SAN FRANCISCO BAY AND DELTA FISH SPECIES

1. Tidewater Goby (*Eucyclogobius newberryi*)

Bay Area Occurrence: Marin, Sonoma and San Mateo Counties; extirpated from Contra Costa, Alameda and San Francisco Counties
State Status: Species of Special Concern
Federal Status: Endangered, 1994
Pesticides Requiring Consultation: diazinon.

The tidewater goby is a small fish that inhabits coastal brackish water along the coast of California. It is found in Marin, Sonoma and San Mateo Counties; it is extirpated from Contra Costa, Alameda and San Francisco Counties. It was listed as endangered in 1994. The USFWS is concerned about high diazinon levels that can cause water column toxicity in lagoons that are tidewater goby habitat, noting that some creeks in Marin County are considered by the State Water Resources Control Board (SWRCB) to be "Water Quality Limited" due to diazinon in urban runoff.[1] From 250,000 to 1 million pounds of diazinon were used from 1999-2003 in the Bay Area.[2] Pesticides of concern are used in or upstream of areas of tidewater goby observations in southern coastal San Mateo County.

2. Delta Smelt (*Hypomesus transpacificus*)

Bay Area Occurrence: Solano and Contra Costa Counties
State Status: Threatened, 1993
Federal Status: Threatened, 1993
Pesticides Requiring Consultation: alachlor, atrazine, carbaryl, carbofuran, chlordane, chlorpyrifos, diazinon, dieldrin, EPTC, malathion, metolachlor, molinate, pebulate, simazine, sulfotep, thiobencarb, trifluralin, diquat dibromide.

The delta smelt is a nearly translucent steely-blue fish found only in the brackish waters from Suisun Bay upstream through the Sacramento-San Joaquin River Delta in Contra Costa, Sacramento, San Joaquin, Solano and Yolo Counties. It was listed as threatened in 1993. Delta smelt spawn in backwater sloughs and along channels with tidal influence.

Delta smelt habitat in the Sacramento-San Joaquin Delta estuary receives flushes of high concentrations of agricultural pesticides such as carbofuran, chlorpyrifos, and diazinon.[3] The SWRCB lists all the important water bodies in the smelt's range as impaired by one or more contaminants, commonly including pesticides such as diazinon, chlorpyrifos, malathion, chlordane, DDT and dieldrin.[4] Up to 1 million pounds each of chlorpyrifos,

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1 U. S. Fish and Wildlife Service. 2004. Draft Recovery Plan for the Tidewater Goby (*Eucyclogobius newberryi*).
2 CDPR 2003, Op. cit.; SFEP 2005, Op. cit.
3 USFWS 1996, Op. cit.
4 USFWS 1996, Op. cit.

diazinon and malathion were applied in the Bay Area from 1999-2003.[5] However, CDPR has not yet identified which pesticides are used in Delta smelt habitat.

Recent research indicates that toxicity of certain contaminants in smelt habitat occurs in episodes, often in runoff from rainstorms following periods of use of the chemicals. Acutely toxic pulses of pesticides move down the rivers and through the estuary with "remarkable persistence and relatively little dilution."[6] Researchers report episodic toxicity in winter associated with organophosphate pesticide treatment of dormant orchards; carbofuran and chlorpyrifos in the San Joaquin River and Delta in spring, possibly associated with treatment of alfalfa; rice pesticides in late spring and early summer with release of rice field water; and a variety of herbicides from irrigation tail water during the summer.[7] Peaks of numerous other chemicals, including the herbicides trifluralin and atrazine, have also been found.[8]

It is unknown what direct effect these toxins have on delta smelt, but there is growing evidence that other fish species in the Delta are suffering direct mortality or additional stress from the presence of toxic substances. There is also evidence that the plankton upon which the smelt feed may be depleted by these highly concentrated pulses of pesticides through the Delta. The Delta's open water fish populations are mysteriously collapsing, with open water forage species including Delta smelt in severe decline. In fall of 2004, Delta smelt were at their lowest ever recorded levels. The delta smelt population has declined nearly 90% since the late 1980s.[9] A report by the USGS attributes pesticide toxicity as one possible cause for the decline.

In 1998-1999, USGS studied the impact of pesticides on the delta smelt.[10] It found a complex mixture of pesticides in the delta smelt habitat and that delta smelt were exposed to this complex mixture of pesticides for extended periods during their larval and juvenile stages. The median number of pesticides detected per sample was 4. Metolachlor, molinate, simazine and thiobencarb were frequently detected. The study found that the highest concentrations of delta smelt co-occurred with the highest concentrations of dissolved pesticides both in the Delta and in the confluence. Pesticides of concern are

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5 CDPR 2003, Op. cit., SFEP 2005, Op. cit.

6 U. S. Fish and Wildlife Service. 1999. Determination of Threatened Status for the Sacramento Splittail. 64 FR 5963, 5974-80, Feb. 8, 1999.

7 Houston, J. R, L. A. Allen, and K. M. Kuivila. 2000. Seasonal patterns and factors controlling the occurrence of dissolved pesticides in the Sacramento-San Joaquin Delta. Presented at CALFED Bay-Delta Program Science Conference, Oct. 3-5, 2000, Sacramento, CA. Abstract (#169), summary, and notes available at www.iep.water.ca.gov/calfed/sciconf/2000/publications/. Kuivila, K. M. 2000. Pesticides in the Sacramento-San Joaquin Delta: State of Our Knowledge. Presented at CALFED Bay-Delta Program Science Conference, Oct. 3-5, 2000, Sacramento, CA. Abstract (#66), summary, and notes available at www.iep.water.ca.gov/calfed/sciconf/2000/publications/. Kuivila, K.M. 1999. Studies Relating Pesticide Concentrations to Potential Effects on Aquatic Organisms in the San Francisco Bay-Estuary, California. U.S.G.S. Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Charleston, S.C., March 8-12, 1999 v.2.

8 Moon, G. E, K. M. Kuivila, and J. L. Orlando. 2000. Exposure of Delta Smelt to Dissolved Pesticides During Larval and Juvenile Stages in 1998 and 1999. Abstract #183 presented at CALFED Bay-Delta Program Science Conference, Oct. 3-5, 2000, Sacramento, CA. Summary and notes available at www.iep.water.ca.gov/calfed/sciconf/2000/publications/.

9 USGS San Francisco Bay Toxics Project, Exposure of Delta Smelt to Pesticides in 1998 and 1999, available at <http://ca.water.usgs.gov/toxics/data/dlta_smelt/index.htm>.

10 *Id.*

used in or upstream of delta smelt critical habitat in eastern Solano, eastern Contra Costa and extreme northeastern Alameda counties.

TIDAL MARSHLAND AND ESTUARINE SPECIES

3. California Clapper Rail (*Rallus longirostris obsoletus*)

Bay Area Occurrence: Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara and San Mateo Counties; extirpated from San Francisco County
State Status: Endangered, 1971; Fully Protected
Federal Status: Endangered, 1970
Pesticides Requiring Consultation: acephate, aldicarb, azinphos-methyl, chlorpyrifos, endosulfan, naled, permethrin, and S-fenvalerate.

The California clapper rail is a coot-sized bird that inhabits cordgrass marshes only around San Francisco Bay. The clapper rail eats invertebrates such as mollusks and crustaceans. The number of clapper rails has plummeted because of loss and degradation of its tidal marsh habitat, including introduction of non-native cordgrass, and predation by non-native red foxes. The population estimate as of 1992 was only 800-1,000 clapper rails. The USFWS considers the clapper rail vulnerable to contaminants from urban runoff that can affect its food sources.[11] Over 130 pesticides are used in proximity to California clapper rail habitat in the Bay Area.[12] CDPR identified the following pesticides as used within one mile of California clapper rail habitat: acephate, aldicarb, azinphos-methyl, chlorpyrifos, endosulfan, naled, permethrin, and S-fenvalerate. Pesticides of concern are used upstream of clapper rail observations in Sonoma, Napa, Solano, San Mateo, Santa Clara, Alameda and Contra Costa Counties.

4. Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*)

Bay Area Occurrence: Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara and San Mateo Counties
State Status: Endangered, 1971
Federal Status: Endangered, 1970
Pesticides Requiring Consultation: acephate, chlorpyrifos, endosulfan, permethrin, brodifacoum, bromadiolone, bromethalin, chlorophacinone, cholecalciferol, diphacinone, warfarin, and zinc phosphide.

The salt marsh harvest mouse is a small, mostly nocturnal rodent that lives in tidal and diked salt marshes, only around the San Francisco Bay and its tributaries. Harvest mice have declined primarily because thousands of acres of wetlands habitat in the San Francisco Bay have been filled, degraded, or converted for agricultural use. Flood control and mosquito abatement activities as well as introduced predators and competitors are also threats.

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11 USFWS 1984, Op. Cit.

12 CDPR 1997, Op. cit.

Pesticides that enter marsh habitats are also a threat to remaining harvest mouse populations.[13] Over 110 pesticides are used in proximity to salt marsh harvest mouse habitat in the Bay Area, including carbaryl, chlorothalonil, chlorpyrifos, 2,4-D, diazinon, and permethrin.[14] The FWS has concluded that use of eight rodenticides (brodifacoum, bromadiolone, bromethalin, chlorophacinone, cholecalciferol, diphacinone, warfarin, and zinc phosphide) in harvest mouse habitat could jeopardize the continued existence of the species,[15] but reported use of these rodenticides in the Bay Area counties where the harvest mouse occurs was minimal in 2003.[16]

A 1993 Biological Opinion by the Fish and Wildlife Service on the Effects of 16 Vertebrate Control Agents on Threatened and Endangered Species (1993 BO) found that brodifacoum, bromadiolone, bromethalin, chlorophacinone, diphacinone, pival, vitaminD3, warfarin, and zinc phosphide jeopardized the harvest mouse. The 1993 BO assigned RPAs for all of these control agents. A 1996 letter (FWS 1996 letter) from FWS to EPA approved of two EPA Bulletins for grain bait and pelletized rodenticides and burrow fumigants for species covered in the 1993 biological opinion. The FWS 1996 letter identified that measures set out in the county bulletins could be substituted for the RPAs and RPMs for the salt marsh harvest mouse set out in the 1993 BO. The 1999 FWS memo identified acephate, chlorpyrifos, endosulfan, and permethrin as pesticides used within one mile of the mouse's habitat. Pesticides of concern are used in or upstream of salt marsh harvest mouse observations in Sonoma, Napa, Alameda and Contra Costa Counties.

FRESHWATER AND WETLANDS SPECIES

5. California Tiger Salamander (*Ambystoma californiense*)

Bay Area Occurrence: Sonoma, Solano, Contra Costa, Alameda and Santa Clara Counties; eliminated from San Mateo and Napa Counties
State Status: Species of Special Concern
Federal Status: Threatened, 2004; Endangered in Sonoma County
Pesticides Requiring Consultation: acephate, azinphos-methyl, chlorpyrifos, endosulfan, fenamiphos, malathion, maneb, mancozeb, metam sodium, methyl bromide, oryzalin, phosmet, aluminum phosphide, carbon monoxide, chlorophacinone, diphacinone, strychnine, methoprene, petroleum oil, copper sulfate.

The California tiger salamander is a colorful amphibian that breeds in seasonal ponds or vernal pools and is particularly susceptible to environmental contaminants. The FWS considers exposure to toxic agricultural chemical contaminants and landscaping chemicals to be a potentially serious threat to the species, cautioning that even if toxic or detectable amounts of pesticides are not found in the breeding ponds or groundwater,

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[13] U. S. Fish and Wildlife Service. 1984. Salt Marsh Harvest Mouse and California Clapper Rail Recovery Plan.

[14] California Department of Pesticide Regulation. 1997. Pesticides by Species (Volume II): An Index to Pesticides that are used in Proximity to Federally Listed, Proposed and Candidate Species in California by Active Ingredient.

[15] U. S. Fish and Wildlife Service. 1993. Effects of 16 Vertebrate Control Agents on Threatened and Endangered Species. Biological Opinion issued in March, 1993.

[16] California Department of Pesticide Regulation. 2003. 2003 Annual Pesticide Use Report Indexed by Chemical.

"salamanders may still be directly affected, particularly when chemicals are applied during the migration and dispersal seasons."[17]

The FWS highlighted use of acephate, azinphos-methyl, chlorpyrifos, endosulfan, fenamiphos, malathion, maneb, metam sodium and methyl bromide, as pesticides thought to be particularly harmful to tiger salamanders. Salamanders can readily absorb the chemical chlorpyrifos through their permeable skins, especially when migrating through recently treated fields. Use of azinphos-methyl in the vicinity of tiger salamander habitat could affect salamander recruitment and survival directly or indirectly affect their food supply. The FWS cited studies reporting severe toxicity to amphibians from exposure to endosulfan, including extensive paralysis, delayed metamorphosis and high death rates, noting that "endosulfan is extremely toxic at low concentrations to amphibians." Use of over 1.3 million pounds of metam sodium, 1.1 million pounds of methyl bromide, 250,000 pounds of chlorpyrifos, 33,000 pounds each of acephate and maneb, 25,000 pounds of malathion, 20,000 pounds of azinphos-methyl and 9,800 pounds of endosulfan was reported from 1999-2003 for the 5 Bay Area counties where the tiger salamander occurs.[18]

FWS also noted that poisons (i.e. rodenticides) typically used on ground squirrels are likely to have a disproportionately adverse effect on California tiger salamanders, which are smaller than the target species and have permeable skins.[19] Furthermore, use of pesticides, such as methoprene, in mosquito abatement may have an indirect adverse effect on the California tiger salamander by reducing the availability of prey.[20] In the South Sacramento Draft Habitat Conservation Plan, FWS noted that toxicants, even at sub-lethal levels may still cause adverse effects such as developmental abnormalities in larvae and behavioral abnormalities in adults, which can be deleterious to the exposed individuals.[21] The Draft HCP went on to note that sources of chemical pollution, which may adversely affect the salamander include pesticides used in agricultural, landscaping, roadside maintenance, and rodent and vector control activities, as well as stormwater from residential and urban lawn care. In regards to rodent control, FWS noted that the salamander spends the majority of its life aestivating underground in burrows and that widespread burrowing mammal control likely poses a significant threat to the salamander. Besides the possible direct adverse affects associated with rodenticides and fumigants, California ground squirrel and pocket gopher control operations may also indirectly affect the salamander by reducing the number of upland burrows available to them.

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17 U. S. Fish and Wildlife Service. 2000. Final Rule to List the Santa Barbara County Distinct Population Segment of the California Tiger Salamander as Endangered. 65 FR 57242, 57259, September 21, 2000. U. S. Fish and Wildlife Service. 2003. Final Rule to List the Sonoma County Distinct Population Segment of the California Tiger Salamander as Endangered. 68 FR 13497-13520, March 19, 2003.

18 CDPR 2003, Op. cit.; SFEP 2005, Op. cit.

19 See FWS California Tiger Salamander Species Account at <http://www.fws.gov/sacramento/es/animal_spp_acct/california_tiger_salamander.htm>.

20 *Id; See also* South Sacramento Draft Habitat Conservation Plan, Appendix A: Species Analysis California Tiger Salamander at A-20–A-21.

21 South Sacramento Draft HCP at A-19–A21.

FWS has designated critical habitat for the salamander.[22] FWS did not consult on the impacts of pesticides on the salamander after critical habitat was designated. FWS cited pesticide application as a threat for a number of East Bay critical habitat units.[23] Pesticides of concern are used in areas of California tiger salamander observations in Sonoma county (Sonoma DPS) and in eastern Contra Costa, central and eastern Alameda and Santa Clara counties (Central DPS).

6. San Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*)

Bay Area Occurrence: San Mateo County
State Status: Endangered, 1971; Fully Protected
Federal Status: Endangered, 1967
Pesticides Requiring Consultation: acephate, azinphos-methyl, bendiocarb, carbofuran, chlorpyrifos, endosulfan, naled, permethrin and trifluralin
Pesticides Requiring Reinitiation of Consultation: aluminum phosphide, magnesium phosphide, potassium nitrate and sodium nitrate.

The most beautiful serpent in North America, the San Francisco garter snake has a broad greenish-yellow stripe on its back, bordered by black and red stripes on each side and a distinctive greenish-blue or turquoise-blue belly. Adults can grow to a length of two to three feet. All known populations of this snake occur in San Mateo County near freshwater marshes, ponds, and slow-moving streams along the coast.

The San Francisco garter snake may be threatened by pesticide use on private lands where it still occurs. The FWS has noted that pesticides are a threat to other aquatic garter snakes in California.[24] Pesticides used in proximity to San Francisco garter snake habitat in the Bay Area include carbaryl, carbofuran, chlorothalonil, chlorpyrifos, diazinon, dinocap and permethrin.[25] Use of over 52,000 pounds of these pesticides was reported for San Mateo County from 1999-2003.[26]

The 1999 FWS memo identified acephate, azinphos-methyl, bendiocarb, carbofuran, chlorpyrifos, endosulfan, naled, permethrin and trifluralin as pesticides used within one mile of the San Francisco garter snake's habitat. The 1993 BO made jeopardy determinations for aluminum phosphide, magnesium phosphide, potassium nitrate and sodium nitrate. These are all rodenticides. RPAs were identified to avoid jeopardy and included prohibition of use during hibernation period and a monitoring enforcement program. Intended use on burrows could result in exposure to garter snakes during hibernation. The FWS 1996 letter to EPA approved of two EPA Bulletins for grain bait and pelletized rodenticides and burrow fumigants for species covered in the 1993 biological opinion. The FWS 1996 letter identified that measures set out in the county bulletins could be substituted for the RPAs and RPMs for the San Francisco garter snake

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22 70 Fed. Reg. 49380-49458 (Aug. 23, 2005).

23 *Id.*

24 USFWS 1993, Op. cit.

25 California Department of Pesticide Regulation. 1997. Species by Pesticide (Volume I): An Index to Pesticides That Are Used in Proximity to Federally Listed, Proposed and Candidate Species in California by Active Ingredient.

26 CDPR 2003, Op. cit.

set out in the 1993 BO. Pesticides of concern are used in areas of San Francisco garter snake observations in San Mateo County.

7. California Freshwater Shrimp (*Syncaris pacifica*)

Bay Area Occurrence: Marin, Sonoma and Napa Counties
State Status: Endangered, 1980
Federal Status: Endangered, 1988
Pesticides Requiring Consultation: acephate, chlorpyrifos.

California freshwater shrimp are found only in low elevation perennial streams or intermittent streams with perennial pools in the northern San Francisco Bay Area. Freshwater shrimp require low gradient streams with diverse habitat structure including undercut banks, exposed roots, woody debris and overhanging vegetation. Among other factors, shrimp populations and habitat are threatened by inadvertent introduction of herbicides and pesticides into creek water through aerial drift, spills, and runoff.[27] Freshwater shrimp may also be sensitive to pesticides commonly used in vineyards. Over 85 pesticides are used in proximity to California freshwater shrimp habitat in the Bay Area, including chlorpyrifos, diazinon and diuron.[28]

While a June 14, 1989 Biological Opinion on the National Pesticide Consultation (1989 BO) reviewed the impact of pesticides on the California freshwater shrimp and found that none of the reviewed pesticides were likely to affect the shrimp, the 1999 FWS memo noted that acephate and chlorpyrifos are used within one mile of its habitat. Pesticides of concern are used in areas of California freshwater shrimp observations in Sonoma County and upstream of observations in Napa County.

TERRESTRIAL SPECIES

8. San Joaquin Kit Fox (*Vulpes macrotis mutica*)

Bay Area Occurrence: Contra Costa, Alameda and Santa Clara Counties
State Status: Threatened, 1971
Federal Status: Endangered, 1967
Pesticides Requiring Consultation: brodifacoum, chlorophacinone, bromadiolone, strychnine, aluminum and magnesium phosphide, diphacinone, pival, potassium nitrate, sodium nitrate, acephate, aldicarb, azinphos-methyl, bendiocarb, carbofuran, chlorpyrifos, endosulfan, S-fenvalerate, naled, parathion, permethrin, phorate, and trifluralin.

The San Joaquin kit fox is the smallest member of the dog family in North America, with an average weight of about 5 pounds. San Joaquin kit foxes inhabit grasslands in the San Joaquin Valley and eastern Bay Area Counties. In the eastern Bay Area, kit foxes mostly

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[27] U. S. Fish and Wildlife Service. 1998. Recovery Plan for the California Freshwater Shrimp (*Syncaris pacifica* Holmes 1895).

[28] CDPR 1997, Op. cit.

prey on California ground squirrels. Kit foxes either dig their own dens or use dens constructed by other animals. The primary threat to kit foxes is the loss and degradation of suitable habitat due to agricultural, industrial, and urban developments.

Hundreds of San Joaquin kit foxes were destroyed in the past by strychnine poisoned bait used for coyote control. The federal government began controlling use of rodenticides in 1972 and prohibited above-ground application of strychnine within the range of the kit fox in 1988. However, use of 28 pounds of strychnine was reported in 2003 for pest control in the East Bay counties where the kit fox occurs.[29] Intensive agricultural use in the Central Valley still exposes kit foxes to a wide array of pesticides and rodenticides.

More than 22,000 pounds of aluminum phosphide was reported used from 1999-2003 in the East Bay counties where the kit fox occurs.[30] At least 27 San Joaquin kit foxes were killed from poisoning recently in the Central Valley and two were poisoned in 1992 in the East Bay, primarily by the rodenticides brodifacoum, chlorophacinone, and bromadiolone.[31] Brodifacoum is a deadly rodenticide widely available to the public as an active ingredient in rat and mouse baits such as Talon, Havoc, and D-Con.

Pesticides and rodenticides may indirectly affect the survival of kit foxes by reducing the abundances of their staple prey species.[32] For example, California ground squirrels, the staple prey of kit foxes in the northern portion of their range, were eliminated from Contra Costa County in 1975 by extensive rodent eradication programs. This severely reduced kit fox abundance through secondary poisoning and elimination of prey.[33]

In the 1999 FWS memo, FWS noted that 13 of the 15 pesticides assessed (acephate, aldicarb, azinphos-methyl, bendiocarb, carbofuran, chlorpyrifos, endosulfan, S-fenvalerate, naled, parathion, permethrin, phorate, and trifluralin) are all used within one mile of San Joaquin kit fox habitat. The kit fox is likely to come into contact with the chemicals considered in the 1999 review via runoff or from aerial drift as well as through direct contact with sprays and treated soils, or through the consumption of contaminated prey. FWS also noted that pest control practices affect kit foxes directly, secondarily and indirectly by reducing prey populations.

The FWS determined in the 1993 BO that use of some burrow fumigants (aluminum and magnesium phosphide), anticoagulant rodenticides (chlorophacinone, diphacinone, and pival), and gas cartridges (potassium nitrate and sodium nitrate) in kit fox habitat could

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29 CDPR 2003. Op. cit.

30 CDPR 2003, Op. cit.

31 U. S. Environmental Protection Agency. 2004. Potential Risks of Nine Rodenticides to Birds and Nontarget Mammals: A Comparative Approach. Office of Pesticides Programs Environmental Fate and Effects Division, July 2004.

32 U. S. Fish and Wildlife Service. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California. Hegdal, P. L., K. A. Fagerston, T. A. Gatz, J. F. Glahn, and G. H. Matshchke. 1986. Hazards to Wildlife Associated with 1080 Baiting for California Ground Squirrels. *Wildlife Society Bulletin* 14:11-21. Schitoskey, F., Jr. 1975. Primary and Secondary Hazards of Three Rodenticides to Kit Fox. *Journal of Wildlife Management* 39:416-418. Wallace, L. T. 1976. Current Evaluation of the Use of Sodium Monofluoroacetate (Compound 1080) for Ground Squirrel Control in Areas Inhabited by the San Joaquin Kit Fox. Unpublished memo to California County Agricultural Commissioners.

33 Orloff, S., L. Spiegel, and F. Hall. 1986. Distribution and habitat requirements of the San Joaquin kit fox in the northern extreme of its range. Western Section Wildlife Society (CAL-NEV) Conference Transactions 22:60–70.

jeopardize the species.[34] The 1993 BO made no jeopardy determinations for brodifacoum, bromadioline, zinc phosphide, provided RPMs were followed. The FWS 1996 letter to EPA approved of two EPA Bulletins for grain bait and pelletized rodenticides and burrow fumigants for species covered in the 1993 biological opinion. The FWS 1996 letter identified that measures set out in the county bulletins could be substituted for the RPAs and RPMs for the San Joaquin kit fox set out in the 1993 BO. Pesticides of concern are used in the San Joaquin kit fox range in eastern Contra Costa, northeastern Alameda and Santa Clara counties.

9. Alameda Whipsnake (*Masticophis lateralis euryxanthus*)

Bay Area Occurrence: Contra Costa, Alameda and Santa Clara Counties
State Status: Threatened, 1971
Federal Status: Threatened, 1997
Pesticides Requiring Consultation: 2,4-D, chlorophacinone, diphacinone, lindane, aluminum phosphide, magnesium phosphide, potassium nitrate, sodium nitrate, brodifacoum, bromadiolone, bromethalin, difenacoum, difethialone, pival, vitamin D3, warfarin, zinc phosphide and acrolein.

The Alameda whipsnake is a slender snake with black dorsal coloring and distinctive yellow-orange racing stripes down each side. Adult whipsnakes grow from three to four feet in length. Whipsnakes are extremely fast moving and hold their heads high off the ground in a cobra-like manner while hunting for potential prey, which includes lizards, small mammals, snakes, and nesting birds. Alameda whipsnakes occupy disappearing northern coastal scrub and chaparral habitats broken by grassland and rocky hillsides, primarily in Contra Costa and Alameda Counties. Whipsnake habitat has been severely reduced and fragmented by urban sprawl, road construction, livestock grazing, and fire suppression.

The FWS is concerned about exposure to rodenticides, herbicides and pesticides adversely affecting the Alameda whipsnake directly or indirectly through prey reduction or habitat alteration.[35]

CDPR identifies the following pesticides as used in Alameda whipsnake habitat: 2,4-D. chlorophacinone, diphacinone, and lindane. The 1996 letter from FWS to EPA approved of two EPA Bulletins for grain bait and pelletized rodenticides and burrow fumigants for species covered in the 1993 BO, but noted that reinitiation was necessary for several species covered in the bulletins but not subject to the 1993 consultation, including the Alameda whipsnake. EPA has not consulted on the use of pesticides, including rodenticides and burrow fumigants on the Alameda whipsnake. Pesticides of concern are used in areas of Alameda whipsnake observations and/or critical habitat in Alameda County.

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[34] USFWS 1993. Op. cit.

[35] U. S. Fish and Wildlife Service. 1997. Determination of Endangered Status for the Callippe Silverspot Butterfly and the Behren's Silverspot Butterfly and Threatened Status for the Alameda Whipsnake. 62 FR 64306, December 5, 1997. U. S. Fish and Wildlife Service. 2002. Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California.

10. Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

Bay Area Occurrence: Napa County
State Status: None
Federal Status: Threatened, 1980
Pesticides Requiring Consultation: acephate, bendiocarb, chlorpyrifos, fenthion, naled, permethrin, S-fenvalerate, aldicarb, azinphos-methyl, carbofuran, endosulfan, parathion and phorate.

The valley elderberry longhorn beetle is a colorful cylindrical beetle less than an inch long, associated with riparian elderberry trees during its entire life cycle. Riparian fragmentation and destruction due to urbanization, agricultural conversion, and waterway maintenance are the primary threats to this insect. Insecticide and herbicide use in agricultural areas and along roadsides may be factors limiting the beetle's distribution. The FWS cautions that pesticides or herbicides should not be sprayed within 100 feet of elderberry beetle habitat.[36]

The 1999 FWS memo determined that acephate, bendiocarb, chlorpyrifos, fenthion, naled, permethrin, and S-fenvalerate jeopardize the longhorn beetle and that the registered uses of acephate, bendiocarb, fenthion, naled and permethrin for mosquito or gypsy moth control are likely to adversely modify designated critical habitat by contaminating elderberry plant surfaces or tissues on which the beetle lives and feeds. FWS also found that while not likely to cause jeopardy, aldicarb, azinphos-methyl, carbofuran, endosulfan, parathion and phorate may adversely affect the species. However, FWS based its proposed no-jeopardy determinations on the implementation of RPMs. The 1999 FWS memo noted that critical habitat for the valley elderberry longhorn beetle may be adversely modified by acephate, bendiocarb, fenthion, naled and permethrin (for mosquito or gypsy moth control). Pesticides of concern are used in areas of valley elderberry longhorn beetle observations in northern Solano County.

11. Bay Checkerspot Butterfly (*Euphydryas editha bayensis*)

Bay Area Occurrence: Santa Clara and San Mateo Counties; extirpated from Contra Costa, Alameda, and San Francisco Counties
State Status: None
Federal Status: Threatened, 1987
Pesticides Requiring Consultation: acephate, azinphos-methyl, bendiocarb, chlorpyrifos, fenthion, naled, permethrin, S-fenvalerate, endosulfan, parathion, phorate.

The bay checkerspot butterfly depends upon several different host plants during its life cycle: eggs are laid on a native plantain, which the larvae feed upon; if this food is not sufficient for development the larvae may move onto owl's clover; the larvae then generally enter dormancy until the following winter, then emerge to feed again, pupating in late winter; finally the adults emerge shortly thereafter.

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[36] U. S. Fish and Wildlife Service. 1999. Conservation Guidelines for the Valley Elderberry Longhorn Beetle.

Populations of bay checkerspots historically occurred in numerous areas around the San Francisco Bay including the San Francisco peninsula, the mountains near San Jose, the Oakland hills, and several spots in Alameda County. Most of these have been eliminated due to explosive urban development, and populations now remain only in San Mateo and Santa Clara counties.

Pesticides have contributed to reduced numbers of bay checkerspots, and application or drift of pesticides may also affect their critical habitat.[37] Precautions may be needed for pesticide use on California oakworm or other pests near bay checkerspot localities.[38] Over 60 pesticides are used in proximity to bay checkerspot butterfly habitat in the Bay Area, including chlorothalonil, chlorpyrifos and diazinon.[39]

The 1989 BO did not review the impact of pesticides on the bay checkerspot butterfly. However, in the 1999 FWS memo, FWS identified acephate, azinphos-methyl, bendiocarb, chlorpyrifos, fenthion, naled, permethrin and S-fenvalerate as pesticides which jeopardize the butterfly. The memo also found that endosulfan, parathion, and phorate were likely to cause mortality or harm to bay checkerspot adults, eggs, larvae, and in the case of trifluralin harm to annual host and nectar plants. However, FWS based its proposed no-jeopardy determinations on the implementation of RPMs. The 1999 FWS memo noted that there was no critical habitat for the species – since critical habitat was designated for the bay checkerspot butterfly in 2001, use of these pesticides may adversely affect critical habitat. Pesticides of concern are used in areas of bay checkerspot butterfly observations and critical habitat in central Santa Clara County.

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37 U. S. Fish and Wildlife Service. 1998. Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area. U. S. Fish and Wildlife Service. 2001. Final Determination of Critical Habitat for the Bay Checkerspot Butterfly (*Euphydryas editha bayensis*). 66 Fed. Reg. 21450, April 30, 2001.

38 USFWS 2001, Op. cit.

39 CDPR 1997, Op. cit.