Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon

Vernal pools at Phoenix Park / Dwight Harvey, U.S. Fish & Wildlife Service

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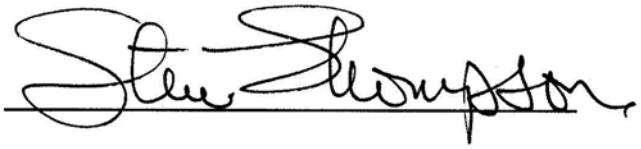
Region 1
U.S. Fish and Wildlife Service
Portland, Oregon

Approved: 

Manager, California/Nevada Operations Office,
U.S. Fish and Wildlife Service

DEC 15 2005

Date: _____

U.S. FISH AND WILDLIFE SERVICE'S MISSION IN RECOVERY PLANNING

Section 4(f) of the Endangered Species Act of 1973, as amended, directs the Secretary of the Interior and the Secretary of Commerce to develop and implement recovery plans for species of animals and plants listed as endangered or threatened unless such plans will not promote the conservation of the species. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service have been delegated the responsibility of administering the Endangered Species Act. Recovery is the process by which the decline of an endangered or threatened species is arrested or reversed, and threats to its survival are neutralized, so that its long-term survival in nature can be ensured. The goal of this process is the maintenance of secure, self-sustaining wild populations of species with the minimum necessary investment of resources. A recovery plan delineates, justifies, and schedules the research and management actions necessary to support recovery of a species. Recovery plans do not, of themselves, commit staffing or funds, but are used in setting regional and national funding priorities and providing direction to local, regional, and State planning efforts. Means within the Endangered Species Act to achieve recovery goals include the responsibility of all Federal agencies to seek to conserve endangered and threatened species, and the Secretary's ability to designate critical habitat, to enter into cooperative agreements with the states, to provide financial assistance to the respective State agencies, to acquire land, and to develop Habitat Conservation Plans with applicants.

The U.S. Fish and Wildlife Service is committed to applying an ecosystem approach to conservation to allow for efficient and effective conservation of our Nation's biological diversity. In terms of recovery plans, ecosystem considerations are incorporated through the development and implementation of recovery plans for communities or ecosystems where multiple listed species and species of concern occur, in a manner that restores, reconstructs, or rehabilitates the structure, distribution, connectivity, and function upon which those listed species depend. In particular, these recovery plans shall be developed and implemented in a manner that conserves the biotic diversity of the ecosystems upon which the listed species depend.

The Endangered Species Act mandates the preparation of recovery plans for listed species unless such a plan would not contribute to their conservation. Recovery plans detail the actions necessary to achieve self-sustaining, wild populations of listed species so they will no longer require protection under the Endangered Species Act. Species of concern are not required to have recovery plans, however, they are included in this recovery plan because a community-level strategy provides opportunities for pre-listing conservation of species with needs similar to those of listed species.

DISCLAIMER

Recovery plans delineate reasonable actions that are believed to be required to recover and/or protect listed species. We, the U.S. Fish and Wildlife Service, publish recovery plans, sometimes preparing them with the assistance of recovery teams, contractors, State agencies, and others. 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. Recovery plans do not necessarily represent the views, official positions, or approval of any individuals or agencies involved in the plan formulation, other than our own. They represent our official position ***only*** after they have been signed by the Director, Regional Director, or Manager as ***approved***. Approved recovery plans are subject to modification as dictated by new findings, changes in species statuses, and the completion of recovery actions.

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Literature Citation should read as follows:

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An electronic copy of this recovery plan will be made available at http://www.fws.gov/pacific/ecoservices/endangered/recovery/plans.html and http://www.fws.gov/endangered/recovery/index.html#plans.

PLAN PREPARATION

Numerous individuals have contributed to the authorship of the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon over a period of several years. The individuals primarily responsible for finalizing this recovery plan are listed in alphabetical order below. We sincerely apologize to anyone whose name was omitted inadvertently from this list.

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The Geographic Information System (GIS) mapping analysis was conducted by: Cheryl Hickam, Joni Mitchell, and Brian Cordone, U. S. Fish and Wildlife Service.

GUIDE TO RECOVERY PLAN ORGANIZATION

This recovery plan provides individual species accounts for all of the 33 species covered. Because of the length and complexity of this recovery plan, an appendix is provided listing the common name and scientific name of all plants and animals mentioned in the document (Appendix A). A glossary of technical terms has been provided in Appendix B.

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We wish to sincerely thank and gratefully acknowledge the Vernal Pool Ecosystem Recovery Team. We sincerely apologize to anyone whose name was omitted inadvertently from this list.

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The recovery planning process has benefitted from the collaboration, advice, and assistance of many individuals, agencies, and organizations over the past several years. We thank the following individuals for their assistance and apologize to anyone whose name was omitted inadvertently from this list *(U.S. Fish and Wildlife Service personnel in italics*):

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EXECUTIVE SUMMARY

Introduction: This recovery plan features 33 species of plants and animals that occur exclusively or primarily within a vernal pool ecosystem in California and southern Oregon. The 20 federally listed species include 10 endangered plants, 5 threatened plants, 3 endangered animals, and 2 threatened animals. The federally endangered plants are *Eryngium constancei* (Loch Lomond button-celery), *Lasthenia conjugens* (Contra Costa goldfields), *Limnanthes floccosa* ssp. *californica* (Butte County meadowfoam), *Navarretia leucocephala* ssp. *pauciflora* (few-flowered navarretia), *Navarretia leucocephala* ssp. *plieantha* (many-flowered navarretia), *Orcuttia pilosa* (hairy Orcutt grass), *Orcuttia viscida* (Sacramento Orcutt grass), *Parvisedum leiocarpum* (Lake County stonecrop), *Tuctoria greenei* (Greene's tuctoria), and *Tuctoria mucronata* (Solano grass). The federally threatened plants are *Castilleja campestris* ssp. *succulenta* (fleshy owl's clover), *Chamaesyce hooveri* (Hoover's spurge), *Neostapfia colusana* (Colusa grass), *Orcuttia inaequalis* (San Joaquin Valley Orcutt grass), and *Orcuttia tenuis* (slender Orcutt grass). The three federally endangered animal species are the Conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), and vernal pool tadpole shrimp (*Lepidurus packardi*). The two federally threatened animal species are the vernal pool fairy shrimp (*Branchinecta lynchi*) and delta green ground beetle (*Elaphrus viridis*).

In addition, 13 species of concern are addressed. The plants include *Astragalus tener* var. *ferrisiae* (Ferris' milk vetch), *Astragalus tener* var. *tener* (alkali milk vetch), *Atriplex persistens* (vernal pool smallscale), *Eryngium spinosepalum* (spiny-sepaled button-celery), *Gratiola heterosepala* (Boggs Lake hedge-hyssop), *Juncus leiospermus* var. *ahartii* (Ahart's dwarf rush), *Legenere limosa* (legenere), *Myosurus minimus* var. *apus* (little mousetail), *Navarretia myersii* ssp. *deminuta* (small pincushion navarretia), and *Plagiobothrys hystriculus* (bearded popcorn flower); and the animals include the midvalley fairy shrimp (*Branchinecta mesovallensis*), California fairy shrimp *(Linderiella occidentalis)*, and western spadefoot toad (*Spea hammondii*).

These species occur primarily in vernal pool, swale, or ephemeral freshwater habitats and are largely confined to a limited area by topographic constraints, soil types, and climatic conditions. Surrounding (or associated) upland habitat is critical to the proper ecological function of these vernal pool habitats. The primary threats to the species are habitat loss and fragmentation due to urban development and associated infrastructure, agricultural conversion, altered hydrology, nonnative invasive species, inadequate regulatory mechanisms, exclusion of grazing in areas

where grazing has been a historic land use, and inappropriate grazing regimes (overgrazing or undergrazing). Resulting small population sizes are subject to extinction due to random, naturally occurring events.

Recovery Priority: Recovery priority numbers for listed species addressed in this recovery plan are provided in Appendix C. Recovery priority numbers are determined per criteria published in the Federal Register (U.S. Fish and Wildlife Service 1983a) as described in Appendix D.

Recovery Goals, Objectives, Strategies, and Criteria: The overall goals of this recovery plan are to:

- Achieve and protect in perpetuity self-sustaining populations of each species.
- Delist the 20 federally listed plant and animal species.
- Ensure the long-term conservation of the 13 species of special concern.

Interim goals of this recovery plan are to:

- Stabilize and protect populations to prevent further decline of each species.
- Conduct research necessary to refine reclassification and recovery criteria.
- Reclassify to threatened status those species listed as endangered.

The overall objectives of this recovery plan are to:

- Ameliorate or eliminate the threats that caused the species to be listed as federally endangered or threatened, and to ameliorate any newly identified threats, in order to be able to delist or downlist these species.
- Ameliorate or eliminate the threats that affect the species of concern and ameliorate any newly identified threats in order to conserve these species.
- Confirm the status of *Plagiobothrys hystriculus*, a species of concern that is currently presumed extinct. If extant populations are discovered, the ultimate goal would be to ensure the long-term conservation of this species.
- Promote natural ecosystem processes and functions by protecting and conserving intact vernal pools and vernal pool complexes.

Ecosystem-level Strategy for Recovery and Conservation: This recovery plan presents an ecosystem-level strategy for recovery and conservation because all of the listed species and species of concern co-occur in the same natural ecosystem and are generally threatened by the same human activities. The likelihood of successful recovery for listed species and long-term conservation of species of concern is increased by protecting entire ecosystems. This task can be most effectively accomplished through the cooperation and collaboration of various stakeholders.

The over-arching recovery strategy for species in this recovery plan is habitat protection and management. The five key elements that compose this ecosystem-level recovery and conservation strategy are described below.

1. Habitat Protection

Considering that habitat loss and fragmentation due to human activities are the primary causes of endangerment for species in this recovery plan, a central component of species recovery and conservation is to establish conservation areas and reserves that represent all of the important vernal pool habitat within the recovery plan area. Habitat protection does not necessarily require land acquisition or easements; only that land uses maintain or enhance species habitat values. Another recommendation of the recovery plan is that, whenever possible, blocks of conservation lands should be situated so that species dispersal mechanisms remain functional.

2. Adaptive Habitat Management, Restoration, and Monitoring

In most cases, active management of the land is necessary to maintain and enhance habitat values for the species covered in this recovery plan. For most species, management strategies have not been investigated; therefore, few management plans with species-specific strategies have been developed. The current condition and status of special status species should be considered in light of past management practices before a new management regime is imposed. After specific threats or habitat goals are identified, the management regime can be adjusted. The response of the species, habitat, and threats should be monitored, the results evaluated, and management potentially adjusted again based on this information; hence an adaptive management approach. Many vernal pools and vernal pool complexes have been degraded by disturbance or alteration of hydrology, or lost completely. In addition to active management, habitat restoration may be necessary in many instances to achieve proper

functioning of a vernal pool ecosystem prior to conducting routine habitat management and monitoring.

3. Status Surveys

Declines in species populations must be halted and/or reversed and threats to the populations ameliorated or eliminated if populations are to be self-sustaining and ultimately warrant delisting. Rangewide species monitoring through use of standardized status surveys will be necessary to determine whether recovery criteria regarding population sustainability and habitat protections are being met. Additionally, standardized status surveys will assist in eliminating data shortfalls regarding whether occurrences are actually extant. "Occurrence" is defined by the California Natural Diversity Database as a location occupied by a species separated from other locations by at least 0.4 kilometer (0.25 mile), and may contain one or more populations. A "population" is defined as a group of organisms of one species, occupying a defined area small enough to permit interbreeding among all members of the group, and isolated to some degree from other members of the same species (Barbour *et al.* 1987, Lincoln 1993). The surveys will include the current status of threats, the historical management regimes associated with the species, and may identify additional species occurrences that will contribute to recovery.

4. Research

Many important aspects of species biology and management have not yet been studied. Thus, continued research, in conjunction with adaptive management is a crucial component of this recovery plan. Results of research will be used to refine habitat protection, habitat management, and species and ecosystem monitoring to more effectively meet recovery criteria. Recovery criteria and actions may be reevaluated for each species as research is completed.

Primary information needs for the species covered in this recovery plan are:

- surveys to determine species distributions;
- population censusing and monitoring;
- reproductive and demographic studies;
- habitat management technique research;
- restoration technique research;
- biosystematic and population genetics studies;
- studies of pesticide and herbicide effects; and
- habitat and species restoration trials.

5. Participation and Outreach

Participation of many groups, including other Federal, State, and local agencies, conservation organizations, private groups, interested stakeholders, and private landowners, will be essential to achieving the recovery goals for the covered species. This recovery plan includes establishing regional recovery implementation working groups representing a diversity of partners from stakeholder groups and Federal, State, and local agencies. These working groups will guide implementation of recovery actions within their regions necessary to achieve recovery goals. In addition to establishing participation of a broad range of partners in recovery implementation, outreach and education will be necessary to inform landowners and partners of recovery opportunities and to garner public support and participation in the recovery process.

Recovery Criteria: The ecosystem-level approach facilitates species recovery and conservation but does not negate the need to consider the requirements of each species. Thus, individual downlisting and/or delisting criteria are presented for each listed species covered in this recovery plan to track their progress towards recovery or conservation. Elements common to the downlisting/delisting criteria of most listed species include:

- protection from further habitat loss, fragmentation, and incompatible uses of the habitat to protect and maintain the full range of genetic and geographic variation in each species;

- development and implementation of appropriate habitat management plans for each species and area identified for protection;

- achievement of self-sustaining populations as determined through species monitoring and status surveys;

- completion of research necessary to refine measures to ameliorate or eliminate threats, and incorporation of results into habitat protection, management, and species monitoring efforts; and

- establishment of regional recovery implementation working groups and development of outreach and education programs to ensure public support and participation in recovery efforts.

Actions Needed: The actions needed to meet the recovery criteria are: 1) protect habitat within core areas, vernal pool regions, and all other areas that contribute to recovery, as appropriate; 2) refine areas for vernal pool conservation by conducting Geographic Information Systems, Remote Sensing, and other analyses; 3) restore habitat where needed and adaptively manage vernal pool conservation areas; 4) develop and implement standardized survey and monitoring protocols to determine success in meeting recovery criteria; 5) conduct research necessary to refine management techniques and recovery criteria; 6) develop and implement cooperative programs and partnerships by establishing regional recovery implementation working groups; and 7) develop and implement participation programs in the form of outreach and education.

Implementation Participation: Although we (the U.S. Fish and Wildlife Service) have the statutory responsibility for implementing this recovery plan, and only Federal agencies are mandated to take part in the effort, the participation of various stakeholders is the key to successful recovery of these species. This recovery plan recommends the establishment of regional recovery implementation working groups comprising all stakeholders and interested parties to develop participation plans, coordinate education and outreach efforts, assist in developing economic incentives for conservation and recovery, ensure that adaptive management is practiced, and oversee the recovery of the species covered in this recovery plan.

Total Estimated Cost of Recovery: The total estimated cost of downlisting/delisting the 20 federally listed species, and ensuring the long-term conservation of the 13 species of concern is broken down by priority of actions. Certain costs, such as securing and protecting specific areas of vernal pool habitat, are dependent on local economics, therefore they may vary from the estimates shown.

Priority 1 actions: $774,193,730

Those actions that must be taken to prevent extinction or prevent the species from declining irreversibly in the foreseeable future.

Priority 2 actions: $1,107,421,800

Those actions that must be taken to prevent a significant decline in the species population or habitat quality, or some other significant negative impact short of extinction.

Priority 3 actions: $202,926,340

All other actions necessary to meet the recovery and conservation objectives outlined in this recovery plan.

Date of Recovery: Recovery is defined in relation to a climatological cycle for most species covered in this recovery plan. If recovery criteria are met, we estimate most listed species covered in this recovery plan could be recovered by 2064 (58 years), based on the interval between the last two droughts of 5 years or longer. Some species, such as those with narrow distributions, could be recovered in less time.

Vernal Pool Recovery Plan Implementation: This recovery plan is designed to be implemented in a logical, progressive manner. Core areas are ranked as Zone 1, 2, or 3 in order of their overall priority for recovery. We anticipate 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 merit 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. Protection of Zone 2 core areas will significantly contribute to recovery of these species, and if sufficient might offset the need to protect some lands within the Zone 1 core areas. In general we consider recovery recommendations 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 important 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.

"Suitable habitat" is defined as habitat that contains the elements necessary for the continued existence of each individual species in this plan. The physical elements include at a minimum: vernal pool type, soil series, 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. Vernal pool habitat must be inundated sufficiently by rainfall at the appropriate time of year to allow the vernal pool crustaceans to reach maturity and reproduce and to allow the vernal pool plants to set viable seed. In addition to these elements, an essential, inseparable part of "suitable habitat" is the watershed

surrounding the vernal pools which collects and contributes water to the pools. Each species in this plan has a different suite of habitat requirements, though similarities exist and some of the species co-occur..

This recovery plan cannot be implemented in a static manner (*i.e.*, following a recipe) if recovery of the species is to be achieved. The threats and environmental conditions existing today may be vastly different from those that will be present in 5, 20, or 50 years. The plan is structured to enable the user to implement the plan based on the dynamics occurring on the land at that particular point in time when a new recovery action is implemented. Those responsible for implementing this plan must be able to determine, in coordination with us, what is the most appropriate course of action to benefit these species under changing circumstances, while still adhering to the basic structure of this recovery plan for reaching the goals of habitat protection and stable or increasing numbers of individuals.

The total costs of implementation of this recovery plan will depend on what level of effort is needed to achieve recovery for all species. For example, if recovery is achieved for species at the Zone 1 core area level, the cost would be approximately $773 million if fee title acquisitions, the most expensive manner to achieve habitat protection, were used exclusively for all recommended habitat protection actions. If, however, conservation easements are used as an option to protect land, rather than fee title acquisition, the recovery costs could be substantially reduced (*e.g.*, 40 percent or more in some cases).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PREFACE

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.

The designation of critical habitat is a regulatory process. 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. Additionally, critical habitat does not have to be designated if it is deemed not prudent to do so, either because it is a species that is threatened by certain human activities (*e.g*, vandalism or overcollecting), or the designation would not be considered beneficial to the species. Critical habitat must take into consideration the economic impact of the designation, and an area may be excluded if it is determined that the benefits of such exclusion outweigh the benefits of specifying such areas as critical habitat.

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.

Recovery plans, on the other hand are voluntary guidance documents, not regulatory documents, that 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. Recovery planning documents are necessarily expansive, identifying as many options and strategies that may contribute to recovery as possible. None of the actions or maps associated with this recovery plan carry any regulatory authority.

The Endangered Species Act clearly envisions recovery plans as the central organizing tool for guiding each species' recovery process. They should also guide Federal agencies in fulfilling their obligations under section 7(a)(1) of the Endangered Species Act which call on all Federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species..." In addition to outlining proactive measures to achieve the species' recovery, recovery plans provide context and guidance for the implementation of other provisions of the Endangered Species Act, such as section 7(a)(2) consultations with other Federal Agencies and the development of Habitat Conservation Plans.