JOINT ENVIRONMENTAL ASSESSMENT 2002-2006

OF THE

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

CURLY TOP VIRUS CONTROL PROGRAM

FOR

BUREAU OF LAND MANAGEMENT

AND DEPARTMENT OF ENERGY

***DOE/EA-#* 1363**

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CDFA

California Department of Food and Agriculture

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LIST OF ACRONYMS

ADSB	Andrew's Dune Beetle
APCS	Agricultural Pest Control Specialist
APHIS	Animal Plant Health Inspection Service (USDA)
BLH	Beet Leafhopper
BLM	Bureau of Land Management
BNLL	Blunt-nosed Leopard Lizard
BVLS	Buena Vista Lake shrew
CAC	County Agriculture Commissioner
CASB	Ciervo Aegialian Scarab Beetle
CBR	California Black Rail
CEQA	California Environmental Quality Act
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CRLF	California Red-legged Frog
CTS	California Tiger Salamander
CTV	Curly Top Virus
CTVCP	Curly Top Virus Control Program
EA	Environmental Assessment
ESRP	Endangered Species Recovery Program
DOE	Department of Energy
FTHL	Flat-tailed Horned Lizard
GGS	Giant Garter Snake
GKR	Giant Kangaroo Rat
LD50	Lethal dose found to cause mortality in 50% of a test animal population
L&M	Limited and Moderate
NEPA	National Environmental Policy Act
NPR	Naval Petroleum Reserve
OTW	Orange-throated Whiptail
PUP	Pesticide Use Permit
SKR	Stephen's Kangaroo Rat
SJAS	San Joaquin Antelope Squirrel
SJDB	San Joaquin Dune Beetle
SJKF	San Joaquin Kit Fox
TKR	Tipton Kangaroo Rat
UCR	University of California, Riverside
USEPA	U. S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USDA	U.S. Department of Agriculture
VELB	Valley Elderberry Longhorn Beetle
WSA	Wilderness Study Area
YCR	Yuma Clapper Rail

PREFACE

This environmental assessment (EA) is a joint document for both the Bureau of Land Management (BLM) and the Department of Energy (DOE) for the review and fulfillment of National Environmental Policy Act (NEPA) requirements and issuance of necessary permits as proposed by the California Department of Food and Agriculture (CDFA). The BLM, as lead agency, has cooperated with DOE in developing this document to assure compliance with NEPA. In addition, this EA will be used to satisfy Section 7 requirements of the Federal Endangered Species Act of 1973, the California Endangered Species Act and the California Native Plant Protection Act.

Although BLM administered lands are highlighted throughout the document, unless otherwise specified, the descriptions and impact analysis will pertain to private as well as public lands.

A Pesticide Use Permit (PUP), issued by the BLM, authorized the CDFA to conduct this program on public lands. The current 5-year permit will be considered for re-authorization upon its expiration, December 31, 2001. In addition, the Curly Top Virus Control Program (CTVCP) is currently operating under a cooperative agreement between the DOE and the CDFA for control of the BLH in Naval Petroleum Reserve #2. Agreements between DOE and CDFA ensure compliance with requirements for notification, health and safety, environmental protection and endangered species. NPR #1 was sold during the past 5-year PUP period and is no longer administered by the DOE. To facilitate the needs of both cooperating agencies, BLM will prepare a decision record and a PUP for the 2002-2006 permit period, and DOE will prepare a Finding of No Significant Impact (FONSI).

On November 21, 2001, the Sacramento Office of the U. S. Fish and Wildlife Service (USFWS) issued a "no jeopardy" biological opinion at the conclusion of a Formal Section 7 Consultation on the potential effects of the CTVCP on the listed species and critical habitats potentially occurring within the project area. This biological opinion was jointly compiled by the USFWS's Sacramento, Carlsbad, and Ventura Field Offices. The biological opinion is referenced by USFWS file # 1-1-00-F-0212, and can be reviewed and/or obtained by contacting Ed Lorentzen at the California State Office, Bureau of Land Management, 2800 Cottage Way, Room W-1834, Sacramento, California 95825 [telephone (916) 978-4646; e-mail: elorentz@ca.blm.gov].

ENVIRONMENTAL ASSESSMENT

Curly Top Virus Control Program

I. INTRODUCTION

Curly top virus (CTV) is a viral disease of sugar beets, tomatoes, melons, peppers, beans, cucumbers, squash, pumpkins, spinach, vine seed and other commercially important crops, including ornamentals. CTV not only infects commercial crops, but at times devastates backyard vegetable and flower gardens. The only known vector of CTV is *Circulifer tenellus* (Baker), commonly known as the sugar beet leafhopper (BLH).

Chemical and biological control of BLH may take place at various locations in the San Joaquin, Salinas, Cuyama, Antelope, San Jacinto, Imperial and Palo Verde Valleys including portions of Stanislaus, San Joaquin, Merced, Fresno, Kings, Kern, San Luis Obispo, Monterey, Santa Barbara, Los Angeles, Riverside and Imperial Counties (See Appendix "E" for potential treatment maps).

The size of annual control activities are totally dependent on the location, size, and distribution of the BLH population. The BLH is a desert insect preferring habitats and environmental conditions that produce sparse open vegetation. In years with above normal rainfall, BLH populations are generally limited. Lush rangeland vegetation reduces optimum breeding acreage and concentrates BLH populations into smaller areas. In years with below normal precipitation, sparse rangeland vegetation increases optimum breeding acreage and the potential for developing a large BLH population. In periods of drought (successive years of below normal rainfall) a significant reduction in rangeland vegetation has led to a decline in BLH populations and a reduction in treatment activities.

Not all BLH breeding grounds require annual treatment. The size and shape of areas treated fluctuate annually due to the local influence and variation of temperature, rainfall, vegetative growth, fire and soil disturbance. Areas subject to perennial virus infection or a significant infection outbreak from the previous year, lends weight to treatment priorities as does the size of the BLH population (See Probability of Treatment Chart, page E-13).

In years with low or average BLH populations, in has been necessary for the CTVCP to treat between 25,000 to 65,000 acres of rangeland and cultivated fallow fields by air to control BLH in western Fresno, Kings, Kern Counties. In years where environmental conditions favor the development of BLH, it has been necessary to treat more than 100,000 acres (See treatment statistics, page E-14). Aerial treatments in the Imperial Valley are intermittent and have been necessary only twice in the last nine years.

A. Purpose and Need for the "Proposed Action"

The purpose of the "Proposed Action" is to control the sugar beet leafhopper, *Circulifer tenellus* (Baker), the only known vector of CTV. Without the control of BLH, the CTV would threaten well over three billion dollars of susceptible crops and home gardens.

With only a 1% loss from CTV in California, it is estimated that during the period 1974-1976, California suffered annual losses of $9.75 million in commercial crops alone. A $2.68 million loss in home gardens can be extrapolated from a 1974 value of $268,199,643 using a 1% infection rate (Yokomi, 1979). Without control where required, BLH is capable of an infection rate of 10-40% or more. Infection rates as high as 80% were observed near Huron, CA in 1977.

Were it not for the Program's effective control of BLH and the support of the affected industries, the state and nation would lose a substantial portion of its tomato, sugar beet, melon, bean, squash, pumpkin, cucumber, pepper and spinach crops valued in excess of $1.2 billion annually.

B. Background

A brief review of the Program's history and development will aid in understanding the purpose and objectives of the CTVCP.

In the early part of the 20th century, large areas in California and the western United States, were cleared of natural vegetation to plant grain. In succeeding years, price fluctuation led to alternate use and abandonment of much of this land. At the same time, unrestricted grazing of cattle and sheep denuded what was once lush grazing land. The long-range result has been an enormous increase in areas ideal for BLH reproduction where natural vegetation was replaced by mustards, (*Brassica* spp.), Russian thistle, (*Salsola* spp.) and other annual BLH host plants. A study by Piemeisel and Chamberlain (1936) found well managed grazing land does not produce economically important numbers of BLH.

BLH is a desert insect introduced from the Middle East, probably in the late 1800's. Years with below normal precipitation provide favorable environmental conditions for the growth and reproduction of BLH populations; which in turn, increases the potential for the spread of CTV and it's devastating effects within the agricultural economy. The year 1919 was such a year and nearly ended the then young sugar beet industry in California. Out of the near disaster of 1919 emerged a concerted effort by private, state and federal researchers to design control methods that would minimize CTV incidence. After extensive research over a period of several years, it was found that in California BLH migrated between the valleys and the foothills and at times concentrated on particular host plants (Severin, 1933).

It was apparent that once breeding grounds and migration patterns were determined, control efforts could be economically carried out with a minimum of expense.

Control was originally carried out by the sugar companies until the realization that a number of other important crops were susceptible to infection. As the other susceptible crops such as tomatoes, melons, and beans increased in acreage, growers found control work becoming futile because of the migratory nature of BLH and the fact that the main breeding grounds were in uncultivated foothill areas under control of disinterested parties. Private growers and industry could not pursue the insect into the breeding grounds where control was most effective.

In 1943, the State of California, Department of Food and Agriculture, assumed full responsibility for the control of BLH. In the first years the annual control budget was only $15,000; however, as the effectiveness and cost of the Program increased, the State Legislature enacted a law requiring grower assessments totaling 65% of the budget. In 1986, in response to growers' request, the CTVCP extended survey and treatment activities into the Blythe and Hemet areas of Riverside County.

Past shortfalls in annual state budget's eliminated the General Fund portion (35%) of the annual CTVCP budget. The Program is now 100% funded by individual grower assessments.

II. PROPOSED ACTIONS AND ALTERNATIVES

ALTERNATIVE 1 - PROPOSED ACTION

GENERAL PROGRAM

The "Proposed Action" alternative of CTVCP represents an overall strategy for the control of the BLH statewide where the infection of susceptible crops and backyard gardens is likely. Control is performed within rangeland habitat on both public and private lands; and along ditch banks, roadsides and fallow fields in cultivation adjacent to rangeland. (Appendix "E" comprises, [1] Maps of Potential CTVCP Treatment Areas [2] Probability of Treatment Chart [3] Acres Sprayed (1992-2001) [4] Ground-rig Frequency and Application Totals.)

In the State of California, there is an estimated 2,506,240 total acres of rangeland which have the potential for developing BLH populations. Of the 2,506,240 acres, approximately 628,480 acres or 25% are public land (See Appendix "A" for detailed descriptions of potential public lands). While it is possible for BLH populations to develop anywhere within this overall potential treatment area, historical breeding grounds encompass a much smaller portion of the broad potential treatment area. An approximate average (10-year) of 70,000 acres have been treated by air to control the BLH on rangeland and cultivated fallow fields each year (See "Acres Sprayed Chart" in Appendix "E", page E-14).

Potential treatment areas are not denoted by rigid boundaries, but represent generalized zones where BLH populations have historically developed. BLH development in rangeland is influenced by annual variations in weather patterns, fires, and grazing. Variations in cultural practices within intensive agriculture largely influence the development of BLH populations in cultivated fallow fields.

In any given year, the CTVCP may treat between 5,000-15,000 acres of public land, depending on the frequency of treatments in Imperial County. Between 1991 and 1998, the CTVCP annually treated an average of 3,857 acres of public lands administered by the BLM and an average of 8,380 acres of public lands administered by the DOE (See Appendix "E", page E-14). The total acres treated in any given year varies depending many factors including rainfall patterns.

Throughout California, BLH populations develop on host plants in rangeland, cultivated fallow fields and roadsides at various times of the year and possess the potential for vectoring CTV to susceptible crops. Control is a year-round effort. As with most pest insects, control is linked to the life cycle and directed at disrupting its continuity. Aerial treatments (fixed-wing or helicopter) are employed to control BLH populations in rangeland habitat and in large cultivated fallow fields, while ground-rigs are utilized to spot treat BLH populations within intensive agriculture adjacent to rangeland breeding grounds and CTV susceptible crops.

San Joaquin Valley - In the San Joaquin Valley, the CTVCP usually conducts three aerial campaigns annually which closely coincide with the reproductive biology of BLH. The winter, spring and fall control periods in the San Joaquin Valley are performed on the west side and southern end of the Valley and are generally performed within three separate geographical areas. A single treatment per calendar year for any given area is generally sufficient to control BLH populations. A second San Joaquin Valley treatment per calendar year over the same geographic area may be necessary to control BLH populations if;

1) fall populations of BLH are developing in Russian thistle on rangelands previously treated in the spring, or

   Approximately 17,000 acres of historical spring breeding grounds in the Pleasant Valley, Fresno County, have the potential to produce Russian thistle populations. Approximately 100-3,000 of the 17,000 acres may need a spring and fall treatment in any one calendar year. Appendix D, pages D3-D5 illustrate potential overlap of spring and fall intensive control areas in the San Joaquin Valley.

2) late spring rains rejuvenate drying rangeland vegetation and a second generation of BLH develops on rangeland treated earlier in the spring. Late spring rains have historically developed a second spring generation of BLH in the San Joaquin Valley every 5 or 6 years involving an estimated 1,000 to 10,000 acres of rangeland.

Imperial Valley - In the Imperial Valley, the CTVCP conducts a single aerial treatment when necessary, in the winter or spring, depending on weather patterns. Historically, treatments in the Imperial Valley are necessary one out of every three years. The treatment acreage varies from one-hundred to several thousand acres and the specific locations receiving treatments vary from treatment period to treatment period. Many years may pass between treatments to any specific location. A second treatment per calendar year, over the same geographical area, due to additional rain in the Imperial Valley has <u>never</u> been necessary and is <u>not</u> anticipated in the future.

Salinas Valley - The last aerial treatment was performed in the Salinas Valley during the spring of 1977. Aerial treatment in the Salinas Valley has been rare, but could be performed as frequently as once every 7-10 years.

Ground-rig Spot Treatments - While aerial treatments are employed to control BLH populations in rangeland habitat and large fallow fields, ground-rigs are used to spot treat migrating BLH populations along roadsides or ditch banks within intensive agriculture adjacent rangeland breeding grounds. General ground-rig spot treatments target BLH host weeds in areas where CTV susceptible crops are grown and ongoing weed control activities are prevalent including discing, mowing and herbicide use. The greatest potential for ground-rig spot treatments are those areas where high CTV infection has been seen in susceptible crops on the extreme western edge of the San Joaquin Valley, from Little Panache Canyon, south to Kettleman City, between Interstate 5 and the California Aqueduct. From Kettleman City, south into Kern County, potential ground-rig spot treatments are performed near

susceptible crops on both sides of Interstate 5 due to potential migrations from the Elk Hills, Buena Vista Hills and the various oil fields spread throughout the west side of Kern County. In the Imperial Valley, ground-rig spot treatments are performed within the agricultural region surrounding El Centro, Brawley and Calipatria. Ground-rig spot treatments in the Salinas Valley have been performed within intensive agriculture along the Salinas River from Greenfield south, to the San Ardo oil fields. See potential treatment maps in Appendix E.

On rare occasions, ground-rigs are used to treat BLH populations in small cultivated fallow fields too small or isolated to be economically treated by aircraft. Small fallow fields, subject to ground-rig applications, range from 1-20 acres and are usually located at the periphery of larger cultivated fields isolated by the intersection of roads, ditches, power lines, equipment yards, or dry washes.

A ground-rig is typically a four-wheel drive pickup truck with an engine powered blower in the bed. Insecticide is injected into the air stream of the blower nozzle which is movable. Although a ground-rig can treat a swath as wide as 50 feet, the swath width is constantly adjusted to the width of the area containing roadside host plants and averages 20 to 25 feet wide. The blower is equipped with dripless nozzles and electric cutoff for precise control of spray. All controls are inside the cab where the operator can start and stop the blower engine, turn the spray off and on and control the direction of the blower. The malathion is mixed in a 100-gallon tank mounted in the bed of the truck and applied at the same rate as an aerial application. Ground-rig vehicles are generally driven on roads accessed by agricultural vehicles and equipment within intensive agriculture.

The size and locations of ground-rig treatments in cultivated areas are related to the size and location of BLH populations in adjacent rangeland habitat. Ground-rig applications are performed immediately following aerial treatments. Spring ground-rig applications are performed for a duration of one to two weeks and target BLH populations migrating from rangeland. Fall ground-rig applications are generally one week in duration and target BLH populations developing through the summer. In most locations, one ground-rig treatment per year is generally sufficient to control roadside and ditch bank BLH populations.

Designated Ground-rig Only Areas - The CTVCP personnel use ground-rigs exclusively to control BLH populations in three distinct control areas. These areas are designated "ground-rig only" and include the Cuyama Valley (page E-12) , Blythe (page E-11), and a portion of the San Joaquin Valley (page E-2**,** E-3**)**. The frequency of ground-rig only treatments (1991-2001), in "ground-rig only" areas, are listed on Page E-15. Both spring and or fall treatments are possible within the San Joaquin Valley "ground-rig only" control areas (See "Probability of Treatment Chart", Page E-13).

Parasite Release Areas Only - In a continuing effort to reduce the use of malathion to control the BLH, the Hemet and Palmdale-Lancaster areas have now been designated as BLH egg parasite release areas only. In the Program's Environmental Assessment 1997-2001, these areas were designated as ground-rig only areas. During the current 5-year permit, no ground-rig spot treatments were performed within these two areas; however, BLH egg parasites were released within these two

areas (See Appendix G, pages EE-8, EE-9). The continued decline in CTV susceptible crop acreage and the relative close proximity to the University of California at Riverside (UCR) made these two areas good choices for field evaluation of BLH egg parasites.

PROGRAM SPECIFICS

Fall Treatments

Fall control operations in the San Joaquin Valley are the culmination of monitoring the BLH population on Russian thistle (*Salsola* spp.). Beginning in June, Russian thistle is mapped where it is growing on fallow ground, oil fields or rangeland. Maps are updated weekly and the BLH populations are monitored with sweep net surveys.

Determining the status of BLH populations throughout the year is dependent on survey with insect nets. Both pre and post-treatment surveys in Russian thistle are conducted on foot using a heavy duty sweep net with shallow net bag of CTVCP design. The net frame consists of a stiff 15" round hoop constructed of 3/16" steel attached to a hardwood handle 7/8" round by 25" long. During survey, the net is vigorously swung horizontally in order to contact the Russian thistle plant in such a manner as to enter the foliage several inches and sweep through with sufficient velocity to dislodge BLH and collect them in the attached net bag. The bag is 16" deep and 15" in diameter, constructed to form a shallow cone. Once captured, the BLH begin migrating from the base of the net towards the open top where they are counted as they attempt to exit.

BLH counts are averaged by the number of BLH per net sweep. The single net sweep method is directly related to actual counts from enclosed trap studies conducted over several decades. If during actual pre-treatment survey, counts on Russian thistle averaged 100 BLH per net sweep and post-treatment counts taken 72 hours after treatment averaged three BLH per net sweep in the same area, the population is considered to have been reduced by 97%. A 97% reduction is considered excellent control since malathion at 7.7 oz. per acre cannot fully penetrate the canopy of moderate sized (24"-30") Russian thistle. However, most treatments result in a 90 percentile plus mortality because of BLH movement to the outer perimeter of the plants where contact with the malathion is assured.

By mid or late September, the Russian thistle harboring the largest populations of BLH has been delimited and the emergence of nymphs, which will be the overwintering generation, has begun. The overwintering generation will be the adults that migrate from the Russian thistle to the hills on the west side of the San Joaquin Valley to seek out sunny south-facing slopes on which they produce the spring generation of BLH. A percentage of the overwintering BLH carry CTV to winter annuals where the disease multiplies and is carried back to cultivated crops by the spring generation of BLH. The only differences between the spring and winter treatments are the time of year and the phase of the life cycle of the BLH that is targeted. In winter, the adult female is targeted prior to egg deposition, whereas, spring operations target adults and nymphs of the first spring generation (See Appendix "F" for detailed control strategies). Once the CTVCP personnel, Entomologists and Agricultural Pest

Control Specialists (APCS), determine that the probability of achieving maximum population reduction is high, pre-treatment counts of the BLH populations are made and aerial control operations are started.

Aerial control of BLH is accomplished by insecticidal application with fixed-wing aircraft or helicopter. Malathion is applied across delimited areas at one gallon of mix per acre. A swath width of 100 ft is used for helicopter applications, while a 100-125 ft swath width is utilize with fixed-wing aircraft. Malathion is mixed at a rate of 7.7 oz. (0.583 lbs./ acre a.i.) of 95% malathion in 120.3 oz. of buffered water. Malathion is routinely sampled by CTVCP and tested by the Center for Analytical Chemistry, CDFA, to assure quality and absence of contaminants. Malathion is the only product registered in California for BLH on rangeland.

Concentrated malathion and water are transported to the aircraft loading site as near to the control area as practical. Mixing is accomplished by metering water, buffered to a pH of 6.5, into a mix tank then metering the prescribed ratio of malathion into the mix tank under agitation. The aircraft is loaded by connecting a hose with a drip proof connector between the mix tank and the aircraft. Each load transferred to the aircraft is metered and checked against the known area treated to assure proper application rate. Spray booms are calibrated on site under the supervision of the CDFA supervisor before application is started and periodically re-checked during the course of the operation. Nozzle arrangement and boom lengths are adapted to allow for the differences in operating speeds of various aircraft while delivering a gallon/acre with an average droplet size of 350 microns.

To aid the accuracy and efficiency of the aerial application, a Global Positioning System (GPS) navigational system is now required under contract to aid the precise application of malathion. The use of the GPS system with a fixed-winged aircraft, for the most part, has eliminated the need for flag persons on foot. Prior to treatments, Program staff obtain GPS points around potential treatment areas with a hand held GPS unit. This information is placed on a potential treatment map and given to the pilot for reference. The GPS point allows the pilot to locate the general vicinity of the treatment polygon where CTVCP personnel are present in vehicles to mark and direct the aircraft to starting points, cutoff points and observe the applications from the ground..

To initiate aerial treatment, CTVCP personnel on the ground visually identify a starting point and communicate that position using ground-to-air radio. The pilot sets a starting point into the on-board GPS unit at that visual position while flying through to the opposite boundary identified by Program staff on the ground. A second visual point is set, establishing an "A-B" line. The on-board GPS unit then generates 100ft parallel interval treatment swaths, from that "A-B" line, to the end of the polygon. When the aircraft reaches the end of the polygon, CTVCP personnel on the ground, directs the final swath by position of a vehicle or visual landmark.

In the event that GPS cannot be used, flagpersons are placed at each end of the swath and at intervals in the swath line if needed. The flaggers keep the aircraft in line by waving a flag or providing the

pilot a bright flash of light from either a signal mirror or powerful spotlight. Once the aircraft approaches one flagger and is sighted on the next, the flagger moves 100 feet to direct the next swath. Since flaggers are on foot, communications are maintained by hand held radio. Supervisors are in constant contact with the pilot and flaggers by radio to give directions, where needed.

The aircraft and pilots are under contract to CDFA and meet or exceed all FAA standards. In addition, CDFA requires that the pilot, licensed as a journeyman agricultural pilot, has a minimum of 1,000 hours in the type and model aircraft being used. Equipment used in conjunction with aerial control operations normally consists of one helicopter or airplane and the fuel and water truck, furnished by the contractor. A CDFA truck with malathion tank and three or four passenger vehicles for the supervisors and flaggers. Flaggers are placed and retrieved via the passenger vehicle where roads are available. If no roads are available, flaggers are placed and retrieved by helicopter.

When fixed-wing aircraft are utilized, the fuel truck and mixing vehicles are located at a landing strip which is frequently remote to the treatment area. This effectively reduces the number of vehicles supporting treatment activities within the immediate treatment. The number of CTVCP personnel needed to support a single fixed-winged aircraft or helicopter during treatment operations varies from 8-12 people. More people are utilized in areas where constant surveillance with extra passenger vehicles is necessary to minimize accidental exposure to people, water sources or to assist in flagging sensitive habitat boundaries. Within 72 hours after application is completed in an area, post-treatment checks are made to assure depopulation of the BLH population has been achieved.

Winter/Spring Treatments

Survey and treatment of BLH populations in winter/spring differs from fall control strategies. BLH overwintering and spring breeding sites in the San Joaquin Valley are located on south to southwestern facing slopes within the upland foothill terrain of western Kern, Kings, Fresno and Merced Counties. Breeding sites are located where dense growing wild oats, red brome, foxtail dominated rangeland gives way to slopes harboring sparsely populated, stressed plant communities, including filaree (*Erodium*), peppergrass (*Lepidium*) and *Plantago*.

Soils are typically low in organic matter and are unable to retain moisture necessary for robust plant development. The BLH, being a desert insect, benefits from these sparse and stunted plant zones. The slope, sun angle and sparse growth provides heat necessary for egg and nymph development at a time of year when the vast portion of the San Joaquin Valley is influenced by fog and cool temperatures. BLH migrate and concentrate in these micro-habitats during the winter and early spring months. In addition, the sparse plant growth and poor soils are subject to rapid dehydration and are usually the first rangeland areas to show moisture stress in the spring while rangeland on north and east facing slopes and flats remain green. BLH treatments target these sparsely vegetated breeding areas after a majority of the nymphs have hatched but prior to the adult migrations.

A different net and sweeping technique is used during winter/spring survey. The net bag is the same; however, the stiff 15" hoop is replaced with a flexible hoop made of flat stainless steel attached to a

30" handle. In sweeping, the net is held against the ground and swiftly moved in a horizontal arc approximately 150^{o} from side to side. As it passes over the tops of host plants, BLH attempting to escape, are caught in the cone of the net. Both pre and post-treatment surveys are conducted and daily evaluations of populations are made in order to alert growers of susceptible crops as to the threat posed by CTV infection in various areas.

Due to the early drying of sparsely vegetated breeding habitat, pilots can easily discern BLH breeding areas from other rangeland vegetation. Flaggers are used to direct the aircraft to pre-designated slopes where concentrations of BLH have been located. Mixing and loading of aircraft is identical to fall treatment.

In contrast to BLH breeding sites in the San Joaquin Valley, historical spring breeding sites in the Imperial Valley develop across the desert floor where seasonal rainfall patterns influence the random growth of host plant populations. (Further information regarding control strategies can be found in Appendix "F".)

PUBLIC HEALTH and ENVIRONMENTAL CONSIDERATIONS

Public Health and Safety

Malathion has been used for 50 years on commercial food crops, home gardens, landscaping, pets, livestock, mosquito abatement and fruit fly eradication projects. The relatively small quantity of 0.583 lbs. of malathion per acre, as specified in the "Proposed Action", limits potential exposure for people living in or near the treatment areas. It is the policy of the CTVCP to prevent accidental exposure of the general public or persons incidentally working in the area treated.

As a requirement of the Food Quality Protection Act of 1996, the U. S. Environmental Protection Agency (EPA) periodically evaluates the use of malathion and other organophosphates for human health and ecological risks. In response to the most recent EPA evaluation completed in 2000, EPA's Health Effects Division's Cancer Assessment Review Committee proposed to classify malathion data as "suggestive evidence of carcinogenicity but not sufficient to assess human carcinogenic potential". Two expert panel reviews were unable to agree with this conclusion and recommended additional study.

To date, malathion has not been classified by the EPA as a carcinogen nor is there convincing evidence that malathion is a carcinogen, teratogen, reproductive toxin, or that it damages nerves. Malathion is not on California's list of compounds know to the state to cause cancer. A summary of toxicological study evaluation worksheets for malathion from the Medical Toxicology Branch, Cal EPA is provided for review in Appendix "J". Detailed discussions of risk and hazard assessments of malathion can be found in Exotic Fruit Fly Eradication Program-Final EIR, Appendix "A" (CDFA, 1994) and in the Health Risk Assessment of Aerial Application of Malathion-bait (CDHS, 1991).

Prior to treating an area by air, the pilot is informed of local non-target sites including water sources, endangered species sites, livestock, and any people working or passing through the treatment area. Where vehicles are able to travel, CTVCP personnel patrol ahead of the aircraft to alert anyone who may not have been notified. When feasible, entry points into the treatment area are restricted by stationing a person to notify people of the pesticide application in progress. Supervisors are in constant contact with the aircraft and ground crews by radio. Wind direction and velocity is monitored to prevent pesticide drift out of the target area. Pilots are instructed to turn off spray when people or vehicles are encountered in the treatment area.

Pesticide Training

CTVCP personnel are trained in the safe and proper mixing, loading and application of malathion in compliance with both federal and state pesticide regulations and the product label. Each full time employee maintains and updates a CTVCP Safety/Pesticide Training Manual consisting of general safety rules and the written pesticide training program. Each employee attends a documented pesticide training session annually or prior to working with malathion. In addition, members of the CTVCP staff maintain a Qualified Applicator Certificate, issued by the California Department of Pesticide Regulation. To maintain a certificate, 20 hours of continuing education courses must be completed every two years.

Notification

The notification of property owners prior to survey and BLH control is a fundamental part of the program. Written permission for continued survey and potential treatment is solicited from the owners or lessees of public and private lands where BLH host plants have been mapped. County property plat books are used to locate names and addresses of property owners. Within winter and spring treatment areas, where large tracks of rangeland are held by small numbers of oil companies or ranchers, the landholders are notified in person. The written waiver informs the owner of the presence of BLH host plant populations and the potential for harboring BLH on their property. Comments or special instructions are requested from the landowners in an effort to minimize the impact of the Program on their daily activities. Special concerns of property owners and the CTVCP may include honeybees, livestock, endangered species, water sources, work crews, recreational uses or pre-existing medical conditions of landowners. Copies of both the malathion label and material safety data sheet are made available on request for more detailed and specific information.

A special effort is made to give a 24/48-hour notice of treatment, if requested by property owners. The one to two-day notice is more commonly requested by the various oil companies to inform company personnel and private contractors within the oil fields, where BLH control will be performed.

Public agencies, such as the BLM, DOE, California Department of Water Resources and California Department of Parks and Recreation, have requested a substantial prior notice of treatment, coordination meetings, or a temporary permit prior to survey or treatment. Pre-treatment meetings

and temporary permits generally highlight safety concerns, the notification of local field supervisors, descriptions of the potential treatment area and known endangered species locations.

Honeybees

Due to the susceptibility of honeybees to malathion, care is taken to locate apiaries during pre-treatment survey activities. The County Agricultural Commissioners (CAC) offices and the Kern Agricultural Chemical Association are utilized by the CTVCP to notify beekeepers prior to BLH treatment activities.

Beekeepers are required to register apiary locations with CAC offices and may register with the Kern Agricultural Chemical Association. Comparisons of CTVCP potential treatment maps to current bee locations at both the CAC and the bee notification service are made prior to treatment. Locations are noted and follow-up field surveys are performed to confirm the presence of bees. The beekeeper is contacted if BLH control must be performed within one mile of the apiary. Pre-treatment contact with the CAC and the bee service also alerts beekeepers, looking for new apiary locations, of the potential treatment areas and approximate time frame. CTVCP staff attempt to contact owners of unregistered apiaries, found during pre-treatment surveys, using the owner information stenciled on the hive boxes. If the owner's name and phone number does not appear on the hives, the CAC is contacted in an effort to locate the owner.

Avoidance of Non-target Sites

Program personnel, through extensive field experience, become intimately acquainted with all physical characteristics of the terrain within their assigned districts. This includes familiarity with non-target sites and situations such as human activity, livestock, water sources, endangered species locations and riparian zones.

Riparian habitats are not conducive to the growth and development of BLH host plants and therefore are not treated. The area of riparian influence or "green belt" is in stark contrast to drying rangeland vegetation where treatments are conducted. Buffer areas of at least 200 meters are left untreated near riparian water courses . The buffers extend from the outer edge of the influence of the water course (green belt) into arid areas of drying rangeland vegetation. Buffer zones are widened sufficiently to compensate for the curvature of stream beds and current wind direction.

BLH breeding habitat, in close proximity to riparian water courses, are most often located on the north side where the slope direction and host plant growth is suitable for BLH development. The slope and sun angle in rangeland habitat on the immediate south side of water courses is not conducive to BLH development and when left untreated, functions as a buffer of 400 to 600 yards or more.

The close familiarity with treatment areas and continual BLH delimitation surveys performed during the 4-5 week period prior to the commencement of aerial applications, enables Program personnel to

predict where non-target sites and situations are likely to occur. Maps provided by private parties, the BLM, National Resource Conservation Service and the U.S. Geological Survey are utilized to record the locations of BLH populations and the position of non-target sites. In addition, computerized field maps, created by the CTVCP, aid field personnel and aerial applicators in identifying non-target areas within or adjacent to delimited treatment areas.

Prior to the treatment of each area, the aerial applicator is briefed and given a map of non-target sites, treatment restrictions and potential aviation hazards within areas to be treated. On occasion, reconnaissance flights are performed to point out non-target areas and potential aviation hazards to pilots unfamiliar with a particular treatment area.

Aerial applicators and Program personnel performing ground-rig applications leave buffers around non-target sites within the potential treatment area. To aid the aerial applicator in this task, Program personnel routinely place flag persons or position vehicles, as cutoff points, between the non-target sites and the flight path of the aircraft, assuring a proper buffer. In addition, field supervisors are in constant radio contact with the pilot to aid and direct the pilot in locating and avoiding non-target sites.

Runoff and Drift Prevention

Weather conditions within potential treatment areas are important factors in determining the effectiveness of control applications. Each canyon is different with respect to weather patterns, precipitation, propensity for fog and winds. A great deal of time and money is invested in the survey, delimitation and treatment of BLH populations. It makes little sense to apply expensive materials by expensive methods when windy or inclement weather conditions could nullify control efforts and increase the potential for drift or runoff into non-target areas.

Listed below are guidelines employed by the CTVCP to reduce the potential for drift and runoff from the influences of weather.

1. Prior to and during treatment activities, the local weather forecasts are consulted on a daily basis to ascertain the likelihood of rain and wind. During control operations, wind speed and direction is constantly monitored in the target area to eliminate drift into non-target areas. Constant communication is maintained with aircraft to alert the pilot should weather conditions change. When necessary, buffer zones are enlarged to compensate for wind direction.

2. When plant cover is moist due to recent rain, dew, or frost, the CTVCP delays the application of malathion until the plant cover is nearly dry.

3. When there is a high probability (80%) of local moderate rain, .25 inch or less within 24-hours, we closely watch the possibility of precipitation within the treatment area allowing applied materials sufficient time to dry (at least four hours) before anticipated rainfall. Light

showers of .10 inch or less appears to have little affect on the applied insecticide once dried on the plant surface.

4. If rainfall of more than a moderate amount (.25 inch or more) is predicted locally within 48 hours, we will discontinue applications until predictable local conditions improve.

Biological Control of the Beet Leafhopper

In an on-going effort to reduce the amount of insecticide used, the CTVCP has been funding research to explore the prospects for utilizing egg parasites to control BLH since 1989. It was the intent of the CTVCP to develop a biological control program to control the sugar beet leafhopper by; 1) surveying and determining the present natural enemies of BLH in the San Joaquin Valley and refine mass rearing techniques for release of native parasites, and 2) survey overseas for additional BLH parasites for importation, mass rearing and release in California to enhance the natural mortality of BLH.

Since the summer of 1995, the CTVCP focused research activities on a classical biological control strategy. Nine species of BLH egg parasites were initially imported from Turkmenistan and Iran, and successfully cultured. These species are: *Anagrus atomus, Gonatocerus* species 1A & 1B, *Gonatocerus* species 2, *Polynema* species 1 & 2, *Aphelinoidea turanica, Aphlinoidea anatolica,* and a single *Oligosita* species. With the exception of *Gonatocerus* species 1B, all parasite species were successfully cultured and mass reared in the University of California at Riverside (UCR) insectary. A total of 109,100 adult parasites have been released since 1996 in BLH overwintering and spring breeding rangeland habitats. The environmental assessment of the release of egg parasite species for the control of BLH is found in Appendix G.

Since the beginning of 1999, the emphasis shifted away from the release of imported parasite species to collecting information on the occurrence and effectiveness of imported parasites in the field. **Host Exposure and Vegetation Sampling methods were used to assess parasitism in the field as well as providing a measure of the relative effectiveness of each individual introduced parasite species. Although introduced parasite species were collected under both methods, several native parasite species made up the majority of parasites collected. Imported parasite species were shown to be established, but did not show a classical biological control response. After the release of over 100,000 imported egg parasites, researchers agree that there has been a reasonable opportunity for these imported parasite species to show a classical biological response by impacting BLH populations where they were established.**

Due to the observation of significant parasitism of BLH by indigenous parasites during introduced parasite assessment studies, the feasibility of using indigenous parasites in augmentative releases was considered as an alternative control strategy. However, the large costs associated with producing large numbers of native parasites in the laboratory makes augmentative releases of native parasites impractical.

In November 2001, the Curly Top Virus Control Board (CTVCB) requested the establishment of a technical research group to review current BLH parasite research and additional areas of research relating to the control of CTV. The first Research Advisory Group meeting was held on December 12, 2001 at UCR. The following areas of research was discussed and will be submitted to the CTVCB research subcommittee, for future research consideration:

1. Environmental monitoring of malathion applications, i.e. insect biomass study, drift assessment, and fresh water monitoring.
2. The identification of CTV reservoirs, including strains and plant preference.
3. Detailed look at the ecology and physiology of the beet leafhopper; including host plant relations and interaction, causes of migration, and the process of virus acquisition and inoculation.
4. Habitat manipulation; including the use of parasitoids on weed hosts, sowing grasses, herbicides, cultural control practices.
5. Fungal pathogens of BLH.
6. Alternative pesticides (to malathion); including bio-rationales and repellents.
7. Plant cross protection.
8. Sterile Insect Technique.
9. Genetic manipulation of BLH.

Key Features of the "Proposed Action"

1. BLH population levels are assessed within historical breeding sites prior to undertaking control measures. CTVCP personnel monitor BLH populations in historical breeding grounds from as far north as Red Bluff south to the international border between the United States and Mexico.

2. The state is divided into five control districts with an APCS assigned to each district, depending on workload in the particular area. Program entomologists coordinate workload and evaluate BLH population levels statewide based on predator/prey relationships, virus analysis, weather trends and available host plants.

3. Control of the BLH will be accomplished through the application of malathion by aircraft or by ground-rig spot treatments where and when the CTVCP determines that BLH populations pose a threat to adjacent croplands.

4. Fixed-winged aircraft or a helicopter is utilized to apply BLH treatments to rangeland and cultivated fallow fields. All terrain vehicles are utilized by CTVCP staff on existing roads to perform pre and post-treatment surveys, and move flaggers if utilized.

    a. The use of a GPS equipped fixed-winged aircraft eliminates the use of flag persons, the associated impacts of traversing the treatment area on foot, and vehicle movements to place and retrieve flag persons during treatment activities.

b. When helicopters are used, they are serviced by a specially built tanker equipped with a closed mixing system and landing pad on the top of the truck. The nearest existing roads are utilized to move mixing vehicles associated with helicopter applications. If two treatment crews are needed simultaneously in separate areas, a second water truck and an additional vehicle carrying malathion and mixing tank is employed to service the second helicopter.

5. Landing strips and related mixing equipment for fixed-winged aircraft are usually located at a distance, further reducing noise and traffic in the immediate treatment area.

6. CTVCP aerial operations can take place during pre-dawn hours, but only when sufficient light exists to safely navigate and observe obstacles such as power poles, wires and structures. Rarely can CTVCP aerial treatments begin earlier than 30 to 45 minutes before sunrise. CTVCP aerial operations are terminated when wind speeds exceed label requirements and/or air temperatures exceed approximately 80^{o}F.

7. Ground-rigs are generally used to treat BLH host plants along roadsides and in cultivated fallow fields. (Ground-rigs consist of a mist blower mounted in the bed of a pickup.)

a. The ground-rigs are calibrated to deliver 7.7 oz. of 95% malathion per acre while treating a 50-foot maximum swath, at approximately 10 mph, along roadsides where the CTVCP determines that population levels warrant treatment. The treatment swath is adjusted to match the width of the target area.

b. Ground-rigs generally use established roads when treating roadside host plants in areas where CTV susceptible crops are grown. Ground-rig treatments target BLH host weeds in areas where intensive weed control activities are ongoing and may be subject to frequent discing, mowing and herbicide use.

8. The ground-rigs will also be used to treat small cultivated fallow fields where the size or location of the fallow field, if treated by aircraft, would not be cost effective.

a. The fallow fields will be covered by driving a ground-rig in parallel lines, 50 feet apart, across the length of the field with a 50-foot treatment swath.

b. The majority of ground-rig use within cultivated fallow fields is adjacent to rangeland breeding grounds and slows BLH migration toward susceptible crops.

9. Aircraft and ground-rigs are calibrated and monitored during treatment to assure a rate of 7.7 oz. of 95% malathion per acre.

a. Exact formulation: 7.7 oz. + 120.22 oz. water + .08 oz. BAC Spred Stik = 128 oz.. mixture per acre (water is buffered as needed)

10. After treatment is completed, post-spray kill checks are taken by CTVCP personnel in all areas at 24, 48 or 72-hour intervals. Sampling is the same as pre-treatment sampling. These post-spray checks give a means of measuring effectiveness of the control work. The areas that were not sprayed are also sampled, both to check for possible build-up of the BLH population and predator population, and as a control to measure against areas sprayed.

11. The use of a totally closed mixing system reduces the possibility of chemical spill at the loading site.

12. All vehicles will be restricted to existing roads to prevent soil compaction and damage to flora and fauna. BLM vehicle designations will be adhered to where applicable.

13. Pre and post-treatment BLH surveys are performed on foot. If personnel are used to direct aircraft across rangeland, flagging activities are performed on foot. Where no roads exist, flag persons walk to the proper position or are placed and retrieved by helicopter.

14. Aircraft landing sites will be watered to reduce dust.

15. All malathion applications are monitored by program personnel on the ground to ensure proper placement of insecticide and to monitor environmental conditions in the treatment area.

16. Wind speed and direction is continually monitored to ensure that the insecticide does not drift into non-target areas.

17. To minimize drift, no application of malathion will take place when sustained wind velocities exceed 5 mph.

18. Great care and effort is taken to ensure that natural or man-made bodies of water, sufficient to support any kind of wildlife, are not contaminated by runoff, drift, or by direct application. These areas include; springs, wildlife guzzlers, alkali sumps, vernal pools, ephemeral pools, stock ponds, reservoirs, streams and riparian zones (See "Avoidance of Non-target Sites", page 20).

    a. Permanent and ephemeral water sources are located prior to treatments during delimitation survey.

b. Adjacent to all bodies of water, a 200-meter buffer zone is left untreated to ensure water quality and reduce impacts to sensitive wildlife.

c. Weather forecasts are consulted prior to and during treatment operations to reduce the potential for runoff (page 21).

19. All beekeepers are notified by the CTVCP within a minimum of 48-hours of pending pesticide application (See "Honeybees", page 20).

20. CTVCP personnel are trained to be observant of and avoid wildlife while using established roads within the areas of operation. The speed of vehicles vary and are commensurate with the quality and condition of roads not to exceed 25 mph.

21. Managers of camps and recreation areas are notified prior to treatment.

22. All Program personnel have been trained to minimize contamination in the event of a pesticide spell (See "Pesticide Spill Contingency Plan", Appendix "I").

23. Application contractors are required to furnish journey level pilots who have a minimum of 1,000 hours experience flying the type of aircraft used in pesticide application. The pilot must possess all licenses required by the county and state.

24. Malathion is routinely sampled by CTVCP and tested by the Center for Analytical Chemistry, CDFA, to assure quality and absence of contaminants.

25. To minimize contamination in the unlikely event of an aircraft accident, fixed-winged aircraft carry a maximum of 50 gallons active ingredient (a.i.) while helicopter's carry a maximum of 24 gallons.

26. All vehicles carry fire fighting equipment including: 1) a chemical fire extinguisher, type A-B-C, of at least one pound minimum capacity of a type approved by the California Department of Forestry, and 2) a shovel in good condition with a handle not less than three feet in length and a blade width not less than 7-3/4 inches. When helicopters are utilized, the tanker truck usually has several hundred gallons of clean water that can be applied by high pressure to control fire, if needed.

Measures to Avoid Potentially Major Effects to Species of Special Concern

Measures to avoid potentially major effects to species of special concern have been adopted directly from terms and conditions, and conservation recommendations outlined in USFWS biological opinions, some stipulated as terms and conditions of CTVCP's Federal PUP. Measures were also adopted from formal and informal consultations with the California Department of Fish and Game (CDFG) and sensitive areas identified in development of San Joaquin Valley Habitat Conservation Plans.

GENERAL MEASURES

1. Motorized Vehicle Use

   A. All CTVCP vehicles will be restricted to established roads to prevent damage to flora and fauna and to prevent soil compaction. CTVCP personnel are required to be observant of and avoid wildlife while driving in the area of operation.

   B. While vehicle speeds can vary and are commensurate with the quality and condition of established roads, the speed of vehicles will not exceed 25 mph.

   C. All vehicle restrictions established for travel on BLM administered lands will be adhered too when applicable. Special designated vehicle restrictions in lands administered by State Agencies will be observed.

2. Measures to Reduce Drift and Impacts to Wet Lands

   A. To minimize drift, wind speed and direction will be continually monitored to ensure that aerial applications will remain in the target area. Aerial applications will not be performed when sustained wind velocities exceed 5 mph.

   B. To reduce the potential impacts to sensitive aquatic non-target species from pesticide drift and contaminated runoff, a 200 meter buffer zone will be established around wet land areas.

   C. If a 200 meter buffer will not adequately control BLH populations in a specific area, ground-rig spot applications will be used.

   D. If circumstances preclude the use of ground-rigs, fixed-winged aircraft or helicopters will be used only when wind direction is flowing away from wet land habitat. *The CTVCP anticipates that a reduced treatment buffer (<200 meters) may be necessary to control BLH in limited areas adjacent to wet land habitat in the mouth of Zapatos, Jacalitos, Warthan, Cantua, and Los Gatos Canyons.*

SAN JOAQUIN VALLEY

1. Blunt-nosed Leopard Lizard (BNLL)

Measures to minimize impacts to BNLL involves a conservation strategy which focuses on efforts to eliminate or severely restrict malathion treatments within habitat important for the recovery and maintenance of the BNLL while allowing control of BLH, when necessary, in historical high CTV virus areas. (See "Summary of Measures" and Maps in Appendix "D"). The strategy includes the following:

- Identification and the establishment of BNLL conservation areas ;
- Identification of specific measures to reduce potential impacts to BNLL from CTVCP treatment activities;
- The integration of BLH egg parasites within BNLL conservation habitat reducing the need for treatments.

Measures Taken within BNLL Conservation Areas

BNLL conservation areas are based on best available knowledge and preliminary recovery planning. BNLL conservation areas are estimated to cover approximately 154,060 acres (67,060 in San Joaquin Valley; 87,000 in the Carrizo Plain). BNLL conservation areas are highlighted in Appendix "D".

A. Malathion will not be applied in areas designated as BNLL conservation areas # 1, 2, 3, 4, 8, 9, and10.

B. Aerial applications of malathion will be applied in designated BNLL conservation areas 5, 6, 7 prior to April 15th and after October 15th to avoid BNLL activity.

(1) Malathion will not be applied prior to April 15th when daytime highs reach 77° F or higher for three consecutive days.
(2) Only large BLH populations will be treated (at least 15 BLH's/10 net sweep average).
(3) No more than 50% of the area will be treated by alternating a treated swath with an untreated swath to facilitate the quick establishment of insect prey species and spot applications will not cover contiguous parcels exceeding 20 acres.
(4) BLH control will be restricted to a single annual treatment.

Measures Taken within Presumed BNLL Habitat

Presumed BNLL habitat is based on known locations, outside the CTVCP designated BNLL conservation areas, as defined by occurrence data maintained by the NDDB, BLM, and the Endangered Species Recovery Program (ESRP).

C. No more than 50% of the area will be treated by alternating a treated swath with an untreated swath to facilitate the quick establishment of insect prey species and spot applications will not cover contiguous parcels exceeding 20 acres. BLH control will be restricted to a single annual treatment.

D. Intensive spring treatment areas which overlap intensive fall treatment areas, highlighted in Appendix "D", will have the option of a second additional treatment in fall, up to 50% coverage, of delimited BLH populations on Russian thistle. (These intensive control areas, approximately 17,000 acres, have the potential of developing large BLH populations in Russian thistle on rangeland where a single spring treatment may have been performed. The majority of these areas are located on the west side of Fresno County in the Pleasant Valley. Approximately 100 to 3,000 acres may need treatment in any one year.)

General Measures Taken within BNLL Habitat

BNLL areas will not receive two treatments per year for consecutive years without the approval of USFWS.

E USFWS will be consulted prior to the treatment of burn areas requiring more than a 50% coverage to control large BLH populations.

F. The CTVCP will target BNLL conservation habitat, outside "High Virus-Intensive Control" areas, for initial release and establishment of BLH egg parasites in BNLL conservation areas 2, 5, 6 and 7 as a first priority and the remaining conservation areas as a second priority.

G. On an annual basis, the CTVCP will consult informally with BLM, USFWS and CDFG, if necessary, to modify designated BNLL conservation habitat areas and review the status of the BNLL conservation strategy and research.

H. Adopt a protocol for sampling relative grasshopper population densities in areas treated the previous year.

NOTE: Additional restrictions to CTVCP activities within potential BNLL habitat exist due to the exclusion of CTVCP's treatment activities from "Specialty Preserves" (as defined within habitat conservation plans), various national and state preserves and refuges, Nature Conservancy lands, Center for Natural Lands Management, wetlands and lands populated by several listed plant species during the spring bloom periods.

2. Tipton Kangaroo Rat and Giant Kangaroo Rats (TKR & GKR)

1. All malathion applications in the vicinity of known TKR or GKR habitat shall be aerial. CTVCP vehicles are restricted to established roads in known TKR or GKR habitat.

3. San Joaquin Kit Fox (SJKF)

A. Known and potential dens of SJKF will be avoided during ground surveys. CTVCP vehicles are restricted to established roads within know SJKF habitat.

4. San Joaquin Dune Beetle; Ciervo Aegialian Scarab Beetle

A. Application of malathion is strictly avoided within 1/4 mile of known habitat of the San Joaquin dune beetle; Ciervo Aegialian scarab beetle.

B. Additional potential dune habitat for each species will be inventoried. Malathion application in such areas, which are found to be occupied, is strictly avoided.

C. Aerial application of malathion within one mile of known and probable population sites are curtailed when sustained wind velocity exceeds 5 mph.

5. San Joaquin and Intercostal Valley Plants of Concern

A. The CTVCP on an annual basis will consult plant records prepared and maintained by the CNPS, NDDB, ESRP, CDFG, DOE and the BLM to update known plant locations.

B. A 1/4-mile buffer will be maintained around extant populations of California jewelflower, Bakersfield cactus, Kern mallow, Monterey spineflower and robust spineflower during the flowering periods .

C. Malathion will not be applied within a quarter-section of extant populations of San Joaquin Woolly-threads during the flowering period; unless, a critically large leafhopper population is found during pre-treatment surveys, averaging 15 BLH's per 10 sweeps. If a critically large leafhopper population is found, control using malathion should be restricted to a single application every other year.

D. If it is not possible to maintain a 1/4 mile buffer, ground-rig spot applications will be utilized.

E. If circumstances do not allow the use of ground-rigs, fixed-winged aircraft or helicopters will be used with special effort to minimize pesticide drift and treat only

when winds are moving away from the plant location. *The CTVCP can anticipate that a reduced treatment buffer may be necessary to control BLH populations near two historical Jewel Flower locations in the mouth of Jacalitos and Zapatos Canyons. NDDB occurrence #'s 7 & 8 are historical sites located in close proximity to BLH breeding grounds. Jewel flower has not been seen in these locations for many years and is considered possibly extirpated. Sites 7 & 8 were surveyed in 1986, Taylor & Davilla. Additional surveys were performed at site #8 in1991 & 1992 for the Pleasant Valley Habitat Conservation Plan; and in 1998 by BLM and CTVCP.*

6. San Joaquin Antelope Squirrel (SJAS)

A. All malathion applications in the vicinity of known SJAS habitat shall be aerial.

B. CTVCP vehicles are restricted to established roads in known SJAS habitat.

7. California Red-legged Frog (CRLF), California Tiger Salamander (CTS)

A. An aerial buffer of at least 1/4 mile radius will be maintain around occupied CRLF or CTS habitat.

B. An aerial buffer of at least 200 meters will remain untreated near aquatic or riparian areas suitable as potential habitat for the CRLF and CTS.

C. In CRLF critical habitat (Panoche, Little Panoche Creeks)

(1) An aerial buffer of at least 200 meters will be maintained around riparian habitat.
(2) If it is not possible to use a 200 meter buffer, ground-rig spot treatments will be utilized.
(3) If circumstances do not allow the use of ground-rigs, fixed-winged aircraft or helicopters will be used with specific efforts to minimize pesticide by treating only when wind is flowing away from riparian habitat.

8. Giant Garter Snake

A. An aerial or ground-rig buffer of at least 200 meters will remain untreated near aquatic or riparian areas suitable as potential habitat for the giant garter snake.

9. Valley Elderberry Longhorn Beetle

A. An aerial or ground-rig buffer of at least 200 meters will remain untreated near riparian areas suitable as potential habitat for Elderberry.

B. During the time when adult beetles are active (March 15th through June 15th), a buffer of at least 1/4-mile radius will remain untreated near known occurrences of valley elderberry longhorn beetle as defined by the National Diversity Data Base or other available data base sources.

C. CTVCP personnel will be trained to recognize elderberry shrubs and potential beetle exit holes.

10. Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp

A. The CTVCP, with the assistance of federal and state resource agencies, will identify and inventory vernal pools known to be habitat for listed fairy shrimp within potential CTVCP treatment areas.

B. A treatment buffer of a ½ mile will be maintained around vernal pools.

C. A treatment buffer of 200 meters will be maintained around suspected vernal pools.

11. Specialty Preserves

The CTVCP recognizes three "Specialty Preserves" as defined in the Pleasant Valley Habitat Conservation Plan (Hopkins, 1994). These areas are categorized as sand dune or stabilized sand dunes, and fall within the potential winter CTVCP treatment area. These areas are potential habitat for the San Joaquin dune beetle (*Coelus gracilis*), ciervo aegelian scarab beetle (*Aegialia concinna*) or the red-headed sphecid wasp (*Euceris ruficeps*).

A. All malathion treatments will be eliminated from within the specialty preserves.

B. CTVCP vehicles are restricted to established roads within the specialty preserves.

12. Doyen's Dune Weevil

A. Malathion will not be applied to dune weevil habitat. (The portion of T22S-R19E-Sec. 30 which lies on the west side of Interstate 5 at the intersection of Hwy 41 and Interstate 5)

13. Buena Vista Lake Shrew

A. The CTVCP will not treat known Buena Vista Lake shrew habitat to reduce the potential for impacts to the Buena Vista Lake shrew population and indirect impacts to insect prey base.

B. An aerial or ground-rig buffer of at least 200 meters will remain untreated near marsh areas suitable for Buena Vista Lake shrew habitat.

14. Nature Conservancy and Center For Natural Lands Management (CNLM) Lands

Nature Conservancy and CNLM lands are generally dedicated to threatened and endangered species management and habitat preservation.

A. The CTVCP will not treat Nature Conservancy and CNLM lands.

B. The CTVCP will seek to establish BLH egg parasites on Nature Conservancy and CNLM lands as development of biological control agents prove effectual.

15. Mountain Plover

A. All CTVCP personnel will be trained to recognize the mountain plover.

B. During the winter treatment period, USFWS will be consulted prior to treating habitat with a slope favorable for the mountain plover.

SOUTHERN CALIFORNIA

16. Desert Tortoise

A. Vehicles used in the CTVCP will not exceed 15 mph while conducting surveys or treatment activities within desert tortoise habitat.

B. Desert tortoises encountered by vehicles used in the CTVCP will be avoided. If a tortoise cannot be avoided without moving the animal out of harm's way, the following procedure will be followed. Stationary tortoises (i.e. those in the path of a survey vehicle) may not be moved out of harm's way until 10 minutes have elapsed from the time of first encounter. Such tortoises may be handled (i.e. moved out of the way) after 10 minutes have elapsed only by personnel who have received instruction in the appropriate procedures for handling tortoises from trained BLM personnel prior to the commencement of surveys.

C. Trash will be removed daily from within desert tortoise habitat to avoid attracting ravens and other predators.

17. Yuma Clapper Rail (YCR) California Black Rail (CBR)

A. No aerial applications of malathion will be made within 300 yards of potential YCR or CBR habitat. Potential rail habitat is defined as any wetland, including agricultural drains with suitable vegetative cover, in the areas shown on Spring Treatment Maps, pages E-10 and E-11 of Appendix "E".

B. Areas containing BLH host material that are between 200 meters and 300 meters from potential YCR or CBR habitat will be treated with ground equipment only.

C. Areas containing BLH host material that are less than 200 meters from potential YCR or CBR habitat may be treated only with equipment that can deliver the malathion specifically to the target plants harboring the BLH population.

D. Malathion will not be applied within 5 miles of occupied YCR or CBR habitat if rain is expected within 72 hours of treatment.

18. Desert Pupfish

A. Application of malathion will not be carried out within a ½ mile of occupied desert pupfish habitat.

B. Application of malathion within one mile of occupied or designated critical habitat boundaries will not take place when sustained wind velocities exceed 5 mph.

C. Application of malathion within five miles of designated critical habitat will be curtailed if weather conditions indicate a moderate to high possibility for precipitation within 72 hours of planned treatment.

19. Andrew's Dune Scarab Beetle (ADSB)

A. Malathion application will be curtailed within the geographic range of the ADSB between the months of February through May to prevent mortality of adult beetles during the breeding season.

B. Prior to an application in January and June, a field examination of proposed treatment areas will be conducted to determine if adult scarabs are active. If present, the malathion application will be postponed until the beetle flight was completed.

20. Flat-tailed Horned Lizard (FTHL)

    A. Application of malathion within the geographic range of the FTHL will consist of no more than a single treatment per given area per year.

    B. All application will be aerial. No spraying from off-road vehicles or use of off-road vehicles on other than designated roads will be used within FTHL habitat.

    C. The application of malathion will be closely associated with ant activity. Pre and post-treatment surveys of harvester ant colonies will be conducted to gauge affects of treatments on ant activity. (See Appendix "H" for survey methods.)

21. Peirson's Milk-vetch

    A. Applications of malathion will not be made within known extant populations of Peirson's milk-vetch.

ALTERNATIVE 2 - REDUCED PROJECT ALTERNATIVE

Under the Reduced Project alternative, the CTVCP would not treat public lands.

The CTVCP would control BLH populations where necessary on adjoining private lands using the same procedures as in the "Proposed Action".

ALTERNATIVE 3 - NO ACTION

Under the No Action alternative, the CTVCP would not use any of the above actions. Pesticide treatments would not be performed by the CTVCP to control BLH.

ALTERNATIVES CONSIDERED BUT REJECTED

1. The use of an alternative pesticide in conjunction with the "Proposed Action".

   Reasons for Rejection

   a. Malathion is considered one of the safest pesticides. It is used extensively and safely as demonstrated by extracts from the Initial Scientific and Minieconomic Review of Malathion (E.P.A., 1975) and toxicological evaluation by Cal-EPA (Appendix "J").

b. No other pesticide is registered for use in California for control of BLH in rangeland.

2. The eradication of all BLH hosts plant species in rangeland areas.

Reasons for Rejection

a. The BLH utilizes many species of host plants for food and/or ovi-position sites. The elimination of all host plant species would include native and introduced species, and would have a major impact on the ecosystem and wildlife dependent on the many BLH host plants.

b. Distribution and diversity of host plant species would make the eradication of BLH hosts practically impossible and extremely costly.

3. The local eradication of a single plant species used by BLH almost exclusively during specific times of the year.

Reason for Rejection

a. During 1940-1965, the CTVCP endeavored to eradicate localized populations of Russian thistle to reduce the large acreages found on the west side of the San Joaquin Valley. The Project utilized hoeing crews to eliminate young Russian thistle plants prior to seed production. The project was terminated due to high costs and a persistent seed bed making even local eradication of Russian thistle nearly impossible. Considerations of eradicating a single introduced BLH host plant, other than Russian thistle, include the following:

1. Financial costs to implement and maintain.
2. Environmental impacts to dependent wildlife.
3. The need for 100% cooperation from every property owner within a given area.
4. Controlling re-infestation from outside the eradication area. Excluding the environmental impacts, the financial commitment for such a project is well beyond the ability of the CTVCP's present budget.

4. Exclusive Use of Biological Control

Reason for Rejection

In an on-going effort to reduce the amount of insecticide used, the CTVCP is currently funding research to determine the viability of using biological agents as an alternative. Presently, researchers from the University of California, Riverside are evaluating the effectiveness of nine separate species of BLH egg parasites in natural rangeland habitat

(See Appendix "G", assessment of biological control agents). This research is beingperformed on an experimental basis in small areas in various locations in California. Parasite release areas have been established where malathion treatments are not performed in order maintain the biological control agents. Biological control has not yet developed sufficiently to consider full-scale development of this alternative as a viable option.

The CTVCP intends to continue funding biological control research to determine the effectiveness of the current list of potential biological control agents. If effective biological control can be demonstrated through research, it is the intention of the CTVCP to integrate biological control as an alternative to chemical control.

5. Control the sugar beet leafhopper, *Circulifer tenellus*, using a combination of minimal aircraft and mostly ground spray rigs; **OR** ground-rigs only - no aircraft.

   This action allows the use of malathion with aircraft, in areas inaccessible by wheeled vehicles and the use of spray-rigs using malathion mounted on wheeled vehicles, in areas where they are able to negotiate the terrain.

   Ground-rig treatments would include roadsides, fallow fields and rangeland where accessible. Treatment of rangeland would be performed using the same methods as ground-rig use in fallow fields (see page 13).

   Aircraft use would be limited to areas inaccessible by wheeled vehicles, or not used at all.

   Reason for Rejection

   An increase in damage to habitat important to listed species on public and private lands would most likely result from the use of ground-rigs to treat rangeland where ground-rigs are able to negotiate the terrain.

   There are large tracts of public and state lands with strict restrictions pertaining to the use of cross-country motorized vehicles. In the desert areas, large tracks of BLM land is designated Limited and Moderate (L&M) use in which cross-country travel is prohibited. Within the Carrizo Plain Natural Area and on NPR-#2, motorized vehicle use is limited to designated routes of travel. Lands administered by the State of California including the Department of Water Resources, Department of Parks and Recreation and the Department of Fish and Game, place restrictions on motorized vehicles use.

III. DESCRIPTION OF EXISTING ENVIRONMENT

The following describes the existing environment in all areas where CTVCP activities take place.

A. SAN JOAQUIN AND INTERCOASTAL VALLEYS

1. Physical Components

a. Soils

The soils of the west side of the San Joaquin Valley and inter-coastal valleys are generally alkaline, ranging from very fine powdery gypsum to gravelly. Many areas have exposed hardpan or hardpan under very shallow (1-5") overburden.

b. Water

Water is scarce except where irrigation canals such as the California Aqueduct wind along the west side of the Valley, generally following the line of low foothills of the Coast Range.

Seasonal streams drain from west to east carrying runoff in arroyos and canyons during wet periods. This runoff is carried to the Valley floor where it is absorbed or becomes associated with wildlife guzzlers, alkali sumps, vernal pools, stock ponds or into one of several small reservoirs in the region. Runoff can be carried directly into streams or rivers during periods of heavy rains.

There are numerous seeps, both natural and created by petroleum production, in the Coalinga area, Kettleman Hills, Lost Hills, Elk Hills and McKittrick area. These seeps support small numbers of aquatic organisms and marsh plants. Oily sumps are screened to reduce access to wildlife.

c. Topography

The elevation of the area where control work takes place is 300 feet to 2,000 feet above sea level. The area varies from flat to gently sloping, to steep hills deeply cut by washes and canyons.

d. Air

The air quality in the west side of the San Joaquin Valley is variable and depending on the inversion layers and coastal intrusion, ranges from good to

poor. There are many factors that can contribute to the accumulation of chemicals and particulates in the air: a) growing urban centers with increases in automobile and truck traffic; b) agricultural chemicals, pesticides, herbicides and agricultural vehicles; c) dust from cultivation; d) oil fields (local influence); e) agricultural burning; f) pollution from population centers in the Sacramento Valley and Bay area driven by prevailing winds.

2. Living Components

A. Flora of Western San Joaquin Valley

The southern and west side of the San Joaquin Valley is dominated by Valley Grassland and Valley Saltbush plant communities. Important annual BLH hosts include filaree (*Erodium* spp.), peppergrass (*Lepidium* spp.), and Plantain (*Plantago* sp.).

Valley foothill grasslands were originally dominated by bunch grasses such as *Stipa pulchra*, *Stipa cernu*a, and *Poa scabrella*. The grasslands are now dominated by annual species of *Bromus*, *Vulpia*, *Lepidium*, *Erodium*, and various flowers. Valley grasslands grow and set seed during a winter/spring growing season of 7-11 months and die during the arid summer season. Seed dormancy is broken at the onset of late fall or winter rains.

The San Joaquin Valley is separated from the influences of the ocean by a series of parallel mountain ranges and inter-coastal valleys. Generally, the San Joaquin Valley has winters that are warm and relatively short. The summers are long and hot with low humidity (Twisselmann, 1967).

Annual rainfall ranges from 6 inches, in southwestern Kern County, to 10 inches in western Merced County. Large floral displays are observed in years with wet springs where dense stands of non-native grasses are absent. Approximately 90% of the rains fall between December and April. Dense ground fog persists for days and sometimes for weeks in late November, December and January (Twisselmann, 1967).

The Valley Saltbush Scrub plant community occurs in the southern and western San Joaquin Valley in poorly drained alkali soils on gently sloped alluvial plains or moderately steep to rolling terrain. The more prominent plants in the Valley Saltbush Scrub community are saltbush (*Atriplex polycarpa*), iodine bush (*Allenrolfea occidentalis*), *Lepidospartum squamatum* and snakeweed (*Gutierrezia* spp.) along with large disturbed areas covered with Russian thistle, (*Salsola* spp.).

Although the boundaries are not always distinct, a series of vegetation zones are generally observed from the Valley floor; west, into the hills. The Valley Grassland plant community is often a fire or grazing seral stage that will develop into a Valley Saltbush Scrub plant community. These communities lie below the mixed chaparral plant community in the higher elevations. It is common to find Valley grassland plants such as *Lasthenia*, *Erodium*, *Bromus*, *Vulpia* and *Lepidium* species as understory growth in Valley Saltbush Scrub. Within the potential treatment area, annual grasses dominate the northern slopes, while *Erodium*, *Lepidium*, and *Plantago* are found on the sparsely vegetated, south-facing slopes. The tops of some hills and sides of canyons at times support a combination of *Atriplex* and *Gutierrezia*.

Small, isolated, areas of riparian habitat are found along major drainage areas and creeks on the west side of the San Joaquin Valley. Primary tree species within riparian habitats include cotton wood (*Populus fremontii*) and tamarisk (*Tamarix ramosissima*). In the northern portions of the San Joaquin Valley, *Lepidospartum squamatum* and *Baccharis vininea* can be found growing as under-story plants within these riparian habitats.

In washes and relatively moist areas, occasional small stands of tree tobacco (*Nicotiana glauca*) occur. Where buildings or homesteads once stood, plantings of tamarisk and other exotic trees are evident, providing shade or windbreaks.

B. Flora of the Intercostal Valleys

The Intercostal Valleys including the Salinas Valley area, are classified generally with the Great Central Valley. They are dominated in the lower elevations by the Valley grasslands which extend into oak woodland chaparral in higher elevations. The Salinas Valley is dominated by the Salinas River and its riparian habitat composed of an occasional cottonwood (*Populus fremontii*) and Red willow (*Salix laevigata*), box elder (*Acer negundo* var. *californicum*), blue elderberry (*Sambucus mexicana*) and western red dogwood (*Cornus douglasii*). In the upper Salinas Valley and other more arid inter-coastal valleys, the grasslands give way to an oak savanna dominated by blue oak (*Quercus douglasii*). The climate of the inter-costal valleys are influenced by the ocean to a greater degree than the Central Valley.

Listed, Threatened and Endangered Species which May Occur within CTVCP Potential Treatment Area:

Several candidates for listing are also highlighted because of special interest. A further list of candidate species and species of special concern can be found in Appendix "G".

FT Federal Threatened
FE Federal Endangered
FPE Federal Proposed Endangered
FSC Federal Species of Concern
ST CA State Threatened
SE CA State Endangered
FPT Federal Proposed Threatened

PLANTS

California Jewelflower (*Caulanthus californicus*) (FE,SE)

The California jewelflower is a member of the mustard family and differs from other *Caulanthus* species by possessing flattened, sword-shaped fruits and spherical seeds. The stems rise out of a basal rosette of leaves to a height of one foot and may produce several flowering branches. This species historically occurs in slightly alkaline sandy loam in native grasslands of the southern San Joaquin Valley. Plant populations today are found in Santa Barbara Canyon, the Carrizo Plain, and in the Kreyenhagen Hills (USFWS 1998). The bloom period is February through May.

Kern Mallow (*Eremalche kernensis*) (FE)

The Kern mallow is a small annual herb in the family Malvaceae. It has a restricted distribution in western Kern County occurring only in the Lokern area between Buttonwillow and McKittrick. It is endemic to Valley Sink Scrub, Valley Saltbush Scrub and adjacent grassland. The Kern mallow blooms during March and May. The amount of precipitation can directly impact the size of the Kern mallow population in any given year. A significant reduction in annual population size has been observed following winters of below normal rainfall. Oil exploration, and agricultural activities has contributed to the decline of habitat in the Lokern area.

San Joaquin Woolly-threads (*Lembertia congdonii*) (FE)

San Joaquin woolly-threads occurs within many operational areas of the CTVCP. It's name is taken from the white, multi branched stems that grow to a length of 8-10 inches. The annual herb is a member of the sunflower family and blooms from March through May. San Joaquin woolly-threads are endemic to the southern San Joaquin Valley within the Valley Saltbush Scrub or Valley Grassland plant communities.

Many new occurrences of San Joaquin wooly-threads have been discovered since 1986 in the Carrizo Plain, Lost Hills, Kettleman Hills and Jacalitos Hills (USFWS 1998).

Bakersfield Cactus (*Opuntia basilaris* var. *treleasei*) (FE,SE)

The Bakersfield cactus is a prickly pear type of cactus. It occurs on coarse well-drained granite sand on the grasslands of Kern County and blooms from April through May Agricultural development and urbanization are suggested as the main factors in the loss of habitat and fragmentation of population groups. It is currently known from five general areas in the southeastern San Joaquin Valley.

Hoover's woolly-star (*Eriastrum hooveri*) (FT)

The Hoover's woolly-star is a short (3 inches) grayish annual herb of the phlox family. It is found within the Valley Saltbush Scrub and Valley Sink Scrub plant communities from Fresno County, south through the southern San Joaquin Valley and into the Cuyama Valley. The bloom period of Hoover's woolly-star extends from March through July.

Bakersfield-saltbush (*Atriplex tularensis*) (FSC, SE)

The Bakersfield-saltbush is a member of the family Chenopodiaceae and is an erect annual with a scaly surface on the stems. This salt-tolerant species has only been reported from Kern County as part of the Kern Lake Preserve. Population size of this annual species fluctuates with local rainfall patterns and blooms from June through October.

Palmate Bracted Birds Beak (*Cordylanthus palmatus*) (FE,SE)

This plant has soft hairy gray-green leaves with five lobes. It grows from 10 to 30 cm tall and is a parasite of salt grass. Floral spikes, 50 to 150 mm tall, hold whitish to pale lavender flowers which appear May through October. This plant can be found inhabiting alkaline flats in Colusa, Alameda, San Joaquin, Madera and Fresno Counties.

Large-Flowering Fiddleneck (*Amsinckia grandiflora*) (FE,SE)

The large-flowing fiddleneck is an annual herb, green in color, hairy with linear to narrowly ovate leafs, red-orange flowers, 10-15 mm wide, bloom from April through May. The plant inhabits grassy slopes and is known from just three native populations near Corral Hollow in San Joaquin County. Some apparently successful reintroductions have been attempted.

Monterey Spineflower *(Chorizanthe pungens var. pungens) (FT)* **and**
Robust Spineflower (*Chorizanthe robusta* var. *robusta*) (FE)

The Monterey and robust spine-flowers are members of the buckwheat family (Polygonaceae). The plants grow to 50 cm in height with greyish soft hair. The flowers are 2-4 mm and contain 9 stamens. Both species are found growing in the Coastal Sage Scrub plant community. Occurrences of these plants, near the potential treatment area in the Salinas Valley, are represented by a few old records and may be extirpated from those locations.

ANIMALS

San Joaquin Kit Fox (*Vulpes macrotis mutica*) (FE,ST)

This kit fox is the smallest canine species ranging throughout the San Joaquin Valley from San Joaquin County south through southern Kern County. Portions of Monterey, Santa Clara, San Benito and Santa Barbara Counties are included in the kit fox range. They eat a varied diet of small rodents, lizards and insects. One kit fox per square mile has been estimated as the average density throughout the San Joaquin kit fox range.

Giant Kangaroo Rat (*Dipodomys ingens*) (FE,SE)

The Giant kangaroo rats (GKR) are small mammals with elongated hind limbs for hopping and external cheek pouches for carrying food. The GKR is the largest of all kangaroo rats and feed almost entirely on the seeds of annual plants. Colonies are found in western Kern County and on the Elkhorn and Carrizo Plains in eastern San Luis Obispo and western Fresno and Kings Counties. They prefer sparsely vegetated Valley Grassland plant communities with sandy loam soils.

Tipton Kangaroo Rat (*Dipodomys nitratoides nitratoides*) (FE,SE)

The Tipton kangaroo rat (TKR) is a small mammal with specialized hind limbs and external cheek pouches. The TKR feeds almost entirely on seeds. They live in arid, open land where they dig burrows for shelter and food storage. The range has been reduced to approximately 6,400 acres among five separate parcels and supports low to moderate popu- lation levels.

Buena Vista Lake Shrew (*Sorex ornatus relictus*) (FPE)

The Buena Vista Lake shrew is one of nine subspecies of the *Sorex* sp. found in California. The shrew is a local endemic subspecies found in very restricted marshy wetland areas encompassing 10 acres in the Kern Lake Preserve. It is an insectivorous mammal the size of a mouse with black back with brown speckles, the sides are of a brown tint and the belly of the shrew is gray. The shrew is active day or night and eats

an equivalent of its own weight (4 grams) every day. Its breeding period is from February or March until the start of the dry season (usually around late May or early June).

San Joaquin Antelope Squirrel (*Ammospermophilus nelsoni*) (FSC, ST)

The San Joaquin antelope squirrel is about 10 inches long with a white stripe on each side of the body. It has an omnivorous diet consisting of grass, seeds and insects. They are generally active at temperatures between 68^{o} to 86^{o}F. Significant populations exist in the Elk Hills and portions of the Carrizo and Elkhorn Plains in western Kern and eastern San Luis Obispo Counties; also, in the Kettleman, Quijarral and Panoche Hills in western Fresno and Kings Counties.

Blunt-nosed Leopard Lizard (*Gambelia silus*) (FE,SE)

The blunt-nosed leopard lizard is a large lizard with dark blotches on the back and tail. Breeding females have orange or reddish spots on their sides. It inhabits sparsely vegetative plains, alkali flats, foothills and canyon floors from San Joaquin County south through Kern County and into eastern San Luis Obispo County. Their diet consists of a wide variety of insects and small lizards.

Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) (SE)

The western yellow-billed cuckoo is a slender brown bird with white underparts. Its natural nesting habitat is in deciduous riparian forest in primarily cottonwoods and willow trees. Food consists of grasshoppers, katydids, tree frogs and caterpillars. Breeding pairs are found along the Sacramento River in Butte, Glenn, Colusa Counties, the south fork of the Kern River, and along the Santa Ana, Amargosa and lower Colorado Rivers.

Swainson's Hawk (*Buteo swainsoni*) (ST)

The Swainson's hawk is a medium-sized hawk with long pointed wings and a long square tail. The Swainson's hawk often nests in riparian systems of the Central Valley adjacent to open grasslands and annual agricultural row crops. The California vole is an important staple in their varied diet.

Peregrine Falcon (*Falco peregrinus anatum*) (SC)

The peregrine falcon is about the size of a crow with slate gray color above and lighter color below. The range includes most of California during migrations and in winter, except in deserts. Nesting sites are typically on ledges of cliff faces. The peregrine falcon eats a variety of birds.

Bald Eagle (*Haliaeetus leucocephalus*) (FT,SE)

The bald eagle is a large brown bird of prey with a white head and tail. It occurs widely in North America and winters at lakes, reservoirs, river systems and some rangelands and coastal wetlands. The bald eagle eats rabbits and large rodents, but chiefly consumes dead or dying fish.

California Condor (*Gymnogyps californianus*) (FE,SE)

Formerly widespread in North America from Baja California to British Columbia, the California condor declined in number during the l970's and 1980's. In 1987 the remaining birds were trapped and placed in a captive breeding program. The number of birds were increased in captivity until the reintroduction of two birds in January 1992. Subsequent releases were made in December 1992 and December 1993. Five condors currently occupy a range adjacent to the Sierra Madre Ridge, south of the Cuyama Valley.

Least Bell's Vireo (*Vireo bellii pusillus*) (FE,SE)

The least Bell's vireo is a small migratory songbird with a drab gray color on top and whitish below with sides of grayish olive-yellow. The vireo is insectivorous and is a summer resident of the cottonwood-willow thickets and dry washes. The breeding range is restricted to primarily Santa Barbara, Riverside and San Diego Counties and into northwestern Baja California. In the most recent biological opinion of the CTVCP, USFWS also considers potential habitat to include an area between Bradly and Camp Roberts, in the Salinas Valley (USFWS 2001). Several birds were found in the area in 1986 and a single bird was observed in 1993.

Aleutian Canada Goose (*Branta canadensis leucopaveia*) (F delisted, SC)

The Aleutian Canada goose is one of the smaller races of *B. canadensis*. External markings are consistent with the greater Canada goose, but the neck and bill are relatively shorter and check patches are slightly smaller. Breeding occurs in the western Aleutian Islands. The goose winters in the Central Valley of California and arrives as far south as Merced County in December. Due to its recovery, it was removed from the Federal list of "threatened" species March, 20, 2001, but remains as a species of concern with California Fish and Game (USFWS, March 2001).

Giant Garter Snake (*Thamnophis gigas*) (FT,ST)

The giant garter snake (GGS) inhabits marshes and swamps and basks near water in the spring and fall. Adult GGS can reach 64 inches in length. The color of the GGS is dull brown with black spots on the dorsal side, separated by a yellow dorsal stripe and two lateral stripes. Thirteen population clusters have been identified in the Central Valley and

coincide with historical flood basins in the Central Valley. The GGS occupies waterways and agricultural wetlands and water delivery systems. Surveys in the San Joaquin Valley during 1986 and 1992 failed to discover any GGS although a few remnant populations may still occur in the northern San Joaquin Valley.

California Red-legged Frog (*Rana aurora draytonii*) (FT)

The historical range of the California red-legged frog (CRLF) extended along the California coast from Point Reyes inland to Redding and south to Baja California. Frogs range in size from 1.5 to 5 inches in length and has a rusty-red color on its belly and the underside of its hind legs. CRLF occurs in lakes, reservoirs, ponds, marshes, streams and other mostly permanent water sources. CRLF are attracted to cattails or other plant cover in or near water. Adult frogs are mobile dispersing from aquatic environments to other aquatic or riparian habitats. After rains they may appear on roads at night.

California Tiger Salamander (*Ambystoma californiense*) (FC)

The tiger salamander occurs in foothill and grassland habitats in association with vernal pools of central California. They are also known from golf courses and stock ponds. The California salamander utilizes ground squirrel burrows and the burrow systems of other burrowing mammals to take refuge during the dry summer months. Three remaining major populations groups remain in Alamdea and Contra Costa Counties, Southern Santa Clara-Northern Monterey-San Benito Counties and Madera-Fresno Counties near Millerton Lake.

San Joaquin Dune Beetle (*Coelus gracilis*) (FSC); **Ciervo Aegialian Scarab Beetle** (*Aegialia concinna*)

The San Joaquin dune beetle (SJDB) and the Ciervo Aegoalian scarab beetle (CASB) appear to be endemic to dune systems along the west side of the San Joaquin Valley. The SJDB restricted to five locations along the western edge of the San Joaquin Valley. The CASB is found north of Coalinga in the Ciervo dunes. The dunes are generally not isolated from other San Joaquin Valley coastal dunes by great distances and display uniform vegetation over broad areas. Larvae are thought to feed on the roots of dune vegetation.

Doyen's Dune Weevil (*Trigonoscuta* sp.)

The Doyen's dune weevil is a plightless and nocturnal weevil. Similar to other weevils in the genus *Trigonoscuta,* they are sescribed as gray, sand colored, oval weevils, with a slightly lighter color than other coastal weevil species.

Conservancy Fairy Shrimp (*Branchinecta conservatio*) (FE)

The Conservancy fairy shrimp inhabits vernal pools with highly clouded water and is known from six separate populations within the Counties of Tehama, Solano (Sacramento Natural Wildlife Refuge), Glenn, Merced and Ventura. The Conservancy fairy shrimp are found in rather large pools and have been observed from November to early April.

Longhorn Fairy Shrimp (*Branchinecta longinatenna*) (FE)

The longhorn fairy shrimp is found inhabiting vernal pool depressions in grasslands and sandstone and is known from four separate populations within the counties of Contra Costa (Altamont Pass), San Luis Obispo (Carrizo Plain), Merced (Kesterson National Wildlife Refuge). The longhorn fairy shrimp have been observed from late December until late April.

Vernal Pool Tadpole Shrimp (*Lepidurus packardi*) (FE)

The vernal pool tadpole shrimp is known from 18 populations ranging from Shasta County, south to Merced County (San Luis National Wildlife Refuge); and a single population in Alameda County (San Francisco Bay National Wildlife Refuge). Winter rains break diapausing eggs in dry pool sediments. Vernal pool tadpole shrimp have been reported to mature within three weeks. Adults are present until the pools dry up in the spring.

Vernal Pool Fairy Shrimp (*Branchinecta lynchi*) (FT)

The vernal pool fairy shrimp is known from 32 populations distributed sporadically from Shasta County in the north through most of the length of the Central Valley to Pixley in Tulare County; along the central coast range from northern Solano County, south to San Benito County. Additional populations have been found in San Luis Obispo County (north of Soda Lake), northern Santa Barbara County, and on the Santa Rosa Plateau and near Rancho California in Riverside County. They feed on algae, and other aquatic microorganisms as adults. The eggs lay dormant in the soil until rainwater replenishes the vernal pool.

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) (FT)

The elderberry longhorn beetle is found in elderberry plants associated with valley oak woodlands along the borders of streams and their tributaries including the Sacramento, Cosumnes, Mokelumne and northern San Joaquin Rivers.

Mountain Plover (*Charadrius montanus*) (FPT)

The mountain plover is a migratory bird that over winters in heavily grazed California grasslands. Populations of the plover winter primarily in the San Joaquin Valley west of Highway 99 and south of Sacramento to Kern County, and portions of southern California including the Antelope Valley, Carrizo Plains and the southern end of the Salton Sea in the Imperial Valley. The mountain plover is an insectivorous bird the size of a killdeer (7") with the back of the body being light brown and the belly being lighter. There is no dark breast belt as found in other plover species.

Western Snowy Plover (*Charadrius alexandrinus*) (CDFG species of concern)

The western snowy plover is a small inhabitant of sandy seashores, alkali flats and sand flats. they consume shellfish, marine invertebrates and worms. The western snowy plover is a migratory bird which breeds along the Pacific Coast from Washington, south to Baja California and inland along riverbanks, sand dunes and alkali flats.

3. Miscellaneous Components

a. Natural Resources

Numerous oil fields are found within the CTVCP potential treatment areas from Maricopa north to Coalinga on the west side of the San Joaquin Valley. Many oil and gas leases have been issued on public lands within these areas. The oil fields have been active for many years and represent some of the first settlements in the southern San Joaquin Valley**.**

b. Naval Petroleum Reserve No. 2 in the Buena Vista Hills.

The CTVCP operates under cooperative agreement with the DOE for the control of the BLH in NPR #2. Agreements between DOE and CDFA ensures compliance with environmental protection, notification and requirements for human health and safety as well as protection of endangered species.

c. Cultural Components

There are many historical and archeological sites throughout the west side of the San Joaquin Valley. They include prehistoric sites from American Indians and more recent artifacts from the early oil exploration and settlements (1911-1912).

d. Wilderness

Wilderness study areas (WSA) #301a, #301b (Panoche Hills) and #309 (San Benito Mt.) lie within or near CTVCP potential treatment areas on the west side of the San Joaquin Valley.

e. Ground-rig ONLY areas, Cuyama Valley and a portion of the San Joaquin Valley.

If treatments are necessary in designated "ground-rig only" areas in the Cuyama or a portion of the San Joaquin Valleys, only ground-rigs will be used to control BLH populations along roadsides, ditch banks and small cultivated fallow fields adjacent to CTV susceptible crops within intensive agriculture (See Appendix "E", pages E-2, E-3, E-11, and E-12 for "ground-rig only" control regions within the Cuyama, Palo Verde, and San Joaquin Valleys).

f. Critical Habitat

Habitat determined to be essential to the conservation of threatened or endangered plants or animals, has been established by USFWS for several California species. Appendix "L" contains a checklist of species for which critical habitat has been designated. Species residing in or frequenting the San Joaquin and inter-coastal valleys near CTVCP control boundaries include the American peregrine falcon, California condor, Fresno kangaroo rat, large-flowered fiddleneck, southwestern willow flycatcher and valley elderberry longhorn beetle.

B. IMPERIAL VALLEY AND EASTERN RIVERSIDE COUNTIES

1. Physical Components

a. Soils

The soils of the desert are typical of low desert, being high in sedimentary mineral deposits, clays and sand. Most desert cobble is covered by fine drift sand from a few inches to several hundred feet in depth.

b. Topography

The general topography is undulating with small rises cut by water eroded gullies varying in depth from a few inches to many feet. Wind storms and flash floods can move large amounts of desert soils not held by scrub brush.

The desert area is high in minerals and is subject to large and small scale mining or quarrying operations. The vast open area attracts large numbers of off-road vehicle enthusiasts, contributing to erosion where they concentrate.

c. Water

Water on the desert is scarce. The irrigated portions of the county are crisscrossed by canal systems and the desert is crossed by larger man-made canals such as the All-American and Coachella Canals.

The Salton Sea is the major body of water fed by runoff from streams and irrigation. Since there is no outlet for the Salton Sea, the water is highly saline. Despite the Salton Sea's salinity, it harbors an abundance of fish and aquatic invertebrates, plus it is frequented by vast numbers of migratory waterfowl.

The Colorado River is the largest source of fresh water in the region and is the main source for the All-American and the Coachella Canals. Annual precipitation averages approximately two inches. Rainfall is extremely varied within localized areas due to periodic thundershowers.

d. Temperatures

Daytime temperatures during the summer often exceed 100^{o}F. and may climb to 120^{o}F. During the winter, daytime maximum temperatures range from 60^{o} to 80^{o}F.

e. Air

The air quality in the Imperial Valley and eastern Riverside County varies with weather, temperature and inversions. Winds frequently move through the Imperial Valley creating dust storms which constantly shift loose top soil. Man-caused pollutants from the Riverside-San Bernardino Basin frequently move into the Imperial Valley through Beaumont Pass when cooler coastal air responds to inland temperature gradients. When Santa Ana wind conditions exist, pollutants can move out of the Imperial Valley towards the coast.

2. Living Components

The Creosote Bush Scrub plant community inhabits well drained soils of low alkalinity. The co-dominant plants are creosote bush (*Larrea tridentata*) and ragweed (*Ambrosia dumosa*), interspersed with *Coldenia palmeri*, *Croton californicus*, smoke tree (*Parosela spinosa*), Mexican tea (*Ephedra trifurca*), and galleta (*Hilaria rigida*).

In the arroyos or washes that cross the Creosote bush community there is a relatively dense wash woodland community dominated by coyote brush (*Baccharis sarathroides*), Palo Verde (*Cercidium floridum*, desert willow (*Chilopsis linearis)*, *Condaliopsis lycioidea*, smoke tree (*Parosela spinosa*), water jacket (*Lyciumandersonii*), desert ironwood (*Olneya tesota*), and honey mesquite (*Prosopis glandulosa*).

Wildlife species utilize the washes for travel corridors, cover, and den sites. The mesquite hummocks provide important habitat and cover for a variety of animal species. Burrows of round-tail ground squirrel, desert kit fox, and kangaroo rats are found at the base of the mesquite hummocks (BLM, 1998). Wind blown sands and stabilized dunes provide habitat for specialized animals such as the sidewinder and Colorado desert fringe-toed lizard. Root systems of dune plants species stabilizes loose soil particles which allows animals to establish burrows.

Washes provide important habitat for a variety of avian species as well as providing prime habitat for the flat-tailed horned lizard (BLM, 1983).

Where soils grade into sandy loam with a higher salinity range, the saltbush scrub community is evident with saltbush *Atriplex polycarpa, Atriplex canescens, Haplopappus acradenius* and *Prosopis glandulosa* as the dominant perennial plants.

Along the edge of the Salton Sea and in areas where there are heavy, wet soils with high salt content, Iodine bush (*Allenrolfea occidentalis, Atriplex lentiformus, Baccaris glutinosa*, screw-bean mesquite (*Prosopis pubesens*), cottonwood (*Populus fremontii*), arrow-weed (*Pluchea sericea*), willow (*Salix gooddingii*), and tamerisk (*Tamarix* spp.) form the Alkali Sink plant community.

Along rocky hillsides or where the soils are gravelly, cactus species are found including *Opuntia, Ferocactys* and *Echinocereus*. Water in both the Coachella and All-American Canals have influenced vegetation along their banks. The vegetation along the Coachella Canal was almost eliminated when it was lined with concrete in 1980. The All-American Canal contains the majority of canal influenced vegetation which is dominated by Carrizo cane.

The Colorado River influences vegetation along its shores through the Colorado River Valley region of the Sonoran Desert. The plant community consists of tamarisk, arrow-weed, cottonwood, mesquite, bulrushes, cattails, coyote bush (*Bacchaus* spp.), willow, sedges and various composites. Throughout the above perennial plant communities, when rainfall is sufficient to germinate seeds, BLH host plants emerge. The more common BLH hosts are: chinch-weed (*Pectus*

papposa), filaree (*Erodium* spp.), plantain (*Plantago* spp.), Mignonette (*Oligomeris linifolia*), mustard (*Brassica* spp.), peppergrass, spectacle pod, lense pod, sand verbena (*Abronia villosa*) and dune primrose (*Oenothera deltoides*). Russian thistle, Bassia and wild mustards are also found along roadsides and in cultivated fallow fields.

Listed, Threatened and Endangered Species which May Occur within CTVCP Potential Treatment Area

Several candidates for listing are also highlighted because of special interest. A further list of candidate species and species of special concern can be found in Appendix "G".

FT	Federal Threatened	**ST**	CA State Threatened
FE	Federal Endangered	**SE**	CA State Endangered
FSC	Federal Species of Concern	**FPT**	Federal Proposed Threatened
FPE	Federal Proposed Endangered		

PLANTS

Giant Spanish Needle (*Palafoxia arida* var. *gigantea*) (FSC)

The giant Spanish needle is scattered throughout the dunes east of the Coachella Canal. Its total range is within the Imperial Sand Dunes.

Peirson's Milk-vetch (*Astragalus magdalenae* var. *peirsonii*) (FT,SE)

Peirson's milk-vetch is known from the Imperial Dunes and areas west of the Salton Sea. The highest concentrations are in the North Algodones Dunes Wilderness Area. It is a stout herbaceous perennial with leaves divided into oval leaflets.

Silver-leaved Dune Sunflower (*Helianthus niveus tephrodes*) (FSC,SE)

The silver-leaved dune sunflower is known from the Imperial Dunes and other dune systems in the Southwest. A dense covering of fine hairs which protect the plant from extreme heat and light, gives the leaves a silvery appearance.

Wiggins' Croton (*Croton wigginsii*) (CA Rare)

Wiggins' croton is common on the west side of the Imperial Sand Dunes and found occasionally on the east side. It is a multi-branched perennial shrub with silvery hairs producing male and female flowers on different plants.

ANIMALS

Desert Tortoise (*Gopherus agassizii*) (FT,ST)

In California, the desert tortoise occurs in northeastern Los Angeles, eastern Kern,

southeastern Inyo and most of San Bernardino, Riverside and Imperial Counties, as well as parts of Arizona and Utah. The desert tortoise can be found in washes, rocky hillsides and flat desert. Adult tortoises grow to 8 to 14 inches long. Creosote bush, burro bush, salt bush, Joshua tree, and Mojave yucca are often present in areas inhabited by the tortoise. They eat a variety of annual and perennial plants. The desert tortoise are active during spring and retreat into burrows during severe winter and summer weather.

Flat-tailed Horned Lizard (*Phrynosoma mcallii*) (FPE, CDFG species of concern)

The present distribution of the flat-tailed horned lizard ranges from the Coachella Valley in Riverside County, south along both sides of the Salton Sea into Imperial County. The most favorable habitats are areas of low relief with surface soils of packed sand, overlain with loose, fine sand, and associated with Creosote bush and bur-sage. The flat-tailed horned lizard is insectivorous with harvester ants accounting for the majority of its prey.

Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) (SE)

The western yellow-billed cuckoo is a slender brown bird with white underparts. Its natural nesting habitat is in deciduous riparian forest in primarily cottonwoods and willow trees. Food consists of grasshoppers, katydids, tree frogs and caterpillars. Breeding pairs are found along the Sacramento River in Butte, Glenn, Colusa Counties, the south fork of the Kern River, and along the Santa Ana, Amargosa and lower Colorado Rivers.

Yuma Clapper Rail (*Rallus longirostris*) (FE,ST)

The Yuma clapper rail (YCR) is a resident of the shallow, freshwater marshes along the lower Colorado River and the Salton Sea and prefers dense growths of cattail, bulrush and reeds to forage and nest. The YCR eats mostly crayfish; also small fish, isopods, insects, clams and seeds. The YCR is gray-brown and grows to the size of a chicken.

Least Bell's Vireo (*Vireo bellii pusillus*) (FE,SE)

The least Bell's vireo is a small migratory songbird with a drab-gray color on top and whitish below with sides of grayish olive-yellow. The vireo is insectivorous and is a summer resident of the cottonwood-willow thickets and dry washes. Its breeding range is restricted to primarily Santa Barbara, Riverside and San Diego Counties and into northwestern Baja California.

Arizona Bell's Vireo (*Vireo bellii arizonae*) (SE)

The Arizona Bell's vireo is very similar in habitats and appearance as the least Bell's vireo. The Arizona Bell's vireo is only found at a few sites on the California side of the Colorado River near Needles and Laguna Dam.

California Black Rail (*Laterallus jamaicensis coturniculus*) (FE , ST)

The California black rail is about the size of a sparrow. It is blackish in color with nape of deep chestnut. They eat a variety of insects, frogs, crustaceans and mollusks. It is known to inhabit saltwater, brackish and fresh water marshes in California, particularly the Salton Sea and lower Colorado River, north of Yuma.

Elf Owl (*Micranthene whitneyi*) (SE)

The elf owl is the smallest owl in North America. The plumage is spotted with buff and white on a gray or brown base. The species is migratory and spends the breeding season in California. The diet of the elf owl consists almost entirely of large insects, centipedes and scorpions. Small birds and amphibians are occasionally taken. The elf owl is limited to the cottonwood, willow and mesquite riparian zone along the lower Colorado River and Corn Springs in Riverside County.

Mountain Plover (*Charadrius montanus*) (FPT)

The mountain plover is a migratory bird that overwinters in heavily grazed California grasslands. Populations of the plover winter primarily in the San Joaquin Valley west of Highway 99 and south of Sacramento to Kern County, and portions of southern California including the Antelope Valley, Carrizo Plains, and the southern end of the Salton Sea in the Imperial Valley. The mountain plover is an insectivorous bird the size of a killdeer (7 inches) with the back of the body being light brown and the belly being lighter. There is no dark breast belt as found in other plover species.

Gilded Northern Flicker (*Colaptes auratus chrysoides*) (SE)

The Gilded northern flicker has a brown-barred back, white rump, yellow wing and tailings and a brown crown. This woodpecker nests in mature cottonwood, willow trees along the lower Colorado River and eats ants, other insects, wild fruits and berries. The bird is found only at several sites on the California side of the Colorado River north of Blythe.

Gila Woodpecker (*Melanerpes uropygialis*) (SE)

This is a large woodpecker with a grayish-brown head, neck and underparts. Its back is narrowly barred with black and white. Food items include insects, mistletoe berries, cactus pulp, bird eggs, and fruit. The Gila woodpecker is a primary cavity nester of the mature cottonwood, willow riparian forest. The woodpecker is now only found in scattered locations along the California side of the river between Needles and Yuma.

Southwestern Willow Flycatcher (*Empidomax traillii extimus*) (ST,FE)

The southwestern willow flycatcher is an insectivorous transient bird and is found from the middle of May through the middle of June in the deserts of southern California. They are found along rivers and streams in dense growing riparian habitat, canyon woodlands, desert washes and desert oases. Southwestern willow flycatchers breed in late spring and are generally gone form breeding grounds in southern California by September. Habitat destruction and the parasitism by brown-headed cowbirds have been proposed as causes of population decline.

Desert Pupfish (*Cyprinodon macularius*) (FE,SE)

The desert pupfish is a small pupfish with a tan to olive coloration with lateral vertical bars. This species occurs in the San Felipe Creek, Salt Creek, Carrizo Wash, Fish Wash, the mouths of agricultural drains and shoreline pools along the edge of the Salton Sea. The desert pupfish forage on invertebrates, algae and detritus. Exotic fish and habitat destruction have contributed to the decline of the species.

Bonytail Chub (*Gila elegans*) (FE,SE)

The bonytail is a large chub, 12-14 inches long with a gray or olive back and white sides and belly. There is usually a conspicuous hump behind the head. The bonytail are bottom feeders and are presently very rare. The bonytail historically occurred in the mainstream of the Colorado River and lower-gradient portions of its major tributaries.

Humpback (Razorback) Sucker (*Xyrauchen texanus*) (SE,FE)

The humpback sucker has a sharp hump or keel on the back which elevates the dorsal region of the body above the head. Its back is a brown to olive and its belly is yellowish. The fish was known from the mainstream of the Colorado River and major tributaries. Recent records of occurrence on the lower basin are sporadic and isolated.

Colorado Squawfish (*Ptychocheilus lucius*) (FE,SE)

The Colorado squawfish is the top carnivore of the Colorado river system. The fish is a dusky green on top and yellowish to white below, with silver sides. The head is long, slender and depressed. The eyes are small and the mouth is large and toothless.

The Colorado squawfish has not been seen below the Glen Canyon Dam since 1968. Habitat alteration is cited as a direct cause of extirpation in the lower Colorado River basin (CDFG, 1992).

Andrew's Dune Scarab Beetle (*Pseudocotalpa andrewsi*) (FPC)

This scarab species appears to be endemic to the Algodones Dunes in Imperial County and possibly portions of the same dune system in Baja California Norte, Mexico. Activity may start as early as February but typically, ADSB activity ranges from mid-April through the first week of May. ADSB emerge from the sand in late afternoon, but before dark, with a brief activity period. Flights of beetles numbering 3-20 have been observed in "clouds" around Creosote and occasionally Palo Verde and *Eriogonum* spp. during this short dusk activity period. From first emergence until last disappearance ranges from 10-30 minutes. After the flight individuals can be seen burying themselves rapidly in the sand within 1-2 minutes of landing on the surface (Hardy and Andrews, 1979).

3. <u>Miscellaneous Components</u>

a. Imperial Sand Dunes

The Imperial Sand Dunes are one of the largest dune systems in North America forming a band 40 miles long and five miles wide. The dune system extends across the border into Mexico and runs northwest to southeast. The dune system is home for many specialized plants and animals.

b. Cultural Components

There are many archeological and historical sites throughout the Imperial Valley and eastern Riverside County. There are three historical cemeteries (from 1880-1930) at the railroad town sites of Amos, Glamis and Ogilby. Remnants of the Plank Road, utilized by vehicles between 1914 and 1926, can be seen fenced at Greys Well. Remnants of native American pottery and signs of ancient trails are evident around the edge of the Ancient Lake beach line.

c. Wilderness

The North Algodones Dunes Wilderness Area is located on the Algodones sand dune system and covers approximately 32,240 acres including both state and private lands. The primary and secondary dunes supports a variety of desert plant and animal species. The Imperial Sand Hills National Natural Landmark and the Algodones Outstanding Natural Area are specially areas found within this wilderness.

d. Ground-rig ONLY area, Blythe (Eastern Riverside County)

If treatments are necessary in the Blythe region, only ground-rigs will be used to control BLH populations on roadsides, ditch banks and in small cultivated

fallow fields adjacent to CTV susceptible crops within intensive agriculture. (Appendix "E", page E-11, illustrates the potential treatment area near Blythe.)

e. Critical Habitat

Habitat determined to be essential to the conservation of threatened or endangered plants or animals, has been established by USFWS for several California species. Appendix "L" contains a checklist of species for which critical habitat has been designated. Species residing in or frequenting the Imperial Valley near CTVCP control boundaries include the bonytail chub, Coachella Valley fringed-toed lizard, Colorado squawfish, desert pupfish, desert tortoise, least Bell's vireo, razorback sucker and southwestern willow flycatcher.

IV. ENVIRONMENTAL CONSEQUENCES

A. Assumptions for Impact Analysis

Malathion will be applied at the rate of 0.583 pounds of active ingredient (a.i.) per acre. This compares to recommended dosages ranging from 0.292-1.166 pounds a.i./acre for insect pests on various agricultural crops.

1. Malathion is broken down relatively fast by hydrolysis and by the action of soil microorganisms. Actual degradation rates depend on prevailing conditions. The variety of mediums such as soil, water, foliage and air influences the rate of degradation. Factors such as acidity, temperature, moisture, presence of microbes, organic matter, and other factors influence the exact rate of breakdown of malathion within the medium. Malathion has particular chemical properties which reduces leaching and presents small risks to ground water. Malathion is not generally phytotoxic and is registered for use on a variety of vegetation, crops and livestock.

2. Conclusions drawn in this EA are based in part on toxicological evaluation of laboratory and domestic animals and on professional judgment of BLM, USFWS, CDFG and CDFA personnel. This is necessary because few studies have been performed to determine the effects of malathion on wildlife species. However, there have been many studies performed on the effects of malathion on laboratory and domestic animals (See Appendix "J" for the Summary of Toxicology Data for Malathion Evaluated by the Medical Toxicology Branch, Cal EPA). Correlations have been drawn from those laboratory studies on possible affects to wildlife populations.

3. The control of the BLH with malathion in rangeland and cultivated fallow fields has been performed for over 30 years (only the last 15 years in Riverside County). No major impacts to vegetation or wildlife has been observed during CTVCP post-treatment surveys. Malathion has been observed by CTVCP personnel to be effective in controlling BLH for 1-4 days after treatment.

4. The CTVCP has cooperated with the following federal, state and local agencies in the control of BLH in California: Department of the Navy, DOE, Department of the Interior, USFWS, BLM, CDFG, Department of Water Resources and the CAC within the counties where BLH control work is performed. No major impacts to vegetation or wildlife has been observed and documented by cooperating governmental agencies from CTVCP activities.

5. Accidental spillage or treatment of malathion on non-target areas is possible due to vehicle or aircraft accidents, equipment malfunction, drift and mis-communication. While the possibility of accidents are recognized, they would be infrequent and

isolated. The CTVCP has maintained a good safety use record throughout the life of the Program; therefore, the likelihood of major adverse impacts to the environment from accidents would be low (See Appendix "I" for "Pesticide Spill Contingency Plan").

B. Impact Topics

1. Impact Topics Dismissed from Detailed Analysis

a. Wilderness Areas

Any proposals to apply the control procedures within wilderness study areas or designated wilderness areas will be analyzed and authorized separately, following the terms of the Bureau's Interim Management Policy for Wilderness Study Areas or Wilderness Management Policies for designated Wilderness Areas and not be considered within the scope of this document.

b. Cultural Components

The prehistoric and historic sites within treatment areas are quite varied. The CTVCP will continue to consult with federal, state or local agencies to identify and avoid sensitive cultural resources throughout the potential treatment areas. The restricted use of vehicles on existing roads during CTVCP treatments will eliminate impacts to unknown cultural resources.

c. Noise

The potential impacts of the CTVCP on noise levels will be the greatest when aircraft are used to apply malathion or to set flaggers. Equipment for ground-rig applications will also increase noise levels. Impacts from noise to the environment are temporary due to the relatively rapid movements of CTVCP treatments performed away from populated areas.

d. Visual Impacts

The impacts on visual resources of aerial and ground equipment are localized and temporary. CTVCP activities are quite mobile and move through a given area quickly and are performed away from populated areas.

e. Bats

There are a number of bat species which may occur within potential BLH treatment areas. Direct exposure of malathion to bats and nesting sites from

daytime treatment activities is not likely due to the nocturnal foraging habits and nesting behavior of bats. Indirect effects of temporarily reducing insects utilized as food by bats is not expected to be significant because: 1) the large foraging range of bats 2) the movement of prey insects and bats within treated and adjacent non-treated.

f. Birds of Prey - Hawks, Eagles, Falcons, California Condor

The bald eagle, peregrine falcon, Swainson's hawk and California condor are listed as threatened or endangered by the State of California, and/or the Federal Government and may occur within the potential BLH treatment areas. The American peregrine falcon has been delisted but remains as a CDFG species of concern. No major impacts to birds of prey and condors are anticipated due to BLH treatment activities due to: 1) the large foraging range within and outside of potential treatment areas; 2) the minimal indirect impacts to food supplies other than insects, including small and medium-sized mammals, birds, reptiles, fish; and 3) riparian systems or cliff faces used for nesting sites are not treated during CTVCP operations.

g. Fish

The bonytail chub, humpback sucker and the Colorado squawfish may occur in the Colorado River adjacent to BLH potential treatment areas. No major impacts to fish or fish species of concern is expected due to the avoidance of aquatic situations during treatment operations (See "Key Points of Proposed Action", pages 23-26).

Malathion may enter aquatic water systems in runoff if isolated thundershowers occur over treated areas before the complete degradation of malathion has taken place. (Discussion on the effects of malathion in runoff is on pages 65-67.) Small residues of malathion washed into the Colorado River or Salton Sea from runoff would be exposed to absorbing organic particles and be diluted by the large bodies of water. Residues of malathion in runoff resulting from isolated thunderstorms is not expected to have a major impact to fish species of special concern.

h. Desert Pupfish

Due to the potential impacts of malathion on the desert pupfish, specific measures have been adopted to avoid impacts (see page 34). Adherence to the procedures, within the proximity of desert pupfish habitat is anticipated to eliminate impacts of CTVCP treatments to desert pupfish populations.

I. San Joaquin Dune Beetle (SJDB); Andrew's Dune Scarab Beetle (ADSB), Ciervo Aegialian Scarab Beetle (CASB), and Doyen's Dune Weevil (DDW). Potential impacts to the SJDB, ADSB, CASB and DDW would be expected if adult beetles were exposed to malathion during their brief flight periods or while above ground. On rare occasions, BLH hosts may be in close proximity to dune systems in the Imperial or San Joaquin Valleys.

Due to potential adverse impacts of CTVCP activities, specific measures have been adopted to minimize impacts (pages 30, 32 and 34). Adherence to measures will reduce potential adverse impacts of CTVCP treatments to dune beetle species.

j. Aleutian Canada Goose

The migratory patterns of the Aleutian Canada goose place the goose within the periphery of CTVCP control boundaries during a time of year when malathion applications, for the control of BLH, are very rare (USFWS 1994). The "Probability of Treatment Chart", Appendix "E", page E-13, indicates potential ground-rig activities in or near overwintering grounds to be completed prior to the first of December. Since 1989, ground-rig treatments have not been performed in either San Joaquin or Stanislaus Counties (Appendix "E-15", "Ground-rig Frequency and Application Totals"). Appendix "E-15" also indicates the frequency of Merced County treatments during October and November to be low. Due to the seasonal application of malathion, low volume of malathion used, the low frequency of use and the restricted application of malathion to roadsides and ditch banks by "ground-rigs only"; no major impacts to Aleutian Canada geese is expected. Due to its recent recovery, the Aleutian Canada goose was removed from the Federal list of "threatened" species March, 20, 2001, (USFWS, March 2001) but remains listed as a species of concern with California Fish and Game.

k. Palmate-bracted Bird's Beak and Large-flowered Fiddleneck

The palmate-bracted bird's beak and large-flowered fiddleneck are known from relatively few occurrences outside potential CTVCP control boundaries. Both plants occupy specialized habitats not typically utilized by BLH host plants. Since very little, if any, natural habitat is expected to occur within the "ground-rig only" treatment region of the San Joaquin Valley, there will little chance that CTVCP ground-rig treatments would encounter unknown populations of palmate-bracted bird's beak or large-flowered fiddleneck.

l. Western Snowy Plover

Habitats utilized by the western snowy plover include sandy seashores, shorelines along rivers and alkali vernal pools. These habitats are generally not found within CTVCP potential treatment areas, and if present, are avoided as prescribed by the "Proposed Action".

m. Buena Vista Lake Shrew

Due to the potential impacts of malathion on the insect prey base of the Buena Vista Lake shrew (BVLS), specific measures have been adopted to avoid impacts to BVLS habitat (see page 32). Adherence to these procedures, within the general proximity of BVLS habitat is anticipated to eliminate impacts to BVLS. The BVLS is most likely found in habitat described generally as riparian vegetation associated with marshes and wet lands (USFWS, June 2000). This type of habitat is not conducive to the development of BLH and is considered by the CTVCP as non-target sites (See Avoidance of Non-target Sites page 20).

n. Critical Habitat

Critical habitat has not been designated within any of the potential CTVCP control areas (USFWS, Oct., 1999 and USFWS, 1993). No impacts to critical habitat is anticipated by the "Proposed Action" (See Appendix "L").

o. The Egg Parasitization of Insect Species Other than BLH by Parasites being Evaluated for Biological Control of the BLH

Based on the current Joint Environmental Assessment (CDFA 1997), the CTVCP will have little or no impacts on the environment due to the release and evaluation of BLH egg parasites. Based on current scientific knowledge, all BLH parasites are specific parasites of BLH eggs only. Release and evaluation activities relating to BLH egg parasites are detailed in the EA for the release of BLH egg parasites, Appendix G. No impacts to endangered species or archaeological sites are anticipated due to the CTVCP's biological control program.

2. Impacts Discussed in Detail

a. PROPOSED ACTION

1. Terrestrial Impacts

Soil compaction is expected to be minimal from CTVCP operations and limited to existing roads or established airstrips. Vehicles, turning around on narrow dirt roads, would compact a small amount of soil to the edges of the road.

Small amounts of dust from vehicles and aircraft would be created from CTVCP activities with negligible impact. The amount of dust created by CTVCP activities would vary with the types of soils and vegetation present and be temporary due to the mobility of treatment procedures through a specific area.

Field Dissipation: Varying rates of terrestrial dissipation have been reported for malathion in literature. No residues found in soil after the first year of an exaggerated application rate of 76.6 lb ai./acre (Roberts et al, 1962 as cited in USEPA, 1975). After a 5 lb ai./acre application of malathion to Carringion silt loam., 83% degradation was observed in 3 days and 97% in 8 days (Lichtenstein & Schulz,1964 as cited in USEPA, 1975). A dissipation half life of less than .2 days was reported in California field applications of malathion at 1.16 lbs. ai./acre, once a week for 6 weeks (USEPA, 2000). It is generally accepted that the fastest dissipation of malathion in a terrestrial field setting is through microbial degradation (USEPA, 2000).

Malathion in Soil. Malathion is broken down relatively fast by hydrolysis and by the action of soil micro-organisms (Matsumura and Boush, 1966). Malathion does not absorb well to inorganic soil particles but binds tightly with organic matter.

Many values for malathion's half-life in soil have been reported: a) 5 days (Curley and Donohue, 1986); b)1 day (USEPA, 1986); c) 7.5 to 11 days in soils with low organic content (Buckman and Brady, 1969). The range of values depends on soil's alkalinity, organic content, microbial population and chemical degradation.

Literature suggest that malathion will persist longer in dry, sandy, low nitrogen, low carbon or acidic soils (Walker and Stojanovic 1973, as cited in USEPA, 2000). There are indications malathion is mobile in loamy sand and loam soils.

Malaoxon, a common degradation product of malathion in the soil, has a toxicity level similar to that of malathion. Degradation of malaoxon is primarily by basic hydrolysis and half-lives of 3.9 to 5 days were found for soils of pH 7.2 to pH 8.2

(Pascal and Neville 1976 as cited in USDA 1991). This indicates that basic hydrolysis will lead to rapid degradation of malaoxon under conditions found in soils in many CTVCP treatment areas.

***Soil Microorganisms*:** Malathion was slightly toxic to the bacterium *Nitrobacter* sp. (Bollen, 1961) but caused complete inhibition of the cerium *Nitrosomonas* sp. (Garretson and San Clemente, 1968). Bacteria and fungi degrade malathion rapidly (Murry and Guthrie, 1980; Paris and Lewis, 1974 and Bourquin, 1977). Malathion application to a forested watershed caused short-term effects on micro-arthropods and no observed effects on bacteria, fungi, earthworms, or snails. Some populations of soil arachnids and insects may be reduced by malathion; populations would not be significantly altered (Giles, 1970). No significant alteration of earthworm population density by aerial spraying of malathion was found in field studies (Giles, 1970).

2. Impacts on Air Quality

The potential impacts of CTVCP on air quality include light increases in dust, pollutants from internal combustion engines of vehicles and aircraft. Amounts of these pollutants should be negligible to air quality except on a local, temporary basis.

Increases in ozone concentrations from the volatilization of malathion is also expected to be negligible. Malathion has a low vapor pressure and is essentially non-volatile. Airborne particles of malathion are not expected to contribute significantly to the formation of photochemical smog (USDA, 1991).

Malathion has not been identified by the USEPA as a hazardous air pollutant to be regulated under Section 112 of the Clean Air Act.

3. Impacts to Water

Water quality is related to the geography and geology of the surrounding area. Soil types, vegetative cover, precipitation and topography determine the quality of the ground and surface water in a drainage basin. Literature shows that malathion is short lived and is subject to hydrolysis (Mulla , 1981). The relatively quick degradation of malathion by ultraviolet light (USEPA, 1975) and hydrolysis, reduces the potential for residues in soil or runoff.

Based on its rapid degradation and reported octanol-water partition coefficient, malathion is not expected to leach to ground water, especially with high organic soils (NLM, 1988). However, malathion has been detected in ground water in three states (USEPA, 1992 as cited in USEPA, 2000). In California, malathion

was found in one well out of 499 wells sampled. USEPA believes the minoring data indicates malathion to have a potential for movement into ground water especially in soils with low organic material and high sand content (USEPA, 2000). Malathion has particular chemical properties which reduces the potential for leaching presenting small risks to people and animals drinking ground water (USDA, 1991).

It is expected that extremely small quantities of malathion may leach from cultivated fallow fields and rangeland after major storms if the storms hit before complete degradation has taken place. Natural river water with a large amount of organic matter resulted in a half-life for malathion of 15 to 16 hours under sunlight photolysis (Wolfe et al., 1977 as cited in USDA, 1991). Malathion found dissolved in surface runoff would be available to bind with organic solids suspended in the water and would result in less malathion exposure to organisms living in or ingesting the water.

4. Impacts to Aquatic Life

Adverse phytotoxic effects from malathion have not been reported on aquatic plants. Algae metabolize malathion rapidly into non-toxic components (Mulla and Mian, 1981). Fogging or aerosol applications of malathion on salt marsh plants showed no adverse effects (Dobroski and Lambert, 1984).

Impacts to aquatic animals varies according to species, duration of exposure and the quality, temperature and flow rate of water. While malathion shows a range of moderate to high toxicity to fish species (USEPA 1975), aquatic invertebrates show the most sensitivity to malathion.

Should rain follow close behind a malathion application, or more critically, before the application can thoroughly dry, malathion may be washed from rangeland foliage and migrate toward small streams or ponds containing aquatic plants and wildlife. The potential for malathion in runoff is reduced if the application has sufficiently dried prior to a rain event and will continue to decline as the time between the application and the rain event increases.

The impacts malathion may have on aquatic life is a function of the following six variables (USDA, 1991): 1) volume of precipitation produced by a storm; 2) volume of rangeland runoff; 3) insecticide concentration in rangeland runoff;4) quantity of insecticide washed into a stream or river; 5) the length of time the insecticides are in contact with the receiving organism; and 6) stream volume and flow.

Additional environmental variables influencing potential malathion exposure to aquatic organisms in streams include; flow rate, volume of water in relation to surface area, subsurface recharge of stream flow, microscopic organism burden, temperature, shading, oxygenation, and bottom characteristics (Peterle and Giles, 1964).

Although the possibility exists for malathion to enter aquatic water systems in runoff, the occurrence of such an event would be rare and isolated. In addition, actual field studies indicate that malathion in runoff or drift would be subject to a wide variety of environmental factors; many of which can degrade and shorten the half-life of malathion under aquatic conditions. Measures to reduce potential runoff and drift into non-target areas are specified in the "Proposed Action" (pages 20-21). Treatment restrictions, in desert areas frequented by thunder showers, have been adopted to minimize the potential impacts of runoff to desert pupfish habitat and Yuma clapper rail habitat (page 34).

Treatments near water are strictly avoided by CTVCP (See "Avoidance of Non-target Sites", page 20). Water is defined as any body of water, natural or man-made including; springs, wildlife guzzlers, alkali sumps, vernal pools, ephemeral pools stock ponds, reservoirs, streams, ditches and canals.

5. Impacts to Vegetation

GENERAL

The potential impacts of malathion on vegetation include effects on plant reproduction through the reduction of insect pollinators and direct toxicity to vegetation.

Phytotoxicity **:** Malathion is registered on a wide variety of vegetation and crops (See Labels in Appendix "B"). When used properly at appropriate concentrations, malathion does not appear to injure vegetation. Malathion is not generally phytotoxic. No phytotoxicity was observed in a forest watershed after several treatments of malathion at .72 lb. a.i./ acre (Giles, 1970). (In the "Proposed Action" malathion rates are applied at 0.583 lbs. a.i. per acre.)

Indirect Impacts Caused by Decline of Pollinators**:** If the populations of insect pollinators (flies, bees, ants, beetles, etc.) are reduced as a result of the use of malathion, propagation of plants within the treatment area could be affected for a short period of time.

Honeybees and groups of insects from the order Hymenoptera (ants, wasps, bees, etc.) are particularly susceptible to malathion exposure (Dobroski and Lambert,

1984). The depression of hymenopterous insects would be temporary because foraging bees, wasps and ants would continue to re-enter from adjacent non-treated areas. Honeybee and ant workers could be quickly replenished from beehives out of the treatment area and ant colonies under ground where the queen, brood and a large majority of workers are protected. Only a small percent of the nest's work force would be out at the time of the application (See "Key Points of Proposed Action", Honeybee Notification Policy, page 20).

Solitary bees and wasps are not members of colonies and foraging adults could not be replenished from a social insect structure. The depression of solitary Hymenoptera may be temporary due to re-entry of solitary species from adjacent non-treated areas (Manser and Bennett, 1962). Research indicates that insects of certain orders are more susceptible to malathion than others. Beetles and Populations of flies, except mosquitos were found not to be affected by low volumes of malathion (Hill, 1971).

PLANT SPECIES OF SPECIAL CONCERN

Plant species of special concern are plants listed by Federal or State resource agencies as "endangered" or "threatened" which may occur within the CTVCP's potential treatment boundaries. They include the California jewelflower, Kern mallow, San Joaquin woolly-threads, Bakersfield cactus, Hoover's woolly-star, Bakersfield saltbush, giant Spanish needle, Peirson's milk-vetch, silver-leafed dune sunflower and Wiggins' croton, Monterey spineflower and robust spineflower.

In the absence of specific research, we are assuming that the effects of direct exposure to malathion to plant species of special concern would be essentially the same as other general plant species in the environment covered previously in "Impacts to Vegetation - General".

Little is known about the pollination strategies of many plant species of special concern. Of concern to USFWS are potential impacts to listed plant species exclusively dependent on insect pollinators to set seed, including vernal pool plants dependant on pollinators which range only a few meters and California jewelflower possibly dependent on bumblebee pollinators (USFWS, Sept., 1991). USFWS speculated that the death of pollinators within a limited range could significantly affect the plant's ability to produce seed for the next generation. The survival of an isolated population of plants could be crucial if a single year's seed production was eliminated.

As a small portion of a larger study, pollination exclusion experiments were performed on San Joaquin woolly-threads and California jewelflower (Mazer &

Hendrickson, July, 1993) and (Mazer & Hendrickson, Sept., 1993). While not conclusive, the San Joaquin woolly-threads exhibited an ability to set seed in the absence of pollinators while the California jewelflower showed a dependence on insect pollinators for seed production. In the absence of pollinator exclusion studies for other plant species of concern, the indirect affects of malathion would be a combination of the following factors: 1) was the plant or immediate area treated by CTVCP; 2) mode of pollination for each species (wind, insect, self-pollinated); 3) variety and quantity of insects utilized in pollination; 4) foraging range of plant pollinators; 5) time of year plant species bloom; 6) duration of bloom period; 7) persistence of seed bed within the environment and 8) time of year CTVCP treatment occurs.

Due to the avoidance of California jewelflower, Kern mallow, Bakersfield cactus and Peirson's milk-vetch, Monterey spineflower, robust spineflower as specified in the "Proposed Action" (page 30-31), no major impact to plant species of special concern is anticipated.

6. Impacts to Animals

GENERAL

The potential impacts of malathion on animals, apart from removing non-target ectoparasites (some on the label), could include possible dermal and oral exposures.

Dermal exposure may result from the direct application of malathion during BLH treatment activities. Malathion is registered for the direct use on animals to control insects, mites and ticks. The animals include sheep, hogs, goats, dogs, cats, cattle, horses, ducks, geese and turkeys (See Appendix "B" page B-5; 57% Emulsifiable Liquid Insecticide). The use of malathion for this wide range of animals indicates a favorable safety margin between target pests and non-target higher terrestrial animals.

Oral exposures may result from grooming, food and inhalation. Oral LD50's for malathion in laboratory and domestic animals vary.

Malathion's low solubility and low-octanol-water partition to efficiently contribute to a low bio-accumulation potential. Malathion has a low potential for accumulating in lipids (Dobroski and Lambert, 1984; as cited in USDA, 1991). A half-life for one hour was reported for retention after exposure to malathion (Kenaga and Goring, 1980; as cited in Dobroski and Lambert, 1984).

Few field studies have been performed on the direct effects of malathion on wildlife. A review of the limited literature sources shows wildlife to have a general tolerance to malathion applied at rates used to control insects. Based on a general comparison of field studies, malathion applied at the rate of 0.583 lbs. of a.i./acre will not adversely affect wildlife populations.

Mammals: Malathion is moderately toxic to mammals. Potential dermal or oral exposure to malathion is dependant on dose and mode of exposure. The lowest oral LD50 values for rabbits, rats, and mice are 250, 370 and 507 mg/kg, respectively (NIOSH, 1987; as cited in USDA, 1991). A study in Michigan found no significant adverse effects on mammals and birds in areas treated with 1 lb. a.i./acre of malathion (DOI, 1963). According to the USEPA, the no observable effect dose of malathon from chronic administration to laboratory rodents is 4mg/kg/day. For a single dose, it is 50 mg/kg. The low observable effect dose for inhalation is 0.1mg/l based on a 90-day inhalation study. The effect seen at the next dose tested is a measurable decrease in cholinesterase enzyme activity in blood samples, an effect that is reversible (USEPA , 2000a)

Reptiles and Amphibian: Impacts of malathion on reptiles and amphibians have not been widely studied in the field and little information is available to aid in assessing impacts of CTVCP activities. Observations of the CTVCP staff during post-treatment surveys have found no evidence of major adverse impacts to reptiles or amphibians.

Both reptiles and amphibians were unaffected by the treatment of a watershed with malathion at the rate of 0.7 lb. a.i./acre (Giles, 1970). In the "Proposed Action", malathion rates are applied at 0.583 lb. a.i./acre. Malathion was applied in seven low volume, high concentration sprays in the Presidio Valley in Texas. No malathion residues were detected in lizard tail muscle, brain tissue, liver, coelom fat, and stomach contents (Culley and Applegate, 1967).

Laboratory studies have shown frog larvae to be sensitive to malathion. A 50% mortality of western chorus frog larvae, *Pseudacris triseriata,* was observed in fixed malathion concentrations at 0.56 mg/L for 24 hours, and 0.20 mg/L for 96 hours. The LC50's for Fowler's toad larvae, *Bufo woodhousei fowleri*, were found to be 1.9 mg/L for 24 hours, and 0.42 mg/L at 96 hours (Devillers & Exbrayat, 1992, as cited in USFWS, 1997; Mayer & Ellerseick, 1986, as cited in USDA, 1991).

Fish and Aquatic Invertebrates: Malathion can be moderately to highly toxic to fish. Toxicity is largely dependant on fish species, exposure time, water quality and temperature (USEPA, 1975; Mayer & Ellerseick, 1986). The 96 hr LC 50's for species such as black bullhead and goldfish

range from 10-11.7 mg/L; while, species such as green sunfish, bluegill, and walleye were found to have much lower LC50's between 0.030-0.146 mg/L (Mayer & Ellerseick, 1986).

Aquatic invertebrates show the most acute sensitivity to malathion. The LC50's range from 0.0007 to 0.032 mg/L for daphnia exposed 48 hours; and, stonefly, caddisfly, grass shrimp, and scuds exposed for 96 hours (Mayer & Ellerseick, 1986).

Differences have been found in the ability of malathion to affect fish and aquatic invertebrates under actual field conditions verses that of the laboratory studies. At application rates to control mosquito and rice pests, no effects were observed on crustacean species including shrimp, plankton and red crawfish (Tagatz et al. , 1974; Wall & Marganian, 1971; Muncy & Oliver, 1963). Malathion applied in a forest watershed at 0.7lb ai/acre reduced aquatic insect populations but rapid recovery was observed (Giles, 1970). Fish and crayfish found sensitive to malathion in the laboratory were found in the stream bed to be unaffected.

Potential malathion exposure to aquatic species from CTVCP activities could result from spray drift or from runoff should a rain event follow close behind treatment application. Strategies have been adopted to avoid impacting non-target aquatic habitats (See "Avoidance of Non-target Sites", Page 20 and "Runoff and Drift Prevention", Page 21).

Birds: Oral exposure to malathion from CTVCP activities may result from grooming, feeding and inhalation. Such exposure is expected to be minor and would not cause major impacts. The reported oral LD50 for various birds are as follows: Chicken 150-850 mg/kg (USEPA, 1975); pheasant 167 mg/kg, horn lark 403 mg/kg (Hudson, 1984); mallard duck 1,484 mg/kg (Smith, 1987).

In field studies, no major effects to birds and mammals were found in areas of Nebraska treated with 0.5 lb. a.i./acre. Domestic turkeys held in cages in the treated area were allowed to eat insects and had slightly depressed plasma cholinesterase levels, but no external symptoms were noted (USDA, 1985). In the "Proposed Action", malathion is applied at 0.583 lb. a.i./acre.

Dermal exposure may result from direct application of malathion to the environment. Malathion is registered for the control of mites and ticks on chickens, ducks, geese and turkeys which indicates a safety margin for exposure (See Appendix "B" - Malathion 57 label.).

***Insects*:** Malathion is a broad spectrum pesticide. Non-target insects and other, arthropods will be killed by malathion treatments. Because various insect groups vary in susceptibility to malathion, temporary changes in the composition of insect populations may occur within the treatment areas. Soft-winged flower beetles, ladybird beetles, green lace wings, crickets, grasshoppers, plant bugs and wasps have shown a greater susceptibility to malathion than other insect groups. This effect is expected to be temporary due to the rapid decomposition of malathion in the environment, high reproductive rates for insects and the migration of insects from adjacent non-treated areas. The rate at which insect populations re-colonize treated areas will depend on their biology and their densities in nearby untreated areas.

A one-year study of beneficial insect populations was performed using annual applications of malathion at 0.75 and 1 lb. a.i./acre. Adverse effects were noted on many insect species immediately after treatment, but no significant difference in populations of beneficial insects was noted the following spring (Huddleston, 1968). Long-term decline of insect populations from repeated annual treatments is not anticipated. BLH control is accomplished because: 1) BLH's are generally found only in areas selected for treatment and 2) those BLH's not affected by treatment will be migratory toward green agricultural areas and are generally not a major part of the rangeland ecosystem after host plants have dried.

***BLH Resistance to Malathion*:** Resistance to malathion by BLH in the field has not been observed by CTVCP personnel. The CTVCP is a control program; therefore, treatments are not continuous and are generally performed only once a year in a relatively small portion of the BLH's range. A tendency towards resistance to malathion would be predicted if all five to six annual BLH generations were exposed to malathion.

IMPACTS TO ANIMAL SPECIES OF SPECIAL CONCERN

San Joaquin Kit Fox (SJKF) (*Vulpes macrotis mutica*)

Impacts from direct dermal exposure of malathion to SJKF populations would be negligible. For the most part, the kit fox is nocturnal and CTVCP treatment operations are performed during daylight hours in the San Joaquin Valley. Any kit foxes, foraging during daylight in the vicinity of CTVCP operations, would most likely be dispersed by the activities into underground dens or out of the treatment area.

Significant oral exposure of malathion to SJKF populations appears unlikely. The kit fox eats a variety of rodents, lizards and insects. There is no evidence that bio-magnification of malathion in food chains occurs. Malathion is not accumulated in

body fat (Metcalf, 1972) and was not found in various tissue samples after seven low-volume, high concentration sprays (Culley and Applegate, 1967).

CTVCP operations may directly affect the SJKF through the destruction of its den sites during ground monitoring surveys and ground spray applications (USFWS, Sept., 1991). In the "Proposed Action", vehicles are restricted to existing roads and potential den sites are avoided during ground survey activities (page 27). Minimal direct impacts to the SJKF from CTVCP operations is anticipated.

Malathion spray treatments could indirectly impact the food base of the SJKF due to potential effects on kangaroo rats and invertebrates (USFWS, Sept., 1991). Although the kit fox utilizes vertebrates for a majority of its food, invertebrates are ingested.

Indirect impacts of CTVCP treatments to kit fox vertebrate and invertebrate food base, as characterized by USFWS, would not be significant. These impacts are expected to be temporary due to the rapid degradation of malathion and the foraging mobility of both the kit fox and its prey within adjacent non-treated areas.

The USFWS postulates that because drought related reductions of vertebrate prey can be documented in the San Joaquin Valley and the Carrizo Plains, that further reductions in optional invertebrate food sources could affect the survival and recovery of the kit fox. Periods of drought may also result in a decline of BLH populations, thereby reducing the need to treat during these periods (USFWS, Sept., 1991).

Potential reproductive impacts from malathion treatments on rodent populations, cited in USFWS, Sept., 1991, and USFWS May, 1991, were re-evaluated by USFWS (See discussion under "Impacts to GKR" and Appendix "C", Correspondence dated Nov. 8, 1993). Malathion induced reproductive effects in rodent species and a corresponding reduction of kit fox food sources is <u>not</u> considered a likely potential impact.

San Joaquin Antelope Squirrel (SJAS) (*Ammospermophilus nelsoni*)

Potential impacts from dermal exposure of malathion to the SJAS may be separated into two areas: direct exposure to fur and/or skin and exposure to feet from treated ground or foliage.

With the absence of dermal LD50 studies of malathion on SJAS in the literature, LD50's for laboratory rats are used for comparison. The dermal LD50 of malathion on rats is quite high at 4,444 mg/kg (Spiller, 1961). If we assumed the dermal LD50 for SJAS to be half that of the rats, the dermal LD50 would still be quite high. (CTVCP uses malathion at 0.583 lb. a.i./acre and is equal to approximately 6.0 mg/sq. ft.). It is unlikely that the SJAS would be exposed to significant concentrations of malathion during treatment operations. No significant dermal impacts to SJAS populations are expected.

Potential impacts from oral exposure of malathion to SJAS populations may result from grooming and the ingestion of treated foods. Impacts from grooming should be minor due to the low concentrations of malathion in the environment coupled with the relatively quick degradation of malathion in soils with some organic mater.

The potential impacts associated with the ingestion of food is a combination of the following: 1) is the SJAS foraging within a treated area? 2) how long the treated vegetation persisted in the environment prior to ingestion; 3) seed coats or skins exposed to malathion being discarded before ingestion of the seed;
4) volume of treated food ingested/time and 5) type of food ingested (Gains, 1969).

Impacts to the pollination of seed producing plants utilized for food by SJAS is discussed generally in (“Indirect Impacts Caused by Decline of Pollinators”, discussion on page 67).

Impacts to SJAS habitat from CTVCP operations, besides the protection of SJAS seed producing plants from non-target phytophogus insects, may include concerns of potential phytotoxicity of malathion to seed producing plants and potential destruction of vegetation and burrow systems with vehicles.

Malathion's low degree of phytotoxicity coupled with the restricted use of CTVCP vehicles on existing roads greatly reduces impacts to SJAS habitat. In the spring, CTVCP treatments are applied to south-facing slopes in foothill terrain. This results in large areas of non-treated land on north and east-facing slopes. No major impacts to SJAS are expected as a result of the “Proposed Action”.

Giant Kangaroo Rat (GKR) (*Dipodomys ingens*)

GKR are predominantly nocturnal; however, USFWS was concerned about potential direct exposure to GKR if CTVCP applications occur in their habitat during pre-dawn hours (USFWS, Sept. 1991). CTVCP operations in the San

Joaquin Valley can take place during pre-dawn hours, but only when sufficient light exists to safely navigate and observe obstacles such as power poles, wires and structures. Rarely can CTVCP treatments begin longer than 30 to 45 minutes before sunrise leaving little pre-dawn treatment time. A percentage of GKR's foraging during daylight or pre-dawn hours would be expected to react to the presence of control operations and temporarily retreat into burrows, avoiding possible dermal exposure.

Impacts from dermal exposure of malathion to GKR populations are expected to be minimal. Malathion applications would have sufficient time to dry before GKR, foraging during the following night, contact treated vegetation or soils with its feet or fur. Negligible dermal exposure to GKR is anticipated from treated vegetation carried in fur-lined cheek pouches.

The dermal LD50 of malathion in rats is quite high at 4,444 mg/kg (Spiller, 1961). If we assumed the dermal LD50 for GKR to be half that of laboratory rats, the dermal LD50 would still be quite high.

Potential impacts from oral exposure of malathion to GKR populations can be separated into two areas: exposure from dry-tooth grooming of fur and the ingestion of sprayed vegetation such as peppergrass and red stem filaree (USFWS, Sept., 1991).

Impacts associated with dry-tooth grooming should have a minor impact on GKR populations because of the unlikely exposure of fur to direct applications. The potential for exposure to malathion from treated dirt used for dust baths is reduced greatly due to the rapid ultraviolet decomposition of malathion in sunlight and its absorption in organic matter. Malathion particles on the surface would not be expected to remain active for more than 4-6 days. The potential impacts associated with the ingestion of food is a combination of the following: 1) is the GKR foraging within a treated area? 2) how long the treated vegetation persisted in the environment prior to ingestion; 3) seed coats or skins exposed to malathion being discarded before ingesting of the seed; 4) volume of food ingested/time; and 5) type of food ingested.

In the absence of specific GKR oral toxicity studies, impacts may vary widely with changes or combinations of food sources in their diet (Gains, 1969). The oral LD50 of malathion in laboratory rats was reported to be 4,445 mg/kg (Spiller, 1961). Past USFWS biological opinions expressed concern for differences in physiology and environmental stresses between laboratory rats and wildlife; and, potential reproductive impacts as suggested in (Dobbins, 1967, cited in USFWS, Sept., 1991&USFWS, May, 1991).

Indirect potential impacts on seed producing plants utilized by GKR from CTVCP treatments may result from the reduction of insect pollinators and phytotoxic injury. The low phytotoxicity of malathion and decline of insect pollinators was previously discussed under "Impacts to Vegetation" (pages 67-69).

CTVCP vehicles have the potential to strike individual GKR and crush food plants and burrow systems. The restricted use of CTVCP vehicles on existing roads greatly reduces impacts to individual GKR's, their burrows and food sources. Only minimal impacts to GKR are anticipated as a result of the "Proposed Action".

Tipton Kangaroo Rat (TKR) (Dipodomys nitratoides nitratoides)

It is expected that potential impacts to the TKR, due to CTVCP activities, would be similar to the GKR.

Blunt-nosed Leopard Lizard (BNLL) (*Gambelia silus*)

Seasonal fluctuations of BNLL activity are expected to reduce the impact of CTVCP operations to BNLL populations during the winter and fall treatments in the San Joaquin Valley. A graph of BNLL seasonal activity (Montanucci, 1965) shows no BNLL activity during the months of January and February and during the month of October, a small percentage of sub-adults comprise most of the activity. A majority of the potential impacts to BNLL would be expected from spring treatment activities. Because little information is available to address the affects of malathion on BNLL, the affects of malathion on other lizard species was examined.

Impacts from oral or dermal exposure to malathion are expected to be minimal. The acute oral LD50 to malathion for *Anolis carolinensis*, a lizard, is 2,324 mg/kg (Hall and Clark, 1982). The genius *Anolis* is in the same family (Iguanidae) as the genus *Gambelia* of which the BNLL belongs. Because of the close relationship of *Anolis* to the BNLL, impacts to BNLL are assumed to be similar.

Potential oral exposure may occur if insect prey species, exposed to malathion, are ingested. Disoriented and dying insect prey species may become easy prey for BNLL. Because insect prey species are in motion only a brief time prior to death, BNLL's are limited to this type of potential exposure. Exposure to disoriented prey species is further limited when spring CTVCP treatments are performed at temperatures below the BNLL activity threshold of 77°F. Cool weather often accompanies spring treatment activities in late March or early April. Treatments

are generally performed during the coolest part of the day, 30-40 minutes before sunrise until 1:00 p.m. During cooler spring weather, maximum daytime temperatures rarely exceed the BNLL activity threshold of 77°F.
Direct exposure of malathion is not expected to adversely affect BNLL (USFWS, Sept., 1991). Avoidance measures for BNLL conservation areas, pages 28-29, will reduce BNLL exposure to CTVCP treatment activities.

USFWS opinion on potential impacts of malathion treatments on BNLL populations focused on the reduction of insect prey species utilized by BNLL. Grasshoppers and crickets make up approximately 74% of the BNLL diet. The reduction of insect prey species would take place during a time when overwintering fat reserves are low and food availability is important (USFWS, Sept., 1991).

Food of the BNLL consists primarily of invertebrates, including Orthroptera, Hymenoptera, Hemiptera, Coleoptera and smaller lizards (Kato, 1987; Snow, 1972). Stomach contents of BNLL, examined in May, contained crickets and *Uta* sp., a small lizard. The majority of the contents were crickets, but the lizards accounted for the greater bulk (Montanucci, 1965). Climate, location and availability of invertebrate prey species may contribute to conflicting food source data observed by Montanucci in 1965 and food source evaluations reported by Tollestrup (Tollestrup, 1972).

Grasshoppers, crickets and invertebrates, in general, are highly mobile and are expected to re-enter treated areas from adjacent non-treated areas. A rapidly changing rangeland habitat due to the maturing and drying of annual plants can also contribute to the movement or migration of invertebrate prey species during spring.

No significant decrease to 2nd year rangeland grasshopper populations was found when rangeland was treated the previous year with a single 0.583 lb/acre malathion application (Quinn, 1989). Pre-treatment grasshopper densities were found to be a significant determinant of 2nd year grasshopper populations rather than the treatment. In a parallel study, pre-treatment darkling beetle populations were also found to be a significant determinant of 2nd year beetle population densities (Quinn, 1990). As with grasshoppers, darkling beetle populations returned to pretreatment levels a year after a single, 0.583 lb/acre malathion treatment (same rate as "Proposed Action").

With BNLL food reserves lowered during drought conditions, USFWS surmised that fewer insect prey species would be available in adjacent non-treated areas.

Continued insect prey reductions during drought periods may adversely affect the BNLL's survival in the areas sprayed. Periods of drought also result in a decline of BLH populations, thereby reducing the need to treat during these periods (USFWS, Sept., 1991).

Moderate and temporary depression of insect food sources are anticipated during spring CTVCP activities due to: 1) the varied diet and mobility of BNLL food sources; 2) the relatively quick degradation of malathion in the environment and 3) specific measures adopted to minimize impacts (pages 28-29).

Only minor impacts to BNLL burrows and habitat vegetation may be expected due to the restricted use of vehicles, and the use of a virtually, non-phytotoxic treatment during CTVCP operations.

Flat-tailed Horned Lizard (FTHL) (*Phrynosoma mcallii*)

The use of malathion, in concentrations outlined in the "Proposed Action", is likely to have no direct adverse effect FTHL populations. Studies cited previously in this EA have shown various lizard species to have a high tolerance to malathion (Hall and Clark, 1982; Peterle and Giles, 1964; Giles, 1970).

Potential impacts to the FTHL prey food (harvester ants) was proposed by CDFG as perhaps a greater concern to the FTHL than the direct effects of malathion (Bolster and Nicol, 1989).

A moderate and temporary impact to insect food sources of the FTHL is expected from CTVCP treatments. The FTHL utilizes ants as a major portion of their diet. Foraging harvester ants (*Veromessor pergandei*) may be killed by malathion treatments.

A mature ant nest may contain up to 50,000 individuals and contain multiple queens (Wheeler & Wheeler, 1973) of which only a small portion are foraging on the surface during a malathion application. The queen, eggs, larvae and a majority of the workers are underground, shielded from exposure to malathion. The majority of treatments will be conducted in early morning, or at night (Imperial County only), prior to peak ant activity. Ant foraging activity usually does not begin until the soil temperature reaches 13^{o}C (55.4^{o}F) (Snelling, 1979). In winter or early spring, this temperature isn't usually reached until about 12:00 noon P.S.T.

Because malathion treatments can occur until mid-morning with an average winter minimum temperature of 50^{o}C (41^{o}F), there is a possibility of ant foraging during spray activities (Bolster and Nicol, 1989).

Past monitoring required under the federal PUP has shown harvester ant colonies recover in areas following malathion spraying. (See "Harvester Ant Surveys, 1991 & 1998", Appendix "K".)

Historically, treatments are necessary one out of every three years. The last two aerial applications of malathion in the Imperial Valley were performed in 1991 and 1998 (Appendix "E", page E-14). The treatment acreage can also vary from a few hundred to several thousand acres. Since the areas receiving treatments vary from treatment period to treatment period, many years may pass between treatments to any particular area.

Due to the random occurrence, size and location of CTVCP treatments in the Imperial Valley, no major impacts to harvester ant colonies are anticipated.Destruction of FTHL habitat is expected to be minimal due to the restriction of CTVCP vehicles to existing roads and malathion's low phytotoxic properties.

Desert Tortoise (*Gopherus agassizi*)

Potential impacts to the desert tortoise from CTVCP operations may result from direct dermal or oral exposure to malathion, indirect impacts to insect pollinators of food plants, or direct impacts to individuals and habitat from vehicles.

Few studies have been performed on exposure of reptiles and amphibians to malathion. Of the studies available, none were found containing information on exposure to tortoise species to aid in assessing toxicological impacts of malathion applications.

Potential impacts from malathion exposure are more likely if CTVCP treatments are performed during March and April, which coincide with post-hibernation activities. Impacts from CTVCP treatments in the Imperial Valley during the months of January and February would be negligible due to the hibernation of the desert tortoise in underground burrows.

Direct dermal exposure of malathion from CTVCP treatments is expected to have minimal impacts on the desert tortoise. The desert tortoise has a small surface area in proportion to its body mass. The desert tortoise would not be expected to absorb enough malathion, before complete degradation, from a single direct treatment or from dermal contact with treated soils or vegetation to cause morbidity. USFWS has concern for the potential of a foraging tortoise to ingest a substantial amount of malathion from food plants (USFWS, May, 1991).

Indirect impacts could occur if insect pollinators are affected by the treatment program, and forage plants are unable to set seed for the following year's growth (USFWS, July, 1996).

Populations of desert tortoises and their food plants would not necessarily be exposed to CTVCP treatments every year. Historical records show that treatments of any particular area in the Imperial Valley occur only once in every three to five years. Imperial Valley aerial treatments have been necessary only 2 years out of the last 10 with widely varying acreage totals (See Appendix "E" page E-14).

An occasional desert tortoise may migrate across roads and be in danger of being struck by CTVCP vehicles. In the "Proposed Action", ground-rigs and survey vehicles move at reduced speeds in desert tortoise habitat increasing the ability to avoid individual tortoises on road ways. The likelihood of hitting a desert tortoise with a CTVCP vehicle would be low.

Because malathion is generally non-phytotoxic, and vehicles are restricted to existing roads, minor to negligible impacts are anticipated to desert tortoise habitat.

No major impacts to the desert tortoise are expected for the following reasons: 1) the vast majority of proposed treatment area occurs on lands where desert tortoise would not be expected to occur; 2) potential treatment areas where desert tortoises are expected to occur is habitat characterized by low densities of desert tortoises and 3) the total area of tortoise habitat which could potentially be treated is extremely small in relation to the occupied desert tortoise habitat in this area (USFWS, July, 1996).

California Red-legged Frog (CRLF) (*Rana aurora draytonii)* **California Tiger Salamander (CTS)** (*Abystoma californiense*)

Impacts to the CRLF and CTS as a result of the "Proposed Action" included the potential for direct and indirect impacts. There is no specific data available on the direct toxicity of malathion to the CRLF and little data available on amphibians in general. Several studies suggest that malathion in water, held at constant concentrations for 24- 96 hours, showed adverse effects to frog and toad larva at low concentrations; 0.56mg/L (*24 hrs*.) & 0.20 mg/L (*96 hrs*.) (Devillers & Exbrayat, 1992). Risks of direct oral and dermal exposure to adult frogs would be significantly less critical. Frog brain cholinesterase has a greater resistance (100 times) to inhibitors than does cholinesterase in mammalian brain (Hall & Kolbe, 1980). Huge doses of cholinesterase inhibitors are required to kill frogs (Tucker and Crabtree, 1970). The CTVCP maintains a standard 200 meter buffer

from water and from riparian habitats (page 20, "Avoidance of Non-target Sites") and maintains a 1/4-mile aerial buffer from known CRLF locations (page 31).

Field studies indicate a difference between laboratory conditions and those conditions found in the ecosystem. Natural and biological factors within aquatic situations influence the concentration, degradation and fate and concentration of malathion in aquatic environments (previously discussed pages 66-67).

There is a potential risk of indirect impacts due to the reduction of invertebrate prey species. This risk to terrestrial insect prey species would be greater during spring treatments and less of a factor during treatments in winter when rangeland invertebrate prey species are not active. The risk is further reduced by the standard buffers given to aquatic situations and to known CRLF and CTS) locations. Only minimal impacts to CRLF and CTS are anticipated because: 1) the CTVCP potential treatment areas are on the periphery of the CRLF range as defined by the State Natural Diversity Database; 2) standard treatment buffers in "Proposed Action" given to riparian and aquatic habitats, page 20 "Avoidance of Non-Target Sites"; 3) drift and runoff protection protocol, "Proposed Action", page 2 and 4) measures to avoid potential impacts to CTS and CRLF, "Proposed Action", page 31.

Giant Garter Snake (GGS) (*Thamnophis gigas*)

Impacts to the GGS as a result of the "Proposed Action" may include the potential for direct and indirect impacts. Research indicates reptile species have a high tolerance to malathion. The risk of impacts to populations of the GGS are not anticipated to be high as only CTVCP ground-rig treatments will be performed in proximity to habitats where remnant populations may exist. Aquatic habitats occupied by the GGS are not suitable habitats for the growth and development of BLH host plants and as such, are not surveyed and treated by the CTVCP. Ground-rig treatments within ground-rig only treatment areas, within the San Joaquin Valley, are small and infrequent (see Appendix "E", page E-15, "Ground-rig Frequency and Application Totals"). Narrow treatment areas will allow invertebrate prey to re-enter from adjacent untreated areas, reducing indirect potential impacts. In addition, the standard treatment buffer given to aquatic habitats, potentially occupied by the GGS, will reduce direct and indirect potential impacts.

Only minimal impacts to giant garter snake are anticipated because: 1) the CTVCP potential treatment areas are on the periphery of the GGS range, only remnant populations may exist in proximity to the "Proposed Action"; 2) standard treatment

buffers in "Proposed Action" given to riparian and aquatic habitats, page 20 and 3) measures to avoid potential impacts to GGS, "Proposed Action", page 31.

Yuma clapper rail (YCR) (*Rallus longirostris*)**;**
California black rail (CBR) (*Laterallus jamaicensis coturniculus*)

Potential direct impacts to bird species of special concern may result from both dermal and oral exposure to malathion. Potential indirect impacts may result if invertebrate prey are affected.

The USFWS believes the Yuma clapper rail is susceptible to malathion both directly and indirectly. Of major concern to the USFWS was the potential for pesticide drift into occupied habitat. The reduction of available invertebrate food sources in a given area could force competition with other bird species in an environment already limited. Regions of concern included buffer zones between YCR habitat and treatment areas and agricultural drains (USFWS, May, 1991). The YCR and the California black rail would be impacted less than other bird species during CTVCP operations. Both birds move and forage along water systems of the Colorado River and Salton Sea and possess diets consisting largely of aquatic arthropods (crayfish and isopods). Direct application to aquatic habitat is strictly avoided by the CTVCP.

Minimal impacts to YCR and CBR are anticipated because: 1) Direct application of malathion to YCR habitat (wetlands) will be avoided by the "Proposed Action"; and 2) the amount of habitat which could be exposed to malathion is small in relation to the total amount of YCR and CBR habitat in the vicinity of the proposed treatment area.

On rare occasions, malathion may enter aquatic water systems in runoff when isolated thundershowers occur over treated areas before complete degradation has taken place (See discussion of malathion in runoff, pages 65-66). The small amount of malathion residue washed into the Colorado River or Salton Sea from runoff would be exposed to absorbing organic particles and be diluted by the large bodies of water. Residues of malathion in runoff resulting from isolated thunderstorms is expected to have minimal impacts to both the YCR and the CBR. Measures have been adopted to lessen impacts within potential YCR and CBR habitat (page 34).

Due to the use of ground-rigs Only in the Blythe potential treatment region, impacts to YCR and CBR in the vicinity of Blythe will not be significant.

Mountain Plover *(Charadrius montanus)*

Impacts to the mountain plover from the CTVCP include both a potential for direct dermal exposure and the indirect reduction of insect prey base.

The mountain plover is an overwintering visitor to California from late November to late March (Small, 1994). While some arrivals have been documented as early as September 11, in Firebaugh (Bent, 1929), they do not appear in large numbers until November (USFWS, Feb. 1999). The mountain plover does not nest in California (Graul, 1975) but migrates to its nesting grounds, in neighboring states, from March to August. Most birds overwintering in southern California have departed to overwintering grounds by mid-February, while the birds in northern California depart about two weeks later (Small, 1994). Unlike other plovers, the mountain plover is rarely found near water but, rather, likes short grass areas with bare and flat ground (USFWS, Feb. 1999).

Mountain plover migrate to spring breeding grounds in March, while CTVCP activities in the San Joaquin Valley are conducted in April. It is likely that the majority of mountain plover will be absent from the San Joaquin Valley at the beginning of spring CTVCP treatment activities. Because a significant numbers of birds not seen do not return to overwintering grounds in the San Joaquin Valley until November, the mountain plover is generally absent during the CTVCP's fall treatment period in October. In addition, the type of overwintering habitat preferred by the mountain plover in the fall consists of a much sorter and more open type of rangeland habitat than the dense, Russian thistle dominated habitat, utilized by BLH populations.

The CTVCP's winter treatment activities are conducted at a time when the mountain plover would most likely be present overwintering in the San Joaquin Valley. Treatment activity in the Imperial Valley may also have a potential for impacts if treatment activities are conducted during winter rather than spring.

Because the mountain plover has an extensive overwintering range, the potential for the mountain plover to be found overwintering in CTVCP's winter treatment areas is small. Winter treatments in the San Joaquin Valley are limited to approximately 12,000 acres of rangeland near Coalinga, Fresno County (see map E-5). An average of 4,000 acres per year has been treated during the last 10 years (chart E-14). In addition, a majority of the potential treatment area comprises steep terrain (>5% slope) undesirable for the mountain plover.

The potential for impacts due to a winter treatment in the Imperial Valley would be small. Mountain plover overwintering areas to the south of the Salton Sea generally do not overlap CTVCP's potential treatment areas on the east and west

mesas. In addition, treatments in the Imperial Valley are infrequent and have been performed only twice in the last 10 years (Chart E-14). Both treatments were performed in April, 1991 and in May, 1998, well after the reported spring migration period.

Due to the wide overwintering range of the mountain plover and CTVCP's limited treatment activities during the five overwintering months, no significant impacts to mountain plover's are anticipated.

RIPARIAN BIRD SPECIES OF CONCERN

The western yellow-billed cuckoo, southwestern willow fly-catcher, coastal California gnatcatcher, elf owl, gilded northern flicker, Gila woodpecker, black-tailed gnatcatcher, Arizona Bell's vireo and least Bell's vireo are generally associated during different times of the year within the willow-cottonwood-mesquite riparian forest along the Colorado River or other riparian systems in California, Nevada, Arizona, New Mexico, and Mexico.

Riparian systems are not treated by CTVCP due to the absence of BLH hosts. Nesting birds and hatchlings within riparian systems would not be exposed to direct applications of malathion during treatment operations.

All of the bird species of special concern are dependent on insects for all or part of their diets and could be indirectly impacted by the "Proposed Action". Indirect impacts to insect populations outside of riparian systems are expected to be temporary due to the high mobility of the birds, prey insects and the rapid degradation of malathion in the environment. Insects would be expected to re-enter treated areas from adjacent non-treated areas. Highly mobile bird species would be expected to easily move and forage in adjacent non-treated areas. Potential treatment areas adjacent to riparian habitat is small in relation to the total amount or riparian habitat occupied by bird species of concern.

The CTVCP will be minimally impacting riparian bird species of concern because: 1) malathion degrades quickly in the environment; 2) riparian habitat will not be treated in this program; 3) potential treatment areas adjacent to riparian habitat are small in relation to the total habitat available; 4) riparian bird species of concern fluctuate seasonably in their association with riparian habitat; 5) buffers placed near riparian habitat in the San Joaquin Valley to protect the California red-legged frog, tiger salamander, giant garter snake and the valley elderberry longhorn beetle will minimize impacts to bird species and 6) specific measures adopted to minimize impacts to YCR and BCR page 34.

FAIRY SHRIMP SPECIES OF CONCERN

Studies of malathion exposure to aquatic habitats from drift or runoff suggest the potential for significant risk to fish and aquatic invertebrates including fairy shrimp. The potential for impacts to aquatic habitats are reflected in the CTVCP's commitment to assure that no man-made or natural water sources are contaminated (pages 20-21).

The Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool tadpole shrimp, and vernal pool fairy shrimp are known from a limited number of locations distributed from Shasta County in the north, through parts of the Central Valley and the coast range into San Luis Obispo, and Santa Barbara Counties. Known locations of listed fairy shrimp are generally not found within CTVCP potential treatment areas (Eng, 1990; USFWS, Sept.,1994). In addition, the terrain and physical characteristics of the soils within historical BLH breeding grounds are generally not conducive to the formation of vernal pool habitat.

No major impacts to listed fairy shrimp species are anticipated from BLH control activities because: 1) the general scarcity of known listed fairy shrimp locations within CTVCP potential treatment areas; 2) the CTVCP avoids natural or man-made aquatic situations during control activities (See "Avoidance of Non-target Sites" page 20); 3) a relatively low risk of significant quantities of malathion leaching or migrating to vernal pools from treated rangeland due to post-treatment precipitation. (See "Impacts to Water and Aquatic Life", pages 65-66) and 4) measures employed by the CTVCP to avoid potentially major effects to listed fairy shrimp (page 32).

Valley Elderberry Longhorn Beetle (VELB)

Malathion could have a direct impact on adult VELB if CTVCP treatments are performed near woody riparian vegetation or water courses containing elderberry plants. No major impacts to the VELB are anticipated from the "Proposed Action" because: 1) habitat conducive to the development of elderberry plants is generally not found within CTVCP potential treatment areas; 2) woody riparian vegetation or watercourses with woody vegetation is not BLH habitat and is avoided in the "Proposed Action" and 3) measures to avoid major impacts to VELB, page 31.

7. Designated "Ground-rig Only" Treatment Areas

Blythe - eastern Riverside County; **Cuyama Valley -** northwestern Ventura County, northeastern Santa Barbara and Southeastern San Luis Obispo Counties; **San Joaquin Valley** - portions of western Stanislaus, Merced, and San Joaquin Counties.

The frequency and quantity of applications in the Blythe, Cuyama, and San Joaquin Valley "ground-rig only" areas have remained generally low (See Appendix "E", page E-15, "Frequency of Ground-rig Only Treatments" and Appendix "E", page E-13, "Probability of Treatment Chart"). There is every reason to conclude that the necessity for ground-rig applications in these designated control areas will continue at current levels or decline further.

When BLH treatments are necessary, the CTVCP spot treats roadsides and ditch banks with ground-rigs adjacent to CTV susceptible crops. Rangeland is not treated in these zones. Considering the small quantity of malathion presently utilized, the low frequency of ground-rig treatments and measures employed to reduce potential impacts to species of concern (pages 27-35); it is likely that plant or animal species of concern or their habitat would be minimally impacted by BLH treatments within "ground-rig only" areas.

8. Impacts to CTV Susceptible Host Crops

Positive impacts to CTV host crops due to the "Proposed Action" may include the following:

1. Maintenance of a 1% or less CTV infection rate within host crops on a statewide basis;
2. Adequate supplies of CTV host crops and products;
3. Stable prices of CTV host crops and products;
4. Stability of jobs and investments in CTV host crop production and related product industries;
5. Minimum amounts of pesticides used to control BLH; and
6. Localized control and reduction of aphids and aphid vectored plant diseases and potential reduction of pesticide treatments in agricultural croplands adjacent to treatment areas.

9. Cumulative Impacts

Cumulative impacts are those impacts on the environment that results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of the agency or person that performs such actions.

ADVERSE EFFECTS OF PAST, PRESENT AND REASONABLE FORESEEABLE FUTURE ACTIONS

A variety of actions have combined to affect ecosystems and sensitive species within potential CTVCP treatment areas. Destruction of natural ecosystems have been evident in urban sprawl, recreational activities such as off-road vehicle use,

hunting, camping, various military uses, oil, gas, and mineral exploration, mining, livestock grazing, agriculture, industrial and vehicular air pollution, poaching, fire, drought, predation, disease, and competition from introduced species.

Agriculture in its many forms has the most wide reaching effects in changing the habitat for many sensitive, threatened and endangered species. The clearing of natural vegetation, the cultivation of soils and the use of herbicides, insecticides and rodenticide has affected the historical range of the blunt-nosed leopard lizard, desert tortoise, Tipton kangaroo rat, giant kangaroo rat, San Joaquin antelope squirrel, Mojave ground squirrel, flat-tailed horned lizard, San Joaquin kit fox, Bakersfield cactus, Kern mallow, San Joaquin woolly-threads, Bakersfield saltbush, California jewelflower, peregrine falcon, Swainson's hawk and the bald eagle.

In addition to the application of malathion to rangeland for control of the BLH, additional pesticides may also be used to control grasshoppers, vertebrate pests and noxious weeds within the CTVCP potential treatment Areas. The Cooperative Rangeland Grasshopper Management Program, administered by USDA, utilizes block or buffer treatments for the control of grasshopper infestations that threaten food, fiber and grasslands. The USDA works closely with state agencies and private landowners to control extremely large grasshopper populations on public and private lands. Grasshopper control within the potential CTVCP treatment area would be rare.

Avicides and rodenticide baits may be placed in rangeland to control vertebrate pests inflicting damage to adjacent cropland areas. The locations and amount of vertebrate pest control would be expected to fluctuate from year to year with changes in vertebrate pest populations.

Herbicides are utilized to control noxious weeds within the boundaries of CTVCP treatment areas. Small isolated acreages of tamarisk, arundo and yellow-star thistle are routinely treated. Federal, state and county agencies may be involved in the survey and eradication of noxious weeds. The majority of weed eradication acreage is quite small and extremely localized. The quantity of herbicides used for control is also quite small and not significant. At this present time, *Salsola vermiculata* is the only weed under regulatory eradication within the CTVCP potential treatment area.

Urban sprawl and associated activities, causing permanent habitat destruction and changes in air and water quality, have affected many species throughout California. In the San Joaquin Valley, species such as the San Joaquin kit fox, western yellow-billed cuckoo, Bakersfield cactus, blunt-nosed leopard lizard and San

Joaquin antelope squirrel have been subject to pressures resulting from urban growth. Urban growth in southern California has had a significant impact on the environment. The black-tailed gnatcatcher, Munz's onion, slender-horned spineflower and California orcutt grass are being threatened by the continued urban expansion in the Hemet area.

A combination of urban sprawl and agriculture has impacted the ecosystems associated with the Colorado River. The development of flood control and the diversion of water from the Colorado River for urban and agriculture uses, has changed the lower Colorado River basin and impacted many sensitive species. The greatly reduced cottonwood-willow-mesquite riparian forest is the home for a large group of birds including the Gila woodpecker, gilded northern flicker, elf owl, California black rail, Arizona Bell's vireo and Yuma clapper rail. The bonytail chub and humpback sucker have also been impacted by changes in the Colorado River.

Oil, gas and mineral exploration or production have profoundly modified, over a limited area, the habitat of San Joaquin kit fox, blunt-nosed leopard lizard and Bakersfield cactus.

Off-road vehicle use, whether in commercial racing events or casual weekend family activities, have posed a clear threat to some desert species, including the desert tortoise, flat-tailed horned lizard, Algodones dunes sunflower, Wiggins' croton and silver-leafed dune sunflower.

The impacts of predation, poaching, and disease are impacting the desert tortoise, flat-tailed horned lizard, blunt-nosed leopard lizard, San Joaquin kit fox, peregrine falcon and bald eagle.

BENEFICIAL ACTIONS

Although many factors are contributing to the degradation of natural habitat in California, efforts are being made to reverse trends of habitat disruption and the decline of species. Protection for sensitive, threatened or endangered species is provided by federal and state legislation. Habitat, identified by federal, state or local agencies to be crucial to the survival of endangered species, may be recommended for acquisition and set aside as wildlife preserves; national, state, county or city parks; national wildlife areas and ecological preserves. Critical habitat for some species has been defined and officially designated by the USFWS. Tax check-off monies, off-site habitat protection to compensate for development, wildlife bond monies and private donations are being used to set aside more land.

Recovery plans have been adopted to enhance the recovery of individual endangered species such as the blunt-nosed leopard lizard, San Joaquin kit fox,

bald eagle and the peregrine falcon. Both the bald eagle and the peregrine falcon are on the road to recovery as their numbers have increased in response to management programs. The bald eagle was downgraded from "Endangered" to "Threatened" status as of July 1, 1994. In the summer of 1999, the American peregrine falcon was removed from the Federal list of endangered and threatened wildlife (USFWS August, 1999) and the bald eagle was proposed for removal from the list of endangered and threatened wildlife in the lower 48 states (USFWS July, 1999). In 1998, the USFWS completed a recovery plan for the San Joaquin Valley which covers many species of plants and animals (USFWS 1998).

Management plans, developed by resource agencies, provide guidance to for the management of a sufficient portion of habitat to maintain viable populations of species in decline.

Non-profit conservation organizations such as the Nature Conservancy, Center for Natural Lands Management, Audubon Society and the Sierra Club are promoting research and habitat improvement which will greatly improve the survival of many species, including those listed as endangered or threatened.

CONCLUSION

The direct and indirect effects of the "Proposed Action" are minor and should not significantly add to or increase cumulative impacts. Malathion breaks down within 1-4 days of application, residue build up is not anticipated from single annual treatments. Studies have shown that insect populations re-establish rapidly within several months of treatment and would not experience long-term decline from repeated annual treatments. Therefore, the "Proposed Action" will not substantially add to the effects of past, present, and reasonablely foreseeable future actions described in the preceding discussion of this EA.

b. ALTERNATIVE 2 - REDUCED PROJECT ALTERNATIVE

Under the Reduced Project alternative, the CTVCP would not treat public lands and would control BLH populations where necessary on adjoining private lands. This alternative would eliminate treatments from an estimated 10,000-20,000 acres of rangeland per year. In years when treatments are necessary in the Imperial Valley, an additional 3,000-20,000 acres would be eliminated from treatment. The Reduced Project alternative would eliminate all negative and positive impacts to public lands previously discussed in the "Proposed Action".

1. Impacts to Soil

Same as "Proposed Action"

2. Impacts on Air Quality

Same as "Proposed Action"

3. Impacts to Water.

Same as "Proposed Action"

4. Impacts to Aquatic Life

Same as "Proposed Action"

5. Impacts to Vegetation

Same as "Proposed Action"

GENERAL

Same as "Proposed Action"

PLANT SPECIES OF SPECIAL CONCERN

Same as "Proposed Action"

6. Impacts to Animals

GENERAL

Same as "Proposed Action"

ANIMAL SPECIES OF SPECIAL CONCERN

Same as "Proposed Action"

7. Impacts to CTV Susceptible Crops

Impacts to CTV susceptible host crops are expected to be similar to the "Proposed Action" with the addition of:

1. Increased potential for small to medium CTV outbreaks from BLH populations migrating from important historical breeding grounds located on untreated public lands in the San Joaquin Valley. Due to the high ratio of public to private lands in the Imperial Valley, large CTV outbreaks in Imperial Valley host crops would be expected;

2. The increased use of foliar and systemic pesticides to control BLH migrating from public lands;
3. Potential localized crop loss; and
4. Untreated public lands could act as a reservoir for CTV and the BLH; increasing the potential for re-infesting adjacent treated lands.

Where treatment of BLH populations is determined by the CTVCP to be necessary and no treatment is allowed by the agency or persons in control of such land harboring these pest populations, abatement orders could be issued under authority of Chapter 6, Article 1 of the Food and Agricultural Code of the State of California. Under the abatement order, the agency or person in charge of land, harboring such a pest, could bear all cost of controlling the pest. The agency or persons controlling lands harboring pest could also be held liable for crop losses attributed to failure to control this pest.

8. Cumulative Impact

The overall cumulative impact of this alternative is expected to be the same as the "Proposed Action".

c. ALTERNATIVE 3 - NO ACTION

Under the No Action alternative, the CTVCP would not use any of the above actions. No pesticide treatment for BLH control would take place in California by the CTVCP.

Where no treatment occurred, both BLH populations and CTV would increase and become a threat to a wide range of agricultural crops and home gardens, statewide, valued at well over three billion dollars worth annually. Losses could be astronomical. A large portion of the produce consumed in the United States comes from California, and a major outbreak of CTV could affect consumers nationally.

Potential impacts of No Action are expected to be: 1) unstable prices for CTV susceptible crops and products; 2) inadequate supplies of CTV susceptible crops and products; 3) loss of jobs and investments in CTV susceptible crop production and related industries; 4) a large increase in pesticide use to control migrating BLH populations within cultivated crops; 5) increased potential for pesticide residue on produce; and 6) potential increases in air and ground water contamination from increased use of pesticides in crops.

Without the control of BLH, CTV infection would threaten over three billion susceptible crops and home gardens annually. Susceptible crops and gardens

growing in California would be subject to the same devastating losses experienced in agricultural history prior to the establishment of the CTVCP.

1. Cumulative Impact

The absence of BLH control in California would have little cumulative impact beyond what is occurring as a result of other actions and be similar to the "Proposed Action".

V. CONSULTATION/COORDINATION

1. **California Department of Food and Agriculture**

A. Division of Plant Industry

1. Jim F. Rudig - Program Supervisor, Integrated Pest Control Branch
2. Peter H. Kurtz, M.D. - Medical Coordinator
3 Jim Rains - Environmental Coordinator
4. Robert L. Peterson - Project Leader, Curly Top Virus Control Program
5. Rodney A. Clark - Associate Entomologist, Curly Top Virus Control Program

2. **California Department of Fish and Game**

A Region 4

1. Donna Daniels

3. **United States Department of the Interior**

A**.** Bureau of Land Management

California State Office:

1. Diana Brink - State Rangeland Management Specialist
2. Jack Mills - Environmental Coordinator
3. Ed Lorentzen - Endangered Species Specialist
4. John Willoughby - Botanist

California Desert District:

1. Larry Foreman - District Wildlife Biologist

El Centro Resource Area:

1. Gavin Wright - Wildlife Management Biologist

Caliente Resource Area:

1. Amy Kuritsubo - Wildlife Management Biologist

Hollister Resource Area:

1. Sam Fitton - Wildlife Management Biologist

Carlsbad Field Office:

1. Carol Roberts

Sacramento Field Office:

1. Greg Van Stralen

Ventura Field Office:

1. Ray Bransfield

4. **United States Department of Energy (Buena Vista Hills-NPR-2)**

A. DOE-NPRC

1. Charlie D. Ellison - NEPA Document Manager

5. **University of California, Riverside**

A. Department of Entomology

1. Dr. Gregory P. Walker - Entomologist
2. Dr. Imad M. Bayoun - Entomologist

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III. DESCRIPTION OF EXISTING ENVIRONMENT

IV. ENVIRONMENTAL CONSEQUENCES

V. CONSULTATION/COORDINATION

VI. REFERENCES CITED

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Description of BLM Land Involved

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Malathion Labels

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Pierce (USFWS) to Hastey (BLM) 11/8/93 -
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Summary of Measures (a-1) to Avoid Significant Impacts to BNLL;
Maps of CTVCP Designated BNLL Conservation Areas;
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APPENDIX "E"

Maps of CTVCP Potential Treatment Areas
Graphs of Probability of Treatment

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A P P E N D I X "G"

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Biology of Mymarid and Trichogrammatid Wasps

Prepared by Dr. Greg Walker,
University of California at Riverside

APPENDIX "EE"

Maps of BLM and DOE Lands Selected for Potential Release

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Parasite Collection Tables 1 & 2

Map of Region Explored for Parasites

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APPENDIX "GG"

Description of *Aphelinoidea turanica* (new species)
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Harvester Ant Monitoring

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Spill Contingency Plan

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Harvester Ant Survey
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APPENDIX “L”

Checklist of Critical Habitat for Species
that May be Found in or Near CTVCP Control Boundries

California Department
of Food and Agriculture