Mammoth Bar Off-Highway Vehicle Area

Wildlife Habitat Protection Plan

Prepared by:
California Department of Parks and Recreation
Mammoth Bar OHV Staff
501 El Dorado St.
Auburn, CA 95603-4949
530-885-4527

and

Contract Consultant:
Brian D. C. Williams
Wildlife & Conservation Ecologist
Williams Wildland Consulting, Inc.
8200 Turner Dr.
Granite Bay, CA 95746
916-791-1240; bwcal@sprynet.com

Revised
June 2002

Introduction

This document describes the Wildlife Habitat Protection Program (WHPP) for the Mammoth Bar Off-Highway Vehicle Area (Mammoth Bar OHVA), as required by Public Resources Code (PRC) section 5090.35

Location

Mammoth Bar OHVA is located approximately 2.5 miles east of the City of Auburn in Placer County. It is on the south facing slope of the Foresthill Divide ridge bordering the Middle Fork of the American River. The OHVA is approximately 1,000 acres and elevations range from about 600 to 1,700 feet.

Administrative Responsibilities

Mammoth Bar OHVA is located in the Auburn State Recreation Area (SRA) on federal land owned by the U.S. Bureau of Reclamation (USBR). Auburn SRA and Mammoth Bar are administered by the Department of Parks and Recreation (DPR) under a 1977 management agreement with the USBR.

Previous and Current Use

In the early 1980s, there was an estimated 400 acres of unmanaged open riding in the Mammoth Bar OHVA. Starting in 1993, the DPR closed and rehabilitated trails and currently allows recreation use on approximately 14 miles of trails and two motocross tracks. Annual visitation by OHV enthusiasts was approximately 20,000 in 2000. The area is also used by approximately 5,000 hikers, mountain bikers, river rafters and other recreational users. Currently, OHV use is permitted only on designated trails to reduce disturbance to natural resources, is restricted to daylight hours when personnel are available for patrol, and the OHV park and trails are closed temporarily during wet weather to prevent trail damage and reduce soil erosion.

Plan Objectives

The goal of this WHPP is to protect and maintain wildlife habitats, wildlife, and other sensitive natural resources at Mammoth Bar OHVA. Achieving this goal will require summarizing current knowledge, an inventory of existing conditions, monitoring to detect changes, and options to achieve goals through management. Thus, this plan is adaptive and intended to be responsive to changing ecological conditions or new information. Both the use of information and implementation are provided through four core components: soils monitoring, habitat monitoring, wildlife monitoring, and a resource protection plan. These components are discussed in the following pages.

Sand & Gravel Bars

Sand bars and gravel bars occur along the Middle Fork of the American River (approximately 45 acres) where channel morphology allows both the deposition of sand or gravel and fairly regular scouring. The bars provide habitat for a variety of wildlife, including Pacific treefrogs and western toad tadpoles in the shallow water, garter snakes, spotted sandpipers, killdeer, and raccoons.

Riverine

The Middle Fork of the American River provides quality riverine habitat (approximately 30 acres) for many species. The primary vertebrates include several species of fish including riffle sculpin, Sacramento suckers, rainbow trout, small-mouth bass, and native minnows such as pikeminnows and hardhead (Lehr 1998). Foothill yellow-legged frogs may occur in gravelly spots, and several waterbirds either breed or winter along the river including common mergansers, bald eagles, belted kingfishers, and American dippers. Insectivores such as northern rough-winged swallows and black phoebes feed on insects over the water, especially during the summer months.

Valley and Foothill Riparian Habitat

Narrow bands of riparian habitat (approximately 13 acres) occur along the Middle Fork of the American River, but this habitat is limited due to the narrowly confined river canyon. Small patches of riparian plants may occur elsewhere on the OHVA, but they are not extensive enough to support a riparian fauna. All riparian associations probably fall into the Great Valley cottonwood-willow or mixed willow series of Sawyer and Keeler-Wolf (1995). The riparian vegetation provides habitat for a variety of wildlife, including downy woodpeckers, bushtits, and migrant warblers, and may be just extensive enough to provide habitat for riparian-dependent species like yellow-breasted chats (Jones & Stokes 2000).

Inventory & Monitoring

The general objectives of the monitoring strategy are to (1) conduct a reasonably comprehensive inventory; and to (2) monitor resources with sufficient effort and standardization to facilitate meaningful comparisons and analyses. Inventories are an important element of any natural area management plan as they generate useful information on species occurrence, distribution, and natural history. This information can be used to reduce or avoid impacts or even to assess gross population changes if inventories are conducted quantitatively and with documented methods (e.g., (Fellers and Drost 1994, Marshall 1988). Monitoring may provide information similar to inventories, but its primary purpose is to provide a measure of abundance that can be used to detect changes or trends in species and/or communities over time. It is not necessary or even desirable to detect all species, because not all taxa or communities can be monitored with equal success, efficiency, or are equally informative. Thus, the monitoring plan must be carefully evaluated in order to identify the appropriate targets and design. In general, a monitoring plan

should (1) be objective-specific; (2) be designed with consideration for the level of sampling effort necessary to detect changes with a high level of confidence (i.e., statistical power)(Aigner et al. 1997, Morrison et al. 2001); and (3) adhere to a methodology "applied in as nearly the same way as possible every time data are collected" (Verner and Kie 1988).

The effectiveness of a sampling design is sensitive to changing objectives or hypotheses, and it may be necessary to alter the protocols or design as objectives change. For example, if more information is required to test the effects of trail use on an uncommon species it may be necessary to adopt some form of adaptive cluster sampling to increase detection rates. Often, however, monitoring rare species is inappropriate because obtaining enough data to detect population trends with statistical power and significance is prohibitively expensive and time-consuming (Aigner et al. 1997, Verner and Kie 1988). Instead, the power and applicability of the monitoring system can be improved if designed to increase sample sizes for those species or habitats that may be most sensitive to manageable causes (e.g., fire, trail use). Incidental data on rare species may still be useful; they just may not be the most appropriate monitoring target. In addition to consideration of power, sampling design should also facilitate long-term analysis by using standardized methods designed to reduce bias. In summary, a monitoring plan should address both potential bias and sampling effort if managers are to have some confidence that any observed changes are real – not artifacts of biased sampling or normal fluctuations in the environment. It is also highly recommended that general (e.g., (Morrison and others 2001) and specific literature be consulted prior to designing a specific study.

Soil Monitoring System

The erosive soils within Mammoth Bar closely link habitat protection to soil conservation and erosion control. A document titled the "Soil Conservation Guidelines and Standards for Off-Highway Vehicle Recreation Management" was approved in 1991. The standards and procedures of this document are and will continue to be implemented at Mammoth Bar OHVA. The trail system is inventoried monthly to check for trouble spots. OHV riding is restricted to established and designated trails to reduce disturbance to natural resources. Trails are closed temporarily during wet weather to prevent damage and reduce soil erosion. The Mammoth Bar equipment operator normally devotes two days a week on trail rehabilitation. The previous WHPP had identified a carrying capacity of 140 riders at any one time and that once that limit had been reached that the park would be closed to OHV riders. Due to the Mammoth Bar lawsuit settlement, this carrying capacity was never instituted and was deemed impractical to enforce. During the lawsuit Interim Management Plan period, surveys of high OHV use days and effects will be made and an attempt will be made to develop an acceptable carrying capacity for OHV use

The OHMVRD adopted a generic soil loss standard that states "Off-highway motor vehicle areas and trails will be maintained in a condition that will allow for feasible rehabilitation by natural resource managers" (California Department of Parks and Recreation 1991). The proposed soil loss monitoring procedures for the Mammoth Bar OHVA is based on an assessment of revegetation potential, as defined in the PRC ("... restoration of... plant communities, and the plant covers comparable to those on surrounding lands or at least those which existed prior to

off-highway motor vehicle use." Section 5090.11). The following describes the steps to be used in the assessment.

- A DPR resource specialist will train staff to conduct trail condition surveys. The staff will be trained to identify different types of erosion, map them, and fill out standardized data sheets.

- Staff will inventory trails and map eroded/unvegetated areas. Features to be mapped include depths of incision/gully erosion within trail treads; sheet, rill, gully, and mass movement erosion of cut and fill slopes and other use areas; incision and head cutting of drainage ways receiving runoff from trails and other use areas; and other use-related erosion areas.

- A DPR resource specialist will review the data collected by staff to determine which trail segments or erosion sites should be inspected in the field. Following the field evaluation, the erosion features will be prioritized for treatment. The priorities will be based on the severity of the erosion feature, cost, and the risk to other sensitive resources. The severity of the erosion feature will be rated considering the type (rill, sheet, sully, or mass movement) and extent (length, depth, width). The cost of rehabilitation increases geometrically as the severity of erosion feature increases. The risk will consider impacts on other sensitive resources (i.e., water quality, endangered species habitat) public safety, and the presence of material high erosion hazards that will exacerbate an existing problem.

- The list of priorities will be reviewed by the Division Management Team and submitted for funding.

As required in the OHV Soil Conservation Guidelines, soil loss monitoring will be conducted each year and the assessment will be completed by November 30. In the event of non-attainment of the soil loss standard in a given part/segment of a recreation area, that part/segment will be temporarily closed and repaired to prevent accelerated erosion until it is capable of meeting the standard (California Department of Parks and Recreation 1991).

An annual report will contain the results from monitoring for the previous year compared to the results from prior years. An interpretation of any apparent year to year changes will be provided as well as management programs needed for mitigation (e.g., closure of areas, rerouting of traffic, revegetation, etc.). The annual report will also contain a synopsis of all projects and inventories accomplished that year that aid in the fulfillment of the WHPP.

Habitat Monitoring System

The general goal of the habitat monitoring system is to provide information for management to avoid impacts to sensitive plant and vegetation resources and to maintain healthy native plant communities. Habitat inventory and monitoring will assess changes in species composition and vegetation structure at three scales.

Fine-grain surveys: rare plants, elderberries, invasives, and sensitive communities
Preliminary plant surveys conducted in 1998 and 1999 documented a possible occurrence of the Red Hills soaproot (Medeiros 2000) and elderberries (Jones & Stokes Associates 2000) on or near the Mammoth Bar OHVA. Because the previous surveys were not focused on the existing OHVA, additional surveys for rare plants are needed, however. In addition to surveying for rare plants following existing protocols (California Department of Fish and Game 2000)(Appendix 2), these surveys will also record and map the locations of elderberry shrubs, sensitive habitats such as seasonal wetlands, and invasives. All elderberry shrubs will be mapped because of their importance as host plants for the endangered valley elderberry longhorn beetle (Appendix 3). Sensitive habitats (e.g., seeps, seasonal wetlands) not easily recorded from topographic maps or aerial photos will also be mapped. Finally, all infestations of invasive exotic plants should be noted, especially isolated populations that offer the best chance at eradication. The primary invasive at Mammoth Bar OHVA is the exotic yellow star-thistle that forms a monoculture in some places, reducing the habitat capability for many species of wildlife. These localized but important resources will be monitored regularly and summarized in an annual report.

Plant Community Survey
Vegetation sampling will be used to monitor structure and composition in the three major plant community types: oak woodland, chamise chaparral, and annual grassland, with multiple samples (replicates) from each habitat. It is also recommended that an equal number of replicates be sampled at ecotonal sites (Appendix 2). Surveys should be conducted periodically, perhaps every 5-10 years. A 5-10 year interval may be longer than ideal to monitor the spread of invasives, but invasives will be monitored more frequently by the fine-scale surveys discussed above.

Photographic Monitoring
Photographic monitoring will be utilized at two scales. Aerial photos of the entire recreation area will be taken approximately every three years. These photos can be used to monitor gross structural changes not easily encompassed by other methods, and may be particularly valuable in identifying trails or following the effects of fire or large-scale restoration.

Ground-based photo monitoring stations will be established at approximately 10 high-use sites to monitor direct impacts and management actions. These will be located in the staging area, at Mammoth Bar, and at representative sites on trail systems. These will show changes in plant community structure and, to some extent, composition. This will allow the assessment of user impacts and potential restoration efforts. Findings and suggestions for management will be summarized in an annual monitoring report.

Wildlife Monitoring System

The general goal of the wildlife monitoring system is to provide information for guiding management to avoid impacts to sensitive wildlife and maintain of the diverse wildlife communities that are representative of the habitats in the area. Consequently, a primary objective of this WHPP is to conduct baseline inventories. A closely related objective is to conduct the inventories in such a way that the data can also be used for monitoring. However,

because not all taxa are effectively sampled or equally informative for management, a monitoring system was developed using the following criteria:

1. Monitoring should be limited to species or groups for which sufficient and informative data can be collected
2. Monitoring should focus on special-status species when possible (Appendix 3, Appendix 4)
3. Monitoring should focus on species most likely to be affected by OHV use or associated recreational activity (Appendix 5)
4. Monitoring should focus on species or groups most responsive to changes in habitat (Appendix 5).
5. Monitoring should focus on regionally sensitive or important species for which Mammoth Bar may provide significant habitat
6. Long-term monitoring should be limited to the most cost-efficient methods that achieve management objectives

These selection criteria led to the identification of the following inventory and/or monitoring groups; these are defined by their common method of detection, behavior, or habitat use.

Valley Elderberry Longhorn Beetle
The valley elderberry longhorn beetle (VELB) is the only legally threatened or endangered species known, assumed, or suspected to occur in the Mammoth Bar OHVA. Although the VELB has not been confirmed in the park, its presence is assumed based on five elderberry shrubs (Jones & Stokes Associates 2000). The Resource Ecologist will conduct annual surveys of all elderberry shrubs (Appendix 2).

Terrestrial Herpetofauna
This group may include one special-status species (coast-horned lizard), and the behavior of some species (e.g., diurnal lizards and snakes) is likely to make this group the most sensitive to OHV use (Brattstrom and Bondello 1983)(Appendix 5) and habitat (Simovich 1979). This group is also of interest because despite the regionally modest herpetofauna of the Sierra foothills, the Auburn SRA probably contains the most significant habitat and diverse collection of amphibians and reptiles in Placer County. These probably include 2-3(4) species of salamanders, 3-4 frogs, 1 turtle, 4-8 lizards, and 11-13 snakes – up to 30 of the 33 extant species in Placer County (Williams 2002; attached as Appendix 6). This group will be inventoried for at least two years. Additional or continued monitoring will depend on the usefulness of the data which could be affected by low detection rates (Block and Morrison 1990, Block and Morrison 1991).

Shrub and Ground-nesting Birds
There is one special-status species (Bell's sage sparrow) assumed to occur on the OHVA, and the group may be sensitive to OHV recreation and habitat changes (Bolger et al. 1997, England 1995), particularly since trails are through chaparral. This group is also of interest because the chamise chaparral is a unique habitat type in Placer County and many birds probably reach their greatest densities in this habitat (e.g., California thrasher, sage sparrow). In addition, of the >180 birds which have bred in Placer County (Williams 1996), approximately 80 have the potential to breed regularly at Mammoth Bar OHVA. This group will be effectively sampled by three years of point count surveys (Appendix 2).

Nesting Raptors
There are multiple special status species with some potential to nest in the oak woodlands, and raptors are likely to be sensitive to recreation use (Andersen et al. 1990, Holmes et al. 1993, Williams 1994). A one-year survey will be conducted to determine species use and location of nests (Appendix 2). Additional monitoring will depend on the value of information gained from the surveys, and will likely depend on the species, location, and/or abundance of active or potential nest sites.

Small Mammals
There are no special-status species with the potential to occur, but some species may be sensitive to OHV recreation and habitat conditions (Quinn 1990, Quinn 1979) see data in (Wone et al. 1997). Two consecutive years of surveys are recommended to provide some measure of annual variability. This group is not expected to be used for long-term monitoring, however, as this group may not be as efficiently monitored as other groups (Block and Morrison 1990); data in (Hogan and Anderson 1994).

Carnivores / Large Mammals
No special-status carnivores or other mammals are expected to occur on the area, but some of these may be sensitive to OHV use or associated recreational activity (see summaries in (Knight and Gutzwiller 1995). Most species, however, are nocturnal and occur at low densities, which limit their usefulness for monitoring. Information on this group is still of interest, however, and inventory data can be valuable in regional studies or future status assessments. A one-year survey will be conducted using remote camera stations (Appendix 2).

Bats
Eight species of special-status bats may occur at Mammoth OHVA (Appendix 4, Appendix 5), but their behavior and habitat use are unlikely to make them specifically vulnerable or sensitive to OHV recreation. Because of a lack of information on regional distribution and habitat use, however, a one-year survey will be conducted (Appendix 2).

Riparian, Semi-aquatic, or Riverine Species
Multiple special status species in this category include yellow-legged frog, western pond turtle, belted kingfisher, and yellow-breasted chat (Appendix 3, Appendix 4). They are all restricted to the river or adjoining riparian areas and therefore are not likely to be significantly impacted by OHV recreation. Because of their status, however, a one-year survey will be conducted along an approximately 5.1 km stretch of the north side of the Middle Fork of the American River (Appendix 2).

Results of the inventories and monitoring will be used to evaluate the potential impacts on these species each year. If a Threatened or Endangered species is located within the OHVA, a management/protection plan for that specific species will be formulated.

Resource Protection Plan

There are several management tools that are used or may be available to protect or restore valuable soil, plant, habitat, and wildlife resources:

Protection: The primary management strategy is to protect valuable resources wherever they occur by controlling access and use patterns. Spur trails to the river have been closed to protect riparian vegetation, and a 50-foot buffer zone from the river channel has been proposed at Mammoth Bar to protect moist soils and streamside habitats from disturbance and pollution. No OHV trails are located in the small wetlands in the grassland habitat, and the OHV area will be closed during wet weather and for a 24-hour dry out period after rain has stopped to prevent trail damage and reduce soil erosion. Ensuring that all trails are at least 20 feet from the outer canopy of any shrub will proteet all elderberry shrubs.

- Species of Special Concern: The only identified species of special concern at Mammoth Bar is the Valley Elderberry Longhorn Beetle (VELP). See Appendix 3 for detailed information on special status species. Actions to protect the VELP, identified elsewhere in the WHPP, include locating trails at least 20 feet from any elderberry shrubs, an annual survey of elderberry shrubs by a resource ecologist and work by the ecologist to ensure the survival of the current shrubs.

- Law enforcement: The area is provided with law enforcement and protection services seven days a week by state park peace officers/rangers. The law enforcement program includes the following:

  1. Perimeter patrols to keep OHV use in designated areas and during authorized riding days
  2. Measures to keep riders on designated trails, including patrol and maintaining signs, barriers, and educational displays on bulletin boards
  3. Inspection and enforcement for
     - OHV registration
     - legal spark arrestors
     - compliance with OHV noise limits
  4. Enforcement of OHV safety violations (reckless driving, no helmet, etc.)
  5. Enforcement of general criminal and traffic laws
  6. OHV accident investigation and reporting
  7. Emergency medical aid
  8. Search & Rescue

- Staff Education: A list and photographic guide of all potential rare, protected, and invasive plants and animals should be made available to all field personnel. This includes training in the identification of the elderberry shrub and the general ecology and control of invasive plants.

- Public Education: Educational materials are displayed on bulletin boards and display cases in the staging areas. These include the Mammoth Bar OHV brochure that is updated as needed. Signs are used to designate use vs. non-use areas.

- Mowing: Properly-timed mowing can control vegetation height and invasives such as yellow star-thistle (Thomsen et al. 1997). Staff and CDF crews should cut thistle in the early flowering stage to minimize the spread of seed to trails. This is probably most practical in the staging area.

- Prescribed fire: Prescribed fire has many potential benefits in the fire-adapted habitats that dominate Mammoth Bar. Prescribed burning may be used to reduce fuel loads, minimize the spread of wildland fire to the urban interface, encourage the regeneration of native vegetation (England 1995), and control invasives. Those objectives are not always compatible, however. It is imperative that any burn strategy carefully consider seasonal timing and perimeter control, as these may have major ecological consequences (England 1995). Perimeter control should not involve soil disturbing activities if possible (e.g., use existing roads as fire breaks) as this may both encourage invasives and negatively affect wildlife habitat (Quinn 1990). Prescribed burning shall only be conducted under the procedures and standards of the DPR Prescribed Burn Program and consistent with federal prescribed burn requirements.

- Restoration: The Resource Ecologist will work to create suitable conditions for the germination and growth of new elderberry shrubs. Additional restoration will be proposed as appropriate. Priority should be given to problem sites (e.g., high erosion rates, abundant invasives), with the primary objective to restore the site to the most likely dominant community. All restoration projects should be designed and protected according to the latest habitat-specific restoration techniques.

- Other: Other habitat management tools (e.g., grazing, herbicides, tilling) may be used for specific management issues if the project evaluation suggests that they may be superior to the methods listed above. The DPR will confer with the Department of Fish and Game, Army Corps of Engineers, and Water Quality Control Board regarding any needed permits or agreements for actions related to streams in the Mammoth Bar OHVA. Other permits will be obtained as necessary.

- An annual resource protection plan (RPP) report will include all RPP efforts during the preceding year, including a copy of the wet weather closure policy. This report will be made available to the public upon request and will normally be contained in the annual OHV grant application. To facilitate the adaptive process, results of the various inventory and monitoring efforts normally will be reviewed annually by the Off-Highway Motor Vehicle Recreation Division's Resource Team for their recommendations to the Superintendent and the Gold Fields District Division Management Team. The Gold Fields District Division Management Team will then revise the management plan as needed with input from the Resource Ecologist. The plan and the results of the monitoring activities will also be reviewed every five years by a team of resource and wildlife professionals outside the Division.

Literature Cited

Aigner, Paul A., William M. Block, and Michael L. Morrison. 1997. Design recommendations for point counts of birds in California oak-pine woodlands: power, sample size, and count stations versus visits. Pgs. 431-439 *in* Norman H. Pillsbury, Jared Verner, and William D. Tietje, tech. coords. 1997. Proceedings of a symposium on oak woodlands: ecology, management, and urban interface issues. San Luis Obispo, CA. Gen. Tech. Rep. PSW-GTR-160. USDA Forest Service, Pacific Southwest Research Station, Albany, CA. 738 pgs.

Andersen, David E., Orrin J. Rongstad, and William R. Mytton. 1990. Home-range changes in raptors exposed to increased human activity levels in southeastern Colorado. Wildlife Society Bulletin 18: 134-142.

Best, Troy L., W. M. Kiser, and Patricia W. Freeman. 1996. *Eumops perotis*. Mammalian Species 534: 1-8.

Bibby, Colin J., Neil D. Burgess, and David A. Hill. 1992. Bird census techniques. Academic Press, San Diego, CA. 257 pgs.

Block, William M. 1989. Spatial and temporal patterns of resource use by birds in California oak woodlands. Univ. Calif. Berkeley, Berkeley, CA. 364 pgs.

Block, William M., and Michael L. Morrison. 1990. Wildlife diversity of the central Sierra foothills. California Agriculture 44(2): 19-22.

Block, William M., and Michael L. Morrison. 1991. Influence of scale on the management of wildlife in California oak woodlands. Pgs. 96-104 *in* Richard B. Standiford, tech. coord. 1991. Proceedings of the symposium on oak woodlands and hardwood rangeland management. Davis, California. Gen. Tech. Rep. PSW-126. USDA Forest Service, Pacific Southwest Research Station, Berkeley, CA. 376 pgs.

Block, William M., Michael L. Morrison, Jared Verner, and Patricia N. Manley. 1994. Assessing wildlife-habitat-relationships models: a case study with California oak woodlands. Wildlife Society Bulletin 22: 549-561.

Bolger, Douglas T., Thomas A. Scott, and John T. Rotenberry. 1997. Breeding bird abundance in an urbanizing landscape in coastal southern California. Conservation Biology 11: 406-421.

Brattstrom, Bayard H., and Michael C. Bondello. 1983. Effects of off-road vehicle noise on desert vertebrates. Pgs. 167-206 *in* R. H. Webb and H. G. Wilshire, eds. Environmental effects of off-road vehicles: impacts and management in arid regions. Springer-Verlag Publishers, New York.

California Department of Fish and Game. 2000. Guidelines for assessing the effects of proposed projects on rare, threatened, and endangered plants and natural communities. California Department of Fish and Game, Sacramento, CA. 2 pgs.

California Native Plant Society Rare Plant Scientific Advisory Committee. 1998. Mitigation guidelines regarding impacts to rare, threatened, and endangered plants. California Native Plant Society, Sacramento, CA. 17 pgs.

Campbell, Lori A., James G. Hallett, and Margaret A. O'Connell. 1996. Conservation of bats in managed forests: use of roosts by *Lasionycteris noctivagans*. Journal of Mammalogy 77: 976-984.

Corn, Paul S., and R. B. Bury. 1990. Sampling methods for terrestrial amphibians and reptiles. Gen. Tech. Rep. PNW-GTR- 256. USDA Forest Service, Pacific Northwest Research Station, Portland, OR. 34 pgs.

Crosswhite, Doyle L., Stanley F. Fox, and Ronald E. Thill. 1999. Comparison of methods for monitoring reptiles and amphibians in upland forests of the Ouachita Mountains. Proceedings of the Oklahoma Academy of Science 79: 45-50.

Crump, Martha L., and Norman J. Scott. 1994. Visual encounter surveys. Pgs. 84-92 *in* W. R. Heyer, Maureen A. Donnelly, Roy W. McDiarmid, Lee-Ann C. Hayek, and Mercedes S. Foster, editors. Measuring and monitoring biological diversity: standard methods for amphibians. Smithsonian Institution Press, Washington, D.C., USA.

England, Albert Sidney. 1995. Avian community organization along a post-fire age gradient in California chaparral. University of California, Davis, CA. 164 pgs.

Fellers, Gary M., and Charles A. Drost. 1994. Visual encounter surveys. Pgs. 146-150 *in* W. R. Heyer, Maureen A. Donnelly, Roy W. McDiarmid, Lee-Ann C. Hayek, and Mercedes S. Foster, editors. Measuring and monitoring biological diversity: standard methods for amphibians. Smithsonian Institution Press, Washington, D.C., USA.

Fellers, Gary M., and Kathleen L. Freel. 1995. A standardized protocol for surveying aquatic amphibians. Tech. Rep. No. NPS/WRUC/NRTR 95-01 National Park Service, Cooperative Park Studies Unit, University of California, Division of Environmental Studies, Davis, CA. 117 pgs.

Fisher, Robert N., Andrew V. Suarez, and Ted J. Case. 2002. Spatial patterns in the abundance of the Coastal Horned Lizard. Conservation Biology 16: 205-215.

Gellman, Steven T., and William J. Zielinski. 1996. Use by bats of old-growth redwood hollows on the north coast of California. Journal of Mammalogy 77: 255-265.

Grinnell, Joseph, and Alden H. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna 27: 1-608.

Hall, Frederick C. 2002. Photo point monitoring handbook: part A – field procedures. Gen. Tech. Rep. PNW-GTR-526. USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Hanes, Ted L. 1988. Chaparral. Chapter 12 in Michael G. Barbour, and Jack Major, eds. Terrestrial vegetation of California. New expanded edition. California Native Plant Society Special Publication Number 9, Sacramento, CA.

Harris, J. 1990a. Small-footed myotis. Pgs. David Zeiner, William F. Laudenslayer, Kenneth E. Mayer, and Marshall White, editors. California's wildlife, volume III: mammals. California Department of Fish and Game, Sacramento, CA.

Harris, J. 1990b. Yuma myotis. Pgs. David Zeiner, William F. Laudenslayer, Kenneth E. Mayer, and Marshall White, editors. California's wildlife, volume III: mammals. California Department of Fish and Game, Sacramento, CA.

Hermanson, John W., and Thomas J. O'Shea. 1983. *Antrozous pallidus*. Mammalian Species 213: 1-8.

Hogan, Bronwyn, and Daniel W. Anderson. 1994. Claypit State Vehicle Recreation Area: wildlife and habitat survey and habitat monitoring plan. Unpublished report submitted to OHV Division, Sacramento, CA. 17 pgs.

Holmes, Tamara L., Richard L. Knight, Libby Stegall, and Gerald R. Craig. 1993. Responses of wintering grassland raptors to human disturbance. Wildlife Society Bulletin 21: 461-468.

Jennings, Mark R., and Marc P. Hayes. 1994. Amphibian and reptile species of special concern in California. Final report submitted to the California Department of Fish and Game, Inland Fisheries Division Rancho Cordova, CA. 255 pgs.

Jones, Clyde, William J. McShea, Michael J. Conroy, and Thomas H. Kunz. 1996. Capturing mammals. Pgs. 115-155 *in* Don E. Wilson, F. R. Cole, James D. Nichols, Rasanayagam Rudran, and Mercedes S. Foster, editors.

Measuring and monitoring biological diversity: standard methods for mammals. Smithsonian Institution Press, Washington, D.C., USA.

Jones & Stokes Associates. 2000. Biological resources survey report for the Mammoth Bar Off-Highway Motor Vehicle Area, Placer County, California. Unpublished report prepared for the U.S. Bureau of Reclamation, Folsom, CA.

Karraker, Nancy E. 2001. String theory: reducing mammal mortality in pitfall traps. Abstract of presentation given at the Annual Meeting of The Western Section of the Wildlife Society, Sacramento, CA..

Kaufman, Kenn. 1996. Lives of North American birds. Houghton Mifflin Company, Boston, MA. 675 pgs.

Knight, Richard L., and Kevin J. Gutzwiller. 1995. Wildlife and recreationists: coexistence through management and research. Island Press, Washington, D.C. 372 pgs.

Kucera, Thomas E., Art M. Soukkala, and William J. Zielinski. 1995. Chapter 3 *in* W. J. Zielinski and T. E. Kucera, tech. eds. American marten, fisher, lynx, and wolverine: survey methods for their detection. Gen. Tech. Rep. PSW-GTR-157. USDA Forest Service, Pacific Southwest Research Station,

Laudenslayer, William F. Jr., and Roberta J. Fargo. 1997. Small nocturnal mammals in oak woodlands: some considerations for assessing presence and abundance. Pgs. 373-380 *in* Norman H. J. V. a. W. D. T. Pillsbury, tech. coords. 1997. Proceedings of a symposium on oak woodlands: ecology, management, and urban interface issues. San Luis Obispo, CA. Gen. Tech. Rep. PSW-GTR-160. USDA Forest Service, Pacific Southwest Research Station, Albany, CA. 738 pgs.

Laymon, Stephen A. 1989. Altitudinal migration movements of Spotted Owls in the Sierra Nevada, California. Condor 91: 837-841.

Lehr, Stafford K. 1998. Biological and aquatic resources assessment of Brushy Creek and the North Fork American River, Placer County, California. California Department of Fish and Game, Rancho Cordova, CA. 7 pgs.

Manning, Richard W., and J. K. Jones, Jr. 1989. *Myotis evotis*. Mammalian Species 329: 1-5.

Marshall, Joe. T. 1988. Birds lost from a Giant Sequoia forest during fifty years. Condor 90: 359-372.

Medeiros, Joe. 2000. American River canyons plant list. Unpublished manuscript available from the author.

Morrison, Michael L., William B. Block, M. D. Strickland, and Willliam L. Kendall. 2001. Wildlife study design. Springer, New York. 210 pgs.

Mosher, James A., Mark R. Fuller, and Mark Kopeny. 1990. Surveying woodland raptors by broadcast of conspecific vocalizations. Journal of Field Ornithology 61: 453-461.

O'Farrell, Michael J., and Eugene H. Studier . 1980. *Myotis thysanodes*. Mammalian Species 137: 1-5.

Ormsbee, Patricia C., and William C. McComb. 1998. Selection of day roosts by female long-legged myotis in the central Oregon Cascade Range. Journal of Wildlife Management 62: 596-603.

Papenfuss, Theodore. 1980. Sierra Nevada foothills amphibian and reptile survey. Report prepared for the Bureau of Land Management, Folsom, CA.

Pierson, Elizabeth D., and William E. Rainey . 1998a. Distribution of the spotted bat, Euderma maculatum, in California. Journal of Mammalogy 79: 1296-1305.

Pierson, Elizabeth D., and William E. Rainey. 1998b. Distribution, status, and management of Townsend's big-

eared bat (*Corynorhinus townsendii*) in California. BMCP Technical Report Number 96-7. California Department of Fish and Game, Bird and Mammal Conservation Program, Sacramento, CA.

Quinn, Ronald D. 1979. Effects of fire on small mammals in the chaparral. Cal-Neva Wildlife Transactions 1979: 125-133.

Quinn, Ronald D. 1990. Habitat preferences and distribution of mammals in California chaparral. Research Paper PSW-RP-202. USDA Forest Service, Pacific Southwest Research Station, Berkeley, CA. 11 pgs.

Rabe, Michael J., Thomas E. Morrell, Heather Green, James C. DeVos, Jr., and C. R. Miller. 1998. Characteristics of ponderosa pine snag roosts used by reproductive bats in northern Arizona. Journal of Wildlife Management 62: 612-621.

Ralph, C. J., John R. Sauer, and Sam Droege. 1995. Monitoring bird populations by point counts. Gen. Tech. Rep. PSW-GTR-149 Pacific Southwest Research Division, Forest Service, U.S. Department of Agriculture, Albany, CA. 187 pgs.

Sawyer, John O., and Todd Keeler-Wolf. 1995. A manual of California vegetation. California Native Plant Society, Sacramento, CA. 471 pgs.

Simovich, Marie A. 1979. Post fire reptile succession. Cal-Neva Wildlife Transactions 1979: 104-113.

Staub, Nancy L., Charles W. Brown, and David B. Wake. 1995. Patterns of growth and movements in a population of *Ensatina eschscholtzii* (Caudata: Plethodontidae) in the Sierra Nevada, California. Journal of Herpetology 29: 593-599.

Stebbins, Robert C. 1985. A field guide to western reptiles and amphibians. Houghton Mifflin Company, Boston, MA.

Steger, George N., Gary E. Eberlein, Thomas E. Munton, and Kenneth D. Johnson. 1997. Characteristics of California Spotted Owl nest sites in foothill riparian and oak woodlands of the southern Sierra Nevada, California. Pgs. 355-364 *in* Norman H. Pillsbury, Jared Verner, and William D. Tietje, tech. coords. 1997. Proceedings of a symposium on oak woodlands: ecology, management, and urban interface issues. San Luis Obispo, CA. Gen. Tech. Rep. PSW-GTR-160. USDA Forest Service, Pacific Southwest Research Station, Albany, CA. 738 pgs.

Sullivan, Brian K. 1981. Distribution and relative abundance of snakes along a transect in California. Journal of Herpetology 15: 247-248.

Thomsen, Craig D., Marc P. Vayssieres, and William A. Williams. 1997. Mowing and subclover plantings suppress yellow starthistle. California Agriculture 51: 15-20.

Tietje, William D., Justin Vreeland, Nancy R. Siepel, and JoAnn L. Dockter. 1997. Relative abundance and habitat associations of vertebrates in oak woodlands in coastal-central California. Pgs. 391-400 *in* Norman H. Pillsbury, Jared Verner, and William D. Tietje, tech. coords. 1997. Proceedings of a symposium on oak woodlands: ecology, management, and urban interface issues. San Luis Obispo, CA. Gen. Tech. Rep. PSW-GTR-160. USDA Forest Service, Pacific Southwest Research Station, Albany, CA. 738 pgs.

Tietje, William D., and Justin K. Vreeland. 1997. The use of plywood coverboards to sample herpetofauna in a California oak woodland. Transactions of the Western Section of the Wildlife Society 33: 67-74.

USFWS. 1991. Protocol for surveying for Spotted Owls in proposed management activity areas and habitat conservation areas. United States Fish and Wildlife Service. 26 pgs.

Verner, Jared, and John G. Kie. 1988. Population monitoring: an essential link between theoretical and applied

conservation biology. Transactions of the Western Section of the Wildlife Society 24: 18-25.

Verner, Jared, and Kathleen A. Milne. 1989. Coping with sources of variability when monitoring population trends. Ann. Zool. Fennici 26: 191-199.

Verner, Jared, Kathryn L. Purcell, and Jennifer G. Turner. 1997. Bird communities in grazed and ungrazed oak-pine woodlands at the San Joaquin Experimental Range. Pgs. 381-390 *in* Norman H. Pillsbury, Jared Verner, and William D. Tietje, tech. coords. 1997. Proceedings of a symposium on oak woodlands: ecology, management, and urban interface issues. San Luis Obispo, CA. Gen. Tech. Rep. PSW-GTR-160. USDA Forest Service, Pacific Southwest Research Station, Albany, CA. 738 pgs.

Warner, Richard M., and Nicholas J. Czaplewski. 1984. *Myotis volans*. Mammalian Species 224: 1-4.

Weller, Theodore J., and Cynthia J. Zabel. 2001. Characteristics of fringed myotis day roosts in northern California. Journal of Wildlife Management 66: 489-497.

Welsh, Hartwell H. Jr., and Garth R. Hodgson . 1997. A hierarchical strategy for sampling herpetofaunal assemblages along small streams in the western U.S., with an example from Northern California. Transactions of the Western Section of the Wildlife Society 33: 56-66.

Williams, Brian. 1994. The effect of field trials on sensitive wintering birds of Spenceville Wildlife Area. Unpublished report. 14 pgs.

Williams, Brian. 1996. Seasonal checklist of the birds of Placer County. Published by the author in cooperation with Sierra Foothills Audubon Society, Placer County, CA.

Williams, Daniel F. 1986. Mammalian species of special concern. Wildlife Management Division Administrative Report 86-1. California Department of Fish and Game, Sacramento, CA. 112 pgs.

Wilson, Randolph A., Patricia Manley, and Barry R. Noon. 1991. Covariance patterns among birds and vegetation in a California oak woodland. Pgs. 126-135 *in* Richard B. Standiford, tech. coord. 1991. Proceedings of the symposium on oak woodlands and hardwood rangeland management. Davis, CA. General Technical Report PSW-126. USDA Forest Service, Pacific Southwest Research Station, Berkeley, CA. 376 pgs.

Wone, Bernard, Beate Beauchamp, and Michael Kutilek. 1997. Bird and mammal monitoring at Carnegie State Vehicular Recreation Area, California. Contract No. C9614012A final report prepared for the California State Parks, Off-Highway Motor Vehicle Division, 18 pgs.

Appendix 1. Names of Species Mentioned in the WHPP.

Plants	
Poison oak	*Toxicodendron diversilobum*
Yellow star-thistle	*Cantaurea solsistitalis*
Canyon live oak	*Quercus chrysolepis*
Blue oak	*Quercus douglasii*
Interior live oak	*Quercus wislizenii*
Chamise	*Adenostoma fasciculatum*
Toyon	*Heteromeles arbutifolia*
Foothill pine	*Pinus sabiniana*
Tree of heaven	*Ailanthus altissima*
Red Hills soaproot	*Chlorogalum grandiflorum*
Insects	
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*
Fish	
Rifle sculpin	*Cottus gulosus*
Sacramento sucker	*Catostomus occidentalis*
Rainbow trout	*Oncorhynchus mykiss*
Small-mouth bass	*Micropterus dolomieui*
Pikeminnow	*Pteychocheilus grandis*
Hardhead	*Mylopharadon conocephalus*
Amphibians	
slender salamander	*Batrachoseps* sp.
Pacific treefrog	*Pseudacris regilla*
Western toad	*Bufo boreas*
Red-legged frog	*Rana aurora draytonii*
Foothill yellow-legged frog	*Rana boylii*
Reptiles	
Coast horned lizard	*Phrynosoma coronatum*
Western skink	*Eumeces skiltonianus*
Whiptail lizard	*Cnemidophorus tigris*
Racers	*Coluber constrictor*
Gopher snakes	*Pituophis catenifer*
Garter snakes	*Thamnophis* sp.
Birds	
Common merganser	*Mergus merganser*
Osprey	*Pandion haliaetus*
White-tailed kite	*Elanus leucurus*
Bald eagle	*Haliaeetus leucocephalus*
Cooper's Hawk	*Accipiter cooperi*
Red-tailed hawk	*Buteo jamaicensis*
Ferruginous Hawk	*Buteo regalis*
Golden Eagle	*Aquila chrysaetos*
Merlin	*Falco columbarius*
Peregrine Falcon	*Falco peregrinus*
Wild turkey	*Maleagris gallopavo*
California quail	*Callipepla californica*
Killdeer	*Charadrius vociferus*
Spotted sandpiper	*Actitis macularia*
Band-tailed pigeon	*Columba fasciata*

Mourning dove	*Zenaida macroura*
Greater roadrunner	*Geococcyx californianus*
Western screech-owl	*Otus kennicottii*
California spotted owl	*Strix occidentalis occidentalis*
Long-eared owl	*Asio otus*
Belted kingfisher	*Ceryle alcyon*
Acorn woodpecker	*Melanerpes formicivorus*
Downy woodpecker	*Picoides pubescens*
Olive-sided flycatcher	*Contopus cooperi*
Ash-throated flycatcher	*Myiarchus cinerascens*
Black phoebe	*Sayornis nigricans*
Loggerhead shrike	*Lanius ludovicianus*
Hutton's vireo	*Vireo huttoni*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Oak titmouse	*Baeolophus inornatus*
Bushtit	*Psaltriparus minimus*
White-breasted nuthatch	*Sitta carolinensis*
Bewick's wren	*Thryomanes bewickii*
American dipper	*Cinclus mexicanus*
Blue-gray gnatcatcher	*Polioptila caerulea*
Western bluebird	*Sialia mexicana*
Wrentit	*Chamaea fasciata*
Orange-crowned warbler	*Vermivora celata*
Yellow warbler	*Dendroica petechia*
Yellow-breasted chat	*Icteria virens*
Bell's sage sparrow	*Amphispiza belli belli*
Grasshopper sparrow	*Ammodramus savannarum*
Lazuli bunting	*Passerina amoena*
Bullock's oriole	*Icterus bullockii*
Lesser goldfinch	*Carduelis psaltria*
Mammals	
Pallid bat	*Antrozous pallidus*
Townsend's big-eared bat	*Corynorhinus townsendii*
Spotted bat	*Euderma maculatum*
Small-footed myotis	*Myotis ciliolabrum*
Long-eared myotis	*Myotis evotis*
Fringed myotis	*Myotis thysanodes*
Long-legged myotis	*Myotis volans*
Yuma myotis	*Myotis yumanensis*
Western mastiff bat	*Eumops perotis*
Botta's pocket gopher	*Thomomys bottae*
Brush mouse	*Peromyscus boylii*
California ground squirrel	*Spermophilus beecheyi*
Western gray squirrel	*Sciurus griseus*
Brush rabbit	*Sylvilagus bachmani*
Coyote	*Canis latrans*
Gray fox	*Urocyon cinereoargenteus*
Raccoon	*Procyon lotor*
Ringtail	*Bassariscus astutus*
American badger	*Taxidea taxus*
Black-tailed mule deer	*Odocoileus hemionus*

Appendix 2. Sampling Design and Monitoring Protocols for Mammoth Bar OHVA

The following protocols are expected to satisfy the objectives for both a thorough baseline inventory and provide a measure of relative abundance and repeatability required for a monitoring program. They have been identified as being (1) successful in sampling the species or groups expected at Mammoth Bar, (2) effective in sampling habitats similar to those at Mammoth Bar, (3) are widely used and standardized for comparison both within Mammoth Bar and similar areas, (4) and are relatively efficient. The study design or protocols may need to be modified if objectives shift to solving of specific management questions (see WHPP, page 6-7). A task matrix has also been included for these protocols (Appendix 7).

It is recommended that the OHVA be divided into units that can be used for sampling at various scales and for various taxa. A 300-m systematic-random grid is recommend as this is near the smallest grid that defines independent bird counts (Ralph et al. 1995), gives a reasonable number of cells and intersections (~70)(Aigner et al. 1997), and is used by other areas in the Sierra foothills (Block 1989, Aigner et al. 1997). The grid can be used to select systematic, random, stratified, or any combination of samples, and units can be subdivided as necessary. An integrated system also allows collection of associated data (e.g., habitat characteristics) that can be used for analysis of multiple taxa at multiple scales. It is highly recommended that the grid and information system be tied to a GIS which will facilitate study planning, spatial analyses, and parallel analyses of multiple taxa.

Vegetation

Fine-grain Plant Surveys

Surveys for rare plants will be conducted according to the guidelines published by the California Department of Fish and Game (California Department of Fish and Game 2000) and recommended by the California Native Plant Society (CNPS)(California Native Plant Society Rare Plant Scientific Advisory Committee 1998). Rare plant surveys will also include the mapping of elderberry shrubs, seasonal wetlands, and infestations of invasive plants (e.g., star-thistle, *Ailanthus*). All locations should be recorded with a GPS and any discoveries of rare plants should be thoroughly documented as recommended in the guidelines.

Plant Community Sampling

Plant community sampling will employ the use of a point-intercept transect method detailed in Sawyer and Keeler-Wolf (1995: 413-424) and also used at Hungry Valley SVRA. Sampling should be conducted at approximately five randomly located grid intersections in each major habitat type. Ecotones should also be considered a major habitat type because of their ecological importance. End points should be permanently marked to allow precise resampling.
The California Native Plant Society's vegetation sampling protocol (Sawyer and Keeler-Wolf 1995) is a widely-recognized floristic and structural sampling technique that provides for the description and monitoring of plant communities. It is sufficiently detailed to provide quantitative data for one-time vegetation typing, but is most useful as a medium- and fine-grain monitoring technique to assess changes in structure and composition.

Photographic Monitoring
Photographic monitoring stations will be established at selected high-use areas in the staging area, at Mammoth Bar, and at representative trail sites. Photo monitoring should follow recommendations in Hall (2002) and be taken biannually in late spring and again in late fall. Stations may be added as necessary to track restoration efforts, trail relocations, etc.

Valley Elderberry Longhorn Beetle

Surveys for VELB will be conducted while monitoring elderberry shrubs. Surveys will record the size of the shrubs, presence of exit holes consistent with VELB, and a qualitative comparison to the previous year's condition.

Terrestrial Herpetofauna

The following protocols emphasize (1) detecting the entire array of potential herpetofauna, especially the special status horned lizard and the most diverse but poorly known group (snakes); and (2) generation of a large sample for analyses. Herpetofauna in general are uncommon and often secretive or inactive and therefore not easily sampled with a single method. Some kind of "trapping" is usually necessary to increase detection rates (Corn and Bury 1990), such as using a drift fence array or coverboards. Implementation of either method at Mammoth OHVA is potentially troublesome due to the possibility of tampering or vandalism, and there are also other effects to consider (e.g., ground-disturbance, long-term habitat effects). The relative efficiency of the two methods is untested, however, and ideally a variety of approaches should be used (Corn and Bury 1990, Welsh and Hodgson 1997).

Site selection may vary with the method used, but, in general, sampling sites should be identified randomly with respect to the established grid system and in proportion to habitat or trail densities. Several small but widely distributed sampling areas will likely sample more species and produce more potential replicates for hypothesis testing. Sampling areas should probably be located near point count stations for efficiency, but not within the 50-m point count radius (see below) to avoid excessive human or habitat disturbance.

Herpetofauna are very responsive to changes in seasons and weather conditions (Welsh and Hodgson 1997). In order to sample the maximum number of possible species during inventory, traps should be sampled during most periods of the year. For example, terrestrial salamander detection rates may be highest in the western Sierra Nevada in the fall (Block and Morrison 1990, Block and Morrison 1991, Staub et al. 1995), whereas snakes are generally most active in spring and summer. Sampling year-round may also yield information on species-specific activity patterns that could be useful for management.

Drift Fence Arrays
Drift Fence arrays are an effective tool for capturing various herpetofauna (Corn and Bury 1990, Crosswhite et al. 1999) as well as small mammals such as shrews (Jones et al. 1996). A drift fence array employs three drift fences radiating 120 from the center and with pitfall traps at three ends and the center. Pitfall traps can be sized to target certain taxa; five-gallon buckets will be used initially as these are probably most effective for capturing horned lizards (Fisher et al. 2002). Traps will be checked daily; when not in use they will be wired shut and buried to prevent accidental captures. In order to reduce mortality, plywood coverboards with strings that

allow the escape of non-target mammals (Karraker 2001) will be used to cover all open traps. The strings may be left off for initial inventory when capture of small mammals is desirable. In order to minimize disruption of a local area, any given array will be operated no more than 14 consecutive days, and inactive for at least 5 days between trapping sessions.

Time- or Area-constrained Searches
Time-constrained searches (TCS)(Corn and Bury 1990) or area-constrained searches (ACS)(Welsh and Hodgson 1997) may be the best way to sample local habitat specialists (e.g., slender salamanders, whiptail lizards) that may not be effectively sampled by random placement of sampling sites. Because such species are likely to occur at low densities, searches should begin in the best available habitat. Two persons should be used for surveys as it often easier to identify a higher proportion of fleeing animals. The sampled area should be mapped and measured to allow estimates of relative abundance and repeatable surveys.

Coverboard Arrays or Artificial Cover Objects (ACO)
Sampling herpetofauna with artificial coverboards (Fellers and Drost 1994, Tietje and Vreeland 1997) takes advantage of their tendency to use cover objects (e.g., rocks, logs) for protection and thermoregulation. Coverboards of 2'x2' 0.5-0.75 inch plywood should be arranged in grids (e.g. 5x5) with 15-m spacing for detection of a variety of species and for comparability with other surveys in California (Tietje et al. 1997). Coverboards should be checked no more than every 1-2 weeks to avoid excessive disturbance. Boards should be lifted quickly by tilting up the far edge (keeping the board between the observer and a potential rattlesnake). Any animals should be quickly captured for identification and the area under the board searched for hidden animals. It is recommended that 400-500 total coverboards be arranged in 20-25 arrays.

Work products: species abundance data (mean, SD) by location and habitat, map of areas sampled, by habitat; observational data on behavior and habitat use that may be relevant to management
Suggested analyses: species abundance regressed against trail proximity or density

Breeding Birds - Point Counts

Point counts are the standard for bird monitoring in woodland and shrubland habitats (Block and Morrison 1990, Wilson et al. 1991, Block et al. 1994, Tietje et al. 1997, Verner et al. 1997). The protocol described here closely follows the excellent summary by Ralph et al. (Ralph et al. 1995) as well as several other studies in California's oak woodlands including the sampling effort recommended by Aigner et al. (Aigner et al. 1997). Potential count stations will be systematically pre-selected by the placement of a 300-m grid over the study area. This grid will ensure independent observations (Ralph et al. 1995), produce a generally satisfactory number of potential counting stations (~70), and allow comparability with other areas (Block 1989, Aigner et al. 1997). Counting stations will be established at all intersections except those with special problems such as points that are dangerous to access (e.g., steep slopes). Other points with potential problems such as excessive noise should either be eliminated or accounted for during analysis. Five-minute, 50-m fixed-radius point counts should be conducted four times at each site (Ralph et al. 1995, Aigner et al. 1997). The counter should approach the point with as little disturbance as possible. Absolutely no coaxing of birds should be used, but unknown birds

should be confirmed after the 5-minute interval or after the end of the survey. For aerial birds, a distinction should be made for perched, flying locally, or flying high overhead. Any nesting evidence should also be recorded. All observers must be skilled at detecting all birds by song and call (Verner and Milne 1989, Ralph et al. 1995). In general, one observer is ideal for counting, but may be inappropriate for long-term monitoring as changes in observers may seriously bias the analysis (Verner and Milne 1989). Thus, it is recommended that two counters be used to alternately count at all stations (i.e., observer A counts all stations for the first survey, observer B counts all stations for the second survey, etc.). It is acceptable for the second observer to begin the first day surveys while the first observer is still counting. Counts should be conducted from late April through mid-June to include the many migrants which would not be sampled if surveys began earlier in the season. Counts should be conducted from 15 minutes before official sunrise (rather than 30 minutes prior, a period of high variability) to four hours after sunrise. Start times should be rotated among the sites so that no count is biased by time of day.

Work products: species abundance data (mean, SD) by location and habitat, map of areas sampled; observational data on behavior and habitat use that may be relevant to management
Suggested analyses: species abundance regressed against trail proximity or density

Nesting Raptors & Selected Species

Surveys for sensitive species should be conducted in all suitable habitats, particularly those near activity areas. These species include diurnal raptors, spotted and long-eared owls, loggerhead shrike, and greater roadrunner. Survey methods fall into three general categories: (1) nest tree search for large raptors, (2) call surveys for accipiters (Mosher et al. 1990), owls (USFWS 1991), roadrunner, and (3) area search (with call playbacks as necessary) for the passerines. It may also be of interest to survey for Spotted Owls during winter.

Work products: survey results, map of locations with observation details including nest sites, potential nests, and best nesting habitat.
Suggested analyses: nest sites vs. random sites in relation to trail proximity or densities

Non-Breeding Birds – Area Search

Inventories of non-breeding birds are best done using the area search method. The area search is straight-forward (Bibby et al. 1992) and simply involves recording all individuals seen or heard in a defined area. Birds should be tallied as occurring within the area, beyond the area, or flying overhead and not using the area. Coaxing of birds can be used to increase detection rates which are often lower outside of the breeding season. If used, it should be documented and used consistently at all points. Observers must be skilled at detecting birds by sight and sound, but because coaxing and moving around is allowed, observer skill may not be as critical as the breeding season point counts. Multiple observers can be used, but should be of comparable skill and should equally sample count areas. Counts should be conducted xx times at each site from July-April. Counts should be conducted from official sunrise to xx hours after sunrise and only during appropriate weather conditions (e.g., wind Beaufort $\leq$3). Start times should be rotated among the sites so that no count is biased by time of day. Targeted surveys can be used to sample specific habitats or find particular species. This is not expected to be used for long-term monitoring, as this group probably exhibits greater variability than during the breeding season.

Work products: species abundance data (mean, SD) by location and habitat, map of areas sampled; observational data on behavior and habitat use that may be relevant to management
Additional analyses: species abundance regressed against trail proximity or density

Small Mammal Protocols

Live trapping is the most appropriate method to assess diversity and abundance of most small mammals. A trap grid (e.g., 7x7) of Sherman or Tomahawk live traps is set out with 15-m spacing. Additional traps can be set near the grid that target certain species such as woodrats (Laudenslayer and Fargo 1997), which also may be sensitive to OHV use (see data in Wone et al. 1997). Traps are pre-baited and baited with a rolled oat-peanut butter mix and set late in the afternoon. They are checked shortly after sunrise the next morning, and closed for the remainder of the day to avoid trap mortality for any diurnal species that may be present. Captured animals are identified, measured, checked for reproductive condition, marked, and released. This protocol is followed for 4-5 consecutive nights for each study plot. Field work should be conducted in the fall (mid-September and mid-November) and/or spring when the small mammals in this system are most active. Further small mammal studies are not planned unless analysis determines more study is warranted.

Work products: species abundance data (mean, SD) by survey plot and habitat type, map of plots sampled
Additional analyses: capture rates, by grid or trap, regressed against trail proximity or density; tests of means in trail-less vs. areas with trails

Large Mammal Protocols

There are several methods available to detect large mammals, but remote camera stations (Kucera et al. 1995) are becoming a standard for monitoring uncommon carnivores and secretive species. They are fairly cost-effective over long periods, can unequivocally document occurrence, work in a variety of habitats including sites not easily sampled by other means. It is recommended that 2-3 cameras be used with various attractants (e.g., carrion, scents, lures, fruit) for different target species. One of the cameras should be positioned along an animal trails to document animals not that may not respond to attractants. Cameras should be positioned and settings adjusted for target taxa following Kucera et al. (1995) or the manufacturer's instructions if commercially available cameras are used.

Work products: species abundance data (mean, SD) by camera station, habitat, and type; map of camera locations
Additional analyses: species abundance regressed against trail proximity or density; tests of means in trail-less vs. areas with trails

Bats

Inventories of bats will be conducted by contracted specialists. Protocols should be suggested by the contractor, but, at a minimum, surveys should include multiple days of acoustical (e.g. AnaBat) and/or mist netting at likely foraging and/or roosting sites.

Semi-aquatic Herpetofauna & Riverine Birds

Distance-based visual encounter surveys (Crump and Scott 1994, Fellers and Freel 1995, Welsh and Hodgson 1997) will be conducted for aquatic or semi-aquatic herpetofauna and other wildlife along the north side of the Middle Fork American River. Species effectively sampled include foothill yellow-legged frog, western pond turtle, garter snakes (*Thamnophis* sp.), spotted sandpiper, belted kingfisher, yellow-breasted chats, and other wildlife. The survey is conducted by walking slowly upstream along or near the water's edge and carefully searching for animals. The observer should use binoculars to scan ahead (at least 100 m) for turtles which often retreat to the water >50 m from the observer. Age/size classes should be noted. Observations should be quantified by stream reach, each of which should be defined by relatively permanent features such as recognizable tributaries; gravel bars make convenient references but may change in size or position over time. Habitat should be documented at observed vs. random sites, and high visitor-use areas should also be identified. These data will allow future comparisons, subsampling, habitat analyses, etc.

Appendix 3. Special-Status Species

Federal Threatened or Endangered Species

The Valley Elderberry Longhorn Beetle (VELB) is the only federally listed species known, assumed, or suspected to occur in the Mammoth Bar OHVA. Assumed presence of the species is based on five elderberry shrubs in the park (Jones & Stokes Associates 2000); the elderberry is the host plant of the VELB. Section 9 of the Endangered Species Act prohibits activities that result in "take" of listed species. Take is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." The term *harm* includes adverse impacts on habitat.

State Threatened or Endangered Species

No state-listed wildlife species are known or suspected to occur at Mammoth Bar OHVA. A few species (e.g., bald eagle, peregrine falcon) may breed in the American River canyons, but there is no suitable habitat thought to exist on the OHVA.

Species of Special Concern

There are 29 state or federal Species of Concern known to occur or with reasonable potential to occur on or immediately adjacent to the Mammoth Bar OHVA: 1 fish, 1 amphibian, 2 reptiles, 10 birds, and 9 mammals (all bats)(Appendix 4). However, five of the birds will soon be removed from consideration (osprey, Cooper's hawk, golden eagle, merlin, and yellow warbler) and two will be added (belted kingfisher, olive-sided flycatcher) when the list of California Species of Special Concern is updated in 2002 or 2003. The following accounts anticipate these changes; some other species may be found in Jones & Stokes (2000).

Foothill yellow-legged frog: The foothill yellow-legged frog is restricted to stream systems and adjacent gravel bars (Stebbins 1985, Jennings and Hayes 1994), and has been documented from the Middle Fork of the American River (Williams 2002). Although impacts to frogs are unlikely because OHV use is not allowed along the river, a one-year survey will be conducted to quantify abundance and locations along approximately 5.1 km of the north side of the Middle Fork (Appendix 2).

Western pond turtle: Pond turtles are primarily aquatic though they make occasional visits onto land to lay eggs or hibernate (Jennings and Hayes 1994). They occur in low densities in the American River canyons, but their status near Mammoth Bar is unknown. OHV and recreational effects are probably minimal, as the stream corridor is off-limits to OHV activity. A one-year survey will be conducted to quantify abundance and locations along approximately 5.1 km of the north side of the Middle Fork (Appendix 2).

Coast horned lizard: The horned lizard occurs in several habitat types, but is generally confined to sites with open ground with sandy, fine-gravelly, or loose soils, and scattered shrubs (Stebbins 1985, Jennings and Hayes 1994, Fisher et al. 2002). This is one of the rarest species in the Sierra foothills and habitat is marginal is the area (Papenfuss 1980), but it has been observed in the

North Fork of the American River canyon (Williams 2002, Appendix 6) and has also been found in chamise chaparral (Jennings and Hayes 1994). This species is poorly known and may be vulnerable to multiple threats, including OHV use, displacement of native ants (the primary food source) by the invasive Argentine ant, and urbanization (Jennings and Hayes 1994, Fisher et al. 2002). Jennings and Hayes recommended that "surveys... in the northern and Sierran slope portions of the range... urgently need to be conducted...." This species will be inventoried using drift fence arrays, which is the best method for detecting this cryptic species (Fisher et al. 2002) (Appendix 2).

Spotted Owl: Spotted owls typically occur in late-successional forests and woodlands. They are not known from the American River canyons at this elevation, but they do breed in oak woodlands in other parts of the Sierra (Steger et al. 1997) and are known to move to lower elevation woodlands in winter (Laymon 1989). They are probably confined to north slopes in this area, however, and are unlikely at Mammoth OHVA which is on the S-facing slope of the Foresthill Divide ridge. However, protocol surveys will be conducted (Appendix 2).

Long-eared owl: Long-eared owls breed in dense woodlands near meadows or grasslands with abundant rodents such as voles and mice (Grinnell and Miller 1944). Nest sites are typically in live oaks where they occur. Their status in the area is unknown, but they could nest at least occasionally in the OHVA. Surveys for owls and suitable nests will be conducted concurrently with spotted owl and raptor surveys (Appendix 2).

Belted kingfisher: The belted kingfisher is being added to the state list of species of concern. It is found near many open water habitats and nests in adjacent earthen embankments (or rarely tree cavities; Kaufman 1996). They occur along the American River system, but their nesting status is unknown. A one-year survey will be conducted to quantify abundance and any nesting locations along approximately 5.1 km of the Middle Fork (Appendix 2).

Olive-sided flycatcher: Olive-sided flycatchers are primarily a coniferous forest species (Grinnell and Miller 1944) and probably do not occur at Mammoth Bar OHVA, but they are also post-fire specialists that could potentially occur in hypothetical post-fire habitats with scattered conifers. OHV activity is unlikely to have any effect, but this conspicuous species would be effectively surveyed by extensive point counts (Appendix 2).

Loggerhead shrike: Shrikes occasionally nest in oak savannahs and should be considered possible (but extremely unlikely) at Mammoth Bar OHVA. This species is sensitive to disturbance (Williams 1994) and should be monitored if found. Surveys should be conducted in late winter or early spring (during raptor surveys) when they are most visible; detection by spring/summer point counts may be ineffective as shrikes are generally nonvocal and less conspicuous at that time.

Purple martin: Purple martins do not occur at Mammoth Bar OHVA, but martins are also post-fire specialists that could potentially occur after a major woodland fire. OHV activity is unlikely to have any effect, but this species would be effectively surveyed by extensive point counts (Appendix 2).

Yellow-breasted chat: Chats are usually restricted to dense patches of riparian vegetation. They occur locally throughout low elevations of the American River canyons, and were observed on the south side of the Middle Fork of the American River during an initial inventory at Mammoth Bar in 1999 (Jones & Stokes Associates 2000). They are unlikely to be impacted because OHV use has been prohibited in riparian vegetation along the American River. A one-year survey will be conducted to quantify abundance and locations along approximately 5.1 km of the north side of the Middle Fork (Appendix 1).

Bell's sage sparrow: Bell's sage sparrows are restricted to chamise chaparral (Grinnell and Miller 1944) and are known to breed in chamise chaparral at the Foresthill Bridge (the northern-most extent of regular breeding in the Sierra Nevada) and probably do so at Mammoth Bar. They may be sensitive to OHV recreation or habitat fragmentation (Bolger et al. 1997). They will be surveyed effectively using extensive point counts (Appendix 2).

Bats: The following list of eight special-status bats assumes that bats range widely and that all may sometime roost in trees. Special-status species are typically designated because they are thought to be indicative of late-successional forests (e.g., long-legged myotis) or sensitive to disturbance at roost sites (e.g., Townsend's big-eared bat). There are no known or suspected high-quality roosting features at the OHVA,, as there are no caves, mines, rocky cliffs, or abandoned buildings, or other favored roost sites. However, some bats may use rock crevices, snags, or old trees with special features such as cavities, crevices, and exfoliating bark (Campbell et al. 1996, Gellman and Zielinski 1996, Ormsbee and McComb 1998, Rabe et al. 1998, Weller and Zabel 2001). Although OHV use is unlikely to cause any significant impacts to this group, an inventory will be conducted by contracted specialists (Appendix 2).

Western mastiff bat: Mastiff bats roost in cliffs, extensive rock outcrops, and buildings (Williams 1986, Best et al. 1996) and could theoretically use large, tall hollow trees. Their status in Placer County is unknown. They appear to have been detected at only two locations to the north, one in the Sutter Buttes (Heather Johnson, pers. comm.) and in Oroville.

Pallid bat: Pallid bats are somewhat unique in that they are often active on the ground, and there may be suitable roost sites in the form of rock formations (Hermanson and O'Shea 1983). Their status in the project area is unknown.

Townsend's big-eared bat: Townsend's big-eared bats are generally restricted to caves, mines, buildings, and similar structures (Williams 1986, Pierson and Rainey 1998b), but could theoretically use large hollow trees (see Gellman and Zielinski 1996). They were collected many years ago in the old lime caves S of Mammoth Bar (Museum of Vertebrate Zoology specimens) but current status is unknown.

Spotted bat: Spotted bats are one of the rarest bats in California and restricted to areas near rocky cliffs (Pierson and Rainey 1998a). They could potentially be found in the American River canyon system, but are unlikely at the OHVA.

Small-footed myotis: Small-footed myotis may be one of the most likely bat species to occur at the OHVA based on general habitat descriptions (Harris 1990a) and is also known to roost under exfoliating bark. However, its status in the project area is unknown.

Long-eared myotis: Long-eared myotis is most often found in conifer forests, but may occur widely. It is known to use snags and exfoliating bark as roost sites (Manning and Jones 1989). Its status in the project area is unknown.

Fringed myotis: Fringed myotis was once not reported to use trees (O'Farrell and Studier 1980), but recent research has confirmed their regular use, at least in some situations (Hermanson and O'Shea 1983, Weller and Zabel 2001). Their status in the project area is unknown.

Long-legged myotis: Long-legged myotis may occur widely but is usually found in conifer forests (Warner and Czaplewski 1984, Ormsbee and McComb 1998). Its status in the project area is unknown.

Yuma myotis: Yuma myotis are well-known for their preference for open water and usually roost in large colonies under bridges, occasionally hollow trees (Gellman and Zielinski 1996), and even old swallow nests (Harris 1990b). They are known from near the American River confluence (Museum of Vertebrate Zoology specimen).

Other Protected Species

Several species are protected from take in one form or another. This includes fully protected species (e.g., ringtail, California Fish and Game Code Section 4700), nesting raptors (CFGC 3503.5), and species protected by hunting, harvest or fishing regulations.

Appendix 4. Sensitive Wildlife Species with Potential to Occur in the Mammoth Bar OHVA Project Area

SPECIES	STATUS[1]	Occurrence[2]	Habitat	Potential Presence at Project Site
INVERTEBRATES				
Valley Elderberry Longhorn Beetle	F	?	Elderberry shrubs at relatively low elevations, usually in areas with high shrub densities	Low. Few shrubs on project site
FISH				
Hardhead	CSC	A	Streams with clear, deep pools with slow water. Not found where sunfishes (e.g., bass) predominate.	High. Commonly found in American River system
AMPHIBIANS				

[1] Status
CSC = California Species of Concern
CSC* = scheduled for removal from list in 2002-2003
CSC – p = scheduled for addition to list in 2002-2003
FSC = Federal Species of Concern
FE = Federal Endangered
SE = State Endangered

[2] Occurrence
yes = definitely recorded from Mammoth since 1960s
A = definitely recorded from habitats near the confluence since 1960s, and assumed on Mammoth OHVA
H = historical records from the area, but not known from the area since 1950s-1960s
h = historical records west of Sierra Nevada crest
? = no information yet located that the species definitely is found in the OHVA, but range and/or habitat requirements suggest they may occur
no = species does not occur in OHVA during the season(s) in which it is protected or deemed to be sensitive

SPECIES	STATUS[1]	Occurrence[2]	Habitat	Potential Presence at Project Site
Foothill Yellow-legged Frog	FSC, CSC	A	Gravelly rivers & streams	Occurs on both North and Middle Fork American Rivers and tributaries; not definitely known from OHVA but probable
Red-legged Frog	FT	no	Ponds or streams with still or slow-moving water and riparian or emergent vegetation	No perennial ponds or slow-moving streams – only MF American River which is unsuitable
REPTILES				
Western Pond Turtle	FSC, CSC	A	Open water with basking sites & cover	Moderate. Occurs in low numbers along river
Horned Lizard	FSC, CSC	?	Open woodland, chaparral with sandy soils and native ants	Low. Known historically from low foothills to low mountains; still in upper foothills
BIRDS				
Osprey	CSC*	?	Many habitats near languid water with fish	Low.
White-tailed Kite	protected	?	Grassland/savannah, usually ungrazed and supporting high densities of rodents	Possible breeder near grasslands
Bald Eagle	FT, SE	?	Large trees for nesting near open water; in the Sierra, usually near a reservoir	Seen in summer, but no known nest sites
Cooper's Hawk	CSC*	A	Relatively dense live oak or pine forests	Moderate. Possible breeder in oak woodland
Golden Eagle (all seasons)	CSC*	?	Many habitats near large open areas for foraging	Low. Potential foraging habitat, but probably too sensitive to nest in OHV area
Merlin (wintering)	CSC*	yes	Many habitats in winter, usually open grasslands or savannahs	Possible winter visitant or migrant
Peregrine Falcon	SE	?	Many habitats, but needs cliffs for nesting	None. Seen in breeding season in mountains, but no known suitable nest sites
Greater Roadrunner		?	Typically chaparral, oak woodland, grassland ecotone in foothills	Brian's list. Possibly extirpated from Placer County (no records since 1980s) but formerly uncommon resident.
California Spotted Owl	FSC, CSC	?	Dense forest and woodland habitats with cool microclimates	Low due to S-exposure. May winter and possibly breed in the Middle Fork canyons at lower elevations
Long-eared Owl	CSC	?	Dense forest or woodland near meadows or grasslands	Potential breeder in oak woodland

SPECIES	STATUS[1]	Occurrence[2]	Habitat	Potential Presence at Project Site
Belted Kingfisher	CSC-p	A	Open water with suitable nesting sites in cut banks	Present along river, but nesting status unknown
Olive-sided Flycatcher	CSC-p	?	Mostly low- to mid-elevation conifer forests, especially post-fire or relatively open	Low. Very unlikely in oak woodland in absence of major fire
Willow Flycatcher	SE	?	Willow scrub at relatively high elevations; formerly more widespread	Not expected as a breeder. No known nest sites in Sierra foothills, and foraging habitat possibly too sparse in canyon
Loggerhead Shrike	FSC, CSC*	?	Open grassland, savannah, and agricultural habitats	Very low. Unlikely >1000 ft in western Placer County
Purple Martin	CSC	?	Mostly post-fire woodland and forest with large trees at prominent positions	Very low. Possible only after tree-killing fire
Yellow Warbler (*brewsteri*)	CSC*	?	Riparian woodlands and montane chaparral	Low. Potential breeder along river; no potential in hard chaparral
Yellow-breasted Chat	CSC	A	Dense riparian woodland, usually in blackberry patches; also occasionally diverse post-fire chaparral	Present along river; nesting on north side unknown
Bell's Sage Sparrow	FSC, CSC*	A	Chamise chaparral	Probably resident on OHVA
MAMMALS				
Pallid Bat	CSC	?	Many habitats, especially open dry areas with rocky areas for roosting. Also uses caves, mines, buildings, hollow trees	High. Probable based on general habitat and CA distribution.
Townsend's Big-eared Bat	FSC, CSC	H	Many habitats, most common in wet areas. Requires caves, mines, buildings, tunnels, other man-made structures, usually cold.	Unknown. Collected at old lime caves, but may be extirpated from that site
Spotted Bat	FSC, CSC	?	Apparently several general habitats, buts needs open rock cliffs for roosting; rare in CA	Not expected. Rare in California
Small-footed Myotis	FSC	?	Arid chaparral and woodland habitats	Expected based on general habitat and range
Long-eared Myotis	FSC	?	Usually in conifer forest, but may occur widely.	Low.

SPECIES	STATUS[1]	Occurrence[2]	Habitat	Potential Presence at Project Site
Fringed Myotis	FSC	?	Many habitats. Roosts or maternal colonies in caves, buildings, bridges, mines	Moderate.
Long-legged Myotis	FSC	h	Woodland and forest generally above ~4000 ft. Roosts/nurseries in rock crevices, mines, caves, under tree bark and in snags.	Low;. Not expected, but bats may occur widely.
Yuma Myotis	FSC, CSC	yes	Open forests and woodlands near open water. Roosts or maternal colonies in warm dark caves, buildings, bridges, mines	High. Collected near project area
Mastiff Bat	FSC, CSC	?	Elevated south-facing cliffs or canyons	Newly discovered populations suggest this species may occur from American River canyons, but no quality habitat on site
American Badger	CNDDB	?	Usually open habitats with friable soils	Low, but occurs widely
Ringtail	CFP	A	Brushy foothill canyons, woodlands, riparian habitats	High. Recorded in Middle Fork canyon.

Appendix 5. Relative Sensitivity Assessment of OHV Recreation on Wildlife at Mammoth Bar OHVA

This table ranks the relative sensitivity (or vulnerability) of groups of species as defined primarily by their common method of detection or behavior. The results were used as a criterion for developing the inventory and monitoring strategy. The scores are location- and habitat-specific, but the technique is flexible and easily updated based on new information or different assumptions. The following reasonable assumptions were used for this evaluation:

(1) The components of OHV use that could negatively impact wildlife populations are collisions, movement, noise, habitat alteration (trails), and spread of noxious weeds. Thus, species most likely to be affected would be active on or near the ground, diurnal, sensitive to movement or noise disturbance, and sensitive to changes in habitat structure or floristic composition.
(2) The OHVA is closed at night and during heavy rains.
(3) OHV use is prohibited in riparian areas and along the river.
(4) Future OHV use patterns will be similar to current patterns.
(5) Habitat structure is at least as important to wildlife abundance as OHV use.
(6) Fire management and extent of invasive weeds are mostly independent of OHV use.

	OHV use						Habitat		Total
	collisions (x 2)	motion (x 1)	noise (x 1)	trails (x 1)	abundance (x 2)	weighted average	weeds (x 1)	fire (x 1)	weighted average
diurnal herpetofauna	3	2	1	2	2	3.0	2	2	2.7
shrub & ground nesting birds	1	2	3	2	2	2.6	2	3	2.6
diurnal raptors	1	3	2	1	2	2.4	2	2	2.3
small mammals	1.5	1	1	2	2	2.2	2	3	2.3
large mammals	1	2	2	2	2	2.4	1	2	2.1
nocturnal herpetofauna	1.5	1	1	2	1	1.8	2	2	1.9
tree-nesting birds	1	2	2	1	1	1.8	2	2	1.9
meso-mammals	1	2	2	1	1	1.8	2	2	1.9
(rabbits	1	2	2	2	2	2.4	2	3	2.4)
meso-carnivores	1	2	2	1	1	1.8	1	2	1.7
bats	1	1	2	1	1	1.6	1	2	1.6
aquatic herpetofauna	1	1	1	1	1	1.4	1	1	1.3

Appendix 6. Herpetofauna of Placer County

SPECIES	STATUS[3]	Occurrence[4]				Auburn SRA	COMMENTS
AMPHIBIANS							
Salamanders & Newts							
California Tiger Salamander (*Ambystoma californiense*)	FC, CSC	?					No records. Potential habitat in west county but extensive surveys of vernal pools have not yet detected any. Nearest populations are in Sacramento and Butte? County.
Southern Long-toed Salamander (*Ambystoma macrodactylum sigillatum*)		coll				?	CAS database (1); (1) E of Cisco 7/14/1929 (UCDZ 3090 – E.D. Clabaugh);
Arboreal Salamander (*Aneides lugubris*)		?					No records. N-most known range is Eldorado County. Papenfuss (1980) considered it not possible near Foresthill based on range.
California Slender Salamander (*Batrachoseps attenuatus*)		coll				x	MVZ database (many)
slender salamander sp. *Batrachoseps* sp.						x	Papenfuss 1980, Stebbins 1985; MVZ?
Sierra Nevada Ensatina (*Ensatina eschscholtzi platensisi*)		coll				?	CAS database (2); MVZ database (many); (Papenfuss 1980)

[3] **STATUS**

[4] **Occurrence**
coll = specimen record for Placer County
yes = definitely recorded from Placer County since 1960s
h = historical records, but not known from Placer County since 1950s-1960s
? = no information yet located that the species definitely is found in Placer County, but range and/or habitat requirements suggest they may occur
no = species does not occur in Placer County during the season(s) in which it is protected or deemed to be sensitive

SPECIES	STATUS[3]	Occurrence[4]				Auburn SRA	COMMENTS
Mount Lyell salamander (*Hydromantes platycephalus*)	FSC, CSC	?					No records. Known from Sierra County and to south in Sierra Nevada
Sierra Newt (*Tarcicha torosa sierrae*)		coll				?	CAS database (many); MVZ database (1);
Frogs							
Western Toad (*Bufo boreas*)		coll				?	CAS database (many); MVZ database (many);
Pacific Treefrog (*Pseudacris regilla*)		coll				x	CAS database (many); MVZ database (many);
Western Spadefoot (*Spea hammondii*)	FSC, FSC	x					Fowler; Balfour; Ranlett;
California Red-legged Frog (*Rana aurora draytonii*)	FT, CSC	coll					MVZ database (4): (1) Michigan Bluff 1916, (3) Dutch Flat 1939
Foothill Yellow-legged Frog (*Rana boylii*)	FSC, CSC	coll				x	CAS database (many); MVZ database (4); (1) American R confluence 4/12/53 (UCDZ 2220 – M. A. Miller)
Bullfrog (*Rana catesbiana*)		coll				?	CAS database (2); MVZ database (1);
Northern Leopard Frog (*Rana pipiens*)		coll					MVZ database (5)
Mountain Yellow-legged Frog (*Rana muscosa*)	FSC, CSC	coll					CAS database (8); MVZ database (many);
REPTILES							
Western Pond Turtle (*Clemmys marmorata*)	FSC, CSC	yes				?	
Lizards							

SPECIES	STATUS[3]	Occurrence[4]				Auburn SRA	COMMENTS
Western Fence Lizard (*Sceloporus occidentailis*)		coll				x	CAS database (many); MVZ database (many); (Papenfuss 1980)
Sagebrush Lizard (*Sceloporus graciosus gracilis*)		coll					CAS database (many); MVZ database (many);
Gilbert's Skink (*Eumeces gilberti*)		coll				x	CAS database (1); MVZ database (many); (Papenfuss 1980)
Western Skink (*Eumeces skiltonianus*)		coll				?	CAS database (2); MVZ database (1);
California Horned Lizard (*Phrynosoma coronatum frontale*)	FSC, CSC	coll				?	CAS database (1); MVZ database (2): Foresthill, Colfax; (1) Penryn 600 ft. 5/14/1929 (UCDZ 3694 – L.M. Smith); (1) M. Fowler sighting
Northern Alligator Lizard (*Elgaria caerulea*)		coll					CAS database (12); MVZ database (1);
Southern Alligator Lizard (*Elgaria multicarinata*)		coll				x	CAS database (many); MVZ database (many); (Papenfuss 1980)
California Whiptail (*Cnemidophorus tigris mundus*)		coll				x	CAS database (9): Loomis, Lauder (near Colfax); (Papenfuss 1980)
Snakes							
(Pacific) Rubber Boa (*Charina bottae bottae*)		coll					CAS database (10); MVZ database (2); (1) E of Tahoe City 8/14/1956 (CSUS collection – Robert Livezy)
(Coral-bellied) Ring-necked Snake (*Diadophis punctatus pulchellus*)		coll				x	CAS database (2); (Papenfuss 1980)
Sharp-tailed Snake (*Contia tenuis*)		coll				?	CAS database (2); MVZ database (5); UCDZ collection (1);
(Western Yellow-bellied) Racer (*Coluber constrictor mormon*)		coll				x	CAS database (5); MVZ database (2); BW sighting at Auburn SRA;
(Red) Coachwhip (*Masticophis flagellum piceus*)		?					No records. Not suspected, but does occur as close as Amador?? County

SPECIES	STATUS[3]	Occurrence[4]				Auburn SRA	COMMENTS
(California) Striped Racer (*Masticophis lateralis lateralis*)		coll					CAS database (2); MVZ database (1);
(Pacific) Gopher Snake (*Pituophis catenifer catenifer*)		coll					CAS database (2);
Western Aquatic Garter Snake (*Thamnophis couchii*)		coll				?	CAS database (many); MVZ database (3);
Western Terrestrial (Mountain) Garter Snake (*Thamnophis elegans elegans*)		coll				?	CAS database (4); MVZ database (many);
Common (Valley) Garter Snake (*Thamnophis sirtalis fitchi*)		coll				?	CAS database (many); MVZ database (3);
Common (California) Kingsnake (*Lampropeltis getula californiae*)		coll				x	CAS database (1); MVZ database (3); UCDZ collection (2); (Papenfuss 1980)
(Sierra) Mountain kingsnake (*Lampropeltis zonata multicincta*)		coll				?	(1) Iowa Hill Rd 5/25/1994 (UCDZ 12231 – M.L. Campbell)
Giant garter snake (*Thamnophis gigas*)	FT, ST	?					No records. Not known from Placer. Check west county sloughs near rice lands
Long-nosed Snake (*Rhinocheilus lecontei*)		coll				x	MVZ database (1): Foresthill Rd, Auburn SRA (Papenfuss 1980)
(California) Night Snake (*Hypsiglena torquata nuchalata*)		coll				?	MVZ database (1): Yankee-Jims Rd (Papenfuss 1980)
Western (Northern Pacific) Rattlesnake (*Crotalis viridis oreganus*)		coll				?	MVZ database (3);

Museum Collections

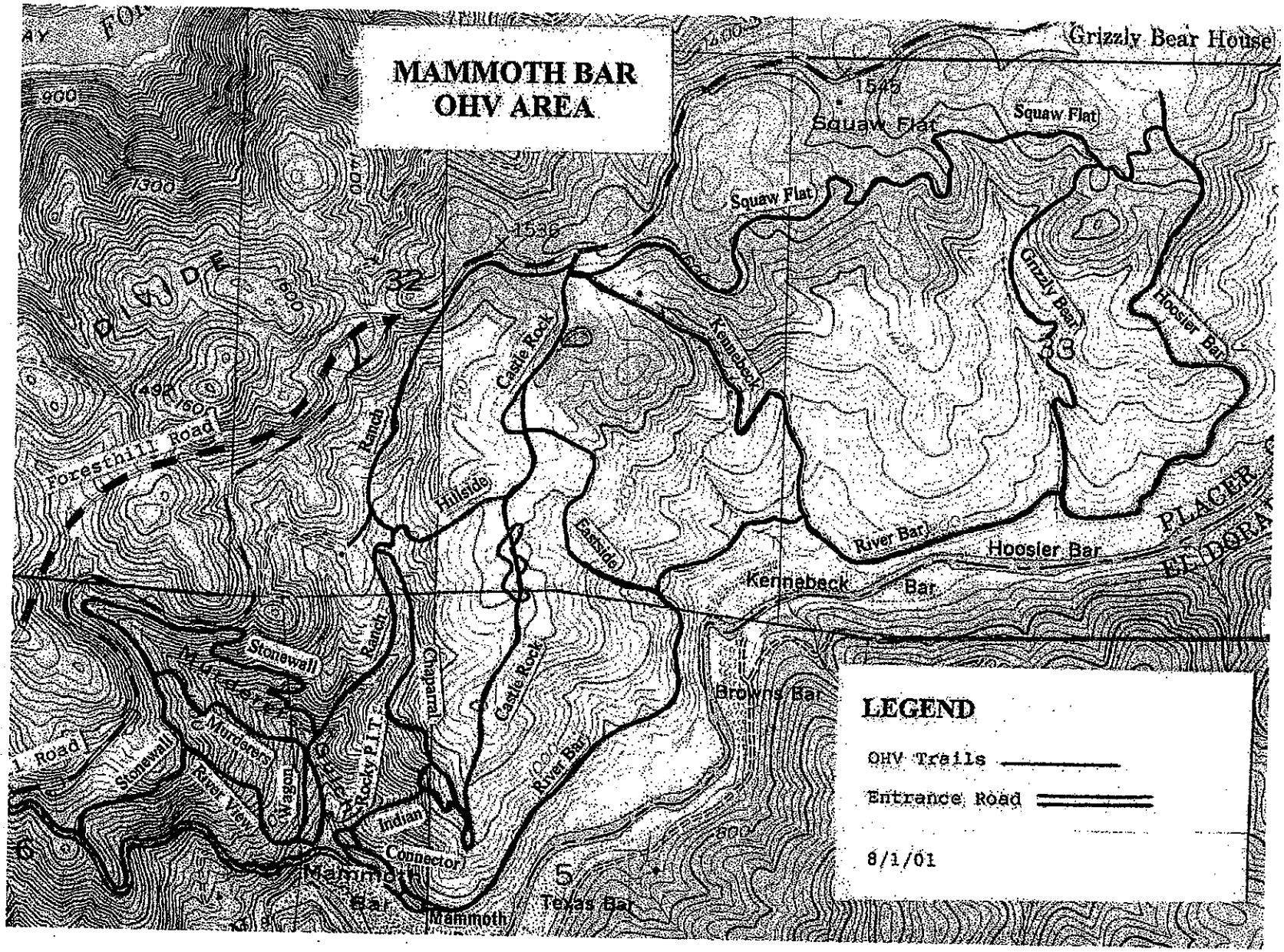
(FMNH) FMNH database – no records for Placer Co. (Feb 2002)

(UNSM) University of Nebraska State Museum (Feb 2002) - no Sierra Nevada Counties specimens

(PMNH) Peabody Museum of Natural History (Feb 2002) – no records
(MCZ) Harvard (Feb 2002) – 2 records (Bufo, Rana); 1 Nevada Co. record
(INHS) Illinois Natural History Survey – no records (4 records for Eldorado County)
(OMNH) Oklahoma Museum of Natural History (Feb 2002) – no records (*Bufo canorus* records for Alpine Co.)
(MVZ) Museum of Vertebrate Zoology, University of California, Berkeley: many records – Feb 2002
(CAS) California Academy of Sciences, San Francisco, CA: many records (Feb 2002)

Appendix 7. Monitoring Task Matrix for Mammoth Bar OHVA

Group	Timing	Sample Sites	Observer Skill	Annual Effort	Inventory (Years)	Monitoring
Fine-grain Vegetation Surveys	Feb-July; bloom time	targeted	A,B	5-10 days	1-2	yes, annually
Plant Community Monitoring	Mar-June	grid	A,B	5-10 days	1	yes, 5-10 years
Valley Elderberry Longhorn Beetle	summer-fall	targeted	B	1 day	1	yes, annually
Aquatic Herpetofauna/Riparian Birds	May-Sep	river bank	B	5 days	1	no
Terrestrial Herpetofauna – Drift Fence Arrays	year-round; group-specific	grid	B,A	60 days	≥2	?
Terrestrial Herpetofauna - TCS	year-round; species-specific	targeted	A	5 days	≥1	?
Breeding Birds – Point Counts	Apr - Jun	grid	A	20 days	3	?
Non-breeding Birds	year-round	grid	A	8 days	≥1	no
Raptors & Sensitive Breeders	Feb-July	targeted	A, B	8 days	≥1	?
Small Mammals	fall, spring	grid	B, A	10 days	≥2	?
Bats	Apr-Sep	targeted	A	4-6 nights	1	no
Carnivores/Large Mammals	winter; year-round	targeted	C, A	3 cameras x 2 mo	1	no


MAMMOTH BAR
OHV AREA
Grizzly Bear House
Squaw Flat
Squaw Flat
Squaw Flat
Grizzly Bear
Hoosier Bar
Kennebeck
Castle Rock
Foresthill Road
Ranch
Hillside
Eastside
River Bar
Hoosier Bar
Kennebeck Bar
PLACER
Browns Bar
Stonewall
Ranch
Chaparral
Castle Rock
River Bar
Stonewall
Murderers
River View
Indian
Connector
Mammoth Bar
Mammoth
Texas Bar
LEGEND
OHV Trails
Entrance Road
8/1/01