivalve	98
Mussel, Speckled Pocketbook Endangered	Bivalve	7
Mussel, Winged Mapleleaf Endangered	Bivalve	105
Mustard, Carter's Endangered	Dicot	26
Mustard, Slender-petaled Endangered	Dicot	25
Myrcia Paganii Endangered	Dicot	4
Na'ena'e (Dubautia herbstobatae) Endangered	Dicot	17
Na'ena'e (Dubautia plantaginea ssp. humilis) Endangered	Dicot	20
Nani Wai'ale'ale (Viola kauaensis var. wahiawaensis) Endangered	Dicot	16
Nanu (Gardenia mannii) Endangered	Dicot	17
Na'u (Gardenia brighamii) Endangered	Dicot	37
Naupaka, Dwarf (Scaevola coriacea) Endangered	Dicot	20
Navarretia, Few-flowered Endangered	Dicot	139
Navarretia, Many-flowered Endangered	Dicot	139
Nehe (Lipochaeta fauriei) Endangered	Dicot	16
Nehe (Lipochaeta kamolensis) Endangered	Dicot	20
Nehe (Lipochaeta lobata var. leptophylla) Endangered	Dicot	17
Nehe (Lipochaeta micrantha) Endangered	Dicot	16
Nehe (Lipochaeta tenuifolia) Endangered	Dicot	17
Nehe (Lipochaeta waimeaensis) Endangered	Dicot	16
Neraudia angulata (ncn) Endangered	Dicot	17
Neraudia ovata (ncn) Endangered	Dicot	20
Neraudia sericea (ncn) Endangered	Dicot	40
Nightjar, Puerto Rico Endangered	Bird	13
Nioi (Eugenia koolauensis) Endangered	Dicot	17
Niterwort, Amargosa Endangered	Dicot	20

Nohoanu (Geranium multiflorum) Endangered	Dicot	40
Nuku Pu'u Endangered	Bird	36
Ocelot Endangered	Mammal	214
'Oha (Delissea rivularis) Endangered	Dicot	16
'Oha (Delissea subcordata) Endangered	Dicot	17
'Oha (Delissea undulata) Endangered	Dicot	20
'Oha (Lobelia gaudichaudii koolauensis) Endangered	Dicot	17
'Oha Wai (Clermontia drepanomorpha) Endangered	Dicot	20
'Oha Wai (Clermontia lindseyana) Endangered	Dicot	40
'Oha Wai (Clermontia oblongifolia ssp. brevipes) Endangered	Dicot	20
'Oha Wai (Clermontia oblongifolia ssp. mauiensis) Endangered	Dicot	20
'Oha Wai (Clermontia peleana) Endangered	Dicot	20
'Oha Wai (Clermontia pyrularia) Endangered	Dicot	20
'Oha Wai (Clermontia samuelii) Endangered	Dicot	20
'Ohai (Sesbania tomentosa) Endangered	Dicot	73
'Ohe'ohe (Tetraplasandra gymnocarpa) Endangered	Dicot	17
'Olulu (Brighamia insignis) Endangered	Dicot	16
Onion, Munz's Endangered	Monocot	28
'O'o, Kauai (='A'a) Endangered	Bird	16
Opuhe (Urera kaalae) Endangered	Dicot	17
'O'u (Honeycreeper) Endangered	Bird	36
Oxytheca, Cushenbury Endangered	Dicot	25

Paintbrush, San Clemente Island Indian Endangered	Dicot	25
Paintbrush, Soft-leaved Endangered	Dicot	25
Paintbrush, Tiburon Endangered	Dicot	58
Palila Endangered	Bird	20
Palo Colorado (Ternstroemia luquillensis) Endangered	Dicot	2
Palo de Jazmin Endangered	Dicot	2
Palo de Nigua Endangered	Dicot	11
Palo de Rosa Endangered	Dicot	7
Pamakani (Viola chamissoniana ssp. chamissoniana) Endangered	Dicot	17
Panicgrass, Carter's (Panicum fauriei var.carteri) Endangered	Monocot	37
Panther, Florida Endangered	Mammal	106
Parrot, Puerto Rican Endangered	Bird	2
Parrotbill, Maui Endangered	Bird	20
Pauoa (Ctenitis squamigera) Endangered	Ferns	37
Pawpaw, Beautiful Endangered	Dicot	25
Pawpaw, Four-petal Endangered	Dicot	28
Pawpaw, Rugel's Endangered	Dicot	11
Pearlymussel, Alabama Lamp Endangered	Bivalve	51
Pearlymussel, Appalachian Monkeyface Endangered	Bivalve	86
Pearlymussel, Birdwing Endangered	Bivalve	185
Pearlymussel, Cracking Endangered	Bivalve	220
Pearlymussel, Cumberland Bean Endangered	Bivalve	215
Pearlymussel, Cumberland Monkeyface Endangered	Bivalve	166
Pearlymussel, Curtis' Endangered	Bivalve	18
Pearlymussel, Dromedary Endangered	Bivalve	255
Pearlymussel, Fat Pocketbook Endangered	Bivalve	379
Pearlymussel, Green-blossom Endangered	Bivalve	114
Pearlymussel, Higgins' Eye Endangered	Bivalve	514
Pearlymussel, Little-wing Endangered	Bivalve	211
Pearlymussel, Orange-footed Endangered	Bivalve	440
Pearlymussel, Pale Lilliput Endangered	Bivalve	69
Pearlymussel, Purple Cat's Paw Endangered	Bivalve	129
Pearlymussel, Tubercled-blossom Endangered	Bivalve	347
Pearlymussel, Turgid-blossom Endangered	Bivalve	89
Pearlymussel, White Cat's Paw Endangered	Bivalve	34

Pearlymussel, White Wartyback Endangered	Bivalve	246
Pearlymussel, Yellow-blossom Endangered	Bivalve	177
Pebblesnail, Flat Endangered	Gastropod	20
Pelos del Diablo Endangered	Monocot	7
Penny-cress, Kneeland Prairie Endangered	Dicot	20
Pennyroyal, Todsen's Endangered	Dicot	27
Penstemon, Blowout Endangered	Dicot	12
Pentachaeta, Lyon's Endangered	Dicot	50
Pentachaeta, White-rayed Endangered	Dicot	58
Peperomia, Wheeler's Endangered	Dicot	2
Petrel, Hawaiian Dark-rumped Endangered	Bird	56
Phacelia, Clay Endangered	Dicot	16
Phacelia, Island Endangered	Dicot	25
Phlox, Texas Trailing Endangered	Dicot	37
Phlox, Yreka Endangered	Dicot	20
Phyllostegia hirsuta (ncn) Endangered	Dicot	17
Phyllostegia kaalaensis (ncn) Endangered	Dicot	17
Phyllostegia knudsenii (ncn) Endangered	Dicot	16
Phyllostegia mannii (ncn) Endangered	Dicot	20
Phyllostegia mollis (ncn) Endangered	Dicot	37
Phyllostegia parviflora (ncn) Endangered	Dicot	17
Phyllostegia velutina (ncn) Endangered	Dicot	20

Phyllostegia waimeae (ncn) Endangered	Dicot	16
Phyllostegia warshaueri (ncn) Endangered	Dicot	20
Phyllostegia wawrana (ncn) Endangered	Dicot	16
Pigeon, Puerto Rican Plain Endangered	Bird	9
Pilo (Hedyotis mannii) Endangered	Dicot	20
Pinkroot, Gentian Endangered	Dicot	17
Piperia, Yadon's Endangered	Monocot	27
Pitaya, Davis' Green Endangered	Dicot	15
Pitcher-plant, Alabama Canebrake Endangered	Dicot	38
Pitcher-plant, Green Endangered	Dicot	106
Pitcher-plant, Mountain Sweet Endangered	Dicot	52
Platanthera holochila (ncn) Endangered	Monocot	36
Plover, Piping Endangered	Bird	2476
Plum, Scrub Endangered	Dicot	36
Poa siphonoglossa (ncn) Endangered	Monocot	16
Po'e (Portulaca sclerocarpa) Endangered	Dicot	40
Polygala, Lewton's Endangered	Dicot	48
Polygala, Tiny Endangered	Dicot	51
Polygonum, Scott's Valley Endangered	Dicot	22
Polystichum calderonense (ncn) Endangered	Ferns	2
Pondberry Endangered	Dicot	190
Pondweed, Little Aguja Creek Endangered	Monocot	2
Po'ouli Endangered	Bird	20
Popcornflower, Rough Endangered	Dicot	19
Popolo 'Aiakeakua (Solanum sandwicense) Endangered	Dicot	33
Popolo Ku Mai (Solanum incompletum) Endangered	Dicot	20
Poppy, Sacramento Prickly Endangered	Dicot	13
Poppy-mallow, Texas Endangered	Dicot	16
Potentilla, Hickman's Endangered	Dicot	46
Prairie-chicken, Attwater's Greater Endangered	Bird	70
Prickly-apple, Fragrant Endangered	Dicot	4
Prickly-ash, St. Thomas Endangered	Dicot	4
Pronghorn, Sonoran Endangered	Mammal	59
Pseudoscorpion, Tooth Cave Endangered	Arachnid	13
Pteris lidgatei (ncn) Endangered	Ferns	37

Pua'ala (Brighamia rockii) Endangered	Dicot	20
Purple Bean Endangered	Bivalve	109
Pu'uka'a (Cyperus trachysanthos) Endangered	Monocot	33
Pygmy-owl, Cactus Ferruginous Endangered	Bird	130
Quillwort, Black-spored Endangered	Ferns	54
Quillwort, Louisiana Endangered	Ferns	124
Quillwort, Mat-forming Endangered	Ferns	33
Rabbit, Lower Keys Marsh Endangered	Mammal	1
Rabbit, Pygmy Endangered	Mammal	79
Rabbit, Riparian Brush Endangered	Mammal	24
Rabbitsfoot, Rough Endangered	Bivalve	64
Rail, California Clapper Endangered	Bird	207
Rail, Light-footed Clapper Endangered	Bird	118
Rail, Yuma Clapper Endangered	Bird	172
Rattleweed, Hairy Endangered	Dicot	22
Reed-mustard, Barneby Endangered	Dicot	11
Reed-mustard, Shrubby Endangered	Dicot	23
Remya kauaiensis (ncn) Endangered	Dicot	16
Remya montgomeryi (ncn) Endangered	Dicot	16
Remya, Maui Endangered	Dicot	20
Rhadine exilis (ncn) Endangered	Insect	17
Rhadine infernalis (ncn) Endangered	Insect	17

Rhododendron, Chapman Endangered	Dicot	20
Rice Rat (=Silver Rice Rat) Endangered	Mammal	1
Ridge-cress (=Pepper-cress), Barneby Endangered	Dicot	13
Riffleshell, Northern Endangered	Bivalve	362
Riffleshell, Tan Endangered	Bivalve	254
Riversnail, Anthony's Endangered	Gastropod	66
Rock-cress, Hoffmann's Endangered	Dicot	25
Rock-cress, Large (=Braun's) Endangered	Dicot	67
Rock-cress, McDonald's Endangered	Dicot	21
Rock-cress, Santa Cruz Island Endangered	Dicot	25
Rock-cress, Shale Barren Endangered	Dicot	81
Rock-cress, Small Endangered	Dicot	46
Rock-pocketbook, Ouachita (=Wheeler's pm) Endangered	Bivalve	38
Rocksnail, Plicate Endangered	Gastropod	25
Rosemary, Etonia Endangered	Dicot	8
Rosemary, Short-leaved Endangered	Dicot	19
Rush-pea, Slender Endangered	Dicot	6
Salamander, Barton Springs Endangered	Amphibian	28
Salamander, California Tiger Endangered	Amphibian	480
Salamander, Desert Slender Endangered	Amphibian	28
Salamander, Santa Cruz Long-toed Endangered	Amphibian	49
Salamander, Shenandoah Endangered	Amphibian	39
Salamander, Sonora Tiger Endangered	Amphibian	26
Salamander, Texas Blind Endangered	Amphibian	75
Sandalwood, Lanai (='Iliahi) Endangered	Dicot	20
Sandlace Endangered	Dicot	36
Sand-verbena, Large-fruited Endangered	Dicot	38
Sandwort, Cumberland Endangered	Dicot	36
Sandwort, Marsh Endangered	Dicot	24
Sanicula mariversa (ncn) Endangered	Dicot	17
Sanicula purpurea (ncn) Endangered	Dicot	20
Schiedea haleakalensis (ncn) Endangered	Dicot	20
Schiedea helleri (ncn) Endangered	Dicot	16
Schiedea hookeri (ncn) Endangered	Dicot	17
Schiedea kaalae (ncn) Endangered	Dicot	17

Schiedea kauaiensis (ncn) Endangered	Dicot	16
Schiedea lydgatei (ncn) Endangered	Dicot	20
Schiedea membranacea (ncn) Endangered	Dicot	16
Schiedea nuttallii (ncn) Endangered	Dicot	33
Schiedea sarmentosa (ncn) Endangered	Dicot	20
Schiedea spergulina var. leiopoda (ncn) Endangered	Dicot	16
Schiedea verticillata (ncn) Endangered	Dicot	17
Schiedea, Diamond Head (Schiedea adamantis) Endangered	Dicot	17
Sea turtle, green Endangered	Reptile	624
Sea turtle, hawksbill Endangered	Reptile	364
Sea turtle, Kemp's ridley Endangered	Reptile	323
Sea turtle, leatherback Endangered	Reptile	566
Sea-blite, California Endangered	Dicot	24
Seal, Caribbean Monk Endangered	Marine mml	2
Seal, Hawaiian Monk Endangered	Marine mml	74
Sedge, Golden Endangered	Monocot	20
Sedge, White Endangered	Monocot	27
Sheep, Peninsular Bighorn Endangered	Mammal	92
Sheep, Sierra Nevada Bighorn Endangered	Mammal	43
Shrew, Buena Vista Lake Ornate Endangered	Mammal	25
Shrike, San Clemente Loggerhead Endangered	Bird	25
Shrimp, Alabama Cave Endangered	Crustacean	15

Shrimp, California Freshwater Endangered	Crustacean	65
Shrimp, Kentucky Cave Endangered	Crustacean	31
Silene alexandri (ncn) Endangered	Dicot	20
Silene lanceolata (ncn) Endangered	Dicot	73
Silene perlmanii (ncn) Endangered	Dicot	17
Silversword, Ka'u (Argyroxiphium kauense) Endangered	Dicot	20
Silversword, Mauna Kea ('Ahinahina) Endangered	Dicot	40
Skipper, Carson Wandering Endangered	Insect	19
Skipper, Laguna Mountain Endangered	Insect	26
Snail, Armored Endangered	Gastropod	14
Snail, Iowa Pleistocene Endangered	Gastropod	78
Snail, Lioplax Cylindrical Endangered	Gastropod	20
Snail, Morro Shoulderband Endangered	Gastropod	24
Snail, O'ahu Tree (Achatinella abbreviata) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella apexfulva) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella bellula) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella buddii) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella bulimoides) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella byronii) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella caesia) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella casta) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella cestus) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella concavospira) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella curta) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella decipiens) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella decora) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella dimorpha) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella elegans) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella fulgens) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella fuscobasis) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella juddii) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella juncea) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella lehuiensis) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella leucorraphe) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella lila) Endangered	Gastropod	17

Snail, O'ahu Tree (Achatinella livida) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella lorata) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella mustelina) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella papyracea) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella phaeozona) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella pulcherrima) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella pupukanioe) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella rosea) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella sowerbyana) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella spaldingi) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella stewartii) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella swiftii) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella taeniolata) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella thaanumi) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella turgida) Endangered	Gastropod	17
Snail, O'ahu Tree (Achatinella valida) Endangered	Gastropod	17
Snail, Pecos Assiminea Endangered	Gastropod	15
Snail, Snake River Physa Endangered	Gastropod	52
Snail, Tulotoma Endangered	Gastropod	63
Snail, Utah Valvata Endangered	Gastropod	35
Snail, Virginia Fringed Mountain Endangered	Gastropod	7
Snake, San Francisco Garter Endangered	Reptile	41

Snakeroot Endangered	Dicot	28
Snowbells, Texas Endangered	Dicot	40
Sparrow, Cape Sable Seaside Endangered	Bird	27
Sparrow, Florida Grasshopper Endangered	Bird	46
Spermolepis hawaiiensis (ncn) Endangered	Dicot	73
Spider, Government Canyon Cave Endangered	Arachnid	17
Spider, Kauai Cave Wolf Endangered	Arachnid	16
Spider, Madla's Cave Endangered	Arachnid	17
Spider, Robber Baron Cave Endangered	Arachnid	17
Spider, Spruce-fir Moss Endangered	Arachnid	67
Spider, Tooth Cave Endangered	Arachnid	13
Spider, Vesper Cave Endangered	Arachnid	17
Spineflower, Ben Lomond Endangered	Dicot	22
Spineflower, Howell's Endangered	Dicot	21
Spineflower, Orcutt's Endangered	Dicot	43
Spineflower, Robust Endangered	Dicot	49
Spineflower, Scotts Valley Endangered	Dicot	22
Spineflower, Slender-horned Endangered	Dicot	104
Spineflower, Sonoma Endangered	Dicot	44
Spinymussel, James River Endangered	Bivalve	176
Spinymussel, Tar River Endangered	Bivalve	90
Springsnail, Alamosa Endangered	Gastropod	11
Springsnail, Bruneau Hot Endangered	Gastropod	9
Springsnail, Koster's Endangered	Gastropod	4
Springsnail, Roswell Endangered	Gastropod	4
Springsnail, Socorro Endangered	Gastropod	11
Spurge, Deltoid Endangered	Dicot	15
Squirrel, Carolina Northern Flying Endangered	Mammal	132
Squirrel, Delmarva Peninsula Fox Endangered	Mammal	178
Squirrel, Mount Graham Red Endangered	Mammal	14
Stenogyne angustifolia (ncn) Endangered	Dicot	20
Stenogyne bifida (ncn) Endangered	Dicot	20
Stenogyne campanulata (ncn) Endangered	Dicot	16
Stenogyne kanehoana (ncn) Endangered	Dicot	17
Stickseed, Showy Endangered	Dicot	10

Stickyseed, Baker's Endangered	Dicot	27
Stilt, Hawaiian (=Ae'o) Endangered	Bird	73
Stirrupshell Endangered	Bivalve	28
Stonecrop, Lake County Endangered	Dicot	139
Stork, Wood Endangered	Bird	1428
Sumac, Michaux's Endangered	Dicot	292
Sunflower, San Mateo Woolly Endangered	Dicot	19
Sunflower, Schweinitz's Endangered	Dicot	193
Tadpole Shrimp, Vernal Pool Endangered	Crustacean	484
Taraxacum, California Endangered	Dicot	25
Tarplant, Gaviota Endangered	Dicot	25
Tectaria Estremerana Endangered	Ferns	2
Tern, California Least Endangered	Bird	239
Tern, Interior (population) Least Endangered	Bird	1622
Tern, Roseate Endangered	Bird	208
Ternstroemia subsessilis (ncn) Endangered	Dicot	2
Tetramolopium arenarium (ncn) Endangered	Dicot	20
Tetramolopium capillare (ncn) Endangered	Dicot	20
Tetramolopium filiforme (ncn) Endangered	Dicot	17
Tetramolopium lepidotum ssp. lepidotum (ncn) Endangered	Dicot	17
Tetramolopium remyi (ncn) Endangered	Dicot	20
Thistle, Chorro creek Bog Endangered	Dicot	24

Thistle, Fountain Endangered	Dicot	64
Thistle, La Graciosa Endangered	Dicot	49
Thistle, Suisun Endangered	Dicot	23
Thornmint, San Mateo Endangered	Dicot	19
Threeridge, Fat (Mussel) Endangered	Bivalve	31
Thrush, Large Kauai Endangered	Bird	16
Thrush, Molokai (Oloma'o) Endangered	Bird	20
Thrush, Small Kauai (Puaiohi) Endangered	Bird	16
Toad, Arroyo Southwestern Endangered	Amphibian	219
Toad, Houston Endangered	Amphibian	157
Torreya, Florida Endangered	Conf/cycds	30
Tree Fern, Elfin Endangered	Ferns	2
Trematolobelia singularis (ncn) Endangered	Dicot	17
Trillium, Persistent Endangered	Monocot	32
Trillium, Relict Endangered	Monocot	89
Tuctoria, Green's Endangered	Dicot	202
Turtle, Alabama Red-bellied Endangered	Reptile	33
Turtle, Plymouth Red-bellied Endangered	Reptile	17
Uhiuhi (Caesalpinia kavaiensis) Endangered	Dicot	57
Ulihi (Phyllostegia glabra var. lanaiensis) Endangered	Dicot	20
Umbel, Huachuca Water Endangered	Dicot	44
Uvillo Endangered	Dicot	6
Vernonia Proctorii (ncn) Endangered	Dicot	3
Vetch, Hawaiian (Vicia menziesii) Endangered	Dicot	20
Vigna o-wahuensis (ncn) Endangered	Dicot	56
Viola helenae (ncn) Endangered	Dicot	16
Viola lanaiensis (ncn) Endangered	Dicot	20
Viola oahuensis (ncn) Endangered	Dicot	17
Vireo, Black-capped Endangered	Bird	590
Vireo, Least Bell's Endangered	Bird	253
Vole, Amargosa Endangered	Mammal	31
Vole, Florida Salt Marsh Endangered	Mammal	8
Vole, Hualapai Mexican Endangered	Mammal	23
Wahane (Pritchardia aylmer-robinsonii) Endangered	Monocot	16
Wahine Noho Kula (Isodendrion pyrifolium) Endangered	Dicot	20

Wallflower, Ben Lomond Endangered	Dicot	22
Wallflower, Contra Costa Endangered	Dicot	18
Wallflower, Menzie's Endangered	Dicot	76
Walnut, Nogal Endangered	Dicot	2
Warbler (=Wood), Golden-cheeked Endangered	Bird	359
Warbler (=Wood), Kirtland's Endangered	Bird	229
Warbler, Bachman's Endangered	Bird	50
Warea, Wide-leaf Endangered	Dicot	28
Watercress, Gambel's Endangered	Dicot	125
Water-willow, Cooley's Endangered	Dicot	7
Wawae'Iole (Phlegmariurus (=Huperzia) mannii) Endangered	Ferns	40
Wawae'Iole (Phlegmariurus (=Lycopodium) nutans) Endangered	Ferns	17
Whale, Finback Endangered	Marine mml	87
Whale, Humpback Endangered	Marine mml	90
Whale, northern right Endangered	Marine mml	18
Wild-buckwheat, Clay-loving Endangered	Dicot	29
Wild-rice, Texas Endangered	Monocot	75
Wire-lettuce, Malheur Endangered	Dicot	1
Wireweed Endangered	Dicot	19
Woodland-star, San Clemente Island Endangered	Dicot	25
Woodpecker, Ivory-billed Endangered	Bird	35
Woodpecker, Red-cockaded Endangered	Bird	3401

Woodrat, Key Largo Endangered	Mammal	1
Woodrat, Riparian Endangered	Mammal	24
Woolly-star, Santa Ana River Endangered	Dicot	70
Woolly-threads, San Joaquin Endangered	Dicot	169
Xylosma crenatum (ncn) Endangered	Dicot	16
Yerba Santa, Lompoc Endangered	Dicot	25
Ziziphus, Florida Endangered	Dicot	19
Adobe Sunburst, San Joaquin Threatened	Dicot	76
Amaranth, Seabeach Threatened	Dicot	171
Amole, Cammatta Canyon Threatened	Monocot	24
Amole, Purple Threatened	Monocot	51
Amphianthus, Little Threatened	Dicot	174
Aster, Decurrent False Threatened	Dicot	301
Aupaka (Isodendrion longifolium) Threatened	Dicot	33
Baccharis, Encinitas Threatened	Dicot	43
Bankclimber, Purple Threatened	Bivalve	126
Barbara Buttons, Mohr's Threatened	Dicot	66
Beaked-rush, Knieskern's Threatened	Monocot	93
Bear, Grizzly Threatened	Mammal	371
Bear, Louisiana Black Threatened	Mammal	679
Beetle, Delta Green Ground Threatened	Insect	23
Beetle, Northeastern Beach Tiger Threatened	Insect	119
Beetle, Puritan Tiger Threatened	Insect	73
Beetle, Valley Elderberry Longhorn Threatened	Insect	377
Birch, Virginia Round-leaf Threatened	Dicot	10
Birds-in-a-nest, White Threatened	Dicot	6
Bladderpod, Dudley Bluffs Threatened	Dicot	1
Bladderpod, Lyrate Threatened	Dicot	31
Bladderpod, Missouri Threatened	Dicot	66
Blazing Star, Ash Meadows Threatened	Dicot	14
Blazing Star, Heller's Threatened	Dicot	51
Bluecurls, Hidden Lake Threatened	Dicot	25
Boa, Mona Threatened	Reptile	2
Bonamia, Florida Threatened	Dicot	82
Brodiaea, Chinese Camp Threatened	Monocot	9

Brodiaea, Thread-leaved Threatened	Monocot	121
Buckwheat, Scrub Threatened	Dicot	56
Buckwheat, Southern Mountain Wild Threatened	Dicot	25
Butterfly Plant, Colorado Threatened	Dicot	16
Butterfly, Bay Checkerspot (Wright's euphydryas) Threatened	Insect	68
Butterfly, Oregon Silverspot Threatened	Insect	68
Butterweed, Layne's Threatened	Dicot	29
Butterwort, Godfrey's Threatened	Dicot	6
Cactus, Bunched Cory Threatened	Dicot	15
Cactus, Chisos Mountain Hedgehog Threatened	Dicot	15
Cactus, Cochise Pincushion Threatened	Dicot	19
Cactus, Lee Pincushion Threatened	Dicot	8
Cactus, Lloyd's Mariposa Threatened	Dicot	21
Cactus, Mesa Verde Threatened	Dicot	29
Cactus, Siler Pincushion Threatened	Dicot	39
Cactus, Uinta Basin Hookless Threatened	Dicot	86
Cactus, Winkler Threatened	Dicot	11
Caracara, Audubon's Crested Threatened	Bird	146
Catchfly, Spalding's Threatened	Dicot	119
Ceanothus, Vail Lake Threatened	Dicot	28
Centaury, Spring-loving Threatened	Dicot	20
Checker-mallow, Nelson's Threatened	Dicot	169

Chumbo, Higo Threatened	Dicot	2
Clarkia, Springville Threatened	Dicot	24
Clover, Fleshy Owl's Threatened	Dicot	149
Clover, Prairie Bush Threatened	Dicot	1054
Cobana Negra Threatened	Dicot	5
Coqui, Golden Threatened	Amphibian	2
Crocodile, American Threatened	Reptile	46
Crownbeard, Big-leaved Threatened	Dicot	43
Cycladenia, Jones Threatened	Dicot	38
Cypress, Gowen Threatened	Conf/cycds	27
Daisy, Lakeside Threatened	Dicot	59
Daisy, Maguire Threatened	Dicot	11
Daisy, Parish's Threatened	Dicot	53
Dudleya, Conejo Threatened	Dicot	25
Dudleya, Marcescent Threatened	Dicot	67
Dudleya, Santa Cruz Island Threatened	Dicot	25
Dudleya, Santa Monica Mountains Threatened	Dicot	67
Dudleya, Verity's Threatened	Dicot	25
Dwarf-flax, Marin Threatened	Dicot	17
Eagle, Bald Threatened	Bird	115
Elimia, Lacy Threatened	Gastropod	11
Evening-primrose, San Benito Threatened	Dicot	23
Fairy Shrimp, Vernal Pool Threatened	Crustacean	615
Fatmucket, Arkansas Threatened	Bivalve	33
Fern, Alabama Streak-sorus Threatened	Ferns	10
Fern, American hart's-tongue Threatened	Ferns	114
Fleabane, Zuni Threatened	Dicot	27
Four-o'clock, Macfarlane's Threatened	Dicot	22
Frog, California Red-legged Threatened	Amphibian	478
Frog, Chiricahua Leopard Threatened	Amphibian	174
Fruit, Earth (=geocarpon) Threatened	Dicot	115
Gesneria pauciflora (ncn) Threatened	Dicot	3
Gnatcatcher, Coastal California Threatened	Bird	146
Goldenrod, Blue Ridge Threatened	Dicot	35
Goldenrod, Houghton's Threatened	Dicot	78

Goldenrod, White-haired Threatened	Dicot	20
Gooseberry, Miccosukee Threatened	Dicot	29
Grass, Colusa Threatened	Monocot	139
Grass, San Joaquin Valley Orcutt Threatened	Monocot	185
Grass, Slender Orcutt Threatened	Dicot	156
Groundsel, San Francisco Peaks Threatened	Dicot	9
Guajon Threatened	Amphibian	4
Gumplant, Ash Meadows Threatened	Dicot	20
Haha (Cyanea recta) Threatened	Dicot	16
Ha'Iwale (Cyrtandra limahuliensis) Threatened	Dicot	16
Heartleaf, Dwarf-flowered Threatened	Dicot	119
Heather, Mountain Golden Threatened	Dicot	13
Howellia, Water Threatened	Dicot	108
Iguana, Mona Ground Threatened	Reptile	2
Iris, Dwarf Lake Threatened	Monocot	113
Isopod, Madison Cave Threatened	Crustacean	34
Ivesia, Ash Meadows Threatened	Dicot	20
Joint-vetch, Sensitive Threatened	Dicot	273
Kolea (Myrsine linearifolia) Threatened	Dicot	16
Ladies'-tresses, Ute Threatened	Monocot	142
Liveforever, Laguna Beach Threatened	Dicot	17
Lizard, Coachella Valley Fringe-toed Threatened	Reptile	28

Lizard, Island Night Threatened	Reptile	75
Locoweed, Fassett's Threatened	Dicot	31
Lupine, Kincaid's Threatened	Dicot	139
Lynx, Canada Threatened	Mammal	286
Makou (Peucedanum sandwicense) Threatened	Dicot	53
Manaca, palma de Threatened	Monocot	11
Manzanita, Ione Threatened	Dicot	31
Manzanita, Morro Threatened	Dicot	24
Manzanita, Pallid Threatened	Dicot	29
Milk-vetch, Ash Meadows Threatened	Dicot	14
Milk-vetch, Deseret Threatened	Dicot	16
Milk-vetch, Fish Slough Threatened	Dicot	17
Milk-vetch, Heliotrope Threatened	Dicot	16
Milk-vetch, Pierson's Threatened	Dicot	21
Milkweed, Mead's Threatened	Dicot	315
Milkweed, Welsh's Threatened	Dicot	12
Monkshood, Northern Wild Threatened	Dicot	217
Moth, Kern Primrose Sphinx Threatened	Insect	25
Mouse, Preble's Meadow Jumping Threatened	Mammal	92
Mouse, Southeastern Beach Threatened	Mammal	18
Mucket, Orangenacre Threatened	Bivalve	107
Murrelet, Marbled Threatened	Bird	643
Mussel, Alabama Moccasinshell Threatened	Bivalve	142
Mussel, Fine-lined Pocketbook Threatened	Bivalve	269
Mussel, Heelsplitter Inflated Threatened	Bivalve	131
Naucorid, Ash Meadows Threatened	Insect	14
Navarretia, Spreading Threatened	Dicot	79
Oak, Hinckley Threatened	Dicot	21
Orchid, Eastern Prairie Fringed Threatened	Monocot	822
Orchid, Western Prairie Fringed Threatened	Monocot	1161
Otter, Northern Sea Threatened	Marine mml	3
Otter, Southern Sea Threatened	Marine mml	73
Owl, Mexican Spotted Threatened	Bird	591
Owl, Northern Spotted Threatened	Bird	893
Paintbrush, Ash-grey Indian Threatened	Dicot	25

Paintbrush, Golden Threatened	Dicot	47
Pearlshell, Louisiana Threatened	Bivalve	18
Pink, Swamp Threatened	Monocot	454
Plover, Western Snowy Threatened	Bird	445
Pogonia, Small Whorled Threatened	Monocot	994
Potato-bean, Price's Threatened	Dicot	194
Prairie Dog, Utah Threatened	Mammal	46
Primrose, Maguire Threatened	Dicot	9
Pussypaws, Mariposa Threatened	Dicot	68
Rattlesnake, New Mexican Ridge-nosed Threatened	Reptile	26
Reed-mustard, Clay Threatened	Dicot	10
Rocksnail, Painted Threatened	Gastropod	50
Rocksnail, Round Threatened	Gastropod	20
Rosemary, Cumberland Threatened	Dicot	61
Roseroot, Leedy's Threatened	Dicot	63
Rush-rose, Island Threatened	Dicot	25
Salamander, Cheat Mountain Threatened	Amphibian	32
Salamander, Flatwoods Threatened	Amphibian	236
Salamander, Red Hills Threatened	Amphibian	38
Salamander, San Marcos Threatened	Amphibian	75
Sandwort, Bear Valley Threatened	Dicot	25
Schiedea spergulina var. spergulina (ncn) Threatened	Dicot	16

Schoepfia arenaria (ncn) Threatened	Dicot	4
Scrub-Jay, Florida Threatened	Bird	310
Sea turtle, loggerhead Threatened	Reptile	816
Sea turtle, olive ridley Threatened	Reptile	96
Seagrass, Johnson's Threatened	Monocot	51
Seal, Guadalupe Fur Threatened	Marine mml	27
Sea-lion, Steller (eastern) Threatened	Marine mml	5
Sedge, Navajo Threatened	Monocot	28
Shagreen, Magazine Mountain Threatened	Gastropod	13
Shearwater, Newell's Townsend's Threatened	Bird	53
Shrimp, Squirrel Chimney Cave Threatened	Crustacean	19
Silene hawaiiensis (ncn) Threatened	Dicot	20
Silversword, Haleakala ('Ahinahina) Threatened	Dicot	40
Skink, Blue-tailed Mole Threatened	Reptile	25
Skink, Sand Threatened	Reptile	56
Skipper, Pawnee Montane Threatened	Insect	22
Skullcap, Large-flowered Threatened	Dicot	58
Slabshell, Chipola Threatened	Bivalve	17
Snail, Bliss Rapids Threatened	Gastropod	43
Snail, Chittenango Ovate Amber Threatened	Gastropod	17
Snail, Flat-spired Three-toothed Threatened	Gastropod	22
Snail, Newcomb's Threatened	Gastropod	16
Snail, Noonday Threatened	Gastropod	4
Snail, Painted Snake Coiled Forest Threatened	Gastropod	3
Snail, Stock Island Tree Threatened	Gastropod	1
Snake, Atlantic Salt Marsh Threatened	Reptile	25
Snake, Concho Water Threatened	Reptile	78
Snake, Eastern Indigo Threatened	Reptile	1251
Snake, Giant Garter Threatened	Reptile	208
Snake, Lake Erie Water Threatened	Reptile	27
Snake, Northern Copperbelly Water Threatened	Reptile	136
Sneezeweed, Virginia Threatened	Dicot	59
Sparrow, San Clemente Sage Threatened	Bird	25
Spineflower, Monterey Threatened	Dicot	49
Spiraea, Virginia Threatened	Dicot	372

Spurge, Garber's Threatened	Dicot	15
Spurge, Hoover's Threatened	Dicot	165
Spurge, Telephus Threatened	Dicot	6
Squirrel, Northern Idaho Ground Threatened	Mammal	11
Staghorn coral Threatened	Coral	1
Sunflower, Pecos Threatened	Dicot	37
Sunray, Ash Meadows Threatened	Dicot	14
Tarplant, Otay Threatened	Dicot	26
Tarplant, Santa Cruz Threatened	Dicot	67
Tetramolopium rockii (ncn) Threatened	Dicot	20
Thelypody, Howell's Spectacular Threatened	Dicot	24
Thistle, Pitcher's Threatened	Dicot	355
Thistle, Sacramento Mountains Threatened	Dicot	13
Thornmint, San Diego Threatened	Dicot	26
Toad, Puerto Rican Crested Threatened	Amphibian	8
Tortoise, Desert Threatened	Reptile	205
Tortoise, Gopher Threatened	Reptile	179
Towhee, Inyo Brown Threatened	Bird	6
Townsendia, Last Chance Threatened	Dicot	19
Turtle, Bog (Northern population) Threatened	Reptile	631
Turtle, Flattened Musk Threatened	Reptile	97
Turtle, Ringed Sawback Threatened	Reptile	104

Turtle, Yellow-blotched Map Threatened	Reptile	68
Twinpod, Dudley Bluffs Threatened	Dicot	1
Vervain, California Threatened	Dicot	9
Water-plantain, Kral's Threatened	Monocot	34
Whipsnake (=Striped Racer), Alameda Threatened	Reptile	29
Whitlow-wort, Papery Threatened	Dicot	44
Wild-buckwheat, Gypsum Threatened	Dicot	11
Wings, Pigeon Threatened	Dicot	30
Yellowhead, Desert Threatened	Dicot	6

No species were selected for exclusion.

Dispersed species included in report. 1/28/2010 10:53:15 AM Ver. 2.10.4 Page 128 of 128

Species in Counties by State and Taxa

No species were excluded

Minimum of 1 Acre

All Medium Types Reported

Amphibian, Reptile, Crustacean, Bivalve, Gastropod, Arachnid, Insect, Dicot, Monocot, Ferns

root celery (PR)

AL, AK, AZ, AR, CA, CO, CT, DE, DC, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, ME, MD, MA,
MI, MN, MS, MO, MT, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OK, OR, PA, PR, RI, SC, SD, TN, TX, UT, VT, VA, WA, WV, WI, WY

28 Species Affected:

Inverse Name: Status:	Taxa:	Co. occurence:
Bariaco Endangered	Dicot	2
Boa, Puerto Rican Endangered	Reptile	4
Capa Rosa Endangered	Dicot	1
Chupacallos Endangered	Dicot	1
Erubia Endangered	Dicot	1
Fern, Elaphoglossum serpens Endangered	Ferns	1
Fern, Thelypteris inabonensis Endangered	Ferns	2

Fern, Thelypteris yaucoensis Endangered	Ferns	2
Higuero De Sierra Endangered	Dicot	1
Holly, Cook's Endangered	Dicot	2
Ilex sintenisii (ncn) Endangered	Dicot	1
Lepanthes eltorensis (ncn) Endangered	Monocot	1
Palo Colorado (Ternstroemia luquillensis) Endangered	Dicot	1
Palo de Jazmin Endangered	Dicot	1
Palo de Nigua Endangered	Dicot	4
Palo de Rosa Endangered	Dicot	1
Prickly-ash, St. Thomas Endangered	Dicot	1
Sea turtle, green Endangered	Reptile	2
Sea turtle, hawksbill Endangered	Reptile	2
Sea turtle, leatherback Endangered	Reptile	3
Tree Fern, Elfin Endangered	Ferns	1
Uvillo Endangered	Dicot	2
Walnut, Nogal Endangered	Dicot	1
Cobana Negra Threatened	Dicot	1
Coqui, Golden Threatened	Amphibian	1
Guajon Threatened	Amphibian	1
Manaca, palma de Threatened	Monocot	1
Toad, Puerto Rican Crested Threatened	Amphibian	1

No species were selected for exclusion.

Dispersed species included in report.

Species in Counties by State and Taxa

No species were excluded

Minimum of 1 Acre

Freshwater

Fish

apples, citrus fruit, all, cotton, all, grapes, potatoes, cantaloups, cucumbers and pickles, honeydew melons, pumpkins, squash, watermelons, eggplant, peppers, bell, peppers, chile (all peppers - excluding bell), pimientos, tomatoes, amaranth, celery, lettuce, all, escarole and endive, lettuce, head, lettuce, leaf, lettuce, romaine, parsley, rhubarb, spinach, root celery (PR)

AL, AK, AZ, AR, CA, CO, CT, DE, DC, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, ME, MD, MA, MI, MN, MS, MO, MT, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OK, OR, PA, PR, RI, SC, SD, TN, TX, UT, VT, VA, WA, WV, WI, WY

140 Species Affected:

Inverse Name: **Status:**	**Taxa:**	**Co. occurence:**
Cavefish, Alabama Endangered	Fish	11
Chub, Bonytail Endangered	Fish	148
Chub, Gila Endangered	Fish	105
Chub, Humpback Endangered	Fish	78
Chub, Mohave Tui Endangered	Fish	88
Chub, Oregon Endangered	Fish	104
Chub, Owens Tui Endangered	Fish	13
Chub, Pahranagat Roundtail Endangered	Fish	1
Chub, Virgin River Endangered	Fish	30
Chub, Yaqui Endangered	Fish	16
Cui-ui Endangered	Fish	7
Dace, Ash Meadows Speckled Endangered	Fish	16
Dace, Clover Valley Speckled Endangered	Fish	1
Dace, Independence Valley Speckled Endangered	Fish	1
Dace, Kendall Warm Springs Endangered	Fish	1
Dace, Moapa Endangered	Fish	10
Darter, Amber Endangered	Fish	47
Darter, Bluemask (=jewel) Endangered	Fish	23
Darter, Boulder Endangered	Fish	31
Darter, Duskytail	Fish	29

Endangered		
Darter, Etowah	Fish	28
Endangered		
Darter, Fountain	Fish	71
Endangered		
Darter, Maryland	Fish	18
Endangered		
Darter, Okaloosa	Fish	23
Endangered		
Darter, Relict	Fish	10
Endangered		
Darter, Vermilion	Fish	8
Endangered		
Darter, Watercress	Fish	8
Endangered		
Gambusia, Big Bend	Fish	12
Endangered		
Gambusia, Clear Creek	Fish	2
Endangered		
Gambusia, Pecos	Fish	25
Endangered		
Gambusia, San Marcos	Fish	62
Endangered		
Goby, Tidewater	Fish	307
Endangered		
Logperch, Conasauga	Fish	24
Endangered		
Logperch, Roanoke	Fish	125
Endangered		
Madtom, Pygmy	Fish	16
Endangered		
Madtom, Scioto	Fish	45
Endangered		
Madtom, Smoky	Fish	15
Endangered		
Minnow, Rio Grande Silvery	Fish	108
Endangered		
Poolfish, Pahrump (= Pahrump Killifish)	Fish	25
Endangered		
Pupfish, Ash Meadows Amargosa	Fish	11
Endangered		
Pupfish, Comanche Springs	Fish	19
Endangered		
Pupfish, Desert	Fish	198
Endangered		
Pupfish, Devils Hole	Fish	21
Endangered		
Pupfish, Leon Springs	Fish	7
Endangered		
Pupfish, Owens	Fish	13
Endangered		
Pupfish, Warm Springs	Fish	11
Endangered		
Salmon, Atlantic	Fish	73
Endangered		
Salmon, Chinook (Sacramento River Winter Run)	Fish	249
Endangered		
Salmon, Chinook (Upper Columbia River Spring)	Fish	209
Endangered		
Salmon, Coho (Central California Coast population)	Fish	109
Endangered		
Salmon, Sockeye (Snake River population)	Fish	187
Endangered		
Sawfish, Smalltooth	Fish	50
Endangered		
Shiner, Cahaba	Fish	49
Endangered		

Shiner, Cape Fear Endangered	Fish	65
Shiner, Palezone Endangered	Fish	42
Shiner, Topeka Endangered	Fish	294
Spinedace, White River Endangered	Fish	15
Springfish, Hiko White River Endangered	Fish	3
Springfish, White River Endangered	Fish	1
Squawfish, Colorado Endangered	Fish	185
Steelhead, (Southern California population) Endangered	Fish	126
Stickleback, Unarmored Threespine Endangered	Fish	88
Sturgeon, Alabama Endangered	Fish	33
Sturgeon, Pallid Endangered	Fish	915
Sturgeon, Shortnose Endangered	Fish	1090
Sturgeon, White Endangered	Fish	8
Sucker, June Endangered	Fish	13
Sucker, Lost River Endangered	Fish	25
Sucker, Modoc Endangered	Fish	9
Sucker, Razorback Endangered	Fish	282
Sucker, Shortnose Endangered	Fish	13
Topminnow, Gila (Yaqui) Endangered	Fish	124
Trout, Gila Endangered	Fish	49
Woundfin Endangered	Fish	30
Catfish, Yaqui Threatened	Fish	16
Cavefish, Ozark Threatened	Fish	87
Chub, Chihuahua Threatened	Fish	12
Chub, Hutton Tui Threatened	Fish	8
Chub, Slender Threatened	Fish	76
Chub, Sonora Threatened	Fish	7
Chub, Spotfin Threatened	Fish	200
Dace, Blackside Threatened	Fish	81
Dace, Desert Threatened	Fish	6
Dace, Foskett Speckled Threatened	Fish	1
Darter, Bayou Threatened	Fish	18
Darter, Cherokee Threatened	Fish	28
Darter, Goldline Threatened	Fish	32
Darter, Leopard Threatened	Fish	30

Darter, Niangua Threatened	Fish	103
Darter, Slackwater Threatened	Fish	59
Darter, Snail Threatened	Fish	187
Madtom, Neosho Threatened	Fish	48
Madtom, Yellowfin Threatened	Fish	93
Minnow, Devils River Threatened	Fish	3
Minnow, Loach Threatened	Fish	123
Salmon, Chinook (California Coastal Run) Threatened	Fish	60
Salmon, Chinook (Central Valley Fall Run) Threatened	Fish	40
Salmon, Chinook (Central Valley Spring Run) Threatened	Fish	319
Salmon, Chinook (Lower Columbia River) Threatened	Fish	119
Salmon, Chinook (Puget Sound) Threatened	Fish	171
Salmon, Chinook (Snake River Fall Run) Threatened	Fish	190
Salmon, Chinook (Snake River spring/summer) Threatened	Fish	206
Salmon, Chinook (Upper Willamette River) Threatened	Fish	212
Salmon, Chum (Columbia River population) Threatened	Fish	90
Salmon, Chum (Hood Canal Summer population) Threatened	Fish	52
Salmon, Coho (Southern OR/Northern CA Coast) Threatened	Fish	164
Salmon, Sockeye (Ozette Lake population) Threatened	Fish	7
Sculpin, Pygmy Threatened	Fish	10
Shiner, Arkansas River Threatened	Fish	260
Shiner, Beautiful Threatened	Fish	42

Shiner, Blue Threatened	Fish	73
Shiner, Pecos Bluntnose Threatened	Fish	18
Silverside, Waccamaw Threatened	Fish	12
Smelt, Delta Threatened	Fish	82
Spikedace Threatened	Fish	123
Spinedace, Big Spring Threatened	Fish	1
Spinedace, Little Colorado Threatened	Fish	21
Springfish, Railroad Valley Threatened	Fish	13
Steelhead, (California Central Valley population) Threatened	Fish	394
Steelhead, (Central California Coast population) Threatened	Fish	151
Steelhead, (Lower Columbia River population) Threatened	Fish	136
Steelhead, (Middle Columbia River population) Threatened	Fish	195
Steelhead, (Northern California population) Threatened	Fish	99
Steelhead, (Snake River Basin population) Threatened	Fish	219
Steelhead, (South-Central California population) Threatened	Fish	102
Steelhead, (Upper Columbia River population) Threatened	Fish	210
Steelhead, (Upper Willamette River population) Threatened	Fish	197
Steelhead, Puget Sound Threatened	Fish	197
Sturgeon, green Threatened	Fish	75
Sturgeon, Gulf Threatened	Fish	587
Sucker, Santa Ana Threatened	Fish	85
Sucker, Warner Threatened	Fish	8
Trout, Apache Threatened	Fish	43
Trout, Bull Threatened	Fish	712
Trout, Bull (Columbia River population) Threatened	Fish	508
Trout, Bull (Klamath River population) Threatened	Fish	505
Trout, Greenback Cutthroat Threatened	Fish	53
Trout, Lahontan Cutthroat Threatened	Fish	129
Trout, Little Kern Golden Threatened	Fish	44
Trout, Paiute Cutthroat Threatened	Fish	50

No species were selected for exclusion.

Species in Counties by State and Taxa

No species were excluded

Minimum of 1 Acre

All Medium Types Reported

Mammal, Marine mml, Bird, Amphibian, Reptile, Crustacean, Bivalve, Gastropod, Arachnid, Insect, Dicot, Monocot, Ferns, Conf/cycds, Coral, Lichen

hops, sugarbeets for sugar (irrigated)

40 Species Affected:

Inverse Name: Status:	Taxa:	Co. occurence:
Bat, Indiana Endangered	Mammal	11
Butterfly, Fender's Blue Endangered	Insect	1
Butterfly, Karner Blue Endangered	Insect	2
Butterfly, Mitchell's Satyr Endangered	Insect	1
Cactus, Wright Fishhook Endangered	Dicot	1
Caribou, Woodland Endangered	Mammal	1
Crane, Whooping Endangered	Bird	12
Daisy, Willamette Endangered	Dicot	2
Ferret, Black-footed Endangered	Mammal	16
Limpet, Banbury Springs Endangered	Gastropod	2
Lomatium, Bradshaw's Endangered	Dicot	2
Penstemon, Blowout Endangered	Dicot	4
Plover, Piping Endangered	Bird	10
Rabbit, Pygmy Endangered	Mammal	2
Riffleshell, Northern Endangered	Bivalve	1
Snail, Snake River Physa Endangered	Gastropod	4
Snail, Utah Valvata Endangered	Gastropod	3
Springsnail, Bruneau Hot Endangered	Gastropod	1
Tern, Interior (population) Least Endangered	Bird	7
Bear, Grizzly Threatened	Mammal	7
Butterfly Plant, Colorado Threatened	Dicot	3
Checker-mallow, Nelson's Threatened	Dicot	3
Clover, Prairie Bush Threatened	Dicot	1
Daisy, Lakeside Threatened	Dicot	1
Ladies'-tresses, Ute	Monocot	3

Threatened		
Lupine, Kincaid's	Dicot	1
Threatened		
Milk-vetch, Heliotrope	Dicot	1
Threatened		
Mouse, Preble's Meadow Jumping	Mammal	5
Threatened		
Murrelet, Marbled	Bird	1
Threatened		
Orchid, Eastern Prairie Fringed	Monocot	8
Threatened		
Orchid, Western Prairie Fringed	Monocot	3
Threatened		
Owl, Mexican Spotted	Bird	1
Threatened		
Owl, Northern Spotted	Bird	4
Threatened		
Prairie Dog, Utah	Mammal	1
Threatened		
Snail, Bliss Rapids	Gastropod	3
Threatened		
Snake, Lake Erie Water	Reptile	1
Threatened		
Thelypody, Howell's Spectacular	Dicot	1
Threatened		
Thistle, Pitcher's	Dicot	1
Threatened		
Townsendia, Last Chance	Dicot	1
Threatened		
Yellowhead, Desert	Dicot	1
Threatened		

No species were selected for exclusion.

Dispersed species included in report.