

VII. APPENDICES

APPENDIX A. LIST OF SCIENTIFIC AND COMMON NAMES OF PLANTS AND ANIMALS

<u>Common name</u>	<u>Scientific name</u>
adobe popcorn flower	<i>Plagiobothrys acanthocarpus</i>
Ahart's dwarf rush	<i>Juncus leiospermus</i> var. <i>ahartii</i>
Ahart's rush	<i>Juncus leiospermus</i> var. <i>ahartii</i>
alkali bulrush	<i>Scirpus maritimus</i>
alkali heath	<i>Frankenia salina</i>
alkali mallow	<i>Malvella leprosa</i> (= <i>Sida hederacea</i>)
alkali milk-vetch	<i>Astragalus tener</i> var. <i>tener</i>
alkali weed	<i>Cressa truxillensis</i>
awnless Orcutt grass	<i>Tuctoria greenei</i>
Baker's navarretia	<i>Navarretia leucocephala</i> ssp. <i>bakeri</i>
ball saltbush	<i>Atriplex fruticulosa</i>
bearded allocarya	<i>Plagiobothrys hystriculus</i>
bearded popcorn flower	<i>Plagiobothrys hystriculus</i>
bellflower family	Campanulaceae
bindweed	<i>Convolvulus arvensis</i>
black oak	<i>Quercus kelloggii</i>
blunt spikerush	<i>Eleocharis obtusa</i>
bog bulrush	<i>Scirpus mucronatus</i>
Boggs Lake dodder	<i>Cuscuta howelliana</i>
Boggs Lake hedge-hyssop	<i>Gratiola heterosepala</i>
borage family	Boraginaceae
bractless hedge-hyssop	<i>Gratiola ebracteata</i>
brass buttons	<i>Cotula coronopifolia</i>
broad-leaved pepper-weed	<i>Lepidium latifolium</i>
brome	<i>Bromus</i> spp.
Burke's goldfields	<i>Lasthenia burkei</i>
Butte County meadowfoam	<i>Limnanthes floccosa</i> ssp. <i>californica</i>
buttercup family	Ranunculaceae
California buckeye	<i>Aesculus californica</i>
California goldfields	<i>Lasthenia californica</i>
California lilac	<i>Ceanothus</i> species
California Orcutt grass	<i>Orcuttia californica</i>
California semaphore grass	<i>Pleuropogon californicus</i>
carrot family	Apiaceae (= Umbelliferae)
cattail	<i>Typha</i> species
chamise	<i>Adenostoma fasciculatum</i>
Chico grass	<i>Tuctoria greenei</i>
Clara Hunt's milk-vetch	<i>Astragalus clarianus</i>
coastal dunes milk-vetch	<i>Astragalus tener</i> var. <i>titi</i>
cocklebur	<i>Xanthium strumarium</i>
Colusa grass	<i>Neostapfia colusana</i>
common American hedge-hyssop	<i>Gratiola neglecta</i>
common coyote-thistle	<i>Eryngium castrense</i>
common mousetail	<i>Myosurus minimus</i>
common spikeweed	<i>Hemizonia pungens</i>
Constance's coyote-thistle	<i>Eryngium constancei</i>
Contra Costa goldfields	<i>Lasthenia conjugens</i>
coyote-thistle	<i>Eryngium</i> species
Crampton's Orcutt grass	<i>Tuctoria mucronata</i>
Crampton's tuctoria	<i>Tuctoria mucronata</i>
dense-flowered owl's-clover	<i>Castilleja densiflora</i>

<u>Common name</u>	<u>Scientific name</u>
Douglas fir	<i>Pseudotsuga menziesii</i>
Douglas' meadowfoam	<i>Limnanthes douglasii</i>
Douglas' pogogyne	<i>Pogogyne douglasii</i>
downingia	<i>Downingia</i> species
dwarf downingia	<i>Downingia pusilla</i>
dwarf peppergrass	<i>Lepidium latipes</i> var. <i>latipes</i>
dwarf woolly-heads	<i>Psilocarphus brevissimus</i>
false mermaid family	Limnanthaceae
Ferris' s milk-vetch	<i>Astragalus tener</i> var. <i>ferrisiae</i>
few-flowered navarretia	<i>Navarretia leucocephala</i> ssp. <i>pauciflora</i>
field bindweed	<i>Convolvulus arvensis</i>
field owl's-clover	<i>Castilleja campestris</i> ssp. <i>campestris</i>
figwort family	Scrophulariaceae
filaree	<i>Erodium</i> species
fleshy owl's-clover	<i>Castilleja campestris</i> ssp. <i>succulenta</i>
foxtail	<i>Alopecurus saccatus</i>
foxtail mousetail	<i>Myosurus minimus</i> ssp. <i>alopecuroides</i>
frankenian	<i>Frankenia salina</i>
Fremont's goldfields	<i>Lasthenia fremontii</i>
Fremont's tidy-tips	<i>Layia fremontii</i>
fringed downingia	<i>Downingia concolor</i>
Gairdner's yampah	<i>Perideridia gairdneri</i> ssp. <i>gairdneri</i>
goldfields	<i>Lasthenia</i> species
goosefoot family	Chenopodiaceae
grass family	Poaceae
Great Valley gumplant	<i>Grindelia camporum</i>
Greene's legenera	<i>Legenere limosa</i>
Greene's Orcutt grass	<i>Tuctoria greenei</i>
Greene's orcuttia	<i>Tuctoria greenei</i>
Greene's popcorn flower	<i>Plagiobothrys greenei</i>
Greene's tuctoria	<i>Tuctoria greenei</i>
hairy checker-mallow	<i>Sidalcea hirsuta</i>
hairy Orcutt grass	<i>Orcuttia pilosa</i>
hairy orcuttia	<i>Orcuttia pilosa</i>
hard-stemmed tule	<i>Scirpus acutus</i> var. <i>occidentalis</i>
Hoover's spurge	<i>Chamaesyce hooveri</i>
Howell's quillwort	<i>Isoetes howelli</i>
hyssop-leaved bassia	<i>Bassia hyssopifolia</i>
inch-high dwarf rush	<i>Juncus uncialis</i>
Italian ryegrass	<i>Lolium multiflorum</i>
Jepson's button-celery	<i>Eryngium aristulatum</i>
Jepson's milk-vetch	<i>Astragalus rattanii</i> var. <i>jepsonianus</i>
juniper	<i>Juniperus</i> species
Kaweah brodiaea	<i>Brodiaea insignis</i>
Lake County stonecrop	<i>Parvisedum leiocarpum</i>
leafy common madia	<i>Madia elegans</i> ssp. <i>densifolia</i>
legenera	<i>Legenere limosa</i>
Lemmon's canary grass	<i>Phalaris lemmonii</i>
lippia	<i>Phyla nodiflora</i> (= <i>Lippia nodiflora</i>)
little mousetail	<i>Myosurus minimus</i> ssp. <i>apus</i>
Loch Lomond button-celery	<i>Eryngium constancei</i>
Loch Lomond coyote-thistle	<i>Eryngium constancei</i>
madrone	<i>Arbutus menziesii</i>
mannagrass	<i>Glyceria</i> species
many-flowered navarretia	<i>Navarretia leucocephala</i> ssp. <i>plieantha</i>
manzanita	<i>Arctostaphylos</i> species

<u>Common name</u>	<u>Scientific name</u>
mayweed	<i>Anthemis cotula</i>
meadowfoam family	Limnanthaceae
meadowfoams	<i>Limnanthes</i> species
Mediterranean barley	<i>Hordeum marinum</i> ssp. <i>gussoneanum</i>
medusahead	<i>Taeniatherum caput-medusae</i>
moss	class Musci
Mt. Hamilton stonecrop	<i>Parvisedum pentandrum</i>
mucronate tuctoria	<i>Tuctoria mucronata</i>
navarretias	<i>Navarretia</i> species
oak	<i>Quercus</i> species
Oregon oak	<i>Quercus garryana</i>
Oregon woolly-heads	<i>Psilocarphus oregonus</i>
Orcutt grasses	<i>Orcuttia</i> species
Otay Mesa mint	<i>Pogogyne nudiuscula</i>
owl's-clover	<i>Castilleja</i> species or <i>Triphysaria</i> species
pale spikerush	<i>Eleocharis macrostachya</i>
Parish's brittle-scale	<i>Atriplex parishii</i>
pea family	Fabaceae
pennyroyal	<i>Mentha pulegium</i>
persistent-fruited salt-scale	<i>Atriplex persistens</i>
phlox family	Polemoniaceae
pilose Orcutt grass	<i>Orcuttia pilosa</i>
pincushion navarretia	<i>Navarretia myersii</i> ssp. <i>myersii</i>
pink meadowfoam	<i>Limnanthes douglasii</i> ssp. <i>rosea</i>
plantain	<i>Plantago</i> species
pointed rush	<i>Juncus oxymeris</i>
ponderosa pine	<i>Pinus ponderosa</i>
popcorn flower	<i>Plagiobothrys</i> species
prostrate navarretia	<i>Navarretia prostrata</i>
pygmy stonecrop	<i>Crassula connata</i> (= <i>Tillaea erecta</i>)
Red Bluff dwarf rush	<i>Juncus leiospermus</i> var. <i>leiospermus</i>
rough-fruited popcorn flower	<i>Plagiobothrys trachycarpus</i>
rush family	Juncaceae
rushes	<i>Juncus</i> species
Russian thistle	<i>Salsola tragus</i>
ryegrass	<i>Lolium</i> species
Sacramento Orcutt grass	<i>Orcuttia viscida</i>
Sacramento orcuttia	<i>Orcuttia viscida</i>
Sacramento Valley milk-vetch	<i>Astragalus tener</i> var. <i>ferrisiae</i>
saltgrass	<i>Distichlis spicata</i>
San Diego button-celery	<i>Eryngium aristulatum</i> var. <i>parishii</i>
San Diego mesa mint	<i>Pogogyne abramsii</i>
San Joaquin Orcutt grass	<i>Orcuttia inaequalis</i>
San Joaquin Valley Orcutt grass	<i>Orcuttia inaequalis</i>
San Joaquin Valley orcuttia	<i>Orcuttia inaequalis</i>
semaphore grass	<i>Pleuropogon</i> species
sessile mousetail	<i>Myosurus sessilis</i>
Shippee meadowfoam	<i>Limnanthes floccosa</i> ssp. <i>californica</i>
silver sagebrush	<i>Artemisia cana</i>
slender Orcutt grass	<i>Orcuttia tenuis</i>
slender orcuttia	<i>Orcuttia tenuis</i>
slender popcorn flower	<i>Plagiobothrys tener</i>
slender rattle-weed	<i>Astragalus tener</i> var. <i>tener</i>
small pincushion navarretia	<i>Navarretia myersii</i> ssp. <i>deminuta</i>
smooth goldfields	<i>Lasthenia glaberrima</i>
snapdragon family	Scrophulariaceae

<u>Common name</u>	<u>Scientific name</u>
Solano grass	<i>Tuctoria mucronata</i>
Sonoma sunshine	<i>Blennosperma bakeri</i>
spikerush	<i>Eleocharis</i> species
spiny-sepaled button-celery	<i>Eryngium spinosepalum</i>
spreading navarretia	<i>Navarretia fossalis</i>
spurge family	Euphorbiaceae
sticky Orcutt grass	<i>Orcuttia viscida</i>
stonecrop family	Crassulaceae
Stony Creek spurge	<i>Chamaesyce ocellata</i> ssp. <i>rattanii</i>
succulent owl's-clover	<i>Castilleja campestris</i> ssp. <i>succulenta</i>
swamp grass	<i>Crypsis schoenoides</i>
sweet clover	<i>Melilotus indica</i>
thistle	<i>Cirsium</i> species
thread-like mousetail	<i>Myosurus minimus</i> ssp. <i>filiformis</i>
three-colored monkey flower	<i>Mimulus tricolor</i>
thyme-leaved spurge	<i>Chamaesyce serpyllifolia</i>
toad rush	<i>Juncus bufonius</i>
turkey mullein	<i>Eremocarpus setigerus</i>
two-horned downingia	<i>Downingia bicornuta</i>
valley downingia	<i>Downingia pulchella</i>
valley oak	<i>Quercus lobata</i>
Vasey's coyote-thistle	<i>Eryngium vaseyi</i>
vernal pool layia	<i>Layia chrysanthemoides</i>
vernal pool popcorn flower	<i>Plagiobothrys stipitatus</i> (= <i>Allocarya stipitata</i>)
vernal pool saltbush	<i>Atriplex persistens</i>
vernal pool smallscale	<i>Atriplex persistens</i>
vinegar weed	<i>Trichostema lanceolatum</i>
water shamrock	<i>Marsilea vestita</i>
whiteflower navarretia	<i>Navarretia leucocephala</i>
white meadowfoam	<i>Limnanthes alba</i>
white tumbleweed	<i>Amaranthus albus</i>
wild barley	<i>Hordeum</i> species
winecup clarkia	<i>Clarkia purpurea</i>
woolly meadowfoam	<i>Limnanthes floccosa</i> ssp. <i>floccosa</i>
yampah	<i>Perideridia</i> species
yellow carpet	<i>Blennosperma nanum</i>
yellow pine	<i>Pinus ponderosa</i>
yellow star-thistle	<i>Centaurea solstitialis</i>
yerba golondrina	<i>Chamaesyce ocellata</i> ssp. <i>ocellata</i>
ANIMALS	
alkali fairy shrimp	<i>Branchinecta mackini</i>
backswimmers	order Hemiptera; family Notonectidae
bee flies	order Diptera; family Bombyliidae
bees	order Hymenoptera, superfamily Apoidea
beetles	order Coleoptera
black-tailed deer	<i>Odocoileus hemionus</i>
<i>Blennosperma</i> -specialist bee	<i>Andrena blennospermatis</i>
bullfrog	<i>Rana catesbeiana</i>
burrowing bee	<i>Andrena</i> and <i>Panurginus</i> species
burrowing owl	<i>Athene cucicularia</i>
butterflies	order Lepidoptera
California fairy shrimp	<i>Lindleriella</i>
California ground squirrel	<i>Spermophilus beecheyi</i>
California tiger salamander	<i>Ambystoma californiense</i>

<u>Common name</u>	<u>Scientific name</u>
cliff swallow	<i>Petrochelidon pyrrhonata</i>
Colorado fairy shrimp	<i>Branchinecta coloradensis</i>
Conservancy fairy shrimp	<i>Branchinecta conservatio</i>
crab spiders	order Araneae; family Thomisidae
crane flies	order Diptera; family Tipulidae
cryptic tadpole shrimp	<i>Lepidurus cryptis</i>
delta green ground beetle	<i>Elaphrus viridis</i>
dragonflies and damselflies	order Odonata
elk	<i>Cervus elaphus</i>
flies	order Diptera
golden-haired dung fly	<i>Scatophaga stercoraria</i>
ground squirrel	<i>Spermophilus</i> species
honeybee	<i>Apis mellifera</i>
horned lark	<i>Eremophila alpestris</i>
lesser nighthawk	<i>Chordeiles acutipennis</i>
<i>Limnanthes</i> -specialist bees	<i>Andrena limnanthis</i> and <i>Panurginus occidentalis</i>
longhorn fairy shrimp	<i>Branchinecta longiantenna</i>
mayflies	order Ephemeroptera
midges	order Diptera; family Chironomidae
midvalley fairy shrimp	<i>Branchinecta mesovallensis</i>
mosquitoes	order Diptera; family Culicidae
moths	order Lepidoptera
pocket gopher	<i>Thomomys</i> species
pronghorn	<i>Antilocapra americana</i>
saldid bugs	order Hemiptera; family Saldidae
solitary bees	order Hymenoptera; family Andrenidae
springtails	order Collembola
true bugs	order Hemiptera
tule elk	<i>Cervus elaphus nannoides</i>
vernal pool fairy shrimp	<i>Branchinecta lynchi</i>
vernal pool tadpole shrimp	<i>Lepidurus packardi</i>
wasps	order Hymenoptera
water boatmen	order Hemiptera; family Corixidae
waterfowl	family Anatidae
water striders	order Hemiptera; family Gerridae
western spadefoot toad	<i>Spea hammondi</i>

APPENDIX B. GLOSSARY OF TECHNICAL TERMS

<u>Term</u>	<u>Definition</u>
<i>achene</i>	a dry, single-seeded <i>fruit</i> that does not split open; the fruit wall is thinner than that of a <i>nutlet</i>
<i>adaptive management</i>	a long-term repeated process of gradually modifying management techniques based upon the results of modeling and research
<i>allele</i>	a form of a <i>gene</i>
<i>alluvial fan</i>	the fan-shaped area of sediment deposited where a mountain stream first enters a valley or plain
<i>alluvium</i>	sediment deposited by flowing water
<i>anaerobic</i>	lacking oxygen
<i>annual</i>	a plant that lives less than 1 year; the entire life cycle from seed germination to <i>seed set</i> is completed in a single growing season
<i>anther</i>	the pollen-producing portion of a <i>stamen</i>
<i>axil</i>	the angle between the base of a leaf and the stem
<i>banner</i>	the outermost petal in flowers of the pea family; it often curves upward away from the other petals
<i>beak</i>	a narrow projection
<i>biennial</i>	a plant that lives for 2 years, flowering only in the second year
<i>bisexual</i>	flowers containing functional male and female reproductive structures
<i>blade</i>	the flattened portion of a leaf
<i>bottleneck</i>	a situation occurring when a population is reduced to only a few individuals, which then reproduce to create a larger population over time; although the population may continue to increase in size, its genetic diversity remains low
<i>bract</i>	a leaf-like structure located in the <i>inflorescence</i>
<i>bractlet</i>	a tiny <i>bract</i> occurring below an individual flower
<i>breeding system</i>	a plant's strategy for reproduction; examples are outcrossing and inbreeding
<i>calyx</i>	the set of <i>sepals</i> in a single flower
<i>capsule</i>	a type of dry <i>fruit</i> that splits open at maturity
<i>caryopsis</i>	the <i>fruit</i> of a grass; also known as a grain
<i>Category 1 candidate</i>	a species for which sufficient information is on file with the Fish and Wildlife Service to list it as endangered or threatened, but which is awaiting publication of a formal listing proposal
<i>Category 2 candidate</i>	a species for which listing possibly may be appropriate, but for which insufficient information is available to make a determination; this category is no longer used by the Fish and Wildlife Service
<i>compatible use</i>	activities and practices that contribute to population stability
<i>competition</i>	the simultaneous demand by two or more organisms or species for an essential common resource that is actually or potentially in limited supply
<i>colony</i>	a group of plants separated by a short distance from other groups of the same species, but not far enough apart to qualify as separate <i>occurrences</i>
<i>compound leaf</i>	a leaf composed of several to many separate segments (<i>leaflets</i>), which share a common <i>petiole</i>
<i>conservation easement</i>	a contract or deed restriction that specifies the type of land uses that may occur in the designated area
<i>corolla</i>	the set of petals in a single flower

<u>Term</u>	<u>Definition</u>
<i>cyathium</i>	the complex flowering structure found in spurges, which resembles a single flower
<i>decumbent</i>	a stem laying on the ground, with the tip turned upward
<i>deflexed</i>	pointing downward
<i>demographic monitoring</i>	a process for determining population trends and identifying and evaluating the factors responsible for lack of population stability; consists of <i>trend analysis</i> and <i>factor resolution</i> (see Pavlik 1994)
<i>demography</i>	the study of populations with reference to birth and death rates, size and density, distribution, migration, and other vital statistics
<i>diploid</i>	the number of chromosomes found in the non-reproductive cells of an organism; designated by $2n$
<i>disk flowers</i>	the tiny, tubular flowers at the center of a flower head in some members of the Asteraceae
<i>distichous</i>	arranged in two opposing rows
<i>ecomorph</i>	A group of individuals of a species that have a unique appearance because of where they live, rather than due to genetic differences.
<i>element occurrence</i>	the unique number assigned to an <i>occurrence</i> by the California Natural Diversity Data Base
<i>elytra</i>	first pair of wings which, in beetles, are hardened and act as a protective covering
<i>endemic</i>	restricted to a particular area
<i>enhancement</i>	manipulating a species or its habitat to increase population size above current levels or improve habitat conditions; one example is adding seed to an existing population
<i>entire</i>	not divided (referring to a leaf margin or flower part)
<i>entomologists</i>	people who study insects
<i>enzyme system</i>	a group of related proteins; analysis of these proteins provides clues as to the genetic relatedness of individuals because the genetic code for each protein is carried on a different gene
<i>extant</i>	still in existence
<i>extirpated</i>	eliminated from a particular area
<i>extrinsic</i>	due to external factors; for example, habitat loss due to urban development is an extrinsic threat
<i>exudate</i>	aromatic, sticky fluid
<i>factor resolution</i>	identifying and evaluating the factors responsible for lack of population stability
<i>fecundity</i>	the number of offspring produced by an animal or the number of seeds produced by a plant
<i>filament</i>	the stalk that supports an <i>anther</i>
<i>final rule</i>	the document published in the Federal Register in which a species is officially designated as threatened or endangered
<i>floret</i>	a single flower of a grass plant, including the <i>stamens</i> , <i>pistil</i> , <i>lemma</i> and <i>palea</i>
<i>frequency</i>	the proportion of samples in which a given species occurs
<i>fruit</i>	the plant structure that bears seeds; may be fleshy or dry
<i>genera</i>	plural of <i>genus</i>

<u>Term</u>	<u>Definition</u>
<i>generalist (pollinator)</i>	an animal, usually an insect, that pollinates flowers of a wide variety of plant species from many families
<i>geomorphological processes</i>	geological and environmental processes that change landforms
<i>germination</i>	sprouting (of a seed)
<i>glume</i>	the scale-like structures at the base of a grass <i>spikelet</i>
<i>grain</i>	the <i>fruit</i> of a grass; also known as a <i>caryopsis</i>
<i>hemiparasite</i>	a plant that obtains water and nutrients from the roots of other plants but manufactures its own food through photosynthesis
<i>herbivore</i>	an animal (invertebrate or vertebrate) that eats plants
<i>host</i>	the source of water and nutrients for a <i>hemiparasite</i>
<i>hydrology</i>	patterns of water movement
<i>in litt.</i>	abbreviation for the Latin phrase <i>in litteris</i> , meaning “in a letter”; also applies to unpublished references, such as internal agency reports
<i>incompatible uses</i>	activities or practices that contribute to the decline of a population
<i>indeterminate</i>	growth pattern in which the stem continues elongating as long as the plant is alive
<i>indehiscent</i>	fruits remaining indefinitely closed, not opening by pores or slits
<i>inflorescence</i>	the entire flowering structure of a plant, often consisting of many separate flowers, their associated <i>bracts</i> , and the <i>rachis</i>
<i>intergrades</i>	plants intermediate in <i>morphology</i> between two recognized <i>taxa</i>
<i>intrinsic</i>	not due to external factors; for example, low levels of genetic diversity within a species is an intrinsic threat
<i>introduce/introduction</i>	to seed or transplant into a site that is not known to have been occupied by a particular species but is within a vernal pool region, pool type, and set of ecological conditions from which the species was known to occur
<i>juvenile leaves</i>	the cylindrical leaves of <i>Orcuttieae</i> that form underwater
<i>keel</i>	the innermost, boat-shaped pair of fused petals in flowers of the pea family
<i>lacustrine</i>	originating in lakes
<i>leaflet</i>	one of the distinct segments of a <i>compound leaf</i>
<i>lemma</i>	a scale-like structure that encloses the <i>palea</i> , <i>stamens</i> , and <i>pistil</i> in a grass flower
<i>ligule</i>	the flattened, strap-shaped portion of the <i>corolla</i> in <i>ray flowers</i> of the aster family; also the appendage commonly found at the junction of the <i>sheath</i> and <i>blade</i> in grasses
<i>lips</i>	two or more groups of fused petals that occur within a single <i>corolla</i> but differ in appearance
<i>List 1B</i>	plants considered by the California Native Plant Society to be “rare, threatened, or endangered in California and elsewhere” (California Native Plant Society 2001)
<i>lobes</i>	free tips of fused plant parts that are partially fused, such as petals, <i>sepals</i> , or leaf tissue
<i>male-sterile</i>	flowers that lack functional anthers

<u>Term</u>	<u>Definition</u>
<i>marginal</i>	a population believed to be too small for long-term persistence without <i>enhancement</i>
<i>median</i>	in a set of data, the value for which half of the observations are smaller and half are greater
<i>metapopulation</i>	separate colonies that function as a single population by exchanging of genetic material at least once a year
<i>microhabitat</i>	localized areas with unique conditions due to small-scale variations in physical features of the landscape
<i>mitigation</i>	actions undertaken to compensate for impacts to endangered species populations or wetlands
<i>mitigation bank</i>	an area important for conservation in which developers of unrelated projects may buy a share to compensate for their impacts to a similar suite of endangered species or wetlands that will be destroyed due to project development in another area
<i>molecular taxonomy</i>	studying similarities among <i>taxa</i> by comparing proteins, DNA, and other molecules
<i>morphology</i>	external form and structure
<i>node</i>	the point where a leaf or branch attaches to the stem
<i>nomenclature</i>	a system of naming rules in the biological sciences, thus plant species are named according to the rules of botanical nomenclature
<i>nutlet</i>	one of several small, dry, single-seeded <i>fruits</i> with a hard covering that are produced within a single flower; nutlets have thicker walls than do <i>achenes</i>
<i>obsidian</i>	volcanic glass
<i>occurrence</i>	an occupied area at least 0.4 kilometers (¼ mile) away from the next occupied area; see also <i>element occurrence, population</i>
<i>order</i>	a taxonomic rank below class and above family
<i>order of magnitude</i>	a factor of 10; for example 1,000 is three orders of magnitude greater than 1
<i>outcrossing</i>	fertilization of an ovary by pollen from a different plant
<i>oviposition</i>	egg-laying
<i>palea</i>	a papery scale that encloses the stamens and <i>pistil</i> in a grass flower
<i>pappus</i>	the hair-like or scale-like structures attached to an <i>achene</i> , which assist in dispersal (<i>e.g.</i> , the tufts visible on dandelions gone to seed)
<i>perennial</i>	a plant that lives for many years
<i>petiole</i>	leaf stalk
<i>phenology</i>	the timing of various stages in the life cycle of a plant
<i>phyllary</i>	one of the <i>bracts</i> below the flower head in members of the Asteraceae
<i>pilose</i>	covered with long, soft hairs
<i>pinnately compound</i>	divided into distinct segments, which are arranged feather-like on either side of a <i>rachis</i> (see also <i>compound leaf</i>)
<i>pinnately lobed</i>	a leaf that has projections (<i>lobes</i>) arranged in a feather-like pattern but is not completely divided into distinct segments
<i>pistil</i>	the female reproductive structure of a flower
<i>pistillate</i>	a flower containing only female reproductive parts

<u>Term</u>	<u>Definition</u>
<i>pith</i>	the tissue at the core of a plant stem
<i>population</i>	a group of individuals of the same species that occupy an area small enough to permit interbreeding regularly (herein used interchangeably with <i>occurrence</i> or to represent a group of individuals that is not included in the California Natural Diversity Data Base)
<i>pubescent</i>	covered with short hairs
<i>pupation</i>	a nonmobile stage in which larvae transform to adults
<i>race</i>	a group of plant populations that share distinct genetic or morphological traits
<i>rachis</i>	the central stalk of an <i>inflorescence</i> or <i>compound leaf</i>
<i>ray flowers</i>	tiny flowers with flattened, fused petals that occur near the margin of a flower head in some members of the aster family (<i>e.g.</i> , the “petals” of a common daisy)
<i>reintroduce/reintroduction</i>	to seed or transplant a species into a specific site from which it has been extirpated
<i>root graft</i>	a connection between the water-conducting tissues in root systems of two plants
<i>rosette</i>	a cluster of leaves near the ground
<i>scape</i>	a leafless flowering stem
<i>seasonal wetlands</i>	areas that hold or carry water for only a portion of the year; herein refers to <i>vernal pools</i> and <i>swales</i>
<i>section 6</i>	the section of the Federal Endangered Species Act through that allows for states to receive Federal funding for programs to conserve listed species
<i>seed bank</i>	stored seeds; may be dormant seeds in the soil (see <i>soil seed bank</i>) or those stored in a facility for conservation purposes
<i>seed set</i>	production of mature seeds
<i>self-compatible</i>	capable of setting seed when pollen reaches <i>pistils</i> on the same plant
<i>self-incompatible</i>	requiring fertilization by pollen from a different plant in order to set seed
<i>sepal</i>	one of several leaf-like structures beneath the petals of a flower
<i>sheath</i>	the narrow, tubular portion of a grass leaf that surrounds the stem
<i>sites necessary for conservation</i>	specific sites necessary to prevent the extinction of species that are not formally listed as endangered or threatened; equivalent to <i>important habitat</i> for listed species
<i>soil seed bank</i>	viable seeds that remain dormant in the soil
<i>solitary</i>	a structure or organism that occurs individually, rather than in groups or clusters (<i>e.g.</i> , solitary flowers, solitary bees)
<i>specialist pollinator</i>	an animal (usually an insect) that pollinates only flowers of a single genus or species
<i>spikelet</i>	in grasses, the structure consisting of one or more <i>florets</i> , the tiny stems that connect the florets, and the <i>glumes</i>
<i>spur</i>	a tubular projection from a sepal or petal
<i>stable</i>	remaining at the current level; (for <i>annual</i> plants, this takes into account not only above-ground plants but also seeds present in the soil; see Pavlik 1994, p. 329)

<u>Term</u>	<u>Definition</u>
<i>stamen</i>	the male reproductive structure of a flower, consisting of an <i>anther</i> and a <i>filament</i>
<i>status survey</i>	identifying all historical localities of a species, predicting additional likely sites where the species may occur, visiting all of the historical and likely sites, and evaluating population size and threats at those sites
<i>stigma</i>	the part of the <i>pistil</i> that receives pollen
<i>stocking rate</i>	the number of livestock per acre
<i>stomates</i>	pores in the surface of a leaf that facilitate gas exchange
<i>stratification</i>	exposure to cold, submersion, or other treatment that is necessary for certain seeds to germinate
<i>swale</i>	a shallow drainage that carries water seasonally; differs from a vernal pool in that it has an outlet
<i>tarsus</i>	terminal leg segments
<i>taxa</i>	plural of <i>taxon</i>
<i>taxon</i>	a term used to denote a taxonomic entity of any rank; often used to refer to an assorted group consisting of species, subspecies, and varieties
<i>terrace</i>	a flat-topped soil formation bordering a river or stream
<i>terrestrial</i>	growing on dry land as opposed to water
<i>terrestrial leaves</i>	the flat-bladed leaves of <i>Orcuttieae</i> that develop after water has evaporated from the pools (as opposed to <i>juvenile leaves</i>)
<i>thatch</i>	a matted layer of dead vegetation on the soil surface
<i>topography</i>	natural and man-made surface features of a geographic area
<i>translocation</i>	moving a species from one site to another; may involve <i>enhancement</i> , <i>introduction</i> , or <i>reintroduction</i>
<i>trend analysis</i>	the process of determining whether a population is increasing, declining, or remaining stable
<i>tribe</i>	a taxonomic rank below family and above genus
<i>tube</i>	the fused portion of a <i>calyx</i> or <i>corolla</i>
<i>tubercle</i>	a wart-like projection
<i>tuffaceous</i>	porous, such as rock formed from cemented volcanic ash
<i>type locality</i>	the site from which the <i>type specimen</i> was collected
<i>type specimen</i>	the individual, preserved plant or animal that the original author designated to represent a new species
<i>vernal pool</i>	a depression that retains water seasonally due to a shallow, impermeable soil layer beneath the surface and the absence of a drainage outlet
<i>viscid</i>	sticky
<i>wings</i>	the pair of petals inside the <i>banner</i> of a flower in the pea family; these petals are very narrow at their bases
> is the symbol for 'greater than'; < is the symbol for 'less than'	

**APPENDIX C. RECOVERY PRIORITY AND FEDERAL REGISTER NOTICE
REFERENCE AND DATES**

Species Name	Recovery Priority¹	Federal Register Notice, Date Listed
<i>Castilleja campestris</i> ssp. <i>succulenta</i> (Fleshy owl's clover)	9	62:14338-14352, March 26, 1997
<i>Chamaesyce hooveri</i> (Hoover's spurge)	2c	62:14338-14352, March 26, 1997
<i>Eryngium constancei</i> (Loch Lomond button-celery)	14	51:45904-45907, December 23, 1986
<i>Lasthenia conjugens</i> (Contra Costa goldfields)	5c	62:34029-34038, June 18, 1997
<i>Limnanthes floccosa</i> ssp. <i>californica</i> (Butte County meadowfoam)	2c	57:24192-24199, June 8, 1992
<i>Navarretia leucocephala</i> ssp. <i>pauciflora</i> (few-flowered navarretia)	3	62:34029-34038, June 18, 1997
<i>Navarretia leucocephala</i> ssp. <i>plieantha</i> (many-flowered navarretia)	3	62:34029-34038, June 18, 1997
<i>Neostapfia colusana</i> (Colusa grass)	2c	62:14338-14352, March 26, 1997
<i>Orcuttia inaequalis</i> (San Joaquin Valley Orcutt grass)	8	62:14338-14352, March 26, 1997
<i>Orcuttia pilosa</i> (hairy Orcutt grass)	2c	62:14338-14352, March 26, 1997
<i>Orcuttia tenuis</i> (slender Orcutt grass)	8	62:14338-14352, March 26, 1997
<i>Orcuttia viscida</i> (Sacramento Orcutt grass)	5c	62:14338-14352, March 26, 1997
<i>Parvisedum leiocarpum</i> (Lake County stonecrop)	2c	62:34029-34038, June 18, 1997
<i>Tuctoria greenei</i> (Greene's tuctoria)	2c	62:14338-14352, March 26, 1997
<i>Tuctoria mucronata</i> (Solano grass)	2	43:44810-44812, September 28, 1978
Conservancy fairy shrimp (<i>Branchinecta conservatio</i>)	8	59(180):48136-48152, September 19, 1994
Longhorn fairy shrimp (<i>Branchinecta longiantenna</i>)	8	59(180):48136-48152, September 19, 1994
Vernal pool fairy shrimp (<i>Branchinecta lynchi</i>)	2c	59(180):48136-48152, September 19, 1994
Delta green ground beetle (<i>Elaphrus viridis</i>)	8	45:52807-52810, August 8, 1980
Vernal pool tadpole shrimp (<i>Lepidurus packardii</i>)	2c	59(180):48136-48152, September 19, 1994

¹Appendix D describes how we determine recovery priority for each species.

**APPENDIX D. PRIORITIES FOR RECOVERY OF THREATENED AND
ENDANGERED SPECIES**

Degree of Threat	Recovery Potential	Taxonomy	Priority	Conflict
High	High	Monotypic Genus	1	1C
	High	Species	2	1 2C
	High	Subspecies	3	2 3C
	Low	Monotypic Genus	4	3 4C
	Low	Species	5	4 5C
	Low	Subspecies	6	5 6C
Moderate	High	Monotypic Genus	7	6 7C
	High	Species	8	7 8C
	High	Subspecies	9	8 9C
	Low	Monotypic Genus	10	9 10C
	Low	Species	11	10 11C
	Low	Subspecies	12	11 12C
Low	High	Monotypic Genus	13	12 13C
	High	Species	14	13 14C
	High	Subspecies	15	14 15C
	Low	Monotypic Genus	16	15 16C
	Low	Species	17	16 17C
	Low	Subspecies	18	17 18C

APPENDIX E. POTENTIAL CONTAMINANTS ASSOCIATED WITH WESTERN SPADEFOOT TOAD HABITAT

The chemicals of greatest concern for which data on amphibians, fish, or their food supply could be found are:

acephate	mancozeb
azinphos-methyl	methamidophos
carbaryl	methoprene
chlorpyrifos	naled
diazinon	paraquat
dicofol	permethrin
disulfoton	phosmet
endosulfan	polycyclic aromatic hydrocarbons
esfenvalerate	pyrethrins
fenamiphos	rotenone
glyphosate	strychnine
malathion	triclopyr
	trifluralin

Glossary of Terminology and Units for Contaminants

LC50-lethal concentration to 50 percent of test organisms
mg/kg-milligrams per kilogram
mg/L-milligrams per liter
ng/L-nanograms per liter
: g/L-micrograms per liter
PAH-Polycyclic Aromatic Hydrocarbons

APPENDIX F. CONSERVATION TOOLS AND STRATEGIES

Rights and Interests in Land that Can be Acquired

Right or Interest	Explanation	Advantages	Disadvantages
Fee simple ownership	Full title to land and all rights associated with land.	Owner has full control of land. Allows for permanent protection and public access.	Most costly. Ownership responsibility includes liability and maintenance.
Conservation easement / development rights (Access to monitor species populations should be added to conservation easement)	A partial interest in property transferred to an appropriate nonprofit or governmental entity either by gift or purchase. As ownership changes, the land remains subject to the easement restrictions.	Less expensive than fee simple. Landowner retains ownership and property is taxed at a lower rate. Easement may allow for some development. Potential income and estate tax benefits from donation.	Public access may not be guaranteed. Easement must be enforced. Restricted use may lower resale value. If the easement has a "sunset" then permanent protection is not guaranteed.
Fee simple / leaseback	Purchase of full title and leaseback to previous owner or other lessee. May impose land use restrictions.	Allows for comprehensive preservation program of land banking. Income through leaseback. Liability and management responsibilities assigned to lessee.	Public access is not guaranteed. Land must be appropriate for leaseback (<i>e.g.</i> , agricultural).
Lease	Short or long-term rental of land.	Low cost for use of land. Landowner receives income and retains control of property.	Does not provide equity and affords only limited control of property. Temporary.
Undivided Interest	Ownership is split between different owners, with each fractional interest extending over the whole parcel. Each owner has equal rights to entire property.	Prevents one owner from acting without the consent of the others.	Several landowners can complicate property management issues, especially payment of taxes, future sale, land uses, and access.
Deed Restriction	Voluntary or imposed restriction on land use placed on title by landowner.	Can prevent impacts to or protect habitat and/or open space values as long as landowner retains the restriction.	Is easily removed from property title by property owner without government knowledge. Does not guarantee even short-term protection.

Ways that Title Can Be Acquired

Technique	Explanation	Advantages	Disadvantages
Fair market value sale*	Land is sold at its highest and best use value.	Highest income (cash inflow) to seller.	Most expensive. Greatest capital gains.
Bargain Sale*	Part donation/part sale - property is sold at less than fair market value.*	Tax benefits to seller since difference between fair market value and sale price is considered a charitable contribution. Smaller capital gains tax.	Seller must be willing to sell at less than fair market value.
Charitable Gift	A donation by landowner of all interest in property.*	Allows for permanent protection without direct public expenditure. Tax benefits to seller since property's fair market value is considered a charitable contribution.	Seller must be willing to donate.
Bequest	Landowner retains ownership until death.*	Management responsibility usually deferred until donor's death.	Date of acquisition is uncertain. Donor does not benefit from income tax deductions. Landowner can change will, will may contain land use conditions unfavorable to open space/ habitat use.
Donation with reserved life estate	Landowner donates during lifetime but has lifetime use.	Landowner retains use but receives tax benefits from donation.	Date of acquisition is uncertain.
Land exchange	Exchange of developable high habitat/open space land for land with equal development potential but less habitat/open space value.	Low-cost technique if trade parcel is donated. Reduces capital gains tax for original owner of protected land.	Properties must be of comparable value. Complicated and time consuming.
Eminent domain (government)	The constitutional police power of government to take private property for public purpose upon payment of just compensation.	Provides government with a tool to acquire desired properties if other acquisition techniques are not workable.	Can be expensive. Can have negative political consequences. Can result in expensive and time consuming litigation.
Tax foreclosure (government)	Government acquires land by tax payment default.	Limited expenditure. If land is not appropriate for public open space, it can be sold or exchanged.	Competitive sealed bidding risk.
Purchase of a Deed of Trust (1 st)	Government acquires land by defaulted loan (private institution) payment and subsequent foreclosure.	Land can be acquired at a distressed sale price.	Can be complicated and result in conflict with local Tax Collector/Assessor
Agency transfer (government)	Certain government agencies may have surplus property inappropriate for their needs that could be transferred to a parks agency for park use.	Limited expenditure.	Time consuming with possible conflicts with local government.
Restricted auction (nonprofit)	Government restricts the future use of property to open space, then sells.	Property sold to highest bidder but restriction lowers price and competition.	It may be difficult for a nonprofit to convince government that a restriction will serve to benefit the general public. Can be expensive.

* There are different ways of financing, i.e.: cash, mortgaged, owner financed, lease/option, *etc.* with some means having greater tax benefits than others for the seller and some means more easily financed by government than others. Conservation easements also can be acquired by these means.

Management and Ownership Options Following Purchase by Nonprofit Organization

Technique	Explanation	Advantages	Disadvantages
Conveyance to public agency	Nonprofit organization acquires and holds land until public agency is able to purchase.	A nonprofit organization can enter the real estate market more easily than government, and can often facilitate a sale when the government agency would be unable.	Must have a public agency willing and able to buy within a reasonable time frame. Private fund raising can be difficult.
Conveyance to another nonprofit organization	Nonprofit organization acquires and holds land until another nonprofit organization has been established or is able to finance acquisition.	Allows immediate acquisition even though acquiring group cannot or is not willing to hold property.	Requires existence or establishment of ultimate land holder that has solid support, funding and the ability to manage land.
Management by nonprofit organization	Nonprofit organization retains ownership and assumes management responsibilities.	Ownership remains within the community; local citizens can provide responsible care and management.	Land must fit criteria of acquiring organization. Organization must assume long-term management responsibilities and costs.
Saleback or leaseback	Nonprofit organization purchases property, limits future development through restrictive easements or covenants, and resells or leases back part or all of property. May involve subdivision of property.	Acquisition is financed by resale or leaseback. Resale at less than fair market value (because of restrictions) makes land affordable for buyer. Sale can finance preservation of part of site.	Complex negotiations. A leaseback means the nonprofit organization retains responsibility for the land.

Financing Options for Government

Financing Option	Explanation	Advantages	Disadvantages
General fund appropriation	Appropriation from primary government funds.	Avoids interest and debt service cost.	Budget allocations unpredictable. Might not provide sufficient funds, and competes with other programs.
Bond act	Borrowing money through insurance of bonds. Usually approved through local or statewide referendum.	Distributes cost of acquisition. Does not impact general funds.	Requires approval of general public. Can be expensive - interest charges are tacked on to cost of project.
Land and Water Conservation Fund	Federal funds provided to local governments on a 50/50 matching basis for acquisition and development of land for public use.	Cost of acquisition for local government is lowered by subsidy.	Federal release of these funds is uncertain and has been extremely limited to date. Competition is extreme.
State grant/low interest loans	States provide matching grants or low interest loans for municipalities to acquire open space.	Encourages localities to preserve open space by leveraging local funds. Donated lands may be used as a match.	Localities must compete for limited funds and be able to match state funds.
Real estate transfer tax	Acquisition funds obtained from a tax on property transfers. Percentage and amount exempted varies with locality.	Growth creates a substantial fund for open space acquisition. Enables local communities to generate their own funds for open space protection.	Places greater burden on new residents than on existing residents. Can inflate real estate values. Effective only in growth situations.
Land gains tax	Capital gains tax on sale or exchange of undeveloped land held for a short period of time. Tax rate varies depending on holding period.	Discourages speculative development. Has a regulatory and revenue impact.	Can inflate real estate values and slow market.
Payment in lieu of dedication	Local government requires developers to pay an impact fee to a municipal trust fund for open space acquisition.	New construction pays for its impact on open space.	Acquisition funds depend on development. May be lack of accountability for funds. Legality of method depends on relationship of open space to new development.
Special assessment district	Special tax district for area benefitted by a public benefit project.	Users finance acquisition and management.	Increases taxes. Timely and costly to implement. Requires 2/3 voter approval in California.
Tax return check off	On state income tax forms, a filer may appropriate a small amount of taxes owed toward revenues for natural lands acquisitions.	Convenient and successful means of generating funds.	Vulnerable to competition from other worthwhile programs.
Other funds/taxes	Taxes on cigarettes, sales, gasoline, and natural resource exploitation; revenue from fees and licenses for boat, off-road vehicle, and snowmobile use, park entry, hunting, <i>etc.</i>	Income from fees and licenses pays for resources.	Revenues from taxes can be diverted for other uses unless dedicated to open space. Fees create pressures for money to be spent on special interest uses.

Financing Option	Explanation	Advantages	Disadvantages
Sale or transfer of tax default property	Sale of tax default property can provide a fund for open space acquisition. Also, if site meets criteria, it can be transferred to appropriate agency for park use.	Funds for acquisition are acquired with little cost to taxpayers.	Need to assure that sale proceeds are specially allocated to open space acquisition. Might not provide a significant income. Very political process.

Financing Options for NonProfit Organizations

Financing Option	Explanation	Advantages	Disadvantages
Loan from institutional or private lender	Conventional loan from bank or savings and loan or private source, such as a foundation or corporation.	Less time-consuming process than fund raising.	Long-term financial commitment for nonprofit organization. Higher interest costs than owner financing. Mortgage lien.
Installment sale	Buyer pays for property over time.	If seller financed, can lower taxes for seller. Buyer can negotiate better sale terms (lower interest rates).	Long-term financial commitment for nonprofit organization. Mortgage lien.
Fundraising	No- or low-interest loans are acquired through program related investments from foundations, nonstandard investments from corporations, or charitable creditors (community members).	Community fundraising creates publicity and support.	A long, uncertain, and time consuming process.
Revolving fund/loans or grants	A public or private organization makes grants to localities or nonprofit organizations for land acquisition based on a project's revenue generating potential.	Encourage projects with revenue generating potential.	Projects with low revenue- generating potential have lower priority.
Partial development/saleback or lease	Nonprofit organization purchases property, limits future development through restrictive covenants, and resells or leases back part or all of property.	Acquisition is financed by resale or leaseback. Sale can finance preservation of part of site.	Complex negotiations. If leaseback, nonprofit organization retains responsibility for land. Finding buyer for restricted property may be difficult, and land value will be lowered by restrictions.

Government Financial Incentives for Conservation

Incentive	Explanation	Advantages	Disadvantages
Preferential assessment	Under state laws, agricultural and forest districts can be established to assess land as farmland or forestland rather than at its highest and best use.	Promotes resource conservation and management. Especially benefits landowners in areas with development pressure. Tax base loss can be partially reclaimed through penalty tax on landowners who terminate enrollment.	Voluntary participation. Does not provide long-term protection. Minimum acreage for entry. Strength of program depends on penalty from withdrawals. Local government bears burden of reduced tax base.
Purchase of development rights	Local or state government purchases development rights to maintain land in farm use.	Landowner can derive income from selling development rights and continue to own land. Lower property value should reduce property taxes.	Can be costly, particularly in a community with high real estate values.
Land conservation grants	State programs pay or otherwise enable landowners to preserve land, enhance wildlife, and provide public access.	Landowners derive revenues from preserving land without selling interests in land.	Provision of public expenditures.

Safe Harbors Agreements

Incentive	Explanation	Advantages	Disadvantages
Create incentives by removing restrictions under section 9 of Endangered Species Act. Allows “take” of listed species beyond baseline conditions (<i>i.e.</i> , those lands or animals protected at time of signing of agreement).	Private landowners and non-Federal property owners encouraged to restore, enhance and maintain habitats for listed species in return for assurances that additional land-use restrictions as a result of voluntary conservation actions will not be imposed.	Could garner non-Federal landowner’s support for species conservation on non-Federal lands. By reducing fear of future additional property use restrictions under Endangered Species Act, landowners may enhance their lands for listed species. Could reduce habitat fragmentation and increase population numbers of listed species. Could help establish additional populations that may become essential for species long-term conservation.	Could adversely affect populations by serving as biological sink for species attracted to enhanced habitat, only to have habitat later lost to development. May not be adequate incentives other than public relations value, and may not offer value over traditional Habitat Conservation Plans. Opportunities may be few in states with strong coastal protection regulations.

Regulatory Techniques - Growth Control

Technique	Explanation	Advantages	Disadvantages
Phased growth	Permits a limited amount of growth each year.	Effective as a comprehensive planning strategy.	There must be an equitable system to approve development. Future development pressures difficult to predict.
Moratorium	Legal postponement or delay of land development.	Useful as an interim measure during the formulation of a master development plan.	Provides only a temporary solution and can create a rush on land development prior to taking effect.
Transfer of development rights	An owner of publicly-designated land can sell development rights to other landowners whose property can support increased density.	Cost of preservation absorbed by property owner who purchases development rights.	Difficult to implement. Preservation and receiving areas must be identified.

Regulatory Techniques - Zoning and Subdivision Provisions

Technique	Explanation	Advantages	Disadvantages
Large lot zoning	Large minimum lot sizes restrict the density of the development.	An established land use control used as part of a comprehensive plan.	Since zoning is subject to change, not effective for permanent preservation. Can increase real estate values and infrastructure costs can foster urban sprawl.
Performance zoning	A zone is defined by a list of permitted impacts (based on natural resource data and design guide-lines) as opposed to permitted uses.	Directs development to appropriate places based on a comprehensive, environmentally-based plan. Can be implemented through cluster development.	Difficulties in implementation since environmental impacts can be hard to measure and criteria are hard to establish. Plan can be expensive to prepare.
Carrying capacity zoning	Based on the ability of an area to accommodate growth and development within the limits defined by existing infrastructure and natural resource capabilities. Often called Current Planning Capacity.	Zoning is based on an area's physical capacity to accommodate development. Can be implemented through cluster development.	Requires a comprehensive environmental inventory for implementation. Determining carrying capacity can be a difficult process, subject to differing opinions, quality-of-life assumptions, and changing technologies.
Cluster Zoning/planned unit development (PUD)	Maintains regular zoning's ratio of housing units to acreage but permits clustered development through undersized lots, thus allowing for open space preservation. A PUD provision allows clustering for a large, mixed-used development.	Flexibility in siting allows preservation of open space areas within development site. Can reduce construction and infrastructure costs.	Open space often preserved in small separate pieces, not necessarily linked to a comprehensive open space system. May increase processing time for development approval. Lack of infrastructure can inhibit technique.
Preservation overlay zoning	At discretion of municipality, overlay zones with development restrictions can be established to protect agricultural and natural areas, scenic views, and historic neighborhoods.	Special zones have regulations specific to the needs of a unique area and may be subject to mandatory clustering, performance standards, special permits, and site plan and architectural review.	Language in special district ordinance must be specific enough to avoid varying interpretations.
Exaction	As a condition of obtaining subdivision approval, local government requires developers to pay a fee or dedicate land to a municipal trust fund for open space. Also, states can require open space set-asides as part of environmental review.	New construction pays for its impact on open space.	Acquisition funds dependent on residential development. Commercial development often not subject to exaction fees. Difficult to calculate developer's fair share of costs. New case law restrictions.
Conservation density subdivisions	Permit developers an option of building roads to less expensive specifications in exchange for permanent restrictions in number of units built. Roads can be public or private.	Increases open space and reduces traffic. Discourages higher densities to pay for the higher cost of road building.	Requires enforcement of easements. Private roads limit public access and require homeowner association maintenance.

Regulatory Technique - Conservation/Mitigation Banks

Technique	Explanation	Advantages	Disadvantages
Conservation/ mitigation banks	Wildlife habitat areas are restored and permanently protected by selling credits to offset development impacts elsewhere.	Could advance regional habitat conservation by allowing mitigation credits at sites recognized to be high priority for regional conservation in exchange for areas of minimal habitat value.	If not carefully considered and development projects are not consistent with all Federal and state laws, could facilitate habitat loss. Environmentally controversial.

APPENDIX G. INFORMATION AND EDUCATION MATERIALS

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INTRODUCTION

Public awareness of the plight of California's vernal pool ecosystems is a significant component of its recovery. Increased awareness can lead to greater acceptance and compliance with management measures. Increased awareness may also inspire advocates and volunteers to assist with monitoring and habitat restoration. This Information and Education Plan describes current interpretation activities along with actions and ideas for future work. Key messages, target audiences, strategies, costs, and volunteer management are among some of the elements addressed.

This plan provides direction for an expanded and continuing effort to reach all those who have a stake in the recovery of vernal pool ecosystems. At the broadest level, this effort extends to the public-at-large as concern for endangered species increases. Attention will also be focused upon groups and individuals who have a particular interest in vernal pool recovery.

Activities and demographics vary greatly throughout communities containing vernal pool habitat. Therefore, this plan has been written as a programmatic document; to be used for overall guidance and to generate ideas for regional plans. Ideally, interpretive strategies should be written for specific locations or land ownerships. At a minimum, individualized plans should be developed for the vernal pool regions described in this recovery plan.

While several of the described actions may already be in motion, it is recommended that the remaining actions be initiated as soon as possible. These actions are an integral part of recovery, and funding for implementation must be supported accordingly. Although budget constraints may prevent development of a complete program, some recommended actions can still be pursued even where budgets are limited.

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon calls for the development and implementation of public information and education programs. This Information and Education Plan provides guidance regarding the information and education activities described therein. Specific activities outlined in the recovery plan include: (1) development of a participation plan and submission to the recovery implementation team for review; (2) development of a participation and outreach programs for private landowners; (3) establishment of a mechanism (*e.g.*, funding, *etc.*) to initiate an effective participation and outreach program for private landowners; (4) compilation and review of existing outreach material targeted for private landowners; (5) if necessary, revision of existing outreach materials, or development of new outreach materials for private landowners; (6) distribution of outreach materials to private landowners through existing outreach mechanisms (*i.e.* newsletters, the Internet, annual meetings of organizations, public meetings); (7) identification of private landowners interested in pursuing recovery and conservation efforts on their lands and prioritization of a list of potential participants; (8) work with private landowners to develop Safe Harbor Agreements, Candidate Conservation Agreements, Memoranda of Understanding, habitat conservation banks, or other appropriate tools for conserving listed species or species of concern on their lands; (9) development of specialized programs to facilitate cooperation and information dispersal/exchange to target audiences (*e.g.*, California Farm Bureau, California Cattlemen's Association, University of California Cooperative Extension, Resource Conservation Districts, County and City Planners, California Builders Association, professional societies, *etc.*); (10) development and implementation of cooperative programs and partnerships with Federal, State, and local agencies to ensure they

utilize their authorities to the fullest extent possible to promote the recovery of listed species and the long-term conservation of the species of concern addressed in this recovery plan.

PLAN GOALS

The primary goal of this Information and Education Plan is:

- To enhance compliance with management efforts to protect and enhance vernal pool species and their habitat.

Secondary goals are:

- To stimulate public interest, understanding, and support of research and management actions which in turn will increase compliance levels.
- To provide land managers, private landowners, and recreational interest groups with guidance to implement a vernal pool recovery program.
- To stimulate public concern and understanding of unique vernal pool ecosystems that support numerous and diverse species, including special status species.
- To develop internal and external support necessary for funding vernal pool management programs.

These goals will be accomplished through the information and education program described in subsequent sections.

EFFECTIVE OUTREACH TOOLS

Partnerships

Partnerships can include working groups and cost share programs. Cooperation between resource and land management agencies, researchers, interest groups, and private individuals increase effectiveness of outreach efforts and bring more resources - both expertise and money - to the table.

Multi-Disciplinary Outreach

Effective management of vernal pool habitat requires cooperation between different and often divergent interests working together using a positive, unified approach. Vernal pool habitat management needs to incorporate input from biologists, land managers, interpretation specialists, and various interest and user groups to reach recovery goals.

Dedicated Conservationists

The exceptional commitment of professional and volunteer conservationists has been, and should continue to be, an important factor in vernal pool ecosystem recovery.

Communications Techniques

The key to increased public understanding and awareness is using a variety of communication techniques and methods of distribution, including a variety of techniques such as videos, brochures, posters, on-site programs, slide presentations, and news releases.

OUTREACH NEEDS

Targeted Audiences

Key audiences and their primary interests should be determined for specific program objectives. Different groups of people will view vernal pool habitat management in different ways. The ranges of vernal pool species includes a large geographic area that incorporates both small towns and large cities with diverse political views, economic bases, ethnic and socioeconomic groups, literacy levels, environmental values, attitudes about government regulations, *etc.* Communications intended for different groups and geographic areas need to be designed to address their different perspectives.

Information

Little information is available on how the various target audiences feel about vernal pool habitat management. Experiences of agency personnel indicate that public sentiment varies considerably. An increased understanding will help managers design effective interpretive signs and programs.

Decreased Use of Jargon

Many communications products to date contain a large amount of technical jargon. This not only fails to communicate with readers or viewers, but may even make them antagonistic.

Increased Personalized Communication

The most effective communications, particularly with those directly impacted, are those delivered via a “one-on-one” approach . Although many outreach strategies such as brochures and videos are cost effective and reach wide audiences, they may not sufficiently capture attention or promote understanding.

Improved Internal Communications

Many people within resource management agencies are not getting information about the vernal pool program and the role they can or should play. Improved dissemination of information and coordination between all levels of staff is needed.

Coordination

When agencies, groups, and individuals work independently, work is not done in an efficient, cost effective, or cohesive manner. Working as a team can alleviate inconsistent messages and prevent redundancy in work.

KEY MESSAGES

Different audiences have different questions, concerns, and values that need to be addressed to effectively meet the goals of this plan. Knowing the audience(s) will enable the design of a practical outreach strategy and product specifically tailored to their issues. The following key messages address some of the most frequently asked questions. Although many of the following key messages apply to all target

audiences, several may be site- or zone-specific. Individual plans should choose key messages appropriate to their audience(s). Sentences within parentheses reflect considerations to tailor messages to individual plans or outreach materials.

Primary Message

Vernal pool ecosystem recovery can be achieved with minimal disruption of landowner interests through cooperation in the voluntary Vernal Pool Ecosystem Recovery Plan.

Secondary Messages

1. All species, no matter how small or seemingly insignificant, are a critical component of the earth's biodiversity. Maintaining native species diversity is key to sustaining healthy ecosystems capable of adapting to constant change.
2. Vernal pool species and other endangered species are like the miner's canary - they are a barometer of the health of the ecosystem.
3. The vernal pool ecosystem includes unique and increasingly rare habitats. Several species are found in this system and no other.
4. All wildlife have distinct habitat needs. Specialized species, like vernal pool species, have specific adaptations, and therefore live only in vernal pools.
5. Habitat destruction is the main cause of vernal pool ecosystem decline. Habitat has been lost from urbanization and agricultural conversion, and introduction of nonnative plant species. Loss of vernal pool habitat also affects other plants and animals linked to this unique landform, such as California red-legged frog and California tiger salamander. Managing for vernal pool species requires controlling invasive species and maintaining hydrologic function. Appropriately managed livestock grazing can play an important role in achieving these management goals
6. Guidelines for using vernal pool habitat in a way that protects species it supports should be specific. Recreationists need to understand that by their very presence, wildlife may be disturbed.
7. Specific sites and types of recreation affect vernal pool species in different ways. Develop key messages targeted to a specific audience explaining how their activity impacts vernal pool species and how modifying their activity can reduce or eliminate these impacts.
8. Your cooperation will help preserve vernal pool ecosystems. You can help by fill in the blank...(*e.g.*, respecting restricted areas; leaving your pets at home or keeping them on a leash; keeping kites, fires and camping sites well away from nesting areas; observing birds at a distance; and keep beaches litter free).
9. Information for off-road vehicle users will focus on off-road vehicle-related impacts, ways to coexist (primarily through land allocation initiatives).

10. Get Involved. Your participation can help lead to vernal pool ecosystem recovery, thus decreasing the need for further restrictions. Contact your state and federal wildlife agencies for further information.

TARGET AUDIENCES

Audiences who have a stake in vernal pool ecosystem conservation and who should be the target of outreach efforts are described below. Each of these target groups influences or has the potential to influence vernal pool management in a significant way. Audiences include those who will be affected by vernal pool management actions.

Regional and site-specific planning teams need to first evaluate audiences particular to their location. Strategies and key messages can then be tailored to these audiences.

Public at Large

In general, this alludes to a national constituency, although on a practical level it primarily includes people who live within the Central Valley. Coordination of recovery efforts for vernal pool ecosystems in California and Oregon may bring attention of vernal pool ecosystem issues to a national audience. However, the activities in this plan are targeted toward the Central Valley.

General Interest Groups

Particular groups which may prove most receptive to information and education efforts include: civic organizations, scouts and other service organizations; environmental education and outdoor learning centers; and conservation groups.

Local Communities

Local communities have a strong and direct interest in local vernal pool recovery efforts. There are often many different voices speaking on behalf of the community, including those focused on the local economy, those concerned with the quality of the environment, and those who support less tangible values such as individual freedom and community self-rule. While these interests can be found among the public-at-large, they are generally felt and expressed much more cogently in the vicinity of the "action." The local community thus comprises not one audience, but a conglomeration of different audiences related by proximity. However, regional or individual outreach programs may want to develop specific messages targeting user groups within a given community or surrounding area.

Schools

School age children may help reach out to other household members with their knowledge and enthusiasm. Provide buttons, posters, pencils, litter bags and other materials.

Public Officials and Land Managers

Through their role as public servants these individuals often represent the myriad interests of the preceding audiences. However, most are required to bring in the added perspective of stewardship responsibilities, including land use decisions. They

may also be interested in related issues, such as predator control and habitat restoration.

Private Landowner

The support of these individuals is essential for the successful recovery plan. Many landowners have cooperated by allowing research and management to proceed on their lands. Others need to be educated and supported in maintaining vernal pools on their property. Reaching this audience is extremely critical, but can be a time-consuming process.

Conservation/Environmental Groups

These groups will generally be strong advocates of vernal pool ecosystem recovery. They constitute an audience in their own right, but they can also be a conduit of information and education to more general audiences.

INFORMATION AND EDUCATION GUIDELINES

The following guidelines should be considered in developing regional or site specific information and education. Evaluation is fundamental to the success of all plans. Be sure to incorporate routine assessment.

Biological

- Ensure the biological requirements of vernal pool species, as identified in the recovery plan, are the focus of outreach activities.
- Emphasize the importance of the entire vernal pool ecosystem.
- Incorporate and highlight with current and national issues such as biodiversity, neotropical migrants, human population growth, international conservation, Western Hemisphere Shorebird Reserve Network and Watchable Wildlife.

Logistical

- Incorporate evaluation. Develop questions to assess effectiveness of program and individual materials.
- Use a team approach. Establish a regional working group if one is not in existence. Utilize this combined expertise and additional resources for an effective and coordinated method.
- Communicate consistently to all land management agencies and the public. Education is a process, not a single event. Target audiences, issues, management activities, and vernal pool ecosystem recovery actions are constantly changing.
- Land management agencies should include staff in all outreach efforts.

Specific Tips (Messages)

- Discuss negative aspects, concerns, and failures as well as successes. Be honest with people.
- Reward and acknowledgment of effort is important to consider when developing messages. Be sure to provide the reasoning behind compliance and provide alternatives.

Specific Tips (Methods)

- Communicate alternatives to restrictions imposed by vernal pool ecosystem management.
- Communicate with local people “face to face” to the extent possible.
- Communicate in a way that is understandable to target audiences.
- Incorporate other languages if needed.
- Avoid jargon and don’t put too many messages in one medium.
- Identify your target audience and be sure your methods and messages are targeted for that audience.
- Involve local people in the process of communicating vernal pool ecosystem information. Invite participation in a regional working group.

MATERIALS AND FORUMS

Direct Contact

Land managers have found one-on-one interaction with beach-users to be the most effective and well received of any outreach method. On-site interpreters can provide explanation to sometimes confusing restrictions. They also provide valuable feedback to the program and provide answers to questions from the public.

Brochures

Brochures can furnish basic facts about vernal pool species and habitat and the need for it’s protection. They lend themselves to modification for more specific audiences, such as owners of land containing vernal pool habitat.

Brochures are well suited to on-site audiences. Brochures can also be distributed through commercial outlets, incorporated into presentations and interpretive programs, or mailed.

Fact Sheets/Flyers/Trading Cards

One-page fact sheets (or multi-page pamphlets) involve minimal production effort and cost. They consist primarily of typed information in a format that can be easily copied. Along with standard information, fact sheets and flyers can address points of

concern for particular audiences and locales. They can also be used as summaries updating vernal pool ecosystem recovery efforts. Fact sheets can be handed out at distribution points that serve user groups, used in meetings, or mailed.

Restaurant Placemats and Table Tents

While waiting for their meal at a restaurant, many people will read materials placed on tabletops. Advertisers take advantage of this vulnerability by placing ads on tri-fold “table-tents” and placemats. Information could be condensed from brochures onto these formats. This forum would be especially useful for tourists and communities near vernal pool ecosystems.

Posters

Attractive posters illustrating vernal pool ecosystems have been developed. Use of these posters in displays is eye-catching. New posters could be developed to complement videos or other materials.

Maps

Colored maps showing vernal pool species and their habitat can be useful in meetings and publications. Large maps that can be reduced could serve both purposes. Maps may be most useful in conjunction with fact sheets and signs.

Curriculum

Curriculum could be developed for different age groups. Supplemental teacher packets and hand-outs could focus on biodiversity using the vernal pool ecosystem as a case study.

Newsletters/Postcards

Newsletters are useful during important decision-making processes, especially those that actively consider public input. A standard newsletter format that can be modified for particular purposes could expedite public information and involvement. Postcards can also be used as a modified version of a newsletter. Planning and conflict mediation processes may benefit from information exchange through newsletters. Recovery status is well-suited to a newsletter format.

Interpretive Exhibits and Portable Displays

An interpretive exhibit can convey a variety of information about vernal pool ecosystem recovery efforts. A standard exhibit could be designed for both indoor and outdoor display. This display could be permanent or portable for use in schools and at conferences and meetings. A more elaborate exhibit could incorporate slide-tape or video displays. Ideally, this type of exhibit could be built into interpretive facilities.

Signs

High-quality interpretive signs explaining seasonal aspects of vernal pool habitat can be used in high traffic areas.

Media Releases

Public notices and news articles informing the public of vernal pool issues, planning efforts, habitat restoration projects, recovery successes, *etc.* are issued as an ongoing effort. Unofficial stories and features can also be used to solicit interest. The use of press releases in connection with conservation planning will be a significant aspect of recovery efforts in the future.

Radio Messages

Public service messages on commercial and public radio stations could also promote protection of vernal pool habitat and elicit general support for such protection among a variety of general audiences.

Web Sites/CD-ROM

Access to the Internet is an effective means of communication that can reach a variety of audiences at relatively low cost. Updates and other site maintenance require an investment of time. A master web site could be developed and operated by the U.S. Fish and Wildlife Service with links to other agency vernal pool homepages. These local homepages can also be area- and site-specific. A CD-ROM could include portions of a video program, ideally with interactive elements.

Video Programs

Video programs can allow the distribution of accurate information in a popular form. These videos can be used in a variety of settings, including interpretive facilities, public meetings, classrooms, and for television broadcast. Regional- or site-specific videos addressing vernal pool ecosystem needs and variable local audiences which have an interest in vernal pool conservation are recommended.

Slide-Tape Program

In situations where video display terminals are not available, a slide-tape program could be used, both as part of exhibits and during presentations. The slide-tape program could potentially be customized for certain audiences. Slide programs with a script instead of a tape back-up could provide a cheaper alternative.

Speaking Engagements

Articulate and persuasive speakers could be engaged to address various groups, either in conjunction with audio-visual programs or on their own. Presentations to general interest and advocacy groups could introduce a forum for constructive dialogue and education. Participation in Fourth of July festivities or other summer activities could provide outreach opportunities.

Private Meetings

Meetings held during the course of consultations and negotiations regarding habitat protection can provide a forum for education as well as information exchange about vernal pool species and their habitat.

Public Meetings

Public meetings may occur during the course of conservation planning processes, education, and through environmental review. These meetings could be used to air various concerns about land use conflicts and to gather support for habitat protection. Ultimately, strategies to protect vernal pool species and habitat with the least possible impact on other interests may develop from the discussions in these meetings.

STRATEGIES FOR REACHING AUDIENCES

This Information and Education Plan is designed to use two means to disseminate information and gain support. The first strategy is to reach general target audiences

through a variety of methods. The second strategy is to reach affected parties through official planning and consultation processes. To this end, actions developed for this plan consider the following:

- A variety of activities will be directed toward stimulating the interest and support of the general public, including specific target audiences, for the vernal pool ecosystem's protection and recovery; and
- Planning, consultation, and negotiation processes will be used to elicit the cooperation of affected parties such as, landowners, growers, ranchers, developers, and managers. Particular emphasis will be placed on public information as a component of the consultation process.

Materials and programs that can effectively increase understanding of vernal pool issues among local communities are an immediate priority. These materials will be developed and distributed by land managers, the U.S. Fish and Wildlife Service, and regional working groups as funds allow. Materials such as annual updates of recovery activities, information packets focusing on vernal pool habitat protection, and teaching packets will be developed for specific audiences.

Distribution of materials and programs will "fan out" from key areas of concern. In addition, major media contacts and visitor centers will be identified for initial contacts. In this way, the vernal pool information and education program will reach both the key target audiences and the broadest possible segment of the general public in as short a time as possible.

As an adjunct effort, a fairly standardized public involvement process will be followed during the course of planning and consultation processes for vernal pool species, in order to expedite education of the involved parties.

Whenever possible, information and education activities for vernal pool habitat will also be used as an opportunity to stimulate public concern for broader or less-prominent endangered species issues. Using "spin-off" techniques to raise awareness of other endangered species issues during vernal pool ecosystem recovery activities could prove beneficial in gathering broad-based support.

ACTIONS

The following actions should be undertaken to achieve the goals of this Information and Education Plan. The list is in general order of priority. For each action, the target audience(s) and a brief description are provided.

INITIAL ACTIVITIES (First year)

In the short term, these activities lay the groundwork for future outreach efforts, or are already underway and need to be completed (varies regionally).

Action 1. Develop regional vernal pool ecosystem information and education working groups.

Audience: Biological resource and land management agencies, conservation/environmental groups, other interested parties.

Description: Establish a working group dedicated to the implementation of an information and education program for each region described in the recovery plan. These groups will coordinate and customize outreach efforts to their local needs. Regional resources will then be combined to accomplish tasks, develop a regional communication strategy, and apply for grant opportunities.

Each working group will coordinate vernal pool outreach efforts by maintaining current information on the programs of other working groups. In review, they will seek to identify areas of overlap; and possibly combine efforts to effectively reach a broader, even national audience. This could prove particularly true for activities such as widely-circulated articles, public service announcements, curriculum, exhibits, and press releases.

To the maximum extent feasible, the working group will draw other agencies and individuals into this effort to inform and educate the public. They will assist any agency or individual involved or interested in vernal pool ecosystem recovery to design a program that draws from or augments strategies in this plan. Especially encouraged is coordination with individuals representing law enforcement, recreation, interpretation, management, and other disciplines.

Action 2. Develop a master mailing/contact list for each region.

Audience: All

Description: Include the following for each region:

- Affected landowners
- Media contacts
- Chambers of Commerce and similar groups
- Local farming and ranching organizations
- Local building development organizations
- Affected businesses
- Special interest groups
- Conservation groups
- Local government elected officials
- Federal, state, county and city land management agencies, planning agencies, and others with land management responsibilities
- Civic groups
- Schools
- Other interested individuals or groups

Initiate development of the mailing list by defining target areas and providing field personnel, refuge managers, outdoor recreation planners, and others with this plan and/or other instructions for compiling their contacts. Consolidate the lists into a sortable, automated data base. Update/expand the list on a continual or periodic basis.

Action 3. Implement a media relations campaign.

Audience: Public at large, landowners, local communities.

Description: Use various opportunities for exposure of vernal pool issues and successful partnerships. Development of many of these action items will also provide a chance for media exposure or assistance in disseminating information to target audiences through television, radio, newspaper, and magazines. News releases on specific stories or a general information package can be developed to generate media interest. Consider public service announcements and paid programming (commercials or ads) if needed.

Action 4. Develop customized materials for key target audiences.

Audience: The highest priorities, in order, are:

- Landowners and managers
- Affected communities
- Agency personnel

Description: Materials will summarize reasons for implementation of management measures and how users can help in vernal pool ecosystem recovery. General flyers could be developed with inserts available for explanations of site specific circumstances (e.g. maps or messages to particular user groups). As funding allows, develop customized fact sheets or pamphlets (using a standard question and answer format), brochures, slide tape programs, and/or videos for special audiences.

Active involvement of these groups in information development will assure responsiveness to questions and concerns about what effect vernal pool ecosystem recovery efforts will have on their pursuits. Solicit ideas from the various user groups about how protection of the vernal pool ecosystem can be achieved while still allowing individuals to pursue their interests. Incorporate feedback in a question/answer or discussion format to address specific concerns of each user group in the most direct way possible.

Develop annual updates regarding the progress made in vernal pool ecosystem recovery and future needs in terms of both research and management. Distribute these to landowners and land management agencies, either during consultation and negotiation procedures or via the mailing list, as appropriate. Use these updates to invite feedback about their current concerns and any support they may want to offer.

Develop customized brochures, flyers, signs, posters, and other materials. Augment this effort with customized presentations and video showings. Post interpretive signs where appropriate.

When appropriate, bring into play the bigger picture of endangered species. Pursue these efforts within environmental education and interpretive settings where it is likely that the vernal pool ecosystem will be one among a variety of topics.

Action 5. Develop customized regional displays.

Audience: All

Description: Develop a standard display that can be exhibited in visitor centers, on kiosks, on portable stands for use in meetings, classrooms, *etc.* When possible, erect kiosks with the display in high traffic areas. When feasible, incorporate a video display or slide-tape program into the exhibit.

Action 6. Establish coordinated clearinghouse for vernal pool ecosystem outreach materials.

Audience: Agency personnel, local governments, conservation/environmental groups.

Description: Provide repository of existing materials for use as templates or to be copied to prevent “reinventing the wheel.” Announce the availability of new materials to interested individuals and agencies identified on the mailing list.

ONGOING OR PERIODIC ACTIVITIES (After first year)

Activities which occur on a continuing basis or at different times throughout the year need to be pursued in as timely a manner as possible over the foreseeable future.

Action 7. Continue or expand initial efforts to distribute customized materials to key target audiences.

Audience: All

Description: Expand distribution to include various groups on the mailing list, update lists as appropriate, and distribute outreach materials at local town and land use planning meetings.

Distribute outreach materials to local and visitor audiences.

Action 8. Follow a standardized public outreach process during recovery plan release, agency planning and large section 7 consultations.

Audience: All

Description: Continue to use the following planning guidelines for public outreach to gather comments and understanding of the process and decision:

- Update the project-specific mailing/contact list, using the master mailing list as the basic source. Include government officials, agency and organization representatives, affected landowners, media contacts, and interested individuals.
- Issue press releases informing the general public about the progress of the recovery effort.
- Distribute a periodic fact sheet/pamphlet/newsletters to all interested parties. Use maps when appropriate.

- Actively solicit public input via newsletters, public scoping meetings, and meetings with involved parties.
- Distribute available educational materials to involved groups. Give presentations upon request.

Action 9. Conduct “by invitation” tours.

Audience: All

Description: There is no better way to communicate why vernal pool ecosystem recovery is significant than to have people accompany a knowledgeable, enthusiastic expert into the field. A significant effort should be made to get key people on the tours. Groups to include are: chambers of commerce, agency employees, community leaders, legislators, media, school groups, and conservation organization leaders.

Action 10. Enlist corporate support for vernal pool ecosystem protection.

Audience: All

Description: Large landowners or developers can be approached for providing support in specific situations. If this strategy is pursued, a prospectus-type brochure should be prepared explaining the public service aspects and the marketing advantages that could be gained by promoting an image of environmental responsibility. Corporate support could range from underwriting recovery projects to making a simple statement of support in their advertisements or on their packaging (the milk carton route). Regional working groups should research and solicit grant opportunities as an avenue to corporate support.

Action 11. Develop educational curriculum, presentations and speakers bureau.

Audience: Schools, environmental educators, interpreters, youth clubs, civic groups.

Description: Develop curriculum with lesson plans and activities targeted to grade levels. Utilize materials from other activities, such as brochures, posters, fact sheets, maps, videos, or a slide-tape program.

Modify the above teaching package into a standardized presentation for civic and school groups, and other general interest organizations. Inform key groups of the availability of such a program through the mailing list or through notices in brochures.

Action 12. Produce videos.

Audience: All

Description: Produce video for target audiences. Ideally, several videos could be produced; each targeted to a different audience. Otherwise, produce

a 15-minute video to use primarily in educational and planning settings; and a 30-second public service announcement to use in informational and commercial contexts.

Announce availability of the videos to field office staff and through the mailing list. Provide press releases to distribute them to the media, commercial outlets, and for public and private functions. Also, distribute copies of the videos to key visitor contact points, including Federal and state facilities. In particular, distribute the educational video to individuals whose property contains vernal pool habitat.

RESPONSIBILITIES

Assistance to agencies who manage vernal pool habitat is an ongoing activity that occurs primarily under section 7 of the Endangered Species Act. In particular, the U.S. Fish and Wildlife Service works closely with state and local agencies to implement vernal pool protection and recovery plans, and other management actions to protect vernal pool habitat.

State agencies also play a role in vernal pool management in their oversight of state wildlife regulations. Although these Federal and state agencies provide oversight and support to vernal pool ecosystem management, ultimately responsibility lies with individual land managers. Local land managers need to ensure that vernal pool ecosystem information and education efforts are appropriately and adequately implemented to support protection of vernal pool habitat at sites under their jurisdiction.

Vernal pools extend across multiple counties in California and Oregon, making a coordinated outreach effort difficult and complicated. Regional working groups will ideally reduce some of this complication. However, there needs to be a means for connection between these groups. The U.S. Fish and Wildlife Service is best suited to play a leadership role in providing advice and coordination and can also be a valuable clearinghouse for existing materials. The U.S. Fish and Wildlife Service should assure that long-term funding is allocated to support a staff position to coordinate outreach efforts as part of other recovery plan implementation duties. Partnerships will be the key to employing an effective information and education program aimed at recovering the vernal pool ecosystem.

APPENDIX H. GUIDANCE TO MINIMIZE THE POTENTIAL TRANSMISSION OF DISEASE AND OTHER PATHOGENS BETWEEN AQUATIC SYSTEMS

In order to minimize the potential transmission of disease and other pathogens, the following guidance has been developed for disinfecting equipment and clothing after surveying a wetland and before entering a new wetland, unless the two wetlands are hydrologically connected to one another. These recommendations are adapted from the Declining Amphibian Population Task Force's Code which can be found in their entirety at: <http://www.mpm.edu/collect/vertzo/herp/daptf/fcode.html>.

- a.** All dirt and debris, including mud, snails, plant material (including fruits and seeds), and algae, should be removed from nets, traps, boots, vehicle tires and all other surfaces that have come into contact with water. Cleaned items should be rinsed with clean water before leaving each study site.
- b.** Boots, nets, traps, *etc.*, should then be scrubbed with either a 70 percent ethanol solution, a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water), QUAT 128 (quaternary ammonium, use 1:60 dilution), or a 6 percent sodium hypochlorite 3 solution and rinsed clean with water between study sites. Cleaning equipment in the immediate vicinity of a pond or wetland should be avoided. Care should be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.
- c.** When working at sites with known or suspected disease problems, disposable gloves should be worn and changed between handling each animal.
- d.** Used cleaning materials (liquids, *etc.*) should be disposed of safely, and if necessary, taken back to the lab for proper disposal. Used disposable gloves should be retained for safe disposal in sealed bags.

Appendix I. Threats to the listed Vernal Pool Species and Steps Within The Recovery Plan for Threat Reduction or Elimination.

SPECIES	LISTING FACTOR₁	THREAT	TASK NUMBERS	RECOVERY CRITERIA₂
All listed vernal pool species	A	Habitat loss (due to urban development, agricultural conversion, mining)	1.4, 5.1, 5.2	1A, 1B, 1D, 5A, 5B, 5C, 5D
All listed vernal pool species	A	Habitat degradation (erosion, siltation, soil disruption)	1.4, 2.1, 2.3, 2.4, 4.1.4, 4.1.5, 4.2.4, 5.1, 5.2	1E, 2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D
All listed vernal pool species	A	Altered hydrology	2.1, 2.3, 2.4, 4.1.4, 4.1.5, 4.2.4, 5.1, 5.2	1E, 2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D
All listed vernal pool species	A	Inappropriate fire regime	2.1, 2.3, 2.4, 4.1.4, 4.2.2, 4.2.4, 5.1, 5.2	2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D
All listed vernal pool species	A, C	Inappropriate livestock grazing regime	2.1, 2.3, 2.4, 4.1.4, 4.2.3, 4.2.4, 5.1, 5.2	2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D
All listed vernal pool species	A, E	Habitat fragmentation	1.4, 4.1.3, 4.1.4, 4.1.5, 4.2.1, 5.1, 5.2	1A, 1B, 1D, 4A, 5A, 5B, 5C, 5D
All listed vernal pool species	A, E	Trash dumping	2.1, 2.3, 2.4, 4.2.4, 5.1, 5.2	2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D
All listed vernal pool species	A, E	Recreational use (off-road vehicles, bicycling)	2.1, 2.3, 2.4, 4.2.4, 5.1, 5.2	2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D
All listed vernal pool species	A, E	Vandalism	2.1, 2.3, 2.4, 4.2.4, 5.1, 5.2	2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D
Delta green ground beetle	B	Overcollection	2.1, 2.3, 2.4, 4.2.4, 5.1, 5.2	2A, 2B, 3B
All listed vernal pool crustaceans	C	Predation by nonnative aquatic species	2.1, 2.3, 2.4, 4.1.4, 4.2.4, 4.3.4, 5.1, 5.2	1E, 2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D
<i>Neostapfia colusana</i> <i>Orcuttia inaequalis</i> <i>Tuctoria mucronata</i>	C	Herbivory by grasshoppers	2.1, 2.3, 2.4, 4.1.4, 4.2.4, 4.3.6, 5.1, 5.2	2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D
Vernal pool tadpole shrimp possibly others	C	Disease	4.1.4, 4.1.5	3B
All listed vernal pool species	D	Lack of adequate protection from State and Federal legislation	beyond scope of recovery plan	N/A
All listed vernal pool species	D	Need for management planning	1.4, 2.3	1A, 1B, 1D, 2A, 2B
All listed vernal pool species	E	Loss of genetic diversity	4.1.1	3B, 4B

SPECIES	LISTING FACTOR ₁	THREAT	TASK NUMBERS	RECOVERY CRITERIA ₂
All listed vernal pool species	E	Contaminants	2.1, 2.3, 2.4, 4.1.4, 4.2.4, 4.3.1, 4.3.2, 5.1, 5.2	2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D
<i>Castilleja campestris</i> ssp. <i>succulenta</i> <i>Chamaesyce hooveri</i> <i>Eryngium constancei</i> <i>Lasthenia conjugens</i> <i>Limnanthes floccosa</i> ssp. <i>californica</i> <i>Navarretia leucocephala</i> ssp. <i>pauciflora</i> <i>Navarretia leucocephala</i> ssp. <i>pliantha</i> <i>Parvisedum leiocarpum</i>	E	Loss of pollinators	2.1, 2.3, 2.4, 4.1.4, 4.2.4, 4.3.5, 5.1, 5.2	2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D
All listed vernal pool species	E	Stochastic events	2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 4.1.6	1A, 1B, 1C, 2D, 3A, 4C
All listed vernal pool plants	E	Competition from invasive plants	2.1, 2.3, 2.4, 4.1.4, 4.2.4, 4.3.7, 5.1, 5.2	2A, 2B, 2C, 3B, 4A, 5A, 5B, 5C, 5D

1. Listing factors are:
 - (A) the present or threatened destruction, modification, or curtailment of its habitat or range;
 - (B) overutilization for commercial, recreational, scientific, or educational purposes;
 - (C) disease or predation;
 - (D) the inadequacy of existing regulatory mechanisms; or
 - (E) other natural or manmade factors affecting its continued existence.
2. Recovery criteria are:
 - 1A: Suitable vernal pool habitat within each prioritized core area for the species is protected.
 - 1B: Species occurrences distributed across the species geographic and genetic range are protected.
 - 1C: Reintroductions and introductions must be carried out and meet success criteria.
 - 1D: Additional occurrences that are determined essential to recovery are protected.
 - 1E: Habitat protection results in protection of hydrology essential to vernal pool ecosystem function, and monitoring indicates that hydrology that contributes to population viability has been maintained.
 - 2A: Habitat management and monitoring plans that ensure maintenance of vernal pool ecosystem function and population viability have been developed and implemented for all habitat protected.
 - 2B: Mechanisms are in place to provide for long-term management and monitoring.
 - 2C: Monitoring indicates ecosystem function has been maintained in the areas protected.
 - 2D: Seed banking actions have been completed.
 - 3A: Status surveys, status reviews, and population monitoring show populations within each vernal pool region where the species occur are viable.
 - 3B: Status surveys, status reviews, and habitat monitoring show that threats have been ameliorated or eliminated.
 - 4A: Research actions on species biology and ecology, habitat management and restoration, and methods to eliminate or ameliorate threats have been completed and incorporated into management plans.
 - 4B: Research on genetic structure has been completed and results incorporated into management plans.
 - 5A: Recovery Implementation Team is established and functioning to oversee rangewide recovery efforts.

5B: Vernal Pool Region working groups are established and functioning to oversee regional recovery efforts.

5C: Participation plans for each Vernal Pool Region have been completed and implemented.

5D: Vernal Pool Region working groups have developed and implemented outreach and incentive programs that develop partnerships.

Appendix J. Agency and Public Comment on the Draft Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon.

I. Summary of Agency and Public Comment on the Draft Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon.

In October 2004, the U.S. Fish and Wildlife Service (Service) released the Draft Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon for a 120-day comment period for Federal agencies, state and local governments, and members of the public. The public comment period ended on March 18, 2005. Sue Bainbridge, Michael Barbour*, Sharon Collinge, Michael Fugate, Todd Keeler-Wolfe, Jon Keeley, Richard Lis, Rod McDonald, Gerrit Platenkamp*, and Rob Schlising*, were asked to provide peer review of the Draft Plan. Peer review comments were received from three reviewers.

This section provides a summary of general information about the comments the Service received, including the numbers of letters from various sources. A complete index of commenters, by affiliation is available from the U.S. Fish and Wildlife Service, Endangered Species Division, Sacramento Fish and Wildlife Office, 2800 Cottage Way, Room W-2605, Sacramento, California 95825. All comment letters are kept on file in the Sacramento Fish and Wildlife Office.

The following is a breakdown of the number of comment letters received from various sources:

Federal Agencies	3
State Agencies	1
Federal Government	2
Local Governments	11
Academia/Professional	1
Business/Industry	7
Environmental /Conservation Organizations	5
Individuals	3

Three peer reviewers provided comments on the draft recovery plan. Their

* Individuals who provided comments.

comments regarding the draft plan were generally very supportive and complimentary. The peer reviewers stated that the draft recovery plan contains a wealth of information on the species covered by the plan; that the factors that are of crucial importance to the protection and management of vernal pools have been given appropriate attention (*e.g.*, hydrology, grazing regime, etc.); and that a convincing case is made for an ecosystem-level vernal pool recovery plan rather than a species-specific plan. The peer reviewers provided specific comments regarding the text as well, many of which we have incorporated into the plan. The shortcomings identified by the reviewers were: (a) the erosion of genetic variation in plants is not emphasized, and (b) the effects of vernal pool mitigation have not been discussed. The comments which were not incorporated are discussed below.

Thirty-three comment letters were received. Each letter contained one or more comments and some raised similar issues. Many letters provided new information or suggestions for clarity. Some commenters requested explanation of various points made in the Draft Plan, particularly the relationship between critical habitat and core areas. Several commenters provided substantive and detailed information, such as locations of additional populations. Many of the comments received have been incorporated into the final version of this recovery plan. All comments were considered and noted. Major comments that were not incorporated or that require clarification in addition to their incorporation are addressed below. Comments with common themes are grouped into a single comment.

II. Summary of Major Public Comments and Service Responses

A. General Comments

1. *Comment:* One commenter wanted verification that the Federal desire to preserve the species habitat must be completely voluntary by the landowner and that landowners would not be offered below market values on easements.

Response: Recovery Plans are guidance documents; not regulatory documents. No agency or other entity is required by the Endangered Species Act to

implement the recovery strategy or specific recommended actions in a recovery plan. The U.S. government must pay the fair market value of the easement (property) and is not allowed to pay a higher or lower amount. Even if money has been specifically allocated through the Land and Water Conservation Funds by the Congress for purchasing rare species habitat, the government can purchase land only if there is a willing seller.

2. Comment: Several commenters contended that the recent decision of the Ninth Circuit in *Gifford Pinchot Task Force v. United State Fish and Wildlife Service* has the effect of giving regulatory status to recovery plans because they will now be considered the best available information to determine thresholds of “adverse modification” of critical habitat in the section 7 process.

Response: Critical habitat designation and recovery planning are two separate processes under the Endangered Species Act. While some of the same information regarding species biology and threats is used in each process, the ultimate outcomes are distinct and independent. A critical habitat designation focuses on areas that contain physical and biological features that meet two criteria: they (a) are “essential to the conservation of the species”, and (b) “may require special management considerations”. Recovery plans, on the other hand, broadly address conservation needs of the species by identifying research, habitat protection and restoration, and management, and all other actions that must be taken to bring a species to a state in which it may be delisted or downlisted. A critical habitat designation may include a subset of areas that may be identified within a recovery plan as important for recovery of a species, but the regulatory standard of adverse modification is measured in terms of effects on the primary constituent elements and essential functions provided by the critical habitat, as identified in the critical habitat designation, and not against recovery plan thresholds.

3. Comment: Several commenters made suggestions or asked questions regarding critical habitat or were confused regarding the differences between the requirements for recovery versus the requirements for critical habitat.

Response: Many of these issues regarding critical habitat mentioned in the

comment letters are beyond the scope of this recovery plan. To the extent a discussion of critical habitat is relevant to the recovery plan, it is discussed.

The evaluation of the need for and designation of critical habitat is accomplished through the listing process under subsections 4(a)(3) and 4(b)(2) of the Endangered Species Act. The development and implementation of a recovery plan is accomplished under section 4(f) of the Endangered Species Act, and is a separate process. In addition, recovery plans are not legally binding documents. That is, the designation of critical habitat imposes specific legal requirements on Federal agencies under section 7 of the Endangered Species Act. In comparison, a recovery plan provides guidance, that if followed, can achieve the objectives of the plan (*e.g.*, delisting of a threatened species). Critical habitat designations are not necessarily intended to encompass a species' entire current range. Recovery plans, however, address all areas determined to be necessary for recovery of listed species and identify the needed measures to achieve recovery. We think the areas identified in the recovery plan beyond those identified in the final critical habitat designation are necessary for recovery of the vernal pools species.

4. Comment: How do recovery plans relate to section 7 and section 10 of the Endangered Species Act?

Response: Recovery plans provide recommendations that guide the U. S. Fish and Wildlife Service and others in recovering federally-listed species. Recovery plans are not land use plans and cannot restrict activities proposed by other agencies or the public. Proposed actions that may affect federally-listed or proposed species and their habitat are evaluated under the procedures established by sections 7 and 10(a)1(B) of the Endangered Species Act. The review, consultation, and permitting processes are the avenues by which those actions are evaluated and any negative effects to listed or proposed species avoided or minimized.

Recovery plans may be used to provide guidance, or as a reference, for section 7 consultations (*e.g.* identifying jeopardy thresholds) and can provide consistency between section 7 and 10(a)1(B). Section 7 refers to the part of the Federal Endangered Species Act that requires Federal agencies to insure that activities

they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species. To “jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. We also evaluate whether the issuance of Habitat Conservation Plan permits (section 10 (a)1(B) permits) jeopardizes the continued existence of any listed species. Issuance of a 10(a)1(B) permit is a Federal action and, as with any other Federal action that may effect federally-listed species, requires an internal section 7 consultation.

5. *Comment:* The California Department of Fish and Game requested clarification regarding which counties have designated Critical Habitat.

Response: We published a new Critical Habitat final rule for 11 plants and four crustaceans endemic to vernal pools on August 11, 2005 (70 **FR** 46924). Some areas that were previously excluded for economic reasons are now designated as Critical Habitat. Other areas are newly excluded. A total area of 858,846 acres are now designated as Critical Habitat. We have noted which species have critical habitat designated within the individual Conservation Efforts sections in this plan in Chapter II. BIOLOGY OF COVERED SPECIES. Because we revised the Critical Habitat designations, the comments provided by California Department of Fish and Game regarding Critical Habitat are no longer pertinent.

6. *Comment:* One commenter noted that during some U.S. Fish and Wildlife Service section 7 consultations, we have stated that reintroduction of listed plant species is unacceptable as a form of mitigation or compensation for loss of the plant’s habitat. This position appears to be in conflict with the recommendations in this recovery plan.

Response: The purpose of reintroducing a plant species to its former habitat is to reduce the threat of extinction of the species by restoring the numbers of populations and restoring the range of a species. We recommend reintroduction of the plant species in this plan only in appropriate areas and under very

controlled conditions where there is a benefit to the species and the risk of failure is minimized. We generally do not recommend introduction, as opposed to reintroduction, of a species to a site that has not supported the species in the past, primarily because the site likely lacks the appropriate conditions to support the plant in perpetuity. A reintroduction site should be an area that 1) previously supported the species but from which the plants have been absent for a substantial length of time and 2) still retains all of the plant's habitat requirements such as hydrology and soil type. A reintroduction site must be sufficiently large, and appropriately managed in perpetuity, such that the reintroduced plant population is reasonably expected to persist in perpetuity. Additionally, removal of seeds or other propagules from existing populations for the purpose of reintroduction must not diminish or stress the donor population. Complicating this process are the specific requirements for germination, growth, and reproduction of each plant species. While some of these requirements are known, many are not, and others may be virtually impossible to recreate. In all reintroduction efforts a high level of risk exists of failure of the new population to thrive, reproduce, and persist. For this reason, reintroduction is not recommended as a standard component of minimization or compensation efforts.

Translocation, *i.e.* moving plants or animals from their original location to another site, should not be confused with reintroduction. Translocation is generally an effort to prevent the loss of the plants or animals, when the habitat will be lost by conversion to another land use, such as development, road construction, or intensive agriculture. Translocation does not increase the numbers of plants or animals. Translocation has a high of risk of failure because the species are being moved from their natural habitat to a site to which they may not be adapted.

Funding

7. *Comment:* Several commenters were concerned about the recovery plan's effects on local economies and local businesses.

Response: A recovery plan is not a regulatory document and does not provide for agreement to or implementation of any of the recovery actions proposed. A recovery plan is a reference document that identifies actions that, if implemented, are expected to recover the species. Any actions that are implemented must follow appropriate State, local, or Federal laws and regulations. Specific arrangements for accomplishing recovery actions would be worked out at the time of planning and implementing the action and should include all appropriate stakeholders.

8. *Comment:* One commenter asked a series of questions regarding recovery plan implementation including: a) How will we implement the Recovery Plan; b) What funding will be available for easements, acquisition, stewardship, research, surveys, and education that are integral components to the Recovery Plan; c) How will recovery criteria for each core area be monitored, and with what funding? d) What will explicitly occur when a core area has destroyed the acreage allowed in the Recovery Plan?

Response: a) We will involve all affected interests in the recovery plan implementation process through the development of participation plans. The participation plan should involve all appropriate agencies and affected interests in a mutually developed strategy to implement one of more specifically designated recovery actions. The participation plans should ensure that a feasible strategy is developed for all affected interests while providing realistic and timely recovery of the species.

b) Sources of funding other than the budget that is proposed by the Congress and approved by the President are discussed in Appendix F. Conservation Tools and Strategies. The recovery plan acknowledges that the objectives of the plan may not occur without adequate funding. The plan states on the Disclaimer Page that objectives will be attained and any necessary funds made available subject to budgetary and other constraints affecting the parties involved, as well as the need to address other priorities.

c) Vernal Pool Region working groups will be important for the tracking the progress of recovery efforts, including the amount of suitable habitat protected for each of the species in the core areas. The recovery criteria for each core area will

be monitored though conducting status surveys. Objectives will be attained and any necessary funds made available subject to budgetary and other constraints affecting the parties involved, as well as the need to address other priorities.

d) The percent acreages mentioned in the recovery plan for protection within a core area are our recommendations for how much of the suitable habitat of the core area needs to be protected to achieve recovery. A possible outcome is that the habitat will become increasingly fragmented; the threats that caused some of the species to be listed will not be ameliorated or eliminated; and, that the most restricted species in the core area may not be recoverable. However, as stated in the plan, core areas were devised based upon the best knowledge available to us today. The plan has been designed to allow for modification of the core areas or the addition of new core areas in the future, should status surveys and research indicate a need to do so. Additionally, if sufficient suitable habitat and occurrences of each species are protected in Priority 1 (now known as Zone 1¹) core areas throughout the range of each species, it is anticipated that a number of species covered by this plan may be recovered through the protection of Zone 1 core areas. Suitable habitat and occurrence protections that occur outside of the Zone 1 core areas will still contribute to the recovery of whichever species are being protected, thereby possibly offsetting the need to protect suitable habitat or occurrences elsewhere. Lastly, the plan provides for flexibility with regard to achieving recovery criteria through the allowance of habitat conservation plans and alternative conservation strategies that meet the criteria outlined in Chapter III of the recovery plan.

9. *Comment:* The costs of recovery shown in the draft plan are too low. Land

¹Core areas were renamed from "Priority" 1, 2 and 3 to "Zone" 1, 2 and 3 based upon confusion created by the use of the word "Priority" for core areas in the context of a multiple-species recovery plan. Zone rankings are based on relative rarity and diversity within a core area of the species covered in this recovery plan, and indicate the overall level of priority for core area protection but are not necessarily identical with recovery priority at the species level (e.g., for certain endemic species with significant populations in Zone 2 core areas, conservation of these areas is necessary to prevent extinction or irreversible decline of those species; conversely, some highly endemic species are restricted to Zone 1, so for these species protection of Zone 2 core areas is not necessary to prevent significant population decline or other significant negative impact short of extinction.).

prices are now far higher than those we used to calculate the cost of land acquisition or conservation easements.

Response: The land prices used to determine the costs of recovery through acquisition or purchase of conservation easements were based on grazing land prices [primarily from the California Chapter, American Society of Farm Managers and Rural Appraisers, and our Realty Staff]. The price of grazing land has not changed significantly in the counties covered in this recovery plan since the draft Vernal Pool Recovery Plan was published. However, if any of these lands are zoned for residential or commercial use rather than grazing, the price is likely higher resulting in higher recovery costs. As stated in the draft plan (page xii), certain costs, such as securing and protecting specific areas of vernal pool habitat, are dependent on local economics. Because land values fluctuate continually, the costs shown in this document can only be an estimate based on information available at the time the plan was written.

10. Comment: Some commenters were concerned that costs were not estimated for many recovery actions listed in the implementation schedule and that cost estimates were not accurate.

Response: Many costs cannot be accurately estimated at this time because they depend on the outcomes of other actions or on evaluation of site-specific needs.

Core Areas

11. Comment: Many areas that are known to contain vernal pools, but have not been surveyed for listed species, have not been considered in this Recovery Plan. In order to maintain populations distributed throughout the range of each species, and to provide habitat for future dispersal, these unsurveyed areas should also be considered for their recovery and conservation value.

Response: We recognize there are many areas that are known to contain vernal

pools that have not been surveyed for listed species; and that to maintain populations distributed throughout the range of each species, and provide habitat for future dispersal, unsurveyed areas should also be considered for their recovery and conservation value. We have included these vernal pool regions in our recommendations for conducting standardized vernal pool habitat assessments and standardized species surveys. Core areas may be modified in the future based upon the results of these surveys.

12. Comment: Some core areas in Placer, Solano, and Sacramento Counties include land that has either been developed, is proposed to be developed, or is not suitable habitat for the species. These parcels should be removed from the core areas and other core areas should be created to include existing habitat or lands on which vernal pool habitat could be restored or created.

Response: We reviewed the requests for specific boundary changes to core areas in Placer, Solano, and Sacramento County and the Carrizo Plain National Monument. Some lands were removed from core areas after we determined that the land did not support habitat for any of the species in this plan or had been already permitted by the Service and other Federal agencies for development. For example, the 2,400-acre Westpark/Fiddymont development project, which has already been built, was removed from the Placer County core area and several portions of core areas in Solano County were removed after Service staff visited the areas and concurred that they did not support habitat. The western Placer County core area has been enlarged to include an additional area northwest of Highway 65 in Placer County. This additional area includes vernal pool habitat and associated uplands that are protected or proposed for protection, including East Sheridan Vernal Pool Preserve, Yankee Slough Preserve, Red Wing Preserve, and Coon Creek Conservancy area. The Yankee Slough Preserve supports known occurrences of vernal pool fairy shrimp and has recently undergone vernal pool restoration. A core area has been added in the Carrizo Plain Vernal Pool Region southeast of Soda Lake to include occurrences and suitable habitat of the longhorn fairy shrimp. Two parcels in Sacramento County known to support the vernal pool fairy shrimp and vernal pool tadpole shrimp were requested to be removed from a Zone 1 core area because of plans to

develop these sites. Land in Stanislaus County was requested to be removed from six core areas due to lack of suitable habitat. Lands in Sacramento County were not removed from the specified core areas because vernal pool species and their habitat still remain on the sites and not all permits have been issued for these projects. The specified lands in Stanislaus County were not removed from the core areas because the lands have not been converted to development and may still contribute to the recovery of vernal pool species by serving as buffer areas and providing some degree of land connectivity, regardless of present agricultural or rural-residential use. Future proposals for these sites may include preservation of the habitat and may still contribute to recovery of one or more of these species. One core area in Solano County was divided into two core areas, as requested by a local agency, to facilitate local planning efforts while still protecting the vernal pool species present.

We will be evaluating and refining core areas and other suitable habitat based on several data sets including data from Holland used in the preparation of a biogeography study (B. Holland pers. comm. 2003), once the data have been peer reviewed. Additionally, the plan allows for revision of the core areas in the future based upon the results of status surveys and research.

13. Comment: Stanislaus County requests that all actions necessary for delisting the species within Stanislaus County be identified as Priority 1 actions, and implemented as such. In addition, because the Service has the authority to list local populations (as was done for the California tiger salamander), Stanislaus County requests that the Service evaluate the potential for delisting local populations of species should adequate protections be in place.

As explained in comment # 32, priority 1 actions are actions that must be taken to prevent extinction or to prevent a species from declining irreversibly in the foreseeable future. Not all actions in Stanislaus County are needed to prevent extinction or prevent a species from declining irreversibly in the foreseeable future. Implementation of recovery actions for particular areas, especially when private landowners (in this case Stanislaus County) are willing to participate, is expected to take place at a much faster pace than in areas where recovery

implementation partners may not be available. We are also aware that all levels of recovery priorities may be implemented in certain areas (as could be the case in Stanislaus County), whereas implementation of even the higher recovery priorities may prove to be more difficult in other areas.

The Endangered Species Act of 1973, as amended, gives us the authority to list a "species" as endangered or threatened, which is not restricted to "species" as recognized in formal taxonomic terms, but can extend to distinct population segments (DPS's), as in the case of the California tiger salamander. However, we only have the authority to list distinctive segments of a particular population for vertebrates. We do not have the authority to list or delist Distinct Population Segments for plants and invertebrates.

14. Comment: Stanislaus County requests that elected officials and staff from Stanislaus County be invited to participate in both the Implementation Team and working groups for the San Joaquin Valley and Southern Sierra Foothills Regions.

Response: The Recovery Plan calls for a recovery implementation team consisting of no more than 10 people from a variety of backgrounds. Additionally the recovery plan calls for individual working groups for each vernal pool region. Having a representative from Stanislaus County, perhaps from the planning department, on the individual vernal pool regional working groups for San Joaquin Valley and Southern Sierran Foothills Regions could be helpful in the implementation of the Recovery Plan.

15. Comment: Stanislaus County requests that prior to adopting the Final Recovery Plan, the Service reevaluate the designations of both Critical Habitat and the specific Recovery Core Areas within the County, and provide the County with data related to the distribution of the species that could justify such a large area for permanent protection.

Response: We have reevaluated the designation for critical habitat, and published a final rule on August 11, 2005 in the Federal Register (70 FR 46924) that decreased the amount of critical habitat from 128,035 acres to 67,462 acres. We have also reevaluated specific Recovery Core Areas within Stanislaus County as discussed in comment 12.

16. Comment: The recovery goal of protection of 85 to 95 percent of habitat in Placer, Solano, and Stanislaus Counties would prevent any further development and is in conflict with the respective Habitat Conservation Plans including the Placer County Conservation Plan (PCCP) and the Placer County Habitat Conservation Plan (PCHCP), in progress, which have already received support and input from the Service and other agencies. The Placer County Conservation Plan should be the guidance document for determining which lands to develop or preserve in Placer County.

Response: The current Placer County Conservation Plan is a draft document that is undergoing modification and environmental review, and will be superseded by the Placer County Habitat Conservation Plan when the PCHCP becomes final. Therefore, use of the PCCP as guidance for this final recovery plan is inappropriate. Adequate protection of suitable vernal pool habitat within a permitted HCP includes following the overall conservation strategy of preservation as a top priority as discussed in Chapter III - Recovery. If a Service-approved Habitat Conservation Plan (HCP) is in place that provides adequate protection for the species in this recovery plan as described in Chapter III and does not preclude the recovery of the plants or animals in this plan, the conservation recommendations in the HCP will not be in conflict with the objectives of this recovery plan for the area covered by the HCP. Adequate protection includes permanently-protected vernal pool habitat preserves in large contiguous blocks of suitable habitat, protection of the entire geographic and genetic range of the species within the area covered by the HCP, protection of all populations of species with 25 or fewer total populations, connectivity with other preserves, and sufficient funding for management, maintenance, and monitoring of the preserves in perpetuity.

17. Comment: One commenter questioned the use of only 1.6 million acres of vernal pool habitat for the recovery of 33 species, stating that if recovery is to occur, the extant acreage must all be protected and restoration of degraded habitat must also occur. Another commenter stated that the recovery criteria need to consider all known habitat and populations of the species in the plan. Other commenters questioned whether we really need as much habitat protected.

Response: As we discuss on Page xii, Vernal Pool Recovery Plan Implementation, if all recovery actions are implemented in all three priority core area levels and recovery is still not achieved, actions will be implemented, as necessary, within all suitable habitat within the designated “vernal pool regions” until recovery goals are met. Some habitat or populations were not included in core areas due to factors such as relatively large numbers of occurrences already within established core areas which are representative of the species distribution throughout its range, or data that indicated the populations documented from a site were extirpated. In such cases, outlier occurrences were not considered, based on the available data, to be critical to the recovery and conservation of the given species. Future analysis through the implementation of this recovery plan may support the need to incorporate these populations into vernal pool regions or core areas.

We do not anticipate that 1.6 million acres will be required to recover and conserve the plan’s covered species. Habitat assessments described in recovery actions 1.1 to 1.3 will refine the localities within core areas to be targeted for conservation. Also, as stated in Section III.C.1.a, it is anticipated that a number of the species covered by this recovery plan can be recovered primarily through the protection of Zone 1 core areas. In particular, the most narrowly endemic species (e.g., *Limnanthes floccosa* ssp. *californica*) occur only in Zone 1 and do not require further protection of Zone 2 habitat. On the other hand, the most widely distributed species such as vernal pool fairy shrimp and *Orcuttia tenuis* occur broadly through Zones 1 and 2. For these species protection of Zone 2 core areas will significantly contribute to recovery, and if sufficient might offset the need to protect some lands within the Zone 1 core areas. In general we consider recovery requirements in Zones 2 and 3 to be more flexible than in Zone 1, and recovery criteria specific to Zone 2 and 3 core areas may be modified on a case by

case basis based on future information. However, certain Zone 2 core areas are essential for recovery of some species (*e.g.*, *Lasthenia conjugens*, longhorn fairy shrimp) that are rare and localized but have significant populations within Zone 2. Further implementation of recovery actions in vernal pool habitat outside core areas and outside vernal pool regions could be recommended for a species if recovery actions have been implemented in Zones 1, 2, and 3 and recovery has not yet been achieved.

18. Comment: Outlier populations should be considered critical to the recovery and conservation of species because peripheral populations can be genetically more variable than core populations.

Response: We recognize that peripheral populations can be genetically important to the species. We have included tasks to conduct research on genetics that are necessary to make informed habitat protection and management decisions (Action 4.1.1). One of the overall goals of this recovery plan is to achieve and protect in perpetuity self-sustaining populations throughout the full ecological, geographical and genetic range of the species by ameliorating or eliminating the threats that caused the species to be listed.

19. Comment: The public comment period should be extended until the Service contacts every private landowner within all core areas by mail and landowners are given time to respond. Notification of the public meetings and availability of the draft plan was sent to very few libraries and no press release was published in newspapers in the San Joaquin County area.

Response: We provided an extensive public outreach program prior to and after the publication of the draft plan in November 2004. During November 2004, public meetings to introduce the plan to the public were held in the Cities of Merced, Livermore, Chico and Sacramento within Merced, Alameda, Butte and Sacramento Counties, respectively. After the draft plan was published in November 2004, a 120-day public comment period was held from November 18, 2004 to March 18, 2005. Additional, combined public meetings on the draft

vernal pool recovery plan and the proposed rule on exclusions from vernal pool critical habitat, and the economic analyses of critical habitat of California tiger salamander and California red-legged frog were held in Modesto, Stanislaus County and Merced, Merced County in January 2005; in Red Bluff, Tehama County and Sacramento, Sacramento County in February 2005; and in Fresno, Fresno County in March 2005. Notification of these meetings were sent to Senators, Members of Congress, Boards of Supervisors of 21 counties, Resource Conservation Districts, Farm Bureau and numerous State, County, and local agencies, local newspapers, including two San Joaquin County newspapers, the Stockton Record and the Orange Cove Mountain Times, environmental organizations, and numerous interested private parties. Copies of the draft plan were available by request from the public beginning November 2004.

20. Comment: The recovery goals were not based on science.

Response: The recovery criteria in the plan were based on the best professional estimates by Service biologists of the level of protection needed to prevent further fragmentation and loss of habitat of the species in this recovery plan. Specific research has not been done to more precisely or specifically determine the amount of habitat or number of populations necessary to be protected to achieve the recovery of the 33 species in this plan. Instead, the species were grouped according to the numbers of populations that have already been lost, the numbers and sizes of populations remaining for each species, and the distribution of the populations. Using this information, Service biologists then estimated how many additional populations and the percent of remaining habitat would be needed to downlist and delist each species.

21. Comment: One commenter noted that we defined, on page III-85, a drought as “a period of 2 or more years of below average local rainfall that prevents reproduction and successful recruitment of vernal pool plants and animals”, yet in our Powerpoint presentation on the draft plan we mention major (5 yr) droughts on the “Time to Recovery “ slide. The drought definition for the purposes of the monitoring period should be a 5-year drought not a 2-year drought.

Response: We agree that longer droughts are common in California, and that the monitoring period should be a 5-year drought. We corrected the text to reflect this.

Habitat Protection

22. Comment: Several commenters requested definitions for “suitable habitat” and “occurrence”.

Response: We have included a general definition for these terms in the Executive Summary of this plan. “Suitable habitat” is defined as habitat that contains the elements necessary for the continued existence of each individual species in this plan. These elements include at a minimum: vernal pool type, soil series, landform, area (*i.e.* dimensions), slope, water quality, depth, duration and timing of inundation, and elevation from which each species has been reported to date. Not all information is currently known about all of the requirements for every species in this plan. Each of the 33 species has a unique suite of habitat requirements, with some similarities; therefore, one single definition of “suitable habitat” will not hold for all species. To the degree that measurable ranges are given for these terms, the information is included in the species accounts section. “Occurrence” is defined by the California Natural Diversity Database as a location occupied by a species separated from other locations by at least one-fourth mile and may contain one or more populations.

23. Comment: The plan does not provide a mechanism to incorporate new land into core areas or for adjusting the percentage of habitat within core recovery areas that must be preserved.

Response: We have a variety of means for adding new information to a recovery plan to keep it current and useful. The types of recovery plan changes we can make are (A) a recovery plan update, (B) a recovery plan revision, or (C) a

recovery plan addendum.

A recovery plan update may be written for relatively minor changes. An update may identify specific actions that have been initiated or will be initiated since the plan was completed, as well as changes in species status or background information that do not alter the overall direction of the recovery plan. An update would not apply to changes in criteria or goals because these are considered substantial changes. An update represents a minor change to a recovery plan and would not require public review or comment.

A revision is a substantial rewrite of at least a portion of a recovery plan and is usually needed if major changes are required in the Recovery Strategy, Recovery Objectives or Criteria, or Recovery Narrative (actions). A revision may be needed when new threats to species are identified, when research identifies new life history traits that have significant recovery ramifications. Revisions of recovery plans represent a major change to the recovery plan and should include review with public comment.

An addendum can be added to a recovery plan after the formal recovery plan has been completed. Types of addenda can range from implementation strategies or participation plans to more minor attachment of data. Addenda that represent significant additions to the recovery plan should undergo public review before being attached to a recovery plan.

The plan has been revised to allow for the modification of core areas based upon future status surveys and research.

24. Comment: The Service should recognize that mitigation by developers for destruction of habitat can contribute to recovery of these species.

Response: The level of mitigation frequently offered by developers for loss of species habitat does not offset the net loss of the species' habitat and is not

sufficient to promote the recovery of the species in question. However, compensation in the form of permanent preservation of large-scale pristine occupied habitat generally would be of greater benefit to the species than smaller parcels.

25. *Comment:* Does suitable habitat include all vernal pools in a core area?

Response: Yes. Suitable habitat includes all vernal pools in a core area; however, because of differences in species habitat requirements, not all pools provide habitat to all species.

26. *Comment:* What is the baseline for the extent of suitable habitat? A core area that had 20,000 acres of suitable habitat in 2003 may only have 17,000 acres when this recovery plan is approved.

Response: The baseline for the extent of suitable habitat is the date that the plan is signed by the Manager of the California/Nevada Operations Office.

Scope of the Plan

27. *Comment:* ““The Endangered Species Act requires that the Secretary of Interior, ...incorporate in each [recovery] plan a description of such site specific management actions as may be necessary to achieve the plan’s goal for the conservation and survival of the species (16 U.S.C. § 1533 (f)(1)(B)(i)). The draft recovery plan recognizes certain actions, but the Endangered Species Act requires that very specific management actions be illuminated for each site when necessary to achieve the plan’s goal.

Response: The Stepdown Narrative in this plan includes actions that recommend Federal, State, and local land management agencies, and private landowners with existing conservation agreements, develop new or improve existing management

and monitoring plans to the benefit of the species in this plan (Actions 2.3.2.1 through 2.3.2.4). These actions are directed toward protection of habitat within the core areas which are shown on maps in this plan. Other actions in this plan (1.1 through 1.3) recommend that suitable habitat be surveyed in order to identify specific areas for protection. To be further specific regarding which sites require management actions would result in omitting any sites that may be identified for habitat preservation after the plan is published. Furthermore, we anticipate that the results of future research, status surveys and monitoring and adaptive management will influence the preparation of management plans for specific sites. Including management plans for specific parcels in this document would possibly interfere with land managers' ability to manage preserves based upon the most up-to-date information.

28. *Comment:* The California Native Plant Society wishes to be listed as a responsible party in the Implementation Schedule in this plan, providing the Service chooses to implement the CNPS Botanical Survey Guidelines, confers with CNPS over appropriate vegetation mapping protocols, and engages CNPS in development of the standardized vernal pool habitat site assessment protocols.

Response: We included CNPS in the Implementation Schedule in the Draft plan with the intention that we would confer with CNPS, and the other appropriate groups, in development of habitat mapping and site assessment protocols. Our current Botanical Survey Guidelines were developed in part from earlier CNPS plant survey guidelines and can be updated to incorporate appropriate additional measures.

29. *Comment:* Twelve California Native Plant Society's State-listed plant species should be added to the plan.

Response: A number of additional vernal pool species of concern could have been considered in the Recovery Plan. The California Native Plant Society's Electronic Inventory (2005) indicates 87 rare species grow in vernal pools in California. We included California State listed vernal pool species, federally

listed vernal pool species, and species of concern that were narrowly restricted, or co-occur with the listed species included in this Recovery Plan.

30. Comment: The California Department of Water Resources conducted vernal pool site survey from 2001-2004 in preparation for environmental review for a possible Sites Reservoir and Thomes/Newville Reservoir. These reservoirs could inundate vernal pool and oak woodland habitat but were not mentioned in the draft recovery plan. These portions of western Glenn and Tehama Counties, whether inhabited or not by any of the 33 species in this plan, should be considered for preservation and reintroduction locations of these species.

Response: California Department of Water Resources contracted surveys for potential special status shrimp habitat at the potential Sites, Colusa, Thomes-Newville, and Red Bank off-stream storage areas (reservoirs) in Colusa, Glenn, and Tehama Counties, during 1998 and 1999 (Integrated Storage Investigations 2000a). These surveys found potential habitat for five species addressed in this plan: vernal pool fairy shrimp, vernal pool tadpole shrimp, conservancy fairy shrimp, mid-valley fairy shrimp, and California fairy shrimp. One hundred fifty-eight acres of potential fairy shrimp habitat (seasonal wetlands and vernal pools) were found at the Sites area, 266 acres were found at the Colusa Cell area, and 327 acres were found at the Thomes-Newville area (Integrated Storage Investigations 2000b). None of the listed vernal pool species addressed in this plan were located during these surveys; however, the surveys did not include specific sampling to detect the presence of the shrimp species. Botanical surveys conducted in 1998 and 1999 at these four potential reservoir areas did not find any of the species addressed in this plan (Integrated Storage Investigations 2000c).

Surveys for other features related to both the Sites and Newville areas were conducted in 2000-2003. None of the species addressed in this plan were located during these surveys (G. Kuenster, DWR, *in litt.*, 2005). However, the majority of these features such as recreation sites, new canals, canal enlargements, and road relocations were specifically designed to avoid sensitive resources such as vernal pools (G. Kuenster, DWR, *in litt.*, 2005). This report has not yet been

made final.

Should any introduction or reintroductions of the plants and animals in this plan be considered for the potential reservoir areas, thorough surveys would first need to be conducted to determine whether the species are already present and whether suitable habitat exists. Currently this information does not exist. If the species are already present, adding more plants or animals of the same species could result in deleterious genetic outcrossing. To introduce a species to an area where it has not previously existed naturally, would be risking the loss of those plants or animals due to the lack of appropriate habitat.

31. Comment : Mapping of vernal pool habitat by CalFed should be included in the plan in addition to an assessment of the impacts from implementation of the Record of Decision and the CalFed Final Programmatic EIR/EIS.

Response: The Record of Decision, Chapter 6a includes vernal pools in the multi-species conservation strategy analysis as an ecosystem. The analysis is not species-specific, therefore no particular distribution by each species is presented. The biological information is based on a Service Biological Opinion and species information available up to 2000. The information presented in this recovery plan includes information available up to 2005, therefore no further modifications to the distribution of the species is required. Chapter 7 of the Record of Decision includes an analysis of 21 species that include some of the species in this plan. A goal for the multi-species conservation strategy is to maintain the populations of these species and “to ensure that any adverse effects on the species that could be associated with implementation of CalFed actions will be fully offset through implementation of actions beneficial to the species”. For one of the species (*Tuctoria greenei*), the goal is to contribute to recovery and to implement some of the actions deemed necessary to recover species populations within the focus area”. The CalFed Final Programmatic EIR/EIS provides a general analysis based on ecosystems but is not species-specific.

32. Comment: The Recovery Plan does not explain how the “recovery priority of

core areas ” as annotated in Table III-1 was determined. The brief explanation on page III-112 is insufficient to reconstruct how these decisions were made.

Response: We have modified the plan to clarify how the “recovery of priority of cores areas” was assigned. Some confusion existed with the terms Priority 1, 2 , and 3 core areas and Priority 1, 2, and 3 actions (see Footnote 1 on page J-8 for an explanation).

In Chapter III RECOVERY, Zone 1, 2 and 3 core areas are applied in Table III-1, which summarizes the species-specific recovery criteria for species occurrence and habitat protection, reintroduction, and seed banking. The core areas listed in Table III-1 also correspond to Table IV-2, where we list core areas for recovery of vernal pool plants and animals, organized by vernal pool region, by species within each core area, and by the priority of habitat protection of each core area. Each Zone 1 core area is necessary to prevent extinction or irreversible decline of at least one species covered by this plan.

Priority 1, 2, or 3 are assigned to actions in a recovery plan. In compliance with the U.S. Fish and Wildlife Endangered and Threatened Species Listing and Recovery Priority Guidelines, Recovery Plan Preparation and Implementation Priorities (48 FR 43103), all recovery actions will have assigned priorities based on the following:

Priority 1: Actions that must be taken to prevent extinction or to prevent a species from declining irreversibly, in the foreseeable future;

Priority 2: Actions that must be taken to prevent a significant decline in the species population/habitat quality or some other significant negative impact short of extinction; and

Priority 3: All other actions necessary to meet recovery or conservation objectives.

33. *Comment:* More guidance is needed for core areas undergoing urbanization, both for conservation through HCPs, NCCPs, and section 7 consultations. It would be helpful if this recovery plan provided an up-to-date scientific consideration of important preserve design issues with references to the published literature.

Response: An in-depth scientific review of preserve design is beyond the scope of this plan. However, the following guidelines from the Report of the Science Advisors for the Placer County Natural Communities Conservation Plan and Habitat Conservation Plan (Brussard *et al.* 2004) does provide scientific consideration of preserve design issues and has references to the published literature. These tenets are also discussed under D. Vernal Pool Regions in Chapter III. Recovery of this plan.

From: Report of the Science Advisors for the Placer County Natural Communities Conservation Plan and Habitat Conservation Plan (Brussard *et al.* 2004):

In the design of conservation areas the following tenets are key:

1. Species that are well-distributed across their native ranges are less susceptible to extinction than are species confined to small portions of their ranges. Therefore the recovery of many target species will depend on conservation programs throughout the State.
2. Although some species can be conserved in a “working landscape,” most sensitive species require protection in reserves where conservation is the major land-use goal. Existing patches of habitat that support populations of sensitive species should be provided with reserve-level protection and these areas should be managed to maintain the structure, composition, and processes found in the natural community.

3. Large conservation areas containing large populations of the target species are superior to small conservation areas. Conservation areas should be designed to maximize the viability of local populations of sensitive species.

4. Conservation areas that are close together are better than those far apart. An arrangement of conservation areas that facilitates dispersal of individuals among these areas is necessary to aid dwindling populations that are supplemented by migrants and continued genetic interchange. In the absence of suitable landscape linkages, conservation areas should not be separated by gaps of unsuitable habitat greater than the dispersal distances of the least vagile (distributable) target species.

5. Interconnected conservation areas are far better than isolated ones. Multiple linkages among conservation areas are optimal because they provide alternative movement pathways for species. Redundancy is particularly important in areas that are subject to high rates of disturbance.

6. Landscape linkages function better when habitat within them resembles the habitat that is preferred by the target species. Landscape linkages wide enough to contain resident individuals of target species must be established to connect conservation areas farther apart than the species' normal dispersal distances. These corridors must include habitat components to meet all of the species' life history requirements.

7. Habitat for a particular species within a conservation area that occurs in less fragmented, contiguous blocks is preferable to habitat that is fragmented.

8. Blocks of habitat that are roadless or otherwise inaccessible to humans serve to better conserve target species than do roaded and accessible habitat blocks.

9. Whenever possible, maximize heterogeneity in conservation areas. Areas that have diverse topography, soils, and vegetation tend to capture a variety of different habitat types and thus support a richer biota than more homogeneous areas.
10. Stakeholders must participate in the planning.
11. Conservation is expensive, and the costs do not end with land acquisition. Once conservation lands or easements are acquired, they must be managed, and management requires a permanent source of funding.
12. There is a tradeoff between area and management intensity. Small conservation areas require much more active management, and thus are more costly on an ongoing basis than are large areas.
13. There is considerable uncertainty in conservation planning and management, and the more endangered a species, the more uncertainty there is in its recovery.
14. The matrix matters. Reserves with hard boundaries are a critical component of conservation plans. However, activities outside of reserves affect processes and events inside them. Thus it is critical to assess the likely impacts that surrounding land uses will have on the reserves. In many cases it will be desirable to establish a “soft edge” around reserve boundaries to minimize the impacts of nearby roads, urbanization, and agriculture.

B. Species-Specific Comments

34. *Comment:* The recovery criteria recommend protection of only 95 percent of suitable habitat for *Tuctoria mucronata* and *Limnanthes floccosa* ssp. *californica*.

This is percentage is too low, 100 percent of suitable habitat for these species should be protected.

Response: We believe that due to pre-existing conditions, protection of 100 percent of suitable habitat is likely impossible. We estimated that at least 5 percent of the habitat in any given area is already converted to infrastructure such as roads, fences, and powerlines.

35. Comment: Will the *Limnanthes floccosa* ssp. *grandiflora* (large-flowered woolly meadowfoam) and *Lomatium cookii* (Cook's lomatium) which are endemic to vernal pool habitats in the Klamath Mountains Vernal Pool Region in Oregon be addressed in this recovery plan.

Response: Recovery of these plant species will be separately addressed in a recovery plan for species of the upper Rogue River Valley, currently in preparation by our Roseburg Field Office. Site-specific recovery actions and strategies for the vernal pool fairy shrimp populations in the Klamath Mountains Vernal Pool Region will also be addressed in the Rogue River Valley recovery plan within the context of integrated conservation and ecosystem-level management for all three species, consistent with the recovery criteria and generalized recovery strategy identified for vernal pool fairy shrimp in this Vernal Pool Ecosystem Draft Recovery Plan. To include these two plants in this plan would require developing recovery strategies for the species which would be a duplication of the work currently being done by the Roseburg staff.

36. Comment: According to the Vernal Pool Ecosystem Draft Recovery Plan, the western spadefoot toad was nearly extirpated from the Sacramento Valley. The recovery goal for this species should be increased from 80 percent to 95 percent.

Response: At the time the Vernal Pool Ecosystem Draft Recovery Plan was written, our range information consisted of 174 occurrences in 24 counties. Since that time, data has become available showing that approximately 146 new

occurrences were reported to the California Natural Diversity Data Base (2005) since 1997, primarily in Riverside and San Diego Counties. Approximately 44 new occurrences were reported from counties in the San Joaquin Valley, and eight occurrences from counties in the Sacramento Valley. The California Natural Diversity Data Base (2005) now lists 316 occurrences of western spadefoot toads from 27 counties. Additionally, a commenter reported sightings not reported to the California Natural Diversity Data of the spadefoot in large numbers on protected lands.

37. Comment: The Service should allow habitat restoration as mitigation for loss of vernal pools from development or other projects; specifically, rice fields in Placer County that apparently supported vernal pool habitat in 1937 aerial photographs, should be allowed to be restored to vernal pools after being added to existing core areas in the County.

Response: Restoration of degraded or converted habitat, where appropriate, is a part of the strategy for recovery of the species in this plan. As stated in Chapter III, preservation of existing natural habitat is the preferred type of habitat protection, followed by restoration of former or degraded habitat, and lastly by creation of vernal pools, if necessary, to maintain the range of vernal pool habitat. Restoration of vernal pools in areas that have not been functional wetlands for many years, such as those shown in the 1937 aerial photos, may be more similar to vernal pool creation than restoration in that the natural vernal pool seedbank and cystbank (seeds and shrimp cysts remaining in the soil) may have been lost, the natural water-restricting layer may have been destroyed, and the site, when restored, may not function like a natural vernal pool. Vernal pool restoration, like creation, still requires extensive monitoring to determine if all functions and values of the habitat that has been lost are achieved in the restored site. Still, preliminary results indicate that some vernal pool creation and restoration efforts have resulted in pools occupied by vernal pool fairy shrimp and vernal pool tadpole shrimp (De Weese 1998), and restoration and creation of habitat may be more useful as recovery tools for some species than others.

38. *Comment:* Some comments were made regarding whether development impacts to vernal pool species within core areas could be offset or compensated outside of core areas. We were asked to clarify that habitat loss in one county could be compensated in another county.

Response: Although recovery plans may provide guidance on protection of existing habitat, they are not the appropriate forum for discussing specific proposals.

39. *Comment:* Why was *Pseudobahia peirsonii* omitted from this plan?

Response: This species is included in the draft Southern Sierra Foothill Plants Recovery Plan (in progress).

40. *Comment:* Why were Herbert Wetland Prairie Preserve in Tulare County, Kern County, and the Coles Levee Preserve omitted as locations of *Eryngium spinosepalum*? This species may be more widespread than reported in the plan. Coles Levee preserve and Kern Water Bank were omitted as locations of the spadefoot toad. Kern Water Bank was omitted as a location for vernal pools. Are Kern Water Bank and Coles Levee Preserve included in core areas?

Response: Staff at the Herbert Wetland Prairie Preserve and at the Coles Levee Preserve state that *Eryngium spinosepalum* does not occur on either preserve; although a similar species of *Eryngium* does occur on the Herbert Wetland Prairie Preserve. The California Natural Diversity Database does not have any records of *E. spinosepalum* in Kern County although plants intermediate between *E. spinosepalum* and *E. castrense* or *E. vaseyi* have been found there. *Eryngium spinosepalum*, as well as other species in the plan, may be more or less widespread than were reported in the plan; however, the most current available scientific and commercial data were used in the species accounts. The manager and biologist for the Kern Water Bank also state that there are no known observations of spadefoot toad on the Kern Water Bank, although it may be

present (J. Jones, pers. comm. 2005). Spadefoot toads have been observed on the Coles Levee Preserve but no focused or formal surveys have been conducted for this species on either Preserve (J. Jones, pers. comm. 2005). The pools on the Coles Levee Preserve are alkaline rain pools, rather than vernal pools, and are located in alkali sink habitat. These pools do support non-listed fairy shrimp species on Coles Levee Preserve (J. Jones, pers. comm. 2005) but likely do not provide habitat for the species addressed in this plan. Neither Coles Levee Preserve nor Kern Water Bank were included in core areas due to lack of presence of the species covered in this plan.

C. Major Peer Reviewer Comment and Service Response

41. Comment: One peer reviewer wanted to know the Service’s view on creation of constructed vernal pools stating “Vernal pool impacts have under section 404 of the Clean Water Act and Section 7 of the ESA been routinely mitigated, in part, by compensatory actions that involve the creation of constructed vernal pools. These compensatory wetlands provide habitat for species covered in this plan. (A) Is it the opinion of the Service that this form of compensation on an ongoing basis is beneficial or detrimental to the species covered in the plan? (B) Do compensation wetlands provide the same habitat quality as the impacted wetlands. It would seem important to discuss recovery actions that relate to this ongoing mitigation policy. For example, it may be necessary to provide stricter guidelines for habitat quality and function of compensation pools.”

Response: Vernal pool habitat creation is complex and still considered experimental. Vernal pool impacts have under section 404 of the Clean Water Act and Section 7 of the ESA been routinely compensated, in part, by actions that include the creation of constructed vernal pools because of a U.S. Army Corps of Engineers policy for “no-net-loss of wetlands.”

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill material into all Waters of the United States (Waters), including wetlands. Any discharge of dredged or fill material into Waters including wetlands requires

a permit from the U.S. Army Corps of Engineers.

While the Clean Water Act provides a means for the Corps to regulate the dredge and fill of Waters and wetlands it does not provide complete protection. Nationwide the Corps denies less than one percent of all applications to dredge or fill Waters or wetlands on an annual basis. While many applicants are required to provide compensation for wetlands losses (*i.e.* no net loss) many smaller impact projects remain largely unmitigated unless specifically required by other environmental laws such as the Endangered Species Act.

Further confusing and hampering efforts to conserve wetlands, including vernal pools, is the recent Supreme Court decision concerning, Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers *et al.* (SWANCC), which now limits the Corps' jurisdiction over certain isolated wetlands, for which the Corps had previously determined as jurisdictional, based on the wetland's or Water's value to migratory birds, such as waterfowl and shorebirds.

Additionally, according to Brussard *et al.* (2004), the results of vernal pool restoration are mixed, ranging from qualified successes to dismal failures. They recommended that it should be the responsibility of those creating the vernal pools to demonstrate their long term effectiveness for any species before relying on created vernal pools as a major conservation tool. Noss *et al.* (2002), in discussing management and monitoring, state "that most apparently successful projects are less than 10 years old and the long-term trends and sustainability of vernal pool flora, invertebrates, and amphibians have not been verified. For this reason, preservation must be the fundamental strategy in maintaining vernal pool ecosystems within the planning area". Still, preliminary results indicate that some vernal pool creation and restoration efforts have resulted in pools occupied by vernal pool fairy shrimp and vernal pool tadpole shrimp (De Weese 1998), and restoration and creation of habitat may be more useful as recovery tools for some species than others.