ATTACHMENT P-1

STANDARD FIELD PROTOCOLS

CALIFORNIA TIGER SALAMANDER

State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME
1416 Ninth Street
Sacramento, California 95814

Inland Fisheries - Informational Leaflet No. 44

SURVEY PROTOCOL FOR CALIFORNIA TIGER SALAMANDER (*Ambystoma californiense*)[1,2,3]

INTRODUCTION

The California tiger salamander (CTS) is a California Department of Fish and Game (DFG) Species of Special Concern and a United States Fish and Wildlife Service (FWS) Candidate Species. Following review of a petition to list the species as federally Endangered (Long 1992), the FWS ruled that Threatened or Endangered status was "warranted but precluded" (Sorenson 1994). Current law states that the FWS must therefore evaluate the species' status annually and publish a ruling.

For purposes of environmental review of projects, the DFG considers the CTS to be a Threatened species under Section 15380(d) of the California Environmental Quality Act (CEQA). Refer to Jennings and Hayes (1994) for justification of the recommended "Threatened" status.

This protocol was developed to ensure that an adequate level of background examination and field work is conducted to determine the occurrence of the CTS on a specific site and to ensure an appropriate level of sensitivity when working with this animal. Also, by standardizing the survey effort and reporting information directly to existing agency databases, trends of salamander numbers at various locations can be monitored range-wide following baseline data provided by Shaffer et al. (1993) and others.

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1 Prepared by John M. Brode, Senior Biologist Specialist, Endangered Species Project, Inland Fisheries Division, Department of fish and Game, Rancho Cordova, CA 95670. (September, 1997).

2 Primary contributors were Mark L. Allaback, David M. Laabs, Richard B. Seymour, and Michael F. Westphal. Primary reviewers were Caitlin Bean and Mark R. Jennings.

3 This Protocol may be revised in the future as more information becomes available.

PROCEDURES

A site analysis shall be completed for each project. A habitat assessment shall be completed for each project within the range of CTS. Biological surveys shall be conducted until CTS are found or the criteria for a Negative Finding are met.

Site Analysis

The first task is to determine if the project site is within the historic range of CTS as provided by Jennings and Hayes (1994), Shaffer et al. (1993), and Stebbins (1985). If the parcel is no more than 1 km (0.62 mile) outside the recognized limit of the historic range of the species, it shall be considered to be within the range. The closest known breeding locality should be determined. A review of the DFG Natural Diversity Data Base and request for information on localities from the Endangered Species Office of the FWS are essential. Communications from both agencies must be documented. If the parcel is found to be more than 1 km (0.62 mile) outside the range of the species, the site analysis should include information in support of this determination.

Habitat Assessment

The CTS is most commonly associated with grasslands in rolling terrain or foothills that contain suitable underground retreats such as burrows of the California ground squirrel (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomyhs bottae)*. CTS have been found, however, in areas with no apparent undergound retreats (M. Allaback, W.Cox, G. Monk, pers. comm.). In these areas CTS may utilize cracks in the ground or may burrow into loose soil, or seek refuge in and under rotting logs or fallen branches. CTS have been observed in captivity to readily burrow into loose substrate such as decomposed oak leaves (W. Cox, pers. comm.). Breeding ponds are typically vernal pools or other small, temporary waters that fill during winter rains and are dry by mid-summer. CTS can utilize artificial impoundments (farm ponds), even permanent ones, if they do not contain fish. Refer to Jennings and Hayes (1994) for a more detailed discussion of suitable habitats. Sites which contain suitable breeding locations and upland habitat (or sites with upland habitat and potential breeding locations within 1 km [0.62 mile]) should be considered potential habitat. Characteristics of the site that should be recorded include topography, plant communities, presence and types of water bodies, fossorial mammal burrows, current land use, and a description of adjacent lands.

Biological Surveys

Biological surveys shall be conducted for all sites with potential habitat. Proper permits must be obtained from the DFG and FWS prior to conducting field surveys. Before nocturnal field work is conducted, the proper authorities (DFG wardens, local sheriff, etc.) must be notified. To obtain a permit, applicants must have prior experience working with CTS that demonstrates their ability to locate and identify all life stages. At least one individual with the required permit must be present to supervise or otherwise oversee field activities.

In 1994, the vernal pool tadpole shrimp (*Lepidurus packardi*), longhorn fairy shrimp (*Branchinecta longiantenna*), and Conservancy fairy shrimp (*Branchinecta conservatio*) were listed as Endangered, and the vernal pool fairy shrimp (*Branchinecta lynchi*) was listed as Threatened by the FWS (Nagano and Browning 1994). These species occupy seasonal wetlands within the range of CTS. A permit must be obtained from FWS that allows aquatic surveys for amphibians in vernal pool habitats within the range of listed crustaceans.

Nocturnal Surveys

Nocturnal surveys are used to detect CTS when they are active above ground during rainstorms. They can be observed at night, under certain conditions, before, during, and after breeding migrations, thereby providing a wide survey window.

A standard nocturnal survey requires five separate night surveys during the same weather year. All surveys must be conducted during optimal conditions or when CTS are known to be active in the region. Optimal conditions are during storm systems with 7-10°C (45-50°F) or greater air temperature when it has rained during the day and continues after dark. At least one visit must be performed during each of the months of December, January, and February. Two additional visits may occur during separate storm systems in these months or in November or March. A minimum of four person hours should be spent surveying during each visit at most study sites. Large sites may require more effort.

As a general guideline, two experienced surveyors can examine approximately 2 hectares (5 acres) of habitat in one hour, if the vegetation is not dense. Larger tracts of land containing multiple breeding locations should be sampled using randomized walk, quadrat, or transect design within 0-500 meters (0-1,640 feet) of breeding sites (Jaeger and Inger 1994, Crump and Scott 1994). The study design for large projects should be formulated in consultation with agency biologists or qualified researchers. Sampling 1-4 hectare (2.5-10 acre) plots within 0-500 meters (0-1,640 feet) of potential breeding locations is recommended.

Transects should be situated 5-15 meter (16-50 feet) apart. Transects should be walked slowly using flashlights and head-lamps to scan on either side of the transect. All mammal burrows should be inspected by looking down the tunnel as far as possible. Flagging suspected underground retreats and the perimeter of the site with reflective tape prior to the survey is helpful.

Depending on permit conditions, CTS should be sexed (see Stebbins 1985) if possible and measured (snout-vent and total length) before returning them to the exact capture location in the same direction of travel. Photographs of adult animals should be available for agency identification. Map all observations in relation to breeding locations and note apparent direction of travel. Quantify the survey effort by recording weather conditions, transect width, amount of area sampled, and person hours.

Aquatic Surveys

A standard aquatic survey requires two separate aquatic surveys during one calendar year. The first survey shall be conducted between March 15 and April 15 and the second between April 15 and May 15. There shall be at least 15 days between surveys. Surveys should not begin prior to March 15 in order to reduce disturbance to eggs and to facilitate larval identification. **Surveys for eggs should not be conducted.** Every suspected breeding location must be sampled twice during the same season if the initial visit was negative. Surveys initiated after 15 May can not be used to report negative findings because larvae may metamorphose by this time. Standard aquatic surveys must be performed at all potential breeding sites for two calendar years to support a negative finding.

CTS larvae, particularly small sizes under 35 mm (total length), are fragile and captured individuals should remain in nets only long enough to record an approximate total length measurement before being released. All other pool fauna should be treated with similar care. **Sampling should cease once presence has been determined in order to minimize disturbance of pool flora and fauna.**

In areas that contain numerous pools, the sampling effort should focus on pools expected to hold water for at least 10 weeks, which is approximately the minimum necessary for larvae to reach transformation (Feaver 1971). It is important to collect data regarding the type and quality of each pool sampled. At a minimum this data should include the date and time, location, type of water body (i.e. vernal pool, seasonal wetland, artificial impoundment, etc.), dimension and depth of pond, water temperature, turbidity, presence of aquatic vegetation (submergent and emergent), introduced species, and vertebrates and invertebrates present. Photographs of pools and adjacent upland areas are helpful and copies should be included in the final report.

All ponds should be initially sampled using D-shaped, long-handled dipnets (typically 30 cm [12 inches] or larger), with 3 mm (1/8-inch) mesh or smaller. Most shallow ponds approximately 3 m (10 feet) in diameter or smaller can be completely sampled with dipnets. Sample approximately 50 percent of the surface area of the pond by spacing dipnet sweeps accordingly from one end of the pool to the other in order to sample different depths.

If fairy shrimp or tadpole shrimp are located, sampling should cease until the animals are identified to species. Return fairy shrimp immediately back to the pond. Empty nets as completely as possible before sampling different pools in proximity in order to minimize inadvertent transfer of fairy shrimp and other species. For the same reasons, nets should be thoroughly rinsed before proceeding to the next study site to ensure that pool fauna are not transferred from one region to another.

Seining can be very disruptive and this method should only be used in large pools and impoundments after dipnetting has been unsuccessful and if fairy shrimp are not present. Fine-mesh minnow seines of varying lengths are used to sample larger pools of different depths and sizes. They should be ordered with weights along the bottom and floats along the top edge. Attach doweling (2.4 cm by 1.5 m [1 inch by 5 feet]) or PVC pipe to the end of the seine so the bottom edge can be dragged along the bottom of the pool (Shaffer, et al. 1994; Jennings, pers. comm.). Whenever possible, pull the seine from one edge of the pond to the other (Shaffer et al. 1994). Estimate the amount of surface area sampled.

Other Survey Methods

Under certain circumstances, this protocol may be combined with other survey methods, such as pit-fall/drift fence surveys, to determine the extent of negative effects on CTS from proposed projects or to conduct more detailed scientific research. However, modifications to this protocol will only be approved on a case-by-case basis in consultation with DFG personnel.

NEGATIVE FINDINGS

In order for a suggested negative finding to be accepted, it must be supported by one or more of the following conditions or minimum survey efforts:

1. The site analysis and/or habitat analysis demonstrate that the area is not suitable for CTS, or

2. Standard aquatic surveys in two consecutive years with one standard nocturnal survey during the second year survey window all have negative results, or

3. There is no aquatic habitat on site and a standard nocturnal survey is negative.

WRITTEN REPORT

A written report should be prepared that includes the following analyses and information:

1. Site Analysis: Determine if the site is within historic range of CTS. Describe current and past land-use practices. Conduct a thorough record search in order to document the closest known breeding locality. If the parcel is found to be outside the range of the species, the report should include information in support of this determination.

2. Habitat Assessment: Provide a site description including location, size, topography, soil type, plant communities, type of water bodies, fossorial mammals detected, current land

use, and information on adjacent lands. Include an assessment of the suitability of the site as upland and/or breeding habitat for CTS. Include a site map and representative photographs of upland and potential breeding habitat.

3. Nocturnal Surveys: Include date and time of each visit, weather conditions, transect spacing, area surveyed, time spent surveying, describe visibility (i.e. grass height and density, intensity of rainfall, etc.), enumerate or estimate the number of ground squirrel burrows examined (if present), map their distribution, and note presence of livestock. List all CTS measured, sexed, and photographed. Show locations of CTS on a site map.

4. Aquatic Surveys: Include the date, materials and methods used, time spent surveying, and estimate the surface area of each pond sampled. List the species of vertebrates and at least the order or family of invertebrates captured in each pool sampled.

5. Record locations of CTS, other special-status vertebrates, suspected introduced *Ambystoma* populations, and fairy shrimp on California Natural Diversity Data Base Field Survey Forms. Forms are available from the DFG (Natural Diversity Data Base, California Department of Fish and Game, 1416 Ninth Street, 12th floor, Sacramento, California 95814).

6. Include all required supporting information if a negative finding is being suggested.

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CALIFORNIA RED LEGGED FROG

February 18, 1997
U.S. Fish and Wildlife Service
Guidance on Site Assessment and Field Surveys for California Red-legged Frogs

I. Introduction

A final rule determining threatened status for the California red-legged frog under the Endangered Species Act of 1973, as amended (Act), was published on May 23, 1996 (61 *Federal Register* 25813) and became effective on June 24, 1996. Since then the United States Fish and Wildlife Service (Service) has received numerous requests from private and government entities for guidance in planning for the protection of the California red-legged frog at the sites of proposed developments or of other land use activities. This document provides guidance for two procedures to accurately assess California red-legged frog status in the vicinity of a project site: (1) an assessment of California red-legged frog locality records and potential California red-legged frog habitat in and around the project area; and (2) focused field surveys of aquatic habitats to determine whether California red-legged frogs are present. Both procedures may be recommended because California red-legged frogs are mobile and, during different life history stages or different seasons of the year, may occupy a variety of aquatic and upland habitats. Both procedures should be incorporated into any assessment of the potential effects of projects on California red-legged frogs, unless field surveys are determined to be unnecessary based on the site assessment (see "Interpreting the results of the site assessment" section).

Ongoing contact and discussions with the Service before, during, and after site assessments and field surveys are a crucial element of this guidance. Results of the site assessment and field surveys should also be reported to the Service (see "Reporting the results" sections below); however, results of the site assessment should be reported prior to proceeding with field surveys. The addresses and phone numbers of the appropriate field office are provided in section V below.

II. Site Assessment

Careful evaluation of the following information about California red-legged frogs and their habitats in the vicinity of projects or other land use activities is important because this information indicates the likelihood that California red-legged frogs may occur on the project site.

Protocol

1. Is the project site within the range of the California red-legged frog?

Because knowledge of the distribution of the California red-legged frog is likely to change as new locality information becomes available, surveyors should contact the appropriate Service field office (see section V below) to determine if a project site is within the range of this species.

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

To: Larry Hurst	From: Ray Beansfield
Dept./Agency:	Phone #: 808/644-1766
Fax #:	Fax #:

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

2 What are the known localities of California red-legged frogs within the project site and within 8 kilometers (km) (five miles) of the project boundaries?

The surveyor should consult the Natural Diversity Data Base (NDDB) maintained by the California Department of Fish and Game's Natural Heritage Division to determine known localities of California red-legged frogs. Information on the NDDB is attached to the end of this document. Other information sources on local occurrences of California red-legged frogs should be consulted. These sources may include, but are not limited to, biological consultants, local residents, amateur herpetologists, resource managers and biologists from municipal, State, and Federal agencies, environmental groups, and herpetologists at museums and universities. The surveyor should report to the Service all known California red-legged frog localities within the project site and within 8 km of the project boundaries.

3 What are the habitats within the project site and within 1.6 km (one mile) of the project boundaries?

Describe the upland and aquatic habitats within the project site and within 1.6 km of the project boundaries. The aquatic habitats should be mapped and characterized (e.g. ponds vs. creeks, pool, riffle, rootball, vegetation) The information provided in section 4 of the attached appendix serves as a guide to the features that will indicate possible California red-legged frog habitat.

Reporting the results of the site assessment. Surveyors should prepare a report that includes the following: photographs of the project site, survey dates and times, names of surveyors, a description of the methods used, and a map of the site showing habitat as requested in section II(3) above. The report should include copies of those portions of the 7.5' topographic quads that contain the site and the area within 1.6 km of its boundaries. A list of California red-legged frog localities as requested in section II(2) above should be included. The report should be provided to the appropriate Service field office (see section V below).

Interpreting the results of site assessment. After completing elements 1-3 of the site assessment above, the appropriate Service field office should be contacted for technical assistance. Based on the information provided from the site assessment, the Service will provide guidance on how California red-legged frogs should be addressed, including whether field surveys are needed or whether incidental take authorization should be obtained through section 7 consultation or a section 10(a)(1)(B) permit pursuant to the Act. A protocol for field surveys is presented below.

III. Field surveys

Frogs can be detected opportunistically in various habitats depending on weather and time of year. Aquatic sampling during the summer months is a reliable method of detecting frogs. Care should be taken to apply a level of effort and to use a style of surveying appropriate to the site. For instance, survey methods may differ according to habitat extent and type (e.g. deep pond,

shallow pond, creek). In addition, field work should be conducted according to the best professional judgement of the surveyor (e.g. dogs should not be brought on surveys as they disturb frogs). The Service recommends that surveyors have field experience in the identification of California amphibians. The Service is willing to cooperate with surveyors who have specific needs not addressed by this field survey protocol and who may wish to propose alternative methods

Protocol

1. Surveys should be conducted between May 1 and November 1. These sampling dates were selected because they allow surveys to be conducted with minimal disturbance of breeding frogs, eggs, or tadpoles during a period when frogs can be reliably detected.

2. All aquatic habitat identified during the site assessment should be surveyed four times, twice during the day and twice at night. Surveyors should wait at least twenty-four hours and possibly longer, to meet the environmental conditions described in section III(3) below, before repeating surveys at the same site.

3. Day-surveys should be conducted on clear, sunny days. Night-surveys should be conducted on warm, still nights between one hour after sunset and 12 midnight. Warm, still nights are preferable for surveying because the probability of observing frogs tends to decrease under cold, windy conditions. In some circumstances where safety issues preclude night-surveys, the Service can provide alternatives to the surveyor on a case-by-case basis to ensure that safe surveys are conducted.

4. Surveyors should work along the entire shore (either on the bank or in the water), visually scanning all shoreline areas in all aquatic habitats identified during the site assessment. This methodology should be applied to both day- and night-surveys. In the case of water bodies covered with floating vegetation such as duckweed, both the shoreline and surface of the water should be scanned. When wading, surveyors should take maximum care to avoid disturbing sediments, vegetation, and any visible larvae. When walking on the bank, surveyors should take care to not crush rootballs, overhanging banks, and stream side vegetation that might provide shelter for frogs.

5. When conducting night-surveys for eyeshine, flashlights and headlamps that use one 6-volt or four to six D-cell batteries are recommended. High-powered spotlights are prohibited to avoid harming frogs.

6. Although not required, photographs of frogs observed during field surveys may aid in verification of species identifications. Surveyors should limit photography to the extent necessary to document the presence of California red-legged frogs and should not attempt to photograph frogs if this is likely to disturb them.

Reporting the results of field surveys. Any information on California red-legged frog distribution resulting from field surveys should be sent to the Natural Diversity Data Base (NDDB) administered by the Natural Heritage program of the California Department of Fish and Game. Information about the NDDB is attached to the end of this document. Copies of the NDDB form should be mailed immediately to both the Service and CDFG.

Surveyors should also prepare a final report that includes the following: copies of all field notes, data sheets, photographs of the project site and of frogs observed, and a typed summary providing survey dates and times (both begin and end times), names of surveyors, temperature (water and air), wind speed, a description of the methods used, numbers and size classes of all amphibians observed, a map of the site showing survey locations, habitat and frog sightings, a copy of the NDDB form, and a description of possible threats to California red-legged frogs observed at the site. The report should be provided to the appropriate Service field office (see section V below).

Interpreting the results of field surveys. Based on the results of field surveys, the Service will provide guidance on how California red-legged frog should be addressed. If California red-legged frogs are found, the Service will work with the project proponent through the section 7 or section 10(a)(1)(B) process to determine a further course of action, including the consideration of avoidance or minimization measures and whether incidental take authorization is needed. If frogs are observed but not identified to species, additional survey effort may be recommended. If the Service recommended that field surveys be conducted and if California red-legged frogs were not identified during these field surveys conducted according to this protocol, the Service will consider the California red-legged frog not to be present on the project site and will not recommend any further take avoidance or mitigation measures. The Service may question the results of field surveys conducted under this protocol for any of the following reasons: 1) if the appropriate Service field office was not contacted prior to field surveys being conducted; 2) if field surveys were conducted in a manner inconsistent with this protocol; 3) if field surveys were incomplete; or 4) if the reporting requirements, including submission of NDDB forms, were not fulfilled.

IV. Statement on permitted activities.

This field survey protocol allows for conducting visual surveys for California red-legged frogs. Surveys following this protocol do not require a section 10(a)(1)(A) recovery permit pursuant to the Act. Activities that would require a section 10(a)(1)(A) recovery permit include: 1) any capture or handling of California red-legged frog adults, larvae, or eggs; 2) any activity intended to significantly modify the behavior of California red-legged frogs; 3) any activity that subjects California red-legged frogs to some environmental condition not naturally present (e.g. experiments designed to study a frog's response to heat, moisture, noise) other than low-level illumination for night surveys as described in section III(5), and 4) any survey methods not covered in this field survey protocol if any form of "take" would occur during such activities. All surveyors using this field survey protocol should make all possible efforts to avoid unintentionally disturbing California red-legged frogs or their habitat. Surveyors should direct inquiries about

section 10(a)(1)(A) recovery permits to the Service's Regional Office (see section V below).

V. Service Contacts

For project sites and land use activities in Santa Cruz, Monterey, San Benito, San Luis Obispo, Santa Barbara, and Ventura Counties, portions of Los Angeles and San Bernardino Counties outside of the Los Angeles Basin, and portions of Kern, Inyo and Mono Counties east of the Sierra Crest and south of Conway Summit, contact:

Ventura Field Office,
2493 Portola Road, Suite B
Ventura, California, 93003
(805/644-1766).

For project sites and land use activities in all other areas of the state south of the Transverse Ranges, contact:

Carlsbad Field Office
2730 Loker Avenue West
Carlsbad, California, 92008
(619/431-9440).

For project sites and land use activities in all other areas of the state, contact:

Sacramento Field Office
3310 El Camino Avenue, Suite 130
Sacramento, California 95821
(916/979-2725).

For information on section 10(a)(1)(A) recovery permits, contact:

Regional Office,
Eastside Federal Complex
911 N.E., 11th Avenue
Portland, Oregon 97232-4181
(503) 231-6241.

CALIFORNIA RED-LEGGED FROG SURVEY PROTOCOL AT THE CASMALIA HAZARDOUS MATERIALS LANDFILL, SANTA BARBARA COUNTY

Lawrence E. Hunt, Herpetologist
5 March 1999, Revised Protocol

Introduction. This document details the field surveys that will be conducted at the Casmalia Landfill site to fulfill the requirements set forth by U.S. Fish and Wildlife Service (USFWS) and Environmental Protection Agency (EPA) personnel. These surveys are intended to build upon the initial presence/absence surveys conducted in 1998, to give a more detailed idea of the distribution, habitat use, and reproductive potential of California red-legged frogs (*Rana aurora draytonii*) in water storage basins within the landfill boundaries.

The proposed survey methods are customized from the standard USFWS survey protocol in order to provide information on the current status of frogs at the landfill and potential project-related impacts to this species. The surveys will attempt to detect larval, subadult, and adult red-legged frogs, so that the occurrence and spatial distribution of breeding can be evaluated. Attempts also will be made to locate egg masses so that oviposition sites can be mapped and characterized. The type, spatial occurrence, and areal extent of potential oviposition habitat will be described, estimated, and mapped.

Survey Area. The A-Series Pond, the RCF Pond, and Pond 13, which were partially surveyed in 1998, will be re-surveyed. Ponds A-5 and 18 will be surveyed for the first time under this protocol. The entire perimeters of these ponds will be surveyed.

Survey Timing. Surveys will be conducted between 8 March and 10 April 1999.

Survey Personnel. The surveys will be directed by Lawrence E. Hunt, with assistance from either Thomas E. Olson or Kim Glinka of Garcia and Associates, Lompoc.

Survey Protocol. U.S. Fish and Wildlife Service has issued a standard survey and site assessment protocol for California red-legged frogs (USFWS memorandum, dated 18 February 1997). We will follow this protocol, with the following exceptions:

- The surveys will occur between 8 March and 10 April. Three daytime and three nighttime surveys will be conducted. Day-time surveys will occur between 0800 hours and sunset. Night-time surveys will occur between 1-2 hours after sunset and midnight.

- Within and around each pond the day-time surveys will focus on locating subadult frogs, visual searches for larvae, mapping potential oviposition sites, and mapping potential subadult and adult retreat sites (e.g., burrows, rip-rap, etc.).

Casmalia Landfill Red-legged Frog Survey Protocol
(continued)

- Visual surveys for larvae will be conducted at several locations around the perimeter of each pond. Care will be taken to locate the sampling sites away from potential oviposition sites so that egg masses will not be disturbed. Development stage and relative numbers of larvae will be recorded to gain information on relative abundance of larvae in each pond.

- In addition to the standard walking surveys, the larger ponds such as the A-series Pond and RCF Pond A require using a boat or kayak in order to effectively reach all shoreline areas. Preferably, a kayak will be used in all ponds because the steep sides and/or dense vegetation around most ponds limit consistent survey intensities.

- Night-time surveys will consist of headlamp or flashlight surveys to detect eyeshine along the perimeter of each pond, again using a rowboat wherever possible. Perimeter surveys will include inspection of all burrows and cover objects to detect occupancy. Relative numbers, habitat use, size class, and location of all frogs will be recorded. At least one night-time survey of the wetland/seep north of Pond A-5 also will occur.

- Egg masses, subadult, and adult frogs will not be handled or otherwise disturbed. The surveys are intended only to visually assess egg masses and count frogs, so handling is unnecessary.

Data Collection and Reporting. Each pond will be characterized in the following manner: survey counts of larval, subadult, and adult frogs; number and location of egg masses; habitat map, and; potential retreat site map. This information will be summarized and presented in the Biological Assessment as an appendix. This information will aid in evaluating potential project-related impacts which may arise during landfill closure operations, as well as suggest mitigation measures to offset potential impacts. Management recommendations for protecting and enhancing red-legged frog habitat on-site will be made.

SOUTHWESTERN POND TURTLE

SOUTHWESTERN POND TURTLE - SURVEY METHODOLOGY

Size and sex of WPTs - With some practice, it is possible to identify the sex of WPTs at a considerable distance, even if only the head or shell is visible (see Fig. 3). Estimating the size of turtles takes some practice. A useful technique is to cut out turtle figures of a known carapace length and place them at typical survey distances (50-100 m) and estimate lengths until you become comfortable with the practice and can accurately classify animals to +/- 20 mm carapace length. A series of pre-measured figures are provided for your use in Appendix C. These should be photocopied, cut out and the size written on the back. Conventionally, we record estimated carapace lengths of all animals observed where possible in 20 mm increments, i.e. 30-50, 50-70, 70-90, 90-110, 110-130, 130-150, 150-170, 170-190 and 190-210. If it is not possible to determine the approximate size of the animal, it should be classified as either an adult (>110 mm) or juvenile (<110 mm).

Notes: There should be at least 2-3 lines on the form for notes from the surveyor. These could include behavioral observations, habitat descriptions (if not a standardized part of the form), or other information.

Survey Methodology: Western pond turtles are an extremely wary species and any survey efforts should be conducted with this in mind. The species has excellent vision and hearing, and will see see a potential observer before the observer sees them. The typical response to disturbance is flight/escape behavior. If this occurs the observer may be able to see turtles re-emerge onto basking sites if they take care to conceal themselves and restrict movement. For a more detailed description of escape behavior see Holland (1985a). Some general considerations on survey methods follows.

Observers: Ideally, any personnel involved in any type of survey work on WPTs should have considerable familiarity with the species. Practically, this is unlikely. At the time of writing (Dec 1991) there are approximately 2 dozen people known to the author that can accurately survey WPT populations. Given the number, nature and distribution of ongoing or planned WPT research projects this number will increase in the next few years. Inexperienced observers may not accurately assess the relative or total abundance of the species either at a given site or in total. As such, for persons or agencies planning survey efforts it would be wise to contact your state wildlife agency for recommendations in this matter.

Clothing, movement and behavior: Surveyors should dress so as to blend with the surroundings - avoid bright colored clothing. In certain cases it appears that high contrast between the skin and clothing (i.e. light-colored skin, dark clothing) should be avoided. Long sleeves and pants are often a good idea given the amount of poison oak, nettles, blackberries and other itchy-scratchy plants that occur in WPT habitat. WPTs have color vision and will more rapidly respond to "flashes" of color or contrast than to dull-colored clothing. Surveyors should move slowly and take advantage of existing cover where possible to screen your movements from the turtles. Avoid loud noises, and if it is necessary to talk do so in a subdued voice. Turtles will often initiate escape behavior on the basis of auditory stimuli alone.

Binoculars and Spotting Scopes: The use of binoculars and spotting scopes is recommended. A good pair of 7 x 35 or 8 x 40 binoculars are adequate for most survey work. Wide-field binoculars are less suitable than those with a narrow field of view. Spotting scopes offer some advantages over binoculars, the most obvious being the increased level of magnification possible.

Timing of Surveys: There are two important temporal considerations when surveying for WPTs. First, it appears that there are "peaks" of activity that occur within the diurnal regime of WPTs. Second, there are peaks of apparent abundance that also occur in relation to the time of year. Daily activity may begin in some areas as soon as the sun rises, but most typically turtles begin to engage in emergent basking by 0900-1000 h, with the maximum # turtles being observed at a given site typically being noted by about 1000 -1100 (Holland, 1985a; Bernard, 1991). This may vary with the time of year - in the late summer months emergent basking may peak by 1000 or may not occur at all (see Thermoregulation). In some areas such as the central coast of California there may be a smaller peak at approximately 1500-1630 h. As such, most surveys should be initiated by at least 0900 and terminated by 1700-1800 unless a more complete picture of daily activity periods is desired. Seasonal variation is a very important consideration in surveys. The percentage of turtles in a population likely to be consistently observed appears to peak in late spring-early summer. There may be considerable geographic variation in this regard; surveys in Washington (F. Slavens, K. Slavens, pers. comm.) indicate an apparent peak in observable numbers of turtles occurring in late April-early May. Along the central coast of California, the peak occurs in late May-June. In most areas visual surveys conducted during August-September will note turtles in areas where they are moderately abundant but may miss them in areas of low abundance. This will also vary with the weather preceeding a given survey (see below). Thus, surveys should generally concentrate on the seasonal period when turtles are most likely to readily observable in numbers proportional to their true abundance (see below), typically late April-early May to July-early August.

It is important to insert a note of caution at this point. Visual surveys alone only rarely observe the majority of members of a population - the rule of thumb based upon a large number of concurrent visual and mark and recapture surveys is that the maximum number of animals observed is <u>usually</u> only about 20% of a given population. Repeated surveys, especially in conjunction with mark-and recapture efforts, may be necessary to accurately assess the size and structure of a given population. Visual surveys also have the disadvantage of being biased towards the larger members of the population for two reasons - 1) larger turtles are easier to see and 2) smaller turtles often utilize different microhabitats in which typical visual surveys are less effective. As such, depending upon the goals of the project, visual surveys alone may not be adequate to answer some of the questions posed.

Temperature/Weather: WPTs are active at a wide range of air and water temperatures. The level and type of activity may often be dependent upon the the differential between the two. In general, most activity takes place when water temperatures are between 16 and 28 degrees Celsius, and air temperatures between 14 and 34 degrees Celsius. Turtles may be active at water temperatures as low as 8 degrees and as high as 39 degrees Celsius. Turtles have been noted moving overland during the winter months at air temperatures as low as 5 degrees Celsius, and during the summer months at temperatures as high as 36 degrees. In situations where air temperatures are actually or effectively (due to wind) lower than water temperatures, turtles may be active but may not engage in emergent basking. In situations where water temperatures are consistently in excess of 28-30 degrees emergent basking may also be very rare. A useful "trick" to observe animals that are aquatic basking in floating vegetation is to "pop" the water surface by cupping the hand and striking the water surface so as to make a "popping" noise. Turtles will often respond to this by elevating the head and neck out of the water to locate the source of the sound, and can thus be censused. Turtle activity may decline dramatically during changes in weather, particularly during the spring when cold fronts following a period of warm weather may effectively eliminate emergent basking for extended periods of time. Turtles may also move overland during periods when weather fronts move through an area, particularly when rain occurs (see oviposition).

Trapping, Mark and Recapture and other survey methods: An important consideration prior to the initiation of any studies involving WPTs is the matter of legality. WPTs are protected by state law in all areas in which they occur. Any efforts which involve handling or even potential disturbance of animals require scientific collecting permits from the appropriate state wildlife agency. Failure to obtain proper permits may have severe consequences for the potential surveyor and/or associated parties. Should the species become listed under the provisions of the Endangered Species Act Federal permits will also become necessary. Given the number of parties involved in ongoing and planned research, it would be wise to contact the appropriate state wildlife agency to prior to the initiation of any research to avoid potential complications in regard to disturbance or interference with ongoing studies. Alternately, I will act as a temporary "clearing house" in this respect until a more formal procedure can be developed. Correspondence can be sent to me at the address previously noted.

Each survey method has both advantages and disadvantages. The advantages of trapping are that 1) it is relatively "low-cost" in terms of time and effort 2) it can be conducted with a minimum of training and 3) it potentially allows multiple sites to be surveyed within a short period of time. The disadvantages are 1) trapping results tend to be heavily adult-biased, as small animals either will not enter the traps or can easily escape 2) traps are initially difficult to set 3) animals quickly become "trap-shy" 4) the possibility of mortality is greater with this method than any other and 5) non-"target" species may be taken. Mark and recapture efforts have the advantages of 1) accurate assessment of population size and structure 2) collection of important ancillary data on reproductive status, growth, survivorship and habitat utilization patterns and 3) allowing some level of comparison with other such studies. The disadvantages are that 1) it is relatively "expensive" in terms of time and effort 2) it requires specialized training and 3) it limits the number of sites that can be surveyed within a given time period. The advantages of visual surveys are that 1) they are relatively "cheap" in terms of time and effort and 2) they allow multiple surveys to be conducted within limited time periods. The disadvantages are that 1) properly conducted visual surveys require some specialized training and/or knowledge 2) survey results are often heavily dependent upon variation in local topography, observer skill, weather and other factors and 3) a large number of surveys may be necessary to accurately assess size and structure of a population.

The preferred method of population estimation survey combines various aspects of all three of these methods. Ideally, inital surveys should be conducted through snorkeling or skin-diving for turtles and the turtles captured should be weighed, measured, marked and released at the exact site of capture. As with other techniques, diving requires a considerable amount of skill and knowledge of the habits of the species to be effective as a survey method. At minimum, the captured animal should be sexed, weighed to the nearest gram and the straight-line carapace length measured to the nearest mm (Fig. 60). Additional linear measurements can be taken at the discretion of the surveyor. Notes should be taken on the presence of scars, missing limbs or or shell/shield abnormalities. Assessment of the reproductive status of females is valuable information but requires some training (see below). Animals can be marked by making shallow (4-5 mm) notches in the marginal shields with a small-medium fine-toothed triangular file. This produces a permanent mark that is known in some cases to last for at least 23 years. Small animals (<60 mm) can be marked by cutting small notches out of the appropriate shields with a pair of iridectomy or other small scissors. As previously noted (see above and Fig. 58), an existing marking system is already in extensive use. As I have marked large numbers of turtles in over 100 localities throughout their range, please contact me before any marking efforts are initiated. The use of two marking systems and efforts at a site has the potential to create enormous problems.

Turtles may be marked to assist in follow-up visual surveys. The preferred method is to use white fingernail polish and paint a large two-digit number on both sides of the carapace. The size of the number should vary with the size of the turtle, but should normally occupy a significant percentage of the 2nd and 3rd costals (see Fig. 60). The nail polish, if allowed to dry well (20-30 min) before replacing the animal in the water, will last 4-8 weeks under normal circumstances. I do not recommend marking any animal under 90 mm carapace length or gravid females as the potential increased exposure to predation almost always outweigh the benefits of the data collected. Turtles marked with this system are often

identifiable at distances in excess of 100 m with 7 x 35 binoculars.

Continuation of the survey can be conducted through repeated hand-sampling (by diving), visual surveys and/or trapping. A typical trap is shown in Fig. 61. The dimensions on this trap are not fixed, and could be increased (particularly in length) to suit the needs of a particular survey. This trap is collapsible - removal of the 4 support rods allows the trap to telescope to a height of approximately 10-12 cm. Cost per trap averages about $7-10 for materials, and construction time with practice requires 1.5-2 h. The metal framework of the trap can be made of either mild steel or aluminum; however steel is easier to weld in most cases. Netting should be secured relatively tightly to the frame - loose areas allow possible entanglement of turtles and risk of drowning. The netting should be ONLY 1" NON-STRETCH netting - cotton will work but deteriorates more rapidly than nylon. Stretch netting may entangle and drown turtles. Traps can be baited with fresh fish, but I have generally found canned sardines or herring ("fish steaks") in oil to be more effective. All bait, whether canned or fresh, should be tied to the bottom of the trap. The funnel/neck of the trap should always be placed "up" (toward the surface of the water). Placement of the trap may be critical to success - ideally traps should be placed in shallow water near foraging areas and on or near basking sites. Traps should be placed so that at least 4-5 cm of the netting on one end will protrude above the surface to allow breathing space for turtles. Traps should be placed and firmly secured so as to preclude any possibility of the trap slipping into deeper water, thus possibly drowning turtles. The time it takes for turtles to enter traps seems to vary widely - I have captured turtles within 20 min of placement and on other occasions it may take several days for the turtles to enter the trap. In general, traps should be placed in the water early in the morning (prior to 0700), checked at least every 2-3 h and removed just before dark.

Although WPTs are a remarkably tough species, handling should be limited to minimize stress. Data collection and marking should be done as quickly and efficiently as possible, and the animal returned to the exact site of capture. Survey tools usually include a clipboard for data forms, a 20 l plastic bucket to temporarily hold turtles, a pair of 200-300 mm calipers, several small-medium triangular files (they dull quickly) and a 1 kg scale with a minimum accuracy of 10 g.

LEAST BELL'S VIREO

U.S. Fish and Wildlife Service
LEAST BELL'S VIREO SURVEY GUIDELINES

1. The Service requires a minimum of eight surveys, one per week, from mid-April to mid-June in all riparian habitat within one-half mile of the project site. These dates encompass the period during which most least Bell's vireo nesting activity occurs. If additional information on least Bell's vireo habitat use is needed, these surveys should be extended to the end of August. These later surveys will typically reflect a broader extent of the riparian habitat and other adjacent habitat types that least Bell's vireos use during the latter phase of the breeding season, especially when the young become independent of the adults.

2. Surveys must be conducted by a qualified biologist familiar with song and plumage characteristics of the least Bell's vireo.

3. Surveys shall be conducted between dawn and 11:00 a.m. Surveys shall avoid periods of excessive heat, wind, or rain.

4. All least Bell's vireo detections (e g., vocalization points, areas used for foraging, etc.) should be used to define individual home range. These data should be mapped on a large-scale aerial photograph.

5. Data on least Bell's vireo breeding status (e.g., number and location of paired and unpaired territorial males, nest building efforts, feeding of nestlings, location of least Bell's vireo nests, etc.) should be noted during each survey.

6. All sightings of brown headed cowbirds and their numbers in least Bell's vireo territories should be noted during each survey.

7. No attempt should be made to locate or examine least Bell's vireo nests unless authorized by permits issued by the California Department of Fish and Game and the U.S. Fish and Wildlife Service.

8. A final report should be prepared which describes survey dates, methods, locations, and information identified in items 4, 5, and 6 above.

If a full complement of surveys is not performed, and suitable habitat is present, the Service assumes that least Bell's vireos are present.

SOUTHWESTERN WILLOW FLYCATCHER

SECTION 2: THE SURVEY PROTOCOL

A number of factors conspire to make southwestern willow flycatcher surveys relatively difficult and anything but straightforward. The willow flycatcher is one of ten *Empidonax* flycatchers common in North America, all of which look very much alike. Like all *Empidonax*, willow flycatchers are nondescript in appearance, making them difficult to see in dense breeding habitat. Although the willow flycatcher has a characteristic *fitz-bew* song which distinguishes it from other birds (including other *Empidonax*), willow flycatchers are not vocal at all times of the day or during all parts of the breeding season. Because southwestern willow flycatchers are rare and require relatively dense riparian habitat, they may occur only in a small area within a larger riparian system, thus decreasing detectability during general bird surveys. Migrating willow flycatchers (of all subspecies) often sing during their migration through the Southwest, and could therefore be confused with local breeders. In addition, southwestern willow flycatchers are in breeding areas for only 3–4 months of the year. Surveys conducted too early or late in the year would fail to find flycatchers even at sites where they breed.

These life history characteristics and demographic factors influence how southwestern willow flycatcher surveys should be conducted. This protocol is based on the use of repeated tape-playback surveys during pre-determined periods of the breeding season, to confirm presence or absence at a site. Such species-specific survey techniques are necessary to collect reliable presence/absence informa- tion for rare species (Verner 1985, Bibby et al. 1992, Reed 1996).

Currently, federal endangered species permits are required for surveys in all USFWS regions where the southwestern willow flycatcher breeds. State permits may also be required before you can survey within any of the states throughout the southwestern willow flycatcher's range: be certain to check with the appropriate state wildlife agency in your area.

The primary objectives of this protocol are to provide a standardized survey technique to detect southwestern willow flycatchers and determine breeding status, and provide consistent and standardized data reporting. The survey technique will, at a minimum, help determine presence or absence of the species in the surveyed habitat for that breeding season.

This protocol is designed for use by persons who are non-specialists with *Empidonax* flycatchers or who are not expert birders. However, surveyors must have sufficient knowledge, training, and experience with bird identification and surveys to distinguish the willow flycatcher from other non-*Empidonax* species, and recognize the willow flycatcher's primary song. Surveys conducted improperly or by unqualified or inexperienced personnel may lead to unwarranted and inaccurate results.

Surveys conducted by qualified personnel in a consistent and standardized manner will enable continued monitoring of general population trends at and between sites. Annual or periodic surveys in cooperation with state and federal agencies should aid resource managers in fulfilling their basic information needs for the southwestern willow flycatcher.

The first version of this protocol (Tibbitts et al. 1994) has been used extensively and successfully for three years. Hundreds of flycatcher surveys conducted throughout the Southwest since 1994 have taught us much about the usefulness and application of this survey technique. Two important lessons are: (1) the tape-playback technique works and detects flycatchers that would have been overlooked; and (2) with appropriate effort, general biologists without extensive experience with *Empidonax* can find and verify willow flycatcher breeding sites.

This revised protocol is still based on tape-playback techniques and detection of singing individuals. However, it includes changes in the

timing and number of surveys to increase the probability of detecting flycatchers and to help determine if they are breeders or migrants. Changes in the survey data sheets make them easier to use and submit, and allow reporting all site visits within a single year on one form.

This protocol does **not** address issues and techniques associated with nest monitoring or other flycatcher research activities. Those efforts are beyond the scope usually needed, and require advanced levels of experience and skills to gather useful data and avoid potential negative effects to the flycatcher.

Biologists who are not expert birders or specialists with regard to *Empidonax* flycatchers can effectively use this protocol. However, users must attend the mandatory southwestern willow flycatcher survey training workshop, and have knowledge and experience with bird identification and ecology sufficient to effectively apply this protocol. See **Contacts** section (page 29)for a listing of agencies offering survey training workshop.

Permits

Currently, all USFWS regions within the southwestern willow flycatcher breeding range require that all persons conducting surveys per this protocol obtain endangered species permits. It may take several months to receive permits, so apply early to avoid delays in starting your surveys. State permits may also be required. Check with the appropriate state wildlife agency. You must also obtain permission from government agencies and private landowners prior to conducting any surveys on their lands.

Pre-survey Preparation

Surveyors should study drawings and photographs of willow flycatchers, and where possible, examine study skins or mounts. It is critical for surveyors to be familiar with willow flycatcher vocalizations before going in the field. Although the *fitz-bew* song is the basis of verifying detections using this protocol, willow flycatchers use many other vocalizations that are valuable in locating birds and breeding sites. We **strongly** encourage that all surveyors learn as many vocalizations as possible (see Stein 1963). If possible, study recordings of southwestern subspecies; tapes are available through the contacts listed at the end of this protocol. Several commercial bird song tapes include willow flycatcher vocalizations, but these tapes typically include only a few vocalizations and the dialects may differ from those in the southwest.

If possible, visit known willow flycatcher breeding sites (but only after obtaining landowner or management agency permission) to become familiar with flycatcher appearance, behavior, vocalizations, and habitat. Such visits are usually part of the standardized flycatcher survey workshops. All visits should be coordinated with USFWS, State wildlife agencies, and the property manager/owner, and must avoid disturbance to resident flycatchers.

Surveyors must be able to identify, by sight and vocalizations, other species likely to be found in survey areas which may be confused with southwestern willow flycatchers. These include Bell's vireo (*Vireo bellii*), western wood-pewee (*Contopus sordidulus*), young or female vermillion flycatchers (*Pyrocephalus rubinus*), and other *Empidonax* flycatchers. At a distance, partial song or call notes of Bell's vireo, ash-throated flycatchers (*Myiarchus cinerascens*) and some swallows can sound considerably like a *fitz-bew*. Surveyors should also be able to identify (by sight and sound) brown-headed cowbirds. It is worthwhile to make one or more pre-survey trips to the survey sites (or other similar areas) to become familiar with the local bird fauna.

Be prepared to work hard and remain focused and diligent in a wide range of physically demanding conditions. At many sites these include heat, cold, wading or swimming through flowing or stagnant water, muddy or swampy conditions, crawling through dense thickets (often on hands and knees), and exposure to snakes, skunks, and biting insects. Familiarity with the survey site **prior** to the first surveys is the best way to be prepared for the conditions you will experience.

Equipment

The following equipment is necessary to conduct the surveys:

(1) **USGS topographic maps of the area** (a marked copy to be attached to survey data sheet). Be sure to ALWAYS submit a copy of a topo map with survey area and flycatcher sightings clearly marked.

(2) **Standardized survey form** (bring more copies than you think you need).

(3) **Lightweight tape player** (with adequate volume to carry well; use portable speakers if necessary).

(4) **Extra tape player and batteries** (dirt, water, dust and heat often cause equipment failure, and having backup equipment helps avoid aborting a survey due to equipment loss).

(5) **Willow flycatcher tapes**; two or more tapes per surveyor (tapes DO get damaged and wear out in the field, extra tapes are very important). One tape per surveyor can be obtained through the contacts listed in the back of this protocol (you will have to make your own copies).

(6) **Clipboard and permanent (waterproof) ink pen** (we recommend recording survey results directly on the survey data form, to assure that you collect and record all required data).

(7) **Aerial photograph** (if available). Aerial photographs can significantly improve your surveys by allowing you to accurately target your efforts, thus saving time (and energy) in the field. Check with local planning offices and/or state/federal land management agencies for availability. Take color xerox copies, not the original aerials, with you in the field. Aerials are also very useful when submitting your survey results, but cannot be submitted in place of a topographic map.

(8) **Binoculars and bird field guide.**

The following equipment is recommended:

(1) **Camera and film** (for habitat photos—especially at sites where flycatchers are found).

(2) **GPS unit**—for determining survey coordinates and verifying location of survey plots on topo maps.

(3) **Survey flagging** (conservative earth-tone colors)—for marking survey sites and/or areas where flycatcher are detected. Check with the local land owner or management agency before flagging sites.

All survey results (both negative and positive) should be recorded directly on data forms when possible. These data forms have been designed to prompt surveyors to record key information crucial to interpretation of survey results and characterization of study sites. Even if no flycatchers are detected or habitat appears unsuitable, this is valuable information and should be recorded. Standardized data forms are provided in Appendix 1.

Willow flycatcher surveys are targeted at this species and require a great deal of focused efforts. Surveyors must be constantly alert and concentrate on detecting flycatcher responses. Therefore, field work such as generalized bird surveys (e.g., point counts or walking transects) or other distracting tasks should not be conducted during willow flycatcher surveys. Avoid bringing pets or additional people who are not needed for the survey. Dress in muted earth-tone colors, and avoid wearing bright clothing.

Willow Flycatcher Identification:

Physical Description

The southwestern willow flycatcher is a small bird, approximately 15 cm long and weighing about 11-12 g. Sexes look alike, and cannot be distinguished by plumage. The upper parts are brownish-olive; a white throat contrasts with the pale olive breast, and the belly is pale yellow. Two white wing bars are visible (juveniles have buffy wing bars), and the eye ring is faint or absent. The upper mandible is dark, and the lower mandible light. The tail is not strongly forked. When perched, the willow flycatcher often flicks its tail upward. The *Empidonax* flycatchers are a difficult groups of birds to distinguish by appearance.

For the purpose of this protocol, identification of willow flycatchers cannot be made by sight alone; vocalizations are a critical identification criterion.

Vocalizations

Given that willow flycatchers look a lot like other *Empidonax* flycatchers that may be present at survey sites, the most certain way to verify willow flycatchers in the field is by their vocalization. Willow flycatchers have a variety of vocalizations (see Stein 1963, McCabe 1991), but two are most commonly heard during surveys or in response to tape-playback:

(1) ***Fitz-bew.*** This is the willow flycatcher's characteristic primary song (note that it is **not** unique to the southwestern subspecies). Male willow flycatchers may sing almost continuously for hours, with song rates as high as one song every few seconds. Song volume, pitch, and frequency may change as the season progresses. During prolonged singing bouts, *fitz-bews* are often separated by short *britt* notes. *Fitz-bews* are most often given by a male, but studies have shown female willow flycatchers also sing, sometimes quite loudly and persistently (though generally less than males). Flycatchers often sing from the top of vegetation, but will also vocalize while perched or moving about in dense vegetation.

(2) ***Whitt.*** This is a call often used by birds on their territory, and is commonly heard even during periods when the flycatchers are not singing (*fitz-bewing*). The *whitt* call appears to be a contact call between sexes, as well as an alarm call, particularly when responding to disturbance near the nest. *Whitt* calls can be extremely useful for locating willow flycatchers later in the season (when *fitz-bewing* may be infrequent), but are easily overlooked by inexperienced surveyors. When flycatcher pairs have active nests (particularly once young have hatched), *whitts* may be the most noticeable vocalization. However, many species of birds *whitt*, and a *whitt* is **not** a diagnostic characteristic for willow flycatchers.

The *fitz-bew* and *whitt* calls are the primary vocalizations used to locate willow flycatchers. However, other less common willow flycatcher vocalizations can be very useful in alerting surveyors to the presence of flycatchers. These include twittering vocalizations (typically given during interactions between flycatchers and sometimes between flycatchers and other birds), bill snapping, and *wheeo's*. Because these sounds can be valuable in locating territories, they should be studied prior to going in the field. Willow flycatcher vocalization tapes are available from the agency contacts listed at the end of this protocol. Refer to Stein (1963) for detailed discussions of flycatcher vocalizations.

Willow flycatcher song rates are highest early in the breeding season (late May - early June), and appear to decline after eggs hatch (Flett and Sanders 1987, Sogge and Tibbitts 1992). However, in areas with many territorial flycatchers or where an unpaired flycatcher is still trying to attract a mate, singing rates may be high well into July (Craig et al. 1992, Sogge 1995b). Isolated pairs can be much quieter and harder to detect than pairs with adjacent territorial flycatchers (M. Whitfield, pers. comm.). At some sites, pre-dawn singing (0330 - 0500 hrs) appears to continue strongly at least through mid-July (Sogge et al. 1995, Petterson and Sogge 1996). Singing rates may increase again later in the season, possibly coinciding with renesting attempts.

There are some periods during which willow flycatchers do not sing and even the use of tape-playback sometimes fails to elicit any response. This can be particularly true late in the breeding season (Sogge et al. 1993, Muiznieks et al. 1994). Early and repeated surveys are the best way to maximize the odds of detecting a singing flycatcher and determining its breeding status.

Special Considerations

To avoid adverse impacts to willow flycatchers, follow these guidelines when performing all surveys:

(1) Obtain all necessary federal, state, and agency permits **prior** to conducting any surveys. Failure to do so leaves you liable for violation of the Endangered Species Act and state laws.

(2) Do not play the tape more than necessary and/or needlessly elicit vocal responses once willow flycatchers have been located and verified. This may distract resident birds from caring for eggs or young, or defending their territory. Excessive tape playing may also attract the attention of predators or brood parasites. Stop playing the survey tape as soon as you have confirmed the presence of a willow flycatcher at that locale, and do not play the tape again until you have moved to the next survey location.

(3) Proceed cautiously while moving through willow flycatcher habitat. Continuously check the area around you to avoid disturbance to nests of willow flycatchers and other species. Do not break understory vegetation, even dead branches, to create a path through the surveyed habitat.

(4) Do not approach known or suspected nests. Nest searches and monitoring require specific state and federal permits, and are not intended to be a part of this survey protocol.

(5) If you find yourself close to a nest (or a suspected nest), move away slowly to avoid startling birds. Avoid physical contact with the nest or nest tree, to prevent physical disturbance and leaving a scent. Do not leave the nest area by the same route that you approached. This leaves a "dead end" trail which could guide a potential predator to the nest/nest tree.

(6) Watch for and note the presence of potential predators and nest parasites, particularly ravens, crows, jays, magpies, and cowbirds. If such predators are in the immediate vicinity, wait for them to leave before playing the tape.

(7) If you use flagging to mark an area where flycatchers are found, use earth-tone colors and make certain the flagging is not near an active nest. Check with the property owner or land management agency before flagging to be sure that similar flagging is not being used for other purposes in the area. Unless conducting specific (and authorized/permitted) nest monitoring, flagging should be placed no closer than 30 m to any nest. Keep flagging inconspicuous from general public view to avoid attracting people or animals to an occupied site, and remove it at the end of the breeding season.

Timing and Number of Visits

Performing repeated surveys during the early to mid-nesting season maximizes the likelihood of detecting flycatchers and determining their breeding status. Single surveys, or surveys conducted too early or late in the breeding cycle, do not provide definitive data and are of little value. This survey protocol requires a **minimum** of three surveys at each site, one during each period outlined below, to document absence of willow flycatchers. Also, successive surveys must be **at least 5 days** apart; surveys conducted more closely are **not** considered to be in separate survey periods.

Survey 1: 15 - 31 May

The timing of this survey is intended to coincide with the period of high singing rates in newly arrived males, which tends to begin in early to mid-May. This is one of the most reliable times to detect flycatchers that have established their territories. However, not all territorial males may have arrived by this time, and migrants (of all subspecies) may still be present and singing during this period.

Survey 2: 1 - 21 June

During this period, the earliest arriving males may already be paired and singing less, but later arriving males should still be singing strongly. This survey can provide insight about the status of flycatchers detected during survey 1 (e.g., if detected during survey 1 but not survey 2, the first detection may have been a migrant). Conversely, detecting a flycatcher at the same site on surveys 1 and 2 increases the likelihood that the bird is not a migrant (but does not necessarily confirm it). Survey period 2 is also the earliest time during which

you are likely to find nesting activity by resident birds.

Survey 3: 22 June - 10 July

Southwestern willow flycatchers should have arrived on their territories by this time. Flycatcher singing rates may have lessened, and most paired flycatchers will have initiated nesting activity. Migrant willow flycatchers should no longer be passing through the southwest; therefore, any flycatchers that you detect are probably resident breeders or nonbreeding floaters. Surveyors should determine if flycatchers detected during surveys 1 and/or 2 are still present, and watch closely for nesting activity.

Southwestern willow flycatchers may not arrive and/or initiate breeding activities at higher elevation sites (above 2000 m) until early June, possibly later in some years due to weather or migration patterns. Therefore, flycatcher breeding chronology may be "set back" one or two weeks at such sites and surveys should be conducted in the latter part of each period.

It may not require three trips to verify flycatcher presence and/or breeding status. If, for example, willow flycatchers are found during surveys 1 or 2 and are observed carrying nest material, this is conclusive verification of breeders as opposed to migrants. However, three trips is the **minimum** necessary to determine with relative confidence that willow flycatchers are probably **not** breeding at a site in that year. Table 1 provides general guidance for interpretation of survey results.

Table 1. Interpretations of willow flycatcher survey results (assuming no observer error).

Survey results				Interpretation
Flycatchers detected during survey? Yes/No			Breeding activity observed[1]	
#1	#2	#3		
N	N	N	not applicable	A - Flycatchers not present at site
N or Y	N or Y	N	none	B - Flycatchers present, but probable migrants
N or Y	N or Y	Y	none	C - Flycatchers territorial, potential[2] breeders
N or Y	N or Y	Y	presence of another "unchallenged" willow flycatcher in the immediate vicinity (indicates possible pair); *whitt* or interaction calls between nearby flycatchers; countersinging or physical aggression against another flycatcher; physical aggression against cowbirds	D - Flycatchers territorial, probable breeders
N or Y	N or Y	Y	willow flycatchers copulating; flycatcher carrying nest material, food or fecal sac; an active nest; adult flycatchers feeding fledged young	E - Flycatchers territorial, definite breeders

[1]Important note: Evidence of flycatcher breeding activity may be seen during any survey. This immediately signifies possible, probable, or definite breeding status, depending on the nature of the observation. Conclusive signs of breeding activity (as listed in E above) during survey periods 1 or 2 verifies actual (or attempted) breeding at the site, even if no flycatchers are detected during period 3.

[2]If a flycatcher is detected in the third survey period but no breeding activities are seen, the flycatcher should be considered a potential breeder. Potential breeders include unmated territorial birds, or mated pairs for which breeding activity simply was not observed.

We strongly encourage additional follow-up visits to sites where resident flycatchers are verified or suspected. Extra visits provide greater confidence about presence or absence of flycatchers at a site, as well as help in estimating the number of breeding territories or pairs, and determining breeding status and the outcome of breeding efforts. However, avoid returning to a site so often as to damage the habitat, establish or enlarge trails, or cause undue disturbance to the flycatchers.

Survey Methods

The survey methods described below fulfill the primary objectives of documenting the presence or absence of willow flycatchers, and determining their status (territorial vs migrant). This protocol is primarily a tape-playback technique, a proven method for eliciting response from nearby resident willow flycatchers (Seutin 1987, Craig et al. 1992, Sogge and Tibbitts 1994, Sferra et al. 1995). At each site, surveyors should broadcast recorded willow flycatcher songs, and look and listen for responses. In addition to maximizing the likelihood of detecting nearby flycatchers, this method also allows for positive identification by comparison to the "known" willow flycatcher tape.

Documenting Presence / Absence

Begin surveys as soon as there is enough light to safely walk (about one hour before sunrise) and end by about 0900 - 1000 hrs, depending on the temperature, wind, background noise, and other environmental factors. If observers are camped in or near potential willow flycatcher habitat, afternoons and evenings can be spent in reconnaissance of the site(s) and planning a survey strategy for the following morning. If camped immediately adjacent to survey sites, surveyors can awaken early and listen for flycatchers singing during the predawn period (0330 - 0500 hrs), when territorial males often sing loudly.

Conduct surveys from within the sites if it is possible to do so without breaking vegetation or damaging the habitat. Flycatchers often respond most strongly if the tape is played from within the habitat and territory, rather than from the periphery. In addition, it can be surprisingly difficult to hear singing willow flycatchers that are even a short distance away amidst the noise generated by many other singing and calling birds. Therefore, it is preferable to survey from within the habitat, but always move carefully to avoid disturbing habitat or nests. Surveying can be done from the periphery where terrain, extremely dense vegetation, or deep water prohibit walking through the habitat.

Because flycatchers may be clustered within only a portion of a habitat patch, it is critical to survey all suitable habitat within the patch. Small linear sites may be thoroughly covered by a single transect through the patch. For larger sites, choose a systematic survey path that assures complete patch coverage throughout the length and breadth of the site. This may require multiple transects, serpentine, zig-zag or criss-cross routes. Aerial photographs are valuable tools to help plan and conduct surveys, and to assure complete coverage. Always move carefully through the habitat to avoid disturbing vegetation or nests.

Initially approach each site and stand quietly for 1 - 2 minutes or longer, listening for spontaneously singing flycatchers. A period of quiet listening is important because it helps acclimate surveyors to background noises (which can be quite loud due to roads, aircraft, machinery, waterways). It also allows surveyors to recognize and "filter out" the songs and calls of other bird species, letting them focus attention on listening for flycatchers. Although it happens rarely, some singing willow flycatchers will actually stop vocalizing and approach quietly in response to a broadcast song. Therefore, playing a tape before listening for singing individuals has at least some potential of reducing detectability.

If you do not hear singing flycatchers during the initial listening period, broadcast the willow flycatcher song tape for 15 - 30 seconds, then listen for approximately 1- 2 minutes for a response. Repeat this procedure (including a 10 - 20 second

quiet pre-broadcast listening period) every 20 - 30 m throughout each survey site, more often if background noise is loud. The tape should be played at about the volume of natural bird calls, and not so loud as to cause distortion of the broadcast. We recommend tapes include a series of *fitz-bews* interspersed with several *whitts*.

Response to the broadcast call could take several forms. Early in the breeding season (approximately May - mid-June), a responding willow flycatcher will usually move toward the observer and sing (*fitz-bew*) from within or at the top of vegetation. Actively territorial willow flycatchers almost always vocalize strongly when a tape is played in their territory early in the season. If there are several flycatchers present in an area, some or all may start singing after hearing the tape or the first responding individual. Flycatchers can often hear the tape from far away but will not usually move outside of their territory, so listen for distant responses. Another common response is alarm calls (*whitts*) or interaction twitters from within nearby vegetation, particularly once nesting has begun. Willow flycatchers will often sing after a period of *whitting* in response to a tape, so surveyors should remain in the area and quietly listen for *fitz-bews* for several minutes. Because some flycatchers may initially respond by approaching quietly, particularly during periods 2 and 3, it is critical to watch carefully for responding birds.

For the purpose of this protocol, detection of a *fitz-bew* song is **essential** to identify a bird as a willow flycatcher. Similar appearing species (including other *Empidonax* flycatchers) occur as migrants, and even breeders, at potential willow flycatcher sites. A few of these other species may even approach a broadcast willow flycatcher song and respond with vocalizations. In order to standardize interpretation of survey results and assure a high degree of confidence in surveys conducted by biologists of varying experience and skill, positive identification must be based on detection of the willow flycatcher's most unique characteristic —its song. It is important to remember that the *whitt* call is **not** unique to willow flycatchers, and therefore cannot serve as the basis of a positive identification. However, *whitts* are extremely useful for locating flycatchers and identifying areas needing follow-up visits. Loud, strong *whitting* may indicate a nearby nest, dictating that surveyors exercise extra caution moving through the area.

Whenever a willow flycatcher (suspected or verified) is detected, be careful not to overplay the song tape. Excessive tape playing could divert the bird from normal breeding activities, and/or attract the attention of predators and brood parasites. Overplaying the tape may constitute "harassment" of the flycatcher, and is not needed to verify species identification. If you have heard even a single *fitz-bew*, this is sufficient for verification (although flycatchers usually sing repeatedly once prompted). If you have played a tape several times and a bird has approached but has not *fitz-bewed*, DO NOT CONTINUE PLAYING THE TAPE. If a "potential" willow flycatcher responds (approaches or *whitts*) but does not sing, it is best to carefully back away and wait quietly. If it is a willow flycatcher, it will probably sing within a short time (5 - 10 minutes). Another option is to return to the same site early the following morning to listen for and/or attempt to elicit singing again.

Once a flycatcher is detected and verified, surveyors may continue the survey (if more survey habitat remains) until the entire site is completed. If continuing the survey, move 20 - 30 m past the current detection before again playing the tape, and try to avoid "double-counting" flycatchers that have already responded. Willow flycatchers may follow the broadcast song for 50 m or more (Sogge and Tibbitts 1994).

Looking for and Recording color bands

Several on-going research projects involve the capture and banding of willow flycatchers at breeding sites across the southwest. In many projects, each flycatcher is banded with a unique combination of small colored plastic leg bands (one or more per leg), and a USFWS numbered aluminum band

(which will appear silver). Surveyors may find color-banded individuals at their sites, and identification of the band combination will provide important data on flycatcher movements, survivorship, and site fidelity.

To look for bands, move to get a good view of the flycatchers legs. This may be difficult in dense vegetation, but flycatchers often perch on more exposed branches at the edges of their territory or habitat patch. If bands are seen, carefully note the band colors. If there is more than one band on a leg, differentiate the top (farthest up the leg) from the bottom (closest to the foot), and those on the bird's left leg versus the right leg. If you are unsure of the color, DO NOT GUESS. Instead, record the color as unknown and attempt to get a better look during your next visit. Incorrect color-band data is worse than incomplete data, so only record colors of which you are certain. The fact that a banded bird was seen, even without being certain of its color combination, is very important information. Record the color-band information on the survey form, and report the sighting to the appropriate state or federal contact as soon as you return from the survey.

Determining the Number of Territories and Pairs

Accurately determining the number of breeding territories and pairs is more difficult than determining simple presence or absence. Flycatcher habitat is usually so dense that visual detections are difficult, and seeing more than one bird at a time is often impossible. Flycatchers sing from multiple song perches within their territories, sometimes appearing to be more than one flycatcher. A flycatcher responding to or following a surveyor playing a tape may move considerable distances in a patch and thus be counted more than once. Resident territorial male flycatchers often sing strongly, but so do many migrants and females, particularly in response to tape-playback (Seutin 1987, Unitt 1987, Sogge et al. in press). Even recently fledged (6–8 wk old) willow flycatchers may respond to a tape by singing (Sogge in press). Rangewide, many territorial male flycatchers are unmated, particularly those in small breeding groups (USFWS data). Clearly, each singing flycatcher may not represent a territory or a mated pair.

Given sufficient time, effort and observation, it is usually possible to approximate the number of territories and pairs. First, determine the number of singing individuals by listening carefully for simultaneously singing flycatchers. Note the general location of each bird (aerial photographs can be useful for this purpose). Spend some time watching each flycatcher to determine approximate boundaries of its territory, and to determine if and how it interacts with other flycatchers. If one or more singing birds stay primarily in mutually exclusive areas, they can be considered as separate territories. To determine if a flycatcher is paired, watch for interactions within a territory. Refer to the **Determining Breeding Status** section that follows for signs of pairing and breeding activity. Do not report a territorial male as a pair unless you observe one or more of the signs listed below. In some cases, it may be possible only to estimate the number of singing individuals. In others, it may take multiple site visits to differentiate territories or pairs.

Determining Breeding Status

One way to determine if the flycatchers found at a particular site are migrants or territorial is to find out if they are still present during the "non-migrant" period, which is generally from about 15 June - 20 July (refer to Figure 4 [page 13]; Unitt 1987). A willow flycatcher found during this time is probably a resident bird on a territory (although there is a small chance it could be a non-territorial "floater"; Sogge and Tibbitts 1994, Sogge et al. in press). If the management question is simply whether the site is a potential breeding area, documenting the presence of a territorial flycatcher during this time period may meet all survey objectives, and the site may not need to be re-surveyed during the remainder of that breeding season.

However, in some cases it may be important to determine whether breeding and nesting efforts are actually taking place. At many currently known breeding sites, some males maintain territories well into July yet never succeed in attracting a mate (Sogge 1995b, Petterson and Sogge 1996, Sferra et al. 1997). Thus, an assumption that a singing male represents a breeding pair may not be well founded (especially in small populations).

The best way to determine whether a pair is present and breeding is to move a short distance away from where the bird was sighted, find a good vantage point, and sit or lie quietly to watch for signs of breeding activity. Signs of breeding activity include:

a) observation of another "unchallenged" willow flycatcher in the immediate vicinity (indicates possible pair);
b) *whitt* calls between nearby flycatchers (indicates possible pair);
c) interaction twitter calls between nearby flycatchers (indicates possible pair);
d) countersinging or physical aggression against another flycatcher or bird species (suggests territorial defense);
e) physical aggression against cowbirds (suggests nest defense);
f) observation of willow flycatchers copulating;
g) flycatcher carrying nest material (verifies nesting attempt, but not nest outcome);
h) flycatcher carrying food or fecal sac (verifies nest with young, but not nest outcome);
i) locating an active nest (see special considerations section above);
j) observation of adult flycatchers feeding fledged young (verifies successful nesting).

You may be able to detect flycatcher nesting activity, especially once the chicks are being fed. Adults feed chicks at rates of up to 30 times per hour (Sogge 1995b), and the repeated trips to the nest tree or bush are often quite evident. Be sure to note on the flycatcher survey form any breeding activity that is observed, including detailed descriptions of the number of birds, specific activities observed, etc. Also note the location of breeding activities on an aerial photograph, map, or sketch of the area.

The number of flycatchers found at a site can also provide a clue as to whether they are migrants or territorial residents. Early season detections of single, isolated willow flycatchers often (but not always) turn out to be migrants. On the other hand, discovery of a number of willow flycatchers at one site usually (but not always) leads to verification that at least some of them remain as breeders. This underscores the importance of completing a thorough survey of each site to be confident of the approximate number of flycatchers present.

Documenting Presence of Cowbirds

Brown-headed cowbirds significantly impact many southwestern willow flycatcher populations by decreasing or eliminating flycatcher productivity, nesting success, and juvenile survival (Unitt 1987, Brown 1988, Whitfield 1990, USFWS 1993, Sogge 1995a and b, Whitfield and Strong 1995, Sferra et al. 1997, Sogge et al. in press). It is important to document if cowbirds occur at a flycatcher breeding site to determine if those flycatchers are at risk from cowbird brood parasitism. As noted earlier, another reason to watch for cowbirds is to avoid attracting cowbirds to a flycatcher territory or making flycatcher nests more detectable to cowbirds.

Surveyors should look and listen for cowbirds at, and in the vicinity of, the survey site. This requires that surveyors are able to identify cowbirds by sight and vocalizations. The latter is particularly important because cowbirds are often heard even when not seen in the dense habitat at flycatcher sites. Accurate estimation of cowbird numbers at a site is often difficult. Cowbirds may be either very inconspicuous or very prominent. They often travel in groups, with individuals and groups ranging over wide areas during short periods of time. A count may be high or low depending on the activities of a cow-

bird flock ranging in the area. Because of the difficulty in accurately estimating cowbird abundance, the flycatcher survey form requests simple presence/absence data. A relative estimate of cowbird abundance can be included in the comment section.

Reporting Results

Fill in all appropriate information on the willow flycatcher survey form while still in the field, and mark the location of detections on a copy of the USGS topographic map. Make a habit of reviewing the form before you leave any site—trying to remember specific information and recording it later leads to missing and inaccurate data. Put the location of the sighting on an aerial photograph or sketch of the site. Whenever a willow flycatcher territory or nest site is confirmed, notify the USFWS or appropriate state wildlife agency (see **Contacts** section, page 29) as soon as you return from the field.

Complete a survey form (Appendix 1) for each site surveyed, whether or not flycatchers are detected. "Negative data" (e.g., a lack of detections) is important to document absence of willow flycatchers and help determine what areas have already been surveyed. Make and retain a copy of each survey form, and **submit the original.** Survey forms must be returned to the USFWS and/or the appropriate wildlife agency by the specified deadline. Contact the appropriate agency each year to find out the submission deadline date. Timely submission of survey data is a permit requirement, and will ensure the information is included in annual statewide and regional reports.

ACKNOWLEDGMENTS

This survey protocol is based primarily on the earlier southwestern willow flycatcher survey protocol (Tibbitts et al. 1994), and owes much to previous U.S. Forest Service guidelines (Craig et al. 1992). The experience and insights of literally dozens of surveyors contributed greatly to the development of this protocol—we are grateful to all of them. The authors greatly appreciate the technical advice and assistance of William Haas, Phillip Unitt, and Mary Whitfield. Helpful reviews were provided by Darrell Ahlers, Troy Corman, Charles Drost, William Haas, Jen Owen, Eben Paxton, Ingri Quon, Jay Rourke, Linda Sogge, and Mary Whitfield. Unpublished data was graciously provided by William Haas, Thomas Huels, Robert McKernan, and Mary Whitfield. The cover illustration was drawn by Troy Corman. The Arizona Game and Fish Department, U.S. Bureau of Reclamation, and U.S. Geological Survey contributed funds for preparation and distribution of this report.

Contacts: Personnel at the following agencies can be contacted for information about willow flycatcher survey training, research permits, and to report flycatcher detections.

STATE AGENCIES

Arizona Game and Fish Dept. 602/942-3000
Nongame Branch
2221 W. Greenway Rd.
Phoenix, AZ 85023

California Dept. of Fish and Game 916/653-7664
1416 Ninth Street
Sacramento, CA 95814

Colorado Division of Wildlife 970/249-0855
151 E. 16th St
Durango, CO 81301

Nevada Division of Wildlife 702/688-1500
Box 10678
Reno, NV 89520

New Mexico Dept. of Game & Fish 505/827-9904
Endangered Species Program
Villagra Building
Santa Fe, NM 87503

Texas Parks and Wildlife Dept. 512/389-4800
3000 IH-35 South, Suite 100
Austin, TX 78704

Utah Div. of Wildlife Resources 801/538-4764
Nongame Avian Program Coordinator
1596 West North Temple
Salt Lake City, UT 84116

FEDERAL AGENCIES

U.S. Fish and Wildlife Service:

Region 1 (includes CA, NV) 503/231-2063
911 NE 11th Ave, Portland, OR 97232

CA Carlsbad Field Office 760/431-9440
2730 Loker Ave
Carlsbad, CA 92008

Sacramento Field Office 916/979-2710
2800 Cottage Way, Rm. E-1803
Sacramento, CA 95825

Ventura Field Office 805/644-1766
2493 Portola Rd, Suite B
Ventura, CA 93003

NV Nevada State Office 702/784-5227
4600 Kietzke Ln, Bldg C, Rm 125
Reno, NV 89502

Region 2 (includes AZ, NM, TX): 505/248-6647
P. O. Box 1306, Albuquerque, NM 87103

AZ AZ Ecological Services 602/640-2720
2321 W. Royal Palm Rd, Suite 103
Phoenix, AZ 85021

NM NM Ecological Services 505/761-4525
3530 Pan American Hwy. NE, Suite D
Albuquerque, NM 87107

TX 611 E. 6th St., Suite 407 512/389-4505
Austin, TX 78701

Region 6 (includes CO, UT) 303/236-7904
P.O. Box 25486, Denver Federal Center
Denver, CO 80225

CO 764 Horizon Dr, South Annex A 970/243-2778
Grand Junction, CO 81506

UT Lincoln Plaza, Suite 404 801/524-5001
145 East 1300 South
Salt Lake City, UT 84115

GUIDELINES FOR ASSESSING THE EFFECTS OF PROPOSED PROJECTS ON RARE, THREATENED, AND ENDANGERED PLANTS AND NATURAL COMMUNITIES

Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities

State of California
THE RESOURCES AGENCY
Department of Fish and Game
December 9, 1983
Revised May 8, 2000

The following recommendations are intended to help those who prepare and review environmental documents determine **when** a botanical survey is needed, **who** should be considered qualified to conduct such surveys, **how** field surveys should be conducted, and **what** information should be contained in the survey report. The Department may recommend that lead agencies not accept the results of surveys that are not conducted according to these guidelines.

1. Botanical surveys are conducted in order to determine the environmental effects of proposed projects on all rare, threatened, and endangered plants and plant communities. Rare, threatened, and endangered plants are not necessarily limited to those species which have been "listed" by state and federal agencies but should include any species that, based on all available data, can be shown to be rare, threatened, and/or endangered under the following definitions:

A species, subspecies, or variety of plant is "endangered" when the prospects of its survival and reproduction are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, or disease. A plant is "threatened" when it is likely to become endangered in the foreseeable future in the absence of protection measures. A plant is "rare" when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens.

Rare natural communities are those communities that are of highly limited distribution. These communities may or may not contain rare, threatened, or endangered species. The most current version of the California Natural Diversity Database's List of California Terrestrial Natural Communities may be used as a guide to the names and status of communities.

2. It is appropriate to conduct a botanical field survey to determine if, or to the extent that, rare, threatened, or endangered plants will be affected by a proposed project when:

a. Natural vegetation occurs on the site, it is unknown if rare, threatened, or endangered plants or habitats occur on the site, and the project has the potential for direct or indirect effects on vegetation; or
b. Rare plants have historically been identified on the project site, but adequate information for impact assessment is lacking.

3. Botanical consultants should possess the following qualifications:

a. Experience conducting floristic field surveys;
b. Knowledge of plant taxonomy and plant community ecology;
c. Familiarity with the plants of the area, including rare, threatened, and endangered species;
d. Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
e. Experience with analyzing impacts of development on native plant species and communities.

4. Field surveys should be conducted in a manner that will locate any rare, threatened, or endangered species that may be present. Specifically, rare, threatened, or endangered plant surveys should be:

a. Conducted in the field at the proper time of year when rare, threatened, or endangered species are both evident and identifiable. Usually, this is when the plants are flowering.

When rare, threatened, or endangered plants are known to occur in the type(s) of habitat present in the project

area, nearby accessible occurrences of the plants (reference sites) should be observed to determine that the species are identifiable at the time of the survey.

b. Floristic in nature. A floristic survey requires that every plant observed be identified to the extent necessary to determine its rarity and listing status. In addition, a sufficient number of visits spaced throughout the growing season are necessary to accurately determine what plants exist on the site. In order to properly characterize the site and document the completeness of the survey, a complete list of plants observed on the site should be included in every botanical survey report.

c. Conducted in a manner that is consistent with conservation ethics. Collections (voucher specimens) of rare, threatened, or endangered species, or suspected rare, threatened, or endangered species should be made only when such actions would not jeopardize the continued existence of the population and in accordance with applicable state and federal permit requirements. A collecting permit from the Habitat Conservation Planning Branch of DFG is required for collection of state-listed plant species. Voucher specimens should be deposited at recognized public herbaria for future reference. Photography should be used to document plant identification and habitat whenever possible, but especially when the population cannot withstand collection of voucher specimens.

d. Conducted using systematic field techniques in all habitats of the site to ensure a thorough coverage of potential impact areas.

e. Well documented. When a rare, threatened, or endangered plant (or rare plant community) is located, a California Native Species (or Community) Field Survey Form or equivalent written form, accompanied by a copy of the appropriate portion of a 7.5 minute topographic map with the occurrence mapped, should be completed and submitted to the Natural Diversity Database. Locations may be best documented using global positioning systems (GPS) and presented in map and digital forms as these tools become more accessible.

5. Reports of botanical field surveys should be included in or with environmental assessments, negative declarations and mitigated negative declarations, Timber Harvesting Plans (THPs), EIR's, and EIS's, and should contain the following information:

a. Project description, including a detailed map of the project location and study area.
b. A written description of biological setting referencing the community nomenclature used and a vegetation map.
c. Detailed description of survey methodology.
d. Dates of field surveys and total person-hours spent on field surveys.
e. Results of field survey including detailed maps and specific location data for each plant population found. Investigators are encouraged to provide GPS data and maps documenting population boundaries.
f. An assessment of potential impacts. This should include a map showing the distribution of plants in relation to proposed activities.
g. Discussion of the significance of rare, threatened, or endangered plant populations in the project area considering nearby populations and total species distribution.
h. Recommended measures to avoid impacts.
i. A list of all plants observed on the project area. Plants should be identified to the taxonomic level necessary to determine whether or not they are rare, threatened or endangered.
j. Description of reference site(s) visited and phenological development of rare, threatened, or endangered plant(s).
k. Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms.
l. Name of field investigator(s).
m. References cited, persons contacted, herbaria visited, and the location of voucher specimens.