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OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

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**MEMORANDUM**

**SUBJECT:** Ecological Risk Assessment for the Dodine Section 3 New Use on Peanuts and Bananas

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The Environmental Fate and Effects Division (EFED) has reviewed the proposed label for the use of dodine (n-dodecylguanidine monoacetate; CAS 2439-10-3) and its end-use product SYLLIT<sup>®</sup> FL (39.6% dodine) fungicide on peanuts and bananas.

The results of this screening-level risk assessment indicate that the proposed new uses of dodine on peanuts and bananas have the potential for direct adverse effects on listed and non-listed freshwater and estuarine/marine invertebrates, listed and non-listed vascular and non-vascular plants, and listed and non-listed birds and mammals.

Major data gaps are listed below. Without these data potential risk to the associated taxa can not be precluded:

- Aquatic vascular plant toxicity data (850.4400)

There is uncertainty regarding the potential chronic effects of dodine to saltwater invertebrates and fish since there are no toxicity data. Using acute-to-chronic ratios (ACR) from freshwater species to calculate chronic endpoints for the saltwater species, however, suggests that risks may be low. The following data would reduce that uncertainty:

- Chronic saltwater fish toxicity data (850.1400)
- Chronic saltwater invertebrates toxicity data (850.1350)

### **Recommended Label Language**

“For terrestrial uses: Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwater or rinsate.”

“Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas.”

“This product may contaminate water through runoff. This product has a potential for runoff for several weeks after application. Poorly draining soils and soils with shallow water tables are more prone to produce runoff that contains this product. A level, well maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential for contamination of water from rainfall-runoff. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours. Sound erosion control practices will reduce this product’s contribution to surface water contamination.”

"This pesticide is toxic to fish, aquatic invertebrates, oysters and shrimp.”

### **1. Executive Summary**

The Environmental Fate and Effects Division (EFED) has reviewed the proposed label for the use of dodine (n-dodecylguanidine monoacetate; CAS 2439-10-3) and its end-use product SYLLIT<sup>®</sup> FL (39.6% dodine) fungicide on peanuts and bananas. Dodine is a fungicide of the guanidine group of chemicals and is considered a general toxophore with several sites of action that may differ among members of the guanidine group. Primarily, dodine’s mode of action is through disruptions of cell membranes. An Ecological Risk Assessment was conducted in support of the Reregistration Eligibility Decision (RED) in September 2005 (DP D310539) and assessed dodine use on apples, cherries, peaches, pears, pecans, strawberries, and black walnut; crab apple and ornamental shade trees at application rates as high as 13.0 lbs ai/A/season.

The proposed maximum single application rates for dodine use on bananas and peanuts range from 0.64 to 1.3 lbs a.i./A. Dodine may be applied via ground and/or aerial spray, up to five times per year for bananas and up to three times per year for peanuts. The minimum application

intervals for bananas and peanuts are 7 and 10 days, respectively. The maximum seasonal application rates for the proposed new uses are lower than the maximum seasonal rate currently registered for dodine. Dodine is not a “restricted use” pesticide.

Dodine applied to an agricultural field is likely to be immobile in soils and is generally not expected to persist longer than a few weeks. Based on a low estimated vapor pressure, volatilization is an unlikely route of dissipation from the field. Because of dodine’s high partitioning coefficient and relatively rapid degradation in aerobic soils, the potential to reach aquatic ecosystems dissolved in runoff or leachate is limited. Dodine may, however, be transported off-site to aquatic ecosystems adsorbed to eroded sediment or via spray drift during aerial, airblast or ground spray applications. In aquatic environments, dodine is resistant to hydrolysis and photolysis. In aerobic aquatic environments, dodine is likely to be moderately persistent to persistent. In anaerobic aquatic environments, dodine is likely to be very persistent. Major environmental degradates (excluding CO<sub>2</sub>) are not expected.

Dodine is practically non-toxic to honeybees, birds, and mammals on an acute exposure basis. However, dodine is moderately to very highly toxic to aquatic non-vascular plants, freshwater aquatic invertebrates, freshwater fish, estuarine/marine invertebrates, molluscs, and estuarine/marine fish on an acute exposure basis. Also, dodine is somewhat toxic to birds, mammals and freshwater aquatic invertebrates under longer-term, chronic exposures.

The results of this screening-level risk assessment indicate that the proposed new uses of dodine on peanuts and bananas have the potential for direct adverse effects on listed and non-listed freshwater and estuarine/marine invertebrates, listed and non-listed vascular and non-vascular plants, and listed and non-listed birds and mammals.

Potential effects to federally-listed endangered and threatened species (listed species) based on exceedances of Agency levels of concern (LOC) require an in-depth listed species evaluation determining the potential co-occurrence of listed species and the areas in which bananas and peanuts are grown. Identified potential risks to listed species are summarized in **Table 1.1**.

<b>Table 1.1. Listed Species Risks Associated with Potential Direct or Indirect Effects Due to the Proposed Applications of Dodine on Peanut and Banana</b>			
<b>Listed Species Taxonomic Group of Concern</b>	<b>Direct Effects</b>	<b>Indirect Effects</b>	
		<b>Potential</b>	<b>Associated Taxa<sup>1</sup></b>
Aquatic vascular plants	Assumed (no data)	YES	Aquatic plants
Non-vascular plants	Acute: growth	YES	Aquatic plants
Estuarine/marine non-vascular plants	Assumed (no data)	YES	Aquatic plants
Terrestrial plants	None	YES	Birds, mammals

**Table 1.1. Listed Species Risks Associated with Potential Direct or Indirect Effects Due to the Proposed Applications of Dodine on Peanut and Banana**

Listed Species Taxonomic Group of Concern	Direct Effects	Indirect Effects	
		Potential	Associated Taxa <sup>1</sup>
Freshwater fish	None	YES	Aquatic plants, aquatic invertebrates
Saltwater fish	None (chronic endpoint based on freshwater ACR)	YES	Aquatic plants, estuarine/marine invertebrates
Freshwater invertebrates	Acute: mortality	YES	Aquatic plants, freshwater invertebrates
Estuarine/marine invertebrates	Acute: mortality	YES	Aquatic plants, estuarine/marine invertebrates
Mollusks	Acute: mortality	YES	Aquatic plants, estuarine/marine invertebrates
Mammals	Acute: mortality Chronic: reproduction, growth	YES	Birds, mammals
Birds	Acute: mortality Chronic: reproduction, growth	YES	Birds, mammals
Terrestrial invertebrates	None	YES	Birds, mammals

<sup>1</sup> Associated taxa refers to those taxa for which there are direct effects that may indirectly affect a listed species taxa.

## 2. Problem Formulation

This assessment evaluates the potential risks to non-target species associated with the proposed use of dodine (n-dodecylguanidine monoacetate; CAS 2439-10-3) and its end-use product SYLLIT<sup>®</sup> FL (39.6% dodine) fungicide on peanuts and bananas. The proposed maximum application rate for bananas is 1.3 lbs a.i./acre for a maximum of 5 applications yielding a maximum seasonal application rate of 6.5 lb. a.i./acre/season. The proposed maximum application rate for peanuts is 0.64 lbs a.i./acre for a maximum of 3 applications yielding a maximum seasonal application rate of 1.9 lb. a.i./acre/season. The proposed methods of application are ground, airblast and aerial sprays.

The dodine Reregistration Eligibility Decision (RED) was published in September 2005. Since that time there have been no Section 3 new use registrations for dodine. An Ecological Risk Assessment was conducted in support of the RED in September 2005 (DP 310539) and assessed

dodine use on apples, cherries, peaches, pears, pecans, strawberries, and black walnut; crab apple and ornamental shade trees at application rates as high as 13.0 lbs ai/A/season.

This assessment utilizes environmental fate and toxicity data for both dodine and DGH (dodecylguanidine hydrochloride) because these compounds behave the same under environmental conditions. DGH is an antimicrobial pesticide that is used as a sanitizer, bacteriostat, microbiocide, microbistat, fungicide, algicide, and molluscicide. Dodine and DGH are water soluble salts of a strong base, dodecylguanidine, and are expected to dissociate to the same degree under any normal environmental conditions. As strong bases, these compounds will be completely dissociated in aqueous solutions at normal environmental pHs. At the low concentrations present in the environment, and in the presence of moisture, both compounds would be present as the dodecylguanidinium cation and as either the acetate or chloride anion.

### 2.1. Mode of Action

Dodine is a fungicide of the guanidine group of chemicals and is considered a general toxophore with several sites of action that may differ among members of the guanidine group. Primarily, dodine’s mode of action is through disruption of cell membranes. Dodine has been shown to cause extensive damage to the cytoplasmic membrane of the common plant pathogen, *Pseudomonas syringae*, marked by cell death and leakage of K<sup>+</sup>, UV-absorbing materials, and ribose-containing molecules (Cabral, 1991).

### 2.2. Use Characterization

Dodine is used as a pre- or post-infection fungicide that is formulated as a liquid flowable concentrate and wettable powder. Dodine has been used to control fungal diseases on apples, cherries, peaches, pears, pecans, strawberries and walnuts. Dodine may be applied to a number of stages of crop growth including delayed dormant, dormant, foliar, pre-bloom, early bloom, bloom, petal fall, postharvest, and popcorn (a developmental stage just before petals begin to open in peaches only). Mostly, dodine is applied using an air blast sprayer and is applied in a dilute or concentrate form. The proposed maximum application rate for bananas is 1.3 lbs a.i./acre with a 7 to 15-day reapplication interval for a maximum of 5 applications yielding a seasonal application rate of 6.5 lb. a.i./acre/season. The proposed maximum application rate for peanuts is 0.64 lbs a.i./acre with a 10 to 14-day reapplication interval for a maximum of 3 applications yielding a seasonal application rate of 1.9 lb. a.i./acre/season.(Table 2.1).

<b>Crop Type</b>	<b>Maximum Rate per Application (lbs a.i./A)</b>	<b>Max. Number of Applications</b>	<b>Maximum Seasonal Application Rate (lbs a.i./A/season)</b>	<b>Minimum Application Interval (days)</b>	<b>Pre-harvest interval (days)</b>	<b>Application Methods(s)</b>
Banana	1.3	5	6.5	7	0	Aerial
Peanuts	0.64	3	1.9	10	14	NS

NS – not specified. Aerial applications assumed for this assessment.

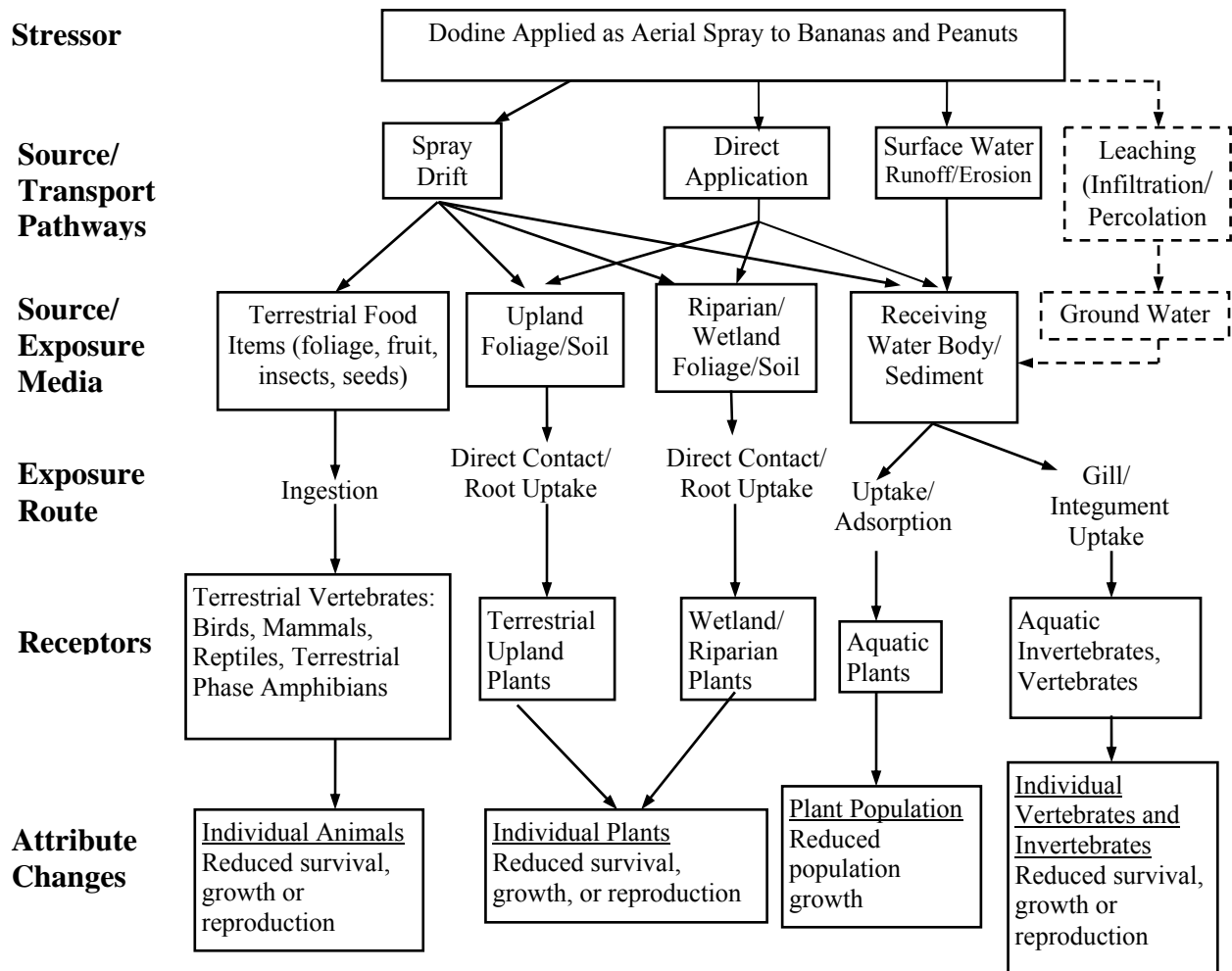
### 2.3. Conceptual Model

The conceptual model used to depict the potential ecological risk associated with the proposed use of dodine on bananas and peanuts assumes that, as a fungicide, dodine is capable of adversely affecting terrestrial and aquatic species, provided environmental concentrations are sufficiently elevated as a result of proposed label uses. The previous screening-level ecological risk assessment indicated the potential for direct adverse effects to non-target aquatic freshwater invertebrates, non-vascular aquatic plants, saltwater invertebrates and mollusk, birds and mammals. Therefore, the hypothesis for the risks of dodine to non-target animals (depicted in **Figure 2.1**) focuses on both aquatic and terrestrial environments via potential exposure from direct spray, spray drift, and runoff/erosion. Risk to terrestrial plants is also considered in this screening-level assessment. For terrestrial organisms, the major route of exposure is consumption of food items, such as plant leaves or insects, which contain dodine residues as a result of direct application and/or spray drift. For aquatic animal species, the major routes of exposure are direct contact via the respiratory surface (gills) or the integument through spray drift or runoff of sediment bound residues via erosion. Aquatic vascular and non-vascular plants may also be exposed via direct uptake and adsorption. Estimated exposure concentrations for all organisms are obtained through the use of several Agency exposure models.

The following risk hypothesis is presumed for this screening-level assessment:

*Based on the application method, mode of action, and the sensitivity of non-target aquatic and terrestrial species, the proposed dodine use on bananas and peanuts has the potential to reduce survival, reproduction, and/or growth in terrestrial and aquatic organisms.*

In order for a chemical to pose an ecological risk, it must reach non-target organisms at concentrations found to cause adverse effects. The exposure pathway is the means by which a pesticide moves in the environment from the application site to non-target organisms. The assessment of ecological exposure pathways in this assessment includes an examination of the source and routes of transport and dissipation for dodine, and the determination of potential exposure routes to non-target species, as depicted in **Figure 2.1**.



**Figure 2.1. Conceptual Model of the Transport and Effects of Dodine in the Environment**

\*Dotted lines indicate that, although this exposure route/media was considered, its contribution to the fate and transport of dodine is expected to be negligible

## 2.4. Analysis Plan

### 2.4.1. Integration of Exposure and Effects

Available exposure and toxicity data are used to evaluate the risks of adverse ecological effects on non-target species. For this screening-level assessment, the risk quotient (RQ) method is used to compare exposure and toxicity values. The RQ method involves dividing estimated environmental concentrations (EECs) by acute and chronic toxicity values. The resulting RQs are then compared to the Agency's LOCs (U.S. EPA, 2004; **Table 2.2**). These criteria are used to determine whether new uses for dodine, as directed on the proposed label, have the potential to cause adverse effects to non-target organisms.

<b>TABLE 2.2. Agency Risk Quotient (RQ) Metrics and Levels of Concern (LOC) Per Risk Class</b>			
<b>RISK CLASS</b>	<b>RISK DESCRIPTION</b>	<b>RQ</b>	<b>LOC</b>
<b>Aquatic Animals (fish and invertebrates)</b>			
Acute	Potential for effects to non-listed animals from acute exposures	Peak EEC/LC <sub>50</sub> <sup>1</sup>	0.5
Acute Restricted Use	Potential for effects to animals from acute exposures Risks may be mitigated through restricted use classification	Peak EEC/LC <sub>50</sub> <sup>1</sup>	0.1
Acute Listed Species	Listed species may be potentially affected by acute exposures	Peak EEC/LC <sub>50</sub> <sup>1</sup>	0.05
Chronic	Potential for effects to non-listed and listed animals from chronic exposures	60-day EEC/NOAEC (fish)	1
		21-day EEC/NOAEC (invertebrates)	
<b>Aquatic Plants</b>			
Non-Listed	Potential for effects to non-listed plants from exposures	Peak EEC/LC <sub>50</sub> <sup>1</sup>	1
Listed	Potential for effects to listed plants from exposures	Peak EEC/NOAEL	1
<b>Terrestrial Animals (mammals and birds)</b>			
Acute	Potential for effects to non-listed animals from acute exposures	EEC <sup>2</sup> /LC <sub>50</sub> (Dietary)	0.5
		EEC/LD <sub>50</sub> (Dose)	
Acute Restricted Use	Potential for effects to animals from acute exposures Risks may be mitigated through restricted use classification	EEC <sup>2</sup> /LC <sub>50</sub> (Dietary)	0.2
		EEC/LD <sub>50</sub> (Dose)	
Acute Listed Species	Listed species may be potentially affected by acute exposures	EEC <sup>2</sup> /LC <sub>50</sub> (Dietary)	0.1
		EEC/LD <sub>50</sub> (Dose)	
Chronic	Potential for effects to non-listed and listed animals from chronic exposures	EEC <sup>2</sup> /NOAEC	1
<b>Terrestrial and Semi-Aquatic Plants</b>			
Non-Listed	Potential for effects to non-target, non-listed plants from exposures	EEC/ EC <sub>25</sub>	1
Listed Plant	Potential for effects to non-target, listed plants from exposures	EEC/ NOEC	1
		EEC/ EC <sub>05</sub>	

<sup>1</sup> LC<sub>50</sub> or EC<sub>50</sub>.

<sup>2</sup> Based on upper bound Kenaga values.



### 3. Analysis

#### 3.1. Exposure Characterization

##### 3.1.1. Environmental Fate and Transport Characterization

This environmental fate and transport characterization addresses dodine (dodecylguanidine acetate) and DGH (dodecylguanidine hydrochloride) as a combined data set because these compounds behave the same under environmental conditions (*i.e.*, in water and moist soil). Both compounds are water soluble salts of a strong base (dodecylguanidine, CAS No. 112-65-2) that should dissociate to the same degree under any normal environmental conditions. As strong bases, these compounds will be completely dissociated in aqueous solutions at normal environmental pHs. At the low concentrations present in the environment, and in the presence of moisture, both compounds would be present as the dodecylguanidinium cation and as either the acetate or chloride anion ( $pK_a = 9$ ).

Dodine is likely to be immobile in soils, based on  $K_d$  values for DGH ( $K_d = 2202 - 18,019$  L/kg) and is generally not expected to persist in aerobic soils (half-lives 17.5 - 22.3 d). Because of dodine's high partitioning coefficient, the potential to reach aquatic ecosystems dissolved in runoff or leachate is limited. Based on a low estimated vapor pressure of  $1.5 \times 10^{-7}$  torr for dodine (EPI Suite), volatilization is an unlikely route of dissipation. Dodine may, however, be transported off-site to aquatic ecosystems adsorbed to eroded sediment or via spray drift during aerial, airblast or ground spray applications. Once in aquatic environments, dodine is resistant to hydrolysis based on data for DGH (half-lives 576-1198 d) and photolysis (half-lives 641-770 d). In aerobic aquatic environments, dodine is likely to be moderately persistent to persistent (half-lives 38.9, 59.8, 227 d). In anaerobic aquatic environments, dodine is likely to be persistent based on data for DGH (half-life 2,492 d). The general fate and physical-chemical property source data used for dodine aquatic exposure modeling are presented in **Table 3.1**. Additional details regarding the environmental fate and transport of dodine and DGH can be found in the September, 2005 Ecological Risk Assessment (U.S. EPA, 2005; DP 310539).

Major degradates (excluding  $CO_2$ ) were not identified in the available studies. Dodine degradation is most likely the result of beta-oxidation, whereby two carbons at a time are cleaved from the alkyl chain. The ultimate metabolite is  $CO_2$ .

<b>Table 3.1 General fate and physical-chemical property for dodine and DGH</b>			
<b>PARAMETER</b>	<b>VALUE</b>		<b>SOURCE</b>
	<b>Dodine</b>	<b>DGH</b>	
Molecular Weight	287.44	263.85	–
Water Solubility (25° C)	630 mg/L	no data	product chemistry data
Vapor Pressure (25° C)	1.5 x 10 <sup>-7</sup> torr	no data	EPI Suite
Hydrolysis t <sub>1/2</sub> (25° C)	no data	pH 5: 576 d pH 7: 914 d pH 9: 1198 d (< 10% in 30 days)	MRID 42242601
Aqueous Photolysis t <sub>1/2</sub>	641 d (<10% in 30 days)	770 d (<10% in 30 days)	MRID 46438203 (dodine), MRID 42419001 (DGH)
Soil Photolysis t <sub>1/2</sub>	239 d	no data	MRID 46438204
Aerobic Soil Metabolism t <sub>1/2</sub>	17.5 d, 22.3 d	no data	MRID 43945201
Anaerobic Soil Metabolism t <sub>1/2</sub>	no data	no data	–
Aerobic Aquatic Metabolism t <sub>1/2</sub>	38.9 d, 59.8 d	227 d (<10% in 30 days)	MRID 46438202 (dodine), MRIDs 42327401, 42414601 (DGH)
Anaerobic Aquatic Metabolism t <sub>1/2</sub>	no data	2492 d (~10% in 12 months)	MRIDs 42763100, 42763002
Soil Partition Coefficient (K <sub>d</sub> , L/kg)	no data	2202, 6440, 15228, 18019	MRID 42148901

### 3.1.2. Measures of Aquatic Exposure

Tier II modeling for scenarios representing proposed uses was used to generate EECs. For Tier II, two models are used in tandem: the Pesticide Root Zone Model, (PRZM, Carsel *et al.*, 2005) and the Exposure Analysis Modeling System (EXAMS, Burns, 2004). PRZM (version 3.12.2 dated May 12, 2005) simulates fate and transport on the agricultural field, and EXAMS (version 2.98.04.06 dated April 25, 2005) simulates the fate and resulting daily concentrations in a standard model water body. Simulations are carried out with the linkage program shell, PE 5.0 (November 15, 2006), which incorporates the standard crop and orchard scenarios developed by EFED. Simulations are run for multiple (usually 30) years, and the EECs represent peak values

that are expected once every ten years, based on the thirty years of daily values generated during the simulation. Additional information on these models can be found at: <http://www.epa.gov/oppefed1/models/water/index.htm>.

### *Input Parameters*

Input parameters for the PRZM/EXAMS models are listed in **Table 3.2**. Explanations of various model input parameters are discussed below.

<b>Table 3.2. Input Values Used for Dordine Tier II Surface Water Modeling with PRZM/EXAMS</b>			
<b>Parameter (units)</b>	<b>Value (s)</b>	<b>Source</b>	<b>Comments</b>
PRZM Scenario	PR coffee NC peanut	--	PR coffee is used as a surrogate for bananas
Application Rate (kg a.i./ha)	Banana: 1.46 Peanuts: 0.72	Proposed label.	Maximum single application rate per crop season.
Number of Applications	Banana: 5 Peanuts: 3	Proposed label.	Maximum applications per crop season
Interval between Applications (days)	Banana: 7 Peanuts: 10	Proposed label.	Minimum interval between applications per crop season
Molecular weight (g/mol)	287.1		
Henry's Law Constant (atm-m <sup>3</sup> /mol)	9.0 x 10 <sup>-11</sup>		Calculated
Vapor Pressure (Torr)	1.5 x 10 <sup>-7</sup>	EPI Suite	
Solubility in Water @ 25 °C (ppm)	6300		10x the water solubility
Soil Partition Coefficient (K <sub>d</sub> L/kg)	10427	MRID 42148901	Average of four values
CAM (Chemical Application Method)	2	Proposed label.	Foliar applications
Foliar Degradation Rate	0		Default in absence of data
Foliar Washoff	0.5		Default in absence of data
Application efficiency	0.95	Input Guidance	Aerial spray
Spray drift fraction	0.05	Input Guidance	Aerial spray
Application date	Banana: Feb 1 <sup>st</sup> Peanuts: June 5 <sup>th</sup>	See text	

<b>Parameter (units)</b>	<b>Value (s)</b>	<b>Source</b>	<b>Comments</b>
Hydrolysis Half-life @ pH 7 (days)	914	MRID 42242601	Standard pond scenario pH 7
Aqueous Photolysis Half-life (days)	770	MRID 42419001	Maximum value reported
Aerobic Aquatic Metabolism Half-life (days)	221	MRIDs 46438202, 42327401, 42414601	90 <sup>th</sup> %-ile confidence bound on the mean of three half-life values
Anaerobic Aquatic Metabolism Half-life (days)	7476	MRIDs 42763100, 42763002	3x the anaerobic aquatic half-life.
Aerobic Soil Metabolism Half-life (days)	27.3	MRID 434945201	90 <sup>th</sup> %-ile confidence bound on the mean of two half-life values

Currently approved standard PRZM crop scenarios were used in modeling. The PR coffee scenario was used as a surrogate for bananas since they are grown in similar locations and there is no current PRZM banana scenario and NC peanut scenario was used to simulate applications to peanuts.

Application methods and rates were obtained from the proposed supplemental labels. Application timing of dodine is related to various fungal pressures. For peanuts, the label suggests beginning applications to peanuts approximately 35 days after planting for treating early leaf spot (*Cercospora arachidicola*) and late leaf spot (*C. personatum*) so an initial application date of June 5<sup>th</sup> was simulated. Dodine application to bananas is used to treat sigatoka (*Mycosphaerella fijiensis*) which can appear with the first leaf so an initial application of February 1<sup>st</sup> was simulated. Applications were modeled with aerial application input values as specified on the label (assumed for peanut applications).

Chemical property input values were chosen in accordance with current input parameter guidance (USEPA, 2002b). A soil partitioning coefficient ( $K_d$ ) for DGH of 10427 L/kg, the mean of four soils, was used. The 90% upper confidence bound on the mean was used for the aerobic soil and aerobic aquatic metabolism half-lives (27.3 and 221 days, respectively). Since there was only one study for the anaerobic aquatic metabolism on DGH, three times the half-life was used to account for variability in the environment (7476 days). The maximum aqueous photolysis half-life, 770 days for DGH, was used and a hydrolysis half-life of 914 days also for DGH was used since the ecological water body is a constant pH 7.

### *Modeling Results*

Proposed use patterns were modeled for surface water exposure estimates, as described above. The maximum use patterns for banana yielded the maximum surface water EECs listed below in **Table 3.3**. Model input/output data for these estimates are attached in **Appendix A**.

<b>Uses (modeled rate)</b>	<b>PRZM Scenario</b>	<b>Application type</b>	<b>Peak (ppb)</b>	<b>21-d (ppb)</b>	<b>60-d (ppb)</b>
Banana (6.5 lb/A/yr)	PR coffee	Aerial	12	2.4	2.3
Peanut (1.9 lb/A/yr)	NC peanut	Aerial	4.3	0.93	0.86

### 3.1.3. Measures of Terrestrial Exposure

#### 3.1.3.1. Terrestrial Animals

T-REX (version 1.2.3) is used to calculate dietary and dose-based EECs of dodine for mammals and birds. Input values for T-REX are located in **Table 3.4**. Upper-bound Kenaga nomogram values are used to derive EECs for dodine exposures to terrestrial mammals and birds (**Table 3.5**). An example output from the T-REX model is provided in **Appendix B**. The default foliar dissipation half-life of 35 days was used because there are no empirical foliar dissipation data for dodine. Label-specified maximum application rate, number of applications and minimum reapplication intervals were used. A one year time period is simulated. Consideration is given to different types of feeding strategies 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.

<b>Parameter Description</b>	<b>Values</b>	
	<b>Banana</b>	<b>Peanuts</b>
Dodine Application Rate (lbs a.i./A)	1.3	0.64
Foliar Dissipation Half-life (days)	35	35
Minimum Application Interval (days)	7	10
Number of Applications	5	3

<b>Food Type</b>	<b>Maximum EEC (mg/kg)</b>	
	<b>Banana</b>	<b>Peanuts</b>
Short Grass	1205	383
Tall Grass	552	176
Broadleaf plants/sm insects	678	215
Fruits/pods/lg insects	75.3	23.9

### 3.1.3.2. Terrestrial Plants

Dodine exposure to terrestrial and semi-aquatic plants is estimated using the TerrPlant (version 1.2.2) model. The model generates EECs for plants residing near a use area that may be exposed via runoff and/or spray drift. The EECs are generated from one application at the maximum rate for a particular use and compound-specific solubility information. Only a single application is considered because it is assumed that for plants, toxic effects are likely to manifest shortly after the initial exposure and that subsequent exposures do not contribute to the response. Hence, the model estimates EECs based on application rate, the solubility factor, and default assumptions of drift. The EECs for terrestrial and semi-aquatic plants for a single application of dodine at the maximum single application rate for the proposed uses on banana and peanuts are presented in **Table 3.6**. An example output from the TerrPlant model is provided in **Appendix C**.

Crop	Single Max. Application Rate (lbs a.i./A)	EECs (lbs a.i./A)		
		Total Loading to Adjacent Dry Areas (sheet runoff + drift)	Total Loading to Semi-Aquatic Areas (channelized runoff + drift)	Spray Drift EEC
Banana	1.3	0.13	0.715	0.065
Peanuts	0.64	0.064	0.352	0.032

### 3.2. Ecological Effects Characterization

The ecological effects characterization for dodine is based primarily on registrant-submitted toxicity studies. Toxicity data from both dodine and DGH were considered for aquatic species only since these compounds behave similarly in water; both dissociate to form the dodecylguanidinium anion. Importantly, the DGH studies evaluated the toxicity of formulated product. Review of the formulated product ingredients indicate that the active ingredient, dodecylguanidine hydrochloride is the only ingredient expected to result in toxic effects. In addition to the data submitted in support of registration and the information compiled through the Agency pesticide review process, the ECOTOX database was used to identify additional toxicity data from the open literature. For dodine, no studies were identified in ECOTOX (in 2005 in support of the RED) that were suitable for use in this assessment. Results from submitted toxicity studies are not likely to capture the toxicity of dodine to all species of birds, mammals, plants, or aquatic organisms. Only a few surrogate species are used to represent all fish, birds, mammals, invertebrates, and plants. Furthermore, there are no currently required toxicity tests for amphibians or reptiles; therefore, birds are used as surrogates for reptiles and terrestrial-phase amphibians, and freshwater fish are used as surrogates for aquatic-phase amphibians. In general, the representation of numerous species by a few commonly used laboratory species, which are often chosen for amenability to laboratory study, is a source of uncertainty.

A brief description of available aquatic and terrestrial toxicity data used to calculate RQs is provided below in Sections 3.2.1 and 3.2.2. Additional summaries of laboratory toxicity data can be found in the September, 2005 Ecological Risk Assessment (U.S. EPA, 2005; DP 310539).

### 3.2.1. Aquatic Effects Characterization

Aquatic toxicity data for animals and plants are summarized in **Tables 3.7** and **3.8**, respectively.

Acute toxicity studies using both bluegill sunfish (*Lepomis macrochirus*) and rainbow trout (*Oncorhynchus mykiss*) indicated that dodine is highly toxic to freshwater fish on an acute exposure basis. Three freshwater invertebrate acute toxicity studies indicated that dodine is very highly toxic to waterfleas (*Daphnia magna*).

A freshwater fish early life-stage chronic toxicity test on fathead minnows (*Pimephales promelas*) was used to evaluate the chronic toxicity of dodine. Results from the study indicated a No Observed Adverse Effect Concentration (NOAEC) of 99 µg/L and an associated Lowest Observed Adverse Effect Concentration (LOAEC) of 200 µg/L. The basis of these effect levels was an observed decrease in growth (both larval weight and larval length) of dodine-exposed fish (Sousa, 1995). An aquatic invertebrate life cycle test was conducted to evaluate the chronic toxicity of dodine to the freshwater aquatic invertebrate *Daphnia magna*. There were significant effects of dodine on survival of first-generation daphnids, reproduction (number of young produced), and growth (length and dry weight of first-generation daphnids). The most sensitive endpoint was the number of young produced with a NOAEC of 7.3 µg/L and a LOAEC of 13 µg/L.

In addition to toxicity studies on freshwater fish and invertebrates, a non-guideline 28-day toxicity study on sediment-water-dwelling larvae of *Chironomus riparius* was available for review (MRID#464382-01). This study showed that there were no significant effects of dodine at any of the concentrations tested. The highest pore-water concentration tested was 380 µg/L.

Results from a DGH study on sheepshead minnows, *Cyprinodon variegatus*, were used in this risk assessment since the LC<sub>50</sub> for the DGH study was lower than that of a comparable study on dodine. The LC<sub>50</sub> was 1782 µg/L, which classifies dodine as moderately toxic to estuarine/marine fish.

The acute toxicity value for estuarine/marine invertebrates used in this assessment is based on a DGH study. Although a study on estuarine/marine invertebrates was available for dodine, the dodine study indicated a lack of toxicity to mysid shrimp, *Americamysis bahia*, (LC<sub>50</sub> = 2335 µg/L) whereas the DGH toxicity study showed that DGH was highly toxic to mysid shrimp on an acute exposure basis. For the study with DGH, the 96-hour LC<sub>50</sub> was 59.4 µg/L a.i. Similar to the results from the study on mysid shrimp, a 96-hour shell deposition study on eastern oysters (*Crassostrea virginica*) indicated that DGH was highly toxic to this molluscan species. There were significant, concentration-dependent effects of dodine on shell deposition. In fact, oysters at the lowest test concentration showed significantly reduced shell deposition. The 96-hour EC<sub>50</sub> was 69.3 µg/L.

There were no chronic estuarine/marine invertebrate or fish toxicity data available for this assessment. Chronic toxicity estimates for both estuarine/marine fish and invertebrates based on the acute-to-chronic ratio for their freshwater counterparts result a NOAEC of 309 and 24.4 µg/L, respectively.

Aquatic plant toxicity testing indicated that the nonvascular plant, *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum*) (green algae), is particularly sensitive to dodine at the concentrations tested. The estimated 120-hour EC<sub>50</sub> was 0.95 µg/L based on cell density effects. The corresponding 120-hour NOAEC for this effect was 0.082 µg/L. Based on these results, dodine is classified as very highly toxic to green algae. A complete evaluation of the toxicity of a compound to aquatic plants requires at least one study on aquatic vascular plants; however, no aquatic vascular plant data are available for dodine.

Species/ Chemical	Acute Toxicity			Chronic Toxicity	
	96-hr LC <sub>50</sub> /EC <sub>50</sub> (µg a.i./L)	48-hr EC <sub>50</sub> (µg a.i./L)	Toxicity Classification (MRID)	NOAEC/ LOAEC (µg a.i./L)	Endpoints (MRID)
Rainbow trout <i>Oncorhynchus mykiss</i> (Dodine)	570	--	Highly toxic (Acc. # 132149)	--	--
Fathead Minnow <i>Pimephales promelas</i> (Dodine)	--	--	--	99/ 200	Larval length and weight (438765-02)
Waterflea <i>Daphnia magna</i> (Dodine)	--	17.8	Very highly toxic (423396-01)	7.3/ 13	Number young produced (438765-01)
Sheepshead minnow <i>Cyprinidon variegates</i> (DGH)	1782	--	Moderately toxic (434855-06)	309 <sup>a</sup>	--
Eastern Oyster <i>Crassostrea virginica</i> (DGH)	69.3	--	Highly toxic (434855-08)	--	--
Mysid shrimp <i>Americamysis bahia</i> (DGH)	59.4	--	Highly toxic (434855-07)	24.4 <sup>b</sup>	--

<sup>a</sup> chronic NOAEC estimated using acute-to-chronic ratio (ACR=5.76) for freshwater fish

<sup>b</sup> chronic NOAEC estimated using acute-to-chronic ratio (ACR=2.43) for freshwater invertebrates.

Species	Acute Toxicity		
	120-hr EC <sub>50</sub> (µg a.i./L)	NOAEC (µg a.i./L)	Endpoints (MRID)
Green algae <i>Pseudokirchneriella subcapitata</i>	0.95	0.082	Cell Density (426951-01)

### 3.2.2. Terrestrial Effects Characterization

Toxicity values for terrestrial animals and plants are summarized in **Tables 3.9** and **3.10**, respectively.



Two studies on the acute toxicity of dodine to birds were available for review. The studies indicated that dodine is practically non-toxic to mallard ducks, *Anas platyrhynchos*, and slightly toxic to bobwhite quail, *Colinus virginianus*, on an acute oral exposure basis. Since bobwhite quail showed greater sensitivity to dodine, results from that study were used for this assessment. The bobwhite quail LD<sub>50</sub> was 690 mg a.i./kg body weight. In addition to mortality, observed sublethal effects included ruffled feathers and depressed activity. Subacute dietary exposures of the same species indicated that dodine was practically non-toxic to both species with LC<sub>50</sub> values of 8413 mg/kg diet and >10000 mg/kg diet for bobwhite quail and mallard ducks, respectively. In the subacute bobwhite quail study, other toxic signs included depressed activity, reduced reaction to external stimuli, wing droop, and coordination loss. No mortality was seen in the subacute dietary study on mallard ducks.

In an avian chronic toxicity test conducted to evaluate the reproductive toxicity of dodine, twenty-four week old mallard ducks were exposed to dodine in feed at several concentrations. There were significant effects of dodine on the number of eggs laid, eggs set, viable embryos, viable 3-week embryos, hatchlings, 14-day old survivors, adult food consumption, hatchling body weights, and adult female body weights at dietary concentrations > 600 mg a.i./kg feed. The NOAEC for these effects was 200 mg a.i./kg feed. In a similar study conducted on bobwhite quail, no significant effects were observed at any exposure level including the highest exposure level (300 mg a.i./kg diet).

The acute toxicity of dodine to mammals was evaluated using the Norway rat (*Rattus norvegicus*). The acute toxicity of dodine differed between male and female rats with females showing greater sensitivity. The LD<sub>50</sub> values were 1056 and 1698 mg/kg bw for females and males, respectively, with a combined LD<sub>50</sub> of 1379 mg/kg bw. For this assessment, the lower female-specific value of 1056 mg/kg was used.

Chronic studies in both dogs and rats show that the endpoint most sensitive to dodine exposure seems to be reduced growth (body weight) in adults and/or offspring. In rats, the NOAEL was 30.3 mg/kg/day for decreased male pup body weight, which corresponds to a dietary level of 400 ppm (mg a.i./kg feed). Growth as a measure of effect for mammals is used because growth rate or body size can be important for survival and reproduction of wild mammals. Frequently, a larger size is associated with increased chances of survival or competitive advantage and growth rate directly influences maturation rate, a strong contributor to population growth rate in many populations.

Acute toxicity of dodine to terrestrial invertebrates was assessed in studies where honey bees (*Apis mellifera*) were exposed to dodine via both contact and oral routes. The contact LD<sub>50</sub> was more than 200 µg per bee, the highest dose tested. This characterizes dodine as practically non-toxic to honey bees via contact exposure. In the oral toxicity test, suspensions of dodine in 50% sucrose water were prepared such that four test concentrations were administered to test bees. Similar to the contact toxicity study, dodine did not cause significant mortality at the concentrations tested. The resulting LD<sub>50</sub> was > 200 µg per bee.

Tier I terrestrial plant studies were submitted in support of the re-registration of dodine. Tier I studies are aimed at quickly evaluating the phytotoxicity of a compound at the maximum single application rate, which for dodine is 2.6 lbs a.i./A. Tier II plant studies are triggered when effects from the Tier I studies exceed 25% of control. At dodine exposures equivalent to 2.6 lbs a.i./A, cabbage showed a 25% reduction in plant dry weight compared to controls. This was the only effect greater than or equal to 25% although several effects in cabbage, a dicotyledonous plant, were  $\geq 20\%$  but less than 25% (**Table 3.10**). Therefore, for the remainder of the plants (monocotyledonous or dicotyledonous) tested, the EC<sub>25</sub> exceeded the equivalent maximum application rate for dodine. No Tier II plant studies were submitted for review, precluding the calculation of RQs. Since only a single exposure concentration was tested, it isn't possible to determine a concentration response profile for terrestrial plants, and it is uncertain whether higher applications rates, if requested in the future, would result in effects on terrestrial plants.

**Table 3.9. Summary of Acute and Chronic Toxicity Data for Terrestrial Animals Exposed to Dodine**

Species	Acute Toxicity				Chronic Toxicity	
	LD <sub>50</sub> (mg/kg)	Acute oral toxicity (MRID)	8-day LC <sub>50</sub> (mg/kg diet)	Subacute dietary toxicity (MRID)	NOAEC/LOAEC (mg/kg diet) (MRID)	Affected Endpoints
Bobwhite quail <i>Colinus virginianus</i>	690	Slightly toxic (Acc.# 130888)	8413	Practically non- toxic (Acc. # 226855)	300/ >300 (449857-05)	Growth (14-d survivor weight); reproduction (eggs cracked)
Mallard Duck <i>Anas platyrhynchos</i>	2214	Practically non-toxic (Acc.# 131455)	>10000	Practically non- toxic (Acc.# 226855)	200/ 600 (432746-02)	Multiple reproductive
Dog <i>Fanis familiaris</i>	--	--	--	--	2.0/ 10.0 mg/kg/d (442461-01)	Body weight
Laboratory Rat <i>Rattus norvegicus</i>	1056	Practically non-toxic (449224-01)	--	--	30.3 / 60.5 (442460-01)	Decreased pup body weight
Honeybee <i>Apis mellifera</i>	>200 (µg/bee contact)	Practically non-toxic (4013155-05)	--	--	--	--

**Table 3.10. Tier I Summary of the Effects of Dodine on Terrestrial Plants**

Plant Type	Study Species	% Reduction Compared to Controls				
		Seedling Emergence (MRID 426951-02)			Vegetative Vigor (MRID 426951-03)	
		Seedling Emergence	Shoot Length	Dry Weight	Shoot Length	Dry Weight
Monocots	Corn	0	1	10	0	0
	Oats	0	9	0	2	0
	Onion	15	0	11	5	20
	Ryegrass	0	5	0	0	8
Dicots	Radish	0	1	9	5	0
	Soybean	0	7	11	0	3
	Lettuce	2.5	17	14	14	0
	Tomato	6	0	0	1	0
	Cucumber	0	2	14	4	15
	Cabbage	3	22	25	12	21

## 4. Risk Characterization

### 4.1. Risk Estimation

#### 4.1.1. Aquatic Organisms

The 1-in-10 year peak EECs in surface water generated from the PRZM/EXAMS model represent acute exposure to fish, aquatic invertebrates, and aquatic plants, and the 1-in-10 year 21-day and 60-day average EECs represent chronic exposure to aquatic invertebrates and fish, respectively. Scenarios are evaluated for aerial applications of dodine to bananas and peanuts. Acute and chronic RQs for freshwater and estuarine/marine organisms are summarized in **Tables 4.1** and **4.2**, respectively.

##### 4.1.1.1. Freshwater Fish and Invertebrates

As shown in **Table 4.1**, acute and chronic RQs are below LOCs (**Table 2.3**) for freshwater fish and chronic RQs are below the chronic risk LOC for freshwater invertebrates. Based on the daphnia toxicity data, the non-listed acute restricted use LOC ( $RQ \geq 0.1$ ) for freshwater invertebrates is exceeded for applications of dodine on peanuts and the non-listed species acute risk LOC ( $RQ \geq 0.5$ ) for freshwater invertebrates is also exceeded for applications on bananas. For both non-listed and listed non-vascular plants, acute RQs exceed the acute risk LOC for both applications to bananas and peanuts.

In addition to toxicity studies on freshwater fish and invertebrates, a non-guideline 28-day toxicity study on sediment-water-dwelling larvae of *Chironomus riparius* that showed that there were no significant effects of dodine at any of the concentrations tested. The highest pore-water concentration tested was 380 ppb. The 1-in-10 year, 21-day chronic estimated pore-water concentration from PRZM/EXAMS was 2.2 ppb for the Puerto Rico coffee scenario. The RQ based on these values is 0.005, which does not exceed any LOC. This analysis indicates that risk to benthic invertebrates is expected to be low.

<b>Table 4.1. Acute and Chronic RQs for Freshwater Fish, Invertebrates and Non-vascular Plants Exposed to Dodine</b>										
Use (App. Method)	Application Rate lbs a.i./A (#app/interval)	EECs (ppb)			Fish and Amphibian RQs LC <sub>50</sub> = 570 ppb NOAEC = 99 ppb		Invertebrate RQs LC <sub>50</sub> = 17.8 ppb NOAEC = 7.3 ppb		Non-vascular Plant RQs EC <sub>50</sub> = 0.95 ppb NOAEC = 0.082 ppb	
		Peak	21- day	60- day	Acute	Chronic	Acute	Chronic	Acute non- listed	Acute listed
Banana (aerial)	1.3 (5/7)	12	2.4	2.3	0.02	0.02	<b>0.67***</b>	0.33	<b>13<sup>+</sup></b>	<b>146<sup>+</sup></b>
Peanut (aerial)	0.64 (3/10)	4.3	0.93	0.86	0.01	0.01	<b>0.24**</b>	0.13	<b>4.5<sup>+</sup></b>	<b>52<sup>+</sup></b>

\*Exceeds the acute listed species LOC (RQ≥0.05)

\*\*Exceeds the acute listed species LOC (RQ≥0.05) and the non-listed species acute restricted use LOC (RQ≥0.1)

\*\*\* Exceeds the acute listed species LOC (RQ≥0.05), the non-listed species acute restricted use LOC (RQ≥0.1), and the acute risk LOC (RQ ≥ 0.5).

<sup>+</sup> Non-vascular plant RQs exceed the listed and/or non-listed species acute risk LOC (RQ≥1.0)

#### 4.1.1.2. Estuarine/Marine Fish and Invertebrates

As shown in **Table 4.2**, acute RQs for estuarine/marine fish are below the listed species LOC of 0.05. Chronic toxicity data were not available for estuarine/marine fish or invertebrates. Based on acute-to-chronic ratios of their freshwater counterparts chronic endpoints were estimated and used to calculate RQs which are below the chronic risk LOC. Based on the mysid shrimp and Eastern oyster toxicity data, the listed species LOC (RQ ≥ 0.05) is exceeded for dodine use on peanuts and bananas; the non-listed species acute restricted use LOC (RQ ≥ 0.1) is also exceeded for applications on bananas.

<b>Table 4.2. Acute and Chronic RQs for Estuarine/Marine Fish and Invertebrates Exposed to Dodine</b>										
Use	Application Rate lbs ai/A (#app/interval)	EECs (ppb)			Fish RQs LC <sub>50</sub> = 1782 ppb NOAEC=309 ppb <sup>a</sup>		Invertebrate RQs EC <sub>50</sub> = 59.4 ppb NOAEC=24.4 ppb <sup>b</sup>		Mollusk RQs EC <sub>50</sub> = 69.3 ppb	
		Peak	21-day	60-day	Acute	Chronic	Acute	Chronic	Acute	
Banana (aerial)	1.3 (5/7)	12	2.5	2.4	<0.01	<0.01	<b>0.20**</b>	0.1	<b>0.17**</b>	
Peanut (aerial)	0.64 (3/10)	4.3	0.94	0.86	<0.00	<0.01	<b>0.07*</b>	0.04	<b>0.06*</b>	

\*Exceeds the acute listed species LOC (RQ≥0.05)

\*\*Exceeds the acute listed species LOC (RQ≥0.05) and the non-listed species acute restricted use LOC (RQ≥0.1)

<sup>a</sup> chronic estuarine fish NOAEC estimated using acute-to-chronic ratio for freshwater fish.

<sup>b</sup> chronic estuarine invertebrate NOAEC estimated using acute-to-chronic ratio for freshwater invertebrate.

## 4.1.2. Terrestrial Organisms

### 4.1.2.1. Birds

As shown in **Table 4.3**, dose-based RQs exceed the acute, acute restricted use and/or listed species acute risk LOCs for most birds that consume short grass, tall grass, broadleaf plants and small insects, and fruits, pods, seeds and large insects at the proposed maximum application rate for dodine to bananas. The acute, restricted use and/or listed species LOCs are exceeded for most birds that consume short grass, tall grass, and broadleaf plants and small insects at the maximum application rate proposed for peanuts. Dietary-based acute RQs only exceed the listed species LOC for birds consuming short grass after applications to bananas. RQ values exceed the chronic risk LOC for birds in all forage categories except fruits/pods/seeds/large insects following dodine application to bananas and exceed for birds foraging on short grass and broadleaf plants/small insects following applications to peanuts. An example output of avian RQs from the T-REX model is provided in **Appendix B**.

Use	Application Rate lbs ai/A (#app/interval)	Dietary Category	Acute RQs				Chronic Dietary- based RQs
			Dose-based RQs			Dietary- based RQs	
			20 g	100 g	1000 g		
Banana	1.3 (5/7)	Short Grass	<b>2.8</b> <sup>***</sup>	<b>1.2</b> <sup>***</sup>	<b>0.39</b> <sup>**</sup>	<b>0.14</b> <sup>*</sup>	<b>6.0</b> <sup>+</sup>
		Tall Grass	<b>1.3</b> <sup>***</sup>	<b>0.57</b> <sup>***</sup>	<b>0.18</b> <sup>*</sup>	0.07	<b>2.8</b> <sup>+</sup>
		Broadleaf plants/sm insects	<b>1.6</b> <sup>***</sup>	<b>0.7</b> <sup>***</sup>	<b>0.22</b> <sup>**</sup>	0.08	<b>3.4</b> <sup>+</sup>
		Fruits/pods/seeds/lg insects	<b>0.17</b> <sup>*</sup>	0.08	0.02	0.01	0.38
Peanut	0.64 (3/10)	Short Grass	<b>0.88</b> <sup>***</sup>	<b>0.39</b> <sup>**</sup>	<b>0.12</b> <sup>*</sup>	0.05	<b>1.9</b> <sup>+</sup>
		Tall Grass	<b>0.40</b> <sup>**</sup>	<b>0.18</b> <sup>*</sup>	0.06	0.02	0.88
		Broadleaf plants/sm insects	<b>0.49</b> <sup>**</sup>	<b>0.22</b> <sup>**</sup>	0.07	0.03	<b>1.1</b> <sup>+</sup>
		Fruits/pods/seeds/lg insects	0.05	0.02	0.01	<0.01	0.12

\*Exceeds the acute listed species LOC (RQ≥0.1)

\*\*Exceeds the acute listed species LOC (RQ≥0.1) and the non-listed species acute restricted use LOC (RQ≥0.2)

\*\*\* Exceeds the acute listed species LOC (RQ≥0.1), the non-listed species acute restricted use LOC (RQ≥0.2), and the acute risk LOC (RQ ≥ 0.5).

<sup>+</sup> Exceeds the listed and non-listed chronic LOC (RQ≥1.0)

### 4.1.2.2. Mammals

**Table 4.5** lists dose-based acute mammalian RQs for the proposed use of dodine on bananas and peanuts. Acute risk, acute restricted use and/or listed species LOCs are exceeded for mammals that consume short grass, tall grass and broadleaf plants/ small insects following applications of dodine on bananas. Following applications of dodine to peanuts, acute risk quotients exceed the listed species LOC for small and medium sized mammals that consume short grass (only).

Use	Application Rate (lbs ai/A) #app/interval(d)	Body Weight (g)	Avian Acute RQs for Specified Food Items				
			Short Grass	Tall Grass	Broadleaf Plants/Small Insects	Fruits/Pods/ Lg Insects	Seeds
Banana	1.3 (5/7)	15	<b>0.50</b> <sup>***</sup>	<b>0.23</b> <sup>**</sup>	<b>0.28</b> <sup>**</sup>	0.03	0.01
		35	<b>0.42</b> <sup>**</sup>	<b>0.19</b> <sup>*</sup>	<b>0.24</b> <sup>**</sup>	0.03	0.01
		1000	<b>0.23</b> <sup>**</sup>	<b>0.10</b> <sup>*</sup>	<b>0.13</b> <sup>*</sup>	0.01	<0.01
		15	<b>0.16</b> <sup>*</sup>	0.07	0.09	0.01	<0.01

Peanut	0.64 (3/10)	35	<b>0.13*</b>	0.06	0.08	0.01	<0.01
		1000	0.07	0.03	0.04	<0.01	<0.01

\*Exceeds the acute listed species LOC (RQ≥0.1)

\*\*Exceeds the acute listed species LOC (RQ≥0.1) and the non-listed species acute restricted use LOC (RQ≥0.2)

\*\*\* Exceeds the acute listed species LOC (RQ≥0.1), the non-listed species acute restricted use LOC (RQ≥0.2), and the acute risk LOC (RQ ≥ 0.5).

**Table 4.6** lists the dose-based chronic mammalian RQs for the proposed uses of dodine. The chronic LOC (RQ ≥ 1.0) is exceeded for both proposed new uses of dodine on bananas and peanuts. However, LOC exceedances are specific to food items including short grass, tall grass, broadleaf plants/small insects and fruits/pods/large insects for small mammals for the banana use only owing to the higher proposed application rate. RQs are higher for smaller mammals due to an increased food ingestion rate associated with the higher metabolic rate of smaller mammals.

<b>Table 4.6. Mammalian Dose-Based Chronic RQ Values for Uses of Dodine</b>							
Use	Application Rate lbs ai/A #app/interval(d)	Body Weight (g)	Dose-based Chronic Mammalian RQs for Specified Food Items				
			Short Grass	Tall Grass	Broadleaf Plants/Small Insects	Fruits/Pods/Lg Insects	Seeds
Banana	1.3 (5/7)	15	<b>17</b>	<b>7.9</b>	<b>9.7</b>	<b>1.1</b>	0.24
		35	<b>15</b>	<b>6.8</b>	<b>8.3</b>	0.92	0.20
		1000	<b>7.9</b>	<b>3.6</b>	<b>4.5</b>	0.49	0.11
Peanut	0.64 (3/10)	15	<b>5.5</b>	<b>2.5</b>	<b>3.1</b>	0.34	0.08
		35	<b>4.7</b>	<b>2.2</b>	<b>2.6</b>	0.29	0.07
		1000	<b>2.5</b>	<b>1.2</b>	<b>1.4</b>	0.16	0.03

**Bolded** values exceed the chronic risk LOC (RQ ≥ 1.0) for non-listed and listed mammalian species

**Table 4.7** summarizes chronic dietary-based mammalian RQs for proposed uses of dodine. These RQs are based on effects associated with chemical concentrations in feed. The chronic dietary-based RQs exceed LOCs for the banana use for the short grass, tall grass and broad leaf plants/ small insect food items.

<b>Table 4.7. Chronic Dietary-Based RQ Values for Mammals Exposed to Dodine</b>				
Use	Application Rate lbs ai/A #app/interval(d)	Food Items	EEC (mg/kg)	Chronic Dietary RQ
Banana	1.3 (5/7)	Short Grass	1205	<b>3.0</b>
		Tall Grass	552	<b>1.4</b>
		Broadleaf plants / small insects	678	<b>1.7</b>
		Fruits, pods, seeds, large insects	75	0.19
Peanut	0.64 (3/10)	Short Grass	383	0.96
		Tall Grass	176	0.44
		Broadleaf plants / small insects	214	0.54
		Fruits, pods, seeds, large insects	23.9	0.06

**Bolded** values exceed the chronic risk LOC for non-listed and listed mammalian species is RQ≥1.0

An example output of mammalian acute and chronic RQs derived from the T-REX model is provided in **Appendix B**.

#### 4.1.2.3. Terrestrial Invertebrates

Dodine is classified as ‘practically nontoxic’ to non-target terrestrial insects including honey bees on an acute exposure basis. Screening-level risk assessments do not typically evaluate risks to terrestrial invertebrates; however, toxicity information for beneficial insects is used to develop precautionary label language where necessary. Based on the available data, precautionary label language for bees does not appear necessary.

#### **4.1.2.4. Plants**

Risk quotients for terrestrial plants could not be calculated because Tier II toxicity studies were not submitted for review and therefore toxicity values used to calculate RQs were not available. Tier I plant studies indicated some deleterious effects of dodine on some species of plants. However, since the application rate tested in the Tier I study (2.6 lbs ai/A) is double the proposed maximum rate on bananas (1.3 lbs ai/A), risk to terrestrial plants resulting from applications of dodine on bananas and peanuts is expected to be low.

### **4.2. Risk Description**

The results of this screening-level risk assessment indicate that the proposed new use of dodine on bananas and peanuts has the potential for direct adverse effects to listed and non-listed estuarine/marine and freshwater invertebrates, listed and non-listed freshwater non-vascular plants, listed and non-listed birds and mammals, and to terrestrial dicotyledonous plants. Therefore, the risk hypothesis [*...the proposed dodine uses on bananas and peanuts has the potential to reduce survival, reproduction, and/or growth in terrestrial and aquatic organisms*] is supported. These results are based on the maximum application rate for these proposed uses. Although direct adverse effects to freshwater fish from dodine uses are not expected, indirect effects to all animals are possible, given the potential for effects on aquatic and terrestrial plant species.

#### **4.2.1. Risks to Aquatic Organisms**

Acute and chronic RQs for freshwater fish, chronic RQs for freshwater invertebrates and acute RQs for estuarine/marine fish are below the acute risk to listed species LOC of 0.05 and/or the chronic risk LOC of 1.0; therefore, direct effects to these taxa from the proposed new uses of dodine are not expected. Analysis based on one study of benthic invertebrates indicated that the chronic risk LOC was not exceeded and risks are expected to be low for benthic freshwater invertebrates.

No chronic estuarine/marine fish data were available for dodine; therefore, chronic risk associated with estuarine/marine fish is unknown. However, given the lack of acute risks and the low chronic risks to freshwater fish species, it seems likely that chronic risks to estuarine/marine fish species would be low. Chronic toxicity estimates for estuarine/marine fish based on the acute-to-chronic ratio for freshwater fish result in chronic RQ values orders of magnitude lower than the chronic risk LOC. Not having data to support or refute potential for chronic risk adds considerable uncertainty to this assessment.

Based on this screening-level analysis, acute restricted use and listed species LOCs for freshwater invertebrates are exceeded for both modeled uses. In addition the acute risk LOC is exceeded for freshwater invertebrates for aerial applications to banana. The chronic risk LOC is not exceeded. Acute RQ values were based on toxicity data on dodine for *Daphnia magna*. Although the lowest toxicity value was chosen out of three studies involving waterfleas, it is likely that more sensitive invertebrates could be found in the wild. In this case, at currently proposed use rates, mortality of aquatic invertebrates would be expected. Despite the fact that invertebrates are less conspicuous members of the aquatic community, they are a major component of aquatic ecosystems and food webs. Any significant effects on invertebrates would most likely influence other components of the ecosystem. Effects may not be limited to merely a change in total biomass as a result of widespread mortality, but any changes associated with differential sensitivity could bring about significant changes in the community structure, which could alter system function (Relyea, 2005). The importance of sustaining viable aquatic invertebrate communities to maintain aquatic ecosystem function cannot be overstated.

Based on this screening-level analysis, listed species acute risk LOCs for estuarine/marine non-molluscan invertebrates were exceeded for both proposed uses of dodine. Also, the acute restricted use LOC is exceeded based on applications to bananas. No chronic estuarine/marine invertebrate data were available for dodine. Using the acute-to-chronic ratio for freshwater invertebrates to calculate an endpoint for estuarine/marine invertebrates results in a chronic RQ that does not exceed the LOC. Not having data to support or refute potential for chronic risk adds considerable uncertainty to this assessment.

There is uncertainty regarding the toxicity of dodine/DGH to estuarine/marine invertebrates due to the large difference in the mysid shrimp  $LC_{50}$ s for the two chemicals. Review of the DGH formulation ingredients used in the mysid study indicated that toxicity was likely the result of exposure to the active ingredient only. The next most abundant chemical in the formulation (17.5% by weight) has an estimated  $LC_{50}$  in brown shrimp of 1150 ppm suggesting that it is not a likely contributor to the lower  $LC_{50}$  associated with DGH. Further, review of both the dodine and DGH studies did not reveal any obvious explanation for the difference in acute toxicity. Indeed, DGH and dodine are expected to behave similarly in aquatic environments. If this were true, results from toxicity tests on aquatic species would likely show similar results with one chemical more or less sensitive than the other in random fashion. Examination of the data, however, indicates that for saltwater species, DGH appears to be more toxic. Further analysis or research may be required to characterize the relative toxicity of DGH and dodine to aquatic species. Again, for purposes of this assessment, it is assumed that DGH and dodine behave similarly in aquatic environments and therefore, the lowest toxicity value is used in calculating RQs.

For molluscs, listed species acute risk LOCs for estuarine/marine non-molluscan invertebrates were exceeded for both proposed uses of dodine. Also, the acute restricted use LOC is exceeded based on applications to bananas. Molluscs are important components of many nearshore saltwater ecosystems. Molluscs serve as prey to a number of aquatic and terrestrial species, can be a commercial commodity, and help clean water through filtration. The effects of dodine on molluscs are not all together unexpected as a structurally similar chemical, DGH, is used in control of some molluscan species. Dodine, however, is not used as a molluscicide.



The toxicity data on estuarine/marine invertebrates (including molluscs) was based on data from studies using DGH. As previously explained (sec 3.2.1), the active ingredient for both DGH and dodine is expected to be the dodecylguanidinium ion, and therefore to have similar toxicities.

Based on predicted EECs for the modeled dodine use patterns and available toxicity data, LOCs are exceeded for non-listed and listed non-vascular aquatic plants. Since there are no available toxicity data for aquatic vascular plants, the potential risk due to dodine use is unknown and, as such, is presumed. Aquatic acute EECs would have to be as low as 0.05 ppb to be sufficient to achieve RQ values for non-vascular aquatic plants that are less than the LOCs. Aquatic plants are key components to all aquatic ecosystems and provide a multitude of ecological functions. They provide food and shelter for a wide variety of aquatic animal species and help maintain water quality through temperature modulation, filtration, and oxygen supply. Any effects on aquatic plants as a result of dodine use would be expected to result in significant ecosystem-level effects. Most notably, there would likely be a near instant decrease in water quality associated with plant decay and depletion of oxygen. In turn, sedimentation would likely increase due to decay and a loss in filtering capacity. The depletion of oxygen and increased siltation could result in widespread fish and invertebrate mortality. The cascade of effects due to effects on aquatic plants would pose a risk to any aquatic listed species near the use area as well as terrestrial species that rely on aquatic organisms as food items such as piscivorous birds, mammals, or reptiles (Relyea, 2005).

#### ***4.2.2. Risks to Terrestrial Organisms***

Using the dose-based ( $LD_{50} = 690$  mg/kg-bw for bobwhite quail) toxicity value, acute, acute restricted use and/or listed species LOCs are exceeded for birds that consume short grass, tall grass, broadleaf plants/ small insects for both proposed application rates. Based on the dose-based endpoint, acute listed species LOCs are also exceeded for birds that consume fruits, pods, seeds, and large insects for the proposed use on bananas, at the smallest weight class. Using the dietary-based ( $LC_{50} = 8413$  mg/kg-diet for bobwhite quail) toxicity value, acute listed species LOCs are only exceeded for birds that consume fruits, pods, seeds, and large insects for the proposed use on bananas. Single application rates would have to drop 0.15 lbs a.i./A to result in RQ values below the acute risk to endangered species LOC for all size birds feeding in any of the forage categories evaluated.

Chronic risks to birds were evaluated using a mallard duck NOAEL value of 200 mg/kg-feed, based on reproductive effects including reduction in the number of eggs laid, eggs set, viable embryos, viable 3- week embryos, hatchlings, 14-day old chick survivors and hatchling weight. Based on the mallard duck NOAEL of 200 mg/kg-feed, chronic LOCs are exceeded for birds that consume short grass, tall grass, and broadleaf plants/small insects for the proposed use on bananas. For the proposed use on peanuts, the chronic risk LOC is exceeded for birds that consume short grass and broadleaf plants/small insects. In order to reduce RQs below the LOC for chronic risk to birds, the application rate would have to be reduced to a single application below 0.825 lbs ai/A.

The estimates for chronic risks to birds were based on the NOAEL of 200 mg/kg-feed from a study on mallard ducks. A similar study using bobwhite quail showed that there were no effects associated with dodine exposure, even at the highest concentration of 300 mg/kg-feed. These data suggest that under chronic exposure conditions, mallard ducks are more sensitive than bobwhite quail, which contrasts with the acute toxicity data in which bobwhite quail were shown to be more sensitive. Chronic toxicity endpoints are largely a function of the exposure levels chosen for the experiment and, for dodine, the actual NOAEL may fall between 200 and 600 ppm (the lowest LOAEL). However, even if the chronic risk estimates had been based on the LOAEL, dietary-based RQ values would still exceed the chronic risk LOC for birds feeding on short grasses (RQ=2.0).

There is uncertainty regarding the exposure estimates for birds since no data are available on the foliar dissipation half-life of dodine and this assessment was based on the default assumption of 35 days. However, at the maximum application rate proposed for bananas, a foliar dissipation half-life on 1 day would still result in an ascendance of the chronic risk LOC for birds feeding on short grasses (RQ=1.6).

Acute risks to wild mammals were evaluated using a common laboratory (Norway) rat female-specific LD<sub>50</sub> value of 1056 mg/kg. Acute, acute restricted use for non-listed species and/or acute risk to listed species LOCs are exceeded for mammals that consume short grass, tall grass, broadleaf plants, and small insects across most weight classes for the proposed use of dodine on bananas. For the proposed use on peanuts, the acute risk to listed species LOC is exceeded for small and medium-sized mammals that consume short grass only.

Chronic risk to wild mammals was evaluated using a laboratory rat NOAEL value of 30 mg/kg/day and NOAEC of 400 mg/kg-feed, based on reduced body weight/growth in adults and/or offspring. Based on the dose-based laboratory NOAEL, chronic LOCs are exceeded for wild animals that consume short grass, tall grass, and broadleaf plants/small insects across all assessed weight classes for both proposed uses. For the banana use, the chronic risk LOC was also exceeded for mammals that consume fruits/pods/large insects for the smallest weight class only. Based on the dietary-based NOAEC of 400 mg/kg-feed, chronic risk LOCs are exceeded for wild mammals that consume short grass, tall grass, and broadleaf plants/small insects for the proposed use on bananas. In order for dietary-based RQ values to drop below the chronic risk LOC for mammals, the maximum proposed application rate would have to be limited to a single application per year.

Tier I plant studies demonstrate the potential for dodine to affect terrestrial dicotyledonous plants. An effect at the 25% level was noted for the highest application rate for cabbage. However, since the application rate tested in the Tier I study (2.6 lbs ai/A) is double the proposed maximum rate on bananas (1.3 lbs ai/A), risk to terrestrial plants resulting from applications of dodine on bananas and peanuts is expected to be low.

EFED currently does not estimate risk quotients for terrestrial non-target insects. However, an appropriate label statement is required to protect foraging honeybees when the LD<sub>50</sub> is < 11 µg/bee. Based on the acute contact toxicity study of honeybees, the LD<sub>50</sub> for dodine is >200 µg/bee. This classifies dodine as practically non-toxic to honeybees.

### 4.2.3. Review of Incident Data

No incidents involving dodine were identified in the EIIIS (Environmental Incident Information System) database for ecological incidents, based on a search conducted on December 27, 2007. It should be noted though that the absence of incident reports is not indicative of the absence of incidents.

### 4.2.4. Federally Threatened and Endangered (Listed) Species Concerns

The results of this screening-level risk assessment indicate that the proposed new uses of dodine on bananas and peanuts have the potential for direct adverse effects on listed and non-listed freshwater and estuarine/marine invertebrates, listed and non-listed vascular and non-vascular plants, and listed and non-listed birds and mammals.

Because of the potential risk from direct effects to the listed and non-listed taxa described above, listed species in all taxa may potentially be affected indirectly due to alteration of habitat (*e.g.*, food sources, shelter, and areas to reproduce) should exposure occur.

#### 4.2.4.1. Co-occurrence Analysis

The goal of the analysis for co-location is to determine whether sites of pesticide use are geographically associated with known locations of listed species [following the convention of the Services, the word ‘species’ in this assessment may actually apply to a ‘species’, ‘subspecies’, or an Evolutionary Significant Unit (ESU)]. At the screening level, this analysis is accomplished using the LOCATES (version 2.10.3) database. The database uses location information for listed species at the county level and compares it to agricultural census data (from 2002) for crop production at the same county level of resolution. The product is a listing of federally-listed species that are located within counties known to produce the crops upon which the pesticide will be used, in this case bananas and peanuts. For direct effects, only listed terrestrial plants, aquatic vascular and non-vascular plants, freshwater and estuarine/marine invertebrates, estuarine/marine fish, birds and mammals are considered, because they were the only taxa to have RQs above the listed species LOC. However, all other taxa are considered for indirect effects, given that there is a potential for indirect effects to taxa that might rely on plants and/or mammals for some stage of their life-cycle.

LOCATES identified a total of 18 states that have listed species associated with bananas and peanuts on which dodine is proposed for use. Hawaii has the highest number of listed species (345) that may co-occur with the proposed dodine use areas. California is second highest with 110 total species, followed by Florida (88). A tabulation of the number of listed species in each state associated with the proposed new uses of dodine is provided in **Table 4.9**. A summary of all listed species by state is provided in **Appendix D**.

**Table 4.9. Tabulation by State and Taxonomic Group of Listed Species that Occur in Potential Dodine Use Areas for Bananas and Peanuts**

State	Amphibians	Arachnid	Birds	Bivalve	Conifer/cycads	Crustacean	Dicot	Ferns & allies	Fish	Gastropod	Insect	Lichen	Mammal	Marine	Monocot	Reptiles	Total
Alabama	2	--	3	16	--	--	7	1	4	1	--	--	4	2	2	8	50
Arizona	2	--	5	--	--	--	2	--	10	--	--	--	5	--	1	1	26
Arkansas	--	--	1	4	--	--	1	--	1	--	--	--	--	--	--	--	7
California	4	--	11	--	--	5	54	--	8	--	3	--	9	4	4	8	110
Florida	1	--	8	7	1	1	40	--	4	--	1	1	7	5	2	10	88
Georgia	1	--	4	15	1	--	8	1	6	--	--	--	3	4	3	6	52
Hawaii	--	1	32	--	--	1	233	12	--	39	1	--	1	1	22	2	345
Louisiana	--	--	1	1	--	--	--	--	1	--	--	--	--	2	--	5	10
Mississippi	1	--	5	1	--	--	1	1	3	--	--	--	2	2	--	9	25
Missouri	--	--	--	--	--	--	2	--	2	--	--	--	1	--	--	--	4
New Mexico	--	--	2	--	--	--	--	--	--	--	--	--	1	--	--	--	3
North Carolina	--	--	2	4	--	--	12	--	3	--	1	--	2	5	2	5	35
Oklahoma	--	--	5	--	--	--	--	--	3	--	1	--	3	--	--	--	12
Puerto Rico	3	--	9	--	--	--	34	8	--	--	--	--	--	1	5	7	67
South Carolina	1	--	4	1	--	--	11	--	1	--	--	--	1	4	3	6	32
Tennessee	--	--	--	--	--	--	--	--	2	--	--	--	2	--	--	--	4
Texas	4	10	11	--	--	1	13	--	3	--	9	--	4	2	2	6	65
Virginia	--	--	2	1	--	1	6	--	1	--	1	--	2	3	--	5	22

This preliminary analysis indicates that there is a potential for dodine use on bananas and peanuts to overlap with listed species (and their designated critical habitat, if applicable) and that a more refined assessment is warranted. The more refined assessment should involve clear delineation of the action area associated with dodine uses and best available information on the temporal and spatial co-location of listed species with respect to the action area. This analysis has not been conducted for this assessment.

## 5. Literature Cited

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## Appendix A. Modeling Input and Output

stored as PRcoffee.out

Chemical: dodine

PRZM environment: PRcoffeeSTD.txt modified Thuday, 23 February 2006 at 09:50:14

EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 15:33:30

Metfile: w11641.dvf modified Wedday, 3 July 2002 at 08:06:16

Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	2.835	0.4141	0.2493	0.1639	0.1303	0.07816
1962	2.897	0.5947	0.3463	0.2436	0.2107	0.1627
1963	4.53	0.911	0.446	0.3791	0.3436	0.2882
1964	3.555	0.7889	0.5228	0.435	0.4224	0.3709
1965	3.193	1.443	0.8673	0.6627	0.6207	0.5267
1966	10.37	1.918	0.899	0.7859	0.7636	0.6757
1967	3.525	1.311	0.9483	0.8347	0.7938	0.7281
1968	3.52	1.113	0.9495	0.8598	0.8222	0.773
1969	10.2	2.985	1.361	1.075	1.023	0.9201
1970	7.426	1.869	1.241	1.134	1.098	1.022
1971	3.826	1.497	1.27	1.171	1.133	1.071
1972	3.853	1.446	1.281	1.218	1.178	1.1
1973	16.23	3.181	1.647	1.417	1.374	1.259
1974	4.036	1.629	1.472	1.379	1.34	1.271
1975	4.047	1.639	1.474	1.385	1.347	1.288
1976	6.798	2.048	1.496	1.407	1.408	1.338
1977	5.121	1.896	1.544	1.462	1.423	1.374
1978	5.592	2.337	1.624	1.566	1.545	1.47
1979	5.692	2.195	1.692	1.593	1.575	1.531
1980	4.309	1.901	1.736	1.647	1.614	1.553
1981	6.747	2.582	1.886	1.725	1.694	1.616
1982	6.908	2.677	1.873	1.754	1.726	1.677
1983	12.12	3.769	2.174	1.94	1.895	1.794
1984	4.569	2.162	1.998	1.909	1.869	1.816
1985	4.686	2.387	2.031	1.934	1.894	1.837
1986	5.855	2.92	2.198	2.045	2.008	1.928
1987	10.61	4.116	2.438	2.288	2.243	2.105
1988	15.44	3.937	2.518	2.337	2.287	2.187
1989	8.014	3.538	2.623	2.398	2.343	2.238
1990	4.987	2.578	2.414	2.331	2.291	2.215

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129			16.23	4.116	2.623	2.398
0.0645161290322581			15.44	3.937	2.518	2.337
0.0967741935483871			12.12	3.769	2.438	2.331
0.129032258064516			10.61	3.538	2.414	2.288
0.161290322580645			10.37	3.181	2.198	2.045
0.193548387096774			10.2	2.985	2.174	1.94
0.2258064516129032			8.014	2.92	2.031	1.934
0.258064516129032			7.426	2.677	1.998	1.909
0.290322580645161			6.908	2.582	1.886	1.754
0.32258064516129	6.798		2.578	1.873	1.725	1.694
0.354838709677419			6.747	2.387	1.736	1.647
0.387096774193548			5.855	2.337	1.692	1.593
0.419354838709677			5.692	2.195	1.647	1.566
0.451612903225806			5.592	2.162	1.624	1.462
0.483870967741936			5.121	2.048	1.544	1.417
0.516129032258065			4.987	1.918	1.496	1.407
0.548387096774194			4.686	1.901	1.474	1.385
0.580645161290323			4.569	1.896	1.472	1.379
						1.34
						1.259

0.612903225806452	4.53	1.869	1.361	1.218	1.178	1.1
0.645161290322581	4.309	1.639	1.281	1.171	1.133	1.071
0.67741935483871 4.047	1.629	1.27	1.134	1.098	1.022	
0.709677419354839	4.036	1.497	1.241	1.075	1.023	0.9201
0.741935483870968	3.853	1.446	0.9495	0.8598	0.8222	0.773
0.774193548387097	3.826	1.443	0.9483	0.8347	0.7938	0.7281
0.806451612903226	3.555	1.311	0.899	0.7859	0.7636	0.6757
0.838709677419355	3.525	1.113	0.8673	0.6627	0.6207	0.5267
0.870967741935484	3.52	0.911	0.5228	0.435	0.4224	0.3709
0.903225806451613	3.193	0.7889	0.446	0.3791	0.3436	0.2882
0.935483870967742	2.897	0.5947	0.3463	0.2436	0.2107	0.1627
0.967741935483871	2.835	0.4141	0.2493	0.1639	0.1303	0.07816

0.1 11.969 3.7459 2.4356 2.3267 2.2826 2.1788  
Average of yearly averages: 1.27378533333333

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:

Output File: PRcoffee

Metfile: w11641.dvf

PRZM scenario: PRcoffeeSTD.txt

EXAMS environment file: pond298.exv

Chemical Name: dodine

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	287.1	g/mol	
Henry's Law Const.	henry	9e-11	atm-m <sup>3</sup> /mol	
Vapor Pressure	vapr	1.5e-7	torr	
Solubility	sol	6300	mg/L	
Kd	Kd	10427	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	770	days	Half-life
Aerobic Aquatic Metabolism	kbacw	221	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	7476	days	Halfife
Aerobic Soil Metabolism	asm	27.3	days	Halfife
Hydrolysis:	pH 7	914	days	Half-life
Method:	CAM 2	integer		See PRZM manual
Incorporation Depth:	DEPI		cm	
Application Rate:	TAPP	1.46	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05		fraction of application rate applied to pond
Application Date	Date	1-2		dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1 interval	7	days		Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Interval 2 interval	7	days		Set to 0 or delete line for single app.
app. rate 2	apprate		kg/ha	
Interval 3 interval	7	days		Set to 0 or delete line for single app.
app. rate 3	apprate		kg/ha	
Interval 4 interval	7	days		Set to 0 or delete line for single app.
app. rate 4	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	3		
	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)

stored as NCpeanut.out

Chemical: dodine

PRZM environment: NCpeanutSTD.txt modified Tuesday, 29 May 2007 at 11:58:46

EXAMS environment: pond298.exv modified Thursday, 29 August 2002 at 15:33:30

Metfile: w13722.dvf modified Wednesday, 3 July 2002 at 08:05:50

Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	1.425	0.2558	0.1228	0.06092	0.05001	0.02026
1962	2.593	0.4116	0.2248	0.1557	0.1325	0.07141
1963	1.467	0.2793	0.1948	0.1381	0.1263	0.1018
1964	1.491	0.3036	0.2372	0.1708	0.1585	0.1267
1965	2.604	0.7189	0.4241	0.302	0.2712	0.1911
1966	3.126	0.7698	0.3953	0.2991	0.2833	0.2382
1967	5.512	1.108	0.5252	0.3852	0.36	0.2927
1968	1.841	0.5317	0.4177	0.378	0.3632	0.328
1969	1.74	0.5489	0.4728	0.4026	0.3894	0.3543
1970	2.414	0.6497	0.464	0.4279	0.4145	0.3797
1971	1.865	0.598	0.5005	0.4563	0.442	0.4062
1972	3.19	0.8712	0.6043	0.5238	0.5025	0.4477
1973	4.337	1.388	0.8153	0.6381	0.6053	0.5192
1974	1.913	0.7481	0.6448	0.5839	0.5744	0.5487
1975	2.525	1.177	0.7075	0.6414	0.6235	0.5777
1976	1.96	0.7721	0.6882	0.626	0.6141	0.5928
1977	1.964	0.7767	0.6927	0.6315	0.6206	0.5986
1978	2.782	1.08	0.7504	0.6875	0.668	0.6225
1979	2.003	0.8718	0.7418	0.6815	0.6677	0.6395
1980	8.955	1.778	0.9116	0.7735	0.7472	0.6814
1981	2.064	1.029	0.8451	0.7703	0.7547	0.7139
1982	3.653	1.118	0.9083	0.8157	0.7937	0.7441
1983	2.122	0.9597	0.8585	0.7908	0.7776	0.7531
1984	2.177	1.078	0.8577	0.8315	0.814	0.7719
1985	2.154	1.081	0.9028	0.8463	0.8306	0.7932
1986	2.165	0.9924	0.8938	0.8407	0.8352	0.8057
1987	2.184	1.117	0.9297	0.8557	0.8432	0.8151
1988	2.185	0.998	0.9182	0.8537	0.8416	0.8183
1989	3.769	1.211	0.9801	0.8907	0.8745	0.8335
1990	2.204	1.017	0.933	0.8709	0.8585	0.8364

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			8.955	1.778	0.9801	0.8907	0.8745	0.8364
0.0645161290322581			5.512	1.388	0.933	0.8709	0.8585	0.8335
0.0967741935483871			4.337	1.211	0.9297	0.8557	0.8432	0.8183
0.129032258064516			3.769	1.177	0.9182	0.8537	0.8416	0.8151
0.161290322580645			3.653	1.118	0.9116	0.8463	0.8352	0.8057
0.193548387096774			3.19	1.117	0.9083	0.8407	0.8306	0.7932
0.225806451612903			3.126	1.108	0.9028	0.8315	0.814	0.7719
0.258064516129032			2.782	1.081	0.8938	0.8157	0.7937	0.7531
0.290322580645161			2.604	1.08	0.8585	0.7908	0.7776	0.7441
0.32258064516129	2.593		1.078	0.8577	0.7735	0.7547	0.7139	
0.354838709677419			2.525	1.029	0.8451	0.7703	0.7472	0.6814
0.387096774193548			2.414	1.017	0.8153	0.6875	0.668	0.6395
0.419354838709677			2.204	0.998	0.7504	0.6815	0.6677	0.6225
0.451612903225806			2.185	0.9924	0.7418	0.6414	0.6235	0.5986
0.483870967741936			2.184	0.9597	0.7075	0.6381	0.6206	0.5928
0.516129032258065			2.177	0.8718	0.6927	0.6315	0.6141	0.5777
0.548387096774194			2.165	0.8712	0.6882	0.626	0.6053	0.5487
0.580645161290323			2.154	0.7767	0.6448	0.5839	0.5744	0.5192
0.612903225806452			2.122	0.7721	0.6043	0.5238	0.5025	0.4477
0.645161290322581			2.064	0.7698	0.5252	0.4563	0.442	0.4062



0.67741935483871	2.003	0.7481	0.5005	0.4279	0.4145	0.3797	
0.709677419354839		1.964	0.7189	0.4728	0.4026	0.3894	0.3543
0.741935483870968		1.96	0.6497	0.464	0.3852	0.3632	0.328
0.774193548387097		1.913	0.598	0.4241	0.378	0.36	0.2927
0.806451612903226		1.865	0.5489	0.4177	0.302	0.2833	0.2382
0.838709677419355		1.841	0.5317	0.3953	0.2991	0.2712	0.1911
0.870967741935484		1.74	0.4116	0.2372	0.1708	0.1585	0.1267
0.903225806451613		1.491	0.3036	0.2248	0.1557	0.1325	0.1018
0.935483870967742		1.467	0.2793	0.1948	0.1381	0.1263	0.07141
0.967741935483871		1.425	0.2558	0.1228	0.06092	0.05001	0.02026

0.1      4.2802   1.2076   0.92855   0.8555   0.84304   0.81798  
Average of yearly averages: 0.520789

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:

Output File: NCpeanut

Metfile: w13722.dvf

PRZM scenario: NCpeanutSTD.txt

EXAMS environment file: pond298.exv

Chemical Name: dodine

Description	Variable	Name	Value	Units	Comments
Molecular weight	mwt	287.1	g/mol		
Henry's Law Const.	henry	9e-11	atm-m <sup>3</sup> /mol		
Vapor Pressure	vapr	1.5e-7	torr		
Solubility	sol	6300	mg/L		
Kd	Kd	10427	mg/L		
Koc	Koc		mg/L		
Photolysis half-life	kdp	770	days	Half-life	
Aerobic Aquatic Metabolism	kbacw	221	days	Halfife	
Anaerobic Aquatic Metabolism		kbacs	7476	days	Halfife
Aerobic Soil Metabolism	asm	27.3	days	Halfife	
Hydrolysis:	pH 7	914	days	Half-life	
Method: CAM	2	integer	See PRZM manual		
Incorporation Depth:	DEPI		cm		
Application Rate:	TAPP	0.72	kg/ha		
Application Efficiency:	APPEFF	0.95	fraction		
Spray Drift	DRFT	0.05	fraction of application rate applied to pond		
Application Date	Date	5-6	dd/mm or dd/mmm or dd-mm or dd-mmm		
Interval 1 interval	10	days	Set to 0 or delete line for single app.		
app. rate 1	apprate		kg/ha		
Interval 2 interval	10	days	Set to 0 or delete line for single app.		
app. rate 2	apprate		kg/ha		
Record 17:	FILTRA				
	IPSCND	2			
	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 B. Example Output of T-REX for Dodine Use on Bananas**

**Summary of Risk Quotient Calculations Based on Upper Bound Kenaga EECs – Dodine Use on Bananas**

<b>Table B-1. Upper Bound Kenaga, Acute Avian Dose-Based Risk Quotients</b>									
<b>Size Class (grams)</b>	<b>Adjusted LD50</b>	<b>EECs and RQs</b>							
		<b>Short Grass</b>		<b>Tall Grass</b>		<b>Broadleaf Plants/ Small Insects</b>		<b>Fruits/Pods/ Seeds/ Large Insects</b>	
		<b>EEC</b>	<b>RQ</b>	<b>EEC</b>	<b>RQ</b>	<b>EEC</b>	<b>RQ</b>	<b>EEC</b>	<b>RQ</b>
20	497.10	1372.49	2.76	629.06	1.27	772.03	1.55	85.78	0.17
100	632.83	782.65	1.24	358.72	0.57	440.24	0.70	48.92	0.08
1000	893.89	350.40	0.39	160.60	0.18	197.10	0.22	21.90	0.02

<b>Table B-2. Upper Bound Kenaga, Subacute Avian Dietary Based Risk Quotients</b>									
<b>LC50</b>	<b>EECs and RQs</b>								
	<b>Short Grass</b>		<b>Tall Grass</b>		<b>Broadleaf Plants/ Small Insects</b>		<b>Fruits/Pods/ Seeds/ Large Insects</b>		
	<b>EEC</b>	<b>RQ</b>	<b>EEC</b>	<b>RQ</b>	<b>EEC</b>	<b>RQ</b>	<b>EEC</b>	<b>RQ</b>	
8413	1205.10	0.14	552.34	0.07	677.87	0.08	75.32	0.01	

Size class not used for dietary risk quotients

<b>Table B-3. Upper Bound Kenaga, Chronic Avian Dietary Based Risk Quotients</b>									
<b>NOAEC (ppm)</b>	<b>EECs and RQs</b>								
	<b>Short Grass</b>		<b>Tall Grass</b>		<b>Broadleaf Plants/ Small Insects</b>		<b>Fruits/Pods/ Seeds/ Large Insects</b>		
	<b>EEC</b>	<b>RQ</b>	<b>EEC</b>	<b>RQ</b>	<b>EEC</b>	<b>RQ</b>	<b>EEC</b>	<b>RQ</b>	
200	1205.10	6.03	552.34	2.76	677.87	3.39	75.32	0.38	

Size class not used for dietary risk quotients

<b>Table B-4. Upper Bound Kenaga, Acute Mammalian Dose-Based Risk Quotients</b>									
<b>Size</b>	<b>Adjusted</b>	<b>EECs and RQs</b>							

Class (grams)	LD50	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	2320.91	1148.97	0.50	526.61	0.23	646.30	0.28	71.81	0.03	15.96	0.01
35	1877.86	794.09	0.42	363.96	0.19	446.68	0.24	49.63	0.03	11.03	0.01
1000	812.23	184.11	0.23	84.39	0.10	103.56	0.13	11.51	0.01	2.56	0.00

Table B-5. Upper Bound Kenaga, Acute Mammalian Dietary Based Risk Quotients									
LC50 (ppm)	EECs and RQs								
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	
No data	1205.10	--	552.34	--	677.87	--	75.32	--	

Size class not used for dietary risk quotients

Table B-6. Upper Bound Kenaga, Chronic Mammalian Dietary Based Risk Quotients									
NOAEC (ppm)	EECs and RQs								
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	
400	1205.10	3.01	552.34	1.38	677.87	1.69	75.32	0.19	

Size class not used for dietary risk quotients

Table B-7. Upper Bound Kenaga, Chronic Mammalian Dose-Based Risk Quotients											
Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	66.55	1148.97	17.26	526.61	7.91	646.30	9.71	71.81	1.08	15.96	0.24
35	53.85	794.09	14.75	363.96	6.76	446.68	8.30	49.63	0.92	11.03	0.20
1000	23.29	184.11	7.91	84.39	3.62	103.56	4.45	11.51	0.49	2.56	0.11

**Appendix C. Example Output of TerrPlant for Aerial Application of Dodine on Bananas**

<b>Table 1. Chemical Identity.</b>	
<b>Chemical Name</b>	Dodine
<b>PC code</b>	x
<b>Use</b>	Banana
<b>Application Method</b>	aerial
<b>Application Form</b>	liquid
<b>Solubility in Water (ppm)</b>	630

<b>Table 2. Input parameters used to derive EECs.</b>			
<b>Input Parameter</b>	<b>Symbol</b>	<b>Value</b>	<b>Units</b>
Application Rate	A	1.3	lbs ai/A
Incorporation	I	1	none
Runoff Fraction	R	0.05	none
Drift Fraction	D	0.05	none

<b>Table 3. EECs for Dodine. Units in lbs ai/A.</b>		
<b>Description</b>	<b>Equation</b>	<b>EEC</b>
Runoff to dry areas	$(A/I)*R$	0.065
Runoff to semi-aquatic areas	$(A/I)*R*10$	0.65
<b>Spray drift</b>	<b><math>A*D</math></b>	<b>0.065</b>
<b>Total for dry areas</b>	<b><math>((A/I)*R)+(A*D)</math></b>	<b>0.13</b>
<b>Total for semi-aquatic areas</b>	<b><math>((A/I)*R*10)+(A*D)</math></b>	<b>0.715</b>

<b>Table 4. Plant survival and growth data used for RQ derivation. Units are in lbs ai/A.</b>				
<b>Plant type</b>	<b>Seedling Emergence</b>		<b>Vegetative Vigor</b>	
	<b>EC25</b>	<b>NOAEC</b>	<b>EC25</b>	<b>NOAEC</b>
Monocot	x	x	x	x
Dicot	x	x	x	x

<b>Table 5. RQ values for plants in dry and semi-aquatic areas exposed to Dodine through runoff and/or spray drift.*</b>				
<b>Plant Type</b>	<b>Listed Status</b>	<b>Dry</b>	<b>Semi-Aquatic</b>	<b>Spray Drift</b>
Monocot	non-listed	#VALUE!	#VALUE!	#DIV/0!
Monocot	listed	#VALUE!	#VALUE!	#DIV/0!
Dicot	non-listed	#VALUE!	#VALUE!	#DIV/0!
Dicot	listed	#VALUE!	#VALUE!	#DIV/0!

\*If RQ > 1.0, the LOC is exceeded, resulting in potential for risk to that plant group.

**Appendix D. LOCATES Output of Listed Species by State**

*Species Listing by State with Use Criteria*

No species were excluded  
Minimum of 1 Acre.

All Medium Types Reported

*Mammal, Marine mml, Bird, Amphibian, Reptile, Fish, Crustacean, Bivalve, Gastropod, Arachnid, Insect, Dicot, Monocot, Ferns, Conf/cycds, Coral, Lichen*  
bananas, bananas (PR), peanuts for nuts

<b>Alabama</b>	( 50) species:		<b>Taxa</b>	<b>Critical Habitat</b>
Salamander, Flatwoods ( <i>Ambystoma cingulatum</i> )		Threatened	Amphibian Freshwater, Vernal pool, Terrestrial	No
Salamander, Red Hills ( <i>Phaeognathus hubrichti</i> )		Threatened	Amphibian Freshwater, Terrestrial	No
Plover, Piping ( <i>Charadrius melodus</i> )		Endangered	Bird Terrestrial	Yes
Stork, Wood ( <i>Mycteria americana</i> )		Endangered	Bird Terrestrial	No
Woodpecker, Red-cockaded ( <i>Picoides borealis</i> )		Endangered	Bird Terrestrial	No
Combshell, Upland ( <i>Epioblasma metastrata</i> )		Endangered	Bivalve Freshwater	Yes
Kidneyshell, Triangular ( <i>Ptychobranthus greenii</i> )		Endangered	Bivalve Freshwater	Yes
Mucket, Orangenacre ( <i>Lampsilis perovalis</i> )		Threatened	Bivalve Freshwater	Yes
Mucket, Pink (Pearlymussel) ( <i>Lampsilis abrupta</i> )		Endangered	Bivalve Freshwater	No
Mussel, Acornshell Southern ( <i>Epioblasma othcaloogensis</i> )		Endangered	Bivalve Freshwater	Yes
Mussel, Alabama Moccasinshell ( <i>Medionidus acutissimus</i> )		Threatened	Bivalve Freshwater	Yes
Mussel, Dark Pigtoe ( <i>Pleurobema furvum</i> )		Endangered	Bivalve Freshwater	Yes
Mussel, Fine-lined Pocketbook ( <i>Lampsilis altilis</i> )		Threatened	Bivalve Freshwater	Yes
Mussel, Heavy Pigtoe (=Judge Tait's Mussel) ( <i>Pleurobema taitianum</i> )		Endangered	Bivalve Freshwater	No
Mussel, Heelsplitter Inflated ( <i>Potamilus inflatus</i> )		Threatened	Bivalve Freshwater	No
Mussel, Ovate Clubshell ( <i>Pleurobema perovatum</i> )		Endangered	Bivalve Freshwater	Yes
Mussel, Rough Pigtoe ( <i>Pleurobema plenum</i> )		Endangered	Bivalve Freshwater	No

**Alabama** ( 50) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Mussel, Shiny-rayed Pocketbook ( <i>Lampsilis subangulata</i> )	Endangered	Bivalve Freshwater	No
Mussel, Southern Clubshell ( <i>Pleurobema decisum</i> )	Endangered	Bivalve Freshwater	Yes
Mussel, Southern Pigtoe ( <i>Pleurobema georgianum</i> )	Endangered	Bivalve Freshwater	Yes
Stirrupshell ( <i>Quadrula stapes</i> )	Endangered	Bivalve Freshwater	No
Bladderpod, Lyrate ( <i>Lesquerella lyrata</i> )	Threatened	Dicot Terrestrial	No
Clover, Leafy Prairie ( <i>Dalea foliosa</i> )	Endangered	Dicot Terrestrial	No
Harperella ( <i>Ptilimnium nodosum</i> )	Endangered	Dicot Freshwater	No
Leather-flower, Alabama ( <i>Clematis socialis</i> )	Endangered	Dicot Terrestrial	No
Pitcher-plant, Alabama Canebrake ( <i>Sarracenia rubra alabamensis</i> )	Endangered	Dicot Freshwater, Terrestrial	No
Pitcher-plant, Green ( <i>Sarracenia oreophila</i> )	Endangered	Dicot Terrestrial, Freshwater	No
Potato-bean, Price's ( <i>Apios priceana</i> )	Threatened	Dicot Terrestrial	No
Quillwort, Louisiana ( <i>Isoetes louisianensis</i> )	Endangered	Ferns Freshwater, Terrestrial	No
Shiner, Blue ( <i>Cyprinella caerulea</i> )	Threatened	Fish Freshwater	No
Shiner, Cahaba ( <i>Notropis cahabae</i> )	Endangered	Fish Freshwater	No
Sturgeon, Alabama ( <i>Scaphirhynchus suttkusi</i> )	Endangered	Fish Freshwater	No
Sturgeon, Gulf ( <i>Acipenser oxyrinchus desotoi</i> )	Threatened	Fish Saltwater, Freshwater	Yes
Snail, Tulotoma ( <i>Tulotoma magnifica</i> )	Endangered	Gastropod Terrestrial	No
Bat, Gray ( <i>Myotis grisescens</i> )	Endangered	Mammal Subterranean, Terrestrial	No
Bat, Indiana ( <i>Myotis sodalis</i> )	Endangered	Mammal Subterranean, Terrestrial	Yes
Mouse, Alabama Beach ( <i>Peromyscus polionotus ammobates</i> )	Endangered	Mammal Terrestrial, Coastal (neritic)	Yes
Mouse, Perdido Key Beach ( <i>Peromyscus polionotus trissyllepsis</i> )	Endangered	Mammal Coastal (neritic)	Yes

**Alabama**

( 50) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Whale, Finback ( <i>Balaenoptera physalus</i> )	Endangered	Marine mml Saltwater	No
Whale, Humpback ( <i>Megaptera novaeangliae</i> )	Endangered	Marine mml Saltwater	No
Trillium, Relict ( <i>Trillium reliquum</i> )	Endangered	Monocot Terrestrial	No
Water-plantain, Kral's ( <i>Sagittaria secundifolia</i> )	Threatened	Monocot Freshwater	No
Sea turtle, hawksbill ( <i>Eretmochelys imbricata</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, Kemp's ridley ( <i>Lepidochelys kempii</i> )	Endangered	Reptile Saltwater	No
Sea turtle, leatherback ( <i>Dermochelys coriacea</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, loggerhead ( <i>Caretta caretta</i> )	Threatened	Reptile Saltwater	No
Snake, Eastern Indigo ( <i>Drymarchon corais couperi</i> )	Threatened	Reptile Terrestrial	No
Tortoise, Gopher ( <i>Gopherus polyphemus</i> )	Threatened	Reptile Terrestrial	No
Turtle, Alabama Red-bellied ( <i>Pseudemys alabamensis</i> )	Endangered	Reptile Terrestrial, Freshwater	No
Turtle, Flattened Musk ( <i>Sternotherus depressus</i> )	Threatened	Reptile Freshwater, Terrestrial	No

**Arizona**

( 26) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Frog, Chiricahua Leopard ( <i>Rana chiricahuensis</i> )	Threatened	Amphibian Freshwater, Terrestrial	No
Salamander, Sonora Tiger ( <i>Ambystoma tigrinum stebbinsi</i> )	Endangered	Amphibian Vernal pool, Freshwater, Terrestrial	No
Falcon, Northern Aplomado ( <i>Falco femoralis septentrionalis</i> )	Endangered	Bird Terrestrial	No
Flycatcher, Southwestern Willow ( <i>Empidonax traillii extimus</i> )	Endangered	Bird Terrestrial	Yes
Owl, Mexican Spotted ( <i>Strix occidentalis lucida</i> )	Threatened	Bird Terrestrial	Yes
Pygmy-owl, Cactus Ferruginous ( <i>Glaucidium brasilianum cactorum</i> )	Endangered	Bird Terrestrial	No
Rail, Yuma Clapper ( <i>Rallus longirostris yumanensis</i> )	Endangered	Bird Terrestrial	No
Cactus, Cochise Pincushion ( <i>Coryphantha robbinsorum</i> )	Threatened	Dicot Terrestrial	No
Umbel, Huachuca Water ( <i>Lilaeopsis schaffneriana var. recurva</i> )	Endangered	Dicot Terrestrial, Freshwater	Yes

**Arizona**

( 26) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Catfish, Yaqui ( <i>Ictalurus pricei</i> )	Threatened	Freshwater Fish	Yes
Chub, Bonytail ( <i>Gila elegans</i> )	Endangered	Freshwater Fish	Yes
Chub, Gila ( <i>Gila intermedia</i> )	Endangered	Freshwater Fish	Yes
Chub, Yaqui ( <i>Gila purpurea</i> )	Endangered	Freshwater Fish	Yes
Minnow, Loach ( <i>Tiaroga cobitis</i> )	Threatened	Freshwater Fish	Yes
Pupfish, Desert ( <i>Cyprinodon macularius</i> )	Endangered	Freshwater Fish	Yes
Shiner, Beautiful ( <i>Cyprinella formosa</i> )	Threatened	Freshwater Fish	Yes
Spikedace ( <i>Meda fulgida</i> )	Threatened	Freshwater Fish	Yes
Sucker, Razorback ( <i>Xyrauchen texanus</i> )	Endangered	Freshwater Fish	Yes
Topminnow, Gila (Yaqui) ( <i>Poeciliopsis occidentalis</i> )	Endangered	Freshwater Fish	No
Bat, Lesser (=Sanborn's) Long-nosed ( <i>Leptonycteris curasoae yerbabuena</i> )	Endangered	Subterranean, Terrestrial Mammal	No
Jaguar ( <i>Panthera onca</i> )	Endangered	Terrestrial Mammal	No
Jaguarundi, Sinaloa ( <i>Herpailurus (=Felis) yagouaroundi tolteca</i> )	Endangered	Terrestrial Mammal	No
Ocelot ( <i>Leopardus (=Felis) pardalis</i> )	Endangered	Terrestrial Mammal	No
Wolf, Gray ( <i>Canis lupus</i> )	Endangered	Terrestrial Mammal	Yes
Ladies'-tresses, Canelo Hills ( <i>Spiranthes delitescens</i> )	Endangered	Terrestrial Monocot	No
Rattlesnake, New Mexican Ridge-nosed ( <i>Crotalus willardi obscurus</i> )	Threatened	Terrestrial Reptile	Yes

**Arkansas**

( 7) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Tern, Interior (population) Least ( <i>Sterna antillarum</i> )	Endangered	Terrestrial Bird	No
Mucket, Pink (Pearlymussel) ( <i>Lampsilis abrupta</i> )	Endangered	Freshwater Bivalve	No
Mussel, Scaleshell ( <i>Leptodea leptodon</i> )	Endangered	Freshwater Bivalve	No
Pearlymussel, Fat Pocketbook ( <i>Potamilus capax</i> )	Endangered	Freshwater Bivalve	No



**Arkansas** ( 7) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Rock-pocketbook, Ouachita (=Wheeler's pm) ( <i>Arkansia wheeleri</i> )	Endangered	Bivalve Freshwater	No
Pondberry ( <i>Lindera melissifolia</i> )	Endangered	Dicot Terrestrial	No
Sturgeon, Pallid ( <i>Scaphirhynchus albus</i> )	Endangered	Fish Freshwater	No

**California** ( 110) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Frog, California Red-legged ( <i>Rana aurora draytonii</i> )	Threatened	Amphibian Terrestrial, Freshwater	Yes
Frog, Mountain Yellow-legged ( <i>Gopherus agassizii</i> )	Endangered	Amphibian Terrestrial, Freshwater	No
Salamander, California Tiger ( <i>Ambystoma californiense</i> )	Endangered	Amphibian Terrestrial, Vernal pool	No
Toad, Arroyo Southwestern ( <i>Bufo californicus (=microscaphus)</i> )	Endangered	Amphibian Freshwater, Terrestrial	Yes
Condor, California ( <i>Gymnogyps californianus</i> )	Endangered	Bird Terrestrial	Yes
Flycatcher, Southwestern Willow ( <i>Empidonax traillii extimus</i> )	Endangered	Bird Terrestrial	Yes
Gnatcatcher, Coastal California ( <i>Polioptila californica californica</i> )	Threatened	Bird Terrestrial	Yes
Murrelet, Marbled ( <i>Brachyramphus marmoratus marmoratus</i> )	Threatened	Bird Freshwater, Terrestrial, Saltwater	Yes
Pelican, Brown ( <i>Pelecanus occidentalis</i> )	Endangered	Bird Terrestrial	No
Plover, Western Snowy ( <i>Charadrius alexandrinus nivosus</i> )	Threatened	Bird Terrestrial	Yes
Rail, Light-footed Clapper ( <i>Rallus longirostris levipes</i> )	Endangered	Bird Terrestrial	No
Shrike, San Clemente Loggerhead ( <i>Lanius ludovicianus mearnsi</i> )	Endangered	Bird Terrestrial	No
Sparrow, San Clemente Sage ( <i>Amphispiza belli clementeae</i> )	Threatened	Bird Terrestrial	No
Tern, California Least ( <i>Sterna antillarum browni</i> )	Endangered	Bird Terrestrial	No
Vireo, Least Bell's ( <i>Vireo bellii pusillus</i> )	Endangered	Bird Terrestrial	Yes
Abalone, White ( <i>Haliotis sorenseni</i> )	Endangered	Crustacean Saltwater	No
Fairy Shrimp, Conservancy Fairy ( <i>Branchinecta conservatio</i> )	Endangered	Crustacean Vernal pool	Yes
Fairy Shrimp, Riverside ( <i>Streptocephalus woottoni</i> )	Endangered	Crustacean Vernal pool	Yes

**California**

( 110) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Fairy Shrimp, Vernal Pool ( <i>Branchinecta lynchi</i> )	Threatened	Crustacean Vernal pool	Yes
Tadpole Shrimp, Vernal Pool ( <i>Lepidurus packardii</i> )	Endangered	Crustacean Vernal pool	Yes
Adobe Sunburst, San Joaquin ( <i>Pseudobahia peirsonii</i> )	Threatened	Dicot Terrestrial	No
Barberry, Island ( <i>Berberis pinnata ssp. insularis</i> )	Endangered	Dicot Terrestrial	No
Barberry, Nevin's ( <i>Berberis nevinii</i> )	Endangered	Dicot Terrestrial	No
Bedstraw, Island ( <i>Galium buxifolium</i> )	Endangered	Dicot Terrestrial	No
Bird's-beak, Palmate-bracted ( <i>Cordylanthus palmatus</i> )	Endangered	Dicot Terrestrial	No
Bird's-beak, salt marsh ( <i>Cordylanthus maritimus ssp. maritimus</i> )	Endangered	Dicot Saltwater	No
Broom, San Clemente Island ( <i>Lotus dendroideus ssp. traskiae</i> )	Endangered	Dicot Terrestrial	No
Bush-mallow, San Clemente Island ( <i>Malacothamnus clementinus</i> )	Endangered	Dicot Terrestrial	No
Bush-mallow, Santa Cruz Island ( <i>Malacothamnus fasciculatus var. nesioticus</i> )	Endangered	Dicot Terrestrial	No
Checker-mallow, Keck's ( <i>Sidalcea keckii</i> )	Endangered	Dicot Terrestrial	Yes
Clover, Fleshy Owl's ( <i>Castilleja campestris ssp. succulenta</i> )	Threatened	Dicot Vernal pool	Yes
Dudleya, Conejo ( <i>Dudleya abramsii ssp. parva</i> )	Threatened	Dicot Terrestrial	No
Dudleya, Marcescent ( <i>Dudleya cymosa ssp. marcescens</i> )	Threatened	Dicot Terrestrial	No
Dudleya, Santa Clara Valley ( <i>Dudleya setchellii</i> )	Endangered	Dicot Terrestrial	No
Dudleya, Santa Cruz Island ( <i>Dudleya nesiotica</i> )	Threatened	Dicot Terrestrial	No
Dudleya, Santa Monica Mountains ( <i>Dudleya cymosa ssp. ovatifolia</i> )	Threatened	Dicot Terrestrial	No
Dudleya, Verity's ( <i>Dudleya verityi</i> )	Threatened	Dicot Terrestrial	No
Fringepod, Santa Cruz Island ( <i>Thysanocarpus conchuliferus</i> )	Endangered	Dicot Terrestrial	No
Gilia, Hoffmann's Slender-flowered ( <i>Gilia tenuiflora ssp. hoffmannii</i> )	Endangered	Dicot Terrestrial	No

<b>California</b>	( 110) species:		<u>Taxa</u>	<u>Critical Habitat</u>
Golden Sunburst, Hartweg's ( <i>Pseudobahia bahiifolia</i> )	Endangered		Dicot Terrestrial	No
Goldfields, Contra Costa ( <i>Lasthenia conjugens</i> )	Endangered		Dicot Terrestrial	Yes
Grass, Hairy Orcutt ( <i>Orcuttia pilosa</i> )	Endangered		Dicot Vernal pool	Yes
Jewelflower, California ( <i>Caulanthus californicus</i> )	Endangered		Dicot Terrestrial	No
Larkspur, San Clemente Island ( <i>Delphinium variegatum ssp. kinkiense</i> )	Endangered		Dicot Terrestrial	No
Layia, Beach ( <i>Layia carnososa</i> )	Endangered		Dicot Terrestrial, Coastal (neritic)	No
Liveforever, Santa Barbara Island ( <i>Dudleya traskiae</i> )	Endangered		Dicot Terrestrial	No
Malacothrix, Island ( <i>Malacothrix squalida</i> )	Endangered		Dicot Terrestrial	No
Malacothrix, Santa Cruz Island ( <i>Malacothrix indecora</i> )	Endangered		Dicot Terrestrial	No
Manzanita, Santa Rosa Island ( <i>Arctostaphylos confertiflora</i> )	Endangered		Dicot Terrestrial	No
Milk-vetch, Braunton's ( <i>Astragalus brauntonii</i> )	Endangered		Dicot Terrestrial	No
Milk-vetch, Ventura Marsh ( <i>Astragalus pycnostachyus var. lanosissimus</i> )	Endangered		Dicot Terrestrial, Freshwater	Yes
Mountain-mahogany, Catalina Island ( <i>Cercocarpus traskiae</i> )	Endangered		Dicot Terrestrial	No
Navarretia, Few-flowered ( <i>Navarretia leucocephala ssp. pauciflora (=N. pauciflora)</i> )	Endangered		Dicot Vernal pool, Terrestrial	No
Navarretia, Many-flowered ( <i>Navarretia leucocephala ssp. plieantha</i> )	Endangered		Dicot Terrestrial, Vernal pool	No
Navarretia, Spreading ( <i>Navarretia fossalis</i> )	Threatened		Dicot Vernal pool	No
Paintbrush, San Clemente Island Indian ( <i>Castilleja grisea</i> )	Endangered		Dicot Terrestrial	No
Paintbrush, Soft-leaved ( <i>Castilleja mollis</i> )	Endangered		Dicot Terrestrial	No
Pentachaeta, Lyon's ( <i>Pentachaeta lyonii</i> )	Endangered		Dicot Terrestrial	No
Phacelia, Island ( <i>Phacelia insularis ssp. insularis</i> )	Endangered		Dicot Terrestrial	No
Pussypaws, Mariposa ( <i>Calyptridium pulchellum</i> )	Threatened		Dicot Terrestrial	No

**California**

( 110) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Rock-cress, Hoffmann's ( <i>Arabis hoffmannii</i> )	Endangered	Dicot Terrestrial	No
Rock-cress, Santa Cruz Island ( <i>Sibara filifolia</i> )	Endangered	Dicot Terrestrial	No
Rush-rose, Island ( <i>Helianthemum greenei</i> )	Threatened	Dicot Terrestrial	No
Spineflower, Slender-horned ( <i>Dodecahema leptoceras</i> )	Endangered	Dicot Terrestrial	No
Spurge, Hoover's ( <i>Chamaesyce hooveri</i> )	Threatened	Dicot Vernal pool	Yes
Stoncrop, Lake County ( <i>Parvisedum leiocarpum</i> )	Endangered	Dicot Vernal pool	No
Tarplant, Gaviota ( <i>Deinandra increscens ssp. villosa</i> )	Endangered	Dicot Terrestrial	Yes
Thistle, Fountain ( <i>Cirsium fontinale var. fontinale</i> )	Endangered	Dicot Terrestrial	No
Thistle, La Graciosa ( <i>Cirsium loncholepis</i> )	Endangered	Dicot Coastal (neritic), Freshwater, Saltwater,	Yes
Tuctoria, Green's ( <i>Tuctoria greenei</i> )	Endangered	Dicot Vernal pool	Yes
Watercress, Gambel's ( <i>Rorippa gambellii</i> )	Endangered	Dicot Terrestrial, Brackish, Freshwater	No
Woodland-star, San Clemente Island ( <i>Lithophragma maximum</i> )	Endangered	Dicot Terrestrial	No
Woolly-threads, San Joaquin ( <i>Monolopia (=Lembertia) congdonii</i> )	Endangered	Dicot Terrestrial	No
Yerba Santa, Lompoc ( <i>Eriodictyon capitatum</i> )	Endangered	Dicot Terrestrial	Yes
Chub, Mohave Tui ( <i>Gila bicolor mohavensis</i> )	Endangered	Fish Freshwater	No
Goby, Tidewater ( <i>Eucyclogobius newberryi</i> )	Endangered	Fish Freshwater	Yes
Steelhead, (California Central Valley population) ( <i>Oncorhynchus (=Salmo) mykiss</i> )	Threatened	Fish Brackish, Freshwater, Saltwater	Yes
Steelhead, (Southern California population) ( <i>Oncorhynchus (=Salmo) mykiss</i> )	Endangered	Fish Brackish, Saltwater, Freshwater	Yes
Stickleback, Unarmored Threespine ( <i>Gasterosteus aculeatus williamsoni</i> )	Endangered	Fish Freshwater	No
Sucker, Santa Ana ( <i>Catostomus santaanae</i> )	Threatened	Fish Freshwater	Yes
Trout, Little Kern Golden ( <i>Oncorhynchus aguabonita whitei</i> )	Threatened	Fish Freshwater	Yes

<b>California</b>	( 110) species:		<b><u>Taxa</u></b>	<b><u>Critical Habitat</u></b>
Trout, Paiute Cutthroat ( <i>Oncorhynchus clarki seleniris</i> )	Threatened		Freshwater Fish	No
Beetle, Valley Elderberry Longhorn ( <i>Desmocerus californicus dimorphus</i> )	Threatened		Terrestrial Insect	Yes
Butterfly, El Segundo Blue ( <i>Euphilotes battoides allyni</i> )	Endangered		Terrestrial Insect	No
Butterfly, Palos Verdes Blue ( <i>Glaucopsyche lygdamus palosverdesensis</i> )	Endangered		Terrestrial Insect	Yes
Fox, San Joaquin Kit ( <i>Vulpes macrotis mutica</i> )	Endangered		Terrestrial Mammal	No
Fox, San Miguel Island ( <i>Urocyon littoralis littoralis</i> )	Endangered		Terrestrial Mammal	Yes
Fox, Santa Catalina Island ( <i>Urocyon littoralis catalinae</i> )	Endangered		Terrestrial Mammal	Yes
Fox, Santa Cruz Island ( <i>Urocyon littoralis santacruzae</i> )	Endangered		Terrestrial Mammal	Yes
Fox, Santa Rosa Island ( <i>Urocyon littoralis santarosae</i> )	Endangered		Terrestrial Mammal	Yes
Kangaroo Rat, Fresno ( <i>Dipodomys nitratoides exilis</i> )	Endangered		Terrestrial Mammal	Yes
Kangaroo Rat, Giant ( <i>Dipodomys ingens</i> )	Endangered		Terrestrial Mammal	No
Kangaroo Rat, Tipton ( <i>Dipodomys nitratoides nitratoides</i> )	Endangered		Terrestrial Mammal	No
Mouse, Pacific Pocket ( <i>Perognathus longimembris pacificus</i> )	Endangered		Terrestrial Mammal	No
Seal, Guadalupe Fur ( <i>Arctocephalus townsendi</i> )	Threatened		Coastal (neritic), Saltwater Marine mml	No
Sea-lion, Steller (eastern) ( <i>Eumetopias jubatus</i> )	Threatened		Saltwater Marine mml	Yes
Whale, Finback ( <i>Balaenoptera physalus</i> )	Endangered		Saltwater Marine mml	No
Whale, Humpback ( <i>Megaptera novaeangliae</i> )	Endangered		Saltwater Marine mml	No
Brodiaea, Thread-leaved ( <i>Brodiaea filifolia</i> )	Threatened		Terrestrial Monocot	Yes
Grass, California Orcutt ( <i>Orcuttia californica</i> )	Endangered		Vernal pool, Terrestrial Monocot	No
Grass, Colusa ( <i>Neostaphia colusana</i> )	Threatened		Vernal pool Monocot	No
Grass, San Joaquin Valley Orcutt ( <i>Orcuttia inaequalis</i> )	Threatened		Vernal pool Monocot	Yes

**California**

( 110) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Lizard, Blunt-nosed Leopard ( <i>Gambelia silus</i> )	Endangered	Reptile Terrestrial	No
Lizard, Island Night ( <i>Xantusia riversiana</i> )	Threatened	Reptile Terrestrial	No
Sea turtle, green ( <i>Chelonia mydas</i> )	Endangered	Reptile Saltwater	No
Sea turtle, leatherback ( <i>Dermochelys coriacea</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, loggerhead ( <i>Caretta caretta</i> )	Threatened	Reptile Saltwater	No
Sea turtle, olive ridley ( <i>Lepidochelys olivacea</i> )	Threatened	Reptile Saltwater	No
Snake, Giant Garter ( <i>Thamnophis gigas</i> )	Threatened	Reptile Freshwater, Terrestrial	No
Tortoise, Desert ( <i>Gopherus agassizii</i> )	Threatened	Reptile Terrestrial	Yes

**Florida**

( 88) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Salamander, Flatwoods ( <i>Ambystoma cingulatum</i> )	Threatened	Amphibian Freshwater, Vernal pool, Terrestrial	No
Caracara, Audubon's Crested ( <i>Polyborus plancus audubonii</i> )	Threatened	Bird Terrestrial	No
Kite, Everglade Snail ( <i>Rostrhamus sociabilis plumbeus</i> )	Endangered	Bird Terrestrial	Yes
Plover, Piping ( <i>Charadrius melodus</i> )	Endangered	Bird Terrestrial	Yes
Scrub-Jay, Florida ( <i>Aphelocoma coerulescens</i> )	Threatened	Bird Terrestrial	No
Sparrow, Cape Sable Seaside ( <i>Ammodramus maritimus mirabilis</i> )	Endangered	Bird Terrestrial	Yes
Sparrow, Florida Grasshopper ( <i>Ammodramus savannarum floridanus</i> )	Endangered	Bird Terrestrial	No
Stork, Wood ( <i>Mycteria americana</i> )	Endangered	Bird Terrestrial	No
Woodpecker, Red-cockaded ( <i>Picoides borealis</i> )	Endangered	Bird Terrestrial	No
Bankclimber, Purple ( <i>Elliptoideus sloatianus</i> )	Threatened	Bivalve Freshwater	No
Mussel, Gulf Moccasinshell ( <i>Medionidus penicillatus</i> )	Endangered	Bivalve Freshwater	No
Mussel, Ochlockonee Moccasinshell ( <i>Medionidus simpsonianus</i> )	Endangered	Bivalve Freshwater	No
Mussel, Oval Pigtoe ( <i>Pleurobema pyriforme</i> )	Endangered	Bivalve Freshwater	No

**Florida** ( 88) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Mussel, Shiny-rayed Pocketbook ( <i>Lampsilis subangulata</i> )	Endangered	Bivalve Freshwater	No
Slabshell, Chipola ( <i>Elliptio chipolaensis</i> )	Threatened	Bivalve Freshwater	No
Threeridge, Fat (Mussel) ( <i>Amblema neislerii</i> )	Endangered	Bivalve Freshwater	No
Torrey, Florida ( <i>Torrey taxifolia</i> )	Endangered	Conf/cycds Terrestrial	No
Shrimp, Squirrel Chimney Cave ( <i>Palaemonetes cummingi</i> )	Threatened	Crustacean Freshwater, Subterraneous	No
Aster, Florida Golden ( <i>Chrysopsis floridana</i> )	Endangered	Dicot Terrestrial	No
Birds-in-a-nest, White ( <i>Macbridea alba</i> )	Threatened	Dicot Terrestrial	No
Blazing Star, Scrub ( <i>Liatis ohlingerae</i> )	Endangered	Dicot Terrestrial	No
Bonamia, Florida ( <i>Bonamia grandiflora</i> )	Threatened	Dicot Terrestrial	No
Buckwheat, Scrub ( <i>Eriogonum longifolium var. gnaphalifolium</i> )	Threatened	Dicot Terrestrial	No
Butterwort, Godfrey's ( <i>Pinguicula ionantha</i> )	Threatened	Dicot Terrestrial, Freshwater	No
Campion, Fringed ( <i>Silene polypetala</i> )	Endangered	Dicot Terrestrial	No
Chaffseed, American ( <i>Schwalbea americana</i> )	Endangered	Dicot Terrestrial	No
Fringe Tree, Pygmy ( <i>Chionanthus pygmaeus</i> )	Endangered	Dicot Terrestrial	No
Gooseberry, Miccosukee ( <i>Ribes echinellum</i> )	Threatened	Dicot Terrestrial	No
Gourd, Okeechobee ( <i>Cucurbita okeechobeensis ssp. okeechobeensis</i> )	Endangered	Dicot Terrestrial	No
Harebells, Avon Park ( <i>Crotalaria avonensis</i> )	Endangered	Dicot Terrestrial	No
Hypericum, Highlands Scrub ( <i>Hypericum cumulicola</i> )	Endangered	Dicot Terrestrial	No
Jacquemontia, Beach ( <i>Jacquemontia reclinata</i> )	Endangered	Dicot Terrestrial, Coastal (neritic)	No
Lead-plant, Crenulate ( <i>Amorpha crenulata</i> )	Endangered	Dicot Terrestrial	No
Lupine, Scrub ( <i>Lupinus aridorum</i> )	Endangered	Dicot Terrestrial	No

<b>Florida</b>	( 88) species:		<u>Taxa</u>	<u>Critical Habitat</u>
Meadowrue, Cooley's ( <i>Thalictrum cooleyi</i> )	Endangered		Dicot Terrestrial	No
Milkpea, Small's ( <i>Galactia smallii</i> )	Endangered		Dicot Terrestrial	No
Mint, Lakela's ( <i>Dicerandra immaculata</i> )	Endangered		Dicot Terrestrial	No
Mint, Longspurred ( <i>Dicerandra cornutissima</i> )	Endangered		Dicot Terrestrial	No
Mustard, Carter's ( <i>Warea carteri</i> )	Endangered		Dicot Terrestrial	No
Pawpaw, Beautiful ( <i>Deeringothamnus pulchellus</i> )	Endangered		Dicot Terrestrial	No
Pawpaw, Four-petal ( <i>Asimina tetramera</i> )	Endangered		Dicot Terrestrial	No
Pinkroot, Gentian ( <i>Spigelia gentianoides</i> )	Endangered		Dicot Terrestrial	No
Plum, Scrub ( <i>Prunus geniculata</i> )	Endangered		Dicot Terrestrial	No
Polygala, Lewton's ( <i>Polygala lewtonii</i> )	Endangered		Dicot Terrestrial	No
Polygala, Tiny ( <i>Polygala smallii</i> )	Endangered		Dicot Terrestrial	No
Rhododendron, Chapman ( <i>Rhododendron chapmanii</i> )	Endangered		Dicot Terrestrial	No
Rosemary, Etonia ( <i>Conradina etonia</i> )	Endangered		Dicot Terrestrial	No
Rosemary, Short-leaved ( <i>Conradina brevifolia</i> )	Endangered		Dicot Terrestrial	No
Sandlace ( <i>Polygonella myriophylla</i> )	Endangered		Dicot Terrestrial	No
Snakeroot ( <i>Eryngium cuneifolium</i> )	Endangered		Dicot Terrestrial	No
Spurge, Deltoid ( <i>Chamaesyce deltoidea ssp. deltoidea</i> )	Endangered		Dicot Terrestrial	No
Spurge, Garber's ( <i>Chamaesyce garberi</i> )	Threatened		Dicot Terrestrial	No
Spurge, Telephus ( <i>Euphorbia telephioides</i> )	Threatened		Dicot Terrestrial	No
Warea, Wide-leaf ( <i>Warea amplexifolia</i> )	Endangered		Dicot Terrestrial	No
Whitlow-wort, Papery ( <i>Paronychia chartacea</i> )	Threatened		Dicot Terrestrial	No



<b>Florida</b>	( 88) species:		<u>Taxa</u>	<u>Critical Habitat</u>
Wings, Pigeon		Threatened	Dicot	No
	( <i>Clitoria fragrans</i> )		Terrestrial	
Wireweed		Endangered	Dicot	No
	( <i>Polygonella basiramia</i> )		Terrestrial	
Ziziphus, Florida		Endangered	Dicot	No
	( <i>Ziziphus celata</i> )		Terrestrial	
Darter, Okaloosa		Endangered	Fish	No
	( <i>Etheostoma okaloosae</i> )		Freshwater	
Sawfish, Smalltooth		Endangered	Fish	No
	( <i>Pristis pectinata</i> )		Saltwater, Freshwater	
Sturgeon, Gulf		Threatened	Fish	Yes
	( <i>Acipenser oxyrinchus desotoi</i> )		Saltwater, Freshwater	
Sturgeon, Shortnose		Endangered	Fish	No
	( <i>Acipenser brevirostrum</i> )		Saltwater, Freshwater	
Butterfly, Schaus Swallowtail		Endangered	Insect	No
	( <i>Heraclides aristodemus ponceanus</i> )		Terrestrial	
Cladonia, Florida Perforate		Endangered	Lichen	No
	( <i>Cladonia perforata</i> )		Terrestrial	
Bat, Gray		Endangered	Mammal	No
	( <i>Myotis grisescens</i> )		Subterranean, Terrestrial	
Bat, Indiana		Endangered	Mammal	Yes
	( <i>Myotis sodalis</i> )		Subterranean, Terrestrial	
Mouse, Choctawhatchee Beach		Endangered	Mammal	Yes
	( <i>Peromyscus polionotus alloparys</i> )		Coastal (neritic), Terrestrial	
Mouse, Perdido Key Beach		Endangered	Mammal	Yes
	( <i>Peromyscus polionotus trissyllepsis</i> )		Coastal (neritic)	
Mouse, Southeastern Beach		Threatened	Mammal	No
	( <i>Peromyscus polionotus niveiventris</i> )		Coastal (neritic), Terrestrial	
Panther, Florida		Endangered	Mammal	No
	( <i>Puma (=Felis) concolor coryi</i> )		Terrestrial	
Vole, Florida Salt Marsh		Endangered	Mammal	No
	( <i>Microtus pennsylvanicus dukecampbelli</i> )		Terrestrial, Brackish	
Manatee, West Indian		Endangered	Marine mml	Yes
	( <i>Trichechus manatus</i> )		Saltwater	
Seal, Caribbean Monk		Endangered	Marine mml	No
	( <i>Monachus tropicalis</i> )		Coastal (neritic), Saltwater	
Whale, Finback		Endangered	Marine mml	No
	( <i>Balaenoptera physalus</i> )		Saltwater	
Whale, Humpback		Endangered	Marine mml	No
	( <i>Megaptera novaeangliae</i> )		Saltwater	
Whale, northern right		Endangered	Marine mml	Yes
	( <i>Eubalaena glacialis (incl. australis)</i> )		Saltwater	

**Florida**

( 88) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Beargrass, Britton's ( <i>Nolina brittoniana</i> )	Endangered	Monocot Terrestrial	No
Seagrass, Johnson's ( <i>Halophila johnsonii</i> )	Threatened	Monocot Coastal (neritic), Saltwater	Yes
Crocodile, American ( <i>Crocodylus acutus</i> )	Threatened	Reptile Terrestrial, Freshwater	Yes
Sea turtle, green ( <i>Chelonia mydas</i> )	Endangered	Reptile Saltwater	No
Sea turtle, hawksbill ( <i>Eretmochelys imbricata</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, Kemp's ridley ( <i>Lepidochelys kempii</i> )	Endangered	Reptile Saltwater	No
Sea turtle, leatherback ( <i>Dermochelys coriacea</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, loggerhead ( <i>Caretta caretta</i> )	Threatened	Reptile Saltwater	No
Skink, Blue-tailed Mole ( <i>Eumeces egregius lividus</i> )	Threatened	Reptile Terrestrial	No
Skink, Sand ( <i>Neoseps reynoldsi</i> )	Threatened	Reptile Terrestrial	No
Snake, Atlantic Salt Marsh ( <i>Nerodia clarkii taeniata</i> )	Threatened	Reptile Saltwater, Terrestrial, Brackish	No
Snake, Eastern Indigo ( <i>Drymarchon corais couperi</i> )	Threatened	Reptile Terrestrial	No

**Georgia**

( 52) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Salamander, Flatwoods ( <i>Ambystoma cingulatum</i> )	Threatened	Amphibian Freshwater, Vernal pool, Terrestrial	No
Plover, Piping ( <i>Charadrius melodus</i> )	Endangered	Bird Terrestrial	Yes
Stork, Wood ( <i>Mycteria americana</i> )	Endangered	Bird Terrestrial	No
Warbler (=Wood), Kirtland's ( <i>Dendroica kirtlandii</i> )	Endangered	Bird Terrestrial	No
Woodpecker, Red-cockaded ( <i>Picoides borealis</i> )	Endangered	Bird Terrestrial	No
Bankclimber, Purple ( <i>Elliptoideus sloatianus</i> )	Threatened	Bivalve Freshwater	No
Combshell, Upland ( <i>Epioblasma metastrata</i> )	Endangered	Bivalve Freshwater	Yes
Kidneyshell, Triangular ( <i>Ptychobranthus greenii</i> )	Endangered	Bivalve Freshwater	Yes
Mucket, Pink (Pearlymussel) ( <i>Lampsilis abrupta</i> )	Endangered	Bivalve Freshwater	No

**Georgia**

( 52) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Mussel, Acornshell Southern ( <i>Epioblasma othcaloogensis</i> )	Endangered	Bivalve Freshwater	Yes
Mussel, Alabama Moccasinshell ( <i>Medionidus acutissimus</i> )	Threatened	Bivalve Freshwater	Yes
Mussel, Coosa Moccasinshell ( <i>Medionidus parvulus</i> )	Endangered	Bivalve Freshwater	Yes
Mussel, Fine-lined Pocketbook ( <i>Lampsilis altilis</i> )	Threatened	Bivalve Freshwater	Yes
Mussel, Gulf Moccasinshell ( <i>Medionidus penicillatus</i> )	Endangered	Bivalve Freshwater	No
Mussel, Oval Pigtoe ( <i>Pleurobema pyriforme</i> )	Endangered	Bivalve Freshwater	No
Mussel, Ovate Clubshell ( <i>Pleurobema perovatum</i> )	Endangered	Bivalve Freshwater	Yes
Mussel, Shiny-rayed Pocketbook ( <i>Lampsilis subangulata</i> )	Endangered	Bivalve Freshwater	No
Mussel, Southern Clubshell ( <i>Pleurobema decisum</i> )	Endangered	Bivalve Freshwater	Yes
Mussel, Southern Pigtoe ( <i>Pleurobema georgianum</i> )	Endangered	Bivalve Freshwater	Yes
Threeridge, Fat (Mussel) ( <i>Amblema neislerii</i> )	Endangered	Bivalve Freshwater	No
Torreyia, Florida ( <i>Torreyia taxifolia</i> )	Endangered	Conf/cycds Terrestrial	No
Amphianthus, Little ( <i>Amphianthus pusillus</i> )	Threatened	Dicot Freshwater	No
Barbara Buttons, Mohr's ( <i>Marshallia mohrii</i> )	Threatened	Dicot Terrestrial	No
Campion, Fringed ( <i>Silene polypetala</i> )	Endangered	Dicot Terrestrial	No
Dropwort, Canby's ( <i>Oxypolis canbyi</i> )	Endangered	Dicot Terrestrial, Freshwater	No
Pitcher-plant, Green ( <i>Sarracenia oreophila</i> )	Endangered	Dicot Terrestrial, Freshwater	No
Pondberry ( <i>Lindera melissifolia</i> )	Endangered	Dicot Terrestrial	No
Rattleweed, Hairy ( <i>Baptisia arachnifera</i> )	Endangered	Dicot Terrestrial	No
Skullcap, Large-flowered ( <i>Scutellaria montana</i> )	Threatened	Dicot Terrestrial	No
Quillwort, Black-spored ( <i>Isoetes melanospora</i> )	Endangered	Ferns Vernal pool	No

**Georgia**

( 52) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Darter, Amber ( <i>Percina antesella</i> )	Endangered	Freshwater Fish	Yes
Darter, Goldline ( <i>Percina aurolineata</i> )	Threatened	Freshwater Fish	No
Logperch, Conasauga ( <i>Percina jenkinsi</i> )	Endangered	Freshwater Fish	Yes
Shiner, Blue ( <i>Cyprinella caerulea</i> )	Threatened	Freshwater Fish	No
Sturgeon, Gulf ( <i>Acipenser oxyrinchus desotoi</i> )	Threatened	Saltwater, Freshwater Fish	Yes
Sturgeon, Shortnose ( <i>Acipenser brevirostrum</i> )	Endangered	Saltwater, Freshwater Fish	No
Bat, Gray ( <i>Myotis grisescens</i> )	Endangered	Subterranean, Terrestrial Mammal	No
Bat, Indiana ( <i>Myotis sodalis</i> )	Endangered	Subterranean, Terrestrial Mammal	Yes
Bat, Virginia Big-eared ( <i>Corynorhinus (=Plecotus) townsendii virginianus</i> )	Endangered	Terrestrial, Subterranean Mammal	Yes
Manatee, West Indian ( <i>Trichechus manatus</i> )	Endangered	Saltwater Marine mml	Yes
Whale, Finback ( <i>Balaenoptera physalus</i> )	Endangered	Saltwater Marine mml	No
Whale, Humpback ( <i>Megaptera novaeangliae</i> )	Endangered	Saltwater Marine mml	No
Whale, northern right ( <i>Eubalaena glacialis (incl. australis)</i> )	Endangered	Saltwater Marine mml	Yes
Grass, Tennessee Yellow-eyed ( <i>Xyris tennesseensis</i> )	Endangered	Terrestrial Monocot	No
Pogonia, Small Whorled ( <i>Isotria medeoloides</i> )	Threatened	Terrestrial Monocot	No
Trillium, Relict ( <i>Trillium reliquum</i> )	Endangered	Terrestrial Monocot	No
Sea turtle, green ( <i>Chelonia mydas</i> )	Endangered	Saltwater Reptile	No
Sea turtle, hawksbill ( <i>Eretmochelys imbricata</i> )	Endangered	Saltwater Reptile	Yes
Sea turtle, Kemp's ridley ( <i>Lepidochelys kempii</i> )	Endangered	Saltwater Reptile	No
Sea turtle, leatherback ( <i>Dermochelys coriacea</i> )	Endangered	Saltwater Reptile	Yes
Sea turtle, loggerhead ( <i>Caretta caretta</i> )	Threatened	Saltwater Reptile	No

**Georgia** ( 52) species:

Snake, Eastern Indigo ( <i>Drymarchon corais couperi</i> )	Threatened	<u>Taxa</u> Reptile	<u>Critical Habitat</u> No
		Terrestrial	

**Hawaii** ( 345) species:

Spider, Kauai Cave Wolf ( <i>Gopherus polyphemus</i> )	Endangered	<u>Taxa</u> Arachnid	<u>Critical Habitat</u> Yes
		Terrestrial, Subterraneous	
'Akepa, Hawaii ( <i>Loxops coccineus coccineus</i> )	Endangered	Bird	No
		Terrestrial	
'Akepa, Maui ( <i>Loxops coccineus ochraceus</i> )	Endangered	Bird	No
		Terrestrial	
'Akia Loa, Kauai (Hemignathus procerus) ( <i>Hemignathus procerus</i> )	Endangered	Bird	No
		Terrestrial	
'Akia Pola'au (Hemignathus munroi) ( <i>Hemignathus munroi</i> )	Endangered	Bird	No
		Terrestrial	
Albatross, Short-tailed ( <i>Phoebastria (=Diomedea) albatrus</i> )	Endangered	Bird	No
		Terrestrial, Saltwater	
Coot, Hawaiian (=Alae keo keo) ( <i>Fulica americana alai</i> )	Endangered	Bird	No
		Terrestrial	
Creeper, Hawaii ( <i>Oreomystis mana</i> )	Endangered	Bird	No
		Terrestrial	
Creeper, Molokai (Kakawahie) ( <i>Paroreomyza flammea</i> )	Endangered	Bird	No
		Terrestrial	
Creeper, Oahu (Alauwahio) ( <i>Paroreomyza maculata</i> )	Endangered	Bird	No
		Terrestrial	
Crow, Hawaiian ('Alala) ( <i>Corvus hawaiiensis</i> )	Endangered	Bird	No
		Terrestrial	
Duck, Hawaiian (Koloa) ( <i>Anas wyvilliana</i> )	Endangered	Bird	No
		Freshwater, Terrestrial	
Duck, Laysan ( <i>Anas laysanensis</i> )	Endangered	Bird	No
		Terrestrial, Freshwater	
Elepaio, Oahu ( <i>Chasiempis sandwichensis ibidis</i> )	Endangered	Bird	Yes
		Terrestrial	
Finch, Laysan ( <i>Telespyza cantans</i> )	Endangered	Bird	No
		Terrestrial	
Finch, Nihoa ( <i>Telespyza ultima</i> )	Endangered	Bird	No
		Terrestrial	
Goose, Hawaiian (Nene) ( <i>Branta (=Nesochen) sandvicensis</i> )	Endangered	Bird	No
		Terrestrial, Freshwater	
Hawk, Hawaiian (Io) ( <i>Buteo solitarius</i> )	Endangered	Bird	No
		Terrestrial	
Honeycreeper, Crested ('Akohekohe) ( <i>Palmeria dolei</i> )	Endangered	Bird	No
		Terrestrial	
Millerbird, Nihoa ( <i>Acrocephalus familiaris kingi</i> )	Endangered	Bird	No
		Terrestrial	

**Hawaii**

( 345) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Moorhen, Hawaiian Common ( <i>Gallinula chloropus sandvicensis</i> )	Endangered	Bird Terrestrial	No
Nuku Pu'u ( <i>Hemignathus lucidus</i> )	Endangered	Bird Terrestrial	No
'O'o, Kauai (= 'A'a) ( <i>Moho braccatus</i> )	Endangered	Bird Terrestrial	No
'O'u (Honeycreeper) ( <i>Psittirostra psittacea</i> )	Endangered	Bird Terrestrial	No
Palila ( <i>Loxioides bailleui</i> )	Endangered	Bird Terrestrial	Yes
Parrotbill, Maui ( <i>Pseudonestor xanthophrys</i> )	Endangered	Bird Terrestrial	No
Petrel, Hawaiian Dark-rumped ( <i>Pterodroma phaeopygia sandwichensis</i> )	Endangered	Bird Terrestrial	No
Po'ouli ( <i>Melamprosops phaeosoma</i> )	Endangered	Bird Terrestrial	No
Shearwater, Newell's Townsend's ( <i>Puffinus auricularis newelli</i> )	Threatened	Bird Terrestrial, Saltwater	No
Stilt, Hawaiian (=Ae'o) ( <i>Himantopus mexicanus knudseni</i> )	Endangered	Bird Terrestrial	No
Thrush, Large Kauai ( <i>Myadestes myadestinus</i> )	Endangered	Bird Terrestrial	No
Thrush, Molokai (Oloma'o) ( <i>Myadestes lanaiensis rutha</i> )	Endangered	Bird Terrestrial	No
Thrush, Small Kauai (Puaiohi) ( <i>Myadestes palmeri</i> )	Endangered	Bird Terrestrial	No
Amphipod, Kauai Cave ( <i>Spelaeorchestia koloana</i> )	Endangered	Crustacean Freshwater, Subterraneous	Yes
Abutilon eremitopetalum (ncn) ( <i>Abutilon eremitopetalum</i> )	Endangered	Dicot Terrestrial	Yes
Abutilon sandwicense (ncn) ( <i>Abutilon sandwicense</i> )	Endangered	Dicot Terrestrial	Yes
Achyranthes mutica (ncn) ( <i>Achyranthes mutica</i> )	Endangered	Dicot Terrestrial	Yes
Achyranthes splendens var. rotundata (ncn) ( <i>Achyranthes splendens var. rotundata</i> )	Endangered	Dicot Terrestrial	No
A'e (Zanthoxylum dipetalum var. tomentosum) ( <i>Zanthoxylum dipetalum var. tomentosum</i> )	Endangered	Dicot Terrestrial	Yes
A'e (Zanthoxylum hawaiiense) ( <i>Zanthoxylum hawaiiense</i> )	Endangered	Dicot Terrestrial	Yes
'Aiea (Nothocestrum breviflorum) ( <i>Nothocestrum breviflorum</i> )	Endangered	Dicot Terrestrial	Yes

**Hawaii**

( 345) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
'Aiea ( <i>Nothocestrum peltatum</i> ) ( <i>Nothocestrum peltatum</i> )	Endangered	Dicot Terrestrial	Yes
'Akoko ( <i>Chamaesyce celastroides</i> var. <i>kaenana</i> ) ( <i>Chamaesyce celastroides</i> var. <i>kaenana</i> )	Endangered	Dicot Terrestrial	Yes
'Akoko ( <i>Chamaesyce deppeana</i> ) ( <i>Chamaesyce deppeana</i> )	Endangered	Dicot Terrestrial	Yes
'Akoko ( <i>Chamaesyce herbstii</i> ) ( <i>Chamaesyce herbstii</i> )	Endangered	Dicot Terrestrial	Yes
'Akoko ( <i>Chamaesyce kuwaleana</i> ) ( <i>Chamaesyce kuwaleana</i> )	Endangered	Dicot Terrestrial	Yes
'Akoko ( <i>Chamaesyce rockii</i> ) ( <i>Chamaesyce rockii</i> )	Endangered	Dicot Terrestrial	Yes
'Akoko ( <i>Chamaesyce skottsbergii</i> var. <i>skottsbe</i> ) ( <i>Chamaesyce skottsbergii</i> var. <i>kalaeloana</i> )	Endangered	Dicot Terrestrial	No
'Akoko ( <i>Euphorbia haeleeleana</i> ) ( <i>Euphorbia haeleeleana</i> )	Endangered	Dicot Terrestrial	Yes
Alani ( <i>Melicope adscendens</i> ) ( <i>Melicope adscendens</i> )	Endangered	Dicot Terrestrial	Yes
Alani ( <i>Melicope balloui</i> ) ( <i>Melicope balloui</i> )	Endangered	Dicot Terrestrial	Yes
Alani ( <i>Melicope haupuensis</i> ) ( <i>Melicope haupuensis</i> )	Endangered	Dicot Terrestrial	Yes
Alani ( <i>Melicope knudsenii</i> ) ( <i>Melicope knudsenii</i> )	Endangered	Dicot Terrestrial	Yes
Alani ( <i>Melicope lydgatei</i> ) ( <i>Melicope lydgatei</i> )	Endangered	Dicot Terrestrial	Yes
Alani ( <i>Melicope mucronulata</i> ) ( <i>Melicope mucronulata</i> )	Endangered	Dicot Terrestrial	Yes
Alani ( <i>Melicope munroi</i> ) ( <i>Melicope munroi</i> )	Endangered	Dicot Terrestrial	No
Alani ( <i>Melicope ovalis</i> ) ( <i>Melicope ovalis</i> )	Endangered	Dicot Terrestrial	Yes
Alani ( <i>Melicope pallida</i> ) ( <i>Melicope pallida</i> )	Endangered	Dicot Terrestrial	Yes
Alani ( <i>Melicope quadrangularis</i> ) ( <i>Melicope quadrangularis</i> )	Endangered	Dicot Terrestrial	No
Alani ( <i>Melicope reflexa</i> ) ( <i>Melicope reflexa</i> )	Endangered	Dicot Terrestrial	Yes
Alani ( <i>Melicope saint-johnii</i> ) ( <i>Melicope saint-johnii</i> )	Endangered	Dicot Terrestrial	Yes
Alani ( <i>Melicope zahlbruckneri</i> ) ( <i>Melicope zahlbruckneri</i> )	Endangered	Dicot Terrestrial	Yes

<b>Hawaii</b>	( 345) species:		<u>Taxa</u>	<u>Critical Habitat</u>
Alsinidendron obovatum (ncn)		Endangered	Dicot	Yes
( <i>Alsinidendron obovatum</i> )			Terrestrial	
Alsinidendron trinerve (ncn)		Endangered	Dicot	Yes
( <i>Alsinidendron trinerve</i> )			Terrestrial	
Alsinidendron viscosum (ncn)		Endangered	Dicot	Yes
( <i>Alsinidendron viscosum</i> )			Terrestrial	
Amaranthus brownii (ncn)		Endangered	Dicot	Yes
( <i>Amaranthus brownii</i> )			Terrestrial	
'Anaunau ( <i>Lepidium arbuscula</i> )		Endangered	Dicot	Yes
( <i>Lepidium arbuscula</i> )			Terrestrial	
'Anunu ( <i>Sicyos alba</i> )		Endangered	Dicot	Yes
( <i>Sicyos alba</i> )			Terrestrial	
Aupaka ( <i>Isodendron hosakae</i> )		Endangered	Dicot	Yes
( <i>Isodendron hosakae</i> )			Terrestrial	
Aupaka ( <i>Isodendron laurifolium</i> )		Endangered	Dicot	Yes
( <i>Isodendron laurifolium</i> )			Terrestrial	
Aupaka ( <i>Isodendron longifolium</i> )		Threatened	Dicot	Yes
( <i>Isodendron longifolium</i> )			Terrestrial	
'Awikiwiki ( <i>Canavalia molokaiensis</i> )		Endangered	Dicot	Yes
( <i>Canavalia molokaiensis</i> )			Terrestrial	
'Awiwi ( <i>Centaurium sebaeoides</i> )		Endangered	Dicot	Yes
( <i>Centaurium sebaeoides</i> )			Terrestrial	
'Awiwi ( <i>Hedyotis cookiana</i> )		Endangered	Dicot	Yes
( <i>Hedyotis cookiana</i> )			Terrestrial	
Bonamia menziesii (ncn)		Endangered	Dicot	Yes
( <i>Bonamia menziesii</i> )			Terrestrial	
Chamaesyce Halemanui (ncn)		Endangered	Dicot	Yes
( <i>Chamaesyce halemanui</i> )			Terrestrial	
Cyanea undulata (ncn)		Endangered	Dicot	Yes
( <i>Cyanea undulata</i> )			Terrestrial	
Delissea rhytidisperma (ncn)		Endangered	Dicot	Yes
( <i>Delissea rhytidisperma</i> )			Terrestrial	
Dubautia latifolia (ncn)		Endangered	Dicot	Yes
( <i>Dubautia latifolia</i> )			Terrestrial	
Dubautia pauciflorula (ncn)		Endangered	Dicot	Yes
( <i>Dubautia pauciflorula</i> )			Terrestrial	
Geranium, Hawaiian Red-flowered		Endangered	Dicot	Yes
( <i>Geranium arboreum</i> )			Terrestrial	
Gouania hillebrandii (ncn)		Endangered	Dicot	Yes
( <i>Gouania hillebrandii</i> )			Terrestrial	
Gouania meyenii (ncn)		Endangered	Dicot	Yes
( <i>Gouania meyenii</i> )			Terrestrial	



**Hawaii**

( 345) species:

			<u>Taxa</u>	<u>Critical Habitat</u>
Gouania vitifolia (ncn)	Endangered		Dicot	Yes
( <i>Gouania vitifolia</i> )			Terrestrial	
Haha (Cyanea acuminata)	Endangered		Dicot	Yes
( <i>Cyanea acuminata</i> )			Terrestrial	
Haha (Cyanea asarifolia)	Endangered		Dicot	Yes
( <i>Cyanea asarifolia</i> )			Terrestrial	
Haha (Cyanea copelandii ssp. copelandii)	Endangered		Dicot	No
( <i>Cyanea copelandii ssp. copelandii</i> )			Terrestrial	
Haha (Cyanea copelandii ssp. haleakalaensis)	Endangered		Dicot	Yes
( <i>Cyanea copelandii ssp. haleakalaensis</i> )			Terrestrial	
Haha (Cyanea Crispa) (=Rollandia crispa)	Endangered		Dicot	Yes
( <i>Cyanea (=Rollandia) crispa</i> )			Terrestrial	
Haha (Cyanea dunbarii)	Endangered		Dicot	Yes
( <i>Cyanea dunbarii</i> )			Terrestrial	
Haha (Cyanea glabra)	Endangered		Dicot	Yes
( <i>Cyanea glabra</i> )			Terrestrial	
Haha (Cyanea grimesiana ssp. grimesiana)	Endangered		Dicot	Yes
( <i>Cyanea grimesiana ssp. grimesiana</i> )			Terrestrial	
Haha (Cyanea grimesiana ssp. obatae)	Endangered		Dicot	Yes
( <i>Cyanea grimesiana ssp. obatae</i> )			Terrestrial	
Haha (Cyanea hamatiflora ssp. carlsonii)	Endangered		Dicot	Yes
( <i>Cyanea hamatiflora carlsonii</i> )			Terrestrial	
Haha (Cyanea hamatiflora ssp. hamatiflora)	Endangered		Dicot	Yes
( <i>Cyanea hamatiflora ssp. hamatiflora</i> )			Terrestrial	
Haha (Cyanea humboldtiana)	Endangered		Dicot	Yes
( <i>Cyanea humboldtiana</i> )			Terrestrial	
Haha (Cyanea koolauensis)	Endangered		Dicot	Yes
( <i>Cyanea koolauensis</i> )			Terrestrial	
Haha (Cyanea longiflora)	Endangered		Dicot	Yes
( <i>Cyanea longiflora</i> )			Terrestrial	
Haha (Cyanea Macrostegia var. gibsonii)	Endangered		Dicot	No
( <i>Cyanea macrostegia ssp. gibsonii</i> )			Terrestrial	
Haha (Cyanea mannii)	Endangered		Dicot	Yes
( <i>Cyanea mannii</i> )			Terrestrial	
Haha (Cyanea mceldowneyi)	Endangered		Dicot	Yes
( <i>Cyanea mceldowneyi</i> )			Terrestrial	
Haha (Cyanea pinnatifida)	Endangered		Dicot	Yes
( <i>Cyanea pinnatifida</i> )			Terrestrial	
Haha (Cyanea platyphylla)	Endangered		Dicot	Yes
( <i>Cyanea platyphylla</i> )			Terrestrial	
Haha (Cyanea procera)	Endangered		Dicot	Yes
( <i>Cyanea procera</i> )			Terrestrial	

**Hawaii**

( 345) species:

			<u>Taxa</u>	<u>Critical Habitat</u>
Haha ( <i>Cyanea recta</i> )	Threatened		Dicot	Yes
( <i>Cyanea recta</i> )		Terrestrial		
Haha ( <i>Cyanea remyi</i> )	Endangered		Dicot	Yes
( <i>Cyanea remyi</i> )		Terrestrial		
Haha ( <i>Cyanea shipmanii</i> )	Endangered		Dicot	Yes
( <i>Cyanea shipmanii</i> )		Terrestrial		
Haha ( <i>Cyanea stictophylla</i> )	Endangered		Dicot	Yes
( <i>Cyanea stictophylla</i> )		Terrestrial		
Haha ( <i>Cyanea St-Johnii</i> ) (=Rollandia St-Johnii)	Endangered		Dicot	Yes
( <i>Cyanea st-johnii</i> )		Terrestrial		
Haha ( <i>Cyanea superba</i> )	Endangered		Dicot	Yes
( <i>Cyanea superba</i> )		Terrestrial		
Ha'lwale ( <i>Cyrtandra crenata</i> )	Endangered		Dicot	No
( <i>Cyrtandra crenata</i> )		Terrestrial		
Ha'lwale ( <i>Cyrtandra dentata</i> )	Endangered		Dicot	Yes
( <i>Cyrtandra dentata</i> )		Terrestrial		
Ha'lwale ( <i>Cyrtandra giffardii</i> )	Endangered		Dicot	Yes
( <i>Cyrtandra giffardii</i> )		Terrestrial		
Ha'lwale ( <i>Cyrtandra limahuliensis</i> )	Threatened		Dicot	Yes
( <i>Cyrtandra limahuliensis</i> )		Terrestrial		
Ha'lwale ( <i>Cyrtandra munroi</i> )	Endangered		Dicot	Yes
( <i>Cyrtandra munroi</i> )		Terrestrial		
Ha'lwale ( <i>Cyrtandra polyantha</i> )	Endangered		Dicot	Yes
( <i>Cyrtandra polyantha</i> )		Terrestrial		
Ha'lwale ( <i>Cyrtandra subumbellata</i> )	Endangered		Dicot	Yes
( <i>Cyrtandra subumbellata</i> )		Terrestrial		
Ha'lwale ( <i>Cyrtandra tintinnabula</i> )	Endangered		Dicot	Yes
( <i>Cyrtandra tintinnabula</i> )		Terrestrial		
Ha'lwale ( <i>Cyrtandra viridiflora</i> )	Endangered		Dicot	Yes
( <i>Cyrtandra viridiflora</i> )		Terrestrial		
Haplostachys <i>Haplostachya</i> (ncn)	Endangered		Dicot	No
( <i>Haplostachys haplostachya</i> )		Terrestrial		
Hau Kauhiwi ( <i>Hibiscadelphus woodii</i> )	Endangered		Dicot	Yes
( <i>Hibiscadelphus woodii</i> )		Terrestrial		
Hau Kuahiwi ( <i>Hibiscadelphus distans</i> )	Endangered		Dicot	No
( <i>Hibiscadelphus distans</i> )		Terrestrial		
Heau ( <i>Exocarpos luteolus</i> )	Endangered		Dicot	Yes
( <i>Exocarpos luteolus</i> )		Terrestrial		
Hedyotis <i>degeneri</i> (ncn)	Endangered		Dicot	Yes
( <i>Hedyotis degeneri</i> )		Terrestrial		
Hedyotis <i>parvula</i> (ncn)	Endangered		Dicot	Yes
( <i>Hedyotis parvula</i> )		Terrestrial		

**Hawaii**

( 345) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Hedyotis St.-Johnii (ncn)	Endangered	Dicot	Yes
( <i>Hedyotis st.-johnii</i> )		Terrestrial	
Hesperomannia arborescens (ncn)	Endangered	Dicot	Yes
( <i>Hesperomannia arborescens</i> )		Terrestrial	
Hesperomannia arbuscula (ncn)	Endangered	Dicot	Yes
( <i>Hesperomannia arbuscula</i> )		Terrestrial	
Hesperomannia lydgatei (ncn)	Endangered	Dicot	Yes
( <i>Hesperomannia lydgatei</i> )		Terrestrial	
Hibiscus, Clay's	Endangered	Dicot	Yes
( <i>Hibiscus clayi</i> )		Terrestrial	
Holei (Ochrosia kilauaeensis)	Endangered	Dicot	No
( <i>Ochrosia kilauaeensis</i> )		Terrestrial	
Iliau (Wilkesia hobdyi)	Endangered	Dicot	Yes
( <i>Wilkesia hobdyi</i> )		Terrestrial	
Kamakahala (Labordia cyrtandrae)	Endangered	Dicot	Yes
( <i>Labordia cyrtandrae</i> )		Terrestrial	
Kamakahala (Labordia lydgatei)	Endangered	Dicot	Yes
( <i>Labordia lydgatei</i> )		Terrestrial	
Kamakahala (Labordia tinifolia var. lanaiensis)	Endangered	Dicot	No
( <i>Labordia tinifolia var. lanaiensis</i> )		Terrestrial	
Kamakahala (Labordia tinifolia var. wahiawaen)	Endangered	Dicot	Yes
( <i>Labordia tinifolia var. wahiawaensis</i> )		Terrestrial	
Kamakahala (Labordia triflora)	Endangered	Dicot	No
( <i>Labordia triflora</i> )		Terrestrial	
Kanaloa kahoolawensis (ncn)	Endangered	Dicot	Yes
( <i>Kanaloa kahoolawensis</i> )		Terrestrial	
Kauila (Colubrina oppositifolia)	Endangered	Dicot	Yes
( <i>Colubrina oppositifolia</i> )		Terrestrial	
Kaulu (Pteralyxia kauaiensis)	Endangered	Dicot	Yes
( <i>Pteralyxia kauaiensis</i> )		Terrestrial	
Kio'Ele (Hedyotis coriacea)	Endangered	Dicot	Yes
( <i>Hedyotis coriacea</i> )		Terrestrial	
Kiponapona (Phyllostegia racemosa)	Endangered	Dicot	Yes
( <i>Phyllostegia racemosa</i> )		Terrestrial	
Koki'o (Kokia drynarioides)	Endangered	Dicot	Yes
( <i>Kokia drynarioides</i> )		Terrestrial	
Koki'o (Kokia kauaiensis)	Endangered	Dicot	Yes
( <i>Kokia kauaiensis</i> )		Terrestrial	
Koki'o Ke'oke'o (Hibiscus arnottianus ssp. immaculatus)	Endangered	Dicot	Yes
( <i>Hibiscus arnottianus ssp. immaculatus</i> )		Terrestrial	
Koki'o Ke'oke'o (Hibiscus waimeae ssp. hanneriae)	Endangered	Dicot	Yes
( <i>Hibiscus waimeae ssp. hanneriae</i> )		Terrestrial	

**Hawaii**

( 345) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Kolea ( <i>Myrsine juddii</i> ) ( <i>Myrsine juddii</i> )	Endangered	Dicot Terrestrial	Yes
Kolea ( <i>Myrsine linearifolia</i> ) ( <i>Myrsine linearifolia</i> )	Threatened	Dicot Terrestrial	Yes
Ko'oko'olau ( <i>Bidens micrantha</i> ssp. <i>kalealaha</i> ) ( <i>Bidens micrantha</i> ssp. <i>kalealaha</i> )	Endangered	Dicot Terrestrial	Yes
Ko'oko'olau ( <i>Bidens wiebkei</i> ) ( <i>Bidens wiebkei</i> )	Endangered	Dicot Terrestrial	Yes
Ko'oloa'ula ( <i>Abutilon menziesii</i> ) ( <i>Abutilon menziesii</i> )	Endangered	Dicot Terrestrial	No
Kopa ( <i>Hedyotis schlechtendahlia</i> var. <i>remyi</i> ) ( <i>Hedyotis schlechtendahlia</i> var. <i>remyi</i> )	Endangered	Dicot Terrestrial	No
Kuawawaenuhu ( <i>Alsinidendron lychnoides</i> ) ( <i>Alsinidendron lychnoides</i> )	Endangered	Dicot Terrestrial	Yes
Kulu'i ( <i>Nototrichium humile</i> ) ( <i>Nototrichium humile</i> )	Endangered	Dicot Terrestrial	Yes
Laukahi Kuahiwi ( <i>Plantago hawaiiensis</i> ) ( <i>Plantago hawaiiensis</i> )	Endangered	Dicot Terrestrial	Yes
Laukahi Kuahiwi ( <i>Plantago princeps</i> ) ( <i>Plantago princeps</i> )	Endangered	Dicot Terrestrial	Yes
Laulihilihi ( <i>Schiedea stellarioides</i> ) ( <i>Schiedea stellarioides</i> )	Endangered	Dicot Terrestrial	Yes
Lipochaeta venosa (ncn) ( <i>Lipochaeta venosa</i> )	Endangered	Dicot Terrestrial	No
Lobelia monostachya (ncn) ( <i>Lobelia monostachya</i> )	Endangered	Dicot Terrestrial	Yes
Lobelia niihauensis (ncn) ( <i>Lobelia niihauensis</i> )	Endangered	Dicot Terrestrial	Yes
Lobelia oahuensis (ncn) ( <i>Lobelia oahuensis</i> )	Endangered	Dicot Terrestrial	Yes
Lysimachia filifolia (ncn) ( <i>Lysimachia filifolia</i> )	Endangered	Dicot Terrestrial	Yes
Lysimachia lydgatei (ncn) ( <i>Lysimachia lydgatei</i> )	Endangered	Dicot Terrestrial	Yes
Lysimachia maxima (ncn) ( <i>Lysimachia maxima</i> )	Endangered	Dicot Terrestrial	Yes
Mahoe ( <i>Alectryon macrococcus</i> ) ( <i>Alectryon macrococcus</i> )	Endangered	Dicot Terrestrial	Yes
Makou ( <i>Peucedanum sandwicense</i> ) ( <i>Peucedanum sandwicense</i> )	Threatened	Dicot Terrestrial	Yes
Ma'o Hau Hele ( <i>Hibiscus brackenridgei</i> ) ( <i>Hibiscus brackenridgei</i> )	Endangered	Dicot Terrestrial	Yes

<b>Hawaii</b>	( 345) species:		<u>Taxa</u>	<u>Critical Habitat</u>
Ma'oli'oli ( <i>Schiedea apokremnos</i> )		Endangered	Dicot	Yes
	( <i>Schiedea apokremnos</i> )		Terrestrial	
Ma'oli'oli ( <i>Schiedea kealiae</i> )		Endangered	Dicot	Yes
	( <i>Schiedea kealiae</i> )		Terrestrial	
Mapele ( <i>Cyrtandra cyaneoides</i> )		Endangered	Dicot	Yes
	( <i>Cyrtandra cyaneoides</i> )		Terrestrial	
Mehamehame ( <i>Flueggea neowawraea</i> )		Endangered	Dicot	Yes
	( <i>Flueggea neowawraea</i> )		Terrestrial	
Munroidendron racemosum (ncn)		Endangered	Dicot	Yes
	( <i>Munroidendron racemosum</i> )		Terrestrial	
Na'ena'e ( <i>Dubautia herbstobatae</i> )		Endangered	Dicot	Yes
	( <i>Gopherus polyphemus</i> )		Terrestrial	
Na'ena'e ( <i>Dubautia plantaginea</i> ssp. <i>humilis</i> )		Endangered	Dicot	Yes
	( <i>Dubautia plantaginea</i> ssp. <i>humilis</i> )		Terrestrial	
Nani Wai'ale'ale ( <i>Viola kauaensis</i> var. <i>wahiawaensis</i> )		Endangered	Dicot	Yes
	( <i>Viola kauaensis</i> var. <i>wahiawaensis</i> )		Terrestrial	
Nanu ( <i>Gardenia mannii</i> )		Endangered	Dicot	Yes
	( <i>Gardenia mannii</i> )		Terrestrial	
Na'u ( <i>Gardenia brighamii</i> )		Endangered	Dicot	No
	( <i>Gardenia brighamii</i> )		Terrestrial	
Naupaka, Dwarf ( <i>Scaevola coriacea</i> )		Endangered	Dicot	No
	( <i>Scaevola coriacea</i> )		Terrestrial	
Nehe ( <i>Lipochaeta fauriei</i> )		Endangered	Dicot	Yes
	( <i>Lipochaeta fauriei</i> )		Terrestrial	
Nehe ( <i>Lipochaeta kamolensis</i> )		Endangered	Dicot	Yes
	( <i>Lipochaeta kamolensis</i> )		Terrestrial	
Nehe ( <i>Lipochaeta lobata</i> var. <i>leptophylla</i> )		Endangered	Dicot	Yes
	( <i>Lipochaeta lobata</i> var. <i>leptophylla</i> )		Terrestrial	
Nehe ( <i>Lipochaeta micrantha</i> )		Endangered	Dicot	Yes
	( <i>Lipochaeta micrantha</i> )		Terrestrial	
Nehe ( <i>Lipochaeta tenuifolia</i> )		Endangered	Dicot	Yes
	( <i>Lipochaeta tenuifolia</i> )		Terrestrial	
Nehe ( <i>Lipochaeta waimeaensis</i> )		Endangered	Dicot	Yes
	( <i>Lipochaeta waimeaensis</i> )		Terrestrial	
Neraudia angulata (ncn)		Endangered	Dicot	Yes
	( <i>Neraudia angulata</i> )		Terrestrial	
Neraudia ovata (ncn)		Endangered	Dicot	Yes
	( <i>Neraudia ovata</i> )		Terrestrial	
Neraudia sericea (ncn)		Endangered	Dicot	Yes
	( <i>Neraudia sericea</i> )		Terrestrial	
Nioi ( <i>Eugenia koolauensis</i> )		Endangered	Dicot	Yes
	( <i>Eugenia koolauensis</i> )		Terrestrial	

<b>Hawaii</b>	( 345) species:		<u>Taxa</u>	<u>Critical Habitat</u>
Nohoanu ( <i>Geranium multiflorum</i> )		Endangered	Dicot	Yes
	( <i>Geranium multiflorum</i> )		Terrestrial	
'Oha ( <i>Delissea rivularis</i> )		Endangered	Dicot	Yes
	( <i>Delissea rivularis</i> )		Terrestrial	
'Oha ( <i>Delissea subcordata</i> )		Endangered	Dicot	Yes
	( <i>Delissea subcordata</i> )		Terrestrial	
'Oha ( <i>Delissea undulata</i> )		Endangered	Dicot	Yes
	( <i>Delissea undulata</i> )		Terrestrial	
'Oha ( <i>Lobelia gaudichaudii koolauensis</i> )		Endangered	Dicot	Yes
	( <i>Lobelia gaudichaudii ssp. koolauensis</i> )		Terrestrial	
'Oha Wai ( <i>Clermontia drepanomorpha</i> )		Endangered	Dicot	Yes
	( <i>Clermontia drepanomorpha</i> )		Terrestrial	
'Oha Wai ( <i>Clermontia lindseyana</i> )		Endangered	Dicot	Yes
	( <i>Clermontia lindseyana</i> )		Terrestrial	
'Oha Wai ( <i>Clermontia oblongifolia ssp. brevipes</i> )		Endangered	Dicot	Yes
	( <i>Clermontia oblongifolia ssp. brevipes</i> )		Terrestrial	
'Oha Wai ( <i>Clermontia oblongifolia ssp. mauiensis</i> )		Endangered	Dicot	Yes
	( <i>Clermontia oblongifolia ssp. mauiensis</i> )		Terrestrial	
'Oha Wai ( <i>Clermontia peleana</i> )		Endangered	Dicot	Yes
	( <i>Clermontia peleana</i> )		Terrestrial	
'Oha Wai ( <i>Clermontia pyrularia</i> )		Endangered	Dicot	Yes
	( <i>Clermontia pyrularia</i> )		Terrestrial	
'Oha Wai ( <i>Clermontia samuelii</i> )		Endangered	Dicot	Yes
	( <i>Clermontia samuelii</i> )		Terrestrial	
'Ohai ( <i>Sesbania tomentosa</i> )		Endangered	Dicot	Yes
	( <i>Sesbania tomentosa</i> )		Terrestrial	
'Ohe'ohe ( <i>Tetraplasandra gymnocarpa</i> )		Endangered	Dicot	Yes
	( <i>Tetraplasandra gymnocarpa</i> )		Terrestrial	
'Olulu ( <i>Brighamia insignis</i> )		Endangered	Dicot	Yes
	( <i>Brighamia insignis</i> )		Terrestrial	
Opuhe ( <i>Urera kaalae</i> )		Endangered	Dicot	Yes
	( <i>Urera kaalae</i> )		Terrestrial	
Pamakani ( <i>Viola chamissoniana ssp. chamissoniana</i> )		Endangered	Dicot	Yes
	( <i>Viola chamissoniana ssp. chamissoniana</i> )		Terrestrial	
Phyllostegia hirsuta (ncn)		Endangered	Dicot	Yes
	( <i>Phyllostegia hirsuta</i> )		Terrestrial	
Phyllostegia kaalaensis (ncn)		Endangered	Dicot	Yes
	( <i>Phyllostegia kaalaensis</i> )		Terrestrial	
Phyllostegia knudsenii (ncn)		Endangered	Dicot	Yes
	( <i>Phyllostegia knudsenii</i> )		Terrestrial	
Phyllostegia mannii (ncn)		Endangered	Dicot	Yes
	( <i>Phyllostegia mannii</i> )		Terrestrial	

**Hawaii**

( 345) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Phyllostegia mollis (ncn)	Endangered	Dicot	Yes
( <i>Phyllostegia mollis</i> )		Terrestrial	
Phyllostegia parviflora (ncn)	Endangered	Dicot	Yes
( <i>Phyllostegia parviflora</i> )		Terrestrial	
Phyllostegia velutina (ncn)	Endangered	Dicot	Yes
( <i>Phyllostegia velutina</i> )		Terrestrial	
Phyllostegia waimeae (ncn)	Endangered	Dicot	Yes
( <i>Phyllostegia waimeae</i> )		Terrestrial	
Phyllostegia warshaueri (ncn)	Endangered	Dicot	Yes
( <i>Phyllostegia warshaueri</i> )		Terrestrial	
Phyllostegia wawrana (ncn)	Endangered	Dicot	Yes
( <i>Phyllostegia wawrana</i> )		Terrestrial	
Pilo (Hedyotis mannii)	Endangered	Dicot	Yes
( <i>Hedyotis mannii</i> )		Terrestrial	
Po'e (Portulaca sclerocarpa)	Endangered	Dicot	Yes
( <i>Portulaca sclerocarpa</i> )		Terrestrial	
Popolo 'Aiakeakua (Solanum sandwicense)	Endangered	Dicot	Yes
( <i>Solanum sandwicense</i> )		Terrestrial	
Popolo Ku Mai (Solanum incompletum)	Endangered	Dicot	Yes
( <i>Solanum incompletum</i> )		Terrestrial	
Pua'ala (Brighamia rockii)	Endangered	Dicot	Yes
( <i>Brighamia rockii</i> )		Terrestrial	
Remya kauaiensis (ncn)	Endangered	Dicot	Yes
( <i>Remya kauaiensis</i> )		Terrestrial	
Remya montgomeryi (ncn)	Endangered	Dicot	Yes
( <i>Remya montgomeryi</i> )		Terrestrial	
Remya, Maui	Endangered	Dicot	Yes
( <i>Remya mauiensis</i> )		Terrestrial	
Sandalwood, Lanai (=Iliahi)	Endangered	Dicot	No
( <i>Santalum freycinetianum</i> var. <i>lanaiense</i> )		Terrestrial	
Sanicula mariversa (ncn)	Endangered	Dicot	Yes
( <i>Sanicula mariversa</i> )		Terrestrial	
Sanicula purpurea (ncn)	Endangered	Dicot	Yes
( <i>Sanicula purpurea</i> )		Terrestrial	
Schiedea haleakalensis (ncn)	Endangered	Dicot	Yes
( <i>Schiedea haleakalensis</i> )		Terrestrial	
Schiedea helleri (ncn)	Endangered	Dicot	Yes
( <i>Schiedea helleri</i> )		Terrestrial	
Schiedea hookeri (ncn)	Endangered	Dicot	Yes
( <i>Schiedea hookeri</i> )		Terrestrial	
Schiedea kaalae (ncn)	Endangered	Dicot	Yes
( <i>Schiedea kaalae</i> )		Terrestrial	

<b>Hawaii</b>	( 345) species:		<u>Taxa</u>	<u>Critical Habitat</u>
Schiedea kauaiensis (ncn)		Endangered	Dicot	Yes
( <i>Schiedea kauaiensis</i> )			Terrestrial	
Schiedea lydgatei (ncn)		Endangered	Dicot	Yes
( <i>Schiedea lydgatei</i> )			Terrestrial	
Schiedea membranacea (ncn)		Endangered	Dicot	Yes
( <i>Schiedea membranacea</i> )			Terrestrial	
Schiedea nuttallii (ncn)		Endangered	Dicot	Yes
( <i>Schiedea nuttallii</i> )			Terrestrial	
Schiedea sarmentosa (ncn)		Endangered	Dicot	Yes
( <i>Schiedea sarmentosa</i> )			Terrestrial	
Schiedea spergulina var. leiopoda (ncn)		Endangered	Dicot	Yes
( <i>Schiedea spergulina</i> var. <i>leiopoda</i> )			Terrestrial	
Schiedea spergulina var. spergulina (ncn)		Threatened	Dicot	Yes
( <i>Schiedea spergulina</i> var. <i>spergulina</i> )			Terrestrial	
Schiedea verticillata (ncn)		Endangered	Dicot	Yes
( <i>Schiedea verticillata</i> )			Terrestrial	
Schiedea, Diamond Head ( <i>Schiedea adamantis</i> )		Endangered	Dicot	No
( <i>Schiedea adamantis</i> )			Terrestrial	
Silene alexandri (ncn)		Endangered	Dicot	Yes
( <i>Silene alexandri</i> )			Terrestrial	
Silene hawaiiensis (ncn)		Threatened	Dicot	Yes
( <i>Silene hawaiiensis</i> )			Terrestrial	
Silene lanceolata (ncn)		Endangered	Dicot	Yes
( <i>Silene lanceolata</i> )			Terrestrial	
Silene perlmanii (ncn)		Endangered	Dicot	Yes
( <i>Silene perlmanii</i> )			Terrestrial	
Silversword, Haleakala ('Ahinahina)		Threatened	Dicot	Yes
( <i>Argyroxiphium sandwicense</i> ssp. <i>macrocephalum</i> )			Terrestrial	
Silversword, Ka'u ( <i>Argyroxiphium kauense</i> )		Endangered	Dicot	Yes
( <i>Argyroxiphium kauense</i> )			Terrestrial	
Silversword, Mauna Kea ('Ahinahina)		Endangered	Dicot	No
( <i>Argyroxiphium sandwicense</i> ssp. <i>sandwicense</i> )			Terrestrial	
Spermolepis hawaiiensis (ncn)		Endangered	Dicot	Yes
( <i>Spermolepis hawaiiensis</i> )			Terrestrial	
Stenogyne angustifolia (ncn)		Endangered	Dicot	No
( <i>Stenogyne angustifolia</i> var. <i>angustifolia</i> )			Terrestrial	
Stenogyne bifida (ncn)		Endangered	Dicot	Yes
( <i>Stenogyne bifida</i> )			Terrestrial	
Stenogyne campanulata (ncn)		Endangered	Dicot	Yes
( <i>Stenogyne campanulata</i> )			Terrestrial	
Stenogyne kanehoana (ncn)		Endangered	Dicot	Yes
( <i>Stenogyne kanehoana</i> )			Terrestrial	



<b>Hawaii</b>	( 345) species:		<u>Taxa</u>	<u>Critical Habitat</u>
Tetramolopium arenarium (ncn)		Endangered	Dicot	No
( <i>Tetramolopium arenarium</i> )			Terrestrial	
Tetramolopium capillare (ncn)		Endangered	Dicot	Yes
( <i>Tetramolopium capillare</i> )			Terrestrial	
Tetramolopium filiforme (ncn)		Endangered	Dicot	Yes
( <i>Tetramolopium filiforme</i> )			Terrestrial	
Tetramolopium lepidotum ssp. lepidotum (ncn)		Endangered	Dicot	Yes
( <i>Tetramolopium lepidotum ssp. lepidotum</i> )			Terrestrial	
Tetramolopium remyi (ncn)		Endangered	Dicot	Yes
( <i>Tetramolopium remyi</i> )			Terrestrial	
Tetramolopium rockii (ncn)		Threatened	Dicot	Yes
( <i>Tetramolopium rockii</i> )			Coastal (neritic), Terrestrial	
Trematolobelia singularis (ncn)		Endangered	Dicot	Yes
( <i>Trematolobelia singularis</i> )			Terrestrial	
Uhiuhi (Caesalpinia kavaensis)		Endangered	Dicot	No
( <i>Caesalpinia kavaense</i> )			Terrestrial	
Ulihi (Phyllostegia glabra var. lanaiensis)		Endangered	Dicot	No
( <i>Phyllostegia glabra var. lanaiensis</i> )			Terrestrial	
Vetch, Hawaiian (Vicia menziesii)		Endangered	Dicot	No
( <i>Vicia menziesii</i> )			Terrestrial	
Vigna o-wahuensis (ncn)		Endangered	Dicot	Yes
( <i>Vigna o-wahuensis</i> )			Terrestrial	
Viola helenae (ncn)		Endangered	Dicot	Yes
( <i>Viola helenae</i> )			Terrestrial	
Viola lanaiensis (ncn)		Endangered	Dicot	No
( <i>Viola lanaiensis</i> )			Terrestrial	
Viola oahuensis (ncn)		Endangered	Dicot	Yes
( <i>Viola oahuensis</i> )			Terrestrial	
Wahine Noho Kula (Isodendron pyriformum)		Endangered	Dicot	Yes
( <i>Isodendron pyriformum</i> )			Terrestrial	
Xylosma crenatum (ncn)		Endangered	Dicot	Yes
( <i>Xylosma crenatum</i> )			Terrestrial	
Asplenium fragile var. insulare (ncn)		Endangered	Ferns	Yes
( <i>Asplenium fragile var. insulare</i> )			Terrestrial	
Diellia erecta (ncn)		Endangered	Ferns	Yes
( <i>Diellia erecta</i> )			Terrestrial	
Diellia falcata (ncn)		Endangered	Ferns	Yes
( <i>Diellia falcata</i> )			Terrestrial	
Diellia pallida (ncn)		Endangered	Ferns	Yes
( <i>Diellia pallida</i> )			Terrestrial	
Diellia unisora (ncn)		Endangered	Ferns	Yes
( <i>Diellia unisora</i> )			Terrestrial	

**Hawaii**

( 345) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Diplazium molokaiense (ncn)	Endangered	Ferns	Yes
( <i>Diplazium molokaiense</i> )		Terrestrial	
Fern, Pendant Kihī (Adenophorus periens)	Endangered	Ferns	Yes
( <i>Adenophorus periens</i> )		Terrestrial	
'Ihī'Ihī (Marsilea villosa)	Endangered	Ferns	Yes
( <i>Marsilea villosa</i> )		Vernal pool, Terrestrial	
Pauoa (Ctenitis squamigera)	Endangered	Ferns	Yes
( <i>Ctenitis squamigera</i> )		Terrestrial	
Pteris lidgatei (ncn)	Endangered	Ferns	Yes
( <i>Pteris lidgatei</i> )		Terrestrial	
Wawae'iole (Phlegmariurus (=Huperzia) mannii)	Endangered	Ferns	Yes
( <i>Huperzia mannii</i> )		Terrestrial	
Wawae'iole (Phlegmariurus (=Lycopodium) nutans)	Endangered	Ferns	Yes
( <i>Lycopodium (=Phlegmariurus) nutans</i> )		Terrestrial	
Snail, Newcomb's	Threatened	Gastropod	Yes
( <i>Erinna newcombi</i> )		Freshwater	
Snail, O'ahu Tree (Achatinella abbreviata)	Endangered	Gastropod	No
( <i>Achatinella abbreviata</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella apexfulva)	Endangered	Gastropod	No
( <i>Achatinella apexfulva</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella bellula)	Endangered	Gastropod	No
( <i>Achatinella bellula</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella buddii)	Endangered	Gastropod	No
( <i>Achatinella buddii</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella bulimoides)	Endangered	Gastropod	No
( <i>Achatinella bulimoides</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella byronii)	Endangered	Gastropod	No
( <i>Achatinella byronii</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella caesia)	Endangered	Gastropod	No
( <i>Achatinella caesia</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella casta)	Endangered	Gastropod	No
( <i>Achatinella casta</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella cestus)	Endangered	Gastropod	No
( <i>Achatinella cestus</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella concavospira)	Endangered	Gastropod	No
( <i>Achatinella concavospira</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella curta)	Endangered	Gastropod	No
( <i>Achatinella curta</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella decipiens)	Endangered	Gastropod	No
( <i>Achatinella decipiens</i> )		Terrestrial	
Snail, O'ahu Tree (Achatinella decora)	Endangered	Gastropod	No
( <i>Achatinella decora</i> )		Terrestrial	

**Hawaii** ( 345) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Snail, O'ahu Tree ( <i>Achatinella dimorpha</i> ) ( <i>Achatinella dimorpha</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella elegans</i> ) ( <i>Achatinella elegans</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella fulgens</i> ) ( <i>Achatinella fulgens</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella fuscobasis</i> ) ( <i>Achatinella fuscobasis</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella juddii</i> ) ( <i>Achatinella juddii</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella juncea</i> ) ( <i>Achatinella juncea</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella lehuiensis</i> ) ( <i>Achatinella lehuiensis</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella leucorraphe</i> ) ( <i>Achatinella leucorraphe</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella lila</i> ) ( <i>Achatinella lila</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella livida</i> ) ( <i>Achatinella livida</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella lorata</i> ) ( <i>Achatinella lorata</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella mustelina</i> ) ( <i>Achatinella mustelina</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella papyracea</i> ) ( <i>Achatinella papyracea</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella phaeozona</i> ) ( <i>Achatinella phaeozona</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella pulcherrima</i> ) ( <i>Achatinella pulcherrima</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella pupukanioe</i> ) ( <i>Achatinella pupukanioe</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella rosea</i> ) ( <i>Achatinella rosea</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella sowerbyana</i> ) ( <i>Achatinella sowerbyana</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella spaldingi</i> ) ( <i>Achatinella spaldingi</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella stewartii</i> ) ( <i>Achatinella stewartii</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella swiftii</i> ) ( <i>Achatinella swiftii</i> )	Endangered	Gastropod Terrestrial	No

**Hawaii** ( 345) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Snail, O'ahu Tree ( <i>Achatinella taeniolata</i> ) ( <i>Achatinella taeniolata</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella thaanumi</i> ) ( <i>Achatinella thaanumi</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella turgida</i> ) ( <i>Achatinella turgida</i> )	Endangered	Gastropod Terrestrial	No
Snail, O'ahu Tree ( <i>Achatinella valida</i> ) ( <i>Achatinella valida</i> )	Endangered	Gastropod Terrestrial	No
Moth, Blackburn's Sphinx ( <i>Manduca blackburni</i> )	Endangered	Insect Terrestrial	Yes
Bat, Hawaiian Hoary ( <i>Lasiurus cinereus semotus</i> )	Endangered	Mammal Terrestrial, Subterraneous	No
Seal, Hawaiian Monk ( <i>Monachus schauinslandi</i> )	Endangered	Marine mml Coastal (neritic), Saltwater	Yes
Bluegrass, Hawaiian ( <i>Poa sandvicensis</i> )	Endangered	Monocot Terrestrial	Yes
Bluegrass, Mann's ( <i>Poa mannii</i> ) ( <i>Poa mannii</i> )	Endangered	Monocot Terrestrial	Yes
Gahnia Lanaiensis (ncn) ( <i>Gahnia lanaiensis</i> )	Endangered	Monocot Terrestrial	No
Grass, Fosberg's Love ( <i>Eragrostis fosbergii</i> )	Endangered	Monocot Terrestrial	Yes
Hala Pepe ( <i>Pleomele hawaiiensis</i> ) ( <i>Pleomele hawaiiensis</i> )	Endangered	Monocot Terrestrial	Yes
Hilo Ischaemum ( <i>Ischaemum byrone</i> ) ( <i>Ischaemum byrone</i> )	Endangered	Monocot Terrestrial	Yes
Kamanomano ( <i>Cenchrus agrimonioides</i> ) ( <i>Cenchrus agrimonioides</i> )	Endangered	Monocot Terrestrial	Yes
Lau'ehu ( <i>Panicum niihauense</i> ) ( <i>Panicum niihauense</i> )	Endangered	Monocot Terrestrial	Yes
Lo`ulu ( <i>Pritchardia affinis</i> ) ( <i>Pritchardia affinis</i> )	Endangered	Monocot Terrestrial	No
Lo`ulu ( <i>Pritchardia kaalae</i> ) ( <i>Pritchardia kaalae</i> )	Endangered	Monocot Terrestrial	No
Lo`ulu ( <i>Pritchardia munroi</i> ) ( <i>Pritchardia munroi</i> )	Endangered	Monocot Terrestrial	Yes
Lo`ulu ( <i>Pritchardia napaliensis</i> ) ( <i>Pritchardia napaliensis</i> )	Endangered	Monocot Terrestrial	No
Lo`ulu ( <i>Pritchardia remota</i> ) ( <i>Pritchardia remota</i> )	Endangered	Monocot Terrestrial	Yes
Lo`ulu ( <i>Pritchardia schattaueri</i> ) ( <i>Pritchardia schattaueri</i> )	Endangered	Monocot Terrestrial	No

<b>Hawaii</b>	( 345) species:		<u>Taxa</u>	<u>Critical Habitat</u>
Lo`ulu ( <i>Pritchardia viscosa</i> )		Endangered	Monocot	No
	( <i>Pritchardia viscosa</i> )		Terrestrial	
Mariscus fauriei (ncn)		Endangered	Monocot	Yes
	( <i>Mariscus fauriei</i> )		Terrestrial	
Mariscus pennatiformis (ncn)		Endangered	Monocot	Yes
	( <i>Mariscus pennatiformis</i> )		Terrestrial	
Panicgrass, Carter's ( <i>Panicum fauriei</i> var. <i>carteri</i> )		Endangered	Monocot	Yes
	( <i>Panicum fauriei</i> var. <i>carteri</i> )		Terrestrial	
Platanthera holochila (ncn)		Endangered	Monocot	Yes
	( <i>Platanthera holochila</i> )		Terrestrial	
Poa siphonoglossa (ncn)		Endangered	Monocot	Yes
	( <i>Poa siphonoglossa</i> )		Terrestrial	
Pu`uka'a ( <i>Cyperus trachysanthos</i> )		Endangered	Monocot	Yes
	( <i>Cyperus trachysanthos</i> )		Terrestrial	
Wahane ( <i>Pritchardia aylmer-robinsonii</i> )		Endangered	Monocot	No
	( <i>Pritchardia aylmer-robinsonii</i> )		Terrestrial	
Sea turtle, green		Endangered	Reptile	No
	( <i>Chelonia mydas</i> )		Saltwater	
Sea turtle, hawksbill		Endangered	Reptile	Yes
	( <i>Eretmochelys imbricata</i> )		Saltwater	

<b>Louisiana</b>	( 10) species:		<u>Taxa</u>	<u>Critical Habitat</u>
Woodpecker, Red-cockaded		Endangered	Bird	No
	( <i>Picoides borealis</i> )		Terrestrial	
Mucket, Pink (Pearlymussel)		Endangered	Bivalve	No
	( <i>Lampsilis abrupta</i> )		Freshwater	
Sturgeon, Pallid		Endangered	Fish	No
	( <i>Scaphirhynchus albus</i> )		Freshwater	
Whale, Finback		Endangered	Marine mml	No
	( <i>Balaenoptera physalus</i> )		Saltwater	
Whale, Humpback		Endangered	Marine mml	No
	( <i>Megaptera novaeangliae</i> )		Saltwater	
Sea turtle, green		Endangered	Reptile	No
	( <i>Chelonia mydas</i> )		Saltwater	
Sea turtle, hawksbill		Endangered	Reptile	Yes
	( <i>Eretmochelys imbricata</i> )		Saltwater	
Sea turtle, Kemp's ridley		Endangered	Reptile	No
	( <i>Lepidochelys kempii</i> )		Saltwater	
Sea turtle, leatherback		Endangered	Reptile	Yes
	( <i>Dermochelys coriacea</i> )		Saltwater	
Sea turtle, loggerhead		Threatened	Reptile	No
	( <i>Caretta caretta</i> )		Saltwater	

<b>Mississippi</b>	( 25) species:		<u>Taxa</u>	<u>Critical Habitat</u>
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**Mississippi** ( 25) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Frog, Dusky Gopher (Mississippi DPS) ( <i>Rana capito sevosa</i> )	Endangered	Amphibian Terrestrial, Freshwater	No
Crane, Mississippi Sandhill ( <i>Grus canadensis pulla</i> )	Endangered	Bird Terrestrial, Freshwater	Yes
Pelican, Brown ( <i>Pelecanus occidentalis</i> )	Endangered	Bird Terrestrial	No
Plover, Piping ( <i>Charadrius melodus</i> )	Endangered	Bird Terrestrial	Yes
Tern, Interior (population) Least ( <i>Sterna antillarum</i> )	Endangered	Bird Terrestrial	No
Woodpecker, Red-cockaded ( <i>Picoides borealis</i> )	Endangered	Bird Terrestrial	No
Mussel, Heelsplitter Inflated ( <i>Potamilus inflatus</i> )	Threatened	Bivalve Freshwater	No
Pondberry ( <i>Lindera melissifolia</i> )	Endangered	Dicot Terrestrial	No
Quillwort, Louisiana ( <i>Isoetes louisianensis</i> )	Endangered	Ferns Freshwater, Terrestrial	No
Darter, Bayou ( <i>Etheostoma rubrum</i> )	Threatened	Fish Freshwater	No
Sturgeon, Gulf ( <i>Acipenser oxyrinchus desotoi</i> )	Threatened	Fish Saltwater, Freshwater	Yes
Sturgeon, Pallid ( <i>Scaphirhynchus albus</i> )	Endangered	Fish Freshwater	No
Bat, Gray ( <i>Myotis grisescens</i> )	Endangered	Mammal Subterraneous, Terrestrial	No
Bear, Louisiana Black ( <i>Ursus americanus luteolus</i> )	Threatened	Mammal Terrestrial	No
Whale, Finback ( <i>Balaenoptera physalus</i> )	Endangered	Marine mml Saltwater	No
Whale, Humpback ( <i>Megaptera novaeangliae</i> )	Endangered	Marine mml Saltwater	No
Sea turtle, green ( <i>Chelonia mydas</i> )	Endangered	Reptile Saltwater	No
Sea turtle, hawksbill ( <i>Eretmochelys imbricata</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, Kemp's ridley ( <i>Lepidochelys kempii</i> )	Endangered	Reptile Saltwater	No
Sea turtle, leatherback ( <i>Dermochelys coriacea</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, loggerhead ( <i>Caretta caretta</i> )	Threatened	Reptile Saltwater	No

**Mississippi** ( 25) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Snake, Eastern Indigo ( <i>Drymarchon corais couperi</i> )	Threatened	Reptile Terrestrial	No
Tortoise, Gopher ( <i>Gopherus polyphemus</i> )	Threatened	Reptile Terrestrial	No
Turtle, Ringed Sawback ( <i>Graptemys oculifera</i> )	Threatened	Reptile Freshwater, Terrestrial	No
Turtle, Yellow-blotched Map ( <i>Graptemys flavimaculata</i> )	Threatened	Reptile Freshwater, Terrestrial	No

**Missouri** ( 5) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Bladderpod, Missouri ( <i>Lesquerella filiformis</i> )	Threatened	Dicot Terrestrial	No
Fruit, Earth (=geocarpon) ( <i>Geocarpon minimum</i> )	Threatened	Dicot Terrestrial	No
Cavefish, Ozark ( <i>Amblyopsis rosae</i> )	Threatened	Fish Freshwater	No
Darter, Niangua ( <i>Etheostoma nianguae</i> )	Threatened	Fish Freshwater	Yes
Bat, Gray ( <i>Myotis grisescens</i> )	Endangered	Mammal Subterranean, Terrestrial	No

**New Mexico** ( 3) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Falcon, Northern Aplomado ( <i>Falco femoralis septentrionalis</i> )	Endangered	Bird Terrestrial	No
Tern, Interior (population) Least ( <i>Sterna antillarum</i> )	Endangered	Bird Terrestrial	No
Ferret, Black-footed ( <i>Mustela nigripes</i> )	Endangered	Mammal Terrestrial	No

**North Carolina** ( 35) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Plover, Piping ( <i>Charadrius melodus</i> )	Endangered	Bird Terrestrial	Yes
Woodpecker, Red-cockaded ( <i>Picooides borealis</i> )	Endangered	Bird Terrestrial	No
Mussel, Dwarf Wedge ( <i>Alasmidonta heterodon</i> )	Endangered	Bivalve Freshwater	No
Pearlymussel, Little-wing ( <i>Pegias fabula</i> )	Endangered	Bivalve Freshwater	No
Purple Bean ( <i>Villosa perpurpurea</i> )	Endangered	Bivalve Freshwater	Yes
Spiny mussel, Tar River ( <i>Elliptio steinstansana</i> )	Endangered	Bivalve Freshwater	No
Amaranth, Seabeach ( <i>Amaranthus pumilus</i> )	Threatened	Dicot Coastal (neritic)	No

**North Carolina** ( 35) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Bittercress, Small-anthered ( <i>Cardamine micranthera</i> )	Endangered	Dicot Terrestrial	No
Chaffseed, American ( <i>Schwalbea americana</i> )	Endangered	Dicot Terrestrial	No
Coneflower, Smooth ( <i>Echinacea laevigata</i> )	Endangered	Dicot Terrestrial	No
Dropwort, Canby's ( <i>Oxypolis canbyi</i> )	Endangered	Dicot Terrestrial, Freshwater	No
Harperella ( <i>Ptilimnium nodosum</i> )	Endangered	Dicot Freshwater	No
Heather, Mountain Golden ( <i>Hudsonia montana</i> )	Threatened	Dicot Terrestrial	Yes
Joint-vetch, Sensitive ( <i>Aeschynomene virginica</i> )	Threatened	Dicot Terrestrial, Brackish	No
Loosestrife, Rough-leaved ( <i>Lysimachia asperulaefolia</i> )	Endangered	Dicot Terrestrial	No
Meadowrue, Cooley's ( <i>Thalictrum cooleyi</i> )	Endangered	Dicot Terrestrial	No
Pondberry ( <i>Lindera melissifolia</i> )	Endangered	Dicot Terrestrial	No
Sumac, Michaux's ( <i>Rhus michauxii</i> )	Endangered	Dicot Terrestrial	No
Shiner, Cape Fear ( <i>Notropis mekistocholas</i> )	Endangered	Fish Freshwater	Yes
Silverside, Waccamaw ( <i>Menidia extensa</i> )	Threatened	Fish Freshwater	Yes
Sturgeon, Shortnose ( <i>Acipenser brevirostrum</i> )	Endangered	Fish Saltwater, Freshwater	No
Butterfly, Saint Francis' Satyr ( <i>Neonympha mitchellii francisci</i> )	Endangered	Insect Terrestrial	No
Bat, Indiana ( <i>Myotis sodalis</i> )	Endangered	Mammal Subterranean, Terrestrial	Yes
Squirrel, Carolina Northern Flying ( <i>Glaucomys sabrinus coloratus</i> )	Endangered	Mammal Terrestrial	No
Manatee, West Indian ( <i>Trichechus manatus</i> )	Endangered	Marine mml Saltwater	Yes
Whale, Finback ( <i>Balaenoptera physalus</i> )	Endangered	Marine mml Saltwater	No
Whale, Humpback ( <i>Megaptera novaeangliae</i> )	Endangered	Marine mml Saltwater	No
Whale, northern right ( <i>Eubalaena glacialis (incl. australis)</i> )	Endangered	Marine mml Saltwater	Yes



**North Carolina**

( 35) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Pogonia, Small Whorled ( <i>Isotria medeoloides</i> )	Threatened	Monocot Terrestrial	No
Sedge, Golden ( <i>Carex lutea</i> )	Endangered	Monocot Terrestrial	No
Sea turtle, green ( <i>Chelonia mydas</i> )	Endangered	Reptile Saltwater	No
Sea turtle, hawksbill ( <i>Eretmochelys imbricata</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, Kemp's ridley ( <i>Lepidochelys kempii</i> )	Endangered	Reptile Saltwater	No
Sea turtle, leatherback ( <i>Dermochelys coriacea</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, loggerhead ( <i>Caretta caretta</i> )	Threatened	Reptile Saltwater	No

**Oklahoma**

( 12) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Crane, Whooping ( <i>Grus americana</i> )	Endangered	Bird Terrestrial, Freshwater	Yes
Plover, Piping ( <i>Charadrius melodus</i> )	Endangered	Bird Terrestrial	Yes
Tern, Interior (population) Least ( <i>Sterna antillarum</i> )	Endangered	Bird Terrestrial	No
Vireo, Black-capped ( <i>Vireo atricapilla</i> )	Endangered	Bird Terrestrial	No
Woodpecker, Red-cockaded ( <i>Picoides borealis</i> )	Endangered	Bird Terrestrial	No
Cavefish, Ozark ( <i>Amblyopsis rosae</i> )	Threatened	Fish Freshwater	No
Madtom, Neosho ( <i>Noturus placidus</i> )	Threatened	Fish Freshwater	No
Shiner, Arkansas River ( <i>Notropis girardi</i> )	Threatened	Fish Freshwater	Yes
Beetle, American Burying ( <i>Nicrophorus americanus</i> )	Endangered	Insect Terrestrial	No
Bat, Gray ( <i>Myotis grisescens</i> )	Endangered	Mammal Subterranean, Terrestrial	No
Bat, Indiana ( <i>Myotis sodalis</i> )	Endangered	Mammal Subterranean, Terrestrial	Yes
Bat, Ozark Big-eared ( <i>Corynorhinus (=Plecotus) townsendii ingens</i> )	Endangered	Mammal Terrestrial, Subterranean	No

**Puerto Rico**

( 67) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Coqui, Golden ( <i>Eleutherodactylus jasperi</i> )	Threatened	Amphibian Freshwater, Terrestrial	Yes

**Puerto Rico**

( 67) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Guajon ( <i>Eleutherodactylus cooki</i> )	Threatened	Amphibian Freshwater, Terrestrial	No
Toad, Puerto Rican Crested ( <i>Peltophryne lemur</i> )	Threatened	Amphibian Terrestrial, Freshwater	No
Blackbird, Yellow-shouldered ( <i>Agelaius xanthomus</i> )	Endangered	Bird Terrestrial	Yes
Hawk, Puerto Rican Broad-winged ( <i>Buteo platypterus brunnescens</i> )	Endangered	Bird Terrestrial	No
Hawk, Puerto Rican Sharp-shinned ( <i>Accipiter striatus venator</i> )	Endangered	Bird Terrestrial	No
Nightjar, Puerto Rico ( <i>Caprimulgus noctitherus</i> )	Endangered	Bird Terrestrial	No
Parrot, Puerto Rican ( <i>Amazona vittata</i> )	Endangered	Bird Terrestrial	No
Pelican, Brown ( <i>Pelecanus occidentalis</i> )	Endangered	Bird Terrestrial	No
Pigeon, Puerto Rican Plain ( <i>Columba inornata wetmorei</i> )	Endangered	Bird Terrestrial	No
Plover, Piping ( <i>Charadrius melodus</i> )	Endangered	Bird Terrestrial	Yes
Tern, Roseate ( <i>Sterna dougallii dougallii</i> )	Endangered	Bird Terrestrial	No
Auerodendron pauciflorum (ncn) ( <i>Auerodendron pauciflorum</i> )	Endangered	Dicot Terrestrial	No
Bariaco ( <i>Trichilia triacantha</i> )	Endangered	Dicot Terrestrial	No
Boxwood, Vahl's ( <i>Buxus vahlii</i> )	Endangered	Dicot Terrestrial	No
Capa Rosa ( <i>Callicarpa ampla</i> )	Endangered	Dicot Terrestrial	No
Catesbaea Melanocarpa (ncn) ( <i>Catesbaea melanocarpa</i> )	Endangered	Dicot Terrestrial	No
Chamaecrista glandulosa (ncn) ( <i>Chamaecrista glandulosa var. mirabilis</i> )	Endangered	Dicot Terrestrial	No
Chumbo, Higo ( <i>Harrisia portoricensis</i> )	Threatened	Dicot Terrestrial	No
Chupacallos ( <i>Pleodendron macranthum</i> )	Endangered	Dicot Terrestrial	No
Cobana Negra ( <i>Stahlia monosperma</i> )	Threatened	Dicot Terrestrial	No
Cordia bellonis (ncn) ( <i>Cordia bellonis</i> )	Endangered	Dicot Terrestrial	No

**Puerto Rico** ( 67) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Daphnopsis hellerana (ncn)	Endangered	Dicot	No
( <i>Daphnopsis hellerana</i> )		Terrestrial	
Erubia	Endangered	Dicot	No
( <i>Solanum drymophilum</i> )		Terrestrial	
Eugenia Woodburyana	Endangered	Dicot	No
( <i>Eugenia woodburyana</i> )		Terrestrial	
Gesneria pauciflora (ncn)	Threatened	Dicot	No
( <i>Gesneria pauciflora</i> )		Terrestrial	
Goetzea, Beautiful (Matabuey)	Endangered	Dicot	No
( <i>Goetzea elegans</i> )		Terrestrial	
Higuero De Sierra	Endangered	Dicot	No
( <i>Crescentia portoricensis</i> )		Terrestrial	
Holly, Cook's	Endangered	Dicot	No
( <i>Ilex cookii</i> )		Terrestrial	
Ilex sintenisii (ncn)	Endangered	Dicot	No
( <i>Ilex sintenisii</i> )		Terrestrial	
Lyonia truncata var. proctorii (ncn)	Endangered	Dicot	No
( <i>Lyonia truncata var. proctorii</i> )		Terrestrial	
Mitracarpus Maxwelliae	Endangered	Dicot	No
( <i>Mitracarpus maxwelliae</i> )		Terrestrial	
Mitracarpus Polycladus	Endangered	Dicot	No
( <i>Mitracarpus polycladus</i> )		Terrestrial	
Myrcia Paganii	Endangered	Dicot	No
( <i>Myrcia paganii</i> )		Terrestrial	
Palo Colorado (Ternstroemia luquillensis)	Endangered	Dicot	No
( <i>Ternstroemia luquillensis</i> )		Terrestrial	
Palo de Jazmin	Endangered	Dicot	No
( <i>Styrax portoricensis</i> )		Terrestrial	
Palo de Nigua	Endangered	Dicot	No
( <i>Cornutia obovata</i> )		Terrestrial	
Palo de Ramon	Endangered	Dicot	No
( <i>Banara vanderbiltii</i> )		Terrestrial	
Palo de Rosa	Endangered	Dicot	No
( <i>Ottoschulzia rhodoxylon</i> )		Terrestrial	
Peperomia, Wheeler's	Endangered	Dicot	No
( <i>Peperomia wheeleri</i> )		Terrestrial	
Prickly-ash, St. Thomas	Endangered	Dicot	No
( <i>Zanthoxylum thomasianum</i> )		Terrestrial	
Schoepfia arenaria (ncn)	Threatened	Dicot	No
( <i>Schoepfia arenaria</i> )		Terrestrial	
Ternstroemia subsessilis (ncn)	Endangered	Dicot	No
( <i>Ternstroemia subsessilis</i> )		Terrestrial	

**Puerto Rico**

( 67) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Uvillo	Endangered	Dicot	No
( <i>Eugenia haematocarpa</i> )		Terrestrial	
Vernonia Proctorii (ncn)	Endangered	Dicot	No
( <i>Vernonia proctorii</i> )		Terrestrial	
Walnut, Nogal	Endangered	Dicot	No
( <i>Juglans jamaicensis</i> )		Terrestrial	
Fern, Adiantum vivesii	Endangered	Ferns	No
( <i>Adiantum vivesii</i> )		Terrestrial	
Fern, Elaphoglossum serpens	Endangered	Ferns	No
( <i>Elaphoglossum serpens</i> )		Terrestrial	
Fern, Thelypteris inabonensis	Endangered	Ferns	No
( <i>Thelypteris inabonensis</i> )		Terrestrial	
Fern, Thelypteris verecunda	Endangered	Ferns	No
( <i>Thelypteris verecunda</i> )		Terrestrial	
Fern, Thelypteris yaucoensis	Endangered	Ferns	No
( <i>Thelypteris yaucoensis</i> )		Terrestrial	
Polystichum calderonense (ncn)	Endangered	Ferns	No
( <i>Polystichum calderonense</i> )		Terrestrial	
Tectaria Estremerana	Endangered	Ferns	No
( <i>Tectaria estremerana</i> )		Terrestrial	
Tree Fern, Elfin	Endangered	Ferns	No
( <i>Cyathea dryopteroides</i> )		Terrestrial	
Manatee, West Indian	Endangered	Marine mml	Yes
( <i>Trichechus manatus</i> )		Saltwater	
Aristida chaseae (ncn)	Endangered	Monocot	No
( <i>Aristida chaseae</i> )		Terrestrial	
Cranichis Ricartii	Endangered	Monocot	No
( <i>Cranichis ricartii</i> )		Terrestrial	
Lepanthes eltorensis (ncn)	Endangered	Monocot	No
( <i>Lepanthes eltorensis</i> )		Terrestrial	
Manaca, palma de	Threatened	Monocot	No
( <i>Calyptrotrichum rivasii</i> )		Terrestrial	
Pelos del Diablo	Endangered	Monocot	No
( <i>Aristida portoricensis</i> )		Terrestrial	
Boa, Mona	Threatened	Reptile	Yes
( <i>Epicrates monensis monensis</i> )		Terrestrial	
Boa, Puerto Rican	Endangered	Reptile	No
( <i>Epicrates inornatus</i> )		Terrestrial	
Gecko, Monito	Endangered	Reptile	Yes
( <i>Sphaerodactylus micropithecus</i> )		Terrestrial	
Iguana, Mona Ground	Threatened	Reptile	Yes
( <i>Cyclura stejnegeri</i> )		Terrestrial	

**Puerto Rico** ( 67) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Sea turtle, green ( <i>Chelonia mydas</i> )	Endangered	Reptile Saltwater	No
Sea turtle, hawksbill ( <i>Eretmochelys imbricata</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, leatherback ( <i>Dermochelys coriacea</i> )	Endangered	Reptile Saltwater	Yes

**South Carolina** ( 32) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Salamander, Flatwoods ( <i>Ambystoma cingulatum</i> )	Threatened	Amphibian Freshwater, Vernal pool, Terrestrial	No
Plover, Piping ( <i>Charadrius melodus</i> )	Endangered	Bird Terrestrial	Yes
Stork, Wood ( <i>Mycteria americana</i> )	Endangered	Bird Terrestrial	No
Warbler, Bachman's ( <i>Vermivora bachmanii</i> )	Endangered	Bird Terrestrial	No
Woodpecker, Red-cockaded ( <i>Picoides borealis</i> )	Endangered	Bird Terrestrial	No
Mussel, Heelsplitter Carolina ( <i>Lasmigona decorata</i> )	Endangered	Bivalve Freshwater	Yes
Amaranth, Seabeach ( <i>Amaranthus pumilus</i> )	Threatened	Dicot Coastal (neritic)	No
Amphianthus, Little ( <i>Amphianthus pusillus</i> )	Threatened	Dicot Freshwater	No
Chaffseed, American ( <i>Schwalbea americana</i> )	Endangered	Dicot Terrestrial	No
Coneflower, Smooth ( <i>Echinacea laevigata</i> )	Endangered	Dicot Terrestrial	No
Dropwort, Canby's ( <i>Oxypolis canbyi</i> )	Endangered	Dicot Terrestrial, Freshwater	No
Gooseberry, Miccosukee ( <i>Ribes echinellum</i> )	Threatened	Dicot Terrestrial	No
Harperella ( <i>Ptilimnium nodosum</i> )	Endangered	Dicot Freshwater	No
Heartleaf, Dwarf-flowered ( <i>Hexastylis naniflora</i> )	Threatened	Dicot Terrestrial	No
Loosestrife, Rough-leaved ( <i>Lysimachia asperulaefolia</i> )	Endangered	Dicot Terrestrial	No
Pondberry ( <i>Lindera melissifolia</i> )	Endangered	Dicot Terrestrial	No
Sunflower, Schweinitz's ( <i>Helianthus schweinitzii</i> )	Endangered	Dicot Terrestrial	No
Sturgeon, Shortnose ( <i>Acipenser brevirostrum</i> )	Endangered	Fish Saltwater, Freshwater	No

**South Carolina** ( 32) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Bat, Indiana ( <i>Myotis sodalis</i> )	Endangered	Mammal Subterraneous, Terrestrial	Yes
Manatee, West Indian ( <i>Trichechus manatus</i> )	Endangered	Marine mml Saltwater	Yes
Whale, Finback ( <i>Balaenoptera physalus</i> )	Endangered	Marine mml Saltwater	No
Whale, Humpback ( <i>Megaptera novaeangliae</i> )	Endangered	Marine mml Saltwater	No
Whale, northern right ( <i>Eubalaena glacialis (incl. australis)</i> )	Endangered	Marine mml Saltwater	Yes
Pogonia, Small Whorled ( <i>Isotria medeoloides</i> )	Threatened	Monocot Terrestrial	No
Trillium, Persistent ( <i>Trillium persistens</i> )	Endangered	Monocot Terrestrial	No
Trillium, Relict ( <i>Trillium reliquum</i> )	Endangered	Monocot Terrestrial	No
Sea turtle, green ( <i>Chelonia mydas</i> )	Endangered	Reptile Saltwater	No
Sea turtle, hawksbill ( <i>Eretmochelys imbricata</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, Kemp's ridley ( <i>Lepidochelys kempii</i> )	Endangered	Reptile Saltwater	No
Sea turtle, leatherback ( <i>Dermochelys coriacea</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, loggerhead ( <i>Caretta caretta</i> )	Threatened	Reptile Saltwater	No
Snake, Eastern Indigo ( <i>Drymarchon corais couperi</i> )	Threatened	Reptile Terrestrial	No

**Tennessee** ( 4) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Chub, Spottfin ( <i>Erimonax monachus</i> )	Threatened	Fish Freshwater	Yes
Darter, Slackwater ( <i>Etheostoma boschungii</i> )	Threatened	Fish Freshwater	Yes
Bat, Gray ( <i>Myotis grisescens</i> )	Endangered	Mammal Subterraneous, Terrestrial	No
Bat, Indiana ( <i>Myotis sodalis</i> )	Endangered	Mammal Subterraneous, Terrestrial	Yes

**Texas** ( 65) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Salamander, Barton Springs ( <i>Eurycea sosorum</i> )	Endangered	Amphibian Freshwater, Terrestrial	No
Salamander, San Marcos ( <i>Eurycea nana</i> )	Threatened	Amphibian Freshwater, Terrestrial	Yes

**Texas**

( 65) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Salamander, Texas Blind ( <i>Typhlomolge rathbuni</i> )	Endangered	Amphibian Subterranean, Freshwater	No
Toad, Houston ( <i>Bufo houstonensis</i> )	Endangered	Amphibian Terrestrial, Freshwater	Yes
Harvestman, Bee Creek Cave ( <i>Texella reddelli</i> )	Endangered	Arachnid Terrestrial, Subterranean	No
Harvestman, Bone Cave ( <i>Texella reyesi</i> )	Endangered	Arachnid Terrestrial, Subterranean	No
Harvestman, Robber Baron Cave ( <i>Texella cokendolpheri</i> )	Endangered	Arachnid Subterranean, Terrestrial	Yes
Meshweaver, Braken Bat Cave ( <i>Cicurina venii</i> )	Endangered	Arachnid Terrestrial, Subterranean	Yes
Pseudoscorpion, Tooth Cave ( <i>Tartarocreagris texana</i> )	Endangered	Arachnid Terrestrial, Subterranean	No
Spider, Government Canyon Cave ( <i>Neoleptoneta microps</i> )	Endangered	Arachnid Subterranean, Terrestrial	No
Spider, Madla's Cave ( <i>Cicurina madla</i> )	Endangered	Arachnid Subterranean, Terrestrial	Yes
Spider, Robber Baron Cave ( <i>Cicurina baronia</i> )	Endangered	Arachnid Terrestrial, Subterranean	Yes
Spider, Tooth Cave ( <i>Neoleptoneta myopica</i> )	Endangered	Arachnid Terrestrial, Subterranean	No
Spider, Vesper Cave ( <i>Cicurina vespera</i> )	Endangered	Arachnid Subterranean, Terrestrial	No
Crane, Whooping ( <i>Grus americana</i> )	Endangered	Bird Terrestrial, Freshwater	Yes
Falcon, Northern Aplomado ( <i>Falco femoralis septentrionalis</i> )	Endangered	Bird Terrestrial	No
Flycatcher, Southwestern Willow ( <i>Empidonax traillii extimus</i> )	Endangered	Bird Terrestrial	Yes
Owl, Mexican Spotted ( <i>Strix occidentalis lucida</i> )	Threatened	Bird Terrestrial	Yes
Pelican, Brown ( <i>Pelecanus occidentalis</i> )	Endangered	Bird Terrestrial	No
Plover, Piping ( <i>Charadrius melodus</i> )	Endangered	Bird Terrestrial	Yes
Prairie-chicken, Attwater's Greater ( <i>Tympanuchus cupido attwateri</i> )	Endangered	Bird Terrestrial	No
Tern, Interior (population) Least ( <i>Sterna antillarum</i> )	Endangered	Bird Terrestrial	No
Vireo, Black-capped ( <i>Vireo atricapilla</i> )	Endangered	Bird Terrestrial	No

**Texas** ( 65) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Warbler (=Wood), Golden-cheeked ( <i>Dendroica chrysoparia</i> )	Endangered	Bird Terrestrial	No
Woodpecker, Red-cockaded ( <i>Picoides borealis</i> )	Endangered	Bird Terrestrial	No
Amphipod, Peck's Cave ( <i>Stygobromus</i> (=Stygonectes) <i>pecki</i> )	Endangered	Crustacean Subterranean, Freshwater	No
Ambrosia, South Texas ( <i>Ambrosia cheiranthifolia</i> )	Endangered	Dicot Terrestrial	No
Ayenia, Texas ( <i>Ayenia limitaris</i> )	Endangered	Dicot Terrestrial	No
Cactus, Black Lace ( <i>Echinocereus reichenbachii</i> var. <i>albertii</i> )	Endangered	Dicot Terrestrial	No
Cactus, Sneed Pincushion ( <i>Coryphantha sneedii</i> var. <i>sneedii</i> )	Endangered	Dicot Terrestrial	No
Cactus, Star ( <i>Astrophytum asterias</i> )	Endangered	Dicot Terrestrial	No
Cactus, Tobusch Fishhook ( <i>Ancistrocactus tobuschii</i> )	Endangered	Dicot Terrestrial	No
Dawn-flower, Texas Prairie (=Texas Bitterweed) ( <i>Hymenoxys texana</i> )	Endangered	Dicot Terrestrial	No
Fruit, Earth (=geocarpon) ( <i>Geocarpon minimum</i> )	Threatened	Dicot Terrestrial	No
Manioc, Walker's ( <i>Manihot walkerae</i> )	Endangered	Dicot Terrestrial	No
Phlox, Texas Trailing ( <i>Phlox nivalis</i> ssp. <i>texensis</i> )	Endangered	Dicot Terrestrial	No
Poppy-mallow, Texas ( <i>Callirhoe scabriuscula</i> )	Endangered	Dicot Terrestrial	No
Sand-verbena, Large-fruited ( <i>Abronia macrocarpa</i> )	Endangered	Dicot Terrestrial	No
Snowbells, Texas ( <i>Styrax texanus</i> )	Endangered	Dicot Terrestrial	No
Darter, Fountain ( <i>Etheostoma fonticola</i> )	Endangered	Fish Freshwater	Yes
Gambusia, San Marcos ( <i>Gambusia georgei</i> )	Endangered	Fish Freshwater	Yes
Minnow, Devils River ( <i>Dionda diaboli</i> )	Threatened	Fish Freshwater	No
Beetle, American Burying ( <i>Nicrophorus americanus</i> )	Endangered	Insect Terrestrial	No
Beetle, Coffin Cave Mold ( <i>Batrisodes texanus</i> )	Endangered	Insect Subterranean	No



**Texas** ( 65) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Beetle, Comal Springs Dryopid ( <i>Stygoparnus comalensis</i> )	Endangered	Insect Subterranean, Freshwater	No
Beetle, Comal Springs Riffle ( <i>Heterelmis comalensis</i> )	Endangered	Insect Subterranean, Freshwater	No
Beetle, Helotes Mold ( <i>Batrisodes venyivi</i> )	Endangered	Insect Subterranean	Yes
Beetle, Kretschmarr Cave Mold ( <i>Texamaurops reddelli</i> )	Endangered	Insect Subterranean	No
Beetle, Tooth Cave Ground ( <i>Rhadine persephone</i> )	Endangered	Insect Subterranean	No
Rhadine exilis (ncn) ( <i>Rhadine exilis</i> )	Endangered	Insect Terrestrial, Subterranean	Yes
Rhadine infernalis (ncn) ( <i>Rhadine infernalis</i> )	Endangered	Insect Terrestrial, Subterranean	Yes
Bear, Louisiana Black ( <i>Ursus americanus luteolus</i> )	Threatened	Mammal Terrestrial	No
Jaguarundi, Gulf Coast ( <i>Herpailurus (=Felis) yagouaroundi cacomitli</i> )	Endangered	Mammal Terrestrial	No
Jaguarundi, Sinaloan ( <i>Herpailurus (=Felis) yagouaroundi tolteca</i> )	Endangered	Mammal Terrestrial	No
Ocelot ( <i>Leopardus (=Felis) pardalis</i> )	Endangered	Mammal Terrestrial	No
Whale, Finback ( <i>Balaenoptera physalus</i> )	Endangered	Marine mml Saltwater	No
Whale, Humpback ( <i>Megaptera novaeangliae</i> )	Endangered	Marine mml Saltwater	No
Ladies'-tresses, Navasota ( <i>Spiranthes parksii</i> )	Endangered	Monocot Terrestrial	No
Wild-rice, Texas ( <i>Zizania texana</i> )	Endangered	Monocot Freshwater	Yes
Sea turtle, green ( <i>Chelonia mydas</i> )	Endangered	Reptile Saltwater	No
Sea turtle, hawksbill ( <i>Eretmochelys imbricata</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, Kemp's ridley ( <i>Lepidochelys kempii</i> )	Endangered	Reptile Saltwater	No
Sea turtle, leatherback ( <i>Dermochelys coriacea</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, loggerhead ( <i>Caretta caretta</i> )	Threatened	Reptile Saltwater	No
Snake, Concho Water ( <i>Nerodia paucimaculata</i> )	Threatened	Reptile Freshwater, Terrestrial	Yes

**Virginia** ( 22) species:

Taxa Critical Habitat

**Virginia**

( 22) species:

		<u>Taxa</u>	<u>Critical Habitat</u>
Plover, Piping ( <i>Charadrius melodus</i> )	Endangered	Bird Terrestrial	Yes
Woodpecker, Red-cockaded ( <i>Picoides borealis</i> )	Endangered	Bird Terrestrial	No
Mussel, Dwarf Wedge ( <i>Alasmidonta heterodon</i> )	Endangered	Bivalve Freshwater	No
Isopod, Madison Cave ( <i>Antrolana lira</i> )	Threatened	Crustacean Freshwater	No
Amaranth, Seabeach ( <i>Amaranthus pumilus</i> )	Threatened	Dicot Coastal (neritic)	No
Chaffseed, American ( <i>Schwalbea americana</i> )	Endangered	Dicot Terrestrial	No
Coneflower, Smooth ( <i>Echinacea laevigata</i> )	Endangered	Dicot Terrestrial	No
Harperella ( <i>Ptilimnium nodosum</i> )	Endangered	Dicot Freshwater	No
Joint-vetch, Sensitive ( <i>Aeschynomene virginica</i> )	Threatened	Dicot Terrestrial, Brackish	No
Sumac, Michaux's ( <i>Rhus michauxii</i> )	Endangered	Dicot Terrestrial	No
Logperch, Roanoke ( <i>Percina rex</i> )	Endangered	Fish Freshwater	No
Beetle, Northeastern Beach Tiger ( <i>Cicindela dorsalis dorsalis</i> )	Threatened	Insect Terrestrial	No
Bat, Indiana ( <i>Myotis sodalis</i> )	Endangered	Mammal Subterranean, Terrestrial	Yes
Squirrel, Delmarva Peninsula Fox ( <i>Sciurus niger cinereus</i> )	Endangered	Mammal Terrestrial	No
Whale, Finback ( <i>Balaenoptera physalus</i> )	Endangered	Marine mml Saltwater	No
Whale, Humpback ( <i>Megaptera novaeangliae</i> )	Endangered	Marine mml Saltwater	No
Whale, northern right ( <i>Eubalaena glacialis (incl. australis)</i> )	Endangered	Marine mml Saltwater	Yes
Sea turtle, green ( <i>Chelonia mydas</i> )	Endangered	Reptile Saltwater	No
Sea turtle, hawksbill ( <i>Eretmochelys imbricata</i> )	Endangered	Reptile Saltwater	Yes
Sea turtle, Kemp's ridley ( <i>Lepidochelys kempii</i> )	Endangered	Reptile Saltwater	No
Sea turtle, leatherback ( <i>Dermochelys coriacea</i> )	Endangered	Reptile Saltwater	Yes

**Virginia**

( 22) species:

Sea turtle, loggerhead  
(*Caretta caretta*)

Threatened

**Taxa**  
Reptile

**Critical Habitat**  
No

Saltwater

**No species were selected for exclusion.**

**Dispersed species included in report.**

