EIP

Planning and Resource Management for Our Communities and the Environment

2 April 2002

Scott E. Shewbridge
Senior Engineer - Hydroelectric
El Dorado Irrigation District
2890 Mosquito Road
Placerville, California 95667

Subject: Technical Memorandum Number 3 – Summary of Field Surveys for Bata (*Chiroptera*)

Dear Mr. Shewbridge:

Attached please find final results for the above-referenced report prepared by EIP Associates as requested by the Forest Service for the El Dorado Irrigation District project license application, FERC No. 184. This is a final draft for distribution. The primary preparers of this report are listed below:

EIP Associates
Roy Leidy
Soraya Romero
Russell Kobayashi, RPF No. 2725

Should you have any questions or wish to discuss this report please contact me.

Sincerely,

Roy Leidy

Roy Leidy
Director, Fisheries and Aquatic Resources

Attachment

1200 Second Street Suite 200 Sacramento CA 95814 Phone 916.325.4800 Fax 916.325.4810 e-mail rleidy@eipassociates.com

EL DORADO IRRIGATION DISTRICT
FEDERAL ENERGY REGULATORY COMMISSION
PROJECT NUMBER 184

SUMMARY OF FIELD SURVEYS FOR BATS (*CHIROPTERA*)

Background and Chronology of Events

On 17 April 1998, Pacific Gas and Electric Company (PG&E) and the El Dorado Irrigation District (EID) filed a joint application with the Federal Energy Regulatory Commission (FERC) to transfer the FERC license for the El Dorado Hydroelectric Project (FERC Project No. 184) from PG&E to EID[1]. PG&E's existing federal license for the El Dorado Hydroelectric Project was due to expire on 23 February 2002. By letter dated 22 June 1998, the El Dorado Irrigation District notified government agencies and other interested parties that it intended to prepare and file an Application for New License with FERC for the El Dorado Hydroelectric Project (Project). Enclosed with that letter was an Initial Stage Consultation Package (ISCP) prepared by EID in compliance with Title 18 of the Code of Federal Regulations (CFR), Section 16.8. The ISCP contained information about the El Dorado Hydroelectric Project and requested the review and comment of government agencies and other interested parties. EID held a public meeting on 23 July 1998, with government agencies and other interested parties to discuss the licensing of the Project and the ISCP.

Subsequent to the issuance of the ISCP, EID issued on 31 July 1998, a Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) for, among other topics, the permanent repair of facilities of the El Dorado Project damaged in the January 1997 flood. Repairs included canal repair, tunnel construction between Bull Creek and Mill Creek, and diversion dam reconstruction. The NOP was issued pursuant to the California Environmental Quality Act (CEQA), independent of the FERC licensing process. The information on the permanent repair of project facilities was not included in the ISCP issued on 22 June 1998.

On 11 August 1998, the U.S. Department of Agriculture, Forest Service, Eldorado National Forest and Lake Tahoe Basin Management Unit, in cooperation with the California Department of Fish and Game, released a proposed response to the ISCP for public comment. Subsequently, the Forest Service held two informal open-house meetings on 20 August and 27 August 1998, to receive public input on the proposed response. The Eldorado National Forest and Lake Tahoe Basin Management Unit responded formally to EID's ISCP, and the CEQA-related NOP, by letter dated 21 September 1998.

[1] PG&E continued to remain the FERC licensee until the license was transferred by FERC to EID on 2 April 1999.

Specifically, the Forest Service requested the following specific study related to bats (page 50, *Forest Service Response to Initial Stage Consultation Package*, 22, September 1998):

> Study 7. Field surveys to identify potential roosting or hibernation sites for Townsend's big-eared bats or pallid bats in the vicinity of areas that would be affected by new construction or reconstruction activities.

Specific locations for surveys were not identified. No other government agencies or interested parties responding to the ISCP recommended specific surveys for bats.

On 29 June 1999, the first visual survey for roosting bats using the existing El Dorado Tunnel located between Alder Creek and Mill Creek was completed. Shortly thereafter, El Dorado National Forest provided EID with two example bat survey protocols and field forms via lettered dated 8 July 1999.

On 16 July 1999, EID formally submitted its Application for License Amendment to allow for the repair the damaged main section of the existing El Dorado Diversion Dam and to replace the damaged section of the El Dorado Canal with a 9,400-foot long bypass tunnel between Mill Creek and Bull Creek.

In a meeting between EID and El Dorado National Forest on 17 August 1999, agreement was reached that the bat surveys (species not specified) referred to in the Forest Service's response to the ISCP would be conducted at the Bull Creek portal[2], the Alder Creek spoils pile[3], and at the El Dorado Powerhouse (Figure 1). In addition, the Forest Service committed to providing "bat house" plans to EID.

The U.S. Department of the Interior, Fish and Wildlife Service (FWS), requested that FERC enter into formal consultation regarding the licensing and amendment of license for the El Dorado Hydroelectric Project pursuant to Section 7 of the Endangered Species Act (ESA) on 8 September 1999. The FWS provided FERC with a list of federal special-status flora and fauna that might be affected by the Project. While no endangered or threatened bat species were identified, the FWS listed the following nine bat taxa as Species of Concern:

Family Vespertilionidae (mouse-eared bats)
- Pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*)
- Townsend's western big-eared bat (*Corynorhinus townsendii townsendii*)
- Spotted bat (*Euderma maculatum*)
- Small-footed myotis (*Myotis ciliolabrum*)
- Long-eared myotis (*Myotis evotis*)
- Finged myotis (*Myotis thysanodes*)
- Long-legged myotis (*Myotis volans*)

[2] A "portal" is the *entry* to a tunnel.

[3] The "spoils pile," also called the "tunnel spoil site," refers to the site near Alder Creek where the *waste rock* was placed when the El Dorado Tunnel was originally excavated between Alder Creek and Mill Creek by PG&E in 1983. This site is near the Alder Creek portal. This location is not to be confused with a second "tunnel spoils site" where the waste rock from the boring of the new Mill Creek to Bull Creek Tunnel is dumped.

Yuma myotis (*Myotis yumanenis*)

Family Molossidae (free-tailed bats)
Greater western mastiff bat (*Eummops perotis californicus*)

The Forest Service advised FERC in its Motion to Intervene on the amendment of license dated 16 September 1999, that bat surveys needed to be completed at both the Bull Creek portal and the Alder Creek spoils site.

Pursuant to the requests of the Forest Service, EID completed bat surveys at the El Dorado Powerhouse, Bull Creek Portal and the proposed Alder Creek spoils site during September, October and November 1999. The bat surveys at all locations were completed by a Forest Service bat specialist.

On 21 February 2000, EID filed its Application for License for the El Dorado Hydroelectric Project. By letter dated 4 May 2000, the Forest Service provided FERC with its preliminary 4(e) conditions and 10(a) recommendations on EID's application to amend the existing license for the purpose of repairing project facilities. Preliminary 4(e) Condition No. 7 stated:

> "The licensee shall not undertake construction or restoration activities until bat surveys at the spoils site and the Bull Creek portal have been completed in accordance with Forest Service direction. If sensitive bat species are detected, the licensee will develop measures to protect roosting and hibernation sites in coordination with the Forest Service."

The Forest Service also recommended the following 10(a) mitigation measure for tunnel construction impacts:

> "Bat houses would be installed in the vicinity of the existing tunnel spoils pile, and the Bull Creek portal to provide alternative habitat for bats displaced by the construction. These [bat houses] would be installed prior to the start of construction, and would remain on site following the completion of the construction. FERC states that, unless bat surveys planned for the spring at the Bull Creek portal site disclose critical bat habitat at that location, there is no need to recommend mitigation for potential impacts on bats, including installation of the proposed bat houses near the spoils site or Bull Creek portal. If surveys reveal previously unknown roost or hibernation sites for sensitive bats, we would recommend that EID develop appropriate protection and enhancement measures in consultation with the FS [Forest Service]. EID should receive Commission [FERC] approval of the plan prior to conducting any construction activities at the Bull Creek portal site."

The Forest Service transmitted to FERC its biological evaluation of EID's application to amend the Project license to make repairs to facilities on 28 June 2000. The Forest Service identified three special-status bat species that may occur on the Eldorado National Forest. These were the pallid bat, Townsend's big-eared bat, and the western red bat (*Lasiurus bllossevillii*). The Forest Service concluded that the Project was above the elevation range of the western red bat, and that the Townsend's big-eared bat did not occur in the El Dorado Tunnel and would not be affected

by activities authorized by a license amendment. It was determined that the pallid bat might be potentially affected by amendment activities if it was found to be present; however, it was concluded that while the Project may affect individual pallid bats, it was not likely to result in a trend toward federal listing or a loss in population viability for this species. The pallid bat is identified as a California Species of Special Concern; however, it is no state or federally listed as endangered or threatened.

Pursuant to the requests of the Forest Service, EID completed a second year of bat surveys at the Bull Creek Portal and the proposed Alder Creek spoils site during June 2000. Second year surveys at El Dorado Powerhouse were conducted in June and July 2000. The bat surveys at all locations were completed by a Forest Service bat specialist.

The commission staff issued a Final Environmental Assessment on Application for Non-Capacity related Amendment of License, on 20 July 2000. The report states that no bats were detected during field surveys completed at the tunnel muck disposal site or the existing El Dorado tunnel. However, EID did identify potential impacts, caused by construction activities, which could cause disruption of mating activities, reproductive failure, or abandonment of roost sites. EID proposed to install bat houses in the vicinity of the tunnel muck pile and at the Bull Creek portal, in order to mitigate for this potential impact. Survey information available at the time of the release of the Final EA indicated that no evidence of bats were present in areas that could be affected by construction activities.

Also stated in the Final EA, under the section Impacts of Action Alternatives, EID concluded that the potential impacts on sensitive species of bats would be less likely with the alternative to "Restore full flow to the canal by repairing the section from Mill Creek to Bull Creek. " Impacts were expected to be less because the tunnel muck disposal site would not be used and there would be no blasting required at the Bull Creek portal site.

On 17 August, 2000, FERC released Scoping Document 1, to provide information on the proposed relicensing project and to solicit written and verbal comments and suggestions on the preliminary list of issues and alternatives to be addressed in the EIS being prepared by the Commission. Included in the list of preliminary environmental issues to be addressed were the potential effects of project operations on special status mammals, including disturbance to potential roosting sites for several species of bats, and appropriate measures to minimize impacts.

A letter from EID to the Forest Service, dated 1 September 2000, EID states that it had completed the biological investigations for the proposed tunnel project, and that the Bat, spotted owl, and goshawk survey results had been reported to the USFS and were currently under review.

On 19 October 2000, the Forest Service released the Preliminary Terms and Conditions Provided Under 18 CFR 4.34(b)(1) in Connection with the Application for Relicensing of the El Dorado Hydroelectric Project. Condition No. 12 (2) "Wildlife and Sensitive Plant Protection Measures," requires that the licensee ensure that a biological evaluation (including necessary surveys) are completed and approved by the Forest Service before taking any action to construct, operate, or maintain the project. Condition No. 12 (3) allows the Forest Service to reserve the authority to

include conditions that address project-related effects to sensitive wildlife and plant species. Condition 12 (4) states that if new threatened, endangered, or sensitive wildlife or plant species occurrences are discovered prior to or during construction activities or other project operations, the licensee shall notify and consult with the Forest Service prior to continuing operations.

In November 2000, the U.S. Forest Service proposed conditioning the license amendment under section 4(e) of the Federal Power Act. Condition No. 7 outlines the actions to be implemented at the portal sites in order to reduce the potential for impacts to bat species prior to construction activities. These actions included the construction of the Bat houses in the vicinity of the existing tunnel muck pile at Alder Creek and at the Bull Creek portal (Appendix A). Operational constraints would also be implemented in order to reduce impacts to bat species. Construction or other disturbances would be initiated at the El Dorado tunnel portal site prior to May 1. If activities were not initiated prior to May 1 and continued through August 15, pre-construction activities at the tunnel would be conducted and bat netting would be placed at the El Dorado Tunnel portals after sunset, two days before activities were planned to occur. Additionally, at the Alder Creek tunnel muck pile, activities would be initiated after August 15, when maternal colonies have dispersed, and prior to May 1, which is before maternal colonies have formed. Continued disturbance at the site after May 1 would likely prevent the formation of maternal colonies. Operations would also begin prior to sunrise or two hours after sunset to allow bats disturbed by noise to find an alternative roost site and avoid exposure and potential predation during daylight hours. At the Bull Creek portal, activities would not occur from March 1 through august 15, and operations would also begin prior to sunrise or two hours after sunset.

A letter from the USFS to EID, dated 20 November 2000, states that the Forest Service has received results of goshawk, spotted owl, and bat surveys in the area affected by the license amendment. The Forest Service stated in the letter it had not received the results of any surveys completed in other project areas.

On February 8, 2001, FERC issued an Order Amending License in which the Forest Service conditions where officially amended into the license, including the conditions regarding the protection of Bat species in the project area.

In addition to the USFS requested bat surveys and the license amendment requirement, a pre-construction bat survey of the tunnel between Alder Creek and Mill Creek was conducted in 2001. Therefore, the following is a summary of the completed bat surveys and the proposed mitigation measures.

Survey Methods

A Forest Service Bat Specialist surveyed the Alder Creek Tailing Pile and the Bull creek portal site for sensitive bat species in September, October, and November of 1999 and again in June of 2000. A Forest Service Bat Specialist surveyed the powerhouse in September, October, and November of 1999 and again in June and July of 2000. Central Coast Bat Research Group conducted the pre-construction bat survey of the tunnel between Alder Creek and Mill Creek in June 2001.

Alder Creek Tailing pile

In 1999, the tailing pile surveys at Alder Creek were conducted with an Anabat remote recorder, a delay switch at the upper level, and one laptop/ZCAIM/Anabat monitoring station at the lower level. In the 2000 surveys, an Anabat remote recorder with a delay switch was used at both the upper and lower level of the tailing pile.

Bull Creek Portal

A site assessment for bat habitat was conducted at the proposed Bull Creek Portal site in October 1999. Typical survey methods (harpnet and anabat detector) are not feasible at this site. Data collected from these methods would provide information about general bat usage of the area, but could not be used to determine presence or absence of roosting bats in these rock outcrops.

Powerhouse

The 1999 and 2000 powerhouse surveys were conducted with an Anabat, delay switch, and recorder outside the 1st floor entrance at the back of the powerhouse. In 1999, bats were monitored with Anabat, delay switch, and recorder on the third floor. During the 2000 surveys, the 3rd floor was monitored with an Anabat and one laptop/ZCAIM/Anabat station. A harpnet was set in front of an open window on the 3rd floor during all surveys. The abandoned house directly across the river from the powerhouse was also visited.

Tunnel between Alder Creek and Mill Creek in June 2001

The tunnel was visually surveyed by a bat biologist to determine if the structure was being used by bats as a day roost, night roost, or maternity roost. The tunnel was surveyed using bright lights to examine the ceiling while traveling the length in a boat. Acoustic monitoring was conducted at the Alder Creek portal and the surrounding area. Netting was placed over the Alder Creek entrance and the Mill Creek opening.

Survey Results

Alder Creek Tailing pile

The tailing pile surveys in 1999 and 2000 produced no usable results. Bats were detected foraging, however, conclusive results were not drawn as to whether the bats were coming directly from the tailing pile or were traveling to the site only to forage. However, through field surveys and consultation with the USFS, it was determined that the project area is within the range for the pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), small-footed myotis (*Myotis californicus*), long-eared myotis (*Myotis evotis*), and Yuma myotis (*Myotis yumanensis*) bats. Suitable foraging habitat for special-status bats is available throughout the project area between the spoils site and the Bull Creek Tunnel.

Bull Creek Portal

Rock outcrops occur in close proximity to the Bull Creek Portal site, north and south of the creek along the canal bench. The site assessment in 1999 determined these outcrops include numerous crevices that could provide roosting sites for a variety of bat species. Bat use of the area would occur in late spring through early fall, as bats avoid these elevations in winter. However, through field surveys and consultation with the USFS, it was determined that the project area is within the range for the pallid bat, Townsend's big-eared bat, small-footed myotis, long-eared myotis, and Yuma myotis bats. Suitable foraging habitat for special-status bats is available throughout the project area between the Alder Creek spoils site and the Bull Creek Tunnel.

Powerhouse

Results of the 1999 surveys indicated there may be small-footed myotis, Yuma myotis, and/or western pipestrelle (*Pipestrellus hesperus*) within the EID powerhouse. However, these detections may only account for those species utilizing this site as a temporary migratory stop-over.

The 2000 survey results concluded a number of bat species may be in the area. These include the western pipestrelle (*Pipistrellus hesperus*), Yuma myotis, small-footed myotis, long-eared myotis, fringed myotis (*Myotis thysanodes*), little brown myotis (*Myotis lucifugus*), long-legged myotis (*Myotis volans*), big brown bat (*Eptisicus fuscus*), Brazilian free-tailed bat (*Tadarida brasiliensis*), silver-haired bat (*Lasionycteris noctivagans*), and pallid bat. Survey results could not rule out Townsend's big-eared bat, potential habitat for the Townsend's big-eared bat does exist in the area.

In 1999, one dead western pipestrelle was found and guano was detected in the abandoned house across the river. In 2000, guano was detected, however, no bats were sighted.

Tunnel between Alder Creek and Mill Creek in June 2001

There was no sign of bat use when the tunnel was visually surveyed. No guano or staining was seen and no bats observed using the tunnel. One silver-haired bat was captured in the mist nets. The following bat species were detected by acoustic monitoring:

Little brown myotis
Yuma myotis FSC/BLMS
Fringed myotis FSC/BLMS/WBWG
Long-legged myotis FSC/BLMS/WBWG
small-footed myotis
Silver-haired bat
Big brown bat
Hoary bat (*Lasiurus cinereus*)

FSC = Federal Special Concern species (former Category 2 candidates for ESA listing)
CSC = California Department of Fish and Game's California Special Concern species
FSS = Forest Service Sensitive species

BLMS = Bureau of Land Management Sensitive species
WBWG = Western Bat Working Group High Priority species

Mitigation Measures

Alder Creek Tailing pile

1. Bat houses would be installed in the vicinity of the existing tunnel muck pile. These bat houses will provide alternative habitat opportunities for bats displaced by the construction. At least one bat house per site shall be installed prior to the start of the construction. At a minimum, houses should be 250 feet from the edge of construction activities, and remain on site following the completion of the construction. Such alternative habitat would likely reduce the impacts of the construction on bats.
2. Begin operations 2 hours after sunset or prior to sunrise to force those bats disturbed by noise and human activity to find an alternative roost site prior to exposing then during daylight hours and potential predation. Operations should avoid the maternity season, beginning prior to May 1st or after August 15th.
3. If operations are initiated between May 1st and August 15th, pre-construction surveys will be conducted in the El Dorado tunnel to determine the bat roosting status. If bats are identified in the tunnel, bat netting will be placed at the El Dorado Tunnel portals after sunset 2 days before blasting is to be conducted. This would exclude bats from roosting the day of the blasting and prevent direct mortality. Once construction begins netting may be removed for the rest of the construction period.

Bull Creek Portal

1. One bat house will be installed in the vicinity of the Bull Creek portal prior to the start of construction. This bat house will provide alternative habitat opportunities for bats displaced by the construction. At a minimum, the house should be 250 feet from the edge of construction activities, and remain on site following the completion of the construction. Such alternative habitat would likely reduce the impacts of the construction on bats.
2. Conduct site prep at the portal in late summer when maternal colonies have dispersed.
3. Prior to initiating work in the vicinity of the Bull Creek portal and along the canal, a dispersing process should be used to displace bats that might be utilizing the site for roosting. This process should be instructed by a bat specialist, such as #4 below.
4. Begin operations (or some disturbance, i.e. a very loud radio or something similar to the expected construction noise decibel level) 2 hours prior to sunrise or sunset to force those bats disturbed by noise and human activity to find an alternative roost site prior to exposing them during daylight hours and potential predation. Operations should avoid the maternity season, beginning prior to May 1st or after August 15th.
5. If operations begin between May 1st and August 15th, it is recommended that bat netting be placed over rock outcrops after sunset 2 days before blasting is to be conducted. This would exclude bats from roosting the day of the blasting and prevent direct mortality. Once construction begins netting may be removed for the rest of the construction period.
6. Trees requiring removal should be felled at night, if possible, prior to May 1st.

Powerhouse

Since potential bat habitat occurs within the powerhouse and survey results cannot conclude that there are no sensitive species within the area, the USFS bat biologist recommends the following appropriate protection measures be taken during the powerhouse repairs.

1. To avoid disturbance of maternity colonies, powerhouse construction should begin before May 1 or after August 15. Continuous construction activities after May 1 will likely prevent maternity colonies from forming.
2. Prior to construction activities at the Powerhouse, EID will install bat boxes within 0.5 mile of the powerhouse to provide alternate roost sites for bats during repair of the powerhouse.
3. Utilize abandoned house across the river from the powerhouse – to provide alternate roosting site for Pallid bats, small-footed myotis, long-eared myotis, and Yuma myotis.

Conclusion

Alder Creek Tailing pile

Two structures containing two bat houses each have been placed near the Alder Creek tailing pile in an area over 250 ft from construction.

Bull Creek Portal

One structure containing two bat houses has been placed near the proposed Bull Creek Portal in an area over 250 ft from construction.

Powerhouse

Currently there are no bat structures placed in the vicinity of the powerhouse and the abandoned house across the river has not been converted into an alternate roosting site for bats. The recommended mitigation measures cannot be implemented until appropriate cultural resource studies have been completed

Tunnel between Alder Creek and Mill Creek in June 2001

The portion of the tunnel to be abandoned (the last 700 ft of the El Dorado canal) was determined that it would provide excellent habitat for bats after the water has been diverted to the new portion of the tunnel. The structure would provide excellent cave habitat for the following special status species.

Yuma myotis FSC/BLMS
Long-eared myotis FSC/BLMS
Fringed myotis FSC/BLMS/WBWG
Long-legged myotis FSC/CSC/FSS/BLMS/WBWG
Western small footed myotis FSC/BLMS
Townsend's big-eared bat FSC/CSC/FSS/BLMS/WBWG

Pallid bat CSC/FSS/BLMS/WBWG

FSC = Federal Special Concern species (former Category 2 candidates for ESA listing)
CSC = California Department of Fish and Game's California Special Concern species
FSS = Forest Service Sensitive species
BLMS = Bureau of Land Management Sensitive species
WBWG = Western Bat Working Group High Priority species

Installation of Bat Houses

Pallid Bat (*Antrozous pallidus*)

In Partial Fulfillment of

August 2000 Bat Protection Plan
For
Amendment to License for Construction of a Tunnel Between
Mill Creek and Bull Creek

FERC Project No. 184
El Dorado County, California

Prepared By:
David Wyatt and Stephen James

Prepared For:
El Dorado Irrigation District

Installation of Bat Houses

Introduction

The El Dorado Irrigation District (EID) has begun construction of a tunnel between Mill Creek and Bull Creek, as well as re-construction of the El Dorado Diversion Dam. The Final Environmental Impact Report (EID 1999) for the project assumed sensitive bats may inhabit the area potentially affected by the project, including existing tunnels, unless data indicating otherwise was presented. The Federal Energy Regulatory Commission Order (Article 70) (FERC 2001) recommended surveys be conducted for sensitive bat roosting sites. Both documents recommended undertaking further measures should evidence of sensitive bats species be revealed.

Field surveys (Heady, 2001), along with consultation with the U.S. Forest Service (USFS), indicated the presence of potential habitat of the pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), and Yuma myotis bats (*Myotis yumanensis*). Based on these findings, mitigation was developed to install bat houses near project construction (EID 2000). It should be noted that *C. townsendii* are not known to utilize bat houses.

Bat House Construction

Because of potential disturbances to bat roosting areas, bats will be purposefully excluded from using the tunnels and local habitat during construction. To provide alternative roosting areas, bat houses were constructed and placed in the vicinity of the tunnel openings in accordance with the Bat Protection Plan (EID 2000).

Six bat houses (three pairs) were constructed using plans obtained from Bat Conservation International (BCI) (Tuttle and Hensley 1994). Plans for the "Nursery House", with space for up to 300 bats, were provided to EID and presented to USFS biologists for their review and approval (Appendix A). Following receipt of approval from the USFS (EID 2001), construction was initiated on six bat houses, four to be placed near the tunnel opening downstream from the siphon at Alder Creek, and two to be placed on the hill side upstream from EID Flume 30 near Bull Creek. Each pair of bat houses were mounted back-to-back as recommended by BCI. Following construction, each bat house was painted with three coats of light brown exterior enamel paint (Behr "Cinnamon Suede" [3B17-6] in an accent base [9670]) and allowed to thoroughly dry prior to installation.

Bat House Installation

Alder Creek. On March 15, 2001, David Wyatt and Stephen James met with representatives of EID including Rick Lind, Steve Lindstrom, and Ron Balderston in the vicinity of the existing El Dorado Tunnel entrance near Alder Creek. Following a general survey of the site, locations were selected for the placement of

two pairs of bat houses northwest of the tunnel entrance. The final sites were selected based on the following factors:

- Proximity to the tunnel opening: The bat houses would need to be near enough to the opening so that the bats could locate them, while being far enough to avoid construction disturbances.

- Slope aspect: The bat houses were located to optimize warming by the sun as well as access to open areas for foraging and water.

Two sites were located approximately 250 feet west of the tunnel opening and approximately 100 feet from each other on an open east-facing slope above the American River and Alder Creek. The GPS coordinates for the bat houses are as follows:

East houses: N 38 deg., 45 min., 51.80 sec.
W 120 deg., 22 min., 59.90 sec.

West houses: N 38 deg., 45 min., 52.58 sec.
W 120 deg., 23 min., 00.35 sec.

The slope consists of relatively open habitat given that much of the area had burned in 1992 during the Cleveland Fire. The bat houses were placed back-to-back on 20 foot four-inch by four-inch redwood posts. Each post was placed in three-foot deep holes. Following placement of the poles, soil was replaced and carefully compacted to ensure the bat houses would remain in place. Photographs of the Alder Creek bat houses are provided in Appendix B.

Bull Creek. On October 14, 2001, David Wyatt and Stephen James, met with Rick Lind and Steve Lindstrom of EID to install the final two bat houses near the Bull Creek portal approximately 200 feet upstream of Flume 30 (about 500 feet north of Bull Creek). The site location was selected based on similar criteria used for those near Alder Creek stated above and placed at GPS coordinates:

Bull Creek house: N 38 deg., 46 min., 00.73 sec.
W 120 deg., 45 min., 44.03 sec.

Habitat adjacent to the bat house location is relatively open and lightly wooded with native pine and shrub species. Two bat houses were placed back-to-back on 20-foot four-inch by four-inch redwood posts. The posts were placed in three-foot deep holes and secured to an adjacent fence cross member. Soil was returned to the holes and compacted carefully around the posts. Monitoring of bat house use at both locations, if necessary, will be conducted through the EID.

Literature Cited

El Dorado Irrigation District. 1999. Final EIR for the Acquisition, Permanent Repair, and Operation of the El Dorado Hydroelectric Project (Project No. 184) and Acquisition of 17,000 Acre-Feet Per Year of New Consumptive Water". Certified on July 12, 1999.

El Dorado Irrigation District. 2000. August 2000 Bat Protection Plan. Prepared by Resource Insights for the El Dorado Irrigation District. August 23, 2000.

El Dorado Irrigation District. 2001. USFS Review of Construction Plans and Document Summary, Project 99004H. Letter to Mr. John Berry, Forest Supervisor. March 27, 2001.

Federal Energy Regulatory Commission. 2001. Order Approving Terrestrial Resources Plan Pursuant to Article 70 (Project No. 184-079). Issued June 4, 2001.

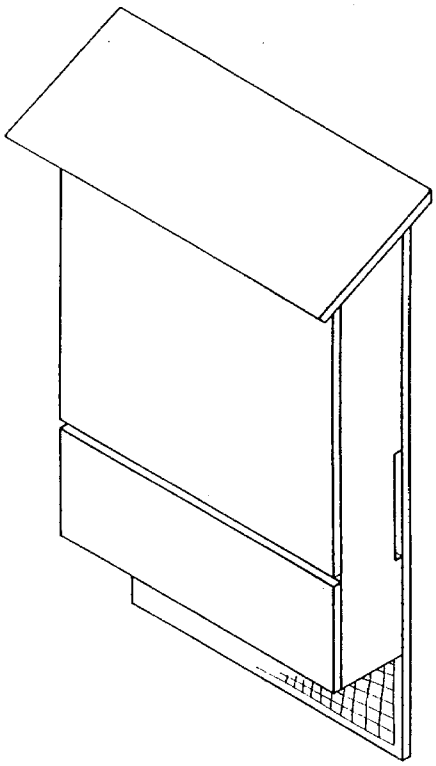
Heady, P. 2001. Pre-construction Bat Survey of the Tunnel Between Alder Creek and Mill Creek. Central Coast Bat Research Group. June 1, 2001

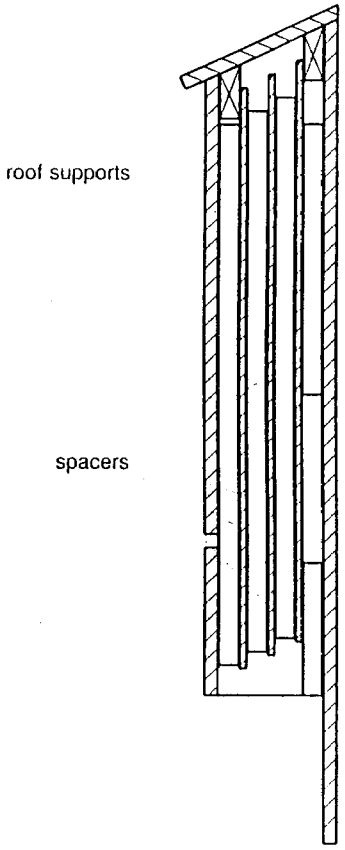
Tuttle, M. and D. Hensley. 1994. The Bat House Builder's Handbook. Bat Conservation International, Inc. Austin, TX.

Appendix A: Bat House Plans

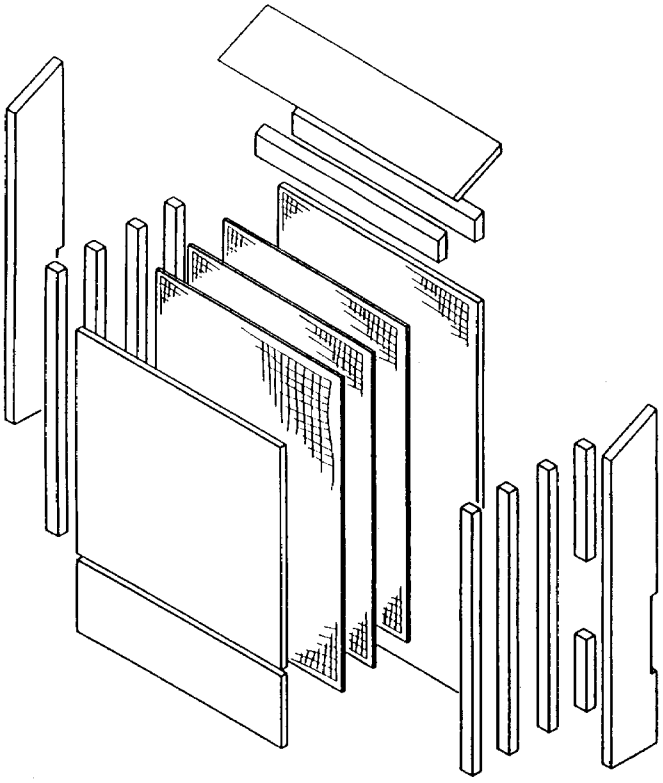
From: Tuttle, M. and D. Hensley. 1994. The Bat House Builders Handbook. Bat Conservation International, Inc. Austin, TX

NURSERY HOUSE





Side view



Bottom view

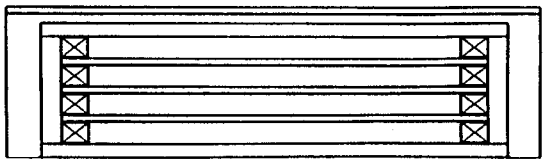


FIGURE 5

NURSERY HOUSE

Materials Needed (makes 2)

See cutting diagrams on pages 14-15.

1/2 sheet (4' x 4') 1/2" cdx (outdoor grade) plywood

1/2 sheet (4' x 4') 1/4" cdx (outdoor grade) plywood

2 pieces 1" x 6" (0.75" x 5.25" finished) x 8' pine or cedar

1/8" mesh HDPE (plastic) netting, 7' x 36"
[such as Internet product #XV-1670 (1-800-328-8456)]

1 lb. 1 5/8" multipurpose (drywall) screws

1 quart latex acrylic paint

1 tube paintable acrylic caulk

5/16" staples

Recommended tools

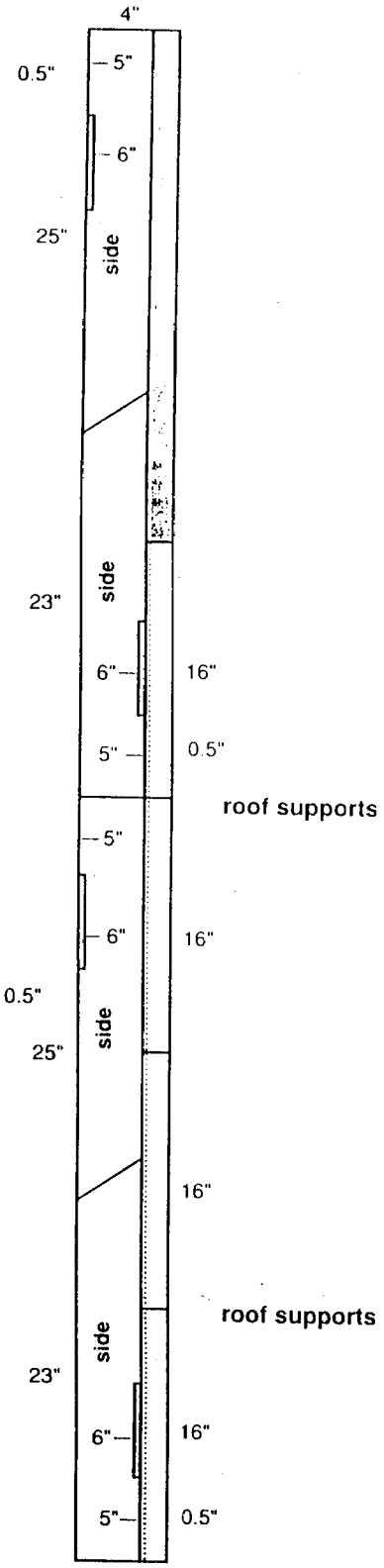
table saw	scissors
variable speed reversing drill	stapler
Phillips bit for drill	paintbrush
tape measure or yardstick	bar clamp (optional)
caulking gun	sander (optional)

Construction procedure

1. Measure and mark all wood as per cutting diagrams on pages 14-15. Cut out all parts.
2. Cut six pieces of netting 14" x 21". Staple to partitions.
3. Screw back to sides, caulking first. Be sure top angles match.
4. Cut a piece of netting 16" x 30" and staple to inside surface of back, starting at the bottom. Be sure netting lies flat (curve down) and does not pucker.
5. Attach 5" and 10" spacers to inside corners as per drawings on page 12.
6. Place a partition on spacers to within 1/2" of roof. Place 20" spacers on partition, screw to first spacers (through partition). Be careful not to block side vents.
7. Repeat step 6 for remaining partitions and spacers.
8. Screw front to sides, top piece first (don't forget to caulk). Be sure top angles match (sand if necessary). Leave 1/2" vent space between top and bottom front pieces. A bar clamp may be useful if sides have flared out during construction.
9. Attach roof supports to the top inside of front and back pieces. Be careful that screws do not protrude into roosting chamber.
10. Caulk around all top surfaces, sanding first if necessary to ensure good fit with roof.
11. Screw roof to sides and roof supports. Caulk around outside of roof if needed to seal roosting chamber.
12. Paint exterior at least twice.

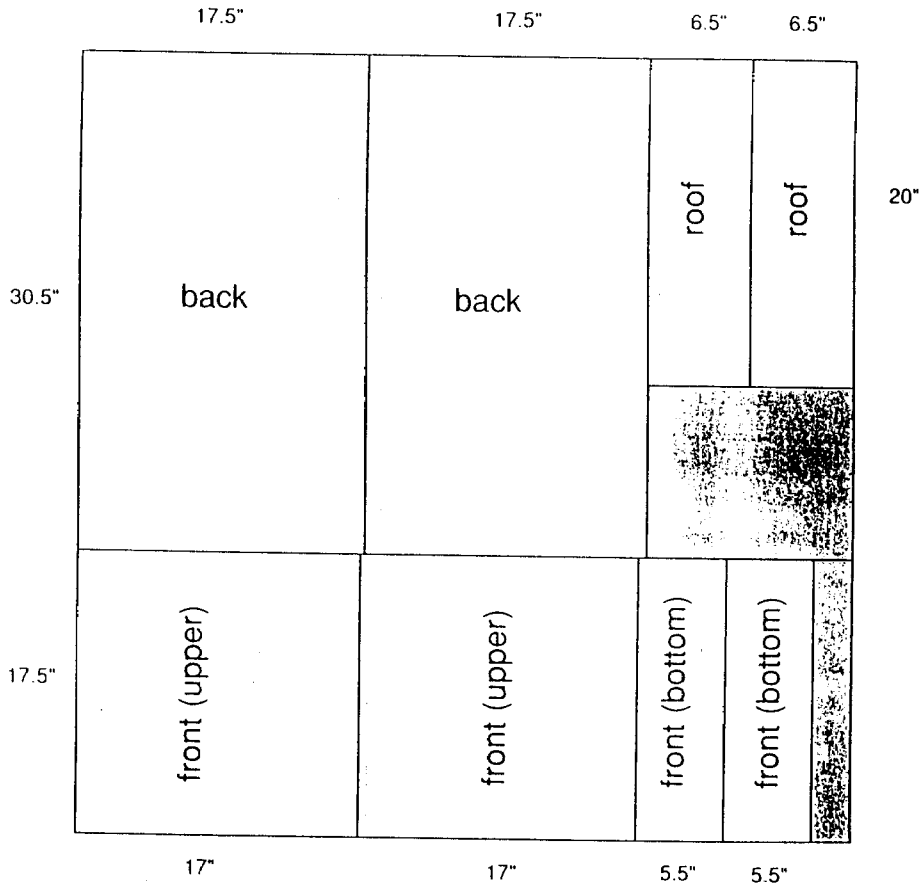
Optional Modifications to the Nursery House

1. Wider bat houses can be built for larger colonies. Be sure to adjust dimensions for back and front pieces, roof, partitions, roof supports, and netting. Additional spacers may be required in the center of the roosting chamber for bat houses over 24" wide. You will no longer be able to get two bat houses from two half sheets of plywood.
2. Taller bat houses can also be created by adjusting the dimensions of the front and back pieces, partitions, sides, spacers, and netting. Bat houses 3' or taller should have the horizontal vent slot 12" from the bottom of the roosting chamber.
3. Longer landing platforms (up to 12") can be substituted, but they should still be covered with plastic screening.
4. Two bat houses can be placed back-to-back mounted on poles. Before assembly, a horizontal 3/4" slot should be cut in the back of each house about 12" from the bottom edge of the back piece to improve ventilation and permit movement of bats between houses. Two pieces of wood, 4" x 10 3/4" x 3/4", screwed horizontally to each side will join the two boxes. One 4" x 23" vertical piece, attached to each side over the horizontal pieces, blocks light but allows bats and air to enter. Leave a 3/4" space between the two houses, and roughen the wood surfaces, or cover the back of each with plastic netting. Do not cover the vents. A tin roof covering both houses protects them and helps prevent overheating. Eaves should be about 3" in southern areas and about 1 1/2" in the North. See figure 2 on page 8 for illustrations.
5. Ventilation may not be necessary in colder climates. In this case, the front of this bat house should be a single piece 23" long. Far northern bat houses may also benefit from a partial bottom to help retain heat. Leave a 3/4" entry gap at the back, and be sure the bottom does not interfere with access to the front crevices. A hinged bottom and regular maintenance is required to prevent guano buildup.



1" x 6" x 8' sheeting

NURSERY HOUSE SAWING DIAGRAMS



4' x 4' x 1/2" plywood

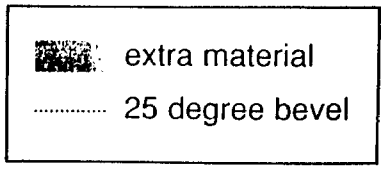
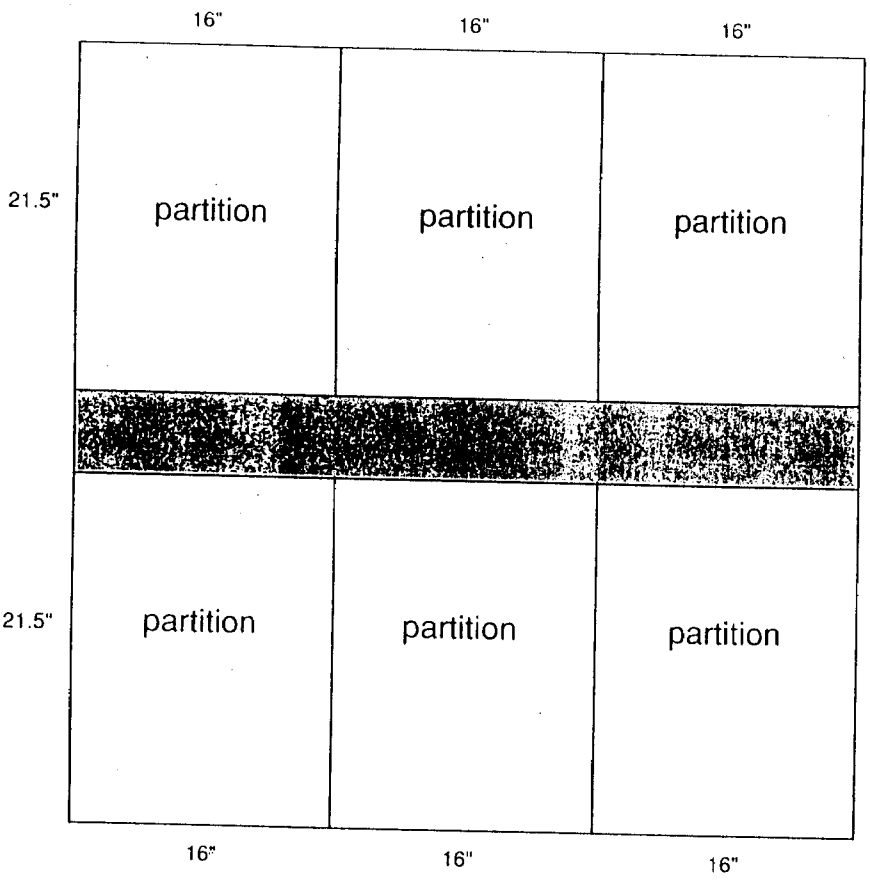
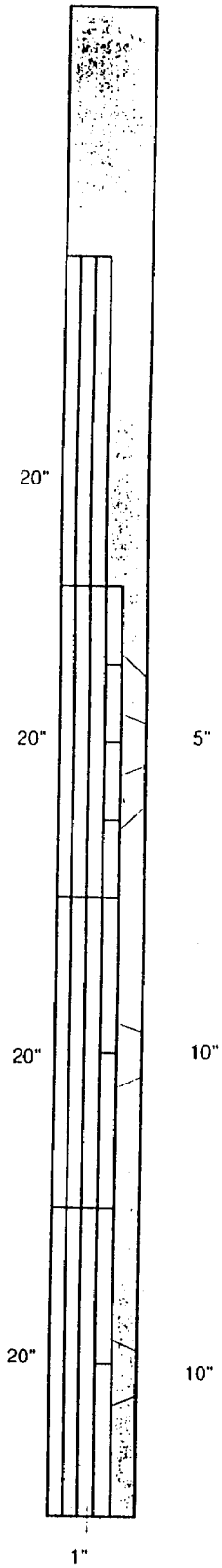


FIGURE 6



4' x 4' x 1/4" plywood



spacers:
5" spacers = back bottom
10" spacers = back top
20" spacers = others

1" x 6" x 8' sheeting

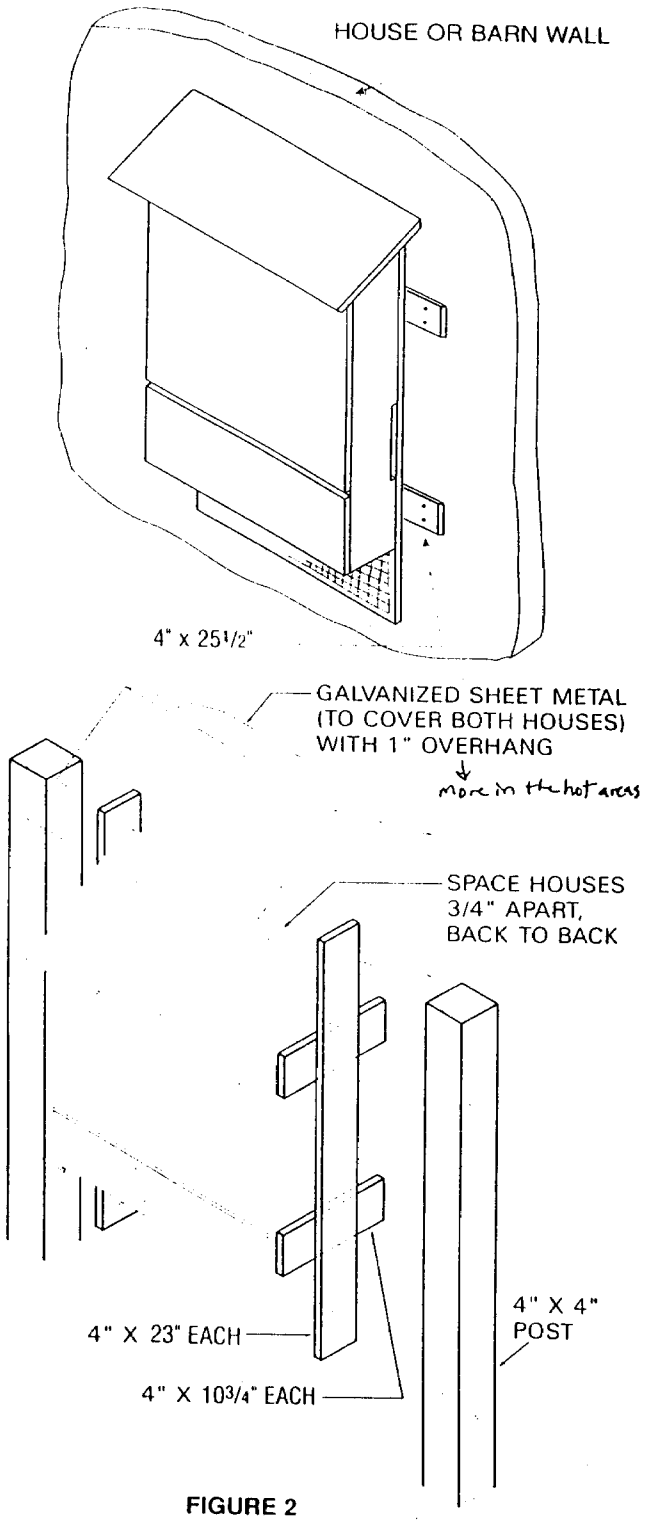
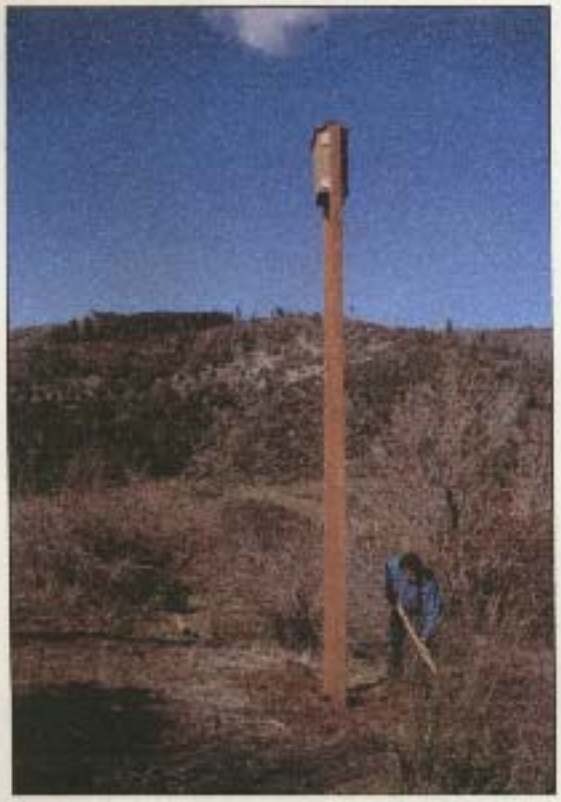


FIGURE 2

Nursery houses can be mounted independently on the side of a building or on a pole. However, when houses are mounted back to back in pairs, the space between can accommodate more bats and provides an especially well-ventilated area for use on hot days. The tin roof is optional, but aids greatly in protecting the houses from midday sun.

Figure A indicates the location of the Alder Creek bat houses; Figures B and C illustrate the back-to-back bat houses following placement.



Figures D and E: Preparation for installation of the Bull Creek bat houses.

Figure F: The Bull Creek bat houses following installation.