

## 3.4 Biological Resources

For the purpose of this EIR, *biological resources* comprise vegetation, wildlife, natural communities, and wetlands and other waters. Potential biological resource impacts associated with the program and the two individual projects are analyzed. Potential impacts are described quantitatively and qualitatively in Section 3.4.2, *Environmental Impacts*. This section also identifies specific and detailed measures to avoid, minimize, or compensate for potentially significant impacts on biological resources, where necessary.

### 3.4.1 Existing Conditions

#### Regulatory Setting

##### Federal

##### Endangered Species Act

Pursuant to the federal Endangered Species Act (ESA), USFWS and the National Marine Fisheries Service (NMFS) have authority over projects that may result in take of a species listed as threatened or endangered under the act. *Take* is defined under the ESA, in part, as killing, harming, or harassing. Under federal regulations, take is further defined to include habitat modification or degradation that results, or is reasonably expected to result, in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. If a likelihood exists that a project would result in take of a federally listed species, either an incidental take permit, under Section 10(a) of the ESA, or a federal interagency consultation, under Section 7 of the ESA, is required. Several federally listed species—vernal pool fairy shrimp (*Branchinecta lynchi*), longhorn fairy shrimp (*Branchinecta longiantenna*), vernal pool tadpole shrimp (*Lepidurus packardii*), California tiger salamander (*Ambystoma californiense*), California red-legged frog (*Rana draytonii*), Alameda whipsnake (*Masticophis lateralis euryxanthus*), and San Joaquin kit fox (*Vulpes macrotis mutica*)—have the potential to be affected by activities associated with the Golden Hills and Patterson Pass projects as well as subsequent repowering projects. Accordingly, such projects would require consultation with USFWS as described above.

##### Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act, as amended in 1964, was enacted to protect fish and wildlife when federal actions result in the control or modification of a natural stream or body of water. The statute requires federal agencies to take into consideration the effect that water-related projects would have on fish and wildlife resources. Consultation and coordination with USFWS and the California Department of Fish and Wildlife (CDFW) are required to address ways to prevent loss of and damage to fish and wildlife resources, and to further develop and improve these resources.

##### Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) domestically implements a series of international treaties that provide for migratory bird protection. The MBTA authorizes the Secretary of the Interior to regulate the taking of migratory birds. The act further provides that it is unlawful, except as

permitted by regulations, “to pursue, take, or kill any migratory bird, or any part, nest or egg of any such bird...” (16 USC 703). This prohibition includes both direct and indirect acts, although harassment and habitat modification are not included unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA can be found in the November 1, 2013 *Federal Register* (78 FR 65844–65864). This list comprises several hundred species, including essentially all native birds. Permits for take of nongame migratory birds can be issued only for specific activities, such as scientific collecting, rehabilitation, propagation, education, taxidermy, and protection of human health and safety and of personal property. Take of nongame migratory birds cannot be authorized through the MBTA for the program or Patterson Pass and Golden Hills projects. USFWS publishes a list of birds of conservation concern (BCC) to identify migratory nongame birds that are likely to become candidates for listing under ESA without additional conservation actions. The BCC list is intended to stimulate coordinated and collaborative conservation efforts among federal, state, tribal, and private parties.

### **The Bald and Golden Eagle Protection Act**

The Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668) prohibits take and disturbance of individuals and nests. Take permits for birds or body parts are limited to religious, scientific, or falconry pursuits. However, the BGEPA was amended in 1978 to allow mining developers to apply to USFWS for permits to remove inactive golden eagle (*Aquila chrysaetos*) nests in the course of “resource development or recovery” operations. With the 2007 removal of bald eagle from the ESA list of threatened and endangered species, USFWS issued new regulations to authorize the limited take of bald eagles (*Haliaeetus leucocephalus*) and golden eagles under the BGEPA, where the take to be authorized is associated with otherwise lawful activities. A final Eagle Permit Rule was published on September 11, 2009 (74 FR 46836–46879; 50 CFR 22.26).

A permit authorizes limited, non-purposeful take of bald eagles and golden eagles, and can be applied for by individuals, companies, government agencies (including tribal governments), and other organizations to allow disturbance of or otherwise take eagles in the course of conducting lawful activities, such as operating utilities and airports. Under BGEPA, *take* is defined as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest or disturb.” *Disturb* is defined in the regulations as “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.” Most permits issued under the new regulations authorize disturbance. In limited cases, a permit may authorize the physical take of eagles, but only if every precaution is first taken to avoid physical take.

USFWS issued the Eagle Conservation Plan Guidance (ECP Guidance) intended to assist parties to avoid, minimize, and mitigate adverse effects on bald and golden eagles (U.S. Fish and Wildlife Service 2013a). The Eagle Guidance calls for scientifically rigorous surveys, monitoring, assessment, and research designs proportionate to the risk to eagles. The Eagle Guidance describes a process by which wind energy developers can collect and analyze information that could lead to a programmatic permit to authorize unintentional take of eagles at wind energy facilities. USFWS recommends that eagle conservation plans be developed in five stages. Each stage builds on the prior stage, such that together the process is a progressive, increasingly intensive look at likely effects on eagles of the development and operation of a particular site and configuration. Additional refinements to the Eagle Guidance are expected at some point in the future. To date, one

programmatic eagle take permit has been issued by USFWS on June 31, 2014 (<http://www.fws.gov/cno/conservation/migratorybirds.html>).

### **Clean Water Act**

Wetlands and other waters of the United States are protected under Section 404 of the Clean Water Act (CWA). Any activity that involves any discharge of dredged or fill material into waters of the United States, including wetlands, is subject to regulation by the U.S. Army Corps of Engineers (USACE). *Waters of the United States* is defined to encompass navigable waters of the United States; interstate waters; all other waters where their use, degradation, or destruction could affect interstate or foreign commerce; tributaries of any of these waters; and wetlands that meet any of these criteria or are adjacent to any of these waters or their tributaries. Wetlands are defined under Section 404 as those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Jurisdictional wetlands must meet three wetland delineation criteria.

- They support hydrophytic vegetation (i.e., plants that grow in saturated soil).
- They have hydric soil types (i.e., soils that are wet or moist enough to develop anaerobic conditions).
- They have wetland hydrology (i.e., conditions of flooding, inundation, or saturation that support wetland communities).

### **Executive Order 11990: Protection of Wetlands**

Executive Order 11990 (May 24, 1977) established the protection of wetlands and riparian systems as the official policy of the federal government. The executive order requires all federal agencies to consider wetland protection as an important part of their policies; take action to minimize the destruction, loss, or degradation of wetlands; and preserve and enhance the natural and beneficial values of wetlands.

### **Federal Noxious Weed Act and Code of Federal Regulations (Title 7, Part 360)**

These laws and regulations are primarily concerned with the introduction of federally designated noxious weed plants or seeds across the United States' international borders. The Federal Noxious Weed Act (7 USC 2801–2813) also regulates the interstate movement of designated noxious weeds under the U.S. Department of Agriculture's permit system.

### **Executive Order 11312: Invasive Species**

Executive Order 11312 (February 3, 1999) directs all federal agencies to prevent and control the introduction and spread of invasive nonnative species in a cost-effective and environmentally sound manner to minimize their effects on economic, ecological, and human health. The executive order was intended to build upon existing laws, such as NEPA, the Nonindigenous Aquatic Nuisance Prevention and Control Act, the Lacey Act, the Plant Pest Act, the Federal Noxious Weed Act, and ESA. The executive order established a national Invasive Species Council composed of federal agencies and departments, as well as a supporting Invasive Species Advisory Committee composed of state, local, and private entities. The council and advisory committee oversee and facilitate implementation of the executive order, including preparation of the National Invasive Species

Management Plan. Federal activities addressing invasive aquatic species are now coordinated through this council and through the National Aquatic Nuisance Species Task Force.

## **State Plans, Policies, and Regulations**

### **California Environmental Quality Act**

CEQA is the regulatory framework by which California public agencies identify and mitigate significant environmental impacts. A project normally has a significant environmental impact on biological resources if it substantially affects a rare or endangered species or the habitat of that species, substantially interferes with the movement of resident or migratory fish or wildlife, or substantially diminishes habitat for fish, wildlife, or plants. The State CEQA Guidelines define rare, threatened, and endangered species as those listed under ESA or the California Endangered Species Act (CESA) or any other species that meet the criteria of the resource agencies or local agencies (e.g., species of special concern, as designated by CDFW). The guidelines state that the lead agency preparing an EIR must consult with and receive written findings from CDFW concerning project impacts on species listed as endangered or threatened. The effects of a proposed project on these resources are important in determining whether the project has significant environmental impacts under CEQA.

### **California Endangered Species Act**

CESA (California Fish and Game Code Sections 2050–2116) states that all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants and their habitats that are threatened with extinction and those experiencing a significant decline that, if not halted, would lead to a threatened or endangered designation will be protected or preserved.

Under Section 2081 of the California Fish and Game Code, an incidental take permit from CDFW is required for projects that could result in the take of a species that is state-listed as threatened or endangered. Under CESA, *take* is defined as an activity that would directly or indirectly kill an individual of a species. The definition does not include *harm* or *harass*, as does the definition of take under ESA. Consequently, the threshold for take under CESA is higher than that under ESA. For example, habitat modification is not necessarily considered take under CESA.

### **Fully Protected Species**

Sections 3511, 3513, 4700, and 5050 of the California Fish and Game Code pertain to fully protected wildlife species (birds in Sections 3511 and 3513, mammals in Section 4700, and reptiles and amphibians in Section 5050) and strictly prohibit the take of these species. CDFW cannot issue a take permit for fully protected species, except under narrow conditions for scientific research or the protection of livestock, or if a Natural Community Conservation Plan (NCCP) has been adopted.

### **California Native Plant Protection Act**

The CNPPA of 1977 gave the California Fish and Game Commission the authority to list plant species as rare or endangered and authorized them to adopt regulations prohibiting importation of rare and endangered plants into California, take of rare and endangered plants, and sale of rare and endangered plants. The CNPPA prohibits take, possession, transportation, exportation, importation, or sale of rare and threatened plants, except as a result of agricultural practices, fire control measures, timber operations, mining, or actions of public agencies or private utilities. Private

landowners are also exempt from the prohibition against removing rare and endangered plants, although they must provide 10-day notice to CDFW before removing the plants. The CNPPPA has mostly been superseded by CESA.

### **California Rare Plant Rankings**

CDFW maintains lists of plants of special concern in California, in addition to those listed as threatened or endangered. These species have no formal protection under CESA, but the values and importance of these lists are widely recognized. Plants with a California Rare Plant Rank of 1A, 1B, and 2 meet the definitions of Section 1901 of the California Fish and Game Code and may qualify for state listing. Accordingly, for purposes of this analysis, such plant species are considered rare plants pursuant to Section 15380 of CEQA.

### **Protection of Birds and Raptors**

Section 3503 of the California Fish and Game Code prohibits the killing of birds and/or the destruction of bird nests. Section 3503.5 prohibits the killing of raptor species and/or the destruction of raptor nests. Typical violations include destruction of active bird and raptor nests as a result of tree removal, and failure of nesting attempts (loss of eggs and/or young) as a result of disturbance of nesting pairs caused by nearby human activity. Section 3513 prohibits any take or possession of birds designated by the MBTA as migratory nongame birds except as allowed by federal rules and regulations pursuant to the MBTA. CDFW cannot issue permits under MBTA for the take of birds by the program or the Golden Hills and Patterson Pass projects.

### **Section 1600 of the California Fish and Game Code**

Sections 1600–1603 of the California Fish and Game Code state that it is unlawful for any person or agency to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources, or to use any material from the streambeds, without first notifying CDFW. A Lake and Streambed Alteration Agreement (LSAA) must be obtained if effects are expected to occur. The regulatory definition of a stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and that supports wildlife, fish, or other aquatic life. This definition includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. CDFW's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife.

### **Porter-Cologne Water Quality Control Act**

Under the Porter-Cologne Act, waters of the state fall under jurisdiction of the nine Regional Water Quality Control Boards (RWQCBs). Under this act, each RWQCB must prepare and periodically update water quality control basin plans. Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control nonpoint and point sources of pollution. Projects that affect wetlands or waters must meet the waste discharge requirements of the RWQCB. Pursuant to CWA Sections 401, an applicant for a Section 404 permit to conduct any activity that may result in discharge into navigable waters must provide a certification from the RWQCB that such discharge will comply with state water quality standards. As part of the wetlands permitting process under Section 404, a project applicant would be required to obtain a water quality certification from the applicable RWQCB.

Section 13050 of the Porter-Cologne Act (California Water Code, Division 7) authorizes the State Water Resources Control Board and the relevant Regional Water Quality Control Board (in the case of the APWRA, the Central Valley and San Francisco Bay Water Boards) to regulate biological pollutants. The California Water Code generally regulates more substances contained in discharges, and defines *discharges to receiving waters* more broadly than the CWA does.

### **California Wetlands Conservation Policy**

The goals of the California Wetlands Conservation Policy, adopted in 1993 (Executive Order W-59-93), are “to ensure no overall net loss, and achieve a long-term net gain in the quantity, quality, and permanence of wetlands acreage and values in California, in a manner that fosters creativity, stewardship, and respect for private property”; to reduce procedural complexity in the administration of state and federal wetlands conservation programs; and to make restoration, landowner incentive programs and cooperative planning efforts the primary focus of wetlands conservation.

## **Regional and Local Plans, Policies, and Regulations**

### **East County Area Plan**

Land use planning in the eastern portion of Alameda County is governed by the ECAP, which was adopted by the County in May 1994. In November 2000, the Alameda County electorate approved Measure D, the Save Agriculture and Open Space Lands Initiative, which amended portions of the County’s General Plan, including the ECAP (Alameda County 2000). The Open Space Element of the ECAP addresses sensitive lands and regionally significant open space, including biological resources. Windfarms are addressed in the Special Land Uses section of the ECAP.

### **East Alameda County Conservation Strategy**

The East Alameda County Conservation Strategy (EACCS) is a collaborative effort among several local, state, and federal agencies intended to provide an effective voluntary framework to protect, enhance, and restore natural resources in eastern Alameda County, while improving and streamlining the environmental permitting process for impacts resulting from infrastructure and development projects (ICF International 2010). The EACCS is intended to focus on impacts on biological resources such as endangered and other special-status species and sensitive habitat types (e.g., wetlands, riparian corridors, rare upland communities). The EACCS will ultimately enable local projects to comply with state and federal regulatory requirements within a framework of comprehensive conservation goals and objectives, and will facilitate implementation using consistent and standardized mitigation requirements. By implementing the EACCS, local agencies will be able to more easily address the legal requirements relevant to these species.

The EACCS study area encompasses 271,485 acres, or approximately 52% of Alameda County in the upper Alameda Creek watershed of the central county area, and the east-facing slopes of the Altamont Hills. The cities of Dublin, Livermore, and Pleasanton are within the EACCS study area. The western boundary of the EACCS study area follows the western edge of the Alameda Creek watershed, and the northern, southern, and eastern boundaries follow the Alameda County line with its adjacent counties. The EACCS study area includes the program area.

A final draft of the EACCS was completed in October 2010 and released to the public in March 2011. On May 31, 2012, USFWS issued the *Programmatic Biological Opinion for the East Alameda County*

*Conservation Strategy* (reference No. 08ESMFOO-2012-F-0092-1) (Programmatic BO). Installation, operation, and maintenance of wind energy projects are identified as covered infrastructure projects under the Programmatic BO. However, avian and bat effects associated with these types of projects are not covered under the Programmatic BO. Individual projects may be appended to the Programmatic BO if they are consistent with the EACCS, occur within the EACCS study area, and are a covered activity. The Programmatic BO does not provide incidental take authorization; therefore, individual projects appended to the Programmatic BO will be granted individual take coverage as part of the project's Section 7 consultation process. Because the EACCS is designed to be an adaptive management process, the Programmatic BO may be amended in the future, or a new BO may be written if there are substantive changes to the EACCS.

For projects where USACE is not the federal lead agency for Section 7 consultation or where Section 10 consultation is required, consistency with the Programmatic BO will enable other federal agencies and nonfederal applicants to streamline their individual ESA consultations by utilizing preapproved mitigation standards and focusing mitigation in conservation priority areas.

EACCS development included input and review by CDFW to address impacts on state-listed species. Consistency with the EACCS also aids in streamlining CESA permit compliance for project impacts on state-listed species.

Although participation in the EACCS by applicants is voluntary, Alameda County participates in the strategy and considers it to be the best available information when considering the impacts of proposed projects on the full range of protected wildlife, plants, and habitats.

## **2007 Settlement Agreement**

In 2007, Audubon, CARE, and three wind energy companies (AES, NextEra, and EnXco) entered into a Settlement Agreement to resolve litigation regarding the County's 2005 issuance of CUP approvals of continued wind energy operations. The 2007 Settlement Agreement, including Exhibit G-1 (modified from the 2005 CUPs), requires participants to develop an NCCP or a similar agreement to "address the long-term operation of wind turbines at the APWRA and the conservation of impacted species of concern and their natural communities." In particular, the 2007 Settlement Agreement committed the participating wind companies to achieve a 50% reduction in avian fatalities from an estimated baseline of annual fatalities of four focal species (golden eagle, burrowing owl [*Athene cunicularia*], American kestrel [*Falco sparverius*], and red-tailed hawk [*Buteo jamaicensis*]) through the implementation of the Avian Wildlife Protection Program and Schedule (AWPPS) as established in 2005 and modified in 2007. The 2007 Settlement Agreement and the amended AWPPS required the implementation of various management actions, including seasonal shutdown of turbines and removal of turbines deemed to be "high-risk" turbines, until the 50% reduction goal was achieved. The AWPPS required the establishment of the Alameda County Avian Fatality Monitoring Team (AFMT). The AFMT was charged with developing and implementing—under the supervision and direction of the Scientific Review Committee—a program to monitor turbine-related avian fatality rates and use of the APWRA by birds of management concern. Under the 2007 Settlement Agreement, the emphasis of the AFMT was directed to the four focal species, and its work was central to evaluation of progress toward achieving the 50% reduction goal established by the Settlement Agreement.

As an alternative to the NCCP called for in the Settlement Agreement, the County prepared this PEIR with mitigation measures to provide a framework for review and approval of wind projects in the APWRA and to promote conservation measures to benefit avian species. As described in Section

1.2.4, *Conditional Use Permits*, the County developed a draft *Avian Protection Program (APP)* to provide a framework and process for wind energy projects to address applicable statutes (e.g., MBTA and BGEPA) through the repowering process. The APP provided a broad evaluation of existing environmental conditions, bird use, and avian fatalities in the program area. It focused on avian mortality associated with repowering projects—specifically construction, operation, monitoring, and mitigation. The key provisions of the APP were incorporated into the program-level mitigation measures of this PEIR. Project proponents will be expected to develop project-specific APPs, incorporating mitigation, monitoring, and adaptive management strategies as set forth in this PEIR.

## 2010 Settlement Agreement

On December 3, 2010, Audubon, CARE, NextEra, the People of the State of California, and the Attorney General entered into a settlement agreement. The repowering schedule in the 2010 Settlement Agreement entailed NextEra repowering old-generation turbines under its current ownership in the APWRA as soon as commercially reasonable, in three or fewer phases, with each phase comprising up to 80 MW and each phase undergoing CEQA review by means of an EIR. Phase 1 was the Vasco Winds project in Contra Costa County; Phases 2 and 3 would be projects in the Alameda County portion of the APWRA. Each phase of repowered turbines is subject to 3 years of postconstruction fatality monitoring, using the focal species identified in the 2007 Settlement Agreement as well as bats as benchmarks for evaluating effectiveness of repowering. The agreement is structured such that each phase of repowering is intended to inform the siting of turbines in subsequent phases. Mitigation fees to compensate for ongoing bird and bat fatalities were also established in the agreement. NextEra is the only wind operator in the APWRA that was a party to the 2010 Settlement Agreement. While the County is not a party to the 2010 Settlement Agreement and therefore has no responsibilities under the agreement, the repowering, conservation, and monitoring measures in the agreement were reviewed and incorporated into the mitigation measures in the PEIR as deemed appropriate by the County.

## Environmental Setting

The program area is characterized by rolling hills with elevations ranging from 256 to 1,542 feet above mean sea level. Windfarm operations, livestock grazing and, to a lesser extent, dryland farming (grain crops) are the primary land uses in the program area.

The program area contains 19 land cover types that were mapped during preparation of the EACCS. Land cover types in the program area are listed in Table 3.4-1 and shown in Figure 3.4-1. Land cover types in the Golden Hills and Patterson Pass project areas are listed in Tables 3.4-2 and 3.4-3 and shown in Figures 3.4-2 and 3.4-3, respectively. Mapping resources used for the EACCS included digital orthophotography from 2005 and 2007, previously mapped wetlands from 2001, USFWS wetlands inventory data layer, and field verification surveys conducted by ICF in 2010. Drainage data from U.S. Geological Survey National Hydrography Dataset from 2012 were added to these data sets to create Figures 3.4-1 through 3.4-3. The plant communities and associated wildlife in each land cover type in the program area are described below. Existing turbines may not be present in all land cover types described below; however, all land cover types are described because it is assumed that repowering activities could have impacts on any land cover type within the program area. Land cover types that are present within the Golden Hills or Patterson Pass project areas are so noted in the land cover descriptions below. Most recently, EDF RE conducted habitat assessments for special-status species and a delineation of waters of the United States, including wetlands, that USACE has



verified. A report detailing the results of the EDF RE biological survey and wetland delineation is included in Appendix C of this PEIR.

**Table 3.4-1. Approximate Acreages of Land Cover Types in the Program Area**

Land Cover	Amount in Program Area (acres)
Annual grassland	39,375.79
Alkali meadow/scald	555.06
Rock outcrop	42.05
Northern mixed chaparral/chamise chaparral	28.65
Northern coastal scrub/Diablan sage scrub	74.51
Mixed evergreen forest/oak woodland	582.18
Blue oak woodland	163.61
Foothill pine-oak woodland	21.11
Mixed willow riparian scrub	39.27
Mixed riparian forest and woodland	9.93
Alkali wetland	483.17
Seasonal wetland	82.76
Perennial freshwater marsh	5.01
Canal/Aqueduct	158.21
Ponds	53.74
Reservoirs	176.58
Drainages	Not calculated
Cropland	4.55
Developed and Disturbed	1,502.58
<b>Total</b>	<b>43,358.76</b>

**Table 3.4-2. Approximate Acreages of Land Cover Types in the Golden Hills Project Area**

Land Cover	Amount in Project Area (acres)
Annual grassland	4,287.08
Alkali meadow/scald	145.69
Mixed willow riparian scrub	6.54
Alkali wetland	37.13
Seasonal wetland	0.09
Ponds	2.89
Drainages	Not calculated
Developed and Disturbed	0.71
<b>Total</b>	<b>4,480.13</b>

**Table 3.4-3. Approximate Acreages of Land Cover Types in the Patterson Pass Project Area**

Land Cover	Amount in Project Area (acres)
Annual grassland	939.81
Mixed willow riparian scrub	4.00
Seasonal wetland	1.41
Perennial freshwater marsh	4.99
Ponds	0.84
Drainages	0.81
<b>Total</b>	<b>951.86</b>

## Grassland

Grassland consists of herbaceous vegetation dominated by grasses, although flowering forbs are often a conspicuous component of the plant cover. Most of the grassland in the program area is characterized as California Annual Grassland. Two other habitats, alkali meadow and rock outcrops, are interspersed as small patches within the grassland matrix and are, accordingly, included in and discussed as components of the grassland habitat.

### Grassland Plant Communities

#### *California Annual Grassland*

California annual grassland is found throughout the program area, occupying approximately 39,375.79 acres. California annual grassland is an herbaceous plant community dominated by nonnative annual grasses (Holland 1986:36–37; Sawyer and Keeler-Wolf 1995:40–41). The dominant species are mostly nonnative grasses from the Mediterranean basin, such as soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis* subsp. *rubens*), Mediterranean barley (*Hordeum marinum* var. *gussoneanum*), wild oats (*Avena* spp.), ripgut brome (*Bromus diandrus*), Italian ryegrass (*Festuca perennis* [*Lolium multiflorum*]), and rat-tail fescue (*Festuca myuros*). In the spring, many of the annual grasslands are interspersed with diverse native wildflowers typical of the inner Coast Ranges. Commonly found species of wildflowers in these grasslands include lupine (*Lupinus* spp.), fiddleneck (*Amsinckia* spp.), popcornflower (*Plagiobothrys* spp.), big heronbill (*Erodium botrys*), redstemmed filaree (*E. cicutarium*), California poppy (*Eschscholzia californica*), owl's-clover (*Castilleja* and *Triphysaria* spp.), and clarkia (*Clarkia* spp.). Special-status plant species that may be found in this plant community include large-flowered fiddleneck (*Amsinckia grandiflora*), big tarplant (*Blepharizonia plumosa*), round-leaved filaree (*California macrophylla*), Lemmon's jewelflower (*Caulanthus lemmonii*), diamond-petaled California poppy (*Eschscholzia rhombipetala*), shining navarretia (*Navarretia nigelliformis* ssp. *radians*), and caper-fruited tropidocarpum (*Tropidocarpum capparideum*).

Annual grassland is also the dominant land cover type in the Golden Hills and Patterson Pass projects areas, with annual grassland constituting 96% (4,287.08 acres) and 99% (934.06 acres) of the project areas, respectively.

#### *Alkali Meadow*

Alkali meadow occurs in scattered patches totaling approximately 555.06 acres in the central and northern portions of the program area. Alkali meadow is a perennial grassland community that

occurs on alkali soils (Holland 1986:42–43; Sawyer and Keeler-Wolf 1995:78–79). Dominant species in alkali meadow include saltgrass (*Distichlis spicata*), wild barley (*Hordeum* spp.), and alkali ryegrass (*Elymus triticoides*). The associated herb cover consists of halophytes, including saltbush (*Atriplex* spp.), alkali heath (*Frankenia salina*), alkali weed (*Cressa truxillensis*), alkali mallow (*Malvella leprosa*), and common spikeweed (*Centromadia pungens*). Alkali meadow is considered a significant natural community by CDFW because of its rarity and the pressing threats to the remnant communities from overgrazing and land use conversion (California Department of Fish and Wildlife 2013a). Special-status plant species that may be found in this plant community include San Joaquin spearscale and recurved larkspur.

Alkali meadow comprises approximately 3% (145.69 acres) of the Golden Hills project area. There is no alkali meadow in the Patterson Pass project area.

### **Rock Outcrop**

Rock outcrops are frequently encountered in some grasslands, and approximately 42.05 acres are present in the program area. These outcrops are exposures of bedrock that typically lack soil and have sparse vegetation. Within the program area, several types of rock outcrops are present and are derived from sedimentary and metamorphic sources. The greatest concentration of rock outcrops occurs near Brushy Peak Regional Preserve, although other rock outcrops are in the vicinity of Tesla Road. One special-status plant species, rayless ragwort (*Packera indecora*), may be found in this plant community.

### **Common Wildlife Associations**

Characteristic wildlife species in grasslands include reptiles such as western fence lizard (*Sceloporus occidentalis*), common garter snake (*Thamnophis sirtalis*), and western rattlesnake (*Crotalis viridis*); mammals such as black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Spermophilus beecheyi*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), and coyote (*Canis latrans*); and birds such as red-tailed hawk, American kestrel, barn owl (*Tyto alba*), and western meadowlark (*Sturnella neglecta*). Several common bat species, such as canyon bat (*Parastrellus hesperus*), can roost in rocky outcrops and forage over grassland.

Special-status wildlife species associated with grasslands include golden eagle, Swainson's hawk, western burrowing owl, loggerhead shrike (*Lanius ludovicianus*), San Joaquin kit fox, and American badger (*Taxidea taxus*). California red-legged frog and California tiger salamander use grasslands as movement and aestivation (summer hibernation) habitat. Alameda whipsnake is known to use grasslands adjacent to shrublands and rock outcrops for breeding and refugia. Pallid bat (*Antrozous pallidus*) is known to roost in crevices in rock outcrops and forage over surrounding grassland. Annual grassland also provides important foraging habitat for northern harrier (*Circus cyaneus*) and white-tailed kite (*Elanus leucurus*).

### **Scrub/Chaparral**

Chaparral communities are dominated by densely packed and nearly impenetrable drought-adapted evergreen woody shrubs, 6.5–13 feet tall, that possess small, thick, leathery, sclerophyllous leaves (Hanes 1977:419; Holland 1986:20–21). Coastal scrub communities, in comparison, are generally characterized by low shrubs, usually 1.5–6.5 feet tall with soft non-sclerophyllous leaves, and interspersed with grassy openings (Holland 1986). Two scrub/chaparral plant communities are

present in the program area: northern mixed chaparral/chamise chaparral and northern coastal scrub/Diablan sage scrub.

### **Scrub/Chaparral Plant Communities**

#### ***Northern Mixed Chaparral/Chamise Chaparral***

Northern mixed chaparral/chamise chaparral occupies approximately 28.65 acres in the southern end of the program area. Northern mixed chaparral may intermingle with northern coastal scrub/Diablan sage scrub, foothill pine-oak woodlands, and mixed evergreen forest/oak woodland.

Dominant shrubs in this community in the program area include chamise (*Adenostoma fasciculatum*), manzanita (*Arctostaphylos* sp.), scrub oak (*Quercus berberidifolia*), and ceanothus (*Ceanothus* sp.). Other important species are toyon (*Heteromeles arbutifolia*), coffeeberry (*Rhamnus californica*), madrone (*Arbutus menziesii*), California bay (*Umbellularia californica*), birchleaf mountain-mahogany (*Cercocarpus betuloides*), poison-oak (*Toxicodendron diversilobum*), bush monkeyflower (*Mimulus aurantiacus*), and California yerba santa (*Eriodictyon californicum*). Some chaparral stands may be almost entirely composed of dense stands of chamise. No special-status plants occur in this plant community in the program area.

#### ***Northern Coastal Scrub/Diablan Sage Scrub***

Northern coastal scrub/Diablan sage scrub occupies approximately 74.51 acres in the southern portion of the program area. Northern coastal scrub/Diablan sage scrub in the program area is composed primarily of evergreen shrubs with an herbaceous understory in openings. Northern coastal scrub/Diablan sage scrub communities are dominated by California sagebrush (*Artemisia californica*) and black sage (*Salvia mellifera*), with associated species including coyote brush (*Baccharis pilularis*), toyon, big-berry manzanita (*Manzanita glauca*), California buckwheat (*Eriogonum fasciculatum*), poison-oak, California yerba santa, and bush monkeyflower (Holland 1986:8–10). Rock outcrops are also present in this plant community. No special-status plants occur in this plant community in the program area.

### **Common Wildlife Associations**

Common wildlife species that use chaparral and scrub habitats in the program area include gopher snake (*Pituophis melanoleucus*), western rattlesnake, western fence lizard, brush rabbit (*Sylvilagus bachmani*), California pocket mouse (*Perognathus californicus*), spotted skunk (*Spilogale gracilis*), mule deer, coyote, and bobcat (*Lynx rufus*). Common bird species include mourning dove (*Zenaida macroura*), California quail (*Callipepla californica*), Anna's hummingbird (*Calypte anna*), western scrub-jay (*Aphelocoma californica*), Bewick's wren (*Thryomanes bewickii*), California towhee (*Pipilo crissalis*), lesser goldfinch (*Carduelis psaltria*), fox sparrow (*Passerella iliaca*), white-crowned sparrow (*Zonotrichia leucophrys*), and dark-eyed junco (*Junco hyemalis*).

Special-status wildlife species known to occur in chaparral and northern coastal scrub communities include Alameda whipsnake and loggerhead shrike. Chaparral and northern coastal scrub are the primary habitats for Alameda whipsnake, which breeds, forages, and thermoregulates in this habitat. Contiguous stands are necessary to support viable populations of this species throughout its range. Loggerhead shrikes are known to nest and forage in scrub habitats with low densities of shrub canopy cover.

## Woodland

The program area contains three woodland plant communities: mixed evergreen forest/oak woodland, blue oak woodland, and foothill pine-oak woodland. The Golden Hills and Patterson Pass project areas do not support any woodland plant communities.

### Woodland Plant Communities

#### **Mixed Evergreen Forest/Oak Woodland**

Mixed evergreen forest/oak woodland is the most common woodland community in the program area, occupying approximately 582.18 acres at the south end of the program area. Mixed evergreen forest/oak woodland is characterized by a diverse overstory often dominated by coast live oak (*Quercus agrifolia*) (Holland 1986:86; Sawyer and Keeler-Wolf 1995:241–242). Associated co-dominant species can include blue oak (*Q. douglasii*), valley oak (*Q. lobata*), California bay, madrone, California buckeye (*Aesculus californica*), and black oak (*Q. kelloggii*). Where shrubby, the understory consists of patches of toyon, poison-oak, and scrub oak. Where more open, the understory typically consists of annual grasses and shade-tolerant perennials, such as yerba buena (*Clinopodium douglasii*) and common snowberry (*Symphoricarpos albus*). No special-status plants occur in this plant community in the program area.

#### **Blue Oak Woodland**

There are approximately 163.61 acres of blue oak woodland scattered throughout the southern half of the program area. This land cover typically occurs in the low- to mid-elevation hills in slightly drier microclimates. Blue oak woodland is dominated by blue oak, a highly drought-tolerant species adapted to growth on thin soils in the dry foothills. California buckeye and foothill pine (*Pinus sabiniana*) are associated tree species in this community. The understory of blue oak woodland varies from shrubby to open. Understory species typically include annual grasses, hollyleaf cherry (*Prunus ilicifolia*), poison-oak, and coffeeberry. Some blue oak woodland alliances are considered by CDFW to be sensitive communities (California Department of Fish and Game 2010). One special-status plant species, shining navarretia, occurs in this plant community in the program area.

#### **Foothill Pine-Oak Woodland**

Foothill pine-oak woodland occupies approximately 21.11 acres in the southern portion of the program area. The canopy is dominated by foothill pine and blue oak (Holland 1986:77). Oaks become more prevalent at lower elevations, often forming a closed canopy layer below the emergent pines, and the understory lacks an appreciable shrub layer. Associated canopy species include interior live oak, coast live oak, and California buckeye. Associated shrub species include ceanothus species, bigberry manzanita, California coffeeberry, poison-oak, silver lupine (*Lupinus albifrons*), blue elderberry, California yerba santa, rock gooseberry (*Ribes quercetorum*), and California redbud (*Cercis occidentalis*). No special-status plants occur in this community in the program area.

### Common Wildlife Associations

Characteristic wildlife species that can be found in woodland habitats include gopher snake, western fence lizard, red-tailed hawk, American kestrel, barn owl, great horned owl (*Bubo virginianus*), acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttallii*), northern flicker (*Colaptes auratus*), white-breasted nuthatch (*Sitta carolinensis*), California quail, spotted towhee (*Pipilo maculatus*), Bewick's wren, bushtit (*Psaltriparus minimus*), big brown bat

(*Eptesicus fuscus*), California myotis (*Myotis californicus*), deer mouse (*Peromyscus maniculatus*), western gray squirrel (*Sciurus griseus*), mule deer, and coyote.

Special-status wildlife species that may be found in oak woodlands include California tiger salamander, Alameda whipsnake, golden eagle, loggerhead shrike, hoary bat, pallid bat, western red bat (*Lasiurus blossevillii*), San Joaquin kit fox, and American badger. California tiger salamanders use burrows in the grassy understory of open woodlands for aestivation and refugia. Alameda whipsnake may use oak woodland for movement between chaparral and coastal scrub habitats. Golden eagles and loggerhead shrikes use valley oak woodland and other woodlands for roosting, nesting, and foraging. Hoary bat, pallid bat, and western red bat roost in woodlands and forage above the canopy, in forest openings, and along forest edges. San Joaquin kit fox and American badger may use open valley oak woodland for denning, foraging, and movement.

## Riparian

Within the program area, the riparian land cover type occurs along creeks and around open water bodies. Riparian vegetation in the program area consist of two community types: mixed willow riparian scrub and mixed riparian forest and woodland. At the state level, riparian plant communities are considered sensitive because of the substantial reduction in their amount and range, and for their value as habitat for a large number of plant and wildlife species.

### Riparian Plant Communities

#### **Mixed Willow Riparian Scrub**

Mixed willow riparian scrub occupies approximately 39.27 acres in and along the margins of the active channel of intermittent and perennial drainages. In the program area, this plant community is found along Patterson Run and drainages north to I-580.

Conditions in the mixed willow riparian scrub community can range from open well-developed canopies with minimal understory to dense areas dominated primarily by understory species with little to no canopy. Yellow willow (*Salix lasiandra*), red willow (*S. laevigata*), arroyo willow (*S. lasiolepis*), and narrowleaf willow (*exigua*) are the dominant canopy species in this habitat. Scrub communities typically consist of scattered willows and mule fat (*Baccharis salicifolia*), which occur in and along the margins of open sandy washes. Understory development in this community type is controlled by canopy density. No special-status plants occur in this plant community in the program area.

Mixed willow riparian scrub comprises approximately 0.1% (6.54 acres) of the Golden Hills project area and 0.4% (4.00 acres) of the Patterson Pass project area.

#### **Mixed Riparian Forest and Woodland**

Mixed riparian forest and woodland occupies approximately 9.93 acres in the southern portion of the program area. It occurs along sections of Arroyo Seco along Tesla Road, Arroyo Valle near Hays Camp, Corral Hollow Creek and its tributaries, and Fairchild Gulch and Deadman Gulch in Elyar Canyon.

Mixed riparian forest and woodland communities are similar to mixed willow riparian scrub in terms of habitat requirements. They are found in and along the margins of the active channel on intermittent and perennial drainages. Generally, no single species dominates the canopy, and

composition varies with elevation, aspect, hydrology, and channel type. The major canopy species include California sycamore, valley oak, coast live oak, red willow, and California bay. Associated trees and shrubs include California black walnut, other species of willow, California buckeye, Fremont cottonwood, and bigleaf maple. No special-status plants occur in this community in the program area.

### **Common Wildlife Associations**

Wildlife species that are often associated with riparian habitats include amphibians such as Sierran treefrog (*Pseudacris sierrae*), California newt (*Taricha torosa*), western aquatic garter snake (*Thamnophis couchii*), red-shouldered hawk (*Buteo lineatus*), Wilson's warbler (*Wilsonia pusilla*), spotted towhee, Bullock's oriole (*Icterus bullockii*), long-tailed weasel (*Mustela frenata*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), and yuma myotis (*Myotis yumanensis*).

Special-status wildlife species associated with riparian forest and scrub include California red-legged frog, Swainson's hawk, western red bat, Townsend's big-eared bat (*Corynorhinus townsendii*), and hoary bat. California red-legged frogs use riparian habitat types for breeding, foraging, and refugia. Swainson's hawks nest and roost in riparian forest, and hoary and western red bats use this habitat for roosting and foraging. Townsend's big-eared bats are known to forage along riparian corridors when appropriate roost habitat is nearby.

### **Wetland**

The wetland land cover type includes areas subject to seasonal or perennial flooding or ponding, or that possess saturated soil conditions and that support predominantly hydrophytic or "water-loving" herbaceous plant species (Cowardin et al. 1979). Because wetlands are periodically waterlogged, the plants growing in them must tolerate low levels of soil oxygen associated with waterlogged or hydric soils. The presence of flood-tolerant species often indicates that a site is a wetland even if the ground appears to be dry for most of the year, or if hydrologic influences are less obvious.

The wetland land cover type in the program area consists of three communities: alkali wetland, seasonal wetland (including vernal pools), and perennial freshwater marsh. In general, wetlands are considered a sensitive biotic community because of their limited distribution and their importance to special-status plant and wildlife species statewide.

### **Wetland Plant Communities**

#### ***Alkali Wetland***

Alkali wetlands occupy approximately 483.17 acres in the program area. Alkali wetlands support ponded or saturated soil conditions and occur as perennial or seasonally wet features on alkali soils. Alkali wetlands occur primarily along stream channels where alkali soils are present. In the program area, this plant community occurs along Altamont Creek, the south side of I-580, and in several drainages south of the Alameda/Contra Costa County line and west of Bethany Reservoir. The only site in Alameda County (besides the Springtown Alkali Sink) that supports large areas of alkali soils and intact stands of valley sink scrub and alkali grassland is an area of approximately 267 acres in the northeastern corner of the county. The site occurs near the intersection of Kelso and Bruns Roads between the Delta-Mendota Canal and the California Aqueduct.

The vegetation of alkali wetlands is composed of halophytic plant species adapted to both wetland conditions and high salinity levels. Typical species include salt grass, alkali heath, and common spikeweed. The associated herb cover consists of halophytes, including saltbush, alkali heath, seepweed, alkali weed, and saltmarsh sand spurry (*Spergularia marina*). Stands of iodine bush may also be present. Special-status plant species that occur in this plant community in the program area include brittlescale (*Atriplex depressa*), San Joaquin sparscale (*A. joaquinana*), lesser saltscale (*A. minuscula*), and recurved larkspur (*Delphinium recurvatum*).

Alkali wetland comprises approximately 0.8% (37.13 acres) of the Golden Hills project area. Alkali wetlands are not present in the Patterson Pass project area.

### **Seasonal Wetlands**

Seasonal wetlands occupy approximately 82.76 acres scattered throughout the program area, with several large seasonal wetland complexes (i.e., groups of many small pools or wetlands) occurring along roadways and drainage bottoms in the vicinity of Altamont Pass. This community often occurs adjacent to alkali wetland.

Seasonal wetlands are freshwater wetlands that support ponded or saturated soil conditions during winter and spring and are dry through the summer and fall until fall/winter rainfall begins to saturate the soil. Vernal pools are a type of seasonal wetland that pond water on the surface for extended durations during winter and spring and dry completely during late spring and summer due to an underlying hardpan. This hardpan restricts the percolation of water and creates a “perched” seasonal water source. They support a typical flora largely composed of native wetland plant species. Vernal pools in eastern Alameda County occur in distinctive topography with low depressions mixed with hummocks or mounds. These depressions fill with rainwater and runoff from adjacent areas during the winter and may remain inundated during the spring to early summer. Vernal pools are found east and north of Livermore and northeast of Bethany Reservoir.

Vegetation typically associated with other seasonal wetlands consists of wetland generalists, such as hyssop loosestrife (*Lithium hyssopifolia*), cocklebur (*Xanthium strumarium*), Mediterranean barley, and Italian ryegrass. Upland species such as soft chess, black mustard (*Brassica nigra*), redstemmed filaree, and common tarweed (*Holocarpha virgata*) can also occur. Common species in seasonal wetlands within the project area include watercress (*Rorippa* sp.), water speedwell (*Veronica anagallis-aquatica*), and smartweeds (*Polygonum* spp.). No known occurrences of special-status plants have been documented in this community in the program area. Most of the special-status plants in the program area vicinity do not occur in seasonal wetlands; however, one species—alkali milk-vetch (*Astragalus tener* var. *tener*)—occurs on the margins of alkali vernal pools.

Seasonal wetland comprises approximately 0.02% (0.09 acre) of the Golden Hills project area and 0.1% (1.32 acres) of the Patterson Pass project area.

### **Perennial Freshwater Marsh**

Perennial freshwater marsh occupies approximately 5.01 acres of the program area. Perennial freshwater marsh occurs primarily in small patches along stream courses or drainages and at the edges of some ponds. In the program area, perennial freshwater marsh is present in the northeast portion of the program area near Bruns Road.

Perennial freshwater marsh is dominated by emergent herbaceous plants (reeds, sedges, grasses) with either intermittently flooded or perennially saturated soils (Holland 1986:48–49). In the



program area, plant species associated with perennial freshwater marsh include willows, saltgrass, Mediterranean barley, Italian ryegrass, rabbitsfoot grass (*Polypogon* sp.), nutsedge (*Cyperus eragrostis*), willow weed (*Polygonum lapathifolium*), watercress, Baltic rush (*Juncus balticus*), narrow-leaved cattail (*Typha angustifolia*), rice cutgrass (*Leersia oryzoides*), bur-reed (*Sparganium eurycarpum*), alkali bulrush (*Bolboschoenus robustus*), stinging nettle (*Urtica dioica* ssp. *holosericea*), willowherb (*Epilobium ciliatum*), celery-leaved buttercup (*Ranunculus scleratus*), small-flowered saltcedar (*Tamarix parviflora*), and perennial peppergrass (*Lepidium latifolium*). No special-status plants occur in this plant community in the program area.

No perennial freshwater marsh occurs in the Golden Hills project area.

Perennial freshwater marsh comprises approximately 0.5% (4.99 acres) of the Patterson Pass project area.

### **Common Wildlife Associations**

Alkali and seasonal wetlands provide important habitat for a variety of aquatic invertebrates and amphibians, which provide food sources for various bird species. Perennial freshwater marsh is an important habitat for a wide variety of wildlife species. Wildlife species that occur in or use freshwater marsh for breeding or cover include western pond turtle (*Actinemys marmorata*), several garter snake species, great blue heron (*Ardea herodias*), great egret (*Ardea alba*), mallard (*Anas platyrhynchos*), killdeer (*Charadrius vociferus*), greater yellowlegs (*Tringa melanoleuca*), mule deer, and coyote. Seasonal wetlands are commonly used by a variety of wildlife during the wet season, including Sierran treefrog, California toad (*Bufo boreas*), black-necked stilt (*Himantopus mexicanus*), American avocet (*Recurvirostra americana*), red-winged blackbird (*Agelaius phoeniceus*), white-tailed kite, and northern harrier. Numerous species of bats forage over freshwater wetland, including Mexican free-tailed bat (*Tadarida brasiliensis mexicana*).

Special-status wildlife species associated with alkali and/or seasonal wetlands include longhorn fairy shrimp, vernal pool shrimp, vernal pool tadpole shrimp, curved-foot hygrotus diving beetle (*Hygrotus curvipes*), California tiger salamander, California red-legged frog, and hoary bat. Longhorn fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp are dependent on ephemeral wetlands such as vernal pools and alkali wetlands. California tiger salamanders use seasonal wetlands that hold water until April or later and perennial freshwater marsh for breeding and larval development. California red-legged frogs use seasonal wetlands and freshwater marsh for refugia and breeding. Perennial freshwater marsh is potential habitat for western pond turtle. Hoary bats forage near or over wetlands.

### **Aquatic**

The aquatic land cover type consists of open water habitats such as reservoirs, rivers, streams, canals, and ponds (including quarry and stock ponds that do not typically support emergent vegetation). Aquatic habitat in the program area comprises canal/aqueducts, ponds, reservoirs, and streams.

### **Aquatic Plant Communities**

#### **Canal/Aqueduct**

Canal/aqueduct encompasses approximately 158.21 acres of the program area. Portions of the California Aqueduct and the Delta Mendota Canal, as well as other irrigation canals, are present in

the program area. Because these features are intended to move water between areas, they are often managed for minimal vegetation to enhance the flow of water through the channels. Canals and aqueducts typically convey large amounts of water and contain deep water with swift flow year-round. No special-status plants occur in this community in the program area.

Canal/aqueduct is not present in the Golden Hills or Patterson Pass project areas.

### **Ponds**

Ponds occupy approximately 53.74 acres of the program area and were defined as perennial or seasonal water bodies less than 20 acres in size. Ponds are scattered throughout the program area. Ponds may have varying amounts of emergent, submerged, and/or floating vegetation, depending on the length of inundation and level of livestock grazing.

The majority of the ponds in the program area are small stock ponds with little or no vegetation that provide water for livestock. Plants often associated with ponds include floating plants such as duckweed (*Lemna* spp.) or rooted plants such as cattails, bulrushes, sedges, rushes, water cress, and water primrose.

Stock ponds are often surrounded by pasture with grazing livestock. Immediately adjacent to the stock pond, soil may be exposed because of the continued presence of livestock. Stock ponds in ungrazed areas or that have been protected from grazing may be surrounded by wetland vegetation including willows, cattails, reeds, bulrushes, sedges, and tules (*Scirpus californicus*). No special-status plants occur in this community in the program area.

Ponds constitute approximately 0.06% (2.89 acres) of the Golden Hills project area and 0.1% (0.84 acre) of the Patterson Pass project area.

### **Reservoirs**

The reservoir land cover type encompasses approximately 176.58 acres of the program area. Reservoirs were defined as being larger than 20 acres. Reservoirs are open water bodies that are highly managed for water storage, water supply, flood protection, or recreational uses. Bethany Reservoir is the only reservoir in the program area. The reservoir serves as a forebay for the South Bay Pumping Plant and a conveyance facility in this reach of the California Aqueduct.

Plants often associated with reservoirs include those plants common to deep water systems. Algae are the predominant plant life found in the open waters of reservoirs. Depending on reservoir temperature, water level, and other environmental conditions, algal blooms may occur, resulting in thick algal mats on the surface of the reservoir. If the reservoir edges are shallow, plant species similar to those found in ponds may be present. If the reservoir has steeper edges, water depth and fluctuations in reservoir height may prevent the establishment of vegetation. Upland and riparian trees that were not removed during construction of the reservoir or that were planted afterward may be present along the perimeter of the reservoir. No special-status plants occur in this community type in the program area.

**Drainages** There are numerous perennial, intermittent, and ephemeral drainages in the program area. Because these are linear features, the area of drainage in the program area was not calculated. Major drainages within the program area include Brushy Creek, Altamont Creek, Mountain House Creek, Corral Hollow Creek, and Patterson Run. Larger drainages often have riparian vegetation along them (see the discussion of the riparian land cover type above). The riparian plant

composition and width of the riparian corridor vary depending on channel slope, magnitude and frequency of channel and overbank flows, and the frequency/duration of flooding flows that inundate the broader floodplain. Willows may become established in-channel in areas of sediment deposition, unless suppressed by intensive grazing.

Intermittent, ephemeral, and potentially perennial drainages are present in the Golden Hills and Patterson Pass project areas. The acreage of drainages was not calculated for the program area or the Golden Hills project area because no delineation of waters was conducted for these areas.

A wetland delineation was prepared for the Patterson Pass project, and 0.85 acre of drainages was mapped in the Patterson Pass project area as part of the wetland delineation.

### **Common Wildlife Associations**

Open water supports a variety of ducks including mallard, green-winged teal, cinnamon teal (*Anas cyanoptera*), gadwall (*A. strepera*), American wigeon (*A. americana*), and American coot. Many species of common and special-status bats, including yuma myotis and silver-haired bat (*Lasiorycteris noctivagans*), forage on emergent aquatic invertebrates and obtain fresh water from open water habitats.

While canals and aqueducts can serve as loafing habitat for some waterfowl species, they generally do not have much habitat value. Because these waterways are so wide and deep, they also create barriers to movement on the landscape for terrestrial species. However, these features may provide the open expanses of water necessary for bat species that drink on the wing and lack the maneuverability to access smaller water sources, such as western mastiff bat (*Eumops perotis*).

Ponds attract many birds that are normally found in the adjacent grasslands; for example, California quail, mourning dove, and barn and cliff swallows (*Hirundo rustica* and *H. pyrrhonota*) all require daily water and are known to use ponds as water sources. Ponds that contain either submerged or emergent vegetation are of particular importance to native amphibians as breeding habitat. In perennial ponds, nonnative bass (*Micropterus* spp.) and bullfrog (*Lithobates catesbeianus*) are common and are often prevalent wildlife species. Raccoons forage along the edges of ponds for adult and larval amphibians, fish, and crayfish.

Reservoirs provide food for some raptors, which may also nest in nearby trees. Shore and wading birds including killdeer, black-necked stilt, greater yellowlegs, and several gull species may be found in and at the edges of reservoirs. Reservoirs provide habitat for some native fish such as hitch, Sacramento blackfish, California roach, and Sacramento sucker, but more commonly support nonnative fish such as bluegill, sunfish, brown bullhead, carp, goldfish, and largemouth bass. Reservoirs can also provide suitable rearing habitat for nonmigratory rainbow trout if conditions are favorable.

Special-status wildlife species that may be found in or use ponds, streams, the margins of reservoirs, or the inlets where streams flow into reservoirs include California tiger salamander, California red-legged frog, western pond turtle, and tricolored blackbird. Tricolored blackbirds rely on vegetation associated with ponds (cattails and bulrush) for nesting. Western red bat, hoary bat, Townsend's big-eared bat, and silver-haired bat could forage above or drink from canals or aqueducts.

## Cropland

### Cropland Plant Communities

The cropland land cover type encompasses all areas where the native vegetation has been cleared for irrigated agricultural use or dryland farming. This community does not include rangeland, which is often characterized as an agricultural land use (most rangeland in the program area is classified as annual grassland). Approximately 4.55 acres of cropland is present in the northeast corner of the program area. No special-status plants occur in this land cover type in the program area.

### Common Wildlife Associations

Some native wildlife, such as small mammals, certain raptors, and migratory waterfowl, utilize cropland seasonally or year-round. Year-round activity tends to be concentrated along the margins of active farmland where vegetation is less disturbed or where trees and shrubs tend to occur (some are planted deliberately as windbreaks). Open fields that are irrigated for forage crops are also used by wildlife. Cultivated agriculture is bisected by streams, ditches, and channels. Some amphibians and reptiles utilize these linear aquatic features and the adjacent upland habitat.

Special-status wildlife species expected to be found in or along the edges of cropland are burrowing owl, white-tailed kite, loggerhead shrike, Swainson's hawk, and golden eagle. San Joaquin kit foxes and American badgers may move through or forage along the edges of croplands if it occurs near suitable grassland areas. California tiger salamanders and California red-legged frogs may move through croplands to reach suitable breeding and aestivation habitat.

## Developed and Disturbed

Approximately 1,502.58 acres of the developed and disturbed land cover type are present in the program area. Developed land comprises all types of development for residential, commercial, industrial, transportation, landfill, landscaping, and recreational uses (e.g., sites with structures, paved surfaces, horticultural plantings, golf courses, and irrigated lawns). Developed and disturbed lands in the program area include ruderal land, urban/suburban development, rural residential, landfill, golf courses/urban parks, and wind turbines and associated infrastructure.

### Developed and Disturbed Plant Communities

Ruderal areas are periodically disturbed and are characterized by sparse nonnative, typically weedy vegetation. Most ruderal areas are vacant parcels surrounded by developed areas. Where vegetation is present, ruderal land cover is dominated by a mixture of nonnative annual grasses and weedy species, such as black mustard (*Brassica nigra*), thistles (*Cirsium* spp.), and wild radish (*Raphanus sativa*), that tend to colonize quickly after disturbance.

Vegetation found in other developed lands is usually in the form of lawns, landscaping, and planted street trees (e.g., elm, ash, liquidambar, pine, palm). The rural residential lands may also include small areas of irrigated pasture.

Landfills are highly disturbed areas while in use. After a landfill is closed and capped, it may be returned to natural community types through planting and management.

### Common Wildlife Associations

Developed and disturbed areas provide limited habitat for wildlife but are often known to support common urban-dwelling species such as northern mockingbird (*Mimus polyglottos*), rock pigeon (*Columba livia*), mourning dove, house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), western scrub-jay, Botta's pocket gopher (*Thomomys bottae*), California ground squirrel, house mouse (*Mus musculus*), black rat (*Rattus rattus*), and coyote. Semi-developed areas containing grass, trees, or water sources (small ponds and ditches) may support additional wildlife species. Mexican free-tailed bat is known to form large colonies in urban buildings and bridges, and other common species, such as big brown bat, are found in residential attics and ornamental trees in city parks. These species are typically generalized opportunistic foragers that are highly tolerant of human activity.

While developed landscapes do not provide high-quality habitat for special-status wildlife species, some developed areas may be used for foraging and movement. San Joaquin kit foxes, golden eagles, and loggerhead shrikes may move through and/or forage in ruderal areas, golf courses/urban parks, and ornamental woodlands. Burrowing owls may use ruderal areas, urban/suburban, and golf courses for foraging and breeding. California tiger salamanders and California red-legged frogs may migrate through some developed areas between habitat patches. California tiger salamanders and California red-legged frogs may also use golf courses if ponds are present on or near the golf course and suitable upland habitat is nearby. Some special-status bats may use artificial structures associated with urban landscapes—such as buildings, bridges, and tunnels—for maternity roosts. Pallid bats are known to roost in crevices in bridges or buildings, and Townsend's big-eared bats have been found in open spaces in abandoned buildings, tunnels and other artificial structures.

### Special-Status Species

Special-status species are plants and animals that are legally protected under ESA, CESA, or other regulations; and species that are considered sufficiently rare by the scientific community to qualify for such listing. Special-status species are defined as follows.

- Species that are listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.11 [listed animals]; 50 CFR 17.12 [listed plants]; and various notices in the Federal Register).
- Species that are candidates for possible future listing as threatened or endangered under ESA (77 FR 69993, November 21, 2012).
- Species that are listed or proposed for listing by the State of California as threatened or endangered under CESA (14 CCR 670.5).
- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines Section 15380).
- Plants listed as rare under the CNPPA (California Department of Fish and Wildlife Commission 1900 et seq.).
- Plants with a California Rare Plant Rank of 1A, 1B, 2A, and 2B (California Department of Fish and Wildlife 2013).
- Animals listed as California species of special concern on CDFW's Special Animals List (California Department of Fish and Game 2011).

- Animals that are fully protected in California (California Department of Fish and Wildlife Commission 3511 [birds], 4700 [mammals], 5050 [amphibians and reptiles], and 5515 [fish]).
- Bats identified as medium or high priority on the Western Bat Working Group regional priority species matrix (Western Bat Working Group 2007).
- APWRA focal species.
- Species of local conservation concern in the APWRA.

### **Special-Status Plants**

Thirty-six special status plant species occur in or within 5 miles of the program area (California Department of Fish and Wildlife 2013b) (Table 3.4-4). Twenty-four of the species are not known to occur in the program area (i.e., they occur within the 5-mile radius but not within the program area boundary) and are not discussed further. The following discussion focuses on the 12 species that occur in the program area.

#### **Large-Flowered Fiddleneck**

Large-flowered fiddleneck is state- and federally listed as endangered, with a California Rare Plant Rank of 1B.1. Historically, it was known from the Mount Diablo foothills in Contra Costa, Alameda, and San Joaquin Counties, but it is currently known only from two natural occurrences near Corral Hollow Road in San Joaquin County (Kelley and Ganders 2012:454; California Department of Fish and Wildlife 2013b). Large-flowered fiddleneck grows in grasslands, generally on north-facing slopes. A single population was known from the program area, located on Lawrence Livermore Laboratory's Site 300 test area (California Department of Fish and Wildlife 2013b). This occurrence appears to have been extirpated by erosion and has not been observed since 1997 (Carlsen et al. 2012). California annual grasslands in the program area are potential habitat for this species.

#### **Brittlescale**

Brittlescale has no federal or state listing status but has a California Rare Plant Rank of 1B.2. It is present along the western side of the Great Valley from Glenn to Merced Counties and in the small valleys of the inner Coast Ranges, including the Livermore Valley (Zacharias 2012:633–634; California Department of Fish and Wildlife 2013b). At the landscape level, brittlescale occurs in the broad flood basins of the valley floor and on alluvial fans associated with the major drainages draining from the inner Coast Range foothills. It grows in iodine bush scrub and alkali grasslands on the margins of vernal pools, swales, slickspots, and scalds. It is generally found at low elevations but has been collected up to 1,055 feet above sea level. Brittlescale has been reported in the program area from scalds in the vicinity of Altamont Pass Road (California Department of Fish and Wildlife 2013b). Potential habitat for this species occurs in alkali wetlands in the program area; alkali wetlands occur in the Golden Hills project area but not in the Patterson Pass project area.

#### **San Joaquin Spearscale**

San Joaquin spearscale has no federal or state listing status but has a California Rare Plant Rank of 1B.2. It occurs along the western side of the Great Valley from Glenn to Fresno Counties and in the small valleys of the inner Coast Ranges, including the Livermore Valley (Zacharias 2012:634; California Department of Fish and Wildlife 2013b). It occurs in the broad flood basins of the valley floor and on alluvial fans associated with the major drainages draining from the inner Coast Ranges

**Table 3.4-4. Special-Status Plant Species Known or with Potential to Occur in the Altamont Pass Wind Repowering Program Area**

Common Name <i>Scientific Name</i>	Status <sup>a</sup> Federal/ State/CRPR	Distribution	Habitat	Occurrence in Program Area
Sharsmith's onion <i>Allium sharsmithii</i>	-/-/1B.3	Mount Hamilton Range	Rocky serpentine slopes, in chaparral or cypress woodland; blooms March–May	Nearest occurrences on Cedar Mountain; program area outside known range of species
Large-flowered fiddleneck <i>Amsinckia grandiflora</i>	E/E/1B.1	Historically known from Mount Diablo foothills in Contra Costa, Alameda, and San Joaquin counties; currently known from two natural occurrences	Valley grassland slopes below 1,200 feet; blooms April–May	Occurs in program area
Alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	-/-/1B.2	Southern Sacramento Valley, northern San Joaquin Valley, east San Francisco Bay Area	Grassy flats and vernal pool margins, on alkali soils; blooms March–June	Nearest occurrences in Livermore Valley, Byron Hot Springs (both occurrences extirpated)
Heartscale <i>Atriplex cordulata</i>	-/-/1B.2	Central Valley from Colusa County to Kern County	Alkali grassland, alkali meadow, alkali scrub; blooms May–October	Occurrence records near program area based on misidentifications
Brittlescale <i>Atriplex depressa</i>	-/-/1B.2	Western and eastern Central Valley and adjacent foothills on west side of Central Valley	Alkali grassland, alkali meadow, and alkali scrub	Occurs in program area
San Joaquin saltbush <i>Atriplex joaquiniana</i>	-/-/1B.2	Eastern San Francisco Bay Area, west edge of Central Valley from Glenn County to Fresno County	Alkali meadow, alkali grassland, saltbush scrub; blooms April–September	Occurs in program area
Lesser saltscale <i>Atriplex minuscula</i>	-/-/1B.1	San Joaquin Valley from Merced County to Kern County; Butte County	Alkali sink and sandy alkaline soils in grasslands, between 65–325 feet; blooms May–October	Occurs in program area
Big scale balsamroot <i>Balsamorhiza macrolepis</i>	-/-/1B.2	Scattered occurrences in the Coast Ranges and Sierra Nevada foothills	Fields and rocky hillsides, below 2,000 feet; grassland, foothill woodland; blooms March–June	Nearest occurrence in Livermore (occurrence extirpated)
Big tarplant <i>Blepharizonia plumosa</i>	-/-/1B.1	Interior Coast Range foothills from Contra Costa County to Stanislaus County	Annual grassland, on dry hills and plains, between 50–1,500 feet; blooms July–October	Occurs in program area
Round-leaved filaree <i>California macrophylla</i>	-/-/1B.1	Scattered occurrences in the Great Valley, southern North Coast Ranges, San Francisco Bay Area, South Coast Ranges, Channel Islands, Transverse Ranges, and Peninsular Ranges	Grasslands, on friable clay soils; blooms; March–May	Occurs in program area

Table 3.4-4. Continued

Common Name <i>Scientific Name</i>	Status <sup>a</sup> Federal/ State/CRPR	Distribution	Habitat	Occurrence in Program Area
Mount Diablo fairy lantern <i>Calochortus pulchellus</i>	-/-/1B.2	Endemic to Contra Costa County	Cismontane woodland; chaparral; blooms April–June	Nearest occurrence in Los Vaqueros watershed
Chaparral harebell <i>Campanula exigua</i>	-/-/1B.2	San Francisco Bay region; northern inner south Coast Ranges; Alameda, Contra Costa, San Benito, Santa Clara, and Stanislaus Counties	Rocky areas in chaparral, usually on serpentinite; blooms May–June	Nearest occurrences on Cedar Mountain; program area outside known range of species
Lemmon's jewelflower <i>Caulanthus lemmonii</i>	-/-/1B.2	Southeast San Francisco Bay Area, south through the South Coast Ranges and adjacent San Joaquin Valley	Dry exposed slopes in grasslands and pinyon-juniper woodland, between 260–4,000 feet; blooms March–May	Occurs in program area
Congdon's spikeweed <i>Centromadia parryi</i> subsp. <i>Congdonii</i>	-/-/1B.2	East San Francisco Bay Area, Salinas Valley, Los Osos Valley	Annual grassland, on lower slopes, flats, and swales, sometimes on alkaline or saline soils, below 560 feet; blooms June–November	Occurrence records in program area based on misidentifications
Hispid bird's-beak <i>Chloropyron molle</i> subsp. <i>Hispidum</i>	-/-/1B.1	Scattered locations in San Joaquin Valley from Solano County to Kern County	Meadow, grassland, playa; on alkaline soils, below 500 feet; blooms June–September	Nearest occurrence in Livermore
Palmate bird's-beak <i>Chloropyron palmatum</i>	E/E/1B.1	Livermore Valley and scattered locations in the Central Valley from Colusa to Fresno County	Alkaline grasslands, chenopod scrub; blooms May–October	Nearest occurrence in Livermore
Mount Hamilton thistle <i>Cirsium fontinale</i> var. <i>campylon</i>	-/-/1B.2	East San Francisco Bay Area	Serpentine seeps and streams; blooms April–October	Nearest occurrences on Cedar Mountain; program area outside known range of species
Livermore tarplant <i>Deinandra bacigalupii</i>	-/-/1B.2	Endemic to Alameda County (Livermore Valley)	Alkali grassland; blooms June–October	Nearest occurrence in Livermore
Hospital Canyon larkspur <i>Delphinium californicum</i> var. <i>interius</i>	-/-/1B.2	Eastern San Francisco Bay Area, northern South Coast Range; Carmel Valley	Moist ravines and slopes in woodlands; blooms March–May	Nearest occurrences south of program area
Recurved larkspur <i>Delphinium recurvatum</i>	-/-/1B.2	San Joaquin Valley and interior valleys of the South Coast Ranges, from Contra Costa County to Kern County	Subalkaline soils in annual grassland, saltbush scrub; blooms March–May	Occurs in program area



Common Name <i>Scientific Name</i>	Status <sup>a</sup> Federal/ State/CRPR	Distribution	Habitat	Occurrence in Program Area
Diamond-petaled California poppy <i>Eschscholzia rhombipetala</i>	-/-/1B.1	Interior foothills of South Coast Ranges from Contra Costa County to Stanislaus County; Carrizo Plain in San Luis Obispo County	Grassland, chenopod scrub; on clay soils, where grass cover is sparse enough to allow growth of low annuals; blooms March–May	Occurs in program area
Talus fritillary <i>Fritillaria falcata</i>	-/-/1B.2	San Francisco Bay Area, Interior South Coast Ranges	Chaparral, oak woodland, coniferous forest, on serpentine talus; blooms March–May	Nearest occurrences on Cedar Mountain; program area outside known range of species
Diablo helianthella <i>Helianthella castanea</i>	-/-/1B.2	San Francisco Bay Area	At chaparral/oak woodland ecotone, often in partial shade, on rocky soils, between 80–3,800 feet; blooms April–June	Nearest occurrences on Cedar Mountain
Brewer's dwarf flax <i>Hesperolinon breweri</i>	-/-/1B.2	Known only from Contra Costa, Napa, and Solano counties	Serpentine slopes in chaparral and grasslands; blooms May–July	Nearest occurrence in Los Vaqueros watershed
Tehama County western flax <i>Hesperolinon tehamense</i>	-/-/1B.3	Northern and central interior North Coast Ranges: Tehama, Glenn Counties	Chaparral, foothill woodland, on serpentine; 100–1,000 m; blooms May–July	Nearest occurrences on Cedar Mountain; no habitat in program area
California hibiscus <i>Hibiscus lasiocarpus</i>	-/-/1B.2	Scattered small locations in central California, from Butte to San Joaquin County	Freshwater marsh along rivers and sloughs; blooms August–September	Nearest occurrences near Clifton Court Forebay
Loma Prieta hoita <i>Hoita strobilina</i>	-/-/1B.1	San Francisco Bay Area	Oak woodland, riparian woodland, chaparral, on serpentinite; blooms May–October	Nearest occurrence on Cedar Mountain
Mount Hamilton coreopsis <i>Leptosyne hamiltonii</i>	-/-/1B.2	Diablo Range	Steep shale talus slopes; blooms March–May	Nearest occurrence on Cedar Mountain
Mason's lilaeopsis <i>Lilaeopsis masonii</i>	-/R/1B.1	Sacramento/San Joaquin River delta	Freshwater or brackish marsh, in tidal zone; blooms April–October	Nearest occurrences near Clifton Court Forebay
Delta mudwort <i>Limosella australis</i>	-/-/2.1	Contra Costa, Sacramento, San Joaquin, and Solano Counties	Marshes and swamps; blooms May–August	Nearest occurrences near Clifton Court Forebay
Showy madia <i>Madia radiata</i>	-/-/1B.1	Scattered populations in the interior foothills of the South Coast Ranges	Oak woodland, grassland; slopes below 3,000 feet; blooms March–May	Nearest occurrences near Corral Hollow

Common Name <i>Scientific Name</i>	Status <sup>a</sup> Federal/ State/CRPR	Distribution	Habitat	Occurrence in Program Area
Shining navarretia <i>Navarretia nigelliformis</i> subsp. <i>radians</i>	-/-/1B.2	Interior foothills of South Coast Ranges from Merced County to San Luis Obispo County	Mesic areas with heavy clay soils, in swales and clay flats; in oak woodland, grassland; between 650–3,300 feet; blooms May–June	Occurs in program area
Hairless popcorn flower <i>Plagiobothrys glaber</i>	-/-/1A	Coastal valleys from Marin County to San Benito County	Alkaline meadows; blooms April–May	Nearest occurrence in Livermore (extirpated)
Rayless ragwort <i>Senecio aphanactis</i>	-/-/2.2	Scattered locations in Central Western California and Southwestern California, from Alameda County to San Diego County	Oak woodland, coastal scrub; open sandy or rocky areas; blooms January–April	Occurs in program area
Saline clover <i>Trifolium depauperatum</i> var. <i>hydrophilum</i>	-/-/1B.2	Sacramento Valley, central western California	Salt marsh, mesic alkaline areas in grasslands, vernal pools, below 990 feet (300 m); blooms April–June	Nearest occurrence in Livermore
Caper-fruited tropidocarpum <i>Tropidocarpum capparideum</i>	-/-/1B.1	Historically known from the northwest San Joaquin Valley and adjacent Coast Range foothills	Grasslands in alkaline hills below 500 feet; blooms March–April	Occurs in program area

<sup>a</sup> Status explanations:

**Federal**

- = no status.
- E = listed as “endangered” under the federal Endangered Species Act.

**State**

- = no status.
- E = listed as “endangered” under the California Endangered Species Act.
- R = listed as “rare” under the California Endangered Species Act.

**California Rare Plant Rank**

- 1A = plants presumed extinct in California.
- 1B = rare, threatened, or endangered in California and elsewhere.
- 2 = rare, threatened, or endangered in California, but more common elsewhere.
- 0.1 = seriously endangered in California.
- 0.2 = fairly endangered in California.
- 0.3 = not very endangered in California.

foothills. It grows in iodine bush scrub, alkali meadow, and alkali grasslands. It is generally found at low elevations, but has been collected up to 820 feet above sea level. In the program area, San Joaquin spearscale has been recorded in alkali wetlands along Altamont Pass Road, Bruns Road, and Mountain House Road (California Department of Fish and Wildlife 2013b). Potential habitat for this species occurs in alkali wetlands in the program area; alkali wetlands occur in the Golden Hills project area but not in the Patterson Pass project area.

### **Lesser Saltscale**

Lesser saltscale has no federal or state listing status but has a California Rare Plant Rank of 1B.1. It is known primarily from the San Joaquin Valley and the Livermore Valley, although other disjunct occurrences have been reported in Butte and western Alameda Counties (Zacharias 2012: 634–636; California Department of Fish and Wildlife 2013b). Lesser saltscale occurs in valley sink scrub and alkali grassland habitats on sandy, alkali soils, often on the margins of slickspots or alkaline rain pools. In the program area, lesser saltscale has been reported from alkali wetlands along Dyer Road (California Department of Fish and Wildlife 2013b). Potential habitat for this species occurs in alkali wetlands in the program area; alkali wetlands occur in the Golden Hills project area but not in the Patterson Pass project area.

### **Big Tarplant**

Big tarplant has no state or federal listing status but has a California Rare Plant Rank of 1B.1. It is known from the eastern San Francisco Bay Area and the northwestern San Joaquin Valley (Baldwin 2012). Big tarplant occurs in annual grassland on clay to clay-loam soils, usually on slopes and often in burned areas, below 1,500 feet. In the program area, big tarplant occurs in the vicinity of Corral Hollow Road and the Midway Substation (California Department of Fish and Wildlife 2013b). Potential habitat for this species occurs in California annual grassland in the program area, including in the Golden Hills and Patterson Pass projects areas.

### **Round-Leaved Filaree**

Round-leaved filaree has no state or federal listing status but has a California Rare Plant Rank of 1B.1. It is known from scattered occurrences in the Central Valley, southern North Coast Ranges, San Francisco Bay Area, South Coast Ranges, Channel Islands, Transverse Ranges, and Peninsular Ranges (Alarcón et al. 2012; California Department of Fish and Wildlife 2013b). It occurs in grasslands and open, grassy areas in oak woodland. In the program area, round-leaved filaree is known from six occurrences along Corral Hollow Road, at Lawrence Livermore Laboratory's Site 300 test area, along Altamont Pass Road, at Mountain House, and in the hills east of Altamont Pass Road and Dyer Road (California Department of Fish and Wildlife 2013b). Potential habitat for this species occurs in California annual grassland in the program area, including the Golden Hills and Patterson Pass projects areas.

### **Lemmon's Jewelflower**

Lemmon's jewelflower has no state or federal listing status but has a California Rare Plant Rank of 1B.1. It ranges from the southeastern San Francisco Bay area south into the South Coast Ranges and adjacent San Joaquin Valley, from Alameda to Ventura Counties (Al-Shehbaz 2012: 538; California Department of Fish and Wildlife 2013b). Lemmon's jewelflower grows on dry exposed slopes in grasslands and pinyon-juniper woodlands, generally between 260 and 4,000 feet above sea level. In the program area, one occurrence is known from the vicinity of Corral Hollow Road (California

Department of Fish and Wildlife 2013b). Potential habitat for this species occurs in California annual grassland in the program area, including in the Golden Hills and Patterson Pass projects areas.

### **Recurved Larkspur**

Recurved larkspur has no state or federal listing status but has a California Rare Plant Rank of 1B.2. Recurved larkspur was formerly widespread in the Central Valley from Colusa to Kern Counties, although it has been extirpated from the Sacramento Valley (Koontz and Warnock 2012:1411; California Department of Fish and Wildlife 2013b). It occurs in chenopod scrub and grasslands on poorly drained, fine, alkaline soils (Koontz and Warnock 2012: 1411). In the program area, one occurrence of recurved larkspur is known from alkali grasslands along Bruns Road (California Department of Fish and Wildlife 2013b). Plant communities in the program area that may provide habitat for recurved larkspur are alkali meadow and alkali wetlands. Alkali wetlands in the Golden Hills project area may provide habitat for recurved larkspur; there are no alkali wetlands in the Patterson Pass project area.

### **Diamond-Petaled California Poppy**

Diamond-petaled California poppy has no state or federal listing status but has a California Rare Plant Rank of 1B.1. This species was known historically from the interior foothills of the North and South Coast Ranges but is currently known from only three locations in Alameda and San Luis Obispo Counties (Hannan and Clark 2012:984; California Department of Fish and Wildlife 2013b). Diamond-petaled California poppy grows in clay soils within California annual grassland. In the program area, diamond-petaled California poppy is known from two locations at Lawrence Livermore Laboratory's Site 300 test area, north of Corral Hollow Road (California Department of Fish and Wildlife 2013b). Potential habitat for this species occurs in California annual grassland in the program area, including in the Golden Hills and Patterson Pass projects areas.

### **Shining Navarretia**

Shining navarretia has no state or federal listing status but has a California Rare Plant Rank of 1B.2. This species ranges throughout the South Coast Ranges, although additional occurrences are reported from the central San Joaquin Valley (Johnson 2012:1066; California Department of Fish and Wildlife 2013b). Shining navarretia grows on clay soils in grasslands and oak woodland, sometimes in association with drying depressions. In the program area, shining navarretia is known from a single occurrence at Lawrence Livermore Laboratory's Site 300 test area (California Department of Fish and Wildlife 2013b). Potential habitat for this species occurs in California annual grassland in the program area, including the Golden Hills and Patterson Pass projects areas, and in blue oak woodland, which does not occur in the Golden Hills and Patterson Pass projects areas.

### **Rayless Ragwort**

Rayless ragwort has no state or federal listing status but has a California Rare Plant Rank of 2.2. It is known from scattered locations in the California Coast Ranges south of San Francisco Bay, the Transverse Ranges, southwest California (including Santa Cruz Island), and Baja California (Preston 2000). It is found in areas with low vegetation cover in grassland and coastal scrub, on various substrates: clay, coarse sand, rock outcrops (including serpentinite), and soils with high gypsum content or high alkalinity (Preston 2000). In the program area, rayless ragwort is known from a single occurrence in the vicinity of Corral Hollow Road (California Department of Fish and Wildlife

2013b). Rock outcrops in the program area are potential habitat for this species. Rock outcrops do not occur in the Golden Hills or Patterson Pass projects areas.

### **Caper-Fruited Troidocarpum**

Caper-fruited troidocarpum has no state or federal listing status but has a California Rare Plant Rank of 1B.1. It was historically known from the northwest San Joaquin Valley and adjacent Diablo Range foothills, but all of these occurrences are believed to be extirpated. It has recently been reported to occur in Fresno, Monterey, and San Luis Obispo Counties. It grows on clay soils in grasslands. In the program area, caper-fruited troidocarpum is known from a single occurrence near Mountain House (California Department of Fish and Wildlife 2013b). Potential habitat for this species occurs in California annual grassland in the program area, including in the Golden Hills and Patterson Pass projects areas.

### **Special-Status Wildlife**

Based on the USFWS species list (U.S. Fish and Wildlife Service 2013b); CNDDDB (California Department of Fish and Wildlife 2013c) records search for the quadrangles overlapping the program area (Altamont, Cedar Mountain, Byron Hot Springs, Clifton Court Forebay, and Midway); and fatality records from APWRA fatality monitoring, 36 special-status wildlife species were identified as having potential to occur in the program area. Of these 35 species, 9 were determined to have low or no potential to occur in the program area and are not discussed further (Table 3.4-5); 26 of the 35 species are known to occur or have a moderate to high likelihood of occurring within the program area because suitable habitat is present (longhorn fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle [*Desmocerus californicus dimorphus*], curved-foot hygrotus diving beetle, California tiger salamander, western spadefoot [*Spea hammondi*], California red-legged frog, foothill yellow-legged frog [*Rana boylei*], western pond turtle, Blainville's [coast] horned lizard, Alameda whipsnake, San Joaquin coachwhip [*Masticophis flagellum ruddocki*], white-tailed kite, northern harrier, Swainson's hawk, golden eagle, western burrowing owl, loggerhead shrike, tricolored blackbird, little brown bat, western red bat, hoary bat, pallid bat, American badger, and San Joaquin kit fox). In addition to these 26 species, three species (bald eagle, Townsend's big-eared bat, and silver-haired bat) were added to this table based on suitable habitat conditions and professional judgment. It should be noted that the CNDDDB is a presence-only database that depends on voluntary submission of species location data and is not a complete database of species locations.

All wildlife species considered are listed in Table 3.4-5, which presents their regulatory status, distribution, habitat requirements, and a rationale for their potential to occur in the program area. The 29 special-status wildlife species that are known to occur or have a moderate to high potential to occur in the program area are discussed briefly below.

In addition to habitat conditions, APWRA fatality data, and CNDDDB data, information from avian use surveys of the program area collected by the AFMT was used to evaluate the potential for special-status birds to occur in the program area and to be potentially adversely affected by construction and operation of new wind turbines. Collection of avian use data was initiated in 2004 and involves sampling avian presence at 70–90 observation points distributed throughout the APWRA for 10–30 minutes at each observation point. The methods used to estimate avian fatality rates and to measure and monitor avian use of the program area are detailed in the *Altamont Pass Wind Resource Area Bird Fatality Study, Bird Years 2005–2011* (ICF International 2013).

### **Longhorn Fairy Shrimp**

Longhorn fairy shrimp is federally listed as endangered. The range of longhorn fairy shrimp is restricted to the eastern edge of the central Coast Ranges. The species has been found in the foothill grasslands west of Tracy, at Kesterson National Wildlife Refuge in Merced County, and near Soda Lake in San Luis Obispo County (Eriksen and Belk 1999:91).

Longhorn fairy shrimp have been found in clear-water depressional pools in sandstone outcrops, in grassland pools, and in pools in valley saltbush scrub. The species has been observed from late December to mid-May in pools that are filled by winter and spring rains. Inhabited pools in sandstone outcrops tend to be very small with clear water and low levels of soluble substances. Clay- and grass-bottomed pools that longhorn fairy shrimp inhabit are clear to fairly turbid. Pools where longhorn fairy shrimp occur are probably short-lived (approximately 3 weeks). Larvae hatch soon after pools fill and water temperature is approximately 10°C. Longhorn fairy shrimp need water temperatures of 15–20°C to attain maturity. Maturation is achieved in 23 days under optimal conditions, but 43 days is more typical (Eriksen and Belk 1999:91-92).

In the program area, seasonal wetlands and rock outcrops provide suitable habitat for longhorn fairy shrimp. There is one CNDDDB record for an occurrence of longhorn fairy shrimp in the northeast portion of the program area (California Department of Fish and Wildlife 2013c). There is an additional record for an occurrence of longhorn fairy shrimp within 0.5 mile north of the program area. Longhorn fairy shrimp is also known to occur near the program area at Brushy Peak Preserve (U.S. Fish and Wildlife Service 2007:3). Critical habitat for longhorn fairy shrimp is located in the northwest portion of the program area (Figure 3.4-4).

Grass-bottom seasonal pools and rock outcrop pools that are suitable for longhorn fairy shrimp may be present within the Golden Hills project area. One seasonal wetland in the Patterson Pass project area provides suitable habitat for longhorn fairy shrimp. Although rock outcrops are present in the Patterson Pass project area, they do not contain suitable pool habitat for longhorn fairy shrimp. There are no CNDDDB records for occurrences of longhorn fairy shrimp in either of the project areas (California Department of Fish and Wildlife 2013c). There is no designated critical habitat for longhorn fairy shrimp in the Golden Hills or Patterson Pass project areas (Figure 3.4-4).

### **Vernal Pool Fairy Shrimp**

Vernal pool fairy shrimp is federally listed as threatened. The species is found from Shasta County in the north throughout the Central Valley to Tulare County and west to the central Coast Ranges. Disjunct populations occur in San Luis Obispo, Santa Barbara, and Riverside Counties (Eriksen and Belk 1999:92, 125). Vernal pool fairy shrimp inhabit sandstone depression pools and vernal pools in grassland habitats. Vernal pool fairy shrimp are most commonly found in grass or mud-bottomed swales, earth slumps, or basalt-flow depression pools in unplowed grasslands (Eng et al. 1990:257). The chemical composition of the habitat and water temperature variations resulting from pools filling at different times and distribution of pools along altitudinal and longitudinal gradients are the most important factors in determining the distribution of different species of fairy shrimp (Eng et al. 1990:273). Vernal pool fairy shrimp also occur in other wetlands that provide habitat characteristics similar to those of vernal pools; these other wetlands include alkaline rain pools, rock outcrop pools, and some disturbed and constructed sites (59 FR 48136–48153, September 16, 1994; Eriksen and Belk 1999:93). Occupied habitats range in size from 6-square-foot puddles to pools exceeding 24 acres. Suitable pools must stay inundated long enough for vernal pool fairy shrimp to complete their life cycle, which typically takes 3–6 weeks (Eriksen and Belk 1999:93). Vernal pool fairy shrimp is

**Table 3.4-5. Special-Status Wildlife Species Known or with Potential to Occur in the Altamont Pass Wind Repowering Program Area**

Common Name <i>Scientific Name</i>	Status Federal/State/ Other	Geographic Distribution	Habitat Requirements	Likelihood to Occur in the Program Area
<b>Invertebrates</b>				
Conservancy fairy shrimp <i>Branchinecta conservatio</i>	E/-/-	Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, and Glenn Counties	Large, deep vernal pools in annual grasslands	Low—suitable habitat may be present but not known to occur in Alameda County.
Longhorn fairy shrimp <i>Branchinecta longiantenna</i>	E/-/-	Eastern margin of central Coast Ranges from Contra Costa County to San Luis Obispo County; disjunct population in Madera County	Small, clear pools in sandstone rock outcrops of clear to moderately turbid clay- or grass-bottomed pools	High—suitable habitat present in the program area; known population at Brushy Peak Preserve near program area; designated critical habitat for the species overlaps with a small portion of the program area.
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	T/-/-	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County; isolated populations also in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools	High—alkali and seasonal wetlands in the program area provide potential habitat for the species; occurrences known in program area.
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	T/-/-	Shasta County south to Merced County	Vernal pools and ephemeral stock ponds	High—program area is within the species known range and stock ponds and alkali wetlands in the program area provide potential habitat for the species. Not known to occur in program area.
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	T/-/-	Streamside habitats below 3,000 feet above sea level throughout the Central Valley.	Riparian and oak savanna habitats with elderberry shrubs and streamside habitats below 3,000 feet above sea level. Elderberry shrub is the host plant.	Moderate—project area supports elderberry shrubs, but no CNDDDB occurrences in program area.
Curved-foot hygrotus diving beetle <i>Hygrotus curvipes</i>	-/-/-	Kellogg Creek watershed and one site near Oakley, Contra Costa County and Alameda County	Aquatic; small seasonal pools and wetlands and small pools left in dry creek beds, associated with alkaline-tolerant vegetation	High—suitable habitat in program area; several CNDDDB occurrences in northwestern portion of program area.

Common Name <i>Scientific Name</i>	Status Federal/State/ Other	Geographic Distribution	Habitat Requirements	Likelihood to Occur in the Program Area
<b>Fish</b>				
Green sturgeon <i>Acipenser medirostris</i>	T/SSC/-	In marine waters of the Pacific Ocean from the Bering Sea to Ensenada, Mexico. In rivers from British Columbia south to the Sacramento River, primarily in the Klamath/Trinity and Sacramento Rivers.	Primarily marine, using large anadromous freshwater rivers and associated estuaries for spawning and rearing.	None—outside of species known range and no suitable habitat in the program area.
Delta smelt <i>Hypomesus transpacificus</i>	T/T/-	Primarily in the Sacramento–San Joaquin Estuary, but has been found as far upstream as the mouth of the American River on the Sacramento River and Mossdale on the San Joaquin River; range extends downstream to San Pablo Bay.	Occurs in estuary habitat in the Delta where fresh and brackish water mix in the salinity range of 2–7 parts per thousand (Moyle 2002).	None—outside of species known range.
Central California Coast steelhead <i>Oncorhynchus mykiss</i>	T/-/-	Coastal drainages along the central California coast.	An anadromous fish that spawns and spends a portion of its life in inland streams, typically maturing in the open ocean	None—outside of species known range and no suitable habitat in the program area.
Central Valley steelhead <i>Oncorhynchus mykiss</i>	T/-/-	Sacramento and San Joaquin River and their tributaries.	An anadromous fish that spawns and spends a portion of its life in inland streams, typically maturing in the open ocean	None—no perennial streams suitable for anadromous fish are present in the program area.
Central Valley spring-run Chinook salmon <i>Oncorhynchus tshawytscha</i>	T/T/-	Upper Sacramento River and tributaries of Feather and Yuba Rivers	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5°C. Habitat types are riffles, runs, and pools. Coldwater pools are needed for holding adults (Moyle 2002.)	None—outside of species known range.
Sacramento River winter-run Chinook salmon <i>Oncorhynchus tshawytscha</i>	E/E/-	Mainstem Sacramento River below Keswick Dam (Moyle 2002)	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5°C. Habitat types are riffles, runs, and pools. (Moyle 2002.)	None—outside of species known range.



Common Name <i>Scientific Name</i>	Status Federal/State/ Other	Geographic Distribution	Habitat Requirements	Likelihood to Occur in the Program Area
<b>Amphibians</b>				
California tiger salamander <i>Ambystoma californiense</i>	T/T/-	Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Sonoma County south to Santa Barbara County	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for breeding and larval development; rodent burrows, rock crevices, or fallen logs for cover for adults and juveniles for summer dormancy.	High—species has been documented at numerous locations within and near the program area. All upland and suitable aquatic habitats within the program area are considered potentially occupied.
Western spadefoot <i>Spea hammondi</i>	-/SSC/-	Sierra Nevada foothills, Central Valley, Coast Ranges, coastal counties in southern California	Shallow streams with riffles; seasonal wetlands, such as vernal pools in annual grasslands and oak woodlands	High—program area is within the species known range and suitable habitat is present in the program area.
California red-legged frog <i>Rana draytonii</i>	T/T/-	Found along the coast and coastal mountain ranges of California from Mendocino County to San Diego County and in the Sierra Nevada from Butte County to Stanislaus County.	Permanent and semipermanent aquatic habitats, such as creeks and cold-water ponds, with emergent and submergent vegetation; may estivate in rodent burrows, soil cracks, or downed logs during dry periods	High—species has been documented at numerous locations within and near the program area; all upland and suitable aquatic habitats within the program area are considered potentially occupied. The program area is entirely within designated critical habitat for the species.
Foothill yellow-legged frog <i>Rana boylei</i>	-/SSC/-	Occurs in the Klamath, Cascade, north Coast, south Coast, Transverse, and Sierra Nevada Ranges up to approximately 1,800 meters (6,000 feet).	Creeks or rivers in woodland, forest, mixed chaparral, and wet meadow habitats with rock and gravel substrate and low overhanging vegetation along the edge. Usually found near riffles with rocks and sunny banks nearby.	Moderate—streams within the program area that contain suitable substrate and cover could support the species; CNDDB records for occurrences within 2 miles of the program area.

Table 3.4-5. Continued

Common Name <i>Scientific Name</i>	Status Federal/State/ Other	Geographic Distribution	Habitat Requirements	Likelihood to Occur in the Program Area
<b>Reptiles</b>				
Western pond turtle <i>Actinemys marmorata</i>	-/SSC/-	The western pond turtle is uncommon to common in suitable aquatic habitat throughout California, west of the Sierra-Cascade crest and absent from desert regions, except in the Mojave Desert along the Mojave River and its tributaries.	Occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests. Nests are typically constructed in upland habitat within 0.25 mile of aquatic habitat.	High—suitable aquatic and upland nesting habitat in the program area; table habitat; known to occur in and near the program area.
Blainville’s (Coast) horned lizard <i>Phrynosoma blainvillii</i>	-/SSC/-	Sacramento Valley, including foothills, south to southern California; Coast Ranges south of Sonoma County; below 1,200 meters (4,000 feet) in northern California.	Grasslands, brushlands, woodlands, and open coniferous forest with sandy or loose soil; requires abundant ant colonies for foraging	High—suitable habitat (grassland and woodland) is present throughout the program area although suitable substrate conditions may not be present throughout the program area; known to occur in and near the program area.
Silvery legless lizard <i>Anniella pulchra</i>	-/SSC/-	Along the Coast, Transverse, and Peninsular Ranges from Contra Costa County to San Diego County with spotty occurrences in the San Joaquin Valley; elevation range extends from sea level to about 5,100 feet.	Occurs in moist warm loose soil with plant cover. Moisture is essential. Habitat consist of sparsely vegetated areas of beach dunes, chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces with sycamores, cottonwoods, or oaks. Leaf litter under trees and bushes in sunny areas, and dunes stabilized with bush lupine and mock heather often indicate suitable habitat. Use surface objects such as rocks, boards, driftwood, and logs for cover.	Low—limited suitable habitat in program area and soil moisture conditions unlikely.

Common Name <i>Scientific Name</i>	Status Federal/State/ Other	Geographic Distribution	Habitat Requirements	Likelihood to Occur in the Program Area
Giant garter snake <i>Thamnophis gigas</i>	T/T/-	Central Valley from the vicinity of Burrel in Fresno County to near Chico in Butte County. Extirpated from areas south of Fresno.	Sloughs, canals, low-gradient streams, and freshwater marshes where there is a prey base of small fish and amphibians. Also irrigation ditches and rice fields. Requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter.	None—program area is outside of species range except for extreme northeast corner of program; no suitable habitat is present in the program area and no nearby occurrences.
Alameda whipsnake <i>Masticophis lateralis euryxanthus</i>	T/T/-	Restricted to Alameda and Contra Costa Counties; fragmented into five disjunct populations throughout its range	Valleys, foothills, and low mountains associated with northern coastal scrub or chaparral habitat; requires rock outcrops for cover and foraging	High—suitable grassland habitat is present throughout the program area but vegetation associations (scrub and chaparral) and rock outcrops are more limited; known to occur in and near the program area. Designated critical habitat for the species overlaps a portion of the program area.
San Joaquin coachwhip <i>Masticophis flagellum ruddocki</i>	-/SSC/-	From Colusa county in the Sacramento Valley southward to the grapevine in the San Joaquin Valley and westward into the inner coast ranges. An isolated population occurs at Sutter Buttes. Known elevational range from 20 to 900 meters.	Occurs in open, dry, vegetative associations with little or no tree cover. It occurs in valley grassland and saltbush scrub associations. Often occurs in association with mammal burrows	High—suitable grassland habitat is present within the program area; known to occur in and near the program area.

Common Name <i>Scientific Name</i>	Status Federal/State/ Other	Geographic Distribution	Habitat Requirements	Likelihood to Occur in the Program Area
<b>Birds</b>				
White-tailed kite <i>Elanus leucurus</i>	-/FP/-	Lowland areas west of Sierra Nevada from the head of the Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border	Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging	High—species is known to occur in the program area and is likely to forage in the program area. Large trees suitable for nesting are limited.
Bald eagle <i>Haliaeetus leucocephalus</i>	P/E, FP/-	Nests in Siskiyou, Modoc, Trinity, Shasta, Lassen, Plumas, Butte, Tehama, Lake, and Mendocino Counties and in the Lake Tahoe Basin; reintroduced into central coast; winter range includes the rest of California, except the southeastern deserts, very high altitudes in the Sierra Nevada, and east of the Sierra Nevada south of Mono County	In western North America, nests and roosts in coniferous forests within 1 mile of a lake, reservoir, or stream, or the ocean	Moderate—suitable nesting and foraging habitat present at Bethany Reservoir; not known to occur in the program area but may nest, forage, or move through it.
Northern harrier <i>Circus cyaneus</i>	-/SSC/-	Throughout lowland California; has been recorded in fall at high elevations	Grasslands, meadows, marshes, and seasonal and agricultural wetlands providing tall cover	High—suitable nesting and foraging habitat is present throughout the program area; known to occur in the program area.
Swainson's hawk <i>Buteo swainsoni</i>	-/T/-	Lower Sacramento and San Joaquin Valleys, Klamath Basin, and Butte Valley. Highest nesting densities occur near Davis and Woodland, Yolo County.	Nests in oaks or cottonwoods in or near riparian habitats. Forages in grasslands, irrigated pastures, and grain fields.	High—species is known to occur in the program area but is largely a Central Valley species and is less likely to forage in the program area. Large trees suitable for nesting are limited.
Golden eagle <i>Aquila chrysaetos</i>	P/FP/-	Foothills and mountains throughout California; uncommon nonbreeding visitor to lowlands such as the Central Valley	Nests in cliffs and escarpments or tall trees; forages in annual grasslands, chaparral, or oak woodlands that provide abundant medium and large-sized mammals for prey	High—suitable nesting and foraging habitat present; known to occur in program area.

Common Name <i>Scientific Name</i>	Status Federal/State/ Other	Geographic Distribution	Habitat Requirements	Likelihood to Occur in the Program Area
Western burrowing owl <i>Athene cunicularia</i>	-/SSC/-	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Level, open, dry, heavily grazed or low stature grassland or desert vegetation with available burrows	High—suitable nesting and foraging habitat is present throughout the program area; numerous known occurrences throughout the program area.
Loggerhead shrike <i>Lanius ludovicianus</i>	-/SSC/-	Resident and winter visitor in lowlands and foothills throughout California; rare on coastal slope north of Mendocino County, occurring only in winter	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. Nests in densely foliated trees or shrubs	High—suitable nesting and foraging habitat present; known to occur in program area; nesting habitat is limited to areas that support shrubs and trees.
Tricolored blackbird <i>Agelaius tricolor</i>	-/SSC/-	Permanent resident in the Central Valley from Butte County to Kern County; breeds at scattered coastal locations from Marin County south to San Diego County and at scattered locations in Lake, Sonoma, and Solano Counties; rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grain fields; habitat must be large enough to support 50 pairs; probably requires water at or near the nesting colony	High—suitable nesting and foraging habitat present; known to occur in program area; nesting habitat is limited to areas that support larger expanses of emergent freshwater marsh and blackberry.
<b>Mammals</b>				
Little brown bat <i>Myotis lucifugus</i>	-/-/WBWG Moderate	Found throughout the northern portion of California, primarily at higher elevations.	Often associated with coniferous forest. Requires nearby water. Roosts in hollow trees, rock outcrops, buildings, and occasionally mines and caves.	High— may roost, forage or drink in the program area. Assuming identification was correct, this species has been documented in fatality records at APWRA.
Silver-haired bat <i>Lasionycteris noctivagans</i>	-/-/WBWG Moderate	Found from the Oregon border south along the coast to San Francisco Bay and along the Sierra Nevada and Great Basin region to Inyo County. Also occurs in southern California from Ventura and San Bernardino Counties. south to Mexico. Has been recorded in Sacramento, Stanislaus, Monterey and Yolo Counties	During spring and fall migrations the silver-haired bat may be found anywhere in California. Summer habitats include coastal and montane coniferous forests, valley foothill woodlands, pinyon-juniper woodlands, and valley foothill and montane riparian habitats. Roosts in hollow trees, snags, buildings, rock crevices, caves, and under bark.	Moderate—may roost, forage or drink in the program area; few fatality records from windfarms in the Delta, approximately 25 miles north/northwest. This species has been acoustically documented at a neighboring wind farm (Pandion 2010).

Common Name <i>Scientific Name</i>	Status Federal/State/ Other	Geographic Distribution	Habitat Requirements	Likelihood to Occur in the Program Area
Western red bat <i>Lasiurus blossevillii</i>	-/SSC/WBVG High	Coastal areas from the San Francisco Bay area south, plus the Central Valley and surrounding foothills, with a limited number of records from southern California, extending as far east as western Riverside and central San Diego counties, upper Sacramento River near Dunsmuir, Siskiyou County.	Found primarily in riparian and wooded habitats. Occurs at least seasonally in urban areas. Day roosts in trees within the foliage. Found in fruit orchards and sycamore riparian habitats in the Central Valley.	High—may roost, forage or drink in the program area. Documented in fatality record at APWRA.
Hoary bat <i>Lasiurus cinereus</i>	-/-/WBVG Moderate	Occurs throughout California from sea level to 13,200 feet. Statewide in wooded areas. Winter in southern California.	Primarily roosts in forested habitats. Also found in riparian areas and in park and garden settings in urban areas. Day roosts within foliage of trees.	High—may roost, forage or drink in the program area. Documented in fatality record at APWRA.
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	-/SSC/WBVG High	Widespread throughout California, from low desert to mid-elevation montane habitats.	Roosts in caves, tunnels, mines, buildings, and other cave-like spaces. Will night roost in more open settings, including under bridges.	Moderate—May roost in caves or structures within or adjacent to the program area; could forage or drink within program area.
Pallid bat <i>Antrozous pallidus</i>	-/SSC/WBVG High	Occurs throughout California except the high Sierra from Shasta to Kern County and the northwest coast, primarily at lower and mid elevations (up to 6,000 feet).	Occurs in a variety of habitats from desert to coniferous forest. Most closely associated with oak, mixed conifer, redwood, and giant sequoia habitats in northern California and oak woodland, grassland, and desert scrub in southern California. Relies heavily on trees for roosts but also uses caves, mines, bridges, and buildings.	High— may roost, forage or drink in the program area; one record for an occurrence within 5 miles of the program area (California Department of Fish and Wildlife 2013b).

Common Name <i>Scientific Name</i>	Status Federal/State/ Other	Geographic Distribution	Habitat Requirements	Likelihood to Occur in the Program Area
American badger <i>Taxidea taxus</i>	-/SSC	In California, badgers occur throughout the state except in humid coastal forests of northwestern California in Del Norte and Humboldt Counties	Occurs in a wide variety of open, arid habitats but are most commonly associated with grasslands, savannas, mountain meadows, and open areas of desert scrub; the principal habitat requirements for the species appear to be sufficient food (burrowing rodents), friable soils, and relatively open, uncultivated ground.	High—suitable grassland habitat throughout the program area; known to occur within and near the program area.
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	E/T	Principally occurs in the San Joaquin Valley and adjacent open foothills to the west; recent records from 17 counties extending from Kern County north to Contra Costa County	Saltbush scrub, grassland, oak, savanna, and freshwater scrub.	High—suitable grassland habitat is present throughout the program area; although recent sightings are limited, the species has been documented at several localities within and near the program area.

<sup>a</sup> Status explanations:

**Federal**

- E = listed as endangered under the federal Endangered Species Act.
- T = listed as threatened under the federal Endangered Species Act.
- = no listing.

**State**

- E = listed as endangered under the California Endangered Species Act.
- T = listed as threatened under the California Endangered Species Act.
- FP = fully protected under the California Fish and Game Code.
- SSC = species of special concern in California.
- = no listing.

**Other**

Western Bat Working Group (WBWG) Priority

- High = species are imperiled or at high risk of imperilment.
- Moderate = this designation indicates a level of concern that should warrant closer evaluation, more research, and conservation actions of both the species and possible threats. A lack of meaningful information is a major obstacle in adequately assessing these species' status and should be considered a threat.

not found in riverine, marine, or other permanent waters (59 FR 48136–48153, September 16, 1994).

Alkali and seasonal wetlands in the program area provide suitable habitat for vernal pool fairy shrimp. There is one CNDDDB record for an occurrence of vernal pool fairy shrimp in the northwest portion of the program area and five additional records for occurrences that are west, north, and northeast of the program area (California Department of Fish and Wildlife 2013c). There is no designated critical habitat for vernal pool fairy shrimp within the program area (Figure 3.4-4).

Alkali and seasonal wetlands that provide suitable habitat for vernal pool fairy shrimp may be present within the Golden Hills project area; however, habitat surveys have not been conducted. One seasonal wetland in the Patterson Pass project area provides suitable habitat for vernal pool fairy shrimp. There are no CNDDDB records for occurrences of vernal pool fairy shrimp in either of the project areas (California Department of Fish and Wildlife 2013c).

### **Vernal Pool Tadpole Shrimp**

Vernal pool tadpole shrimp is federally listed as endangered. This species is a California Central Valley endemic species, with the majority of populations in the Sacramento Valley. Vernal pool tadpole shrimp has also been reported from the Sacramento River Delta east of San Francisco Bay and from scattered localities in the San Joaquin Valley from San Joaquin to Madera Counties (Rogers 2001:1002).

Vernal pool tadpole shrimp occur in a wide variety of seasonal habitats including vernal pools, ponded clay flats, alkaline pools, ephemeral stock tanks, and roadside ditches. Habitats where vernal pool tadpole shrimp have been observed range in size from small (less than 25 square feet), clear, vegetated vernal pools to highly turbid alkali scald pools to large (more than 100 acres) winter lakes (Helm 1998:134–138; Rogers 2001:1002–1005). These pools and other ephemeral wetlands must dry out and be inundated again for the vernal pool tadpole shrimp cysts to hatch. This species has not been reported in pools that contain high concentrations of sodium salts, but may occur in pools with high concentrations of calcium salts (Helm 1998:134–138; Rogers 2001:1002–1005).

Seasonal wetlands and ephemeral ponds in the program area that remain inundated for a minimum of 6–8 weeks would provide suitable habitat for vernal pool tadpole shrimp. Although there are no CNDDDB records for occurrences of vernal pool tadpole shrimp in the program area (California Department of Fish and Wildlife 2013c), the program area is located within their known range. There is no designated critical habitat for vernal pool tadpole shrimp within the program area.

Seasonal wetlands and ephemeral ponds that provide suitable habitat for vernal pool tadpole shrimp may be present within the Golden Hills project area. One area of perennial freshwater marsh in the Patterson Pass project area provides suitable habitat for vernal pool tadpole shrimp. There are no CNDDDB records for occurrences of vernal pool tadpole shrimp in either of the project areas (California Department of Fish and Wildlife 2013c).

### **Valley Elderberry Longhorn Beetle**

Valley elderberry longhorn beetle is federally listed as threatened. On October 2, 2012, USFWS proposed to remove valley elderberry longhorn beetle from the federal list of endangered and threatened species (77 FR 60237–60276). The proposed rule, if made final, would also remove the designation of critical habitat for the subspecies. The public comment period on the proposed delisting ended December 3, 2012, and was extended through January 23, 2013 (78 FR 4812–4813).



USFWS will review comments and make a final determination on the proposed rule. There is no official time period for this determination; until it is made, the beetle retains its protected status and critical habitat designation.

The current known range of valley elderberry longhorn beetle extends throughout California's Central Valley and associated foothills from about the 3,000-foot contour on the east and the watershed of the Central Valley on the west (U.S. Fish and Wildlife Service 1999:1). Valley elderberry longhorn beetle is dependent on its host plant, elderberry, which is a common component of riparian corridors and adjacent upland areas in the Central Valley (Barr 1991:5).

Valley elderberry longhorn beetle has four stages of life: egg, larva, pupa, and adult. Females deposit eggs on or adjacent to the host elderberry. Egg production varies; females have been observed to lay between 16 and 180 eggs. Eggs hatch within a few days of being deposited. Larvae emerge and bore into the wood of the host plant, creating a long feeding gallery in the pith of the elderberry stem. The larvae feed on the pith of the plant for 1–2 years. When a larva is ready to pupate, it chews an exit hole to the outside of the stem and then plugs it with frass. The larva then retreats into the feeding gallery and constructs a pupal chamber from wood and frass. The larvae metamorphose between December and April; the pupal stage lasts about a month. The adult remains in the chamber for several weeks after metamorphosis and then emerges from the chamber through the exit hole. Adults emerge between mid-March and mid-June, the flowering season of the plant. Adults feed on elderberry leaves and mate within the elderberry canopy (Talley et al. 2006: 7-9).

Elderberry shrubs in the program area provide suitable habitat for valley elderberry longhorn beetle. Elderberry shrubs may be associated with the mixed riparian forest and woodland, mixed willow riparian scrub, blue oak woodland, foothill pine-oak woodland, mixed evergreen forest oak woodland, and grassland land cover types. There are no CNDDDB records for occurrences for valley elderberry longhorn beetle in the program area. The closest record is for three adults observed at Lawrence Livermore National Laboratory Site 300 (California Department of Fish and Wildlife 2013c).

Elderberry shrubs may be present in the Golden Hills project area and would provide suitable habitat for valley elderberry longhorn beetle. Elderberry shrubs may be associated with the mixed willow riparian scrub and grassland land cover types. An ICF biologist found 39 elderberry shrubs in the Patterson Pass project area during a survey to assess habitats for special-status species in November 2013. Several of the shrubs had valley elderberry longhorn beetle exit holes.

### **Curved-Footed Hygrotus Diving Beetle**

Curved-footed hygrotus diving beetle does not have any state or federal status but is considered rare under CEQA. In the November 15, 1994 Notice of Review (50 FR 58982–59028), USFWS concluded that curved-foot hygrotus diving beetle was possibly appropriate for listing as threatened or endangered but lacking persuasive data to support a proposal for listing. Its status trend was listed as unknown.

The known range of the curved-foot hygrotus diving beetle is limited to Contra Costa and Alameda Counties (California Department of Fish and Wildlife 2013c). Little information is available for the curved-foot hygrotus diving beetle. The species is known to inhabit vernal and seasonal pools and wetlands (Essig Museum of Entomology 2013), as well as stock ponds, irrigation canals, roadside ditches, pools in creeks and creeks with slow flows (California Department of Fish and Wildlife 2013c). Both larval and adult life stages are predaceous and, like other species in the family, winged

adults can disperse between habitats (Powell and Hogue 1979). Reasons for decline of the species include loss of habitat to development and non-target effects of mosquito control (Essig Museum of Entomology 2013).

Seasonal wetlands, ponds, and some creeks in the program area may provide suitable habitat for curved-footed hygrotylus diving beetle. There are three CNDDDB records for occurrences of curved-footed hygrotylus diving beetle in the northwest portion of the program area and eight additional records for occurrences that are west, north, and east of the program area (California Department of Fish and Wildlife 2013c).

Seasonal wetlands, ponds, and some creeks may provide suitable habitat for curved-footed hygrotylus diving beetle in the Golden Hills project area. Ponds and some creeks may provide suitable habitat for this beetle in the Patterson Pass project area. There are no CNDDDB records for occurrences of curved-footed hygrotylus diving beetle in either of the project areas; however one of the occurrences in the program area is just outside of the Golden Hills project area (California Department of Fish and Wildlife 2013c).

### **California Tiger Salamander**

The Central California distinct population segment of California tiger salamander (which overlaps with the program area) is federally listed as threatened (50 CFR 47212–47248, August 4, 2004). California tiger salamander is also state-listed as threatened (California Department of Fish and Game 2011).

California tiger salamander is endemic to the San Joaquin–Sacramento River valleys, bordering foothills, and coastal valleys of central California (Barry and Shaffer 1994:159). California tiger salamander is a lowland species restricted to grasslands and low foothill regions where its breeding habitat occurs (Jennings and Hayes 1994:14). Breeding habitat consists of temporary ponds or pools, slower portions of streams, and some permanent waters (Stebbins 2003:153–154). Permanent aquatic sites are unlikely to be used for breeding unless they lack fish predators (Jennings and Hayes 1994:14). California tiger salamanders also require dry-season refuge sites in the vicinity of breeding sites (within 1 mile) (Jennings and Hayes 1994:14). California ground squirrel (*Spermophilus beecheyi*) burrows are important refuge sites for adults and juveniles (Loredo et al. 1996:283–284).

Adult California tiger salamanders move from subterranean refuge sites to breeding pools during relatively warm late winter and spring rains (Jennings and Hayes 1994:12). Breeding generally occurs from December through March (Stebbins 2003:154). Development through metamorphosis requires 3–6 months (69 FR 47215). Metamorphosed juveniles leave their ponds in the late spring or early summer and move to terrestrial refuge sites before seasonal ponds dry (Loredo et al. 1996:282). However, in late fall 1993, one larval overwintering salamander was observed in Monterey County and many overwintering salamanders were observed in three perennial stock ponds in Contra Costa County from 1998 to 2001 (Alvarez 2004:344).

Ponds, longer lasting seasonal wetlands, and portions of drainages in the program area may provide suitable breeding habitat for California tiger salamander, and surrounding grasslands and oak woodland provide suitable upland refuge and dispersal habitat. There are numerous (more than 20) CNDDDB records for occurrences of California tiger salamander in the program area. The majority of these occurrences are in the northern portion of the program area. There are more than 70 additional records for occurrences of California tiger salamander surrounding the program area

(California Department of Fish and Wildlife 2013c). There is no designated critical habitat for California tiger salamander in the program area.

Ponds and pooled portions of drainages in the Golden Hills and Patterson Pass project areas provide suitable breeding habitat for California tiger salamander, and surrounding grasslands provide suitable upland refuge and dispersal habitat. Longer lasting seasonal wetlands in the Golden Hills project area may also provide suitable habitat for California tiger salamander. There are CNDDDB records for occurrences of California tiger salamander in both project areas (California Department of Fish and Wildlife 2013c).

### **Western Spadefoot**

Western spadefoot is a California species of special concern. Western spadefoot is a lowland toad that occurs in washes, river floodplains, alluvial fans, playas, and alkali flats within valley and foothill grasslands, open chaparral, and pine-oak woodlands. It breeds in quiet streams and temporary rain pools. Western spadefoot prefers habitats with open vegetation and short grasses where the soil is sandy or gravelly (Stebbins 2003:203). Western spadefoot toads spend a considerable portion of the year underground in burrows (Zeiner et al. 1988:56). Depending on temperature and rainfall, egg laying occurs between late February and late May. Eggs hatch within 6 days, and larval development can be completed within 3–11 weeks (Jennings and Hayes 1994:94). Recently metamorphosed toads disperse after spending a few hours or days at the pond margin (Zeiner et al. 1988:56).

Seasonal wetlands, pooled portions of drainages, and ephemeral ponds in the program area that remain inundated for a minimum of 4 weeks would provide suitable habitat for western spadefoot. Although there are no CNDDDB records for occurrences of western spadefoot in the program area (California Department of Fish and Wildlife 2013c), the program area is within their known range.

Seasonal wetlands, pooled portions of drainages, and ephemeral ponds that provide suitable habitat for western spadefoot may be present in the Golden Hills project area. One seasonal wetland and two pooled areas in a drainage provide suitable habitat for western spadefoot in the Patterson Pass project area. There are no CNDDDB occurrences of western spadefoot in either of the project areas (California Department of Fish and Wildlife 2013c).

### **California Red-Legged Frog**

California red-legged frog is a California species of special concern and is federally listed as threatened. The taxon is known from isolated locations in the Sierra Nevada, North Coast, and northern Transverse Ranges. It is relatively common in the San Francisco Bay Area and along the central coast. California red-legged frog is believed to be extirpated from the floor of the Central Valley (U.S. Fish and Wildlife Service 2002a:5).

California red-legged frogs use a variety of habitats; these include various aquatic, riparian, and upland habitats (U.S. Fish and Wildlife Service 2002a:12). However, California red-legged frogs may complete their entire life cycle in a pond or other aquatic site that is suitable for all life stages (66 FR 14626). California red-legged frogs inhabit marshes; streams; lakes; ponds; and other, usually permanent, sources of water that have dense riparian vegetation (Stebbins 2003:225). Habitat consists of deep (at least 2.5 feet) still or slow-moving water with shrubby riparian vegetation (willows [*Salix* sp.], tules [*Scirpus* sp.], or cattails [*Typha* sp.]) (Jennings and Hayes 1994:64). California red-legged frogs are highly aquatic and spend the majority of their lives in the riparian

zone (Brode and Bury 1984:32). Adults may take refuge during dry periods in rodent holes or leaf litter in riparian habitats (U.S. Fish and Wildlife Service 2002a:14).

California red-legged frogs breed from November through April and typically lay their eggs in clusters around aquatic vegetation (U.S. Fish and Wildlife Service 2002a:16). Larvae undergo metamorphosis between July and September, 3.5–7 months after hatching (66 FR 14626). However, larvae have been observed to take more than 1 year to complete metamorphosis in four counties in central coast California (Fellers et al. 2001:156).

Ponds, perennial marsh, seasonal wetlands, drainages, and mixed willow riparian scrub in the program area provide suitable breeding and/or foraging/dispersal habitat for California red-legged frog, and surrounding grasslands and oak woodland provide suitable upland refuge and dispersal habitat. There are numerous (more than 40) records for occurrences of California red-legged frog throughout the program area. There are many additional CNDDDB records for occurrences of California red-legged frog surrounding the program area (California Department of Fish and Wildlife 2013c). The entire program area is within designated critical habitat for California red-legged frog.

Ponds, perennial marsh, seasonal wetlands, drainages, and mixed willow riparian scrub within the Golden Hills and Patterson Pass project areas provide suitable breeding and/or foraging/dispersal habitat for California red-legged frog, and surrounding grasslands provide suitable upland refuge and dispersal habitat. There are CNDDDB records for occurrences of California red-legged frog in both project areas (California Department of Fish and Wildlife 2013c). The Golden Hills and Patterson Pass project areas are located entirely within designated critical habitat for California red-legged frog (Figure 3.4-4).

### **Foothill Yellow-Legged Frog**

Foothill yellow-legged frog is designated as a California species of special concern. Historically, foothill yellow-legged frogs occurred in the coastal foothills and mountains from the Oregon border south to Los Angeles County and in the Sierra Nevada foothills south to Kern County (Zweifel 1955:215; Stebbins 2003:232). The current range excludes coastal areas south of northern San Luis Obispo County and foothill areas south of Fresno County where the species is apparently extirpated (Jennings and Hayes 1994:67–69). The species can occur from sea level to 6,000 feet above sea level (Stebbins 2003:232). Foothill yellow-legged frogs occupy rocky drainages in valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadow types of habitat (Zeiner et al. 1988:86). The streambed is usually gravelly or sandy and the stream gradient is generally not steep (Zweifel 1955:221). Foothill yellow-legged frogs are typically found near water, especially near riffles with rocks nearby and sunny banks (Stebbins 2003:232). Foothill yellow-legged frogs are active from late February or early March through summer and into the fall (Zweifel 1955:226). The species breeds from mid-March to May after the high-water stage in streams has passed and less sediment is being conveyed (Stebbins 1954:130).

Perennial and intermittent drainages and mixed willow riparian scrub in the program area may provide suitable habitat for foothill yellow-legged frog. There are no CNDDDB records for occurrences of foothill yellow-legged frog within the program area; however there are two records for occurrences that are south and southwest of the program area (California Department of Fish and Wildlife 2013c).

Perennial and intermittent drainages and mixed willow riparian scrub in the Golden Hills and Patterson Pass project areas may provide suitable habitat for foothill yellow-legged frog. There are no CNDDDB records for occurrences of foothill yellow-legged frog in either of the project areas (California Department of Fish and Wildlife 2013c).

### **Western Pond Turtle**

Western pond turtle is a California species of special concern. In California, the range is discontinuously distributed throughout the state west of the Cascade-Sierran crest (Jennings and Hayes 1994:99). Aquatic habitats used by western pond turtles include ponds, lakes, marshes, rivers, streams, and irrigation ditches with a muddy or rocky bottom in grassland, woodland, and open forest areas (Stebbins 2003:250). Western pond turtles spend a considerable amount of time basking on rocks, logs, emergent vegetation, mud or sand banks, or human-generated debris (Jennings et al. 1992:11). Western pond turtles move to upland areas adjacent to watercourses to deposit eggs and overwinter (Jennings and Hayes 1994:98). Turtles have been observed overwintering several hundred meters from aquatic habitat. In the southern portion of the range and along the central coast, western pond turtles are active year-round. In the remainder of their range, these turtles typically become active in March and return to overwintering sites by October or November (Jennings et al. 1992:11).

Ponds, reservoirs, Brushy Creek, and portions of other drainages in the program area may provide suitable aquatic habitat for western pond turtle. They may also deposit eggs in mixed willow riparian scrub or grassland areas near aquatic habitat in the program area. There are two CNDDDB records for occurrences of western pond turtle within the program area and many additional records for occurrences within 5 miles of the program area (California Department of Fish and Wildlife 2013c).

Ponds and portions of drainages in the Golden Hills and Patterson Pass project areas may provide suitable aquatic habitat for western pond turtle. They may also deposit eggs in mixed willow riparian scrub or grassland areas near aquatic habitat in the Golden Hills and Patterson Pass project areas. There are no CNDDDB records for occurrences of western pond turtle in either of the project areas (California Department of Fish and Wildlife 2013c).

### **Blainville's (Coast) Horned Lizard**

Blainville's horned lizard is a California species of special concern. Although fragmented, the range of Blainville's horned lizard generally extends along the Pacific coast from Baja California west of the deserts and the Sierra Nevada, north to the Bay Area, and inland as far north as Shasta Reservoir. It also occurs on the Kern Plateau east of the crest of the Sierra Nevada (CaliforniaHerps.com 2013). The species occurs between sea level and an elevation of 8,000 feet (Stebbins 2003:301).

Blainville's horned lizard occupies a variety of habitats, including areas with an exposed gravelly-sandy substrate supporting scattered shrubs, chamise chaparral, annual grassland (Jennings and Hayes 1994:132), broadleaf woodland, and conifer forest (Stebbins 2003:300). They are most common in lowlands along sandy washes with scattered shrubs for cover. Habitat requirements include open areas for basking; patches of fine, loose soil where it can bury itself; and ants and other insect prey (Stebbins 2003: 300–301). For extended periods of inactivity or hibernation, horned lizards occupy small mammal burrows or burrow into loose soils under surface objects (Zeiner et al. 1988:48). Blainville's horned lizards have been observed to be active between April and October, and hatchlings first appear in July and August (Jennings and Hayes 1994:130).

Portions of grassland, chaparral, and oak woodland in the program area provide suitable habitat for Blainville's horned lizard. There are three CNDDDB records for occurrences of Blainville's horned lizard in the southeast portion of the program area, and additional records for occurrences outside of the program area (California Department of Fish and Wildlife 2013c).

Portions of grassland in the Golden Hills and Patterson Pass project areas may provide suitable habitat for Blainville's horned lizard, but there are no CNDDDB records for occurrences of Blainville's horned lizard in either of the project areas (California Department of Fish and Wildlife 2013c).

### **Alameda Whipsnake**

Alameda whipsnake is state and federally listed as threatened. The Alameda whipsnake is a subspecies of the California whipsnake. The North American distribution for the California whipsnake includes Northern California west of the Sierran Crest and desert to central Baja California. This species is found primarily in the foothills but its range extends into deciduous and pine forests of mountains. (Stebbins 2003:353–354.) Historically, Alameda whipsnake probably occurred within the entire coastal scrub and oak woodland communities throughout the East Bay in Contra Costa, Alameda, and parts of San Joaquin and Santa Clara Counties. Currently, its distribution encompasses five separate populations with little or no interchange within these same counties (70 FR 60608–60656, October 18, 2005).

Alameda whipsnakes are primarily found within a mixture of habitat types containing scrub/shrub communities, with a significant portion of annual grassland, and other wooded habitats such as blue oak-foothill pine, blue oak woodland, coastal oak woodland, valley oak woodland, riparian communities, or rock outcrops. They will also move into adjacent grassland, oak savannah, and occasionally, oak-bay woodland habitats. Alameda whipsnakes prefer habitats with woody debris and exposed rock outcrops, which provide basking areas, shelter from predators, and an abundance of western fence lizards, which are a major prey item of this snake. The subspecies has been observed to regularly move 200 meters (656 feet) from scrub and chaparral and will remain in grasslands for several hours to weeks at a time. Grasslands are used extensively during the breeding season (March through July). Male snakes use grassland areas extensively during the mating season and female snakes use grasslands after mating, possibly to search for egg-laying sites. (70 FR 60610, October 18, 2005.)

Annual grassland, scrub, chaparral, oak woodland, and mixed willow riparian scrub in the program area provide suitable habitat for Alameda whipsnake. There are seven CNDDDB records for occurrences of Alameda whipsnake along the eastern portion of the program area and numerous additional records for occurrences outside but near the program area (California Department of Fish and Wildlife 2013c). Designated critical habitat for Alameda whipsnake is located in the southeast portion of the program area (Figure 3-4-4).

Annual grassland and mixed willow riparian scrub in the Golden Hills and Patterson Pass project areas may provide suitable habitat for Alameda whipsnake. There are no CNDDDB records for occurrences of Alameda whipsnake in either of the project areas; however there are several records for occurrences just southeast of the project areas (California Department of Fish and Wildlife 2013c). An ICF biologist conducted habitat assessments for special-status species in the Patterson Pass project area and determined that Alameda whipsnake has a low potential to occur there because of the distance to scrub and chaparral habitats, which are the primary habitats for the species. There is no designated critical habitat for Alameda whipsnake in the Golden Hills or Patterson Pass project areas (Figure 3.4-4).

### **San Joaquin Coachwhip**

The San Joaquin coachwhip (whipsnake) is one of six subspecies of the coachwhip that has a known range extending from Colusa County in the Sacramento Valley, south to the Grapevine in Kern County in the San Joaquin Valley, and west to the inner South Coast Ranges. An isolated population occurs in the Sutter Buttes. The taxon is known to occur from 65 to 2,950 feet above sea level. San Joaquin coachwhip lives in open, dry vegetative associations with little or no tree cover. In the western San Joaquin Valley, coachwhip inhabits grassland and saltbush scrub associations, and is known to climb bushes such as saltbush to view prey and predators. Mammal burrows are used by San Joaquin coachwhips for refuge and likely as oviposition sites. Coachwhip subspecies will not emerge from burrows until near-surface temperatures reach 28°C on either a daily or seasonal basis. For this reason, emergence tends to be late in the season (April to early May) and later in the morning (10–11 a.m.), although younger individuals may emerge earlier in the day. The subspecies primarily eats lizards and robs the nests of birds and mammals, but may also eat carrion. Land conversion from grassland and grassland/scrub habitat to agriculture has removed habitat and eliminated the food base and mammal burrow associations on which the coachwhip depends for refuge. Urban development and drought have also been implicated in the depletion and fragmentation of San Joaquin coachwhip populations (Jennings and Hayes 1994:162–164).

Annual grassland in the program area provides suitable habitat for San Joaquin coachwhip. There is one CNDDDB record for an occurrence of San Joaquin coachwhip along the eastern portion of the program area and two records for occurrences east and west of the program area (California Department of Fish and Wildlife 2013c).

Annual grassland in the Golden Hills and Patterson Pass project areas provides suitable habitat for San Joaquin coachwhip. There are no CNDDDB occurrences of San Joaquin coachwhip in either of the project areas (California Department of Fish and Wildlife 2013c).

### **White-Tailed Kite**

White-tailed kite is fully protected under the California Fish and Game Code. White-tailed kites generally inhabit low-elevation grassland, savannah, oak woodland, wetland, agricultural, and riparian habitats. Some large shrubs or trees are required for nesting and for communal roosting sites. Nest trees range from small, isolated shrubs and trees to trees in relatively large stands (Dunk 1995). White-tailed kites make nests of loosely piled sticks and twigs, lined with grass and straw, near the top of dense oaks, willows, and other tree stands. The breeding season lasts from February through October and peaks between May and August. White-tailed kites forage in undisturbed, open grassland, meadows, farmland, and emergent wetlands (Zeiner et al. 1990a:120).

Foraging habitat and a small amount of suitable nesting habitat for white-tailed kites are present in the program area. The CNDDDB lists two records of white-tailed kite nests in the northeast and southeast portions of the program area (California Department of Fish and Wildlife 2013c) and Two additional records within 2 miles southwest of the program area.

Suitable nesting and foraging habitat for white-tailed kite is present in the Golden Hills and Patterson Pass project areas. There are no CNDDDB occurrences of white-tailed kite nests in either project area (California Department of Fish and Wildlife 2013c). White-tailed kites have been documented foraging in both project areas during 2005–2011 avian use surveys conducted by the AFMT (Alameda County unpublished data).

### **Bald Eagle**

Bald eagle is state-listed as endangered and is protected under the MBTA, the BGEPA, and several sections of the California Fish and Game Code. Bald eagle is a permanent resident and uncommon winter migrant in California (Zeiner et al. 1990a:122). Bald eagles breed at coastal areas, rivers, lakes, and reservoirs with forested shorelines or cliffs in northern California. Wintering bald eagles are associated with aquatic areas containing some open water for foraging. Bald eagles nest in trees in mature and old growth forests that have some habitat edge and are somewhat close (within 1.25 miles) to water with suitable foraging opportunities. Although nests can be closer, the average distance of bald eagle nests to human development and disturbance is more than 1,640 feet (Buehler 2000:6). The breeding season is February through July (Zeiner et al. 1990a:122).

Suitable nesting and foraging habitat (Bethany Reservoir) for bald eagle is present in the program area. There are no CNDDDB records for occurrences of bald eagle nests or wintering bald eagles in or near the program area (California Department of Fish and Wildlife 2013c), although the AFMT has documented them flying through the program area with increasing frequency.

Suitable nesting and foraging habitat for bald eagle may be present in the Golden Hills project area near Bethany Reservoir. No suitable nesting or foraging habitat is present in the Patterson Pass project area, but bald eagles may forage in or fly through this area. There are no CNDDDB records for occurrences of bald eagle nests or wintering bald eagles in either project area (California Department of Fish and Wildlife 2013c). The AFMT has detected bald eagles four times in the vicinity of the Golden Hills project area within the last 4 years, but not in the Patterson Pass project area.

### **Northern Harrier**

Northern harrier is a California species of special concern. Northern harrier is a year-round resident throughout the Central Valley and is often associated with open grassland habitats and agricultural fields. Nests are found on the ground in tall, dense herbaceous vegetation (MacWhirter and Bildstein 1996). Northern harrier nests from April to September, with peak activity in June and July. The breeding population has been reduced, particularly along the southern coast, through the destruction of wetland habitat, native grassland, and moist meadows and through the burning and plowing of nesting areas during early stages of breeding (Zeiner et al. 1990a:124).

Suitable nesting and foraging habitat for northern harrier is present in the program area. There are no CNDDDB records of northern harrier nests within the program area; there is one record for a nest within 2 miles northeast of the program area (California Department of Fish and Wildlife 2013c). The AFMT has documented northern harriers foraging in all months of the year throughout the program area.

Suitable nesting habitat may be present and suitable foraging habitat is present for northern harrier in the Golden Hills and Patterson Pass project areas. Although there are no CNDDDB records of northern harrier nests in either project area (California Department of Fish and Wildlife 2013c), the AFMT has documented northern harriers year-round in the APWRA as noted above.

### **Swainson's Hawk**

Swainson's hawk is a state-listed threatened species and a species of local conservation concern. Swainson's hawks forage in grasslands, grazed pastures, alfalfa and other hay crops, and certain grain and row croplands. Vineyards, orchards, rice, and cotton crops are generally unsuitable for



foraging because of the density of the vegetation (California Department of Fish and Game 1992:41). The majority of Swainson's hawks winter in South America, although some winter in the United States. Swainson's hawks arrive in California in early March to establish nesting territories and breed (California Department of Fish and Game 1994). They usually nest in large, mature trees. Most nest sites (87%) in the Central Valley are found in riparian habitats (Estep 1989:35), primarily because trees are more available there. Swainson's hawks also nest in mature roadside trees and in isolated trees in agricultural fields or pastures. The breeding season is from March through August (Estep 1989:12, 35).

Although suitable nesting and foraging habitat for Swainson's hawks is present in the program area, Swainson's hawks more typically occur in flat terrain and rarely occur in the foothills of the Coast Ranges. There is one CNDDDB record of a Swainson's hawk nest in the northeastern portion of the program area (California Department of Fish and Wildlife 2013c), and East Bay Regional Park District (EBRPD) reported a Swainson's hawk nesting in the program area (Barton pers. comm.). There are 11 additional CNDDDB records of Swainson's hawk nests east and northeast of the program area, including one that is just outside of the program area. Swainson's hawk has been documented as a fatality only once in more than 7 years of intensive fatality monitoring (ICF International 2013), and only 11 sightings of Swainson's hawks have been recorded in the program area in more than 7 years of avian use monitoring conducted throughout the program area by the AFMT (Alameda County unpublished data).

Foraging habitat and a small amount of suitable nesting habitat for Swainson's hawks is present in the Golden Hills and Patterson Pass project areas. There are no CNDDDB records of Swainson's hawk nests in either project area (California Department of Fish and Wildlife 2013c), and, as noted above, the AFMT has rarely observed Swainson's hawks in the APWRA.

### **Red-Tailed Hawk**

Red-tailed hawk is not a state- or federally listed species. However, it is protected under the MBTA and the California Fish and Game Code and is an APWRA focal species. Red-tailed hawks occur in California throughout the year. Large numbers of migratory and wintering red-tailed hawks enter the Central Valley from October through February, substantially augmenting the population occurring within the state. Migratory, wintering, and resident red-tailed hawks inhabit California in open areas, such as grasslands, agricultural fields, pastures, and open brush habitats, that are interspersed with patches of trees or structurally similar features for nesting, perching, and roosting (Polite and Pratt 1990). This species is primarily a sit-and-wait predator that requires elevated perch sites for hunting; however, red-tailed hawks can also be seen soaring over open landscapes and swooping for prey. Their diet includes a wide variety of small to medium-sized mammals, birds, and snakes, with occasional insects and fresh carrion (Preston and Beane 1993). Nest locations vary with vegetation and topography.<sup>1</sup> In the western United States, satellite tracking indicates that adult red-tailed hawks show high fidelity to their summer and winter ranges and to migration routes (Goodrich and Smith 2008).

While the CNDDDB does not contain records for red-tailed hawks, previous studies found the program area and the surrounding region to be an important winter foraging area and migration corridor for raptors, including red-tailed hawks (California Department of Fish and Game 1993).

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<sup>1</sup> Observations of nesting red-tailed hawks in the APWRA in 2005 to 2006 were confirmed in the field by Jones & Stokes wildlife biologist Julia Camp.

Natural perches from which this species hunts were scarce before development of the APWRA. Turbines and transmission towers, poles, and lines provide abundant perches and may have resulted in a substantial increase in wintering red-tailed hawks in the program area over historic numbers (Orloff and Flannery 1992).

### Golden Eagle

Golden eagle is fully protected under the California Fish and Game Code and is an APWRA focal species. It is also protected by the MBTA, the BGEPA, and several sections of the California Fish and Game Code.

Golden eagle is a year-round resident throughout much of California. The species does not breed in the center of the Central Valley but breeds in much of the rest of the state. Golden eagles typically occur in rolling foothills, mountain areas, sage-juniper flats, and deserts (Zeiner et al. 1990a:142–143). In California, golden eagles nest primarily in open grasslands and oak (*Quercus* spp.) savanna but will also nest in oak woodland and open shrublands. Golden eagles forage in open grassland habitats (Kochert et al. 2002:6). Preferred territory sites include those that have a favorable nest site, a dependable food supply (small to medium mammals, including ground squirrels, and birds), and broad expanses of open country for foraging. Hilly or mountainous country where takeoff and soaring are supported by updrafts is generally preferred to flat habitats (Johnsgard 1990:262). In the interior central Coast Ranges of California, golden eagles favor open grasslands and oak savanna, with lesser numbers in oak woodland and open shrublands. In the Diablo Range of California, all except a few pairs nest in trees in oak woodland and oak savanna habitats due to a lack of suitable rock outcrops or cliffs. Nest tree species include several oak species (*Quercus* spp.), foothill pine (*Pinus sabiniana* and *P. coulteri*), California bay laurel (*Umbellularia californica*), eucalyptus (*Eucalyptus* spp.), and western sycamore (*Platanus racemosa*). A few pairs of eagles nest on electrical transmission towers traversing grasslands (Hunt et al. 1999:13).

Suitable nesting and foraging habitat for golden eagle is present in the program area. The APWRA has been reported to contain a higher density of golden eagles than anywhere else in the world (Hunt and Hunt 2006). The Predatory Bird Research Group estimated that at least 70 active golden eagle territories existed within 19 miles of the program area, based on annual surveys from January 1994 to December 1997 (Hunt et al. 1999). These territories were resurveyed and occupancy verified in 2005 (Hunt and Hunt 2006). The golden eagle population within 19 miles of the APWRA includes seven golden eagle territories/breeding areas within the Los Vaqueros watershed. Nest surveys and monitoring have been conducted within the watershed from 1994 to 2013, and 26 golden eagle nest structures have been documented during this period. Six of the seven breeding areas were occupied by golden eagle pairs during 2013 (California Environmental Services 2014). Moreover, EBRPD reported three historic and one recent golden eagle nests within the program area and two additional nests within 2 miles of the program area (Barton pers. comm.). There are no CNDDDB records of golden eagle nests within the program area; however, there are 10 records of nests within 3.5 miles north and northwest of the program area (California Department of Fish and Wildlife 2013c). In early 2014, ground-based surveys for golden eagles were initiated in an expanded area to collect information on site occupancy and nesting success of the broader population of golden eagles in the Diablo Mountains. This study is a collaborative effort led by the U.S. Geological Survey, with the overall objective being to develop and evaluate survey and monitoring methods for estimating trends in occurrence and nesting success of golden eagles (U.S. Geological Survey 2013). The results of the 2014 surveys have not yet been published.

Golden eagle is unlikely to nest at Patterson Pass because the larger willow trees present are located in a deep ravine and do not offer an open view of the landscape. Suitable nesting habitat for golden eagle may be present in the Golden Hills project area, and golden eagles may forage in either project area. The CNDDB lists no occurrences of golden eagle nests in either project area (California Department of Fish and Wildlife 2013c).

Research of the golden eagle population in the APWRA has revealed it to be stable but with reduced resilience due to turbine-related mortality. Hunt (2002) examined data collected over a 7-year period between 1994 and 2002 that included the monitoring of 60–70 active territories within 30 kilometers (19 miles) of the APWRA. In 2005, these territories were found still to be 100% occupied (Hunt and Hunt 2006). The conclusions of these studies were that the golden eagle population in the APWRA region remains stable (Hunt 2002; Hunt and Hunt 2006). In addition, the studies found no increase in the number of actively breeding subadults, indicating that there are enough floaters to buffer any loss of breeding adults (Hunt 2002; Hunt and Hunt 2006). The conclusion of a stable golden eagle population in the APWRA vicinity was supported by the results of a population dynamics model that used reproduction rates and fatality rates, among other variables (Hunt 2002). However, the model results also suggested that the number of estimated annual fatalities used in the model, 50 individuals, could not be sustained by the number of breeding adults when considering the loss of reproductive potential incurred by each eagle fatality (Hunt and Hunt 2006). Although the vacant territories are filled by floaters and subadults to stabilize the APWRA population, the APWRA vicinity can be considered a population sink because the population demands a flow of recruits from outside the area to fill breeding vacancies as they occur.

Hunt and Hunt (2006) recommended future studies of the APWRA golden eagle populations to better understand long-term trends. The U.S. Geological Survey is currently conducting a population inventory in the APWRA region (U.S. Geological Survey 2013) to build on previous research by expanding surveys of territory occupancy and nesting success to include the broader population of golden eagles in the Diablo Mountains. The objectives of the study are to (1) estimate the breeding and nonbreeding population and measure reproductive success, (2) evaluate golden eagle detectability based on temporal and survey methodology factors, and (3) recommend strategies for improving golden nesting success and methods to monitor trends (U.S. Geological Survey 2013). This study will help to inform future management of golden eagles in the APWRA and surrounding region.

### **American Kestrel**

American kestrel is not a state- or federally listed species. However, it is protected under the MBTA and the California Fish and Game Code and is an APWRA focal species. The North American Breeding Bird Survey has detected significant declines of American kestrel populations in many areas of the United States, including California (Smallwood and Bird 2002).

American kestrels are found in a variety of open to semi-open habitats, including meadows, grasslands, deserts, early field successional communities, open parkland, agricultural fields, and both urban and suburban areas (Smallwood and Bird 2002). Grinnell and Wythe (1927) described American kestrel as a common resident throughout the San Francisco Bay region. American kestrels are cavity nesters, using tress, snags, rock crevices, cliffs, banks, and buildings (Polite and Ahlborn 1990). They display strong site fidelity to breeding territories and wintering areas; however, little information exists regarding the actual delineation of territory size. The breeding season in

California occurs between late February and August, with egg laying occurring from mid-March to late June (Smallwood and Bird 2002).

American kestrels forage on a wide variety of insects, including grasshoppers, cicadas, beetles, dragonflies, butterflies, and moths; small rodents, especially voles and mice; and small birds (Sherrod 1978). American kestrels are perch and pounce or hover and pounce predators, rarely pursuing prey on wing (Polite and Ahlborn 1990); they tend to perch lower as wind speed increases (Smallwood and Bird 2002).

While the CNDDDB does not contain records for American kestrel, previous studies in the region have found the program area vicinity to be an important winter foraging area and migration corridor for raptors, including American kestrels (California Department of Fish and Game 1993). Natural perches from which this species hunts were scarce before development of the APWRA. Turbines and transmission towers, poles, and lines provide abundant perches and have likely resulted in a substantial increase in American kestrel numbers in the APWRA over historic numbers (Orloff and Flannery 1992).

### **Prairie Falcon**

Prairie falcon is not a state- or federally listed species. However, it is protected under the MBTA and the California Fish and Game Code and is a species of local conservation concern in the APWRA due to the high number of recorded fatalities. Prairie falcon inhabits arid environments of western North America in open plains and shrub-steppe deserts with cliffs, bluffs, or rock outcroppings. An efficient and specialized predator of medium-sized desert mammals and birds, prairie falcons range widely, searching large areas for patchily distributed prey. Nesting, postnesting, and wintering ranges are generally widely separated, with movements between ranges being potentially dependent on seasonal availability of prey. These diurnal hunters prey predominantly on ground squirrels, small birds, reptiles, and insects. Hunting strategies include still-hunting from perches, soaring, and low active flight (Phipps 1979). Prairie falcons nest on cliffs with eagles, ravens, and red-tailed hawks, but have also been known to use trees, caves, buildings, and transmission lines (Nelson 1974; Pitcher 1977; Haak and Denton 1979; MacLaren et al. 1984; Roppe et al. 1989; Bunnell et al. 1997).

The CNDDDB (2013c) lists two prairie falcon occurrences within the program area, and 11 more within 10 miles of the program area boundary. Twenty-six observations of prairie falcons were recorded during fixed point surveys around the Diablo Winds repowering project from 2005 to 2007 (Western Ecosystems Technology 2008). At least four recent known nest sites have been identified within the APWRA and at least two within 2 miles of the program area. A telemetry study conducted by East Bay Regional Parks District (unpublished data) has documented extensive use of the program area by prairie falcons nesting more than 10 miles from the program area (Final PEIR Appendix E, Comment LA-1-46).

### **Barn Owl**

Barn owl is not a state- or federally listed species. However, it is on the DFG Watch List, is protected under the MBTA and the California Fish and Game Code, and is a species of local conservation concern in the APWRA. Barn owl is found throughout most of the United States, except in the northern portions of the Rockies, midwest, and northeast (Marti et al. 2005). Within California, this species is a year-round resident ranging from sea level to 5,500 feet, preferring habitat in grasslands, agricultural fields, chaparral, and marshes and other wetland areas. Barn owls nest in a wide variety of cavities, natural and artificial, such as trees, cliffs, caves, riverbanks, church steeples,

barn lofts, haystacks, and nest boxes. The species' breeding numbers seem limited by the availability of nest cavities near adequate densities of prey. Most hunting occurs while flying about 5–15 feet above the ground in open habitats, using excellent low-light vision and sound to detect prey (Marti 1974; Bunn et al. 1982). Barn owls occasionally hunt from perches and feed primarily on mice, rats, voles, pocket gophers, and ground squirrels. They also consume shrews, insects, crustaceans, reptiles, amphibians, and birds, including meadowlarks and blackbirds (Polite 1990).

The barn owl breeding season in California occurs between January and November, with egg laying potentially occurring during most months, as barn owls typically have two broods a year (Polite 1990; Marti et al. 2005). Reproductive success varies with age, prior breeding experience, prey availability, and weather (Marti et al. 2005). Barn owls defend only the immediate vicinity of the nest, allowing two or more pairs to nest in close proximity and share the same foraging habitat.

There is no significant continent-wide barn owl population trend. Population declines have been evident in the Midwest and Northeast, while western U.S. populations appear to be mostly stable. Local threats or declines do not pose a major conservation problem from a global perspective (NatureServe 2012). The CNDDDB does not contain records for barn owls as they are not a state- or federally listed species. Studies of wind-turbine-related fatalities in the APWRA have found numerous barn owls, suggesting this species is fairly common in portions of the program area. Barn owls are particularly common in the areas of Brushy Peak and Vasco Caves Regional Preserves, using available rock outcrops, palm trees, and structures for nesting and roosting (East Bay Regional Parks District 2000).

### **Western Burrowing Owl**

Western burrowing owl is a California species of special concern and an APWRA focal species. Western burrowing owl is a year-round resident in the Central Valley, San Francisco Bay region, Carrizo Plain, and Imperial Valley. They occur primarily in grassland habitats but may also occur in landscapes that are highly altered by human activity. Suitable habitat must contain burrows with relatively short vegetation and minimal amounts of shrubs or taller vegetation. Western burrowing owl may also occur in agricultural areas along roads, canals, ditches, and drains. They most commonly nest and roost in California ground squirrel burrows, but may also use burrows dug by other species, as well as culverts, piles of concrete rubble, and pipes. The breeding season is March to August, but can begin as early as February. During the breeding season, owls forage near their burrows but have been recorded hunting up to 1.7 miles away. Rodent populations, particularly California vole populations, may greatly influence survival and reproductive success of California burrowing owls (Shuford and Gardali 2008:219, 221).

Suitable nesting and foraging habitat for western burrowing owl is present in the program area. There are 30 records for occurrences of breeding and/or wintering owls in the program area (California Department of Fish and Wildlife 2013c). The majority of these records are in the northern portion of the program area. There are more than 40 additional CNDDDB records for occurrences of burrowing owl surrounding the program area. Moreover, western burrowing owl fatalities have been documented during APWRA fatality surveys (ICF International 2013). A recent study conducted under the auspices of the AFMT produced an estimate of the APWRA-wide breeding season population of burrowing owls of approximately 635 pairs (90% confidence interval 368–903, P228) (Smallwood et al. 2011).

Suitable nesting and foraging habitat for western burrowing owl is present in the Golden Hills and Patterson Pass project areas. There are two CNDDDB records of occurrences of burrowing owl in the

Patterson Pass project area and one CNDDDB record for burrowing owl in the Golden Hills project area (California Department of Fish and Wildlife 2013c). Burrowing owls have been documented in both the Golden Hills and Patterson Pass project areas during avian use surveys conducted by the AFMT (Alameda County unpublished data).

### **Loggerhead Shrike**

Loggerhead shrike is a California species of special concern and a species of local conservation concern in the APWRA. In California, the range of loggerhead shrike extends throughout most of the state except for the heavily forested areas of the coastal slope, Coast Ranges, Klamath and Siskiyou mountains, Sierra Nevada and southern Cascades, and high elevations of the Transverse Ranges. Loggerhead shrikes breed in shrublands and open woodlands with grass cover and bare ground. They search for prey from tall shrubs, trees, fences, and power lines, and frequently impale their prey on sharp, thorny, or multi-stemmed plants and barbed-wire fences. Loggerhead shrikes forage in open areas with short grasses and forbs or bare ground. (Shuford and Gardali 2008: 274) Nests are built in trees or shrubs with dense foliage and are usually hidden well. The nesting period for loggerhead shrikes is March through June (Zeiner et al. 1990a:546).

Suitable nesting and foraging habitat for loggerhead shrike is present in the program area. There are three CNDDDB records for occurrences of loggerhead shrike nests in the southeast portion of the program area. There are four additional CNDDDB records for occurrences east, southeast, and southwest of the program area (California Department of Fish and Wildlife 2013c). Loggerhead shrike fatalities have been documented during APWRA fatality surveys (ICF International 2013), and loggerhead shrikes are regularly documented in the program area during avian use surveys conducted by the AFMT (Alameda County unpublished data).

Suitable foraging habitat for loggerhead shrike is present in the Golden Hills and Patterson Pass project areas, and suitable breeding habitat may be present. Although there are no CNDDDB records of loggerhead shrike nests in either of the project areas (California Department of Fish and Wildlife 2013c), loggerhead shrikes are regularly documented in portions of both project areas during avian use surveys conducted by the AFMT (Alameda County unpublished data).

### **Tricolored Blackbird**

Tricolored blackbird is a California species of special concern. Tricolored blackbird is a highly colonial species that is largely endemic to California. Tricolored blackbird breeding colony sites require open, accessible water; a protected nesting substrate, including either flooded, thorny, or spiny vegetation; and a suitable foraging space providing adequate insect prey within a few miles of the nesting colony. Tricolored blackbird breeding colonies occur in freshwater marshes dominated by tules and cattails, in Himalayan blackberries (*Rubus armeniacus*), and in silage and grain fields (Beedy and Hamilton 1997:3-4). The breeding season is from late February to early August (Beedy and Hamilton 1999). Tricolored blackbird foraging habitats in all seasons include annual grasslands, dry seasonal pools, agricultural fields (such as large tracts of alfalfa with continuous mowing schedules, and recently tilled fields), cattle feedlots, and dairies. Tricolored blackbirds also forage occasionally in riparian scrub habitats and along marsh borders. Weed-free row crops and intensively managed vineyards and orchards do not serve as regular foraging sites. Most tricolored blackbirds forage within 3 miles of their colony sites but commute distances of up to 8 miles have been reported (Beedy and Hamilton 1997:5).

Surveys during the 1990s (Hamilton et al. 1995; Beedy and Hamilton 1997; Hamilton 2000) confirmed a significant declining trend in California populations since the 1930s, with a particularly dramatic decline noted after 1994. Statewide surveys conducted during the 2000s indicate some recovery from the 1999 low; however, the population increases have primarily been limited to the San Joaquin Valley and the Tulare Basin (Kyle and Kelsey 2011). A total of 145,135 tricolored blackbirds were counted during the most recent (2014) statewide survey, with Madera, Placer, Sacramento, and Tulare Counties accounting for about 64% of the total population in April 2014 (Meese 2014:6,8). The number of tricolored blackbirds statewide decreased from approximately 395,000 in 2008 to 259,000 in 2011, a decline of 34%. Breeding surveys conducted between 1994 and 2011 documented tricolored blackbird populations that fluctuated from just under 100,000 birds to nearly 400,000 birds (Kyle and Kelsey 2011). From 2011 to 2014, the number of tricolored blackbirds declined by 44%, from approximately 259,000 to 145,000. The decline in tricolored blackbirds from 2008 to 2014 was 64%. While the number of tricolored blackbirds is down statewide, declines are most pronounced in the San Joaquin Valley (78% decline between 2008 and 2014) and along the Central Coast (91% decline between 2008 and 2014). Conversely, populations in Sacramento County and the Sierra Nevada Foothills have increased by 145% since 2008. Overall, the rate of decline appears to be accelerating, and additional efforts to reduce the rate of decline may be necessary (Meese 2014:6–7, 13–15).

Suitable nesting and foraging habitat for tricolored blackbird is present in the program area. There are two CNDDDB records of tricolored blackbird nesting colonies in the program area. These nesting colonies are located in the north-central portion of the program area and just southeast of Bethany Reservoir. There is one additional record for a tricolored blackbird colony approximately 1.5 miles east of the program area (California Department of Fish and Wildlife 2013c). Tricolored blackbird has also been documented during APWRA fatality surveys (ICF International 2013).

Suitable foraging habitat for tricolored blackbird is present in the Golden Hills and Patterson Pass project areas, and suitable breeding habitat may be present. There are no CNDDDB records of tricolored blackbird nesting colonies in either of the project areas; however, there is one record for a nesting colony near Bethany Reservoir just outside the Golden Hills project area (California Department of Fish and Wildlife 2013c).

### **Little Brown Bat**

Little brown bat is considered a moderate priority species in California by the Western Bat Working Group (2007). The species occurs primarily in mid- to upper elevations in California. It is associated with woodland habitats in both urban and wilderness areas but may occur anywhere in California during seasonal movements. Little brown bats forage over water and along woodland edges. They use a wide variety of crevice and cavity-type roost sites in trees, buildings, other artificial structures, and rock formations and caves, and rely on night roosts between foraging bouts (Anthony et al. 1981:151). Maternity colonies can contain several hundred bats. The species congregates in mating swarms in the fall, though mating continues in hibernacula throughout the winter. Little brown bats hibernate in caves and abandoned mines, potentially in large aggregations.

Suitable foraging habitat for little brown bat is present along drainages and over ponds and other aquatic habitats in the program area. Small amounts of suitable roosting habitat may be present in the program area as well. There are no CNDDDB records of little brown bat roosts in the program area (California Department of Fish and Wildlife 2013c); however, a single little brown bat fatality has

been tentatively identified in the program area during APWRA fatality surveys (ICF International 2013).

A small amount of suitable roosting habitat may be present in the Golden Hills and Patterson Pass project areas. However, given the currently known elevation preferences and range for this species in California, it is unlikely that any location in the APWRA contains hibernacula or significant maternity roosting habitat. There are no CNDDDB records of little brown bat roosts in either project area (California Department of Fish and Wildlife 2013c); nevertheless, little brown bats may forage in or fly through both project areas.

### **Silver-Haired Bat**

Silver-haired bat is considered a moderate priority species in California by the Western Bat Working Group (2007). Silver-haired bats occur primarily in the northern portion of California and at higher elevations in the southern and coastal mountain ranges (Brown and Pierson 1996) but may occur anywhere in California during their spring and fall migrations. They are associated with coastal and montane coniferous forests, valley foothill woodlands, pinyon-juniper woodlands, and valley foothill and montane riparian habitats (Zeiner et al. 1990b:54). Silver-haired bats roost in trees almost exclusively in the summer, and maternity roosts typically are located in woodpecker hollows or in gaps under bark. Maternal colonies range from several to about 75 individuals (Brown and Pierson 1996).

Suitable foraging habitat for silver-haired bat is present along drainages and over ponds and other aquatic habitats in the program area. Trees in the program area may provide suitable roosting habitat for silver-haired bat. There are no CNDDDB records of silver-haired bat roosts in the program area (California Department of Fish and Wildlife 2013c).

Suitable foraging habitat for silver-haired bat is present along drainages and over ponds in the Golden Hills and Patterson Pass project areas. Trees in the project areas may provide suitable roosting habitat for silver-haired bat. There are no CNDDDB records of silver-haired bat roosts in either project area (California Department of Fish and Wildlife 2013c).

### **Western Red Bat**

Western red bat is a California species of special concern and is considered a high priority species in California by the Western Bat Working Group (2007). It occurs throughout much of California at lower elevations. It is found primarily in riparian and wooded habitats but also occurs seasonally in urban areas (Brown and Pierson 1996). Western red bats roost in the foliage of trees that are often located on the edge of habitats adjacent to streams, fields, or urban areas. This species breeds in August and September and young are born in May through July (Zeiner et al. 1990b:60).

Suitable foraging habitat for western red bat is present along drainages and over ponds and other aquatic habitats in the program area. Trees and mixed willow riparian scrub in the program area may provide suitable roosting habitat for western red bat. There are no CNDDDB records of western red bat roosts in the program area (California Department of Fish and Wildlife 2013c); however, western red bat has been documented in the program area during APWRA fatality surveys (ICF International 2013).

Suitable foraging habitat for western red bat is present along drainages and over ponds in the Golden Hills and Patterson Pass project areas. Trees and mixed willow riparian scrub in the project



areas may provide suitable roosting habitat for western red bat. There are no CNDDDB records of western red bat roosts in either project area (California Department of Fish and Wildlife 2013c).

### **Hoary Bat**

Hoary bat is considered a moderate priority species in California by the Western Bat Working Group (2007). Hoary bats occur throughout California but are thought to have a patchy distribution in the southeastern deserts (Zeiner et al. 1990b:62). Hoary bats are found primarily in forested habitats, including riparian forests, and may occur in park and garden settings in urban areas. Day roost sites are in the foliage of coniferous and deciduous trees (Brown and Pierson 1996). Woodlands with medium to large trees with dense foliage provide suitable maternity roost sites (Zeiner et al. 1990b:62). Mating occurs in the fall, and after delayed fertilization, young are born May–June (Zeiner et al. 1990b:62; Brown and Pierson 1996).

Suitable foraging habitat for hoary bats is present along drainages and over ponds and other aquatic habitats in the program area. Trees and mixed willow riparian scrub in the program area may provide suitable roosting habitat for hoary bat. There are no CNDDDB records of hoary bat roosts in the program area; however, there is one historic record of a roost near Lake del Valle, southwest of the program area (California Department of Fish and Wildlife 2013c). In addition, hoary bat has been documented in the program area during APWRA fatality surveys (ICF International 2013) and in acoustic surveys at the Vasco Wind repowering site (Pandion Systems 2010; Szewczak 2013).

Suitable foraging and potentially suitable roosting habitat for hoary bats is present in the Golden Hills and Patterson Pass project areas. Trees and mixed willow riparian scrub in the project areas may provide suitable roosting habitat for hoary bat. There are no CNDDDB records of hoary bat roosts in either project area (California Department of Fish and Wildlife 2013c).

### **Townsend's Big-Eared Bat**

Townsend's big-eared bat is a candidate species for listing under the California Endangered Species Act, is a California state species of special concern, and a high priority species under the Western Bat Working Group's conservation priority matrix (Western Bat Working Group 2007). Townsend's big-eared bat occurs throughout California but distribution appears to be limited by the availability of cavern-like roost structures. Townsend's big-eared bats have been found in a wide variety of habitats from desert to riparian and coastal woodland, but they are found in greatest numbers in areas with cavern-forming rock or abandoned mines (Western Bat Working Group 2005).

Townsend's big-eared bats roost in dome-like spaces in caves or mines, where they roost hanging in the open from the ceiling. They have also been known to use cavern-like spaces in abandoned buildings or bridges, and in the basal hollows in large coast redwood trees (Mazurek 2004:60). Mating occurs in fall and spring, and pups are born in late spring to early summer (Pierson and Rainey 1998:2). Maternity roost size varies, and may contain only a few or up to several hundred individuals. The species is believed to be relatively sedentary, hibernating in caves and mines near summer maternity roosts, though seasonal movements are not well understood. Townsend's big-eared bats may have hibernated historically in aggregations of thousands of individuals (Pierson and Rainey 1998:1). They are highly sensitive to roost disturbance.

Suitable foraging habitat for Townsend's big-eared bat is present along drainages and over ponds and other aquatic habitats in the program area. Small amounts of suitable roosting habitat may be present in the program area as well. There are no CNDDDB records of Townsend's big-eared bat

roosts in the program area; however there is one record of a roost site southwest of the program area near Lake del Valle (California Department of Fish and Wildlife 2013c).

It is unlikely that suitable roosting habitat for Townsend's big-eared bat is present in the Golden Hills and Patterson Pass project areas; however, Townsend's big-eared bats may forage in or fly through both of these project areas. There are no CNDDDB records of Townsend's big eared bat roosts in either project area (California Department of Fish and Wildlife 2013c).

### **Pallid Bat**

Pallid bat is a California species of special concern and is considered a high priority species in California by the Western Bat Working Group (2007). It is found throughout most of California at low to middle elevations (6,000 feet). Pallid bats are found in a variety of habitats including desert, brushy terrain, coniferous forest, and non-coniferous woodlands. Daytime roost sites include rock outcrops, mines, caves, hollow trees, buildings, and bridges. Night roosts are commonly under bridges but are also in caves and mines (Brown and Pierson 1996). Hibernation may occur during late November through March. Pallid bats breed from late October through February (Zeiner et al. 1990b:70) and one or two young are born in May or June (Brown and Pierson 1996).

Suitable foraging habitat for pallid bat is present along drainages and over ponds and other aquatic habitats in the program area. Small amounts of suitable roosting habitat may be present in the program area as well. There are no CNDDDB records of pallid bat roosts in the program area; however there are two records for occurrences southwest of the program area (California Department of Fish and Wildlife 2013c).

Suitable foraging habitat for pallid bat is present along drainages and over ponds in the Golden Hills and Patterson Pass project areas. Trees in the project areas may provide suitable roosting habitat for pallid bat. There are no CNDDDB records of pallid bat roosts in either project area (California Department of Fish and Wildlife 2013c).

### **American Badger**

American badger is a California species of special concern. In California, American badgers occur throughout the state except in humid coastal forests of northwestern California in Del Norte and Humboldt Counties. American badgers occur in a wide variety of open, arid habitats but most commonly are associated with grasslands, savannas, and mountain meadows. They require sufficient food (burrowing rodents), friable soils, and relatively open, uncultivated ground. (Williams 1986:66–67.) Badgers dig burrows, which are used for cover and reproduction. The species mates in summer and early autumn, and young are born in March and early April. (Zeiner et al. 1990b:312.)

Suitable denning and foraging habitat for American badger is present in the program area. There are eight records for occurrences of badgers in the program area (California Department of Fish and Wildlife 2013c). There are four additional CNDDDB records for occurrences of American badger outside but near the program area.

Suitable denning and foraging habitat for American badger is present in the Golden Hills and Patterson Pass project areas. There are two CNDDDB records for occurrences of American badger in the Golden Hills project area, and an additional occurrence just outside it (California Department of Fish and Wildlife 2013c). There are no CNDDDB records for American badger in the Patterson Pass project area.

### **San Joaquin Kit Fox**

The San Joaquin kit fox is state- and federally listed as endangered. San Joaquin kit foxes occur in some areas of suitable habitat on the floor of the San Joaquin Valley and in the surrounding foothills of the Coast Ranges, Sierra Nevada, and Tehachapi Mountains from Kern County north to Contra Costa, Alameda, and San Joaquin Counties (U.S. Fish and Wildlife Service 1998). Since 1998, the population structure has become more fragmented, with some resident satellite populations having been locally extirpated; those areas have been used by dispersing kit foxes rather than resident animals (U.S. Fish and Wildlife Service 2010:15). The largest extant populations of kit fox are in Kern County (Elk Hills and Buena Vista Valley) and San Luis Obispo County in the Carrizo Plain Natural Area (U.S. Fish and Wildlife Service 1998).

Natural habitats for San Joaquin kit fox include alkali sink, alkali flat, and grasslands. San Joaquin kit foxes may use agricultural lands such as row crops, orchards, and vineyards to a limited extent, but they are unable to occupy farmland on a long-term basis. (U.S. Fish and Wildlife Service 2010: 19–21.) San Joaquin kit foxes usually prefer areas with loose-textured soils suitable for den excavation (Orloff et al. 1986:62) but are found on virtually every soil type (U.S. Fish and Wildlife Service 1998:129). Where soils make digging difficult, kit foxes may enlarge or modify burrows built by other animals, particularly those of California ground squirrels (Orloff et al. 1986:63; U.S. Fish and Wildlife Service 1998:127). Structures such as culverts, abandoned pipelines, and well casings may also be used as den sites (U.S. Fish and Wildlife Service 1998:127).

The breeding season begins during September and October when adult females begin to clean and enlarge natal or pupping dens. Litters of two to six pups are born between late February and late March. (U.S. Fish and Wildlife Service 1998:126.)

Suitable denning and foraging habitat for San Joaquin kit fox is present in the program area. There are 11 records for occurrences of San Joaquin kit fox in the program area (California Department of Fish and Wildlife 2013c). The majority of the occurrences are in the north and eastern portions of the program area. There are 15 additional CNDDDB records for occurrences of San Joaquin kit fox outside but near the program area.

Suitable denning and foraging habitat for San Joaquin kit fox is present in the Golden Hills and Patterson Pass project areas. There are three CNDDDB records for occurrences of San Joaquin kit fox in the Golden Hills project area and one in the Patterson Pass project area (California Department of Fish and Wildlife 2013c).

### **Birds and Bats Subject to Turbine-Related Mortality**

In addition to the special-status wildlife species discussed above, several non-special-status species of birds and bats are considered in this EIR because of their potential to be killed by operating wind turbines. Bats are particularly vulnerable because of their low reproductive rate and susceptibility to turbine-related mortality. Past and existing turbine-related avian and bat mortality and monitoring are discussed below to provide context for the turbine-related avian and bat mortality impact discussions.

#### **Avian Mortality and Monitoring**

The APWRA supports a broad diversity of resident, migratory, and wintering bird species that regularly move through the area (Orloff and Flannery 1992). In particular, diurnal raptors (eagles

and hawks) use the prevailing winds and updrafts for soaring and gliding during daily travel, foraging, and migration. Birds passing through the rotor plane of operating wind turbines are at risk of being injured or killed. Multiple studies of avian mortality in the APWRA show that substantial numbers of golden eagles, red-tailed hawks, American kestrels, burrowing owls, barn owls, and a diverse mix of non-raptor species are killed each year in turbine-related incidents (Howell and DiDonato 1991; Orloff and Flannery 1992; Howell 1997; Smallwood and Thelander 2004; ICF International 2013).

Until recently, attempts to reduce avian fatalities in the APWRA have focused primarily on two management actions: the shutdown of turbines during the winter period when use of the area by red-tailed hawks, golden eagles, and American kestrels is highest, and the removal of turbines determined to pose the highest collision risk based on history of fatalities, topographic position of the turbine, and other factors (Smallwood and Spiegel 2005a, 2005b, 2005c; ICF International 2013). While these actions have met with some success, their effectiveness has been less than expected for reasons that are not yet clear. However, an increasing body of evidence suggests that repowering—in this case the replacement of numerous older, smaller turbines with fewer newer, larger turbines—could result in a substantial reduction in avian fatalities. Using the first few years of data from the Alameda County Avian Fatality Monitoring Program, Smallwood and Karas (2009) concluded that the most effective way to reduce turbine-related avian fatalities in the APWRA is to repower. Evidence collected to date from the three sites in the APWRA that have been repowered suggests that the larger modern turbines cause substantially fewer turbine-related avian fatalities than the older generation turbines (Brown et al. 2013; ICF International 2013), although it should be pointed out that two of the three sites involved had much smaller turbines than those proposed for use in the program. The Scientific Review Committee (SRC) for the APWRA has also produced guidelines for siting wind turbines to reduce avian fatalities in the APWRA. The SRC evaluated topographic, wind pattern, bird behavior, and turbine siting variables related to hazardous conditions to provide guidance to the wind companies to reduce avian collision hazards (Alameda County Scientific Review Committee 2010).

The monitoring program established by the Settlement Agreement described in Chapter 1 of this EIR and conducted by the Alameda County AFMT has resulted in considerable information on which to base conclusions about the effects of the APWRA-wide program and the Golden Hills and Patterson Pass repowering projects. The monitoring program has been running continuously since 2005, and annual estimates of turbine-related avian fatality rates and estimates of the total number of birds killed each year are available for each bird year from 2005 through 2011. A bird year starts on October 1 and ends on September 30 and is named for the calendar year in which it starts. Bird years are used as the basis for analysis because they better reflect the timing of avian movements and ecology than do calendar years (ICF International 2013).

### **Bat Fatality and Monitoring**

The APWRA supports habitat types suitable for maternity, foraging, and migration for special-status and common bats. Several of these species are susceptible to direct mortality through collision or other interactions with wind turbines. Five species of bat have been documented as fatalities in the APWRA: little brown bat, California myotis, western red bat, hoary bat, and Mexican free-tailed bat (Table 3.4-6) (Insignia Environmental 2012:47–48; ICF International 2013:3-3). Hoary bats and Mexican free-tailed bats have made up the majority of documented fatalities; western red bat, another migratory species and a California species of special concern, has sustained the third highest number of documented fatalities.

Other than fatality records, occurrence data for bat species in the APWRA are limited, and expectations of presence are generally based on known ranges and habitat associations. However, preliminary analysis of pre- and postconstruction acoustic survey data from the recently repowered Vasco Winds facility in the Contra Costa County portion of the APWRA documents the presence of four additional species (big brown bat, silver-haired bat, canyon bat, and Yuma myotis). Acoustic surveys indicated bat activity in all three seasons in which surveys were conducted, with a spike in activity in the fall (Pandion Systems 2010; Szewczak 2013). Mexican free-tailed bat and hoary bat comprised the majority of the acoustic detections (Pandion Systems 2010).

Relatively little is known about bat biology as it relates to fatality risk at wind energy facilities. Limited knowledge of such factors as migration, mating behavior, behavior around turbines, and seasonal movements impede efforts to predict risk of turbine collision. Studies at wind energy facilities in North America generally show strong seasonal and species-composition patterns in bat fatalities, with the bulk of fatalities consisting of migratory species and occurring in late summer to mid-autumn. As in other parts of North America, the majority of documented fatalities in the APWRA have occurred during the fall migration season and have consisted of migratory bat species.

Historically, the number of bat fatalities detected as part of the avian fatality monitoring program at old-generation turbines in the APWRA has been extremely low, due at least in part to the monitoring program's design, which has focused on bird mortality. As previous study methods were not designed to generate defensible bat mortality rates, and as new generation turbines may pose novel threats to bats, assumptions of species vulnerability based on extrapolation from the older turbine technologies present in the APWRA are not necessarily valid (California Bat Working Group 2006).

Calculating adjusted bat fatality rates at old generation turbines using data collected under the early avian monitoring program is problematic both because the sample size is low and because monitoring and analysis methods were not designed to detect and adjust for these types of fatalities. In their paper grappling with comparisons of fatality rates between old-generation turbines at the APWRA and early repowering projects, Smallwood and Karas (2009) illustrated these points by acknowledging that all of their old-generation bat fatality estimates are likely biased low (2009:1065) and that differences observed in comparisons of various bat fatality estimates, even those as seemingly significant as 800%, could not be statistically defended due to the small sample sizes involved (Smallwood and Karas 2009:1066-67).

Bat fatality rates available for old-generation turbines at the APWRA are as follows. For the earlier years, covering 1998-2002 and a combination of turbine models, nameplate capacities, and designs, Smallwood and Karas presented a bat fatality rate estimate of 0.115 (SE+- 0.073) bat deaths/MW/year (2009:1066). For more recent old-generation turbine monitoring years (2005-2007), Smallwood and Karas presented a bat fatality rate estimate of 0.263 (SE+\_0.172) bat deaths/MW/ year, (used as the baseline in this PEIR) (2009:1066).

Bat fatality rates documented at the three repowered projects in the APWRA vary. These rates were also generated using different search efforts and different adjustment calculations, making direct comparison problematic, despite the common metric reported. For the Diablo Winds Energy Project (2005-2007), Smallwood and Karas (2009:1067) reported a bat fatality rate estimate of 0.783 (SE+- 0.548)/MW/year; for the Buena Vista Wind Farm (2008-2010), Insignia Environmental (2012:ES-3) reported a bat fatality rate range of 0.48-1.08/MW/year, depending on calculation methods; for the first year of the Vasco Winds repowering project (2012-2013), Brown et al. (2013:35-36) reported

a bat fatality rate range of 0.663 (SE+ 0.486) to 2.281 (SE+ 1.06)/MW/year, with the “best estimate” rate reported as 1.679 (SE+ 0.801)/MW/year (2013:39).

Consistent across all documented rates, though methods used to generate these rates vary, is that reported bat fatality rates increased when old-generation turbines were replaced by newer, larger turbines (Smallwood and Karas 2009:1068). Turbines used in future repowering projects are likely to be similar in size to the Vasco Winds turbines but much larger than the Diablo Winds and Buena Vista turbines in both overall size and rated nameplate capacity. In a meta-analysis of bat fatalities at numerous wind energy facilities in North America, Barclay et al. found that bat fatality increased exponentially with increasing turbine height (2007:384).

The limited data available for the program area and vicinity suggest the potential for similar species composition and temporal patterns of bat mortality to those that have been documented at the Vasco Winds repowering project and at other fourth-generation wind energy facilities, such as those in the Montezuma Hills Wind Resource Area.

**Table 3.4-6. Raw Bat Fatalities by Species Detected in Standardized Searches at Various APWRA Monitoring Projects**

Species	2005	2006	2007	2008	2009	2010	Total
<b>APWRA Monitoring<sup>a</sup></b>							
Hoary bat	0	2	1	0	2	0	5
Mexican free-tailed bat	0	1	1	1	1	0	4
Western red bat	0	1	1	1	0	0	3
Little brown bat	0	0	0	0	1	1	2
Unidentified bat	0	2	1	1	1	2	7
Total bats	0	6	4	3	5	3	21
<b>Buena Vista Repowering Project<sup>b</sup></b>							
Hoary bat				1	5	3	9
Mexican free-tailed bat				0	1	2	3
California myotis				0	0	1	1
Total bats				1	6	6	13
<b>Vasco Winds Repowering Project, Year One<sup>c</sup></b>							
Hoary bat							10
Mexican free-tailed bat							7
Western red bat							1
Unidentified bat							1
Total bats							19

Sources: APWRA: ICF International 2013:3-3; Buena Vista: Insignia Environmental 2012:47-8.

Note: Fatalities are shown for all years for which monitoring data are available.

<sup>a</sup> Variable: up to 417 MW installed, turbine heights of 60–164 feet.

<sup>b</sup> 38 MW installed, turbine heights of 147–196 feet. Monitoring results from February 2008 to January 2011.

<sup>c</sup> 78 MW installed, turbine heights of 263 feet. Monitoring results from May 2012–May 2013.

## 3.4.2 Environmental Impacts

### Methods for Analysis

This section describes the methods and assumptions used to determine the direct and indirect impacts of the program and the two specific projects on biological resources. The general methods for analysis are followed by discussions of the methods used to evaluate and quantify avian and bat fatality impacts. The methods for analysis of impacts on biological resources are based on professional standards and information cited throughout this section. The key effects were identified and evaluated based on the environmental characteristics of the program and project areas and the expected magnitude, intensity, and duration of activities related to the construction and operation of the program and the Patterson Pass and Golden Hills projects.

Direct impacts are those effects that are directly caused by project construction and operation (even if the resulting effect becomes apparent over time). Indirect impacts are those effects of a project that occur either later in time or at a distance from the project location but are reasonably foreseeable, such as conversion of wetlands to uplands from diversion of upstream water sources. Direct and indirect impacts can be either permanent or temporary. Impacts on land cover are generally considered temporary when the land cover is restored to preconstruction conditions within 1 year.

The activities listed below could have direct effects on biological resources.

- Vegetation clearing; grading; excavating/trenching; and construction of crane pads, turbine foundations, and batch plants.
- Construction of new dirt or gravel roads and widening of existing roads.
- Temporary stockpiling and sidecasting of soil, construction materials, or other construction wastes.
- Soil compaction, dust, and water runoff from construction sites.
- Increased vehicle traffic.
- Short-term construction-related noise (from equipment) and visual disturbance.
- Degradation of water quality in drainages and other water bodies resulting from construction runoff containing petroleum products.
- Introduction or spread of invasive plant species.
- Operation of wind turbines.
- Reclamation of landscape.
- Maintenance of fire breaks and roads.

The conditions listed below are examples of indirect effects on biological resources.

- Permanent alterations to light and noise levels.
- Damage through toxicity associated with herbicides and rodenticides.

Most of the biological impacts associated with repowering activities analyzed in this section are direct impacts. Where indirect impacts would result from such activities, they are so identified in the impact discussion.

Permanent direct effects on biological resources were quantified using the estimated amount of land cover that would be converted as a result of construction of new facilities. Temporary effects on biological resources were quantified using the estimated amount of land cover that would be temporarily disturbed during project construction but would be restored to preproject conditions within 1 year of disturbance.

For the program, specific locations of facilities and roads are not available. To estimate permanent and temporary impact acreages in the program area, impact information derived from the Golden Hills project description was used to calculate average permanent and temporary areas of disturbance for an 80 MW project using turbines similar to those proposed for the program. These standardized areas of impact were applied to the specifications of the program (see Chapter 2, *Program Description*). The total amounts of permanent and temporary impacts were then allocated to the various land cover types based on the proportion of the program area comprising each land cover type. Accordingly, the estimated permanent and temporary land cover impacts are proportional to the amount of each land cover type in the program area. These estimated impacts are shown in Table 3.4-7.



**Table 3.4-7. Estimated Permanent and Temporary Impacts on Land Cover Types in the Program Area<sup>a</sup>**

Land Cover Type	Amount in Program Area (acres)	Percent of Total Program Area	Permanent Impact Estimate (acres) <sup>b</sup>		Temporary Impact Estimate (acres) <sup>c</sup>	
			Alt 1	Alt 2	Alt 1	Alt 2
Annual grassland	39,381.63	90.83	598.57	645.80	526.81	568.60
Alkali meadow	555.06	1.28	8.44	9.10	7.42	8.01
Rock outcrop	42.05	0.001	0.01	0.01	0.01	0.01
Northern mixed chaparral/ chamise chaparral	28.65	0.0007	0.00	0.00	0.00	0.00
Northern coastal scrub/Diablan sage scrub	74.51	0.002	0.01	0.01	0.01	0.01
Mixed evergreen forest/oak woodland	582.18	0.01	0.07	0.07	0.06	0.06
Blue oak woodland	163.61	0.004	0.03	0.03	0.02	0.03
Foothill pine–oak woodland	21.11	0.0005	0.00	0.00	0.00	0.00
Mixed willow riparian scrub	39.27	0.0009	0.01	0.01	0.01	0.01
Mixed riparian forest and woodland	9.93	0.0002	0.00	0.00	0.00	0.00
Alkali wetland	483.17	1.11	7.31	7.89	6.44	6.95
Seasonal wetland	81.44	0.002	0.01	0.01	0.01	0.01
Perennial freshwater marsh	0.01	0	0.00	0.00	0.00	0.00
Canal/Aqueduct	158.21	0.004	0.03	0.03	0.02	0.03
Ponds	54.19	0.001	0.01	0.01	0.01	0.01
Reservoirs	176.58	0.004	0.03	0.03	0.02	0.03
Drainages <sup>d</sup>	-	-	-	-	-	-
Cropland	4.55	0.0001	0.00	0.00	0.00	0.00
Developed and Disturbed	1,502.58	0.03	0.20	0.21	0.17	0.19

<sup>a</sup> These impact estimates do not include offset of land cover that is returned to natural conditions from removal of facilities and roads. Therefore, acreages of impacts are likely to be lower than those shown here.

<sup>b</sup> Percent of total program area multiplied by 659 acres (Alternative 1) and 711 acres (Alternative 2) of total permanent impacts associated with the program.

<sup>c</sup> Percent of total program area multiplied by 580 acres (Alternative 1) and 626 acres (Alternative 2) of total temporary impacts associated with the program.

<sup>d</sup> Acreage was not calculated for impacts on drainages. Typically, such impacts are measured in linear feet; these impacts will be quantified when design drawings are available.

It should be noted that siting considerations during design and development of individual projects and implementation of avoidance and minimization measures would likely modify such impacts. For example, because most roads and facilities would not be constructed in low areas where most ponds and wetlands are located, permanent loss of these land cover types is not anticipated. Additionally, impact estimates do not take into account that some developed areas may be returned to natural

conditions; such restoration would offset the acreages of affected land cover. Consequently, the estimates in Table 3.4-7 likely exceed the actual impacts that would result from construction.

Land cover impacts associated with the Golden Hills and Patterson Pass projects were determined by overlaying the footprint of the proposed project components on the mapped land cover types and calculating the area of each land cover type that would be permanently and temporarily affected. Permanent and temporary impacts on land cover (and special-status species habitat) resulting from the Golden Hills and Patterson Pass projects are shown in Tables 3.4-8 and 3.4-9, respectively.

**Table 3.4-8. Estimated Permanent and Temporary Impacts on Land Cover Types in the Golden Hills Project Area (acres)<sup>a</sup>**

Land Cover	Permanent	Temporary		Associated Wildlife Species
		Construction	Decommissioning	
Annual grassland	124.89	91.80	28.47 (existing turbines) 117.00 (roads)	California tiger salamander, western spadefoot, California red-legged frog, western pond turtle, Blainville's horned lizard, Alameda whipsnake, San Joaquin coachwhip, white-tailed kite, northern harrier, Swainson's hawk, golden eagle, western burrowing owl, loggerhead shrike, tricolored blackbird, American badger, San Joaquin kit fox, non-special-status migratory birds
Alkali meadow	0.30	3.69	-	Same as annual grassland
Ponds	0.15	0.00	-	Vernal pool tadpole shrimp, curved-footed hygrotus diving beetle, California tiger salamander, western spadefoot, California red-legged frog, western pond turtle
Drainages <sup>b</sup>	-		-	Curved-footed hygrotus diving beetle, California tiger salamander, California red-legged frog, foothill yellow-legged frog, western pond turtle

<sup>a</sup> These impact estimates do not include offset of land cover that is returned to natural conditions from removal of facilities and roads. Therefore, acreages of impacts are likely to be lower than those shown here.

<sup>b</sup> Acreage was not calculated for impacts on drainages. Typically, such impacts are measured in linear feet; these impacts will be quantified when design drawings are available.

**Table 3.4-9. Permanent and Temporary Impacts (acres) on Land Cover Types in the Patterson Pass Project Area (acres)<sup>a</sup>**

Land Cover	Permanent	Temporary		Associated Wildlife Species
		Construction	Decommissioning	
Annual grassland	15.59	56.38	12.34 (existing turbines) 66.00 (roads)	California tiger salamander, western spadefoot, California red-legged frog, western pond turtle, Blainville's horned lizard, Alameda whipsnake, San Joaquin coachwhip, white-tailed kite, northern harrier, Swainson's hawk, golden eagle, western burrowing owl, loggerhead shrike, tricolored blackbird, American badger, San Joaquin kit fox, non-special-status migratory birds
Seasonal Wetland	–	0.01	–	Longhorn fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, curved-footed hygrotus diving beetle, western spadefoot
Perennial freshwater marsh	–	0.02	–	California tiger salamander, California red-legged frog, western pond turtle
Drainages	0.01	0.03	–	Curved-footed hygrotus diving beetle, California tiger salamander, western spadefoot, California red-legged frog, foothill yellow-legged frog, western pond turtle

<sup>a</sup> These impact estimates do not include offset of land cover that is returned to natural conditions from removal of facilities and roads. Therefore, acreages of impacts are likely to be lower than those shown here.

Potential indirect impacts resulting from the program and the two projects were evaluated qualitatively for two reasons: (1) indirect impacts would occur farther from the project area or later in time, and (2) evaluating indirect effects quantitatively would be highly speculative.

## Avian Fatality Analysis Methods

### Fatality Rates

Estimating the number of birds killed at wind energy facilities is a rapidly developing field, with a variety of metrics, methods, and estimators used to quantify turbine-related avian fatalities. Most commonly used estimators first calculate the *rate* at which birds are killed. Historically, the most commonly used rate has been the number of birds killed *per megawatt* (MW) per year, where MWs are measured as the rated nameplate capacities of the turbines. The rated nameplate capacity of a turbine is the amount of power it can generate under its ideal conditions (different turbines are designed to operate most efficiently under different conditions).

The number of fatalities per MW per year has been used most often because it facilitates comparisons across a number of different turbine types with different sizes and rated nameplate capacities. However, the number of birds killed *per turbine* per year is being used more often at facilities using modern turbines because these larger turbines are reaching a size at which a higher

density of turbines is no longer feasible. Consequently, the number of towers becomes relatively more important than the actual rated capacity.

Regardless of the metric used, the fatality rate (expressed either per MW or per turbine) is then multiplied by either the total number of MWs in the facility or the total number of turbines in the facility, respectively, to obtain the estimate of the total number of birds killed each year at the facility.

The baseline estimate of the number of birds killed annually for each project and for the program area was based on the total number of MWs that were installed (referred to as the *total installed capacity*) at the time the Notice of Preparation for this PEIR was filed. The installed capacity at the time the NOP was filed was 329 MW for the program area, 80.5 MW for the Golden Hills project area, and 21.8 MW for the Patterson Pass project area (the program area total includes the capacity of the two project areas).

For the fatality rates, the average of the annual estimates of each fatality rate from the 2005–2011 bird years (n=7 years) provided by the Alameda County Avian Fatality Monitoring Program (ICF International 2013) was based on old-generation turbines only (i.e., results from the Diablo Winds and Buena Vista turbines were excluded because they are not considered old-generation turbines). This average was used because the annual fatality rates vary considerably from year to year.

The analysis was based on five groups of species: focal species, species of local conservation concern, raptors (including owls and turkey vultures), non-raptors, and all birds. *Focal species* were defined in the 2007 Settlement Agreement as American kestrel, burrowing owl, golden eagle, and red-tailed hawk for the purpose of measuring the reduction in raptor fatalities resulting from implementation of management actions. Four additional species (loggerhead shrike [California species of special concern], prairie falcon [CDFW Watch List], Swainson's hawk [listed as threatened under CESA], and barn owl) were added for the analyses in this PEIR because of a high fatality rate, general concerns about the conservation status of these species, or both.

ICF biologists compared the baseline number of fatalities for each species and species group calculated as outlined above to the number of fatalities expected to occur as a result of repowering. The number of fatalities expected to occur as a result of repowering was based on the 417 and 450 MW caps for the two program alternatives and on the size of each of the projects measured in MWs as outlined in the project description. The rates used to calculate the number of fatalities expected to occur as a result of repowering were derived from the rates at three repowering projects in the APWRA that use newer, repowered turbines: Diablo Winds, Buena Vista, and Vasco Winds. Diablo Winds comprises thirty-one 660 kW turbines, Buena Vista thirty-eight 1 MW turbines, and Vasco Winds thirty-four 2.3 MW turbines (Insignia Environmental 2012; Brown et al. 2013; ICF International 2013). Although there is considerable range in turbine sizes among these three projects, they are all considered new-generation turbines relative to the rest of the turbines installed in the APWRA. The annual fatality rates (expressed as fatalities per MW per year) for these three repowering projects are presented in Table 3.4-10, along with the average of the annual fatality rates at nonrepowered turbines for comparison. However, it should be noted that the rate estimates available from new-generation repowered turbines in the APWRA may not be representative of rates that would occur at other locations in the APWRA. This is because the three existing repowered project sites each have different turbine types and are located in three relatively small, distinct areas with site-specific geographic, topographic, and other ecological conditions, and because the primary species of concern are not evenly distributed throughout the APWRA.

**Table 3.4-10. Annual Adjusted Fatality Rates for Nonrepowered and Repowered APWRA Turbines**

Species/Group	Nonrepowered <sup>a</sup>	Repowered		
		Diablo Winds <sup>b</sup>	Buena Vista <sup>c</sup>	Vasco Winds <sup>d</sup>
American kestrel	0.59	0.09	0.15	0.30
Barn owl	0.24	0.02	0.00	0.03
Burrowing owl	0.78	0.84	–	0.05
Golden eagle	0.08	0.01	0.04	0.03 <sup>e</sup>
Loggerhead shrike	0.19	0.00	–	–
Prairie falcon	0.02	–	0.00	–
Red-tailed hawk	0.44	0.20	0.10	0.25
Swainson's hawk	0.00	–	–	–
All raptors	2.43	1.21	0.31	0.64
All native non-raptors	4.50	2.51	1.01	2.09

Notes: fatality rates reflect annual fatalities per MW. “–” denotes that no fatalities were detected. “0.00” signifies that, although fatalities were detected, the rate is lower than two significant digits.

<sup>a</sup> Average of 2005–2011 bird years.

<sup>b</sup> Average of 2005–2009 bird years.

<sup>c</sup> Average of 3 years (2007–2009).

<sup>d</sup> Values from first year of monitoring (2013).

<sup>e</sup> Value updated based on information provided by NextEra Energy Resources on July 21, 2014. Value provided is an average of the adjusted rates from monitoring years 1 (0.016) and 2 (0.048).

### Potential Biases in the Avian Fatality Analysis Methods

Several factors confound the comparison of avian fatality rates between old- and new-generation turbines. The fatality rates from nonrepowered turbines were obtained while management actions were being implemented to reduce avian fatalities. These actions included the shutdown of turbines during the winter period, a time when winds are lowest but avian use of the area is highest for three of the four focal species. In addition, hazardous turbines were being removed during the period of data collection. These actions in combination resulted in a reduction of avian fatality rates, tending to underestimate the differences between old-generation turbines and newer turbines because the newer turbines are not shut down during the winter period and none were deemed hazardous enough to warrant removal.

The fatality rates from two of the three repowered projects are associated with turbines considerably smaller than those likely to be used in all future repowering projects. Evidence collected to date suggests that avian fatality rates may decrease as turbine size increases (Smallwood and Karas 2009). Consequently, these rates may be biased high relative to the turbines likely to be used in the two projects described in this PEIR and future projects implemented in the rest of the APWRA. In addition, there is considerable variation in collision risk across the various topographies and geographies of the APWRA, presumably due in part to variations in abundance and use of these areas by different species. For example, burrowing owls were known to be abundant in the area around the Diablo Winds turbines when they were installed, and thus there is a relatively high rate (for new-generation turbines) of fatalities at these turbines. Conversely, no burrowing owl fatalities were detected in the Buena Vista project area in the 3 years of fatality monitoring after repowering. Thus, the fatality rates at the three repowered project sites may not be

representative of the fatality rates likely to occur at other repowering project sites. Because of the variation between these projects, fatality rates from all three projects were used to provide a range in the estimates of total annual fatalities likely to occur as a result of repowering.

Finally, one of the biggest differences among all studies is variation in detection probability. *Detection probability* as it is used here refers to the probability that a turbine-related fatality is actually detected. There are various ways of measuring detection probability, the most common being the use of carcass placement trials to measure the rate at which carcasses are removed from the search area and the rate at which searchers detect carcasses given that they are still present. Detection probability varies among searchers, habitat types, seasons, years, and many other factors. The Alameda County Avian Fatality Monitoring Program measured detection probabilities in only one year, and these probabilities were used to estimate the number of killed birds in all years of the study. If detection probability varies considerably across years, such variation can also confound to an unknown degree comparisons of fatality rates and estimates of total fatalities across projects.

Differences in search radius may constitute an additional bias affecting the analysis. There is some debate in the scientific community regarding the appropriate search radii; consequently, fatality rates for new-generation turbines may have a potential and as yet unknown bias.

## **Bat Fatality Analysis Methods**

### **Fatality Rates**

The assessment of bat species potentially at risk is based on a review of existing bat fatality data for the APWRA, species occurrence data in and around the program and project areas, the current understanding of those species' susceptibility to fourth-generation turbine-related mortality, and known trends in bat fatalities at wind energy facilities in general.

Methods used to conduct the analysis were similar to those used to assess the potential impacts on avian species. The total installed capacity at the time the NOP for this PEIR was filed was used to estimate the baseline number of fatalities that would occur if the old-generation turbines were to continue operating without any repowering. This value was multiplied by the fatality rate for bats provided by Smallwood and Karas (2009:1066) using data from the AFMT for the 2005–2007 bird years to obtain estimates of total bat fatalities per year for the program and the two projects. These numbers were compared to the number of fatalities expected to occur if old-generation turbines were replaced with newer, modern turbines. The number of fatalities expected to occur as a result of repowering was based on the 417 MW cap for the program area and the size of each of the projects measured in MWs as outlined in the project description.

Estimates of bat fatality rates from several sources were used to provide a range of bat fatality estimates that could occur as a result of repowering. The primary source, Vasco Winds, was supplemented with bat fatality rate estimates from the two other repowering projects in the APWRA—Diablo Winds and Buena Vista—both of which used turbines smaller than those used in current and future repowering projects. Bat fatality rates from the nearby Montezuma Hills Wind Resource Area were also used because this is the nearest area—beyond Vasco Winds—where fourth-generation turbines are in operation. The resultant range of possible fatality rates was compared to the baseline estimates of total fatalities for the two project areas and the program area.

### Potential Biases in the Bat Fatality Analysis Methods

Although the best available evidence was used to estimate the number of bat fatalities potentially resulting from implementation of the proposed program and projects, there is more uncertainty in these estimates than there is for bird fatality estimates. Because the Alameda County Avian Fatality Program was not designed to count bats, the baseline fatality rate is likely underestimated. Moreover, because Vasco Winds is not representative of the entire program area, extrapolation of results from this site to other areas should be interpreted with caution. Finally, the nearby Montezuma Hills Wind Resource Area, while sharing some land use characteristics (e.g., grazing), supports more dryland farming than the APWRA and has a different topographical profile.

### Determination of Significance

The basis for determining when a given impact exceeds the threshold of significance—that is, when it has a substantial adverse effect—was determined by the professional judgment of qualified biologists. Under long-established CEQA practice and principle, such determinations are derived from comparison with the baseline of existing conditions, as the focus of CEQA is on “substantial adverse effect” as a change from existing conditions. The analysis of impacts on biological resources, and in particular on avian species in the program area, accordingly, entailed the comparison of the existing condition of regular and more or less predictable levels of avian mortality associated with the existing wind turbines—the baseline mortality rate defined above in *Avian Fatality Analysis Methods*—with the anticipated or calculated projection of the mortality rate that would result from implementation of the program or projects. Where the projected rate would exceed the baseline rate, the impact would typically be significant; if the projected rate is below the baseline rate, the impact would typically be considered less than significant. The County considered several issues involving use of the typical determination of significance outlined above.

- The baseline condition is one that already results in a substantial number of avian fatalities, which in itself constitutes a significant impact.
- Avian mortality consists of a series of temporal, moment-to-moment events; accordingly, it cannot be viewed as a constant in the way that other baseline environmental conditions, such as presence of existing habitat areas, landscape features, or an earthquake fault, can be viewed.
- Estimation of fatality rates from existing and new-generation turbines is, as discussed in the impact analysis, variable and uncertain.
- A determination of significance would be appropriate if wind turbine operations could violate specific laws and regulations (e.g., ESA, CESA, MBTA) that are not tied to mortality rates.
- Commitments were agreed to by the majority of the wind operators, documented in the 2007 Settlement Agreement, to achieve a 50% reduction in avian fatalities of annual fatalities of four focal species (golden eagle, burrowing owl, American kestrel, and red-tailed hawk) through implementation of the Avian Wildlife Protection Program and Schedule (AWPPS) as established in 2005 and modified in 2007.

Accordingly, in view of the foregoing considerations, the fact that even reduced avian fatalities could violate specific laws and regulations, and the conservation approach described in the 2007 Settlement Agreement, the County has determined that the threshold of significance for impacts on avian species is effectively any level of avian mortality above zero.

In accordance with Appendix G of the State CEQA Guidelines, the program alternatives and the Patterson Pass and Golden Hills projects would be considered to have a significant effect if the program or project would result in any of the conditions listed below.

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marshes, vernal pools, coastal wetlands, etc.) through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Substantially reduce the habitat of a common plant or wildlife species, cause a plant or wildlife population to drop below self-sustaining levels, or threaten to eliminate a plant or animal community.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.

## Impacts and Mitigation Measures

The following discussion assesses potential impacts on biological resources resulting from implementation of the program and the Golden Hills and Patterson Pass projects. Wildlife species with similar habitat use (e.g., tree-nesting species) were grouped in the impact discussions below.

Mitigation measures for potential impacts of the program and Patterson Pass and Golden Hills projects were developed to be consistent with the avoidance, minimization, and mitigation measures set forth in the East Alameda County Conservation Strategy (EACCS or Conservation Strategy). The Conservation Strategy was developed to assist with environmental compliance requirements of ESA, CESA, CEQA, NEPA, and other applicable laws for all projects within the area covered by the strategy that would have impacts on biological resources. The Conservation Strategy establishes goals and objectives and a compensation program to offset impacts from projects in the covered area. The program area lies within the area covered by the Conservation Strategy. Where applicable, the goals and objectives in the Conservation Strategy were used to develop mitigation measures to minimize potential impacts resulting from the program and the individual projects addressed in this EIR. Likewise, compensatory mitigation for the program and individual projects refers to mitigation ratios from the Conservation Strategy. In the event that take authorization is obtained for any species listed under ESA, CESA, or BGEPA, avoidance, minimization, and compensatory mitigation will be undertaken in accordance with the authorization in consultation with USFWS and/or CDFW. Implementation of state and federal requirements contained in such authorization will constitute compliance with corresponding measures in this PEIR.



**Impact BIO-1a-1: Potential for ground-disturbing activities to result in adverse effects on special-status plants or habitat occupied by special-status plants—program Alternative 1: 417 MW (less than significant with mitigation)**

Ground-disturbing activities associated with Alternative 1 could result in adverse effects on special-status plants or their habitat. Direct effects include those effects where plants may be removed, damaged, or crushed (seedlings) by ground-disturbing activities, the movement or parking of vehicles, and/or the placement of equipment and supplies. Ground disturbance can kill or damage mature individuals or eliminate their habitat. Excavation alters soil properties and may create conditions unsuitable for the growth of some species or favor their replacement by other species. The roots of shrubs and other perennial species are susceptible to damage from soil compaction by equipment or construction materials. Possible indirect effects on plants could result from erosion that degrades habitat or accidental ignition of a fire that damages or kills individuals. Because these ground-disturbing activities could have substantial adverse effects on special-status plant species, this impact is significant. Implementation of Mitigation Measures BIO-1a through BIO-1e would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1a: Conduct surveys to determine the presence or absence of special-status plant species**

Project proponents will conduct surveys for the special-status plant species within and adjacent to all project sites. All surveys will be conducted by qualified biologists in accordance with the appropriate protocols.

Special-status plant surveys will be conducted in accordance with *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (California Department of Fish and Game 2009) during the season that special-status plant species would be evident and identifiable—i.e., during their blooming season. No more than 3 years prior to ground-disturbing repowering activities and during the appropriate identification periods for special-status plants (Table 3.4-4), a qualified biologist (as determined by Alameda County) will conduct field surveys within decommissioning work areas, proposed construction areas, and the immediately adjacent areas to determine the presence of habitat for special-status plant species. The project proponent will submit a report documenting the survey results to Alameda County for review and approval prior to conducting any repowering activities. The report will include the location and description of all proposed work areas, the location and description of all suitable habitat for special-status plant species, and the location and description of other sensitive habitats (e.g., vernal pools, wetlands, riparian areas). Additionally, the report will outline where additional species and/or habitat-specific mitigation measures are required. This report will provide the basis for any applicable permit applications where incidental take of listed species may occur.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

Project proponents will ensure that the following BMPs, in accordance with practices established in the EACCS, will be incorporated into individual project design and construction documents.

- Employees and contractors performing decommissioning and reclamation activities will receive environmental sensitivity training. Training will include review of environmental

- laws, mitigation measures, permit conditions, and other requirements that must be followed by all personnel to reduce or avoid effects on special-status species during construction activities.
- Environmental tailboard trainings will take place on an as-needed basis in the field. These trainings will include a brief review of the biology of the covered species and guidelines that must be followed by all personnel to reduce or avoid negative effects on these species during decommissioning and reclamation activities. Directors, managers, superintendents, and the crew leaders will be responsible for ensuring that crewmembers comply with the guidelines.
  - Vehicles and equipment will be parked on pavement, existing roads, and previously disturbed areas to the extent practicable.
  - Offroad vehicle travel will be avoided.
  - Material will be stockpiled only in areas that do not support special-status species or sensitive habitats.
  - Grading will be restricted to the minimum area necessary.
  - Prior to ground-disturbing activities in sensitive habitats, project construction boundaries and access areas will be flagged and temporarily fenced during construction to reduce the potential for vehicles and equipment to stray into adjacent habitats.
  - Vehicles or equipment will not be refueled within 100 feet of a wetland, stream, or other waterway unless a bermed and lined refueling area (i.e., a created berm made of sandbags or other removable material) is constructed.
  - Erosion control measures will be implemented to reduce sedimentation in nearby aquatic habitat when activities are the source of potential erosion. Plastic monofilament netting (erosion control matting) or similar material containing netting will not be used at the project. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.
  - Significant earth moving-activities will not be conducted in riparian areas within 24 hours of predicted storms or after major storms (defined as 1-inch of rain or more).
  - The following will not be allowed at or near work sites for project activities: trash dumping, firearms, open fires (such as barbecues) not required by the activity, hunting, and pets (except for safety in remote locations).

**Mitigation Measure BIO-1c: Avoid and minimize impacts on special-status plant species by establishing activity exclusion zones**

Where surveys determine that a special-status plant species is present in or adjacent to a project area, direct and indirect impacts of the project on the species will be avoided through the establishment of activity exclusion zones, within which no ground-disturbing activities will take place, including construction of new facilities, construction staging, or other temporary work areas. Activity exclusion zones for special-status plant species will be established around each occupied habitat site, the boundaries of which will be clearly marked with standard orange plastic construction exclusion fencing or its equivalent. The establishment of activity exclusion zones will not be required if no construction-related disturbances will occur within 250 feet of

the occupied habitat. The size of activity exclusion zones may be reduced through consultation with a qualified biologist and with concurrence from CDFW based on site-specific conditions.

**Mitigation Measure BIO-1d: Compensate for impacts on special-status plant species**

All project proponents will avoid or minimize temporary and permanent impacts on special-status plants that occur on project sites and will compensate for impacts on special-status plant species. Although all impacts on large-flowered fiddleneck, diamond-petaled California poppy, and caper-fruited troidocarpum will be avoided, impacts on other special-status plant species will be avoided to the extent feasible, and any unavoidable impacts will be addressed through compensatory mitigation.

Where avoidance of impacts on a special-status plant species is infeasible, loss of individuals or occupied habitat of a special-status plant species occurrence will be compensated for through the acquisition, protection, and subsequent management in perpetuity of other existing occurrences at a 2:1 ratio (occurrences impacted: occurrences preserved). The project proponent will provide detailed information to the County and CDFW on the location of the preserved occurrences, quality of the preserved habitat, feasibility of protecting and managing the areas in-perpetuity, responsibility parties, and other pertinent information. If suitable occurrences of a special-status plant species are not available for preservation, then the project will be redesigned to remove features that would result in impacts on that species.

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

All project proponents will retain a qualified biologist (as determined by Alameda County) to conduct periodic monitoring of decommissioning, repowering, and reclamation activities that occur adjacent to sensitive biological resources (e.g., special-status species, sensitive vegetation communities, wetlands). Monitoring will occur during initial ground disturbance where sensitive biological resources are present and weekly thereafter or as determined by the County in coordination with a qualified biologist. The biologist will assist the crew, as needed, to comply with all project implementation restrictions and guidelines. In addition, the biologist will be responsible for ensuring that the project proponent or its contractors maintain exclusion areas adjacent to sensitive biological resources, and for documenting compliance with all biological resources-related mitigation measures.

**Impact BIO-1a-2: Potential for ground-disturbing activities to result in adverse effects on special-status plants or habitat occupied by special-status plants—program Alternative 2: 450 MW (less than significant with mitigation)**

Ground-disturbing activities associated with Alternative 2 could result in adverse effects on special-status plants or their habitat. Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Direct effects include those where plants may be removed, damaged, or crushed (seedlings) by ground-disturbing activities, the movement or parking of vehicles, and/or the placement of equipment and supplies. Ground disturbance can kill or damage mature individuals or eliminate their habitat. Excavation alters soil properties and may create conditions unsuitable for the growth of some species or favor their replacement by other species. The roots of shrubs and other perennial

species are susceptible to damage from soil compaction by equipment or construction materials. Possible indirect effects on plants could result from erosion that degrades habitat or accidental ignition of a fire that damages or kills individuals. Because these ground-disturbing activities could have substantial adverse effects on special-status plant species, this impact is significant. Implementation of Mitigation Measures BIO-1a through BIO-1e would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1a: Conduct surveys to determine the presence or absence of special-status plant species**

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1c: Avoid and minimize impacts on special-status plant species by establishing activity exclusion zones**

**Mitigation Measure BIO-1d: Compensate for impacts on special-status plant species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Impact BIO-1b: Potential for ground-disturbing activities to result in adverse effects on special-status plants or habitat occupied by special-status plants—Golden Hills Project (less than significant with mitigation)**

Ground-disturbing activities associated with the Golden Hills Project could result in adverse effects on special-status plants or their habitat. Direct effects include those effects where plants may be removed, damaged, or crushed (seedlings) by ground-disturbing activities, the movement or parking of vehicles, and/or the placement of equipment and supplies. Ground disturbance can kill or damage mature individuals or eliminate their habitat. Excavation alters soil properties and may create conditions unsuitable for the growth of some species or favor their replacement by other species. The roots of shrubs and other perennial species are susceptible to damage from soil compaction by equipment or construction materials. Possible indirect effects on plants could result from erosion that degrades habitat or accidental ignition of a fire that damages or kills individuals. Because these ground-disturbing activities could have substantial adverse effects on special-status plant species, this impact is significant. Implementation of Mitigation Measures BIO-1a through BIO-1e would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1a: Conduct surveys to determine the presence or absence of special-status plant species**

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1c: Avoid and minimize impacts on special-status plant species by establishing activity exclusion zones**

**Mitigation Measure BIO-1d: Compensate for impacts on special-status plant species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Impact BIO-1c: Potential for ground-disturbing activities to result in adverse effects on special-status plants or habitat occupied by special-status plants—Patterson Pass Project (less than significant with mitigation)**

Ground-disturbing activities associated with the Patterson Pass Project could result in adverse effects on special-status plants or their habitat. Direct effects include those effects where plants may be removed, damaged, or crushed (seedlings) by ground-disturbing activities, the movement or parking of vehicles, and/or the placement of equipment and supplies. Ground disturbance can kill or damage mature individuals or eliminate their habitat. Excavation alters soil properties and may create conditions unsuitable for the growth of some species or favor their replacement by other species. The roots of shrubs and other perennial species are susceptible to damage from soil compaction by equipment or construction materials. Possible indirect effects on plants could result from erosion that degrades habitat or accidental ignition of a fire that damages or kills individuals. Because these ground-disturbing activities could have substantial adverse effects on special-status plant species, this impact is significant. Implementation of Mitigation Measures BIO-1a through BIO-1e would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1a: Conduct surveys to determine the presence or absence of special-status plant species**

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1c: Avoid and minimize impacts on special-status plant species by establishing activity exclusion zones**

**Mitigation Measure BIO-1d: Compensate for impacts on special-status plant species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Impact BIO-2a-1: Adverse effects on special-status plants and natural communities resulting from the introduction and spread of invasive plant species—program Alternative 1: 417 MW (less than significant with mitigation)**

Construction activities have the potential to facilitate the introduction and spread of invasive nonnative plant species by removing vegetation and disturbing soils. Construction vehicles and machinery are primary vectors for the spread of such species. Invasive species compete with native species for resources and can alter natural communities by influencing fire regimes, hydrology (e.g., sedimentation and erosion), light availability, nutrient cycling, and soil chemistry (Randall and Hoshovsky 2000). Invasive species also have the potential to harm human health and the economy by adversely affecting natural ecosystems, recreation, agricultural lands, and developed areas (California Department of Fish and Game 2008). The introduction and spread of invasive nonnative plant species as a result of activities associated with the program would constitute a significant indirect impact. However, implementation of Mitigation Measures BIO-1b, BIO-2, BIO-5c, and WQ-1 would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-2: Prevent introduction, spread, and establishment of invasive plant species**

To avoid and minimize the introduction and spread of invasive nonnative plant species, all project proponents will implement the following BMPs.

- Construction vehicles and machinery will be cleaned prior to entering the construction area. Cleaning stations will be established at the perimeter of the construction area along all construction routes or immediately offsite.
- Vehicles will be washed only at approved areas. No washing of vehicles will occur at job sites.
- To discourage the introduction and establishment of invasive plant species, seed mixtures and straw used within natural vegetation will be either rice straw or weed-free straw, as allowed by state and federal regulation of stormwater runoff.

In addition, the project proponents will prepare and implement erosion and sediment control plans to control short-term and long-term erosion and sedimentation effects and to restore soils and vegetation in areas affected by construction activities (Mitigation Measures BIO-1b and WQ-1). Prior to initiating any construction activities that will result in temporary impacts on natural communities, a restoration and monitoring plan will be developed for temporarily affected habitats in each project area (Mitigation Measure BIO-5c). Restoration and monitoring plans will be submitted to the County and CDFW for approval. These plans will include methods for restoring soil conditions and revegetating disturbed areas, seed mixes, monitoring and maintenance schedules, adaptive management strategies, reporting requirements, and success criteria. Following completion of project construction, the project proponents will implement the revegetation plans to restore areas disturbed by project activities to a condition of equal or greater habitat function than occurred prior to the disturbance.

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

See discussion on pages 3.4-78 and 3.4-79.

**Mitigation Measure WQ-1: Comply with NPDES requirements**

See discussion on pages 3.9-8 and 3.9-9.

**Impact BIO-2a-2: Adverse effects on special-status plants and natural communities resulting from the introduction and spread of invasive plant species—program Alternative 2: 450 MW (less than significant with mitigation)**

Construction activities have the potential to facilitate the introduction and spread of invasive nonnative plant species by removing vegetation and disturbing soils. Construction vehicles and machinery are primary vectors for the spread of such species. Invasive species compete with native species for resources and can alter natural communities by influencing fire regimes, hydrology (e.g., sedimentation and erosion), light availability, nutrient cycling, and soil chemistry (Randall and Hoshovsky 2000). Invasive species also have the potential to harm human health and the economy by adversely affecting natural ecosystems, recreation, agricultural lands, and developed areas (California Department of Fish and Game 2008). The introduction and spread of invasive nonnative plant species as a result of activities associated with the program would constitute a significant indirect impact. Effects under Alternative 2 would be the same as those under Alternative 1. Although the area of disturbance would be 8% greater under Alternative 2, the severity of the effects of introduction and spread of invasive plant species does not necessarily correlate directly to the areal extent of disturbance, but rather to the practices that facilitate introduction. Implementation of Mitigation Measure BIO-2 would reduce this impact to a level less-than-significant level.

**Mitigation Measure BIO-2: Prevent introduction, spread, and establishment of invasive plant species****Impact BIO-2b: Adverse effects on special-status plants and natural communities resulting from the introduction and spread of invasive plant species—Golden Hills Project (less than significant with mitigation)**

Construction activities have the potential to facilitate the introduction and spread of invasive nonnative plant species by removing vegetation and disturbing soils. Construction vehicles and machinery are primary vectors for the spread of such species. Invasive species compete with native species for resources and can alter natural communities by influencing fire regimes, hydrology (e.g., sedimentation and erosion), light availability, nutrient cycling, and soil chemistry (Randall and Hoshovsky 2000). Invasive species also have the potential to harm human health and the economy by adversely affecting natural ecosystems, recreation, agricultural lands, and developed areas (California Department of Fish and Game 2008). The introduction and spread of invasive nonnative plant species as a result of activities associated with the Golden Hills Project would constitute a significant indirect impact. However, implementation of Mitigation Measure BIO-2 would reduce this impact to a level less-than-significant level.

**Mitigation Measure BIO-2: Prevent introduction, spread, and establishment of invasive plant species****Impact BIO-2c: Adverse effects on special-status plants and natural communities resulting from the introduction and spread of invasive plant species—Patterson Pass Project (less than significant with mitigation)**

Construction activities have the potential to facilitate the introduction and spread of invasive nonnative plant species by removing vegetation and disturbing soils. Construction vehicles and machinery are primary vectors for the spread of such species. Invasive species compete with native species for resources and can alter natural communities by influencing fire regimes, hydrology (e.g., sedimentation and erosion), light availability, nutrient cycling, and soil chemistry (Randall and Hoshovsky 2000). Invasive species also have the potential to harm human health and the economy by adversely affecting natural ecosystems, recreation, agricultural lands, and developed areas (California Department of Fish and Game 2008). The introduction and spread of invasive nonnative plant species as a result of activities associated with the Patterson Pass Project would constitute a significant indirect impact. However, implementation of Mitigation Measure BIO-2 would reduce this impact to a level less-than-significant level.

**Mitigation Measure BIO-2: Prevent introduction, spread, and establishment of invasive plant species****Impact BIO-3a-1: Potential mortality of or loss of habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle—program Alternative 1: 417 MW (less than significant with mitigation)**

Construction activities in the program area could result in direct effects on longhorn fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp (vernal pool branchiopods), and curved-footed hygrotus diving beetle or their habitats. The majority of construction activities would take place on grassland habitat along ridgelines; consequently, loss of potential vernal pool branchiopod and curved-footed hygrotus diving beetle habitat would generally be avoided. However, direct impacts on habitat associated with road construction or widening and impacts on water quality could result from some construction activities. Estimated permanent and temporary impacts on alkali wetland, seasonal wetland, and ponds that may provide habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle are shown in Table 3.4-7. Impacts on drainages that may provide potential habitat for the beetle could not be estimated because these features have not yet been delineated. Construction activities such as excavation, grading, or stockpiling of soil, could fill, remove, or otherwise alter suitable habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle and could result in injury or mortality of these species. Such ground-disturbing activities may be associated with installation of power collection and communication systems and road construction and widening. Vernal pool branchiopods and curved-footed hygrotus diving beetles could also be injured or killed if vehicles or construction equipment are driven through occupied habitat, or if gasoline, oil, or other contaminants enter their habitat. Changes in hydrology or sedimentation of habitat from erosion associated with project construction could alter the suitability of habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle and could cause mortality.

Operation and maintenance activities may also result in impacts on vernal pool branchiopods or their habitats. Use of herbicides near occupied habitat could result in mortality or reduced fitness of



vernal pool branchiopods (U.S. Fish and Wildlife Service 1996). Herbicide or pesticide use near or upstream of suitable habitat for curved-footed hygrotus diving beetle could result in mortality or reduced fitness of the beetle. Road and firebreak maintenance may also result in degradation of habitat or injury or mortality of vernal pool branchiopods and curved-footed hygrotus diving beetles. These impacts would be significant because the project could reduce the local populations of federally listed vernal pool branchiopods and a rare beetle species through direct mortality and habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3a, and BIO-3b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

No more than 3 years prior to ground-disturbing repowering activities, a qualified biologist (as determined by Alameda County) will conduct field surveys within decommissioning, repowering, and restoration work areas and their immediate surroundings to determine the presence of habitat for special-status wildlife species. The project proponent will submit a report documenting the survey results to Alameda County for review prior to conducting any repowering activities. The report will include the location and description of all proposed work areas, the location and description of all suitable habitat for special-status wildlife species, and the location and description of other sensitive habitats (e.g., vernal pools, wetlands, riparian areas). Additionally, the report will outline where additional species- and/or habitat-specific mitigation measures are required. This report may provide the basis for any applicable permit applications where incidental take may occur.

**Mitigation Measure BIO-3b: Implement measures to avoid, minimize, and mitigate impacts on vernal pool branchiopods and curved-footed hygrotus diving beetle**

Where suitable habitat for listed vernal pool branchiopods and curved-footed hygrotus diving beetle are identified within 250 feet (or another distance as determined by a qualified biologist based on topography and other site conditions) of proposed work areas, the following measures will be implemented to ensure that the repowering projects do not have adverse impacts on listed vernal pool branchiopods or curved-footed hygrotus diving beetle. These measures are based on measures from the EACCS, with some modifications and additions. Additional conservation measures or conditions of approval may be required in applicable project permits (e.g., ESA incidental take permit).

- Avoid all direct impacts on sandstone rock outcrop vernal pools.
- Ground disturbance will be avoided from the first day of the first significant rain (1 inch or more) until June 1, or until pools remain dry for 72 hours and no significant rain is forecast on the day of such ground disturbance.
- If vernal pools, clay flats, alkaline pools, ephemeral stock tanks (or ponds), sandstone pools, or roadside ditches are present within 250 feet of the work area (or another appropriate

distance as determined by a qualified biologist on the basis of topography and other site conditions), the biologist will stake and flag an exclusion zone prior to construction activities. The width of the exclusion zone will be based on site conditions and will be the maximum practicable distance that ensures protection of the feature from direct and indirect effects of the project. Exclusion zones will be established around features whether they are wet or dry at the time. The exclusion zone will be fenced with orange construction zone and erosion control fencing (to be installed by construction crew).

- No herbicide will be applied within 100 feet of exclusion zones, except when applied to cut stumps or frilled stems or injected into stems. No broadcast applications will be allowed.
- Avoid modifying or changing the hydrology of aquatic habitats.
- Minimize the work area for stream crossings and conduct work during the dry season (June 1 through the first significant rain of the fall/winter).
- Install utility collection lines across perennial creeks by boring under the creek.

Where impacts cannot be avoided or minimized, compensatory mitigation will be undertaken in accordance with mitigation ratios and requirements developed under the EACCS (Appendix C). In the event that an incidental take permit is required, compensatory mitigation will be undertaken in accordance with the terms of the permit in consultation with USFWS.

**Impact BIO-3a-2: Potential mortality of or loss of habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle—program Alternative 2: 450 MW (less than significant with mitigation)**

Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Construction activities in the program area could result in direct effects on vernal pool branchiopods and curved-footed hygrotus diving beetle or their habitats. The majority of construction activities would take place on grassland habitat along ridgelines; consequently, loss of potential vernal pool branchiopod and curved-footed hygrotus diving beetle habitat would generally be avoided. However, direct impacts on habitat associated with road construction or widening and impacts on water quality could result from some construction activities. Estimated permanent and temporary impacts on alkali wetland, seasonal wetland, and ponds that may provide habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle are shown in Table 3.4-7. Impacts on drainages that may provide potential habitat for the beetle could not be estimated because these features have not yet been delineated. Construction activities such as excavation, grading, or stockpiling of soil, could fill, remove, or otherwise alter suitable habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle and could result in injury or mortality of these species. Such ground-disturbing activities may be associated with installation of power collection and communication systems and road construction and widening. Vernal pool branchiopods and curved-footed hygrotus diving beetles could also be injured or killed if vehicles or construction equipment are driven through occupied habitat, or if gasoline, oil, or other contaminants enter their habitat. Changes in hydrology or sedimentation of habitat from erosion associated with project construction could alter the suitability of habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle and could cause mortality.

Operation and maintenance activities may also result in impacts on vernal pool branchiopods or their habitats. Use of herbicides near occupied habitat could result in mortality or reduced fitness of vernal pool branchiopods (U.S. Fish and Wildlife Service 1996). Herbicide or pesticide use near or upstream of suitable habitat for curved-footed hygrotus diving beetle could result in mortality or reduced fitness of the beetle. Road and firebreak maintenance may also result in degradation of habitat or injury or mortality of vernal pool branchiopods and curved-footed hygrotus diving beetles. These impacts would be significant because the project could reduce the local populations of federally listed vernal pool branchiopods and a rare beetle species through direct mortality and habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3a, and BIO-3b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-3b: Implement measures to avoid, minimize, and mitigate impacts on vernal pool branchiopods and curved-footed hygrotus diving beetle**

**Impact BIO-3b: Potential mortality of or loss of habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle—Golden Hills Project (less than significant with mitigation)**

Impacts from construction, operation, and maintenance of the Golden Hills project on vernal pool branchiopods and curved-footed hygrotus diving beetle would be similar to those described above for the program. The majority of construction activities would take place on grassland habitat along ridgelines; consequently, loss of potential vernal pool branchiopod and curved-footed hygrotus diving beetle habitat would generally be avoided. However, direct impacts on habitat associated with road construction or widening and impacts on water quality could result from some construction activities. Estimated permanent and temporary impacts on alkali wetland, seasonal wetland, and ponds that may provide habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle are shown in Table 3.4-8. Impacts on drainages that may provide potential habitat for the beetle could not be estimated because these features have not yet been delineated. These impacts would be significant because the project could reduce the local populations of federally listed vernal pool branchiopods and a rare beetle species through direct mortality and habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3a, and BIO-3b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-3b: Implement measures to avoid, minimize, and mitigate impacts on vernal pool branchiopods and curved-footed hygrotus diving beetle****Impact BIO-3c: Potential mortality of or loss of habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle—Patterson Pass Project (less than significant with mitigation)**

The seasonal wetland that provides suitable habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle would not be filled or removed. However, mortality of these aquatic species could occur if oil or other contaminants enter the wetland during construction. Additionally, the seasonal wetland could be indirectly affected if the hydrology of the wetland is modified as a result of project construction. Small areas of other seasonal wetlands and stream/freshwater marsh that may provide suitable habitat for curved-footed hygrotus diving beetle would be temporarily affected during construction of collector lines. None of the ponds that provide suitable habitat for curved-footed hygrotus diving beetle would be filled or removed. Estimated permanent and temporary impacts on seasonal wetland and stream/freshwater marsh that may provide habitat for vernal pool branchiopods and curved-footed hygrotus diving beetle are shown in Table 3.4-9. These impacts would be significant because the project could reduce the local populations of federally listed vernal pool branchiopods and a rare beetle species through direct mortality or habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3a, and BIO-3b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-3b: Implement measures to avoid, minimize, and mitigate impacts on vernal pool branchiopods and curved-footed hygrotus diving beetle****Impact BIO-4a-1: Potential disturbance or mortality of and loss of suitable habitat for valley elderberry longhorn beetle—program Alternative 1: 417 MW (less than significant with mitigation)**

Removal of habitat (elderberry shrubs) and potential injury or mortality of valley elderberry longhorn beetle associated with removal of elderberry shrubs would be considered direct effects on the species. Trimming of elderberry branches 1 inch or more in diameter could also result in injury or mortality of valley elderberry longhorn beetle. Because valley elderberry longhorn beetle larvae may feed on the roots of elderberries, disturbance of elderberry roots within the shrub dripline could also result in injury or mortality of individuals. Reduction of water infiltration to elderberry shrubs caused by changes in topography or compaction of soil from construction could result in reduced shrub vigor/vitality and an associated decrease in shoot, leaf, and flower production and

could ultimately reduce the suitability of the shrubs to provide habitat for valley elderberry longhorn beetle.

Operations and maintenance activities such as use of herbicides may also affect valley elderberry longhorn beetle or its habitat. Valley elderberry longhorn beetles could be indirectly affected if there is a loss of connectivity between elderberry shrubs when elderberries or associated vegetation is removed. Removal of such vegetation could result in gaps in vegetation that are too wide for beetles to cross because of their fairly limited movement distances (Talley et al. 2006), resulting in separation of individuals or reducing the possibility of colonization of adjacent areas. Although more research is needed, valley elderberry longhorn beetles have been observed to fly a mile or more in contiguous or fairly contiguous habitat, and exit holes have been observed on isolated shrubs 0.25 mile (0.4 kilometer) or more from the next nearest elderberry (Arnold pers. comm.). Because elderberries are expected to be widely separated due to the limited amount of riparian habitat in the program area, the removal of any elderberry shrubs could constitute a significant impact. Any of these impacts could be significant because they could reduce the local population size of a federally listed species through direct mortality or habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-4a, and BIO-4b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-4a: Implement measures to avoid or protect habitat for valley elderberry longhorn beetle**

If it is determined through preconstruction surveys conducted pursuant to Mitigation Measure BIO-3a that elderberry shrubs are present within proposed work areas or within 100 feet of these areas, the following measures will be implemented to ensure that the proposed project does not have a significant impact on valley elderberry longhorn beetle.

- Avoid removal of elderberry shrubs.
- Elderberry shrubs/clusters within 100 feet of the construction area that will not be removed will be protected during construction. A qualified biologist (i.e., with elderberry/VELB experience) will mark the elderberry shrubs and clusters that will be protected during construction. Orange construction barrier fencing will be placed at the edge of the buffer areas. The buffer area distances will be proposed by the biologist and approved by USFWS. No construction activities will be permitted within the buffer zone other than those activities necessary to erect the fencing. Signs will be posted every 50 feet (15.2 meters) along the perimeter of the buffer area fencing. The signs will contain the following information: *This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.*

- Buffer area fences around elderberry shrubs will be inspected weekly by a qualified biological monitor during ground-disturbing activities and monthly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around elderberry shrubs throughout construction. Biological inspection reports will be provided to the project proponent and USFWS.

#### **Mitigation Measure BIO-4b: Compensate for direct and indirect effects on valley elderberry longhorn beetle**

If elderberry shrubs cannot be avoided and protected as outlined in Mitigation Measure 4a, the project proponent will obtain an incidental take permit from USFWS and compensate for the loss of any elderberry shrubs. Surveys of elderberry shrubs to be transplanted will be conducted by a qualified biologist prior to transplantation. Surveys will be conducted in accordance with the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (U.S. Fish and Wildlife Service 1999). Survey results and an analysis of the number of elderberry seedlings/cuttings and associated native plants based on the survey results will be submitted to USFWS in a biological assessment or an HCP. After receipt of an incidental take permit and before construction begins, the project proponent will compensate for direct effects on elderberry shrubs by transplanting shrubs that cannot be avoided to a USFWS-approved conservation area. Elderberry seedlings or cuttings and associated native species will also be planted in the conservation area. Each elderberry stem measuring 1 inch or more in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) will be replaced, in the conservation area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). The numbers of elderberry seedlings/cuttings and associated riparian native trees/shrubs to be planted as replacement habitat are determined by stem size class of affected elderberry shrubs, presence or absence of exit holes, and whether the shrub lies in a riparian or nonriparian area. Stock of either seedlings or cuttings would be obtained from local sources.

At the discretion of USFWS, shrubs that are unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible, minimization ratios would be increased to offset the additional habitat loss.

The relocation of the elderberry shrubs will be conducted according to USFWS-approved procedures outlined in the *Conservation Guidelines* (U.S. Fish and Wildlife Service 1999). Elderberry shrubs within the project construction area that cannot be avoided will be transplanted during the plant's dormant phase (November through the first 2 weeks of February). A qualified biological monitor will remain onsite while the shrubs are being transplanted.

Evidence of valley elderberry longhorn beetle occurrence in the conservation area, the condition of the elderberry shrubs in the conservation area, and the general condition of the conservation area itself will be monitored over a period of 10 consecutive years or for 7 years over a 15-year period from the date of transplanting. The project proponent will be responsible for funding and providing monitoring reports to USFWS in each of the years in which a monitoring report is required. As specified in the *Conservation Guidelines*, the report will include information on timing and rate of irrigation, growth rates, and survival rates and mortality.

**Impact BIO-4a-2: Potential disturbance or mortality of and loss of suitable habitat for valley elderberry longhorn beetle—program Alternative 2: 450 MW (less than significant with mitigation)**

Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Removal of elderberry shrubs and potential injury or mortality of valley elderberry longhorn beetle associated with removal of elderberry shrubs would be considered direct effects on the species. Trimming of elderberry branches 1 inch or more in diameter could also result in injury or mortality of valley elderberry longhorn beetle. Because valley elderberry longhorn beetle larvae may feed on the roots of elderberries, disturbance of elderberry roots within the shrub dripline could also result in injury or mortality of individuals. Reduction of water infiltration to elderberry shrubs caused by changes in topography or compaction of soil from construction could result in reduced shrub vigor/vitality and an associated decrease in shoot, leaf, and flower production and could ultimately reduce the suitability of the shrubs to provide habitat for valley elderberry longhorn beetle.

Operations and maintenance activities such as use of herbicides may also affect valley elderberry longhorn beetle or its habitat. Valley elderberry longhorn beetles could be indirectly affected if there is a loss of connectivity between elderberry shrubs when elderberries or associated vegetation is removed. Removal of such vegetation could result in gaps in vegetation that are too wide for beetles to cross because of their fairly limited movement distances (Talley et al. 2006), resulting in separation of individuals or reducing the possibility of colonization of adjacent areas. Although more research is needed, valley elderberry longhorn beetles have been observed to fly a mile or more in contiguous or fairly contiguous habitat, and exit holes have been observed on isolated shrubs 0.25 mile (0.4 kilometer) or more from the next nearest elderberry (Arnold pers. comm.). Because elderberries are expected to be widely separated due to the limited amount of riparian habitat in the program area, the removal of any elderberry shrubs could constitute a significant impact. Any of these impacts could be significant because they could reduce the local population size of a federally listed species through direct mortality or habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-4a, and BIO-4b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-4a: Implement measures to avoid or protect habitat for valley elderberry longhorn beetle****Mitigation Measure BIO-4b: Compensate for direct and indirect effects on valley elderberry longhorn beetle**

**Impact BIO-4b: Potential disturbance or mortality of and loss of suitable habitat for valley elderberry longhorn beetle—Golden Hills Project (less than significant with mitigation)**

If elderberry shrubs are present in the Golden Hills project area, they could be affected by project construction and operation. Impacts from construction, operation, and maintenance of the Golden Hills project would be similar to those described for the program. Removal of habitat (elderberry shrubs), injury or mortality of beetles, cutting elderberry branches or roots that are 1 inch or more in diameter, and changes in hydrology would directly affect valley elderberry longhorn beetle. The beetle may also be indirectly affected by operations and maintenance activities such as use of herbicides or through the loss of connectivity between elderberry shrubs when shrubs or associated vegetation are removed. Because elderberries are expected to be widely separated due to the limited amount of riparian habitat in the project vicinity, the removal of any elderberry shrubs could constitute a significant impact. Any of these impacts would be significant because they could reduce the local population size of a federally listed species through direct mortality or habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-4a, and BIO-4b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-4a: Implement measures to avoid or protect habitat for valley elderberry longhorn beetle****Mitigation Measure BIO-4b: Compensate for direct and indirect effects on valley elderberry longhorn beetle****Impact BIO-4c: Potential disturbance or mortality of and loss of suitable habitat for valley elderberry longhorn beetle—Patterson Pass Project (less than significant with mitigation)**

None of the 39 elderberry shrubs in the Patterson Pass project area would be removed in order to construct the project. One of the shrubs is located within 100 feet of a construction access road and could be subjected to increased levels of dust during construction, potentially leading to reduced vigor of the shrub and consequently affecting valley elderberry longhorn beetle. However, according to Talley et al. (2006b:654–655), an experiment along the American River Parkway (Sacramento County) showed that conditions of elderberry shrubs associated with dust from nearby trails and roads (paved and dirt) did not affect the presence of valley elderberry longhorn beetle. The beetle may also be indirectly affected by operations and maintenance activities such as use of herbicides, which could harm elderberry shrubs and/or the beetle. Impacts on valley elderberry longhorn beetle would be significant because such impacts could reduce the local population size of a federally listed species through direct mortality or habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-4a, and BIO-4b would reduce this impact to a less-than-significant level.



**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-4a: Implement measures to avoid or protect habitat for valley elderberry longhorn beetle****Mitigation Measure BIO-4b: Compensate for direct and indirect effects on valley elderberry longhorn beetle****Impact BIO-5a-1: Potential disturbance or mortality of and loss of suitable habitat for California tiger salamander, western spadefoot, California red-legged frog, and foothill yellow-legged frog—program Alternative 1: 417 MW (less than significant with mitigation)**

Construction activities in the program area could result in direct effects on California tiger salamander, western spadefoot, California red-legged frog, and foothill yellow-legged frog (collectively referred to as special-status amphibians) or their habitats (seasonal wetland, freshwater marsh, mixed willow riparian scrub, ponds, drainages, and surrounding upland areas). Estimated permanent and temporary impacts on seasonal wetland, freshwater marsh, mixed willow riparian scrub, and ponds that may provide habitat for special-status amphibians are shown in Table 3.4-7. Impacts on drainages that may provide potential habitat for California red-legged frog and foothill yellow-legged frog could not be estimated because these features have not yet been delineated. The majority of construction activities would take place on suitable upland grassland dispersal and aestivation habitat for California tiger salamander, western spadefoot, and California red-legged frog. Aquatic habitats for special-status amphibians would generally be avoided; however, direct impacts on habitat and impacts on water quality could result from road construction or widening activities.

Construction activities such as excavation, grading, or stockpiling of soil, could fill, remove or otherwise alter suitable habitat for special-status amphibians or result in injury or mortality of individual amphibians. Potential direct impacts include mortality or injury by equipment, entrapment in open trenches or other project facilities, and removal or disturbance of upland habitat that results in damage or elimination of suitable aestivation burrows. Specific activities that may affect these species could include installation of power collection and communication systems, turbine construction, road infrastructure construction/maintenance and upgrades, meteorological tower installation and removal, temporary staging area set-up, and reclamation activities. Special-status amphibians could be injured or killed if vehicles or construction equipment are driven through occupied habitat, or if gasoline, oil, or other contaminants enter habitat. Changes in hydrology or sedimentation of habitat from erosion associated with project construction could alter the suitability of their habitat or cause mortality.

Operation and maintenance activities may also result in impacts on special-status amphibians or their habitats. Travel on maintenance roads during the rainy season or when amphibians are dispersing could result in mortality of individuals. Road and firebreak maintenance could result in degradation of habitat or injury or mortality of special-status amphibians. These impacts would be significant because they could reduce the local population sizes of federally listed and sensitive

amphibians through direct mortality or habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, and BIO-5a through BIO-5c would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-5a: Implement best management practices to avoid and minimize effects on special-status amphibians**

All project proponents will ensure that BMPs and other appropriate measures, in accordance with measures developed for the EACCS, be incorporated into the appropriate design and construction documents. *Implementation of some of these measures will require that the project proponent obtain incidental take permits from USFWS (California red-legged frog and California tiger salamander) and from CDFW (California tiger salamander only) before construction begins.* Additional conservation measures or conditions of approval may be required in applicable project permits (e.g., ESA or CESA incidental take authorization). The applicant will comply with the State of California State Water Resources Control Board NPDES construction general requirements for stormwater.

- Ground-disturbing activities will be limited to dry weather between April 15 and October 31. No ground-disturbing work will occur during wet weather. Wet weather is defined as when there has been 0.25 inch of rain in a 24-hour period. Ground disturbing activities halted due to wet weather may resume when precipitation ceases and the National Weather Service 72-hour weather forecast indicates a 30% or less chance of precipitation. No ground-disturbing work will occur during a dry-out period of 48 hours after the above referenced wet weather.
- Where applicable, barrier fencing will be installed around the worksite to prevent amphibians from entering the work area. Barrier fencing will be removed within 72 hours of completion of work.
- Before construction begins, a qualified biologist will locate appropriate relocation areas and prepare a relocation plan for special-status amphibians that may need to be moved during construction. The proponent will submit this plan to USFWS and CDFW for approval a minimum of 2 weeks prior to the start of construction.
- A qualified biologist will conduct preconstruction surveys immediately prior to ground-disturbing activities (including equipment staging, vegetation removal, grading). The biologist will survey the work area and all suitable habitats within 300 feet of the work area. If individuals (including adults, juveniles, larvae, or eggs) are found, work will not begin until USFWS and/or CDFW is contacted to determine if moving these life-stages is appropriate. If relocation is deemed necessary, it will be conducted in accordance with the relocation plan. Incidental take permits are required for relocation of California tiger salamander (USFWS and CDFW) and California red-legged frog (USFWS). Relocation of

western spadefoot and foothill yellow-legged frog requires a letter from CDFW authorizing this activity.

- No monofilament plastic will be used for erosion control.
- All project activity will terminate 30 minutes before sunset and will not resume until 30 minutes after sunrise during the migration/active season from November 1 to June 15. Sunrise and sunset times are established by the U.S. Naval Observatory Astronomical Applications Department for the geographic area where the project is located.
- Vehicles will not exceed a speed limit of 15 mph on unpaved roads within natural land cover types, or during offroad travel.
- Trenches or holes more than 6 inches deep will be provided with one or more escape ramps constructed of earth fill or wooden planks and will be inspected by a qualified biologist prior to being filled. Any such features that are left open overnight will be searched each day prior to construction activities to ensure no covered species are trapped. Work will not continue until trapped animals have moved out of open trenches.
- Work crews or the onsite biological monitor will inspect open trenches, pits, and under construction equipment and material left onsite in the morning and evening to look for amphibians that may have become trapped or are seeking refuge.
- If special-status amphibians are found in the work area during construction and cannot or do not move offsite on their own, a qualified biologist who is USFWS and/or CDFW-approved under a biological opinion and/or incidental take permit for the specific project, will trap and move special-status amphibians in accordance with the relocation plan. Relocation of western spadefoot and foothill yellow-legged frog requires a letter permit from CDFW authorizing this activity.

#### **Mitigation Measure BIO-5b: Compensate for loss of habitat for special-status amphibians**

Where impacts on aquatic and upland habitat for special-status amphibians cannot be avoided or minimized, compensatory mitigation will be undertaken in accordance with mitigation ratios and requirements developed under the EACCS (Appendix C). In the event that take authorization is required, compensatory mitigation will be undertaken in accordance with the terms of the authorization in consultation with USFWS and/or CDFW.

#### **Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

Within 30 days prior to any ground disturbance, a qualified biologist will prepare a Grassland Restoration Plan in coordination with CDFW and subject to CDFW approval, to ensure that temporarily disturbed annual grasslands and areas planned for the removal of permanent roads and turbine pad areas are restored to preproject conditions. The Grassland Restoration Plan will include but not be limited to the following measures.

- Gravel will be removed from areas proposed for grassland restoration.
- To the maximum extent feasible, topsoil will be salvaged from within onsite work areas prior to construction. Imported fill soils will be limited to weed-free topsoil similar in texture, chemical composition, and pH to soils found at the restoration site.
- Where appropriate, restoration areas will be seeded (hydroseeding is acceptable) to ensure erosion control. Seed mixes will be tailored to closely match that of reference site(s) within

the program area and should include native or naturalized, noninvasive species sourced within the project area or from the nearest available location.

- Reclaimed roads will be restored in such a way as to permanently prevent vehicular travel.

The plan will include a requirement to monitor restoration areas annually (between March and October) for up to 3 years following the year of restoration. The restoration will be considered successful when the percent cover for restored areas is 70% absolute cover of the planted/seeded species compared to the percent absolute cover of nearby reference sites. No more than 5% relative cover of the vegetation in the restoration areas will consist of invasive plant species rated as “high” in Cal-IPC’s California Invasive Plant Inventory Database (<http://www.cal-ipc.org>). Remedial measures prescribed in the plan will include supplemental seeding, weed control, and other actions as determined necessary to achieve the long-term success criteria. Monitoring may be extended if necessary to achieve the success criteria or if drought conditions preclude restoration success. Other performance standards may also be required as they relate to special-status species habitat; these will be identified in coordination with CDFW and included in the plan. The project proponent will provide evidence that CDFW has reviewed and approved the Grassland Restoration Plan. Additionally, the project proponent will provide annual monitoring reports to the County by January 31 of each year, summarizing the monitoring results and any remedial measures implemented (if any are necessary) during the previous year.

**Impact BIO-5a-2: Potential disturbance or mortality of and loss of suitable habitat for California tiger salamander, western spadefoot, California red-legged frog, and foothill yellow-legged frog—program Alternative 2: 450 MW (less than significant with mitigation)**

Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Construction activities in the program area could result in direct effects on special-status amphibians or their habitats (seasonal wetland, freshwater marsh, mixed willow riparian scrub, ponds, drainages, and surrounding upland areas). Estimated permanent and temporary impacts on seasonal wetland, freshwater marsh, mixed willow riparian scrub, and ponds that may provide habitat for special-status amphibians are shown in Table 3.4-7. Impacts on drainages that may provide potential habitat for California red-legged frog and foothill yellow-legged frog could not be estimated because these features have not yet been delineated. The majority of construction activities would take place on suitable upland grassland dispersal and aestivation habitat for California tiger salamander, western spadefoot, and California red-legged frog. Aquatic habitats for special-status amphibians would generally be avoided; however, direct impacts on habitat and impacts on water quality could result from road construction or widening activities.

Construction activities such as excavation, grading, or stockpiling of soil, could fill, remove or otherwise alter suitable habitat for special-status amphibians or result in injury or mortality of individual amphibians. Potential direct impacts include mortality or injury by equipment, entrapment in open trenches or other project facilities, and removal or disturbance of upland habitat that results in damage or elimination of suitable aestivation burrows. Specific activities that may affect these species could include installation of power collection and communication systems, turbine construction, road infrastructure construction/maintenance and upgrades, meteorological tower installation and removal, temporary staging area set-up, and reclamation activities. Special-

status amphibians could be injured or killed if vehicles or construction equipment are driven through occupied habitat, or if gasoline, oil, or other contaminants enter habitat. Changes in hydrology or sedimentation of habitat from erosion associated with project construction could alter the suitability of their habitat or cause mortality.

Operation and maintenance activities may also result in impacts on special-status amphibians or their habitats. Travel on maintenance roads during the rainy season or when amphibians are dispersing could result in mortality of individuals. Road and firebreak maintenance could result in degradation of habitat or injury or mortality of special-status amphibians. These impacts would be significant because they could reduce the local population sizes of federally listed and sensitive amphibians through direct mortality or habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, and BIO-5a through BIO-5c would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-5a: Implement best management practices to avoid and minimize effects on special-status amphibians**

**Mitigation Measure BIO-5b: Compensate for loss of habitat for special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Impact BIO-5b: Potential disturbance or mortality of and loss of suitable habitat for California tiger salamander, western spadefoot, California red-legged frog, and foothill yellow-legged frog—Golden Hills Project (less than significant with mitigation)**

Impacts from construction, operation, and maintenance of the Golden Hills Project would be similar to those described for the program. The majority of construction activities would take place on potential upland grassland dispersal and aestivation habitat for California tiger salamander, western spadefoot, and California red-legged frog. Aquatic habitats for special-status amphibians would generally be avoided; however, direct impacts on habitat and impacts on water quality could result from road construction or widening activities. Estimated permanent and temporary impacts on seasonal wetland, mixed willow riparian forest, and ponds that may provide habitat for special-status amphibians are shown in Table 3.4-8. Impacts on drainages that may provide potential habitat for California red-legged frog and foothill yellow-legged frog could not be estimated because these features have not yet been delineated. These impacts would be significant because they could reduce the local population sizes of federally listed and sensitive amphibians through direct mortality or habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, and BIO-5a through BIO-5c would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-5a: Implement best management practices to avoid and minimize effects on special-status amphibians**

**Mitigation Measure BIO-5b: Compensate for loss of habitat for special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Impact BIO-5c: Potential disturbance or mortality of and loss of suitable habitat for California tiger salamander, western spadefoot, California red-legged frog, and foothill yellow-legged frog—Patterson Pass Project (less than significant with mitigation)**

Impacts from construction, operation, and maintenance of the Patterson Pass Project would be similar to those described for the program. The majority of construction activities would take place on potential upland grassland dispersal and aestivation habitat for California tiger salamander, western spadefoot, and California red-legged frog. Aquatic habitats for special-status amphibians would generally be avoided; however, direct impacts on habitat and impacts on water quality could result from road construction or widening activities. Estimated permanent and temporary impacts on seasonal wetland, mixed willow riparian forest, and ponds that may provide habitat for special-status amphibians are shown in Table 3.4-9. Impacts on drainages that may provide potential habitat for California red-legged frog and foothill yellow-legged frog could not be estimated because these features have not yet been delineated. These impacts would be significant because they could reduce the local population sizes of federally listed and sensitive amphibians through direct mortality or habitat loss. Implementation of Mitigation Measures BIO-1b, BIO-1e, Bio-3, BIO-5a through BIO-5c would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-5a: Implement best management practices to avoid and minimize effects on special-status amphibians**

**Mitigation Measure BIO-5b: Compensate for loss of habitat for special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Impact BIO-6a-1: Potential disturbance or mortality of and loss of suitable habitat for western pond turtle—program Alternative 1: 417 MW (less than significant with mitigation)**

Construction activities in the program area could result in direct effects on western pond turtle or its habitats (ponds, reservoirs, drainages, and surrounding riparian and grassland areas). Estimated permanent and temporary impacts on ponds, reservoirs, riparian, and grassland that may provide habitat for western pond turtle are shown in Table 3.4-7. Impacts on drainages that may provide potential habitat for western pond turtle could not be estimated because these features have not yet been delineated. Because the majority of construction activities would take place on grassland habitat along ridgelines, suitable aquatic habitat would generally be avoided; however, direct impacts on habitat and impacts on water quality could result from road construction or widening activities.

Aquatic and upland (overwintering, nesting) habitat for western pond turtle may be removed or temporarily disturbed by construction activities. Potential direct impacts include mortality or injury by equipment, entrapment in open trenches or other project facilities, and removal or disturbance of aquatic or upland nesting habitat. Western pond turtles could also be injured or killed if gasoline, oil, or other contaminants enter habitat. Declines in populations of western pond turtle throughout the species' range have been documented (Jennings and Hayes 1994). Loss of individuals in the program area could diminish the local population and lower reproductive potential, contributing to the further decline of the species. The loss of upland nesting sites or eggs would also decrease the local population. This impact would be significant, but implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, and BIO-6 would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-6: Conduct preconstruction surveys for western pond turtle and monitor construction activities if turtles are observed**

If it is determined through preconstruction surveys conducted pursuant to Mitigation Measure BIO-3a that suitable aquatic or upland habitat for western pond turtle is present within proposed work areas, the following measures, consistent with measures developed for the EACCS, will be implemented to ensure that the proposed project does not have a significant impact on western pond turtle.

- One week before and within 24 hours of beginning work in suitable aquatic habitat, a qualified biologist (one who is familiar with different species of turtles) will conduct surveys for western pond turtle. The surveys should be timed to coincide with the time of day and year when turtles are most likely to be active (during the cooler part of the day between 8 a.m. and 12 p.m. during spring and summer). Prior to conducting the surveys, the biologist should locate the microhabitats for turtle basking (logs, rocks, brush thickets) and determine a location to quietly observe turtles. Each survey should include a 30-minute wait time after arriving onsite to allow startled turtles to return to open basking areas. The

survey should consist of a minimum 15-minute observation period for each area where turtles could be observed.

- If western pond turtles are observed during either survey, a biological monitor will be present during construction activities in the aquatic habitat where the turtle was observed. The biological monitor also will be mindful of suitable nesting and overwintering areas in proximity to suitable aquatic habitat and will periodically inspect these areas for nests and turtles.
- If one or more western pond turtles are found in the work area during construction and cannot or do not move offsite on their own, a qualified biologist will remove and relocate the turtle to appropriate aquatic habitat outside and away from the construction area. Relocation of western pond turtle requires a letter from CDFW authorizing this activity.

**Impact BIO-6a-2: Potential disturbance or mortality of and loss of suitable habitat for western pond turtle—program Alternative 2: 450 MW (less than significant with mitigation)**

Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Construction activities in the program area could result in direct effects on western pond turtle or its habitats (ponds, reservoirs, drainages, and surrounding riparian and grassland areas). Estimated permanent and temporary impacts on ponds, reservoirs, riparian, and grassland that may provide habitat for western pond turtle are shown in Table 3.4-7. Impacts on drainages that may provide potential habitat for western pond turtle could not be estimated because these features have not yet been delineated. Because the majority of construction activities would take place on grassland habitat along ridgelines, suitable aquatic habitat would generally be avoided; however, direct impacts on habitat and impacts on water quality could result from road construction or widening activities.

Aquatic and upland (overwintering, nesting) habitat for western pond turtle may be removed or temporarily disturbed by construction activities. Potential direct impacts include mortality or injury by equipment, entrapment in open trenches or other project facilities, and removal or disturbance of aquatic or upland nesting habitat. Western pond turtles could also be injured or killed if gasoline, oil, or other contaminants enter habitat. Declines in populations of western pond turtle throughout the species' range have been documented (Jennings and Hayes 1994). Loss of individuals in the program area could diminish the local population and lower reproductive potential, contributing to the further decline of the species. The loss of upland nesting sites or eggs would also decrease the local population. This impact would be significant, but implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, and BIO-6 would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**



**Mitigation Measure BIO-6: Conduct preconstruction surveys for western pond turtle and monitor construction activities if turtles are observed****Impact BIO-6b: Potential disturbance or mortality of and loss of suitable habitat for western pond turtle—Golden Hills Project (less than significant with mitigation)**

Impacts from construction, operation, and maintenance of the Golden Hills Project would be similar to those described for the program. Estimated permanent and temporary impacts on ponds, mixed willow riparian scrub, and grassland that may provide habitat for western pond turtle are shown in Table 3.4-8. Impacts on drainages that may provide potential habitat for western pond turtle could not be estimated because these features have not yet been delineated. Because the majority of construction activities would take place on grassland habitat along ridgelines, suitable aquatic habitat would generally be avoided; however, direct impacts on habitat and impacts on water quality could result from road construction or widening activities.

Aquatic and upland (overwintering, nesting) habitat for western pond turtle may be removed or temporarily disturbed by construction activities. Potential direct impacts include mortality or injury by equipment, entrapment in open trenches or other project facilities, and removal or disturbance of aquatic or upland nesting habitat. Western pond turtles could also be injured or killed if gasoline, oil, or other contaminants enter habitat. Declines in populations of western pond turtle throughout the species' range have been documented (Jennings and Hayes 1994). Loss of individuals in the project area could diminish the local population and lower reproductive potential, contributing to the further decline of the species. The loss of upland nesting sites or eggs would also decrease the local population. This impact would be significant, but implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, and BIO-6 would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-6: Conduct preconstruction surveys for western pond turtle and monitor construction activities if turtles are observed****Impact BIO-6c: Potential disturbance or mortality of and loss of suitable habitat for western pond turtle—Patterson Pass Project (less than significant with mitigation)**

Impacts from construction, operation, and maintenance of the Patterson Pass Project would be similar to those described for the program. Estimated permanent and temporary impacts on ponds, mixed willow riparian scrub, and grassland that may provide habitat for western pond turtle are shown in Table 3.4-9. Impacts on drainages that may provide potential habitat for western pond turtle could not be estimated because these features have not yet been delineated. Because the majority of construction activities would take place on grassland habitat along ridgelines, suitable aquatic habitat would generally be avoided; however, direct impacts on habitat and impacts on water quality could result from road construction or widening activities.

Aquatic and upland (overwintering, nesting) habitat for western pond turtle may be removed or temporarily disturbed by construction activities. Potential direct impacts include mortality or injury by equipment, entrapment in open trenches or other project facilities, and removal or disturbance of aquatic or upland nesting habitat. Western pond turtles could also be injured or killed if gasoline, oil, or other contaminants enter habitat. Declines in populations of western pond turtle throughout the species' range have been documented (Jennings and Hayes 1994). Loss of individuals in the project area could diminish the local population and lower reproductive potential, contributing to the further decline of the species. The loss of upland nesting sites or eggs would also decrease the local population. This impact would be significant, but implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, and BIO-6 would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-6: Conduct preconstruction surveys for western pond turtle and monitor construction activities if turtles are observed**

**Impact BIO-7a-1: Potential disturbance or mortality of and loss of suitable habitat for Blainville's horned lizard, Alameda whipsnake, and San Joaquin coachwhip—program Alternative 1: 417 MW (less than significant with mitigation)**

Construction activities in the program area could result in direct effects on Blainville's horned lizard, Alameda whipsnake, and San Joaquin coachwhip or their habitats (grassland, chaparral, oak woodland, and scrub). Estimated permanent and temporary impacts on grassland, chaparral, oak woodland, and scrub that may provide habitat for these species are shown in Table 3.4-7. It is anticipated that the majority of construction activities would take place on grassland habitat along ridgelines and that loss of chaparral, oak woodland, and scrub habitat would be minimal. Potential direct impacts include mortality or injury by equipment, entrapment in open trenches or other project facilities, and removal or disturbance of habitat. Operation and maintenance activities, such as road and firebreak maintenance, may also result in injury or mortality of individuals. Blainville's horned lizard has disappeared from portions of its range and continues to be threatened by development in other portions of its range (Jennings and Hayes 1994:132). Alameda whipsnake is state- and federally listed as threatened because of habitat loss and fragmentation resulting from urban development (U.S. Fish and Wildlife Service 2002b:69). San Joaquin coachwhip has a restricted geographic range and is threatened by continued conversion of its habitat to cropland and urban development (Jennings and Hayes 1994:164). Loss of individuals in the program area could diminish the local populations of these species and lower reproductive potential, contributing to the further decline of these species. This would be a significant impact; however, implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-7a, and BIO-7b would reduce this impact to a less-than-significant level by reducing the potential for injury and mortality of individuals, restoring disturbed habitat, and compensating for permanent habitat loss.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-5c: Restore disturbed annual grasslands****Mitigation Measure BIO-7a: Implement best management practices to avoid and minimize effects on special-status reptiles**

Where suitable habitat for Blainville's horned lizard, Alameda whipsnake, or San Joaquin coachwhip is identified in proposed work areas, all project proponents will ensure that BMPs and other appropriate measures, in accordance with measures developed for the EACCS, be incorporated into the appropriate design and construction documents. *Implementation of some of these measures will require that the project proponent obtain incidental take permits from USFWS and CDFW (Alameda whipsnake) before construction begins.* Additional conservation measures or conditions of approval may be required in applicable project permits (i.e., ESA incidental take permit).

- A qualified biologist will conduct preconstruction surveys immediately prior to ground-disturbing activities (e.g., equipment staging, vegetation removal, grading) associated with the program. If any Blainville's horned lizards, Alameda whipsnakes, or San Joaquin coachwhips are found, work will not begin until they are moved out of the work area to a USFWS- and/or CDFW-approved relocation site. Incidental take permits from USFWS and CDFW are required for relocation of Alameda whipsnake. Relocation of Blainville's horned lizard and San Joaquin coachwhip requires a letter from CDFW authorizing this activity.
- No monofilament plastic will be used for erosion control.
- Where applicable, barrier fencing will be used to exclude Blainville's horned lizard, Alameda whipsnake, and San Joaquin coachwhip. Barrier fencing will be removed within 72 hours of completion of work.
- Work crews or an onsite biological monitor will inspect open trenches and pits and under construction equipment and materials left onsite for special-status reptiles each morning and evening during construction.
- Ground disturbance in suitable habitat will be minimized.
- Vegetation within the proposed work area will be removed prior to grading. Prior to clearing and grubbing operations, a qualified biologist will clearly mark vegetation within the work area that will be avoided. Vegetation outside the work area will not be removed. Where possible hand tools (e.g., trimmer, chain saw) will be used to trim or remove vegetation. All vegetation removal will be monitored by the qualified biologist to minimize impacts on special-status reptiles.
- If special-status reptiles are found in the work area during construction and cannot or do not move offsite on their own, a qualified biologist who is USFWS- and/or CDFW-approved

under an incidental take permit for the specific project will trap and move the animal(s) to a USFWS and/or CDFW-approved relocation area. Incidental take permits from USFWS and CDFW are required for relocation of Alameda whipsnake. Relocation of Blainville's horned lizard and San Joaquin coachwhip requires a letter from CDFW authorizing this activity.

**Mitigation Measure BIO-7b: Compensate for loss of habitat for special-status reptiles**

Where impacts on habitat for special-status reptiles cannot be avoided or minimized, compensatory mitigation will be undertaken in accordance with mitigation ratios and requirements developed under the EACCS (Appendix C). In the event that incidental take permits are required for Alameda whipsnake, compensatory mitigation will be undertaken in accordance with the terms of permits in consultation with USFWS and CDFW.

**Impact BIO-7a-2: Potential disturbance or mortality of and loss of suitable habitat for Blainville's horned lizard, Alameda whipsnake, and San Joaquin coachwhip—program Alternative 2: 450 MW (less than significant with mitigation)**

Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Construction activities in the program area could result in direct effects on Blainville's horned lizard, Alameda whipsnake, and San Joaquin coachwhip or their habitats (grassland, chaparral, oak woodland, and scrub). Estimated permanent and temporary impacts on grassland, chaparral, oak woodland, and scrub that may provide habitat for these species are shown in Table 3.4-7. It is anticipated that the majority of construction activities would take place on grassland habitat along ridgelines and that loss of chaparral, oak woodland, and scrub habitat would be minimal. Potential direct impacts include mortality or injury by equipment, entrapment in open trenches or other project facilities, and removal or disturbance of habitat. Operation and maintenance activities, such as road and firebreak maintenance, may also result in injury or mortality of individuals. Blainville's horned lizard has disappeared from portions of its range and continues to be threatened by development in other portions of its range (Jennings and Hayes 1994:132). Alameda whipsnake is state- and federally listed as threatened because of habitat loss and fragmentation resulting from urban development (U.S. Fish and Wildlife Service 2002b: 69). San Joaquin coachwhip has a restricted geographic range and is threatened by continued conversion of its habitat to cropland and urban development (Jennings and Hayes 1994:164). Loss of individuals in the program area could diminish the local populations of these species and lower reproductive potential, contributing to the further decline of these species. This would be a significant impact; however, implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-7a, and BIO-7b would reduce this impact to a less-than-significant level by reducing the potential for injury and mortality of individuals, restoring disturbed habitat, and compensating for permanent habitat loss.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands****Mitigation Measure BIO-7a: Implement best management practices to avoid and minimize effects on special-status reptiles****Mitigation Measure BIO-7b: Compensate for loss of habitat for special-status reptiles****Impact BIO-7b: Potential disturbance or mortality of and loss of suitable habitat for Blainville's horned lizard, Alameda whipsnake, and San Joaquin coachwhip—Golden Hills Project (less than significant with mitigation)**

Impacts from construction, operation, and maintenance of the Golden Hills Project would be similar to those described for the program. Estimated permanent and temporary impacts on grassland, chaparral, oak woodland, and scrub that may provide habitat for Blainville's horned lizard, Alameda whipsnake, or San Joaquin coachwhip are shown in Table 3.4-8. It is anticipated that the majority of construction activities would take place on grassland habitat along ridgelines and that loss of chaparral, oak woodland, and scrub habitat would be minimal. Potential direct impacts include mortality or injury by equipment, entrapment in open trenches or other project facilities, and removal or disturbance of habitat. Operation and maintenance activities, such as road and firebreak maintenance, may also result in injury or mortality of individuals. Loss of individuals in the project area could diminish the local populations of these species and lower reproductive potential, contributing to the further decline of these species. This would be a significant impact, but implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-7a, and BIO-7b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-5c: Restore disturbed annual grasslands****Mitigation Measure BIO-7a: Implement best management practices to avoid and minimize effects on special-status reptiles****Mitigation Measure BIO-7b: Compensate for loss of habitat for special-status reptiles****Impact BIO-7c: Potential disturbance or mortality of and loss of suitable habitat for Blainville's horned lizard, Alameda whipsnake, and San Joaquin coachwhip—Patterson Pass Project (less than significant with mitigation)**

Impacts from construction, operation, and maintenance of the Patterson Pass Project would be similar to those described for the program. Estimated permanent and temporary impacts on grassland and mixed willow riparian scrub that may provide habitat for Blainville's horned lizard, Alameda whipsnake, or San Joaquin coachwhip are shown in Table 3.4-9. It is anticipated that the

majority of construction activities would take place on grassland habitat along ridgelines and that loss of mixed willow riparian scrub habitat would be minimal. Potential direct impacts include mortality or injury by equipment, entrapment in open trenches or other project facilities, and removal or disturbance of habitat. Operation and maintenance activities, such as road and firebreak maintenance, may also result in injury or mortality of individuals. Loss of individuals in the project area could diminish the local populations of these species and lower reproductive potential, contributing to the further decline of these species. This would be a significant impact; however, implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-7a, and BIO-7b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-7a: Implement best management practices to avoid and minimize effects on special-status reptiles**

**Mitigation Measure BIO-7b: Compensate for loss of habitat for special-status reptiles**

**Impact BIO-8a-1: Potential construction-related disturbance or mortality of special-status and non-special-status migratory birds—program Alternative 1: 417 MW (less than significant with mitigation)**

Construction activities during the nesting season (generally February 1–August 31) of white-tailed kite, bald eagle, northern harrier, Swainson’s hawk, golden eagle, western burrowing owl, loggerhead shrike, and tricolored blackbird could result in direct effects on these species, as well as on non-special-status migratory birds, if they are nesting in the program area. Suitable nesting habitat may be present in nearly all land cover types in the program area. Removal of grassland, burrows, wetland and marsh vegetation, and trees or shrubs with active nests and construction disturbance during the breeding season may result in nest abandonment and subsequent loss of eggs or young. Because the placement of wind turbines would generally be on the tops of hills and ridgelines in the program area where trees are not generally present, the number of trees to be removed is expected to be very low. Exclusion of burrowing owls from their burrows during the non-nesting season as part of efforts to avoid or minimize some forms of direct take could result in harm of burrowing owls. Estimated permanent and temporary impacts on suitable foraging habitat (grassland, cropland, alkali meadow and scald, and wetlands) for special-status and non-special-status birds are shown in Table 3.4-7. Such losses could affect the local population of special-status and non-special-status birds. This would be a significant impact. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-8a, and BIO-8b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-5c: Restore disturbed annual grasslands****Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential impacts on special-status and non-special-status nesting birds**

Where suitable habitat is present for raptors within 1 mile (within 2 miles for golden eagles) and for tree/shrub- and ground-nesting migratory birds (non-raptors) within 50 feet of proposed work areas, the following measures will be implemented to ensure that the proposed project does not have a significant impact on nesting special-status and non-special-status birds.

- Remove suitable nesting habitat (shrubs and trees) during the non-breeding season (typically September 1–January 31) for nesting birds.
- To the extent feasible, avoid construction activities in or near suitable or occupied nesting habitat during the breeding season of birds (generally February 1–August 31).
- If construction activities (including vegetation removal, clearing, and grading) will occur during the nesting season for migratory birds, a qualified biologist will conduct preconstruction nesting bird surveys within 7 days prior to construction activities. The construction area and a 1-mile buffer will be surveyed for tree-nesting raptors (except for golden eagles), and a 50-foot buffer will be surveyed for all other bird species.
- Surveys to locate eagle nests within 2 miles of construction will be conducted during the breeding season prior to construction. A 1-mile no-disturbance buffer will be implemented for construction activities to protect nesting eagles from disturbance. Through coordination with USFWS, the no-disturbance buffer may be reduced to 0.5 mile if construction activities are not within line-of-sight of the nest.
- If an active nest (other than golden eagle) is identified near a proposed work area and work cannot be conducted outside the nesting season (February 1–August 31), a no-activity zone will be established around the nest by a qualified biologist in coordination with USFWS and/or CDFW. Fencing and/or flagging will be used to delineate the no-activity zone. To minimize the potential to affect the reproductive success of the nesting pair, the extent of the no-activity zone will be based on the distance of the activity to the nest, the type and extent of the proposed activity, the duration and timing of the activity, the sensitivity and habituation of the species, and the dissimilarity of the proposed activity to background activities. The no-activity zone will be large enough to avoid nest abandonment and will be between 50 feet and 1 mile from the nest, or as otherwise required by USFWS and/or CDFW.

**Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl**

Where suitable habitat for western burrowing owl is in or within 500 feet of proposed work areas, the following measures will be implemented to avoid or minimize potential adverse impacts on burrowing owls.

- To the maximum extent feasible (e.g., where the construction footprint can be modified), construction activities within 500 feet of active burrowing owl burrows will be avoided during the nesting season (February 1–August 31).
- A qualified biologist will conduct preconstruction take avoidance surveys for burrowing owl no less than 14 days prior to and within 24 hours of initiating ground-disturbing activities. The survey area will encompass the work area and a 500-foot buffer around this area.
- If an active burrow is identified near a proposed work area and work cannot be conducted outside the nesting season (February 1–August 31), a no-activity zone will be established by a qualified biologist in coordination with CDFW. The no-activity zone will be large enough to avoid nest abandonment and will extend a minimum of 250 feet around the burrow.
- If burrowing owls are present at the site during the non-breeding season (September 1–January 31), a qualified biologist will establish a no-activity zone that extends a minimum of 150 feet around the burrow.
- If the designated no-activity zone for either breeding or non-breeding burrowing owls cannot be established, a wildlife biologist experienced in burrowing owl behavior will evaluate site-specific conditions and, in coordination with CDFW, recommend a smaller buffer (if possible) and/or other measure that still minimizes disturbance of the owls (while allowing reproductive success during the breeding season). The site-specific buffer (and/or other measure) will consider the type and extent of the proposed activity occurring near the occupied burrow, the duration and timing of the activity, the sensitivity and habituation of the owls, and the dissimilarity of the proposed activity to background activities.
- If burrowing owls are present in the direct disturbance area and cannot be avoided during the non-breeding season (generally September 1 through January 31), burrowing owls may be excluded from burrows through the installation of one-way doors at burrow entrances. A burrowing owl exclusion plan, prepared by the project proponent, must be approved by CDFW prior to exclusion of owls. One-way doors (e.g., modified dryer vents or other CDFW-approved method) will be left in place for a minimum of 1 week and monitored daily to ensure that the owl(s) have left the burrow(s). Excavation of the burrow will be conducted using hand tools. During excavation of the burrow, a section of flexible plastic pipe (at least 3 inches in diameter) will be inserted into the burrow tunnel to maintain an escape route for any animals that may be inside the burrow. Owls will be excluded from their burrows as a last resort and only if other avoidance and minimization measures cannot be implemented.
- Avoid destruction of unoccupied burrows outside the work area and place visible markers near burrows to ensure that they are not collapsed.
- Conduct ongoing surveillance of the project site for burrowing owls during project activities. If additional owls are observed using burrows within 500 feet of construction, the onsite biological monitor will determine, in coordination with CDFW, if the owl(s) are or would be affected by construction activities and if additional exclusion zones are required.



**Impact BIO-8a-2: Potential construction-related disturbance or mortality of special-status and non-special-status migratory birds—program Alternative 2: 450 MW (less than significant with mitigation)**

Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Construction activities during the nesting season (generally February 1–August 31) of white-tailed kite, bald eagle, northern harrier, Swainson’s hawk, golden eagle, western burrowing owl, loggerhead shrike, and tricolored blackbird could result in direct effects on these species, as well as on non-special-status migratory birds, if they are nesting in the program area. Suitable nesting habitat may be present in nearly all land cover types in the program area. Removal of grassland, burrows, wetland and marsh vegetation, and trees or shrubs with active nests and construction disturbance during the breeding season may result in nest abandonment and subsequent loss of eggs or young. Because the placement of wind turbines would generally be on the tops of hills and ridgelines in the program area where trees are not generally present, the number of trees to be removed is expected to be very low. Exclusion of burrowing owls from their burrows during the non-nesting season as part of efforts to avoid or minimize some forms of direct take could result in harm of burrowing owls. Estimated permanent and temporary impacts on suitable foraging habitat (grassland, cropland, alkali meadow and scald, and wetlands) for special-status and non-special-status birds are shown in Table 3.4-7. Such losses could affect the local population of special-status and non-special-status birds. This would be a significant impact. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-8a, and BIO-8b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential impacts on special-status and non-special-status nesting birds**

**Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl**

**Impact BIO-8b: Potential construction-related disturbance or mortality of special-status and non-special-status migratory birds—Golden Hills Project (less than significant with mitigation)**

Construction activities during the nesting season (generally February 1–August 31) of white-tailed kite, bald eagle, northern harrier, Swainson’s hawk, golden eagle, western burrowing owl, loggerhead shrike, and tricolored blackbird could result in direct effects on these species, as well as on non-special-status migratory birds, if they are nesting in the project area. Suitable nesting

habitat may be present in nearly all land cover types in the project area. Removal of grassland, burrows, wetland and marsh vegetation, and trees or shrubs with active nests and construction disturbance during the breeding season may result in nest abandonment and subsequent loss of eggs or young. Because the placement of wind turbines would generally be on the tops of hills and ridgelines in the program area where trees are not generally present, the number of trees to be removed is expected to be very low. Exclusion of burrowing owls from their burrows during the non-nesting season as part of efforts to avoid or minimize some forms of direct take could result in harm of burrowing owls. Estimated permanent and temporary impacts on suitable foraging habitat (grassland, cropland, alkali meadow and scald, and wetlands) for special-status and non-special-status birds are shown in Table 3.4-8. Such losses could affect the local population of special-status and non-special-status birds. This would be a significant impact. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-8a, and BIO-8b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential impacts on special-status and non-special-status nesting birds**

**Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl**

**Impact BIO-8c: Potential construction-related disturbance or mortality of special-status and non-special-status migratory birds—Patterson Pass Project (less than significant with mitigation)**

Construction activities during the nesting season (generally February 1–August 31) of white-tailed kite, northern harrier, Swainson's hawk, golden eagle, western burrowing owl, loggerhead shrike, and tricolored blackbird could result in direct effects on these species, as well as on non-special-status migratory birds, if they are nesting in the project area. Suitable nesting habitat may be present in nearly all land cover types in the project area. Removal of grassland, burrows, wetland vegetation, and trees or shrubs with active nests and construction disturbance during the breeding season may result in nest abandonment and subsequent loss of eggs or young. Because the placement of wind turbines would generally be on the tops of hills and ridgelines in the program area where trees are not generally present, the number of trees to be removed is expected to be very low. Exclusion of burrowing owls from their burrows during the non-nesting season as part of efforts to avoid or minimize some forms of direct take could result in harm of burrowing owls. Estimated permanent and temporary impacts on suitable foraging habitat (grassland, mixed willow riparian scrub, and wetlands) for special-status and non-special-status birds are shown in Table 3.4-9. Such losses could affect the local population of special-status and non-special-status birds. This

would be a significant impact. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-8a, and BIO-8b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential impacts on special-status and non-special-status nesting birds**

**Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl**

**Impact BIO-9a-1: Permanent and temporary loss of occupied habitat for western burrowing owl and foraging habitat for tricolored blackbird and other special-status and non-special-status birds—program Alternative 1: 417 MW (less than significant with mitigation)**

Implementation of the program would result in the temporary and permanent loss of grassland that provides suitable foraging habitat for burrowing owl and a number of other special-status and non-special-status migratory birds. Because of the limited use of the program area by Swainson's hawks for foraging, no compensation is proposed for the loss of foraging habitat for Swainson's hawk. Estimated permanent and temporary impacts on suitable grassland foraging habitat for burrowing owl, tricolored blackbird, and other special-status and non-special-status birds are shown in Table 3.4-7. The loss of grassland foraging habitat for special-status and non-special-status birds would be compensated through implementation of Mitigation Measure BIO-5b (for special-status amphibians) and/or through the standardized mitigation ratios for nonlisted species developed for the EACCS (Appendix C).

CDFW has determined that compensation is required for permanent loss of occupied burrowing owl habitat (i.e., where burrowing owls have been documented to occupy burrows in the preceding 3 years). Permanent loss of occupied burrowing owl habitat could affect the local population and would be a significant impact; however, implementation of Mitigation Measures BIO-5b, BIO-5c, and BIO-9 would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-5b: Compensate for loss of habitat for special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-9: Compensate for the permanent loss of occupied habitat for western burrowing owl**

If construction activities would result in the removal of occupied burrowing owl habitat (determined during preconstruction surveys described in Mitigation Measure BIO-8a), this

habitat loss will be mitigated by permanently protecting mitigation land through a conservation easement or by implementing alternative mitigation determined through consultation with CDFW as described in its *Staff Report on Burrowing Owl Mitigation* (California Department of Fish and Game 2012:11–13). The project proponent will work with CDFW to develop the compensation plan, which will be subject to County review and approval.

**Impact BIO-9a-2: Permanent and temporary loss of occupied habitat for western burrowing owl and foraging habitat for tricolored blackbird and other special-status and non-special-status birds—program Alternative 2: 450 MW (less than significant with mitigation)**

Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Implementation of the program would result in the temporary and permanent loss of grassland that provides suitable foraging habitat for burrowing owl and a number of other special-status and non-special-status migratory birds. Because of the limited use of the program area by Swainson's hawks for foraging, no compensation is proposed for the loss of foraging habitat for Swainson's hawk. Estimated permanent and temporary impacts on suitable grassland foraging habitat for burrowing owl, tricolored blackbird, and other special-status and non-special-status birds are shown in Table 3.4-7. The loss of grassland foraging habitat for special-status and non-special-status birds would be compensated through implementation of Mitigation Measure BIO-5b (for special-status amphibians) and/or through the standardized mitigation ratios for nonlisted species developed for the EACCS (Appendix C).

CDFW has determined that compensation is required for permanent loss of occupied burrowing owl habitat (i.e., where burrowing owls have been documented to occupy burrows in the preceding 3 years). Permanent loss of occupied burrowing owl habitat could affect the local population and would be a significant impact; however, implementation of Mitigation Measures BIO-5b, BIO-5c, and BIO-9 would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-5b: Compensate for loss of habitat for special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-9: Compensate for the permanent loss of occupied habitat for western burrowing owl**

**Impact BIO-9b: Permanent and temporary loss of occupied habitat for western burrowing owl and foraging habitat for tricolored blackbird and other special-status and non-special-status birds—Golden Hills Project (less than significant with mitigation)**

Construction of the Golden Hills Project would result in the temporary and permanent loss of grassland that provides suitable foraging habitat for burrowing owl, tricolored blackbird, and a number of other special-status and non-special-status migratory birds. Estimated permanent and temporary impacts on suitable grassland foraging habitat for burrowing owl, tricolored blackbird, and other special-status and non-special-status birds are shown in Table 3.4-8. The loss of grassland foraging habitat for special-status and non-special-status birds would be compensated through implementation of Mitigation Measure 5b (for special-status amphibians) and/or through the standardized mitigation ratios for non-listed species developed for the EACCS (Appendix C).

CDFW has determined that compensation is required for permanent loss of occupied burrowing owl habitat (i.e., where burrowing owls have been documented to occupy burrows in the preceding 3 years). Permanent loss of occupied habitat could affect the local population and would be a significant impact; however, implementation of Mitigation Measures BIO-5b, BIO-5c, and BIO-9 would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-5b: Compensate for loss of habitat for special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-9: Compensate for the permanent loss of occupied habitat for western burrowing owl**

**Impact BIO-9c: Permanent and temporary loss of occupied habitat for western burrowing owl and foraging habitat for tricolored blackbird and other special-status and non-special-status birds—Patterson Pass Project (less than significant with mitigation)**

Construction of the Patterson Pass Project would result in the temporary and permanent loss of grassland that provides suitable foraging habitat for burrowing owl, tricolored blackbird, and a number of other special-status and non-special-status migratory birds. Estimated permanent and temporary impacts on suitable grassland foraging habitat for burrowing owl, tricolored blackbird, and other special-status and non-special-status birds are shown in Table 3.4-9. The loss of grassland foraging habitat for special-status and non-special-status birds would be compensated through implementation of Mitigation Measure 5b (for special-status amphibians) and/or through the standardized mitigation ratios for non-listed species developed for the EACCS (Appendix C).

CDFW has determined that compensation is required for permanent loss of occupied burrowing owl habitat (i.e., where burrowing owls have been documented to occupy burrows in the preceding 3 years). Permanent loss of occupied habitat could affect the local population and would be a significant impact; however, implementation of Mitigation Measures BIO-5c and BIO-9 would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-5b: Compensate for loss of habitat for special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-9: Compensate for the permanent loss of occupied habitat for western burrowing owl**

**Impact BIO-10a-1: Potential injury or mortality of and loss of habitat for San Joaquin kit fox and American badger—program Alternative 1: 417 MW (less than significant with mitigation)**

Construction activities in the program area could result in direct effects on San Joaquin kit fox and American badger or their grassland habitat. Estimated permanent and temporary impacts on grassland that provide suitable denning and foraging habitat for San Joaquin kit fox and American badger are shown in Table 3.4-7. In addition to the permanent and temporary removal of habitat, other potential direct impacts include mortality or injury of individuals from construction vehicles or heavy equipment, direct mortality or injury of individuals from den collapse and subsequent suffocation, temporary disturbance from noise and human presence associated with construction

activities, and harassment of individuals by construction personnel. Additionally, exposed pipes, large excavated holes, or trenches that are left open after construction has finished for the day could entrap San Joaquin kit foxes or American badgers. Operation and maintenance activities, such as road and firebreak maintenance, may also result in injury or mortality of individuals. San Joaquin kit fox is federally listed as endangered and state-listed as threatened because of habitat loss resulting from agricultural development, infrastructure construction, and urban development (U.S. Fish and Wildlife Service 2010:25). American badger has experienced drastic declines, particularly in the Central Valley, and has been extirpated from many areas in southern California (Williams 1986:66). Loss of individuals in the program area could diminish the local populations of these species and reduce reproductive potential, contributing to the further decline of these species. This would be a significant impact; however, implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-10a, and BIO-10b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-10a: Implement measures to avoid and minimize potential impacts on San Joaquin kit fox and American badger**

Where suitable habitat is present for San Joaquin kit fox and American badger in and adjacent to proposed work areas, the following measures, consistent with measures developed in the EACCS, will be implemented to ensure that proposed projects do not have a significant impact on San Joaquin kit fox or American badger. *Implementation of some of these measures will require that the project proponent obtain incidental take permits from USFWS and CDFW (San Joaquin kit fox) before construction begins.* Implementation of state and federal requirements contained in such authorization may constitute compliance with corresponding measures in this PEIR..

- To the maximum extent feasible, suitable dens for San Joaquin kit fox and American badger will be avoided.
- All project proponents will retain qualified approved biologists (as determined by USFWS) to conduct a preconstruction survey for potential San Joaquin kit fox dens (U.S. Fish and Wildlife Service 2011). Resumes of biologists will be submitted to USFWS for review and approval prior to the start of the survey.
- Preconstruction surveys for American badgers will be conducted in conjunction with San Joaquin kit fox preconstruction surveys.
- As described in U.S. Fish and Wildlife Service 2011, the preconstruction survey will be conducted no less than 14 days and no more than 30 days before the beginning of ground disturbance, or any activity likely to affect San Joaquin kit fox. The biologists will conduct den searches by systematically walking transects through the project area and a buffer area to be determined in coordination with USFWS and CDFW. Transect distance should be based

on the height of vegetation such that 100% visual coverage of the project area is achieved. If a potential or known den is found during the survey, the biologist will measure the size of the den, evaluate the shape of the den entrances, and note tracks, scat, prey remains, and recent excavations at the den site. The biologists will also determine the status of the dens and map the features. Dens will be classified in one of the following four den status categories defined by USFWS (U.S. Fish and Wildlife Service 2011).

- Potential den: Any subterranean hole within the species' range that has entrances of appropriate dimensions and for which available evidence is sufficient to conclude that it is being used or has been used by a kit fox. Potential dens include (1) any suitable subterranean hole; or (2) any den or burrow of another species (e.g., coyote, badger, red fox, ground squirrel) that otherwise has appropriate characteristics for kit fox use; or an artificial structure that otherwise has appropriate characteristics for kit fox use.
- Known den: Any existing natural den or artificial structure that is used or has been used at any time in the past by a San Joaquin kit fox. Evidence of use may include historical records; past or current radiotelemetry or spotlighting data; kit fox sign such as tracks, scat, and/or prey remains; or other reasonable proof that a given den is being or has been used by a kit fox (USFWS discourages use of the terms *active* and *inactive* when referring to any kit fox den because a great percentage of occupied dens show no evidence of use, and because kit foxes change dens often, with the result that the status of a given den may change frequently and abruptly).
- Known natal or pupping den: Any den that is used, or has been used at any time in the past, by kit foxes to whelp and/or rear their pups. Natal/pupping dens may be larger with more numerous entrances than dens occupied exclusively by adults. These dens typically have more kit fox tracks, scat, and prey remains in the vicinity of the den, and may have a broader apron of matted dirt or vegetation at one or more entrances. A natal den, defined as a den in which kit fox pups are actually whelped but not necessarily reared, is a more restrictive version of the pupping den. In practice, however, it is difficult to distinguish between the two; therefore, for purposes of this definition either term applies.
- Known atypical den: Any artificial structure that has been or is being occupied by a San Joaquin kit fox. Atypical dens may include pipes, culverts, and diggings beneath concrete slabs and buildings.

Written results of the survey including the locations of any potential or known San Joaquin kit fox dens will be submitted to USFWS within 5 days following completion of the survey and prior to the start of ground disturbance or construction activities.

- After preconstruction den searches and before the commencement of repowering activities, exclusion zones will be established as measured in a radius outward from the entrance or cluster of entrances of each den. Repowering activities will be prohibited or greatly restricted within these exclusion zones. Only essential vehicular operation on existing roads and foot traffic will be permitted. All other repowering activities, vehicle operation, material and equipment storage, and other surface-disturbing activities will be prohibited in the exclusion zones. Barrier fencing will be removed within 72 hours of completion of work. Exclusion zones will be established using the following parameters.

- Potential and atypical dens: A total of four or five flagged stakes will be placed 50 feet from the den entrance to identify the den location.
- Known den: Orange construction barrier fencing will be installed between the work area and the known den site at a minimum distance of 100 feet from the den. The fencing will be maintained until construction-related disturbances have ceased. At that time, all fencing will be removed to avoid attracting subsequent attention to the den.
- Natal/pupping den: USFWS will be contacted immediately if a natal or pupping den is discovered in or within 200 feet of the work area.
- Any occupied or potentially occupied badger den will be avoided by establishing an exclusion zone consistent with a San Joaquin kit fox potential burrow (i.e., four or five flagged stakes will be placed 50 feet from the den entrance).
- In cases where avoidance is not a reasonable alternative, limited destruction of potential San Joaquin kit fox dens may be allowed as follows.
  - Natal/pupping dens: Natal or pupping dens that are occupied will not be destroyed until the adults and pups have vacated the dens and then only after consultation with USFWS. Removal of natal/pupping dens requires incidental take authorization from USFWS and CDFW.
  - Known dens: Known dens within the footprint of the activity must be monitored for 3 days with tracking medium or an infrared camera to determine current use. If no kit fox activity is observed during this period, the den should be destroyed immediately to preclude subsequent use. If kit fox activity is observed during this period, the den will be monitored for at least 5 consecutive days from the time of observation to allow any resident animal to move to another den during its normal activity. Use of the den can be discouraged by partially plugging its entrance(s) with soil in such a manner that any resident animal can escape easily. Only when the den is determined to be unoccupied will the den be excavated under the direction of a biologist. If the fox is still present after 5 or more consecutive days of monitoring, the den may be excavated when, in the judgment of the biologist, it is temporarily vacant, such as during the fox's normal foraging activities. Removal of known dens requires incidental take authorization from USFWS and CDFW.
  - Potential dens: If incidental take permits have been received (from USFWS and CDFW), potential dens can be removed (preferably by hand excavation) by biologist or under the supervision of a biologist without monitoring, unless other restrictions were issued with the incidental take permits. If no take authorizations have been issued, the potential dens will be monitored as if they are known dens. If any den was considered a potential den but was later determined during monitoring or destruction to be currently or previously used by kit foxes (e.g., kit fox sign is found inside), then all construction activities will cease and USFWS and CDFW will be notified immediately.
- Nighttime work will be minimized to the extent possible. The vehicular speed limit will be reduced to 10 miles per hour during nighttime work.
- Pipes, culverts, and similar materials greater than 4 inches in diameter will be stored so as to prevent wildlife species from using these as temporary refuges, and these materials will be inspected each morning for the presence of animals prior to being moved.



- A representative appointed by the project proponent will be the contact for any employee or contractor who might inadvertently kill or injure a kit fox or who finds a dead, injured, or entrapped kit fox. The representative will be identified during environmental sensitivity training (Mitigation Measure BIO-1b) and his/her name and phone number will be provided to USFWS and CDFW. Upon such incident or finding, the representative will immediately contact USFWS and CDFW.
- The Sacramento USFWS office and CDFW will be notified in writing within 3 working days of the accidental death or injury of a San Joaquin kit fox during project-related activities. Notification must include the date, time, and location of the incident, and any other pertinent information.

#### **Mitigation Measure BIO-10b: Compensate for loss of suitable habitat for San Joaquin kit fox and American badger**

Where permanent impacts on habitat for San Joaquin kit fox and American badger cannot be avoided or minimized, compensatory mitigation will be undertaken in accordance with mitigation ratios and requirements developed under the EACCS (Appendix C). In the event that incidental take permits are required for San Joaquin kit fox, compensatory mitigation will be undertaken in accordance with the terms of permits in consultation with USFWS and CDFW.

#### **Impact BIO-10a-2: Potential injury or mortality of and loss of habitat for San Joaquin kit fox and American badger—program Alternative 2: 450 MW (less than significant with mitigation)**

Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Construction activities in the program area could result in direct effects on San Joaquin kit fox and American badger or their grassland habitat. Estimated permanent and temporary impacts on grassland that provide suitable denning and foraging habitat for San Joaquin kit fox and American badger are shown in Table 3.4-7. In addition to the permanent and temporary removal of habitat, other potential direct impacts include mortality or injury of individuals from construction vehicles or heavy equipment, direct mortality or injury of individuals from den collapse and subsequent suffocation, temporary disturbance from noise and human presence associated with construction activities, and harassment of individuals by construction personnel. Additionally, exposed pipes, large excavated holes, or trenches that are left open after construction has finished for the day could entrap San Joaquin kit foxes or American badgers. Operation and maintenance activities, such as road and firebreak maintenance, may also result in injury or mortality of individuals. San Joaquin kit fox is federally listed as endangered and state-listed as threatened because of habitat loss resulting from agricultural development, infrastructure construction, and urban development (U.S. Fish and Wildlife Service 2010:25). American badger has experienced drastic declines, particularly in the Central Valley, and has been extirpated from many areas in southern California (Williams 1986:66). Loss of individuals in the program area could diminish the local populations of these species and reduce reproductive potential, contributing to the further decline of these species. This would be a significant impact; however, implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-10a, and BIO-10b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-5c: Restore disturbed annual grasslands****Mitigation Measure BIO-10a: Implement measures to avoid and minimize potential impacts on San Joaquin kit fox and American badger****Mitigation Measure BIO-10b: Compensate for loss of suitable habitat for San Joaquin kit fox and American badger****Impact BIO-10b: Potential injury or mortality of and loss of habitat for San Joaquin kit fox and American badger—Golden Hills Project (less than significant with mitigation)**

Impacts from construction, operation, and maintenance of the Golden Hills Project would be similar to those described for the program. Estimated permanent and temporary impacts on grassland that provide suitable denning and foraging habitat for San Joaquin kit fox and American badger are shown in Table 3.4-8. In addition to the permanent and temporary removal of habitat, other direct impacts include mortality or injury of individuals from construction vehicles or heavy equipment, direct mortality or injury of individuals from den collapse and subsequent suffocation, temporary disturbance from noise and human presence associated with construction activities, and harassment of individuals by construction personnel. Additionally, exposed pipes, large excavated holes, or trenches that are left open after construction has finished for the day could entrap San Joaquin kit foxes or American badgers. Operation and maintenance activities, such as road and firebreak maintenance, may also result in injury or mortality of individuals. Loss of individuals in the project area could diminish the local populations and/or lower the reproductive potential of San Joaquin kit fox and American badger, contributing to the further decline of these species. This would be a significant impact; however, implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-10a, and BIO-10b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-5c: Restore disturbed annual grasslands****Mitigation Measure BIO-10a: Implement measures to avoid and minimize potential impacts on San Joaquin kit fox and American badger**

**Mitigation Measure BIO-10b: Compensate for loss of suitable habitat for San Joaquin kit fox and American badger****Impact BIO-10c: Potential injury or mortality of and loss of habitat for San Joaquin kit fox and American badger—Patterson Pass Project (less than significant with mitigation)**

Impacts from construction, operation, and maintenance of the Patterson Pass Project would be similar to those described for the program. Estimated permanent and temporary impacts on grassland that provide suitable denning and foraging habitat for San Joaquin kit fox and American badger are shown in Table 3.4-9. In addition to the permanent and temporary removal of habitat, other direct impacts include mortality or injury of individuals from construction vehicles or heavy equipment, direct mortality or injury of individuals from den collapse and subsequent suffocation, temporary disturbance from noise and human presence associated with construction activities, and harassment of individuals by construction personnel. Additionally, exposed pipes, large excavated holes, or trenches that are left open after construction has finished for the day could entrap San Joaquin kit foxes or American badgers. Operation and maintenance activities, such as road and firebreak maintenance, may also result in injury or mortality of individuals. Loss of individuals in the project area could diminish the local populations and/or lower the reproductive potential of San Joaquin kit fox and American badger, contributing to the further decline of these species. This would be a significant impact; however, implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3, BIO-5c, BIO-10a, and BIO-10b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-5c: Restore disturbed annual grasslands****Mitigation Measure BIO-10a: Implement measures to avoid and minimize potential impacts on San Joaquin kit fox and American badger****Mitigation Measure BIO-10b: Compensate for loss of suitable habitat for San Joaquin kit fox and American badger****Impact BIO-11a-1: Avian mortality resulting from interaction with wind energy facilities—program Alternative 1: 417 MW (significant and unavoidable)**

The operation of wind energy facilities has been shown to cause avian fatalities through collisions with wind turbines and powerlines and through electrocution on powerlines.

Most collection lines for first- and second- generation turbines are aboveground facilities. As repowering projects are implemented, old collection systems would be removed and new collection systems would be installed. The majority of new collection lines associated with the program would be undergrounded, reducing the risk of avian fatality from electrocution or collision with powerlines.

Diablo Winds, Buena Vista, and Vasco Winds are the only repowered projects in the APWRA for which estimates of avian fatality rates are available. Based on these estimates, avian collision risk is expected to be substantially reduced when older-generation turbines are replaced by newer, larger turbines with the same total rated nameplate capacity (Table 3.4-10). However, while the available evidence suggests that repowering could substantially reduce turbine-related avian fatalities below the levels documented for older generation turbines, avian fatalities would continue to occur. Moreover, while repowering is intended to reduce fatalities, enough uncertainty remains in light of project- and site-specific data to warrant a conservative approach in the impact analysis. Accordingly, the continued or increased loss of birds (including special-status species) at a rate exceeding the baseline rate would be a significant adverse impact. There is also evidence that the repowering program would result in continued avian mortality in conflict with specific laws and regulations (e.g., ESA, CESA, MBTA) that are not based on mortality rates, as described above in *Determination of Significance*, and with the objectives of the 2007 Settlement Agreement that bound the wind energy operators and the County to provide strategies and measures to conserve avian species of concern and their habitats. This conflict is considered a significant impact on protected and special-status avian species, and adopting a conservative expectation that some level of avian mortality will continue even with the implementation of every feasible mitigation measure and conservation strategy, this would be a significant and unavoidable impact.

It should be noted that turbines used in future repowering projects are likely to be of similar size to the Vasco Winds turbines but much larger than the Diablo Winds and Buena Vista turbines in both overall size and rated nameplate capacity. There is evidence to suggest that larger turbines—like those used in the Vasco Winds project—could result in additional decreases in avian fatality rates for bird species currently killed in the APWRA (Smallwood and Karas 2009). However, it is also possible that larger turbines may negatively affect a different suite of bird species that have been relatively unaffected by older (i.e., smaller) turbines. In addition, fatality rates in the APWRA are highly variable (that is, because they differ across years, turbines types, geographies, and topographies, species impacts may differ between sites due to different levels of use) and potentially imprecise (Smallwood et al 2010.; ICF International 2013). Nonetheless, these three repowering projects represent the best available information to understand the potential for avian fatalities associated with repowering; accordingly, data from these projects were used to form the basis for avian fatality estimates. The estimated changes associated with Alternative 1 are shown in Table 3.4-11 and discussed below. Postconstruction monitoring, once the turbines are in operation, will provide data to quantify the actual extent of change in avian fatalities from repowering and the extent of avian fatality for projects in the program area, and will contribute to the body of knowledge supporting future analyses.

**Table 3.4-11. Estimated Annual Avian Fatalities for Existing and Repowered Program Area—  
Alternative 1 (417 MW)**

Species	Estimated Annual Fatalities for Program Area						
	Nonrepowered	Repowered					
		Diablo Winds <sup>a</sup>		Buena Vista <sup>b</sup>		Vasco Winds <sup>c,d</sup>	
Average Annual Fatalities	Average Annual Fatalities	% Decrease	Average Annual Fatalities	% Decrease	Average Annual Fatalities	% Decrease	
American kestrel	194.2	37.5	81	62.6	75	123.8	36
Barn owl	79.5	8.3	90	0.0	100	13.8	83
Burrowing owl	255.1	350.3	-37	0.0	100	20.9	92
Golden eagle	26.6	4.2	84	16.7	44	13.3	50
Loggerhead shrike	61.8	0.0	100	0.0	100	0.0	100
Prairie falcon	6.6	0.0	100	0.0	100	0.0	100
Red-tailed hawk	144.5	83.4	42	41.7	71	102.6	29
Swainson's hawk	0.5	0.0	100	0.0	100	0.0	100
All raptors	799.9	504.6	37	129.3	84	267.7	67
All native non-raptors	1,482.0	1,046.7	29	421.2	81	873.2	41

Note: fatality rates reflect annual fatalities (95% confidence interval).

<sup>a</sup> Diablo Winds fatality rates extrapolated to the overall program area.

<sup>b</sup> Buena Vista fatality rates extrapolated to the overall program area.

<sup>c</sup> Vasco Winds fatality rates extrapolated to the overall program area.

<sup>d</sup> Vasco Winds fatality rate for golden eagle based on updated information received from NextEra Energy Resources on July 21, 2014, and extrapolated to the overall program area.

**American Kestrel.** As shown in Table 3.4-11, a fully repowered 417 MW program area would be expected to result in an estimated 38–124 American kestrel fatalities per year. Based on these estimates, the program could decrease average annual fatalities by 36–81%.

The North American population of American kestrels is estimated at more than 4,000,000 birds, representing 75% of the global population. Populations have declined over the western U.S. since the 1980s, pronouncedly so since the 1990s (Hawk Mountain 2007). This trend is also apparent for California's foothill and Central Valley populations (Sauer et al. 2008). North American Breeding Bird Survey (BBS) data indicate a decline in American kestrels for Coastal California and the state as a whole (Sauer et al. 2011), as do Christmas Bird Count data for California (National Audubon Society 2011).

Based on the estimated annual fatalities in Table 3.4.11, adverse effects on American kestrel from wind turbines would substantially decrease with repowering in the program area. In addition, Mitigation Measures BIO-11c and BIO-11f will further limit prey availability and reduce the number of potential perch sites in the program area, potentially reducing the exposure of American kestrels to turbine hazards. Furthermore, the rotor-swept area of repowered turbines would be higher off the ground than that of existing turbines, potentially reducing the risk to kestrels, as they are generally perch and pounce predators, perching lower in higher wind speeds (Smallwood and Bird 2002). Considering that American kestrel fatalities are likely to substantially decline with repowering (Smallwood et al. 2009; Smallwood 2010; ICF International 2012), repowering the program area is unlikely to have adverse impacts on American kestrels at the population level.

**Barn Owl.** As shown in Table 3.4-11, a fully repowered 417 MW program area would be expected to result in an estimated 8–14 barn owl fatalities per year. Based on these estimates, the program could decrease average annual fatalities by 83–90%.

Barn owls are common in California with a stable population in the state (Audubon California 2010). Although BBS results may indicate a declining population in the state, the data are of limited credibility due to sampling deficiencies (Sauer et al. 2011). Barn owls are used throughout California for rodent control in orchards and vineyards (Barn Owl Box Company 2012). It is uncertain what the effect of repowering the program area would have on local barn owl populations. The higher rotor-swept area of repowered turbines may reduce the risk of turbine collision, as most hunting is done in low quartering flights at about 1.5–4.5 meters (5–15 feet) above the ground (Marti et al. 2005). Mitigation Measure BIO-11c would also reduce the perch availability in the program area. It is unclear what the effects of the estimated 8–14 turbine-related fatalities of barn owls per year would have on the local population, but the species' relative abundance in the state would indicate that fatalities as a result of repowering would be unlikely to have adverse impacts on the species at the population level.

**Burrowing Owl.** As shown in Table 3.4-11, a fully repowered 417 MW program area would be expected to result in an estimated 30–350 burrowing owl fatalities per year—a change ranging from a 92% decrease to a 37% increase in fatalities. This fatality estimate is based on data from Diablo Winds and Vasco Winds because no burrowing owl fatalities were detected at Buena Vista. Current evidence suggests that burrowing owl fatality rates are not reduced by the transition from old- to new-generation turbines to the same extent as the fatality rates of other species. The increase in energy production from 329 MW to 417 MW would likely result in a small estimated increase in burrowing owl fatalities per year.

Focused surveys in Contra Costa County in 2006 on 3.3 square miles and 2007 on 4.4 square miles in the APWRA found 56 pairs and 67 pairs, respectively (Barclay and Harman 2008 unpublished data), suggesting that the APWRA could support several hundred pairs of burrowing owls distributed in clusters. Smallwood et al.'s (2012) surveys in 2011 and 2012 estimated approximately 500–600 breeding pairs, ranging in density from 0 to approximately 28 breeding pairs per square kilometer. Since this species has been extirpated from much of the San Francisco Bay Area, it is believed that the APWRA may support the largest number of breeding pairs in the Bay Area (Barclay and Harman 2008 unpublished data). Studies of burrowing owls in the APWRA have suggested that turbine-related mortalities may lower adult and juvenile survivorship sufficiently such that the local population is not self-sustaining in some years (Smallwood et al. 2008), but recent surveys indicate that burrowing owl abundance in the APWRA may be much greater than previously estimated (Smallwood et al. 2012). A growing body of circumstantial evidence indicates that many of the burrowing owl fatalities found during fatality surveys are due to predation rather than turbine collision. Because of this confounding effect, the potential reduction in turbine-related burrowing owl fatalities may be underestimated because of the inability to distinguish fatalities resulting from predation from those caused by turbine collision (ICF International 2013).

**Golden Eagle.** As shown in Table 3.4-11, a fully repowered 417 MW program area would be expected to result in an estimated 4–17 golden eagle fatalities per year. Based on these estimates, the program could decrease average annual fatalities by 44–84%.

Portions of the Diablo Range in southern Alameda County and eastern Contra Costa County support some of the highest known densities of golden eagle nesting territories in the world (Hunt and Hunt

2006). In the past 15 years, several comprehensive studies, discussed below, estimated territory occupancy (number of breeding pairs); assessed reproductive rates; and monitored juvenile, subadult, and floater<sup>2</sup> range and mortality.

Hunt (2002) examined data collected over a 7-year period between 1994 and 2002 that included the monitoring of 60–70 active territories within 30 km (11.6 miles) of the APWRA. In 2005, these territories were found to still be 100% occupied (Hunt and Hunt 2006). The conclusions of these studies were that the golden eagle population remains stable (Hunt 2002; Hunt and Hunt 2006). In addition, the studies found no increase in the number of actively breeding subadults, indicating that there are enough floaters to buffer any loss of breeding adults (Hunt 2002; Hunt and Hunt 2006). The conclusion of a stable golden eagle population in the APWRA vicinity is supported by the results of a population dynamics model that used reproduction rates and fatality rates, among other variables (Hunt 2002). However, the model results also suggested that the number of estimated annual fatalities used in the model, 50 individuals, could not be sustained by the number of breeding adults when considering the loss of reproductive potential incurred by each eagle fatality (Hunt and Hunt 2006). Although the vacant territories are filled by floaters and subadults to stabilize the APWRA population, because the population demands a flow of recruits from outside the area to fill breeding vacancies as they occur, the APWRA can be considered a population sink. The researchers conclude, therefore, that turbine-related mortality reduces the resilience of the local golden eagle population.

Table 3.4.11 shows an estimated 4–17 fatalities per year in a fully repowered program area, or between 8 and 36% of the 50 fatalities estimated for the Hunt (2002) model. It is not possible to determine the proportion of these fatalities that would consist of individuals from the local population. However, these annual fatality estimates, when compared to current conditions, would indicate that repowering the program area would reduce golden eagle fatalities and increase the potential for restoring a self-sustaining local breeding population. The implementation of mitigation measures described below—including Mitigation Measure BIO-11e, which would require that existing power lines associated with raptor strikes be retrofitted to be raptor-safe—would further reduce golden eagle fatalities in the program area.

**Loggerhead Shrike.** No documented fatalities of loggerhead shrikes have occurred at the Diablo Winds, Buena Vista, or Vasco Winds projects (Table 3.4-10), although loggerhead shrikes are regularly detected in the vicinity of the Diablo Winds turbines. The lack of documented fatalities may suggest a reduced level of fatality from the repowered turbines at these sites.

According to Shuford and Gardali (2008), loggerhead shrike was an abundant resident in the San Francisco Bay region in the early twentieth century. However, birds have been extirpated locally or reduced in numbers by habitat loss (Shuford and Gardali 2008). BBS data for California's shrike population show a negative trend from 1968 to 2010 (Sauer et al. 2011). Given the lack of documented fatalities at repowered facilities in the program area, it is difficult to quantify the effects of a fully repowered program area on the regional loggerhead shrike population. Minimizing available perches through Mitigation Measure BIO-11c and increasing the height of the rotor-swept area of repowered turbines may reduce the risk of turbine collisions for shrikes, as they mostly take prey on the ground (Yosef 1996). Careful monitoring of fatalities and implementing monitoring

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<sup>2</sup> A juvenile is 3–15 months of age, a subadult is 1–3 years of age, and a floater is a nonbreeding, nonterritorial adult individual more than 4 years of age (Hunt 2002).

protocols that are likely to detect loggerhead shrike fatalities will be important for understanding impacts on this species and implementing adaptive management measures, as appropriate.

**Prairie Falcon.** Fatality estimates at repowered sites are not available for prairie falcon because no fatalities have been documented at Diablo Winds or Vasco Winds and only one fatality has been recorded at Buena Vista (Table 3.4-10). Consequently, it is difficult to estimate the annual fatalities that would result from a fully repowered program area. The lack of documented fatalities may suggest a reduced level of fatality from the repowered turbines at these sites. However, the nonrepowered fatality rate for prairie falcon is already relatively low (0.02 fatality/MW/year), suggesting that the collision risk for this species is low. Prairie falcons are present mostly in winter, and the baseline fatality rate is measured during a period when the seasonal shutdown has been in effect. Repowered turbines are not anticipated to shut down in winter.

Across North America, the prairie falcon population is stable but experiencing local declines; in California, the species is vulnerable to extirpation (NatureServe 2012). Within the program area and its vicinity, the species is somewhat rare, with less than three yearly sightings in the region during summer BBS counts from 2006 to 2010 (Sauer et al. 2011). State-wide, however, BBS trends may indicate an increase in abundance, although the data are of limited value due to the small sample size (Sauer et al. 2011). Given the lack of documented fatalities at repowered facilities in the program area, it is difficult to quantify the effects of a fully repowered program area on the regional prairie falcon population. Prairie falcons use a variety of foraging flight characteristics, including high soaring, making it difficult to hypothesize how repowered turbines may affect the risk of turbine collision. Careful monitoring of fatalities and implementing monitoring protocols that are likely to detect prairie falcon fatalities will be important for understanding impacts on this species and implementing adaptive management measures, as appropriate.

**Red-Tailed Hawk.** As shown in Table 3.4-11, the fully repowered 417 MW program area would be expected to result in an estimated 42–103 red-tailed hawk fatalities per year. Based on these estimates, the program could decrease the average annual fatalities by 29–71%.

An estimated 89% of the global population of red-tailed hawks (approximately 1,960,000 breeding birds) is found in North America (Hawk Mountain 2007). Populations have remained stable or increased throughout most of the western United States since the 1980s, growing 1.5% in California between 1983 and 2005 (Hawk Mountain 2007; Sauer et al. 2008). California foothill populations have remained stable since 1968, while the Central Valley population has significantly increased (Sauer et al. 2008).

Although a substantial number of red-tailed hawk fatalities occur in the APWRA, the annual fatalities have shown a generally decreasing trend since 2005, although not a statistically significant decline (ICF International 2012) and are predicted to continue to decline as repowering proceeds in the APWRA (Smallwood 2010; ICF International 2012). The yearly fatalities for red-tailed hawks presented in Table 3.4.11 coincide with these other studies, suggesting that repowering the program area is likely to continue to reduce the number of red-tailed hawks killed each year. Considering that the red-tailed hawk population in California has grown while the APWRA has been in operation, continued operation of repowered turbines in the program area is unlikely to have any population-level impacts on red-tailed hawk.

**Swainson's Hawk.** Only one Swainson's hawk fatality has been recorded in the APWRA, yielding an annual estimated fatality rate of approximately zero (Table 3.4-10). No Swainson's hawk fatalities were detected at Diablo Winds, Buena Vista, or Vasco Winds. Based on the low estimated fatality



rate from nonrepowered sites, the lack of fatalities detected at repowered sites, and the relatively low use of the APWRA by Swainson's hawks, it is expected that the fatality rate for Swainson's hawk would remain low under the program.

Swainson's hawk is one of two (the other is sandhill crane) state-listed species that has a recorded fatality in the APWRA (ICF International 2012). While the program area does not provide high-value nesting or foraging habitat for the Swainson's hawk, neighboring agricultural areas in the northeasternmost corner of Alameda County and north of the APWRA in Contra Costa County do provide prime foraging habitat, and Swainson's hawk may cross into the program area occasionally. The Audubon Society (2007) includes Swainson's hawk on its Watch List as a declining or rare species of national conservation concern. Evidence from egg collections suggests that the California population has been reduced by as much as 90% from its estimated historical levels (Bloom 1980). This severe population decline in the Central Valley of California is corroborated by microsatellite analyses of DNA that suggest that the decline has taken place over 68–75 generations, or about 200 years, corresponding with the time of European settlement (Audubon Society 2007; Hull et al. 2008). Based on migration counts in Vera Cruz, Mexico, the present global population may approach 1 million individuals (HawkWatch International 2009). The California population is estimated at more 1,900 nesting pairs, 95% of which are in the Central Valley (Anderson et al. 2007). The BBS reports a rising California population since surveys began in 1968, but also reports that important deficiencies in the underlying data may make these trends inaccurate (Sauer et al. 2011).

The very small number of estimated fatalities in the program area compared to the size of the local population east of the program area in the Central Valley indicates that turbine-related fatalities in the program area are unlikely to have an adverse effect on the local Swainson's hawk population. The implementation of subsequent project-level avian use and fatality studies described in Mitigation Measure BIO-11g will continue to provide data for assessing the effect of turbine operation on the Swainson's hawk population in the area.

**Raptors.** As shown in Table 3.4-11, a fully repowered 417 MW program area would be expected to result in an estimated 129–505 raptor fatalities per year. Based on these estimates, the program could decrease average annual raptor fatalities by 37–84%.

**Native non-raptors.** As shown in Table 3.4-11, a fully repowered 417 MW program area would be expected to result in an estimated 421–1,047 native non-raptor fatalities per year. Based on these estimates, the program could decrease the average annual fatalities by 29–81%.

As described above, for all avian species analyzed, a fully repowered program area would be expected to reduce estimated fatality rates. However, fatalities would still be expected to result from the operation of the repowered turbines, and uncertainty surrounding the accuracy of the estimated fatality rates and the types of species potentially affected remains. Considering this information, and despite the anticipated reductions in avian impacts compared to the baseline rates, the County has determined to use a conservative approach for the impact assessment, concluding that turbine-related fatalities could constitute a substantial adverse effect on avian species because the rates for some or all of the species could be greater than the baseline rates. This impact would be significant. Implementation of Mitigation Measures BIO-11a through BIO-11i would reduce this impact, but not to a less-than-significant level; accordingly, this impact is considered significant and unavoidable. These measures, which individual project proponents would be required to carry out as appropriate in light of project-specific conditions, were derived from the EACCS, based on established practice, or developed in the context of the program's conservation objectives.

**Mitigation Measure BIO-11a: Prepare a project-specific avian protection plan**

All project proponents will prepare a project-specific APP to specify measures and protocols consistent with the program-level mitigation measures that address avian mortality. The project-specific APPs will include, at a minimum, the following components.

- Information and methods used to site turbines to minimize risk.
- Documentation that appropriate turbine designs are being used.
- Documentation that avian-safe practices are being implemented on project infrastructure.
- Methods used to discourage prey for raptors.
- A detailed description of the postconstruction avian fatality monitoring methods to be used (consistent with the minimum requirements outlined in Mitigation Measure BIO-11g).
- Methods used to compensate for the loss of raptors (consistent with the requirements of Mitigation Measure BIO-11h).

Each project applicant will prepare and submit a draft project-specific APP to the County. The draft APP will be reviewed by the TAC for consistency and the inclusion of appropriate mitigation measures that are consistent with the PEIR and recommended for approval by the County. Each project applicant must have an approved Final APP prior to commercial operation.

**Mitigation Measure BIO-11b: Site turbines to minimize potential mortality of birds**

Siting of turbines—using analyses of landscape features and location-specific bird use and behavior data to identify locations with reduced collision risk—may result in reduced fatalities (Smallwood et al. 2009). All project proponents will conduct a siting process and prepare a siting analysis to select turbine locations to minimize potential impacts on bird and bat species. Proponents will utilize existing data as well as collect new site-specific data as part of the siting analysis.

Project proponents will utilize currently available guidelines such as the Alameda County SRC guidelines for siting wind turbines (Alameda County SRC 2010) and/or other currently available research or guidelines to conduct siting analysis. Additionally, project proponents will use the results of previous siting efforts to inform the analysis and siting methods as appropriate such that the science of siting continues to be advanced. All project proponents will collect field data that identify or confirm the behavior, utilization, and distribution patterns of affected avian and bat species prior to the installation of turbines. Project proponents will collect and utilize available existing information, including but not necessarily limited to: siting reports and monitoring data from previously installed projects; published use and abundance studies and reports; and topographic features known to increase collision risk (trees, riparian areas, water bodies, and wetlands).

Project proponents will also collect and utilize additional field data as necessary to inform the siting analysis for golden eagle. As required in Mitigation Measure BIO-8a, surveys will be conducted to locate golden eagle nests within 2 miles of proposed project areas. Siting of turbines within 2 miles of an active or alternative golden eagle nest or active golden eagle territory will be based on a site-specific analysis of risk based on the estimated eagle territories, conducted in consultation with USFWS.

Project proponents will utilize methods (i.e., computer models) to identify dangerous locations for birds and bats based on site-specific risk factors informed by the information discussed above. The project proponents will compile the results of the siting analyses for each turbine and document these in the project-level APP, along with the specific location of each turbine.

#### **Mitigation Measure BIO-11c: Use turbine designs that reduce avian impacts**

Use of turbines with certain characteristics is believed to reduce the collision risk for avian species. Project proponents will implement the design-related measures listed below.

- Turbine designs will be selected that have been shown or that are suspected to reduce avian fatalities, based on the height, color, configuration, or other features of the turbines.
- Turbine design will limit or eliminate perching opportunities. Designs will include a tubular tower with internal ladders; external catwalks, railings, or ladders will be prohibited.
- Turbine design will limit or eliminate nesting or roosting opportunities. Openings on turbines will be covered to prevent cavity-nesting species from nesting in the turbines.
- Lighting will be installed on the fewest number of turbines allowed by FAA regulations, and all pilot warning lights will fire synchronously. Turbine lighting will employ only red or dual red-and-white strobe, strobe-like, or flashing lights (U.S. Fish and Wildlife Service 2012). All lighting on turbines will be operated at the minimum allowable intensity, flashing frequency, and quantity allowed by FAA (Gehring et al. 2009; U.S. Fish and Wildlife Service 2012). Duration between flashes will be the longest allowable by the FAA.

#### **Mitigation Measure BIO-11d: Incorporate avian-safe practices into design of turbine-related infrastructure**

All project proponents will apply the following measures when designing and siting turbine-related infrastructure. These measures will reduce the risk of bird electrocution and collision.

- Permanent meteorological stations will avoid use of guy wires. If it is not possible to avoid using guy wires, the wires will be at least 4/0 gauge to ensure visibility and will be fitted with bird deterrent devices.
- All permanent meteorological towers will be unlit unless lighting is required by FAA. If lighting is required, it will be operated at the minimum allowable intensity, flashing frequency, and quantity allowed by FAA.
- To the extent possible, all powerlines will be placed underground. However, lines may be placed aboveground immediately prior to entering the substation. All aboveground lines will be fitted with bird flight diverters or visibility enhancement devices (e.g., spiral damping devices). When lines cannot be placed underground, appropriate avian protection designs must be employed. As a minimum requirement, the collection system will conform with the most current edition of the Avian Power Line Interaction Committee guidelines to prevent electrocutions.
- Lighting will be focused downward and minimized to limit skyward illumination. Sodium vapor lamps and spotlights will not be used at any facility (e.g., laydown areas, substations) except when emergency maintenance is needed. Lighting at collection facilities, including substations, will be minimized using downcast lighting and motion-detection devices. The use of high-intensity lighting; steady-burning or bright lights such as sodium vapor, quartz,

or halogen; or other bright spotlights will be minimized. Where lighting is required it will be designed for the minimum intensity required for safe operation of the facility. Green or blue lighting will be used in place of red or white lighting.

#### **Mitigation Measure BIO-11e: Retrofit existing infrastructure to minimize risk to raptors**

Any existing power lines in a specific project area that are owned by the wind project operator and that are associated with electrocution of an eagle or other raptor will be retrofitted within 30 days to make them raptor-safe according to Avian Power Line Interaction Committee guidelines. All other existing structures to remain in a project area during repowering will be retrofitted, as feasible, according to specifications of Mitigation Measure BIO-11c prior to repowered turbine operation.

#### **Mitigation Measure BIO-11f: Discourage prey for raptors**

All project proponents will apply the following measures when designing and siting turbine-related infrastructure. These measures are intended to minimize opportunities for fossorial mammals to become established and thereby create a prey base that could become an attractant for raptors.

- Rodenticide will not be utilized on the project site to avoid the risk of raptors scavenging the remains of poisoned animals.
- Boulders (rocks more than 12 inches in diameter) excavated during project construction may be placed in aboveground piles in the project area so long as they are more than 500 meters (1,640 feet) from any turbine. Existing rock piles created during construction of first- and second-generation turbines will also be moved at least 500 meters (1,640 feet) from turbines.
- Gravel will be placed around each tower foundation to discourage small mammals from burrowing near turbines.

#### **Mitigation Measure BIO-11g: Implement postconstruction avian fatality monitoring for all repowering projects**

A postconstruction monitoring program will be conducted at each repowering project for a minimum of 3 years beginning on the commercial operation date (COD) of the project. Monitoring may continue beyond 3 years if construction is completed in phases. Moreover, if the results of the first 3 years indicate that baseline fatality rates (i.e., nonrepowered fatality rates) are exceeded, monitoring will be extended until the average annual fatality rate has dropped below baseline fatality rates for 2 years, and to assess the effectiveness of adaptive management measures specified in Mitigation Measure BIO-11i. An additional 2 years of monitoring will be implemented at year 10 (i.e., the tenth anniversary of the COD). Project proponents will provide access to qualified third parties authorized by the County to conduct any additional monitoring after the initial 3-year monitoring period has expired and before and after the additional 2-year monitoring period, provided that such additional monitoring utilizes scientifically valid monitoring protocols.

A technical advisory committee (TAC) will be formed to oversee the monitoring program and to advise the County on adaptive management measures that may be necessary if fatality rates substantially exceed those predicted for the project (as described below in Mitigation Measure

BIO-11j). The TAC will have a standing meeting, which will be open to the public, every 6 months to review monitoring reports produced by operators in the program area. In these meetings, the TAC will discuss any issues raised by the monitoring reports and recommend to the County next steps to address issues, including scheduling additional meetings, if necessary.

The TAC will comprise representatives from the County (including one or more technical consultants, such as a biostatistician, an avian biologist, and a bat biologist), and wildlife agencies (CDFW, USFWS). Additional TAC members may also be considered (e.g., a representative from Audubon, a landowner in the program area, a representative of the operators) at the discretion of the County. The TAC will be a voluntary and advisory group that will provide guidance to the County Planning Department. To maintain transparency with the public, all TAC meetings will be open to the public, and notice of meetings will be given to interested parties.

The TAC will have three primary advisory roles: (1) to review and advise on project planning documents (i.e., project-specific APPs) to ensure that project-specific mitigation measures and compensatory mitigation measures described in this PEIR are appropriately and consistently applied, (2) to review and advise on monitoring documents (protocols and reporting) for consistency with the mitigation measures, and (3) to review and advise on implementation of the adaptive management plans.

Should fatality monitoring reveal that impacts exceed the baseline thresholds established in this PEIR, the TAC will advise the County on requiring implementation of adaptive management measures as described in Mitigation Measure BIO-11i. The County will have the decision-making authority, as it is the organization issuing the CUPs. However, the TAC will collaboratively inform the decisions of the County.

Operators are required to provide for avian use surveys to be conducted within the project area boundaries for a minimum of 30 minutes duration. Surveyors will be qualified and trained and subject to approval by the County.

Carcass surveys will be conducted at every turbine for projects with 20 or fewer turbines. For projects with more than 20 turbines, such surveys will be required at a minimum of 20 turbines, and a sample of the remaining turbines may be selected for carcass searches. The operator will be required to demonstrate that the sampling scheme and sample size are statistically rigorous and defensible. Where substantial variation in terrain, land cover type, management, or other factors may contribute to significant variation in fatality rates, the sampling scheme will be stratified to account for such variation. The survey protocol for sets and subsets of turbines, as well as proposed sampling schemes that do not entail a search of all turbines, must be approved by the County in consultation with the TAC prior to the start of surveys.

The search interval will not exceed 14 days for the minimum of 20 turbines to be surveyed; however, the search interval for the additional turbines (i.e., those exceeding the 20-turbine minimum) that are to be included in the sampling scheme may be extended up to 28 days or longer if recommended by the TAC.

The estimation of detection probability is a rapidly advancing field. Carcass placement trials, broadly defined, will be conducted to estimate detection probability during each year of monitoring. Sample sizes will be large enough to potentially detect significant variation by season, carcass size, and habitat type.

Operators will be required to submit copies of all raw data forms to the County annually, will supply raw data in a readily accessible digital format to be specified by the County, and will prepare raw data for inclusion as appendices in the annual reports. The intent is to allow the County to conduct independent analyses and meta-analyses of data across the APWRA, and to supply these data to the regulatory agencies if requested.

Annual reports submitted to the County will provide a synthesis of all information collected to date. Each report will provide an introduction; descriptions of the study area, methods, and results; a discussion of the results; and any suitable recommendations. Reports will provide raw counts of fatalities, adjusted fatality rates, and estimates of project-wide fatalities on both a per MW and per turbine basis.

### **Mitigation Measure BIO-11h: Compensate for the loss of raptors and other avian species, including golden eagles, by contributing to conservation efforts**

#### **Discussion**

Several options to compensate for impacts on raptors are currently available. Some are targeted to benefit certain species, but they may also have benefits for other raptor and non-raptor species. For example, USFWS's ECP Guidelines currently outline a compensatory mitigation strategy for golden eagles using the retrofit of high-risk power poles (poles known or suspected to electrocute and kill eagles). The goal of this strategy is to eliminate hazards for golden eagles. However, because the poles are also dangerous for other large raptors (e.g., red-tailed hawk, Swainson's hawk), retrofitting them can benefit such species as well as eagles.

Similarly, although the retrofitting of electrical poles may have benefits for large raptors, such an approach may provide minimal benefits for smaller raptors such as American kestrel and burrowing owl. Consequently, additional measures would be required components of an overall mitigation package to compensate for impacts on raptors in general.

The Secretary of the Interior issued Order 3330 on October 31, 2013, outlining a new approach to mitigation policies and practices of the Department of the Interior. This approach recognizes that certain strategies aimed at some species (e.g., raptors) can provide substantial benefit to others (e.g., non-raptors) and to the ecological landscape as a whole. The landscape-scale approach to mitigation and conservation efforts is now central to the Department's mitigation strategy. Although the Order was intended for use by federal agencies and as such is not directly applicable to the County, it is evident that such an approach would likely have the greatest mitigation benefits, especially when considering ongoing and long-term impacts from wind energy projects.

With these considerations in mind, the County has outlined several options that are currently available to compensate for impacts on raptors and other avian species. The options discussed below are currently considered acceptable approaches to compensation for impacts on raptors and other species. Although not every option is appropriate for all species, it is hoped that as time proceeds, a more comprehensive landscape-level approach to mitigation will be adopted to benefit a broader suite of species than might benefit from more species-specific measures. The County recognizes that the science of raptor conservation and the understanding of wind-wildlife impacts are continuing to evolve and that the suite of available compensation options may consequently change over the life of the proposed projects.

## Conservation Measures

To promote the conservation of raptors and other avian species, project proponents will compensate for raptor fatalities estimated within their project areas. Mitigation will be provided in 10-year increments, with the first increment based on the estimates (raptors/MW/year) provided in this PEIR for the Vasco Winds Project (Table 3.4-10) or the project-specific EIR for future projects. The Vasco Winds fatality rates were selected because the Vasco turbines are the most similar to those likely to be proposed for future repowering projects and consequently represent the best available fatality estimates. Each project proponent will conduct postconstruction fatality monitoring for at least 3 years beginning at project startup (date of commercial operation) and again for 2 years at year 10, as required under Mitigation Measure BIO-11g, to estimate the average number of raptors taken each year by each individual project. The project proponent will compensate for this number of raptors in subsequent 10-year increments for the life of the project (i.e., three 10-year increments) as outlined below. Mitigation Measure BIO-11g also requires additional fatality monitoring at year 10 of the project. The results of the first 3 years of monitoring and/or the monitoring at year 10 may lead to revisions of the estimated average number of raptors taken, and mitigation provided may be adjusted accordingly on a one-time basis within each of the first two 10-year increments, based on the results of the monitoring required by Mitigation Measure BIO-11g, in consultation with the TAC.

Prior to the start of operations, project proponents will submit for County approval an avian conservation strategy, as part of the project-specific APP outlined in Mitigation Measure BIO-11a, outlining the estimated number of raptor fatalities based on the number and type of turbines being constructed, and the type or types of compensation options to be implemented. Project proponents will use the avian conservation strategy to craft an appropriate strategy using a balanced mix of the options presented below, as well as considering new options suggested by the growing body of knowledge during the course of the project lifespan, as supported by a Resource Equivalency Analysis (REA) (see example in Appendix C) or similar type of compensation assessment acceptable to the County that demonstrates the efficacy of proposed mitigation for impacts on raptors.

The County Planning Director, in consultation with the TAC, will consider, based on the REA, whether the proposed avian conservation strategy is adequate, including consideration of whether each avian mitigation plan incorporates a landscape-scale approach such that the conservation efforts achieve the greatest possible benefits. Compensation measures as detailed in an approved avian conservation strategy must be implemented within 1 year of the date of commercial operations. Avian conservation strategies will be reviewed and may be revised by the County every 10 years, and on a one-time basis in each of the two 10-year increments based on the monitoring required by Mitigation Measure BIO-11g.

- **Retrofitting high-risk electrical infrastructure.** USFWS's ECP Guidelines outline a compensatory mitigation strategy using the retrofit of high-risk power poles (poles known or suspected to electrocute and kill eagles). USFWS has developed an REA (U.S. Fish and Wildlife Service 2013a) as a tool to estimate the compensatory mitigation (number of retrofits) required for the take of eagles. The REA takes into account the current understanding of eagle life history factors, the effectiveness of retrofitting poles, the expected annual take, and the timing of implementation of the pole retrofits. The project proponents may need to contract with a utility or a third-party mitigation account (such as the National Fish and Wildlife Foundation) to retrofit the number of poles needed as

demonstrated by a project-specific REA. If contracting directly, the project proponent will consult with utility companies to ensure that high-risk poles have been identified for retrofitting. Proponents will agree in writing to pay the utility owner/operator to retrofit the required number of power poles and maintain the retrofits for 10 years and will provide the County with documentation of the retrofit agreement. The first retrofits will be based on the estimated number of eagle fatalities as described above in this measure or as developed in the project-specific EIR for future projects. Subsequent numbers of retrofits required for additional 10-year durations will be based on the results of project-specific fatality monitoring as outlined in Mitigation Measure BIO-11g. If fewer eagle fatalities are identified through the monitoring, the number of future required retrofits may be reduced through a project-specific REA. Although retrofitting poles has not been identified as appropriate mitigation for other large raptors, they would likely benefit from such efforts, as they (particularly red-tailed and Swainson's hawks) constitute the largest non-eagle group to suffer electrocution on power lines (Avian Power Line Interaction Committee 2006).

- **Measures outlined in an approved Eagle Conservation Plan and Bird and Bat Conservation Strategy.** Project proponents may elect to apply for programmatic eagle take permits from USFWS. The programmatic eagle take permit process currently involves preparation of an ECP and a Bird and Bat Conservation Strategy (BBCS). The ECP specifies avoidance and minimization measures, advanced conservation practices, and compensatory mitigation for eagles—conditions that meet USFWS's criteria for issuance of a permit. The BBCS outlines measures being implemented by the applicant to avoid and minimize impacts on migratory birds, including raptors. If programmatic eagle take permits are obtained by project proponents, those permit terms, including the measures outlined in the approved ECP and BBCS, may constitute an appropriate conservation measure for estimated take of golden eagles and other raptors, provided such terms are deemed by the County to be comparable to or more protective of raptors than the other options listed herein.
- **Contribute to raptor conservation efforts.** Project proponents will contribute funds, in the amount of \$580/raptor fatality, in 10-year increments to local and/or regional conservation efforts designed to protect, recover, and manage lands for raptors, or to conduct research involving methods to reduce raptor fatalities or increase raptor productivity. The \$580 amount is based on the average cost to rehabilitate one raptor at the California Raptor Center, affiliated with the UC Davis School of Veterinary Medicine, which receives more than 200 injured or ill raptors annually (Stedman pers. comm.). Ten-year installments are more advantageous than more frequent installments for planning and budgeting purposes.

The funds will be contributed to an entity or entities engaged in these activities, such as the East Bay Regional Park District and the Livermore Area Regional Park District. Conservation efforts may include constructing and installing nest boxes and perches, conducting an awareness campaign to reduce the use of rodenticide, and conducting research to benefit raptors. The specific conservation effort to be pursued will be submitted to the County for approval as part of the avian conservation strategy review process. The donation receipt will be provided to the County as evidence of payment.

The first contributions for any given project will be based on the estimated number of raptor fatalities as described above in this measure or as developed in the project-specific EIR for future projects. Funds for subsequent 10-year installments will be provided on the basis of the average annual raptor fatality rates determined through postconstruction



monitoring efforts, allowing for a one-time adjustment within each 10-year increment after the results of the monitoring efforts are available. If fewer raptor fatalities are detected through the monitoring effort, the second installment amount may be reduced to account for the difference between the first estimated numbers and the monitoring results.

- **Contribute to regional conservation of raptor habitat.** Project proponents may address regional conservation of raptor habitat by funding the acquisition of conservation easements within the APWRA or on lands in the same eco-region outside the APWRA, subject to County approval, for the purpose of long-term regional conservation of raptor habitat. Lands proposed for conservation must be well-managed grazing lands similar to those on which the projects have been developed. Project proponents will fund the regional conservation and improvement of lands (through habitat enhancement, lead abatement activities, elimination of rodenticides, and/or other measures) using a number of acres equivalent to the conservation benefit of the raptor recovery and conservation efforts described above, or as determined through a project-specific REA (see example REA in Appendix C). The conservation lands must be provided for compensation of a minimum of 10 years of raptor fatalities, as 10-year increments will minimize the transaction costs associated with the identification and conservation of lands, thereby increasing overall cost effectiveness. The conservation easements will be held by an organization whose mission is to purchase and/or otherwise conserve lands, such as The Trust for Public Lands, The Nature Conservancy, California Rangeland Trust, or the East Bay Regional Parks District. The project proponents will obtain approval from the County regarding the amount of conserved lands, any enhancements proposed to increase raptor habitat value, and the entity holding the lands and/or conservation easement.
- **Other Conservation Measures Identified in the Future.** As noted above, additional conservation measures for raptors may become available in the future. Conservation measures for raptors are currently being developed by USFWS and nongovernmental organizations (e.g., American Wind Wildlife Institute)—for example, activities serving to reduce such fatalities elsewhere, and enhancing foraging and nesting habitat. Additional options for conservation could include purchasing credits at an approved mitigation bank, credits for the retirement of windfarms that are particularly dangerous to birds or bats, the curtailment of prey elimination programs, and hunter-education programs that remove sources of lead from the environment. Under this option, the project proponent may make alternative proposals to the County for conservation measures—based on an REA or similar compensation assessment—that the County may accept as mitigation if they are deemed by the County to be comparable to or more protective of raptor species than the other options described herein.

### **Mitigation Measure BIO-11i: Implement an avian adaptive management program**

If fatality monitoring described in Mitigation Measure BIO-11g results in an estimate that exceeds the preconstruction baseline fatality estimates (i.e., estimates at the nonpowered turbines as described in this PEIR) for any focal species or species group (i.e., individual focal species, all focal species, all raptors, all non-raptors, all birds combined), project proponents will prepare a project-specific adaptive management plan within 2 months following the availability of the fatality monitoring results. These plans will be used to adjust operation and mitigation to the results of monitoring, new technology, and new research to ensure that the best available science is used to minimize impacts to below baseline. Project-specific adaptive management

plans will be reviewed by the TAC, revised by project proponents as necessary, and approved by the County. The TAC will take current research and the most effective impact reduction strategies into account when reviewing adaptive management plans and suggesting measures to reduce impacts. The project-specific adaptive management plans will be implemented within 2 months of approval by the County. The plans will include a stepped approach whereby an adaptive measure or measures are implemented, the results are monitored for success or failure for a year, and additional adaptive measures are added as necessary, followed by another year of monitoring, until the success criteria are achieved (i.e., estimated fatalities are below the baseline). Project proponents should use the best measures available when the plan is prepared in consideration of the specific adaptive management needs. For example, if only one threshold is exceeded, such as golden eagle fatalities, the plan and measures used will target that species. As set forth in other agreements in the APWRA, project proponents may also focus adaptive management measures on individual or multiple turbines if those turbines are shown to cause a significantly disproportionate number of fatalities.

In general, the following types of measures will be considered by the TAC, in the order they are presented below; however, the TAC may recommend any of these or other measures that are shown to be successful in reducing the impact.

**ADMM-1: Visual Modifications.** The project proponent could paint a pattern on a proportion of the turbine blades. The proportion and the pattern of the blades to be painted will be determined by the County in consultation with the TAC. USFWS recommends testing measures to reduce *motion smear*—the blurring of turbine blades due to rapid rotation that renders them less visible and hence more perilous to birds in flight. Suggested techniques include painting blades with staggered stripes or painting one blade black. The project proponent will conduct fatality studies on a controlled number of painted and unpainted turbines. The project proponent will coordinate with the TAC to determine the location of the painted turbines, but the intent is to implement this measure in areas that appear to be contributing most to the high number of fatalities detected.

**ADMM-2: Anti-Perching Measures.** The County will consult with the TAC regarding the use of anti-perching measures to discourage bird use of the area. The TAC will use the most recent research and information available to determine, on a case-by-case basis, if anti-perching measures will be an effective strategy to reduce impacts. If determined to be feasible, anti-perching devices will be installed on artificial structures, excluding utility poles, within 1 mile of project facilities (with landowner permission) to discourage bird use of the area.

**ADMM-3: Prey Reduction.** The project proponent will implement a prey reduction program around the most hazardous turbines. Examples of prey reduction measures may include changes in grazing practices to make the area less desirable for prey species, active reduction through direct removal of prey species, or other measures provided they are consistent with management goals for threatened and endangered species.

**ADMM-4: Implementation of Experimental Technologies.** Project proponents can deploy experimental technologies at their facilities to test their efficacy in reducing turbine-related fatalities. Examples may include, but are not limited to, visual deterrents, noise deterrents, and active radar systems.

**ADMM-5: Turbine Curtailment.** If postconstruction monitoring indicates patterns of turbine-caused fatalities—such as seasonal spikes in fatalities, topographic or other environmental

features associated with high numbers of fatalities, or other factors that can potentially be manipulated and that suggest that curtailment of a specific turbine's operation would result in reducing future avian fatalities—the project operator can curtail operations of the offending turbine or turbines. Curtailment restrictions would be developed in coordination with the TAC and based on currently available fatality data, use data, and research.

**ADMM-6: Cut-in Speed Study.** Changes in cut-in speed could be conducted to see if changing cut-in speeds from 3 meters per second to 5 meters per second (for example) would significantly reduce avian fatalities. The proponent will coordinate with the TAC in determining the feasibility of the measure for the particular species affected as well as the amount of the change in the cut-in speed.

**ADMM-7: Real-Time Turbine Curtailment.** The project proponent can employ a real-time turbine curtailment program designed in consultation with the TAC. The intent would be to deploy a biologist to monitor onsite conditions and issue a curtailment order when raptors are near operating turbines. Alternatively, radar, video, or other monitoring measures could be deployed in place of a biological monitor if there is evidence to indicate that such a system would be as effective and more efficient than use of a human monitor.

#### **Impact BIO-11a-2: Avian mortality resulting from interaction with wind energy facilities—program Alternative 2: 450 MW (significant and unavoidable)**

The operation of wind energy facilities has been shown to cause avian fatalities through collisions with wind turbines and powerlines and through electrocution on powerlines.

Most collection lines for first- and second- generation turbines are aboveground facilities. As repowering projects are implemented, old collection systems would be removed and new collection systems would be installed. The majority of new collection lines associated with the program would be undergrounded, reducing the risk of avian fatality from electrocution or collision with powerlines.

Diablo Winds, Buena Vista, and Vasco Winds are the only repowered projects in the APWRA for which estimates of avian fatality rates are available. Based on these estimates, avian collision risk may be substantially reduced when older-generation turbines are replaced by newer, larger turbines with the same total rated nameplate capacity (Table 3.4-10). However, while the available evidence suggests that repowering could substantially reduce turbine-related avian fatalities below the levels documented for older generation turbines, avian fatalities would continue to occur. Moreover, while repowering is intended to reduce fatalities, enough uncertainty remains in light of project- and site-specific data to warrant a conservative approach in the impact analysis. Accordingly, the continued loss of birds (including special-status species) at a rate potentially greater than the existing baseline fatality rates is considered a significant and unavoidable impact.

It should be noted that turbines used in future repowering projects are likely to be of similar size to the Vasco Winds turbines but much larger than the Diablo Winds and Buena Vista turbines in both overall size and rated nameplate capacity. There is evidence to suggest that larger turbines—like those used in the Vasco Winds project—could result in additional decreases in avian fatality rates for bird species currently killed in the APWRA (Smallwood and Karas 2009). However, it is also possible that larger turbines may negatively affect a different suite of bird species that have been relatively unaffected by older (i.e., smaller) turbines. In addition, fatality rates in the APWRA are highly variable (that is, because they differ across years, turbines types, geographies, and

topographies, species impacts may differ between sites due to different levels of use) and potentially imprecise (Smallwood et al. 2010; ICF International 2013). Nonetheless, these three repowering projects represent the best available information to understand the potential for avian fatalities associated with repowering; accordingly, data from these projects were used to form the basis for avian fatality estimates. The estimated changes associated with Alternative 2 are shown in Table 3.4-12 and discussed below. Postconstruction monitoring, once the turbines are in operation, will provide data to quantify the actual extent of change in avian fatalities from repowering and the extent of avian fatality for projects in the program area, and will contribute to the body of knowledge supporting future analyses.

**Table 3.4-12. Estimated Annual Avian Fatalities for Existing and Repowered Program Area—Alternative 2 (450 MW)**

Species	Estimated Annual Fatalities for Program Area							
	Nonrepowered	Repowered						
		Diablo Winds <sup>a</sup>			Buena Vista <sup>b</sup>		Vasco Winds <sup>c,d</sup>	
		Average Annual Fatalities	Average Annual Fatalities	% Decrease	Average Annual Fatalities	% Decrease	Average Annual Fatalities	% Decrease
American kestrel	194.2	40.5	79	67.5	65	133.7	31	
Barn owl	79.5	9.0	89	0.0	0	14.9	81	
Burrowing owl	255.1	378.0	-48	0.0	100	22.5	91	
Golden eagle	26.6	4.5	83	18.0	32	14.4	46	
Loggerhead shrike	61.8	0.0	100	0.0	100	0.0	100	
Prairie falcon	6.6	0.0	100	0.0	100	0.0	100	
Red-tailed hawk	144.5	90.0	38	45.0	69	110.7	23	
Swainson's hawk	0.5	0.0	100	0.0	100	0.0	100	
All raptors	799.9	544.5	32	139.5	83	288.9	64	
All native non-raptors	1,482.0	1,129.5	24	454.5	69	942.3	36	

Note: fatality rates reflect annual fatalities (95% confidence interval).

<sup>a</sup> Diablo Winds fatality rates extrapolated to the overall program area.

<sup>b</sup> Buena Vista fatality rates extrapolated to the overall program area.

<sup>c</sup> Vasco Winds fatality rates extrapolated to the overall program area.

<sup>d</sup> Vasco Winds fatality rate for golden eagle based on updated information received from NextEra Energy Resources on July 21, 2014, and extrapolated to the overall program area.

**American Kestrel.** As shown in Table 3.4-12, a fully repowered 450 MW program area would be expected to result in an estimated 41–138 American kestrel fatalities per year. Based on these estimates, the program could decrease average annual fatalities by 31–79%. The potential impact of repowering on the American kestrel population would be similar to that described in Impact BIO-11a-1.

**Barn Owl.** As shown in Table 3.4-12, a fully repowered 450 MW program area would be expected to result in an estimated 9–15 barn owl fatalities per year. Based on these estimates, the program could decrease average annual fatalities by 81–89%. The potential impact of repowering on the barn owl population would be similar to that described in Impact BIO-11a-1.

**Burrowing Owl.** As shown in Table 3.4-12, a fully repowered 450 MW program area would be expected to result in an estimated 23–378 burrowing owl fatalities per year—a change ranging from a 91% decrease to a 48% increase in fatalities. This fatality estimate is based on data from Diablo Winds and Vasco Winds because no burrowing owl fatalities were detected at Buena Vista. Current evidence suggests that burrowing owl fatality rates are not reduced by the transition from old- to new-generation turbines to the same extent as the fatality rates of other species. The increase in energy production from 329 MW to 450 MW would likely result in a small estimated increase in burrowing owl fatalities per year. However, a growing body of circumstantial evidence indicates that many of the burrowing owl fatalities found during fatality surveys are due to predation rather than turbine collision. Because of this confounding effect, the potential reduction in turbine-related burrowing owl fatalities may be underestimated because of the inability to distinguish fatalities resulting from predation from those caused by turbine collision (ICF International 2013). The potential impact of repowering on the burrowing owl population would be similar to that described in Impact BIO-11a-1.

**Golden Eagle.** As shown in Table 3.4-12, a fully repowered 450 MW program area would be expected to result in an estimated 5–18 golden eagle fatalities per year. Based on these estimates, the program could decrease average annual fatalities by 32–83%. The potential impact of repowering on the golden eagle population would be similar to that described in Impact BIO-11a-1.

**Loggerhead Shrike.** No documented fatalities of loggerhead shrikes have occurred at the Diablo Winds, Buena Vista, or Vasco Winds projects (Table 3.4-10), although loggerhead shrikes are regularly detected in the vicinity of the Diablo Winds turbines. The lack of documented fatalities may suggest a reduced level of fatality from the repowered turbines at these sites. The potential impact of repowering on the loggerhead shrike population would be similar to that described in Impact BIO-11a-1.

**Prairie Falcon.** Fatality estimates at repowered sites are not available for prairie falcon because no fatalities have been documented at Diablo Winds or Vasco Winds and only one fatality has been recorded at Buena Vista (Table 3.4-10). Therefore, it is difficult to estimate the annual fatalities that would result from a fully repowered program area. The lack of documented fatalities may suggest a reduced level of fatality from the repowered turbines at these sites. However, the nonrepowered fatality rate for prairie falcon is already relatively low (0.02 fatality/MW/year), suggesting that the collision risk for this species is low. Prairie falcon occurs mostly in winter, and the baseline fatality rate is measured during a period when the seasonal shutdown has been in effect. Repowered turbines do not shut down in winter. The potential impact of repowering on the prairie falcon population would be similar to that described in Impact BIO-11a-1.

**Red-Tailed Hawk.** As shown in Table 3.4-12, the fully repowered 450 MW program area would be expected to result in an estimated 45–111 red-tailed hawk fatalities per year. Based on these estimates, the program could decrease the average annual fatalities by 23–69%. The potential impact of repowering on the red-tailed hawk population would be similar to that described in Impact BIO-11a-1.

**Swainson's Hawk.** There is only one recorded Swainson's hawk fatality in the APWRA, resulting in an annual estimated fatality rate of approximately zero (Table 3.4-10). No Swainson's hawk fatalities were detected at Diablo Winds, Buena Vista, or Vasco Winds. Based on the low estimated fatality rate from nonrepowered sites, the lack of fatalities detected at repowered sites, and the relatively low use of the APWRA by Swainson's hawks, it is expected that the fatality rate for

Swainson's hawk would remain low under the program. The potential impact of repowering on the Swainson's hawk population would be similar to that described in Impact BIO-11a-1.

**Raptors.** As shown in Table 3.4-12, a fully repowered 450 MW program area would be expected to result in an estimated 140–545 raptor fatalities per year. Based on these estimates, the program could decrease average annual raptor fatalities by 32–83%.

**Native non-raptors.** As shown in Table 3.4-12, a fully repowered 450 MW program area would be expected to result in an estimated 455–1,130 native non-raptor fatalities per year. Based on these estimates, the program could decrease the average annual fatalities by 24–69%.

As described above, for all avian focal species analyzed, a fully repowered program area would be expected to reduce estimated fatality rates. However, fatalities would still be expected to result from the operation of the repowered turbines, and uncertainty surrounding the accuracy of the estimated fatality rates and the types of species potentially affected remains. Considering this information, and despite the anticipated reductions in avian impacts compared to the baseline rates, the County has determined to use a conservative approach for the impact assessment, concluding that turbine-related fatalities could constitute a substantial adverse effect on avian species because the rates for some or all of the species could be greater than the baseline rates. This impact would be significant. Implementation of Mitigation Measures BIO-11a through BIO-11i would reduce this impact, but not to a less-than-significant level; accordingly, this impact is considered significant and unavoidable.

**Mitigation Measure BIO-11a: Prepare a project-specific avian protection plan**

**Mitigation Measure BIO-11b: Site turbines to minimize potential mortality of birds**

**Mitigation Measure BIO-11c: Use turbine designs that reduce avian impacts**

**Mitigation Measure BIO-11d: Incorporate avian-safe practices into design of turbine-related infrastructure**

**Mitigation Measure BIO-11e: Retrofit existing infrastructure to minimize risk to raptors**

**Mitigation Measure BIO-11f: Discourage prey for raptors**

**Mitigation Measure BIO-11g: Implement postconstruction avian fatality monitoring for all repowering projects and implement adaptive management measures as necessary**

**Mitigation Measure BIO-11h: Compensate for the loss of raptors and other avian species, including golden eagles, by contributing to conservation efforts**

**Mitigation Measure BIO-11i: Implement an avian adaptive management program**

**Impact BIO-11b: Avian mortality resulting from interaction with wind energy facilities—Golden Hills Project (significant and unavoidable)**

The operation of repowered turbines in the Golden Hills project area would be expected to result in a reduction in avian fatalities below the number estimated to occur from nonrepowered turbines. However, as discussed above in Impact BIO-11a-1, repowering would not eliminate avian turbine-related fatalities, considerable uncertainty surrounding the comparative dataset remains, and

fatalities from turbine collision would still constitute a significant and unavoidable impact. The estimated reduction in annual fatalities differs by species and species group. These reductions are presented in Table 3.4-13 and summarized below.

**Table 3.4-13. Estimated Annual Avian Fatalities for Existing and Repowered Golden Hills Project Area**

Species	Estimated Annual Fatalities for Program Area						
	Nonrepowered	Repowered					
		Diablo Winds <sup>a</sup>		Buena Vista <sup>b</sup>		Vasco Winds <sup>c,d</sup>	
		Average Annual Fatalities	Average Annual Fatalities	% Decrease	Average Annual Fatalities	% Decrease	Average Annual Fatalities
American kestrel	47.5	8.0	83	13.3	72	26.3	45
Barn owl	19.4	1.8	91	-	-	2.9	85
Burrowing owl	62.4	74.3	-19	0.0	100	4.4	93
Golden eagle	6.5	0.9	86	3.5	46	2.8	57
Loggerhead shrike	15.1	0.0	100	0.0	100	0.0	100
Prairie falcon	1.6	0.0	100	0.0	100	0.0	100
Red-tailed hawk	35.4	17.7	50	8.8	75	21.7	39
Swainson's hawk	0.1	0.0	100	0.0	100	0.0	100
All raptors	195.7	107.0	45	27.4	86	56.8	71
All native non-raptors	362.6	221.9	39	89.3	75	185.1	49

Note: fatality rates reflect annual fatalities (95% confidence interval).

<sup>a</sup> Diablo Winds fatality rates extrapolated to the Golden Hills project area.

<sup>b</sup> Buena Vista fatality rates extrapolated to the Golden Hills project area.

<sup>c</sup> Vasco Winds fatality rates extrapolated to the Golden Hills project area.

<sup>d</sup> Vasco Winds fatality rate for golden eagle based on updated information received from NextEra Energy Resources on July 21, 2014, and extrapolated to the Golden Hills project area.

**American Kestrel.** As shown in Table 3.4-13, the repowered 88.4 MW Golden Hills project would be expected to result in an estimated 8–26 American kestrel fatalities per year—a 45–83% decrease. The potential impact of repowering on the American kestrel population would be similar to that described in Impact BIO-11a-1.

**Barn Owl.** As shown in Table 3.4-13, the repowered 88.4 MW Golden Hills project would be expected to result in an estimated two to three barn owl fatalities per year—an 85–91% decrease. This fatality estimate is based on fatality rates for the Diablo Winds and Vasco Winds projects; fatality estimates for barn owl were not available from the Buena Vista project. The potential impact of repowering on the barn owl population would be similar to that described in Impact BIO-11a-1.

**Burrowing Owl.** As shown in Table 3.4-13, the repowered 88.4 MW Golden Hills project would be expected to result in an estimated 4–74 burrowing owl fatalities per year—a change ranging from a 91% decrease to a 19% increase in fatalities.

However, a growing body of circumstantial evidence indicates that many of the burrowing of fatalities found during fatality surveys are due to predation rather than turbine collision. Because of this confounding effect, the potential reduction in turbine-related burrowing owl fatalities may be underestimated because of the inability to distinguish fatalities resulting from predation from those caused by turbine collision. The potential impact of repowering on the burrowing owl population would be similar to that described in Impact BIO-11a-1.

**Golden Eagle.** As shown in Table 3.4-13, the repowered 88.4 MW Golden Hills project would be expected to result in from less than one to four golden eagle fatalities per year—a 46–86% decrease. The potential impact of repowering on the golden eagle population would be similar to that described in Impact BIO-11a-1.

**Loggerhead Shrike.** No documented fatalities of loggerhead shrikes have occurred at the Diablo Winds, Buena Vista, or Vasco Winds projects (Table 3.4-13), although loggerhead shrikes are regularly detected in the vicinity of the Diablo Winds turbines. The lack of documented fatalities suggests that there may be a reduced level of fatality from the repowered turbines at the Golden Hills project site. The potential impact of repowering on the loggerhead shrike population would be similar to that described in Impact BIO-11a-1.

**Prairie Falcon.** Fatality estimates at repowered sites are not available for prairie falcon because no fatalities have been documented at Diablo Winds or Vasco Winds and only one fatality has been recorded at Buena Vista (Table 3.4-13). Therefore, it is difficult to estimate the annual fatalities that would result from the repowered Golden Hills project. The lack of documented fatalities suggests there may be a reduced level of fatality from the repowered turbines at the Golden Hills project site. However, the nonrepowered fatality rate for prairie falcon is already relatively low (0.02 fatality/MW/year), suggesting that the collision risk for this species is low. Prairie falcon occurs mostly in winter, and the baseline fatality rate is measured during a period when the seasonal shutdown has been in effect. Repowered turbines do not shut down in winter. The potential impact of repowering on the prairie falcon population would be similar to that described in Impact BIO-11a-1.

**Red-Tailed Hawk.** As shown in Table 3.4-13, the repowered 88.4 MW Golden Hills Project would be expected to result in an estimated 9–22 red-tailed hawk fatalities per year—a 35–75% decrease. The potential impact of repowering on the red-tailed hawk population would be similar to that described in Impact BIO-11a-1.

**Swainson's Hawk.** There is only one recorded Swainson's hawk fatality in the APWRA, resulting in an annual estimated fatality rate of approximately zero (Table 3.4-13). No Swainson's hawk fatalities were detected at Diablo Winds, Buena Vista, or Vasco Winds. Based on the low estimated fatality rate from nonrepowered sites, the lack of fatalities detected at repowered sites, and the relatively low number of detections during avian use surveys conducted by the AFMT (Alameda County unpublished data), it is expected that the fatality rate for Swainson's hawk would remain near zero at the repowered Golden Hills project. The potential impact of repowering on the Swainson's hawk population would be similar to that described in Impact BIO-11a-1.

**Raptors.** As shown in Table 3.4-13, the repowered 88.4 MW Golden Hills project would be expected to result in an estimated 27–107 raptor fatalities per year—a 45–86% decrease.



**Native non-raptors.** As shown in Table 3.4-13, the repowered 88.4 MW Golden Hills project would be expected to result in an estimated 89–222 native non-raptor fatalities per year—a 39–75% decrease.

As described above, for all avian focal species analyzed, the repowered Golden Hills project would be expected to reduce estimated fatality rates. However, fatalities would still be expected to result from the operation of the repowered turbines, and uncertainty surrounding the accuracy of the estimated fatality rates and the types of species potentially affected remains. Considering this information, and despite the anticipated reductions in avian impacts compared to the baseline rates, the County has determined to use a conservative approach for the impact assessment, concluding that turbine-related fatalities could constitute a substantial adverse effect on avian species because the rates for some or all of the species could be greater than the baseline rates. This impact would be significant. Implementation of Mitigation Measures BIO-12a through BIO-12j would reduce this impact, but not to a less-than-significant level; accordingly, this impact is considered significant and unavoidable.

**Mitigation Measure BIO-11a: Prepare a project-specific avian protection plan**

**Mitigation Measure BIO-11b: Site turbines to minimize potential mortality of birds**

**Mitigation Measure BIO-11c: Use turbine designs that reduce avian impacts**

**Mitigation Measure BIO-11d: Incorporate avian-safe practices into design of turbine-related infrastructure**

**Mitigation Measure BIO-11e: Retrofit existing infrastructure to minimize risk to raptors**

**Mitigation Measure BIO-11f: Discourage prey for raptors**

**Mitigation Measure BIO-11g: Implement postconstruction avian fatality monitoring for all repowering projects and implement adaptive management measures as necessary**

**Mitigation Measure BIO-11h: Compensate for the loss of raptors and other avian species, including golden eagles, by contributing to conservation efforts**

The County anticipates that the mitigation fees required by the 2010 Agreement to Repower Turbines at the Altamont Pass Wind Resource Area will satisfy this mitigation measure for the Golden Hills Project.

**Mitigation Measure BIO-11i: Implement an avian adaptive management program**

**Impact BIO-11c: Avian mortality resulting from interaction with wind energy facilities—Patterson Pass Project (significant and unavoidable)**

The operation of repowered turbines in the Patterson Pass project area would be expected to result in a reduction in estimated avian fatality rate in comparison with the fatality estimates from nonrepowered turbines. However, as discussed above in Impact BIO-11a-1 and 11a-2, repowering would not eliminate avian turbine-related fatalities, considerable uncertainty surrounding the comparative dataset remains, and fatalities from turbine collision would still result in a significant and unavoidable impact. The estimated reduction in annual fatalities differs by species and species group. These reductions are presented in Table 3.4-13 and summarized below.

**Table 3.4-14. Estimated Annual Avian Fatalities for Existing and Repowered Patterson Pass Project Area**

Species	Estimated Annual Fatalities for Program Area						
	Nonrepowered	Repowered					
		Diablo Winds <sup>a</sup>		Buena Vista <sup>b</sup>		Vasco Winds <sup>c,d</sup>	
Average Annual Fatalities	Average Annual Fatalities	% Decrease	Average Annual Fatalities	% Decrease	Average Annual Fatalities	% Decrease	
American kestrel	12.9	1.8	86	3.0	77	5.9	54
Barn owl	5.2	0.4	92	–	–	0.7	87
Burrowing owl	16.9	16.6	2	0.0	100	1.0	94
Golden eagle	1.8	0.2	89	0.8	56	0.6	67
Loggerhead shrike	4.1	0.0	100	0.0	100	0.0	100
Prairie falcon	0.4	0.0	100	0.0	100	0.0	100
Red-tailed hawk	9.6	4.0	59	2.0	79	4.9	49
Swainson's hawk	0.0	0.0	0.0	0.0	0	0.0	0
All raptors	53.1	24.0	55	6.1	88	12.7	76
All native non-raptors	98.4	49.7	49	20.0	80	41.5	58

Note: fatality rates reflect annual fatalities (95% confidence interval).

<sup>a</sup> Diablo Winds fatality rates extrapolated to the Patterson Pass project area.

<sup>b</sup> Buena Vista fatality rates extrapolated to the Patterson Pass project area.

<sup>c</sup> Vasco Winds fatality rates extrapolated to the Patterson Pass project area.

<sup>d</sup> Vasco Winds fatality rate for golden eagle based on updated information received from NextEra Energy Resources on July 21, 2014 and extrapolated to the Patterson Pass project area.

**American Kestrel.** As shown in Table 3.4-14, the repowered 19.8 MW Patterson Pass project would be expected to result in an estimated two to six American kestrel fatalities per year—a 54–86% decrease.

**Barn Owl.** As shown in Table 3.4-14, the repowered 19.8 MW Patterson Pass project would be expected to result in less than one barn owl fatality per year—an 87–92% decrease.

**Burrowing Owl.** As shown in Table 3.4-14, the repowered 19.8 MW Patterson Pass project would be expected to result in an estimated 1–17 burrowing owl fatalities per year—a 2–94% decrease in fatalities. This fatality estimate is based on data from Diablo Winds and Vasco Winds; no burrowing owl fatalities were detected at Buena Vista.

However, a growing body of circumstantial evidence indicates that many of the burrowing owl fatalities found during fatality surveys are due to predation rather than turbine collision. Because of this confounding effect, the potential reduction in turbine-related burrowing owl fatalities may be underestimated because of the inability to distinguish fatalities resulting from predation from those caused by turbine collision.

**Golden Eagle.** As shown in Table 3.4-14, the repowered 19.8 MW Patterson Pass project would be expected to result in less than one golden eagle fatality per year—a 56–89% decrease.

**Loggerhead Shrike.** No documented fatalities of loggerhead shrikes have occurred at the Diablo Winds, Buena Vista, or Vasco Winds projects (Table 3.4-14), although loggerhead shrikes are

regularly detected in the vicinity of the Diablo Winds turbines. The lack of documented fatalities suggests that there may be a reduced level of fatality from the repowered turbines at the Pattern Pass project site.

**Prairie Falcon.** Fatality estimates at repowered sites are not available for prairie falcon because no fatalities have been documented at Diablo Winds or Vasco Winds and only one fatality has been recorded at Buena Vista (Table 3.4-14). Therefore, it is difficult to estimate the annual fatalities that would result from the repowered Patterson Pass project. The lack of documented fatalities suggests that there may be a reduced level of fatality from the repowered turbines at the Patterson Pass project site. However, the nonrepowered fatality rate for prairie falcon is already relatively low (0.02 fatality/MW/year), suggesting that the collision risk for this species is low. Prairie falcon occurs mostly in winter, and the baseline fatality rate is measured during a period when the seasonal shutdown has been in effect. Repowered turbines do not shut down in winter.

**Red-Tailed Hawk.** As shown in Table 3.4-14, the repowered 19.8 MW Patterson Pass project would be expected to result in an estimated two to five red-tailed hawk fatalities per year—a 49–79% decrease.

**Swainson's Hawk.** There is only one recorded Swainson's hawk fatality in the APWRA, resulting in an annual estimated fatality rate of approximately zero (Table 3.4-14). No Swainson's hawk fatalities were detected at Diablo Winds, Buena Vista, or Vasco Winds. Based on the low estimated fatality rate from nonrepowered sites and the lack of fatalities detected at repowered sites, it is expected that the fatality rate for Swainson's hawk would remain low at the repowered Patterson Pass project site.

**Raptors.** As shown in Table 3.4-14, the repowered 19.8 MW Patterson Pass project would be expected to result in an estimated 6–24 raptor fatalities per year—a 55–88% decrease.

**Native non-raptors.** As shown in Table 3.4-14, the repowered 19.8 MW Patterson Pass project would be expected to result in an estimated 20–50 native non-raptor fatalities per year—a 49–80% decrease.

As described above, for all avian focal species analyzed, the repowered Patterson Pass project would be expected to reduce estimated fatality rates. However, fatalities would still be expected to result from the operation of the repowered turbines, and uncertainty surrounding the accuracy of the estimated fatality rates and the types of species potentially affected remains. Considering this information, and despite the anticipated reductions in avian impacts compared to the baseline rates, the County has determined to use a conservative approach for the impact assessment, concluding that turbine-related fatalities could constitute a substantial adverse effect on avian species because the rates for some or all of the species could be greater than the baseline rates. This impact would be significant. Implementation of the mitigation measures listed below would reduce this impact but not to a less-than-significant level; accordingly, this impact is considered significant and unavoidable. Implementation of Mitigation Measures BIO-11a through BIO-11i would reduce this impact but not to a less-than-significant level; accordingly, this impact is considered significant and unavoidable.

**Mitigation Measure BIO-11a: Prepare a project-specific avian protection plan**

**Mitigation Measure BIO-11b: Site turbines to minimize potential mortality of birds**

**Mitigation Measure BIO-11c: Use turbine designs that reduce avian impacts****Mitigation Measure BIO-11d: Incorporate avian-safe practices into design of turbine-related infrastructure****Mitigation Measure BIO-11e: Retrofit existing infrastructure to minimize risk to raptors****Mitigation Measure BIO-11f: Discourage prey for raptors****Mitigation Measure BIO-11g: Implement postconstruction avian fatality monitoring for all repowering projects and implement adaptive management measures as necessary****Mitigation Measure BIO-11h: Compensate for the loss of raptors and other avian species, including golden eagles, by contributing to conservation efforts****Mitigation Measure BIO-11i: Implement an avian adaptive management program****Impact BIO-12a-1: Potential mortality or disturbance of bats from roost removal or disturbance—program Alternative 1: 417 MW (less than significant with mitigation)**

Several species of both common (*Myotis* spp.) and special-status (western red bat, pallid bat, Townsend's big-eared bat) bats are known to occur or could occur in or around the program area, and could use the area for foraging, dispersal, and migration. Bats may use rock outcrops, trees, buildings, bridges, and other structures in the program area as maternity or migratory stopover roosts. Permanent water bodies and stock tanks in and adjacent to the program area provide sources of fresh water for both resident and migratory bats.

Construction and decommissioning of turbines could result in disturbance or loss of active bat roosts through increased traffic, noise, lighting, and human access. Removal or disturbance of trees, rock outcrops, debris piles, outbuildings, or other artificial structures could result in removal of roost habitat and mortality of bats using the structure as a roost. Several species of bat are sensitive to disturbance and may abandon flightless young, or they may simply not return to the roost once disturbed, resulting in the loss of that roost as habitat for the local population. Because some bats roost colonially, removal of special-status species' roost structures in a roost-limited habitat could result in the loss of a significant portion of the local bat population. This would be a significant impact. Implementation of Mitigation Measures BIO-1b, BIO-3, BIO-12a, and BIO-12b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-12a: Conduct bat roost surveys**

Prior to development of any repowering project, a qualified bat biologist will conduct a roost habitat assessment to identify potential colonial roost sites of special-status and common bat species within 750 feet of the construction area. If suitable roost sites are to be removed or otherwise affected by the proposed project, the bat biologist will conduct targeted roost surveys

of all identified sites that would be affected. Because bat activity is highly variable (both spatially and temporally) across the landscape and may move unpredictably among several roosts, several separate survey visits may be required. Surveys will be repeated at different times of year if deemed necessary by the bat biologist to determine the presence of seasonally active roosts (hibernacula, migratory stopovers, maternity roosts). Appropriate field methods will be employed to determine the species, type, and vulnerability of the roost to construction disturbance. Methods will follow best practices for roost surveys such that species are not disturbed and adequate temporal and spatial coverage is provided to increase likelihood of detection.

Roost surveys may consist of both daylight surveys for signs of bat use and evening/night visit(s) to conduct emergence surveys or evaluate the status of night roosts. Survey timing should be adequate to account for individual bats or species that might not emerge until well after dark.

Methods and approaches for determining roost occupancy status should include a combination of the following components as the biologist deems necessary for the particular roost site.

- Passive and/or active acoustic monitoring to assist with species identification.
- Guano traps to determine activity status.
- Night-vision equipment.
- Passive infrared camera traps.

At the completion of the roost surveys, a report will be prepared documenting areas surveyed, methods, results, and mapping of high-quality habitat or confirmed roost locations.

#### **Mitigation Measure BIO-12b: Avoid removing or disturbing bat roosts**

- Active bat roosts will not be disturbed, and will be provided a minimum buffer of 500 feet where preexisting disturbance is moderate or 750 feet where preexisting disturbance is minimal. Confirmation of buffer distances and determination of the need for a biological monitor for active maternity roosts or hibernacula will be obtained in consultation with CDFW. At a minimum, when an active maternity roost or hibernaculum is present within 750 feet of a construction site, a qualified biologist will conduct an initial assessment of the roost response to construction activities and will recommend buffer expansion if there are signs of disturbance from the roost.
- Structures (natural or artificial) showing evidence of significant bat use within the past year will be left in place as habitat wherever feasible. Should such a structure need to be removed or disturbed, CDFW will be consulted to determine appropriate buffers, timing and methods, and compensatory mitigation for the loss of the roost.
- All project proponents will provide environmental awareness training to construction personnel, establish buffers, and initiate consultation with CDFW if needed.
- Artificial night lighting within 500 feet of any roost will be shielded and angled such that bats may enter and exit the roost without artificial illumination and the roost does not receive artificial exposure to visual predators.
- Tree and vegetation removal will be conducted outside the maternity season (April 1–September 15) to avoid disturbance of maternity groups of foliage-roosting bats.

- If a maternity roost or hibernaculum is present within 500 feet of the construction site where preexisting disturbance is moderate or within 750 feet where preexisting disturbance is minimal, a qualified biological monitor will be onsite during groundbreaking activities.

**Impact BIO-12a-2: Potential mortality or disturbance of bats from roost removal or disturbance—program Alternative 2: 450 MW (less than significant with mitigation)**

Several species of both common (*Myotis* spp.) and special-status (western red bat, pallid bat, Townsend's big-eared bat) bats are known to occur or could occur in or around the program area, and could use the area for foraging, dispersal, and migration. Bats may use rock outcrops, trees, buildings, bridges, and other structures in the program area as maternity or migratory stopover roosts. Permanent water bodies and stock tanks in and adjacent to the program area provide sources of fresh water for both resident and migratory bats.

Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Construction and decommissioning of turbines could result in disturbance or loss of active bat roosts through increased traffic, noise, lighting, and human access. Removal or disturbance of trees, rock outcrops, debris piles, outbuildings, or other artificial structures could result in removal of roost habitat and mortality of bats using the structure as a roost. Several species of bat are sensitive to disturbance and may abandon flightless young, or they may simply not return to the roost once disturbed, resulting in the loss of that roost as habitat for the local population. Because some bats roost colonially, removal of special-status species' roost structures in a roost-limited habitat could result in the loss of a significant portion of the local bat population. This would be a significant impact. Implementation of Mitigation Measures BIO-1b, BIO-3, BIO-12a, and BIO-12b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-12a: Conduct bat roost surveys**

**Mitigation Measure BIO-12b: Avoid removing or disturbing bat roosts**

**Impact BIO-12b: Potential mortality or disturbance of bats from roost removal or disturbance—Golden Hills Project (less than significant with mitigation)**

Construction and decommissioning of turbines could result in disturbance or loss of active bat roosts through increased traffic, noise, lighting or human access. Removal or disturbance of trees, rock outcrops, debris piles, outbuildings, or other artificial structures could result in removal of roost habitat and mortality of bats using the structure as a roost. Several species of bat are sensitive to disturbance and may abandon flightless young, or they may simply not return to the roost once disturbed, resulting in the loss of that roost as habitat for the local population. Because some bats roost colonially, removal of special-status species' roost structures in a roost-limited habitat could

result in the loss of a significant portion of the local bat population. This would be a significant impact. Implementation of Mitigation Measures BIO-1b, BIO-3, BIO-12a and BIO-12b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-12a: Conduct bat roost surveys**

**Mitigation Measure BIO-12b: Avoid removing or disturbing bat roosts**

**Impact BIO-12c: Potential mortality or disturbance of bats from roost removal or disturbance—Patterson Pass Project (less than significant with mitigation)**

Construction and decommissioning of turbines could result in disturbance or loss of active bat roosts through increased traffic, noise, lighting or human access. Removal or disturbance of trees, rock outcrops, debris piles, outbuildings, or other artificial structures could result in removal of roost habitat and mortality of bats using the structure as a roost. Several species of bat are sensitive to disturbance and may abandon flightless young, or they may simply not return to the roost once disturbed, resulting in the loss of that roost as habitat for the local population. Because some bats roost colonially, removal of special-status species' roost structures in a roost-limited habitat could result in the loss of a significant portion of the local bat population. This would be a significant impact. Implementation of Mitigation Measures BIO-1b, BIO-3, BIO-12a and BIO-12b would reduce this impact to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-12a: Conduct bat roost surveys**

**Mitigation Measure BIO-12b: Avoid removing or disturbing bat roosts**

**Impact BIO-13a-1: Potential for construction activities to temporarily remove or alter bat foraging habitat—program Alternative 1: 417 MW (less than significant)**

Construction of repowering projects could degrade bat foraging habitat by replacing vegetation with nonvegetated land cover types. Project construction would create a temporary increase in traffic, noise, and artificial night lighting in the program area, reducing the extent of landscape available for foraging. However, the amount of landscape returned to foraging habitat in the process of decommissioning the first- and second-generation turbines would offset the amount of foraging habitat lost to repowering activities. This impact would be less than significant. No mitigation is required.

**Impact BIO-13a-2: Potential for construction activities to temporarily remove or alter bat foraging habitat—program Alternative 2: 450 MW (less than significant)**

Construction of repowering projects could degrade bat foraging habitat by replacing vegetation with nonvegetated land cover types. Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Project construction would create a temporary increase in traffic, noise, and artificial night lighting in the program area, reducing the extent of landscape available for foraging. However, the amount of landscape returned to foraging habitat in the process of decommissioning the first- and second-generation turbines would offset the amount of foraging habitat lost to repowering activities. This impact would be less than significant. No mitigation is required.

**Impact BIO-13b: Potential for construction activities to temporarily remove or alter bat foraging habitat—Golden Hills Project (less than significant)**

Construction of the Golden Hills Project could degrade bat foraging habitat by replacing vegetation with nonvegetated land cover types. Project construction would create a temporary increase in traffic, noise, and artificial night lighting in the program area, reducing the extent of landscape available for foraging. However, the amount of landscape returned to foraging habitat in the process of decommissioning the first- and second-generation turbines would offset the amount of foraging habitat lost to repowering activities. This impact would be less than significant. No mitigation is required.

**Impact BIO-13c: Potential for construction activities to temporarily remove or alter bat foraging habitat—Patterson Pass Project (less than significant)**

Construction of the Patterson Pass Project could degrade bat foraging habitat by replacing vegetation with nonvegetated land cover types. Project construction would create a temporary increase in traffic, noise, and artificial night lighting in the program area, reducing the extent of landscape available for foraging. However, the amount of landscape returned to foraging habitat in the process of decommissioning the first- and second-generation turbines would offset the amount of foraging habitat lost to repowering activities. This impact would be less than significant. No mitigation is required.

**Impact BIO-14a-1: Turbine-related fatalities of special-status and other bats—program Alternative 1: 417 MW (significant and unavoidable)**

Resident and migratory bats flying in and through the program area may be killed by collision with wind turbine blades or other interaction with the wind turbine generators.

Insufficient data are currently available to develop accurate fatality estimates for individual bat species. Five bat species have been documented in fatality monitoring programs in the APWRA (Insignia Environmental 2012:48; Brown et al. 2013: 23; ICF International 2012:3-3), of which two (western red bat and hoary bat) are special-status species. Extrapolating from existing fatality data and from trends observed at other wind energy facilities where fourth-generation turbines are in operation, it appears likely that fatalities would occur predominantly in the late summer to mid-fall migration period; that fatalities would consist mostly of migratory bats, particularly Mexican free-tailed bat and hoary bat; that fatalities would occur sporadically at other times of year; and that fatalities of one or more other species would occur in smaller numbers.



Diablo Winds, Buena Vista, and Vasco Winds are the only repowered projects in the APWRA for which estimates of bat fatality rates are available. While these rates vary widely (Smallwood and Karas 2009:1067; Insignia Environmental 2012:65; Brown et al. 2013:39), based on these estimates, bat collision risk increases substantially when old-generation turbines are replaced by newer, larger turbines (Smallwood and Karas 2009:1068). Turbines used in future repowering projects are likely to be similar in size to the Vasco Winds turbines but much larger than the Diablo Winds and Buena Vista turbines in both overall size and rated nameplate capacity. There is evidence to suggest that larger turbines similar to those used in the Vasco Winds project will result in additional increases in bat fatality rates for those bat species currently killed in the APWRA.

Some hypotheses for the increased collision risk to migratory bat species at fourth-generation turbines are summarized below.

- Bats tend not to fly at high wind speeds. The lower wind speeds at which fourth-generation turbines are able to produce power create more overlap in the time that turbines are operating and bats are in the air. In several studies, the majority of fatalities occurred on nights of lower wind speed (less than 5.5 meters/second [m/s]) (Arnett et al. 2008:73; Good et al. 2012:iv). This correlation suggests a possible source for the increased risk that fourth-generation turbines pose to bats.
- Migratory tree-roosting bats may be attracted to the tubular tower structure of newer turbines; this attraction may be related to mating behavior during migration (Arnett et al. 2008:73; Cryan 2008:1).
- Echolocation pulses may not be used during open-air migratory flight, or not used as often, resulting in bats being unaware of the hazard presented by the turbine blades (Kunz et al. 2007:319).
- Foraging, water acquisition, roost selection, or mating behavior during migration season may bring bats through the rotor-swept area of taller turbines more often (Cryan and Barclay 2009:1333).
- Taller turbines have been documented to kill more bats. The increased height of fourth-generation turbines puts the rotor-swept area into bat flight paths (Barclay et al 2007: 384).

Table 3.4-15 provides a comparison of the estimated number of fatalities expected to occur if old-generation turbines are allowed to continue operating at their current level and the estimated number of fatalities expected to occur after repowering of the program area and the two project areas. Due to the high degree of uncertainty in bat fatality estimates, a range of estimates based on available data is presented. The lowest estimate is derived from the *best estimate* rate of 1.679 fatalities/MW/year reported for the first year of monitoring at the Vasco Winds repowering project (Brown et al. 2013:39). The upper end of this range is calculated using the bat fatality rate of 3.92 fatalities/MW/year reported for the Shiloh I project in the Montezuma Hills Wind Resource Area. The baseline estimate is derived from the bat fatality rate of 0.263 fatalities/MW/year reported for the APWRA for 2005–2007 (Smallwood and Karas 2009:1066). As shown in Table 3.4-15, annual estimated bat fatalities in the program area from implementation of Alternative 1 are anticipated to increase from the current estimate of 87 to 700–1,635 fatalities.

**Table 3.4-15. Estimated Range of Annual Bat Fatalities**

Study Area	Capacity (MW)	Baseline Fatalities <sup>a</sup>	Predicted Fatalities <sup>b</sup>
Existing program area	329	87	–
Program Alternative 1	417	110	700–1,635
Program Alternative 2	450	118	756–1,764
Golden Hills	88.4	23	148–347
Patterson Pass	19.8	5	33–78

<sup>a</sup> Estimate of total baseline fatalities are based on the Smallwood and Karas fatality rate of 0.263 fatalities/MW/year derived from 2005–2007 monitoring at the APWRA.

<sup>b</sup> Estimate of total predicted fatalities are based on fatality rates from the Vasco Winds repowering project (1.679 fatalities/MW/year), and from the multiyear average rates from the Shiloh I project in the Montezuma Hills WRA (3.92 fatalities/MW/year).

Despite the high level of uncertainty in estimates of bat fatality rates, all available data suggest that repowering would result in a substantial increase in bat fatalities. The degree of increase may be influenced by the following factors.

- Turbine placement in areas of high autumn bat activity or along migration routes.
- Turbine placement along commuting flyways to key resources (e.g., roosts, water, foraging habitat).
- Behavior of the turbine model before it cuts in (i.e., whether blades are allowed to spin at lower wind speeds) (Good et al. 2012:v).

Mitigation Measures BIO-14a through BIO-14e would reduce this impact, but not to a less-than-significant level; accordingly, this impact is considered significant and unavoidable.

#### **Mitigation Measure BIO-14a: Site and select turbines to minimize potential mortality of bats**

All project proponents will use the best information available to site turbines and to select from turbine models in such a manner as to reduce bat collision risk. The siting and selection process will take into account bat use of the area and landscape features known to increase collision risk (trees, edge habitats, riparian areas, water bodies, and wetlands). Measures include but are not limited to siting turbines the greatest distance feasible up to 500 meters (1,640) feet from still or flowing bodies of water, riparian habitat, known roosts, and tree stands (California Bat Working Group 2006:6).

To generate site-specific “best information” to inform turbine siting and operation decisions, a bat habitat assessment and roost survey will be conducted in the project area to identify and map habitat of potential significance to bats, such as potential roost sites (trees and shrubs, significant rock formations, artificial structures) and water sources. Turbine siting decisions will incorporate relevant bat use survey data and bat fatality records published by other projects in the APWRA. Roost surveys will be carried out according to the methods described in Mitigation Measure-BIO-12a.

#### **Mitigation Measure BIO-14b: Implement postconstruction bat fatality monitoring program for all repowering projects**

A scientifically defensible, postconstruction bat fatality monitoring program will be implemented to estimate actual bat fatalities and determine if additional mitigation is required. Bat-specific modifications to the 3-year postconstruction monitoring program described in Mitigation Measure BIO-11g, developed in accordance with CEC 2007 and with appropriate recommendations from California Bat Working Group guidelines (2006), will be implemented.

In addition to the requirements outlined in Mitigation Measure BIO-11g, the following two bat-specific requirements will be added.

- Include on the TAC at least one biologist with significant expertise in bat research and wind energy impacts on bats.
- Conduct bat acoustic surveys concurrently with fatality monitoring in the project area to estimate nightly, seasonal, or annual variations in relative activity and species use patterns, and to contribute to the body of knowledge on seasonal bat movements and relationships between bat activity, environmental variables, and turbine fatality. Should emerging research support the approach, these data may be used to generate site-specific predictive models to increase the precision and effectiveness of mitigation measures (e.g., the season-specific, multivariate models described by Weller and Baldwin 2011:11). Acoustic bat surveys will be designed and data analysis conducted by qualified biologists with significant experience in acoustic bat survey techniques. Methods will be informed by the latest available guidelines (California Energy Commission guidelines, 2007); California Bat Working Group guidelines, 2006), except where best available science supports technological or methodological updates. High-quality, sensitive acoustic equipment will be used to produce data of sufficient quality to generate species identifications. Survey design and methods will be scientifically defensible and will include, at a minimum, the following elements.
  - Acoustic detectors will be installed at multiple stations to adequately sample range of habitats in the project area for both resident and migratory bats. The number of detector arrays installed per project site will incorporate emerging research on the density of detectors required to adequately meet sampling goals and inform mitigation approaches (Weller and Baldwin 2011:10).
  - Acoustic detector arrays will sample multiple airspace heights including as close to the repowered rotor swept area as possible. Vertical structures used for mounting may be preexisting or may be installed for the project (e.g., temporary or permanent meteorological towers).
  - Surveys will be conducted such that data are collected continuously from early July to early November to cover the activity transition from maternity to migration season and determine if there is elevated activity during migration. Survey season may be adjusted to more accurately reflect the full extent of the local migration season and/or season(s) of greatest local bat fatality risk, if scientifically sound data support doing so.
  - Anticipated adaptive management goals, such as determining justifiable timeframes to reduce required periods of cut-in speed adjustments, will be reviewed with the TAC and incorporated in designing the acoustic monitoring and data analysis program.

Modifications to the fatality search protocol will be implemented to obtain better information on the number and timing of bat fatalities (e.g., Johnston et al. 2013:85). Modifications will include decreases in the transect width and search interval for a period of time coinciding with high

levels of bat mortality, i.e., the fall migration season (roughly August to early November, or as appropriate in the view of the TAC). The nature of bat-specific transect distance and search intervals will be determined in consultation with the TAC and will be guided by scientifically sound and pertinent data on rates of bat carcass detection at wind energy facilities (e.g., Johnston et al. 2013:54–55) and site-specific data from APWRA repowering project fatality monitoring programs as these data become available.

Other methods to achieve the goals of the bat fatality monitoring program while avoiding prohibitive costs may be considered subject to approval by the TAC, if these methods have been peer reviewed and evidence indicates the methods are effective. For example, if project proponents wish to have the option of altering search methodology to a newly developed method, such as searching only roads and pads (Good et al. 2011:73), a statistically robust field study to index the results of the methodology against standard search methods will be conducted concurrently to ensure site-specific, long-term validity of the new methods.

Finally, detection probability trials will utilize bat carcasses to develop bat-specific detection probabilities. Care should be taken to avoid introducing novel disease reservoirs; such avoidance will entail using onsite fatalities or using carcasses obtained from within a reasonably anticipated flight distance for that species.

**Mitigation Measure BIO-14c: Prepare and publish annual monitoring reports on the findings of bat use of the project area and fatality monitoring results**

Annual reports of bat use results and fatality monitoring will be produced within 3 months of the end of the last day of fatality monitoring. Special-status bat species records will be reported to CNDDB.

**Mitigation Measure BIO-14d: Develop and implement a bat adaptive management plan**

In concert with Mitigation Measure BIO-14b, all project proponents will develop adaptive management plans to ensure appropriate, feasible, and current incorporation of emerging information. The goals of the adaptive management plans are to ensure that the best available science and emerging technologies are used to assess impacts on bats, and that impacts are minimized to the greatest extent possible while maximizing energy production.

The project-specific adaptive management plans will be used to adjust operation and mitigation to incorporate the results of project area monitoring and new technology and research results when sufficient evidence exists to support these new approaches. These plans will be reviewed by the TAC and approved by the County. All adaptive management measures will be implemented within a reasonable timeframe, sufficient to allow the measures to take effect in the first fall migration season following the year of monitoring in which the adaptive management threshold was crossed. ADMMs may be modified by the County in consultation with the TAC to take into account current research, site-specific data, and the most effective impact reduction strategies. ADMMs will include a scientifically defensible, controlled research component and minimum post-implementation monitoring time to evaluate the effectiveness and validity of the measures. The minimum monitoring time will consist of three sequential fall seasons of the bat-specific mortality monitoring program covering the 3–4 months of the year in which the highest bat mortality has been observed: likely August–November. The start and end dates of the 3–4 months of bat-specific mortality monitoring period will be based on existing fatality data and in consultation with the TAC.

Determining a fatality threshold to trigger adaptive management is not straightforward, as insufficient information exists on the status and vitality of the populations of migratory bat species subject to mortality in the APWRA. The low estimate of anticipated bat fatality rates is from the Vasco Winds project in the APWRA. Applying this rate programmatically would result in an estimate of 21,000 bats killed over the 30-year life of the program. The high estimate is from the Montezuma Hills Wind Resource Area. Applying this rate programmatically would result in an estimate of 49,050 bats killed over the 30-year life of the program. Bats are slow to reproduce, and turbines may be more likely to kill adult bats than juveniles, suggesting that a conservative approach is warranted. Accordingly, an initial adaptive management threshold will be established using the low fatality estimates, or 1.679 fatalities/MW/year, to ensure that the most conservative trigger for implementation of adaptive management measures is adopted.

If postconstruction fatality monitoring results in a point estimate for the bat fatality rate that exceeds the 1.679 fatalities/MW/year threshold by a statistically significant amount, then, in consultation with the TAC, ADMM-7 and ADMM-8 (described below) for bats will be implemented.

It is important to note that neither the high nor the low estimate speaks to the ability of bat populations to withstand the associated levels of take. The initial fatality rate threshold triggering adaptive management may be modified by the TAC if appropriate and if such adaptation is supported by the best available science.

The TAC may direct implementation of adaptive management measures for other appropriate reasons, such as an unexpectedly and markedly high fatality rate observed for any bat species, or special-status species being killed in unexpectedly high numbers.

ADMMs for bats may be implemented using a stepped approach until necessary fatality reductions are reached, and monitoring methods must be revised as needed to ensure accurate measurement of the effectiveness of the ADMMs. Additional ADMMs for bats should be developed as new technologies or science supports doing so.

**ADMM-7: Seasonal Turbine Cut-in Speed Increase.** Cut-in speed increases offer the most promising and immediately available approach to reducing bat fatalities at fourth-generation wind turbines. Reductions in fatalities (53–87%) were observed when increasing modern turbine cut-in speed to 5.0–6.5 m/s (Arnett et al. 2009:3; Good et al. 2012:iii). While implementing this measure immediately upon a project's commencement would likely reduce bat fatalities, that assumption is not yet supported by conclusive data. Moreover, without establishing baseline fatality at repowered projects, there would be no way to determine the effectiveness of the approach or whether the costs of increased cut-in speeds (and consequent power generation reductions) were providing fatality reductions.

Cut-in speed increases will be implemented as outlined below, with effectiveness assessed annually.

- The project proponent will increase cut-in speed to 5.0 m/s from sunset to sunrise during peak migration season (generally August–October). If this is ineffective, the project proponent will increase turbine cut-in speed by annual increments of 0.5 m/s until target fatality reductions are achieved.

- The project proponent may refine site-specific migration start dates on the basis of pre- and postconstruction acoustic surveys and ongoing review of dates of fatality occurrences for migratory bats in the APWRA.
- The project proponent may request a shorter season of required cut-in speed increases with substantial evidence that similar levels of mortality reduction could be achieved. Should resource agencies and the TAC find there is sufficient support for a shorter period (as low as 8 weeks), evidence in support of this shorter period will be documented for the public record and the shorter period may be implemented.
- The project proponent may request shorter nightly periods of cut-in speed increases with substantial evidence from defensible onsite, long-term postconstruction acoustic surveys indicating predictable nightly timeframes when target species appear not to be active. Target species are here defined as migratory bats or any other species appearing repeatedly in the fatality records.
- The project proponent may request exceptions to cut-in speed increases for particular weather events or wind patterns if substantial evidence is available from onsite acoustic or other monitoring to support such exceptions (i.e., all available literature and onsite surveys indicate that bat activity ceases during specific weather events or other predictable conditions).
- In the absence of defensible site-specific data, mandatory cut-in speed increases will commence on August 1 and continue through October 31, and will be in effect from sunset to sunrise.

**ADMM-8: Emerging Technology as Mitigation.** The project proponent may request, with consultation and approval from agencies, replacement or augmentation of cut-in speed increases with developing technology or another mitigation approach that has been proven to achieve similar bat fatality reductions.

The project proponent may also request the second tier of adaptive management to be the adoption of a promising but not fully proven technology or mitigation method. These requests are subject to review and approval by the TAC and must include a controlled research component designed by a qualified principal investigator so that the effectiveness of the method may be accurately assessed.

Some examples of such emerging technologies and research areas that could be incorporated in adaptive management plans are listed below.

- The use of acoustic deterrents (Arnett et al. 2013:1).
- The use of altitude-specific radar, night vision and/or other technology allowing bat use monitoring and assessment of at-risk bat behavior (Johnston et al. 2013: 90-91) if research in these areas advances sufficiently to allow effective application of these technologies.
- Application of emerging peer-reviewed studies on bat biology (such as studies documenting migratory corridors or bat behavior in relation to turbines) that support specific mitigation methods.

**Mitigation Measure BIO-14e: Compensate for expenses incurred by rehabilitating injured bats**

The cost of reasonable, licensed rehabilitation efforts for any injured bats taken to wildlife care facilities from the program area will be assumed in full by project proponents.

**Impact BIO-14a-2: Turbine-related fatalities of special-status and other bats—program Alternative 2: 450 MW (significant and unavoidable)**

Resident and migratory bats flying in and through the program area may be killed by collision with wind turbine blades or other interaction with the wind turbine generators.

Insufficient data are currently available to develop accurate fatality estimates for individual bat species. Five bat species have been documented in fatality monitoring programs in the APWRA (Insignia Environmental 2012:48; Brown et al. 2013: 23; ICF International 2012:3-3), of which two (western red bat and hoary bat) are special-status species. Extrapolating from existing fatality data and from trends observed at other wind energy facilities where fourth-generation turbines are in operation, it appears likely that fatalities would occur predominantly in the late summer to mid-fall migration period; that fatalities would consist mostly of migratory bats, particularly Mexican free-tailed bat and hoary bat; that fatalities would occur sporadically at other times of year; and that fatalities of one or more other species would occur in smaller numbers.

Diablo Winds, Buena Vista, and Vasco Winds are the only repowered projects in the APWRA for which estimates of bat fatality rates are available. While these rates vary widely (Smallwood and Karas 2009:1067; Insignia Environmental 2012:65; Brown et al. 2013:39), based on these estimates, bat collision risk increases substantially when old-generation turbines are replaced by newer, larger turbines (Smallwood and Karas 2009:1068). Turbines used in future repowering projects are likely to be similar in size to the Vasco Winds turbines but much larger than the Diablo Winds and Buena Vista turbines in both overall size and rated nameplate capacity. There is evidence to suggest that larger turbines similar to those used in the Vasco Winds project will result in additional increases in bat fatality rates for those bat species currently killed in the APWRA.

Some hypotheses for the increased collision risk to migratory bat species at fourth-generation turbines are summarized below.

- Bats tend not to fly at high wind speeds. The lower wind speeds at which fourth-generation turbines are able to produce power create more overlap in the time that turbines are operating and bats are in the air. In several studies, the majority of fatalities occurred on nights of lower wind speed (less than 5.5 meters/second [m/s]) (Arnett et al. 2008:73; Good et al. 2012:iv). This correlation suggests a possible source for the increased risk that fourth-generation turbines pose to bats.
- Migratory tree-roosting bats may be attracted to the tubular tower structure of newer turbines; this attraction may be related to mating behavior during migration (Arnett et al. 2008:73; Cryan 2008:1).
- Echolocation pulses may not be used during open-air migratory flight, or not used as often, resulting in bats being unaware of the hazard presented by the turbine blades (Kunz et al. 2007:319).

- Foraging, water acquisition, roost selection, or mating behavior during migration season may bring bats through the rotor-swept area of taller turbines more often (Cryan and Barclay 2009:1333).
- Taller turbines have been documented to kill more bats. The increased height of fourth-generation turbines puts the rotor-swept area into bat flight paths (Barclay et al 2007: 384).

Table 3.4-15 provides a comparison of the estimated number of fatalities expected to occur if old-generation turbines are allowed to continue operating at their current level and the estimated number of fatalities expected to occur after repowering of the program area and the two project areas. Due to the high degree of uncertainty in bat fatality estimates, a range of estimates based on available data is presented. The lowest estimate is derived from the *best estimate* rate of 1.679 fatalities/MW/year reported for the first year of monitoring at the Vasco Winds repowering project (Brown et al. 2013:39). The upper end of this range is calculated using the bat fatality rate of 3.92 fatalities/MW/year reported for the Shiloh I project in the Montezuma Hills Wind Resource Area. The baseline estimate is derived from the bat fatality rate of 0.263 fatalities/MW/year reported for the APWRA for 2005–2007 (Smallwood and Karas 2009:1066). As shown in Table 3.4-15, annual estimated bat fatalities in the program area from implementation of Alternative 2 are anticipated to increase from the current estimate of 87 to 756–1,764 fatalities.

Despite the high level of uncertainty in estimates of bat fatality rates, all available data suggest that repowering would result in a substantial increase in bat fatalities. The degree of increase may be influenced by the following factors.

- Turbine placement in areas of high autumn bat activity or along migration routes.
- Turbine placement along commuting flyways to key resources (e.g., roosts, water, foraging habitat).
- Behavior of the turbine model before it cuts in (i.e., whether blades are allowed to spin at lower wind speeds) (Good et al. 2012:v).

Mitigation Measures BIO-14a through BIO-14e would reduce this impact, but not to a less-than-significant level; accordingly, this impact is considered significant and unavoidable.

**Mitigation Measure BIO-14a: Site and select turbines to minimize potential mortality of bats**

**Mitigation Measure BIO-14b: Implement postconstruction bat fatality monitoring program for all repowering projects**

**Mitigation Measure BIO-14c: Prepare and publish annual monitoring reports on the findings of bat use of the project area and fatality monitoring results**

**Mitigation Measure BIO-14d: Develop and implement a bat adaptive management plan**

**Mitigation Measure BIO-14e: Compensate for expenses incurred by rehabilitating injured bats**

**Impact BIO-14b: Turbine-related fatalities of special-status and other bats—Golden Hills Project (significant and unavoidable)**



Resident and migratory bats flying in and through the Golden Hills project area may be killed by collision with wind turbine blades or other interaction with the wind turbine generators. Repowering in the project area would introduce increased fatality risk, particularly to migratory bats.

Extrapolating from existing fatality data and from trends observed at other wind energy facilities where fourth-generation turbines are in operation, it appears likely that fatalities would occur predominantly in the late summer to mid-fall migration period; that fatalities would consist mostly of migratory bats, particularly Mexican free-tailed bat and hoary bat; that fatalities would occur sporadically at other times of year; and that fatalities of one or more other species will occur in smaller numbers. As shown in Table 3.4-14, annual estimated bat fatalities in the Golden Hills project area are anticipated to increase from the current estimate of 23 to 148–347 fatalities. Mitigation Measures BIO-14a through BIO-14e would reduce this impact, but not to a less-than-significant level; accordingly, this impact is considered significant and unavoidable.

**Mitigation Measure BIO-14a: Site and select turbines to minimize potential mortality of bats**

**Mitigation Measure BIO-14b: Implement postconstruction bat fatality monitoring program for all repowering projects**

**Mitigation Measure BIO-14c: Prepare and publish annual monitoring reports on the findings of bat use of the project area and fatality monitoring results**

**Mitigation Measure BIO-14d: Develop and implement a bat adaptive management plan**

**Mitigation Measure BIO-14e: Compensate for expenses incurred by rehabilitating injured bats**

**Impact BIO-14c: Turbine-related fatalities of special-status and other bats—Patterson Pass Project (significant and unavoidable)**

Resident and migratory bats flying in and through the Patterson Pass project area may be killed by collision with wind turbine blades or other interaction with the wind turbine generators. Repowering in the project area would introduce increased fatality risk, particularly to migratory bats.

Extrapolating from existing fatality data and from trends observed at other wind energy facilities where fourth-generation turbines are in operation, it appears likely that fatalities would occur predominantly in the late summer to mid-fall migration period; that fatalities would consist mostly of migratory bats, particularly Mexican free-tailed bat and hoary bat; that fatalities would occur sporadically at other times of year; and that fatalities of one or more other species will occur in smaller numbers. As shown in Table 3.4-14, annual estimated bat fatalities in the Patterson Pass project area are anticipated to increase from the current estimate of 5 to 33–78 fatalities. Mitigation Measures BIO-14a through BIO-14e would reduce this impact, but not to a less-than-significant level; accordingly, this impact is considered significant and unavoidable.

**Mitigation Measure BIO-14a: Site and select turbines to minimize potential mortality of bats**

**Mitigation Measure BIO-14b: Implement postconstruction bat fatality monitoring program for all repowering projects****Mitigation Measure BIO-14c: Prepare and publish annual monitoring reports on the findings of bat use of the project area and fatality monitoring results****Mitigation Measure BIO-14d: Develop and implement a bat adaptive management plan****Mitigation Measure BIO-14e: Compensate for expenses incurred by rehabilitating injured bats****Impact BIO-15a-1: Potential for road infrastructure upgrades to result in adverse effects on alkali meadow—program Alternative 1: 417 MW (less than significant with mitigation)**

Road infrastructure upgrades would include grading, widening, and regravelling of existing roads and construction of new roads to accommodate decommission and repowering activities. Culverts would be upgraded for existing roads, and new culverts would be installed for new roads. Direct effects would consist of fill of alkali meadow at locations where roads crossing the habitat would be widened. Indirect effects could involve altered hydrology or runoff of sediment and other substances during road construction activities. Some effects, such as those due to runoff, would be avoided and minimized through implementation of erosion control BMPs and postconstruction reclamation. Installation of new and upgraded culverts would maintain existing hydrology. However, loss of alkali meadow habitat as a result of direct fill would be a substantial adverse effect on a sensitive natural community. This would be a significant impact; however, implementation of Mitigation Measure BIO-15 would reduce this impact to a level less-than-significant level.

**Mitigation Measure BIO-15: Compensate for the loss of alkali meadow habitat**

If alkali meadow habitat is filled or disturbed as part of a repowering project, the project proponent will compensate for the loss of this habitat to ensure no net loss of habitat functions and values. Compensation ratios will be based on site-specific information and determined through coordination with state and federal agencies (CDFW, USFWS, USACE). Unless specified otherwise by a resource agency, the compensation will be at a minimum 1:1 ratio (1 acre restored or created for every 1 acre filled) and may be a combination of onsite restoration/creation, offsite restoration, and mitigation credits. A restoration and monitoring plan will be developed and implemented. The plan will describe how alkali meadow habitat will be created and monitored.

**Impact BIO-15a-2: Potential for road infrastructure upgrades to result in adverse effects on alkali meadow—program Alternative 2: 450 MW (less than significant with mitigation)**

Road infrastructure upgrades would include grading, widening, and regravelling of existing roads and construction of new roads to accommodate decommission and repowering activities. Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Culverts would be upgraded for existing roads, and new culverts would be installed for new roads. Direct effects would consist of fill of alkali meadow at locations where roads crossing the habitat would be widened. Indirect effects could involve altered hydrology or runoff of sediment and other substances during

road construction activities. Some effects, such as those due to runoff, would be avoided and minimized through implementation of erosion control BMPs and postconstruction reclamation. Installation of new and upgraded culverts would maintain existing hydrology. However, loss of alkali meadow habitat as a result of direct fill would be a substantial adverse effect on a sensitive natural community. This would be a significant impact; however, implementation of Mitigation Measure BIO-15 would reduce this impact to a level less-than-significant level.

#### **Mitigation Measure BIO-15: Compensate for the loss of alkali meadow habitat**

##### **Impact BIO-15b: Potential for road infrastructure upgrades to result in adverse effects on alkali meadow—Golden Hills Project (less than significant with mitigation)**

Alkali meadow comprises approximately 3% (145.69 acres) of the Golden Hills project area. Road infrastructure upgrades that could affect this habitat would include grading, widening, and regravelling of existing roads and construction of new roads to accommodate decommission and repowering activities. Culverts would be upgraded for existing roads, and new culverts would be installed for new roads. Direct effects would consist of fill of alkali meadow at locations where roads crossing the habitat would be widened. Indirect effects could involve altered hydrology or runoff of sediment and other substances during road construction activities. Some effects, such as those due to runoff, would be avoided and minimized through implementation of erosion control BMPs and postconstruction reclamation. Installation of new and upgraded culverts would maintain existing hydrology. However, loss of alkali meadow habitat as a result of direct fill would be a substantial adverse effect on a sensitive natural community. Because specific designs have not been developed for the Golden Hills project, it is not possible to quantify this effect. However, if alkali meadow is affected by road infrastructure upgrades, it would be a significant impact. Implementation of Mitigation Measure BIO-15 would reduce this impact to a level less-than-significant level.

#### **Mitigation Measure BIO-15: Compensate for the loss of alkali meadow habitat**

##### **Impact BIO-15c: Potential for road infrastructure upgrades to result in adverse effects on alkali meadow—Patterson Pass (no impact)**

Because no alkali meadow occurs in the Patterson Pass project area, there would be no impact. No mitigation is required.

##### **Impact BIO-16a-1: Potential for road infrastructure upgrades to result in adverse effects on riparian habitat—program Alternative 1: 417 MW (less than significant with mitigation)**

Road infrastructure upgrades would include grading, widening, and regravelling of existing roads and construction of new roads to accommodate decommission and repowering activities. Culverts would be upgraded for existing roads, and new culverts would be installed for new roads. Loss of riparian habitat as a result of direct fill would be a substantial adverse effect on a sensitive natural community. This would be a significant impact; however, implementation of Mitigation Measure BIO-16 would reduce this impact to a level less-than-significant level.

#### **Mitigation Measure BIO-16: Compensate for the loss of riparian habitat**

If riparian habitat is filled or removed as part of a project, the project proponent will compensate for the loss of riparian habitat to ensure no net loss of habitat functions and values. Compensation ratios will be based on site-specific information and determined through

coordination with state and federal agencies (CDFW, USFWS, USACE). The compensation will be at a minimum 1:1 ratio (1 acre restored or created for every 1 acre filled) and may be a combination of onsite restoration/creation, offsite restoration, and mitigation credits. A restoration and monitoring plan will be developed and implemented. The plan will describe how riparian habitat will be created and monitored.

**Impact BIO-16a-2: Potential for road infrastructure upgrades to result in adverse effects on riparian habitat—program Alternative 2: 450 MW (less than significant with mitigation)**

Road infrastructure upgrades would include grading, widening, and regravelling of existing roads and construction of new roads to accommodate decommission and repowering activities. Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Culverts would be upgraded for existing roads, and new culverts would be installed for new roads. Loss of riparian habitat as a result of direct fill would be a substantial adverse effect on a sensitive natural community. This would be a significant impact; however, implementation of Mitigation Measure BIO-16 would reduce this impact to a level less-than-significant level.

**Mitigation Measure BIO-16: Compensate for the loss of riparian habitat**

**Impact BIO-16b: Potential for road infrastructure upgrades to result in adverse effects on riparian habitat—Golden Hills Project (less than significant with mitigation)**

Road infrastructure upgrades would include grading, widening, and regravelling of existing roads and construction of new roads to accommodate decommission and repowering activities. Culverts would be upgraded for existing roads, and new culverts would be installed for new roads. Loss of riparian habitat as a result of direct fill would be a substantial adverse effect on a sensitive natural community. Because specific designs have not been developed for the Golden Hills project, it is not possible to quantify this effect. However, if riparian habitat is affected by road infrastructure upgrades, it would be a significant impact. Implementation of Mitigation Measure BIO-16 would reduce this impact to a level less-than-significant level.

**Mitigation Measure BIO-16: Compensate for the loss of riparian habitat**

**Impact BIO-16c: Potential for road infrastructure upgrades to result in adverse effects on riparian habitat—Patterson Pass Project (less than significant with mitigation)**

Under current design, no riparian habitat would be affected by road infrastructure upgrades. However, if final design would result in riparian habitat being affected by road infrastructure upgrades, it would be a significant impact. Implementation of Mitigation Measure BIO-16 would reduce this impact to a level less-than-significant level.

**Mitigation Measure BIO-16: Compensate for the loss of riparian habitat**

**Impact BIO-17a-1: Potential for ground-disturbing activities to result in direct adverse effects on common habitats—program Alternative 1: 417 MW (less than significant)**

Ground-disturbing activities would result in the permanent loss of common habitats as a result of constructing new permanent facilities and the temporary loss of common habitats as a result of

constructing temporary facilities and landscape reclamation. These activities would create minor changes in total acreage of common habitats in the project area, primarily in the annual grassland plant community.

All lands disturbed by infrastructure installation or removal would be returned to preproject conditions. At each reclamation site, the topography would be contour graded (if necessary and if environmentally beneficial), stabilized, and reseeded with an appropriate seed mixture to maintain slope stability. Reclamation activities would be guided by a reclamation plan developed in coordination with the County and other applicable agencies.

This impact would be less than significant. No mitigation is required.

**Impact BIO-17a-2: Potential for ground-disturbing activities to result in direct adverse effects on common habitats—program Alternative 2: 450 MW (less than significant)**

Ground-disturbing activities would result in the permanent loss of common habitats as a result of constructing new permanent facilities and the temporary loss of common habitats as a result of constructing temporary facilities and landscape reclamation. These activities would create minor changes in total acreage of common habitats in the project area, primarily in the annual grassland plant community.

Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. All lands disturbed by infrastructure installation or removal would be returned to preproject conditions. At each reclamation site, the topography would be contour graded (if necessary and if environmentally beneficial), stabilized, and reseeded with an appropriate seed mixture to maintain slope stability. Reclamation activities would be guided by a reclamation plan developed in coordination with the County and other applicable agencies.

This impact would be less than significant. No mitigation is required.

**Impact BIO-17b: Potential for ground-disturbing activities to result in direct adverse effects on common habitats—Golden Hills Project (less than significant)**

Ground-disturbing activities would result in the permanent loss of common habitats as a result of constructing new permanent facilities and the temporary loss of common habitats as a result of constructing temporary facilities and landscape reclamation. These activities would create minor changes in total acreage of common habitats in the project area, primarily in the annual grassland plant community.

All lands disturbed by infrastructure installation or removal would be returned to preproject conditions. At each reclamation site, the topography would be contour graded (if necessary and if environmentally beneficial), stabilized, and reseeded with an appropriate seed mixture to maintain slope stability. Reclamation activities would be guided by a reclamation plan developed in coordination with the County and other applicable agencies.

This impact would be less than significant. No mitigation is required.

**Impact BIO-17c: Potential for ground-disturbing activities to result in direct adverse effects on common habitats—Patterson Pass Project (less than significant)**

Ground-disturbing activities would result in the permanent loss of common habitats as a result of constructing new permanent facilities and the temporary loss of common habitats as a result of constructing temporary facilities and landscape reclamation. These activities would create minor changes in total acreage of common habitats in the project area, primarily in the annual grassland plant community.

All lands disturbed by infrastructure installation or removal would be returned to preproject conditions. At each reclamation site, the topography would be contour graded (if necessary and if environmentally beneficial), stabilized, and reseeded with an appropriate seed mixture to maintain slope stability. Reclamation activities would be guided by a reclamation plan developed in coordination with the County and other applicable agencies.

This impact would be less than significant. No mitigation is required.

**Impact BIO-18a-1: Potential for road infrastructure upgrades to result in adverse effects on wetlands—program Alternative 1: 417 MW (less than significant with mitigation)**

Road infrastructure upgrades would include grading, widening, and regravelling of the existing roads and construction of new roads. Culverts would be upgraded for existing roads, and new culverts would be installed for new roads. Direct effects would include fill of wetlands at locations where roads crossing the habitat would be widened. Indirect effects could include altered hydrology or runoff of sediment and other substances during road construction activities. Some effects, such as those due to runoff, would be avoided and minimized through the implementation of erosion control BMPs and postconstruction reclamation. Installation of new and upgraded culverts would maintain existing hydrology. However, loss of wetlands as a result of direct fill would be a substantial adverse effect on a sensitive natural community. This would be a significant impact; however, implementation of Mitigation Measure BIO-18 would reduce this impact to a level less-than-significant level.

**Mitigation Measure BIO-18: Compensate for the loss of wetlands**

If wetlands are filled or disturbed as part of a project, the project proponent will compensate for the loss to ensure no net loss of habitat functions and values. Compensation ratios will be based on site-specific information and determined through coordination with state and federal agencies (CDFW, USFWS, USACE). The compensation will be at a minimum 1:1 ratio (1 acre restored or created for every 1 acre filled) and may be a combination of onsite restoration/creation, offsite restoration, and mitigation credits. A restoration and monitoring plan will be developed and implemented. The plan will describe how wetlands will be created and monitored.

**Impact BIO-18a-2: Potential for road infrastructure upgrades to result in adverse effects on wetlands—program Alternative 2: 450 MW (less than significant with mitigation)**

Road infrastructure upgrades would include grading, widening, and regravelling of the existing roads and construction of new roads. Culverts would be upgraded for existing roads, and new culverts would be installed for new roads. Direct effects would include fill of wetlands at locations where roads crossing the habitat would be widened. Indirect effects could include altered hydrology or runoff of sediment and other substances during road construction activities. Some effects, such as those due to runoff, would be avoided and minimized through the implementation of erosion control BMPs and postconstruction reclamation. Installation of new and upgraded culverts would maintain

existing hydrology. Direct effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. However, loss of wetlands as a result of direct fill would be a substantial adverse effect on a sensitive natural community. This would be a significant impact; however, implementation of Mitigation Measure BIO-18 would reduce this impact to a level less-than-significant level.

#### **Mitigation Measure BIO-18: Compensate for the loss of wetlands**

##### **Impact BIO-18b: Potential for road infrastructure upgrades to result in adverse effects on wetlands—Golden Hills Project (less than significant with mitigation)**

Road infrastructure upgrades would include grading, widening, and regravelling of the existing roads and construction of new roads. Culverts would be upgraded for existing roads, and new culverts would be installed for new roads. Direct effects would include fill of wetlands at locations where roads crossing the habitat would be widened. Indirect effects could include altered hydrology or runoff of sediment and other substances during road construction activities. Some effects, such as those due to runoff, would be avoided and minimized through the implementation of erosion control BMPs and postconstruction reclamation. Installation of new and upgraded culverts would maintain existing hydrology. However, loss of wetlands as a result of direct fill would be a substantial adverse effect on a sensitive natural community. This would be a significant impact; however, implementation of Mitigation Measure BIO-18 would reduce this impact to a level less-than-significant level.

#### **Mitigation Measure BIO-18: Compensate for the loss of wetlands**

##### **Impact BIO-18c: Potential for road infrastructure upgrades to result in adverse effects on wetlands—Patterson Pass Project (less than significant with mitigation)**

Road infrastructure upgrades would include grading, widening, and regravelling of the existing roads and construction of new roads. Culverts would be upgraded for existing roads, and new culverts would be installed for new roads. Direct effects would include fill of wetlands at locations where roads crossing the habitat would be widened. Indirect effects could include altered hydrology or runoff of sediment and other substances during road construction activities. Some effects, such as those due to runoff, would be avoided and minimized through the implementation of erosion control BMPs and postconstruction reclamation. Installation of new and upgraded culverts would maintain existing hydrology. However, loss of wetlands as a result of direct fill would be a substantial adverse effect on a sensitive natural community. This would be a significant impact; however, implementation of Mitigation Measure BIO-18 would reduce this impact to a level less-than-significant level.

#### **Mitigation Measure BIO-18: Compensate for the loss of wetlands**

##### **Impact BIO-19a-1: Potential impact on the movement of any native resident or migratory wildlife species or established native resident or migratory wildlife corridors, and the use of native wildlife nursery sites—program Alternative 1: 417 MW (significant and unavoidable)**

Many common wildlife species (e.g., ground squirrels, voles, deer, coyote, raccoon, skunk) and special-status wildlife species (e.g., California red-legged frog, Alameda whipsnake, American

badger) are likely to occur in and move through the program area. Construction activities associated with the program and fencing of work areas may temporarily impede wildlife movement through the work area or cause animals to travel longer distances to avoid the work area. This could result in higher energy expenditure and increased susceptibility to predation for some species and is a potentially significant impact. Because the construction period for individual projects in the repowering program would be 9 months for a typical 80 MW project, it would likely encompass the movement/migration period for some species (e.g., California tiger salamander movement to/from breeding ponds). In particular, smaller animals, whose energy expenditures to travel around or avoid the area would be greater than for larger animals, could be more severely affected. Upon completion of the program, the new wind turbines would be spaced apart and would not be a barrier to on-the-ground wildlife movement. Additionally, there would be fewer turbines on the ground, and a net increase in the amount of natural area would result from the restoration of decommissioned turbine pads and foundations. This removal of turbines and increase of natural area would partially compensate for this impact. As discussed above for special-status species, the program has the potential to affect native wildlife nursery sites (i.e., breeding areas). Because common species may also use these breeding areas, they may also be affected by the program. This would constitute a significant effect. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3a, BIO-4a, BIO-5a, BIO-5c, BIO-7a, BIO-8a, BIO-8b, and BIO-10a would avoid and minimize potential impacts on wildlife nursery areas for special-status and common wildlife species.

As discussed above, the operation of wind turbines after repowering would adversely affect raptors, other birds, and bats migrating through and wintering in the program area because they could be injured or killed if they fly through the rotor plane of operating wind turbines. As discussed above, this would be a significant and unavoidable impact. Implementation of Mitigation Measures BIO-11b, BIO-11c, BIO-11d, BIO-11e, BIO-11i, BIO-12a, BIO-12b, BIO-14a, and BIO-14d would reduce this impact, but not to a less-than-significant level. Accordingly, this impact would be significant and unavoidable.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-4a: Implement measures to avoid or protect habitat for valley elderberry longhorn beetle**

**Mitigation Measure BIO-5a: Implement best management practices to avoid and minimize effects on special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-7a: Implement best management practices to avoid and minimize effects on special-status reptiles**



**Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential impacts on special-status and non-special-status nesting birds**

**Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl**

**Mitigation Measure BIO-10a: Implement measures to avoid and minimize potential impacts on San Joaquin kit fox and American badger**

**Mitigation Measure BIO-11b: Site turbines to minimize potential mortality of birds**

**Mitigation Measure BIO-11c: Use turbine designs that reduce avian impacts**

**Mitigation Measure BIO-11d: Incorporate avian-safe practices into design of turbine-related infrastructure**

**Mitigation Measure BIO-11e: Retrofit existing infrastructure to minimize risk to raptors**

**Mitigation Measure BIO-11i: Implement an avian adaptive management program**

**Mitigation Measure BIO-12a: Conduct bat roost surveys**

**Mitigation Measure BIO-12b: Avoid removing or disturbing bat roosts**

**Mitigation Measure BIO-14a: Site and select turbines to minimize potential mortality of bats**

**Mitigation Measure BIO-14d: Develop and implement a bat adaptive management plan**

**Impact BIO-19a-2: Potential impact on the movement of any native resident or migratory wildlife species or established native resident or migratory wildlife corridors, and the use of native wildlife nursery sites—program Alternative 2: 450 MW (significant and unavoidable)**

Effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. Many common wildlife species (e.g., ground squirrels, voles, deer, coyote, raccoon, skunk) and special-status wildlife species (e.g., California red-legged frog, Alameda whipsnake, American badger) are likely to occur in and move through the program area. Construction activities associated with the program and fencing of work areas may temporarily impede wildlife movement through the work area or cause animals to travel longer distances to avoid the work area. This could result in higher energy expenditure and increased susceptibility to predation for some species and is a potentially significant impact. Because the construction period for individual projects in the repowering program would be 9 months for a typical 80 MW project, it would likely encompass the movement/migration period for some species (e.g., California tiger salamander movement to/from breeding ponds). In particular, smaller animals, whose energy expenditures to travel around or avoid the area would be greater than for larger animals, could be more severely affected. Upon completion of the program, the new wind turbines would be spaced apart and would not be a barrier to on-the-ground wildlife movement. Additionally, there would be fewer turbines on the

ground, and a net increase in the amount of natural area would result from the restoration of decommissioned turbine pads and foundations. This removal of turbines and increase of natural area would partially compensate for this impact. As discussed above for special-status species, the program has the potential to affect native wildlife nursery sites (i.e., breeding areas). Because common species may also use these breeding areas, they may also be affected by the program. This would constitute a significant effect. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3a, BIO-4a, BIO-5a, BIO-5c, BIO-7a, BIO-8a, BIO-8b, and BIO-10a would avoid and minimize potential impacts on wildlife nursery areas for special-status and common wildlife species.

As discussed above, the operation of wind turbines after repowering would adversely affect raptors, other birds, and bats migrating through and wintering in the program area because they could be injured or killed if they fly through the rotor plane of operating wind turbines. As discussed above, this would be a significant and unavoidable impact. Implementation of Mitigation Measures BIO-11b, BIO-11c, BIO-11d, BIO-11e, BIO-11j, BIO-12a, BIO-12b, BIO-14a, and BIO-14d would reduce this impact, but not to a less-than-significant level. Accordingly, this impact would be significant and unavoidable.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-4a: Implement measures to avoid or protect habitat for valley elderberry longhorn beetle**

**Mitigation Measure BIO-5a: Implement best management practices to avoid and minimize effects on special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-7a: Implement best management practices to avoid and minimize effects on special-status reptiles**

**Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential impacts on special-status and non-special-status nesting birds**

**Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl**

**Mitigation Measure BIO-10a: Implement measures to avoid and minimize potential impacts on San Joaquin kit fox and American badger**

**Mitigation Measure BIO-11b: Site turbines to minimize potential mortality of birds**

**Mitigation Measure BIO-11c: Use turbine designs that reduce avian impacts**

**Mitigation Measure BIO-11d: Incorporate avian-safe practices into design of turbine-related infrastructure****Mitigation Measure BIO-11e: Retrofit existing infrastructure to minimize risk to raptors****Mitigation Measure BIO-11i: Implement an avian adaptive management program****Mitigation Measure BIO-12a: Conduct bat roost surveys****Mitigation Measure BIO-12b: Avoid removing or disturbing bat roosts****Mitigation Measure BIO-14a: Site and select turbines to minimize potential mortality of bats****Mitigation Measure BIO-14d: Develop and implement a bat adaptive management plan****Impact BIO-19b: Potential impact on the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites—Golden Hills Project (significant and unavoidable)**

Many common wildlife species (e.g., ground squirrels, voles, deer, coyote, raccoon, skunk) and special-status wildlife species (e.g., California red-legged frog, Alameda whipsnake, American badger) are likely to occur in and move through the Golden Hills project area. Construction activities associated with the Golden Hills Project and fencing of work areas may temporarily impede wildlife movement through the work area or cause animals to travel longer distances to avoid the work area. This could result in higher energy expenditure and increased susceptibility to predation for some species and is a potentially significant impact. Because the construction period is anticipated to last 9 months, it would likely encompass the movement/migration period for some species (e.g., California tiger salamander movement to/from breeding ponds). In particular, smaller animals, whose energy expenditures to travel around or avoid the area would be greater than for larger animals, could be more severely affected. Upon completion of project construction, the new wind turbines would be spaced apart and would not be a barrier to on-the-ground wildlife movement. Additionally, there would be fewer turbines on the ground, and a net increase in the amount of natural area would result from the restoration of decommissioned turbine pads and foundations. This removal of turbines and increase of natural area would partially compensate for this impact. As discussed above for special-status species, the Golden Hills Project has the potential to affect native wildlife nursery sites (i.e., breeding areas). Because common species may also use these breeding areas, they may also be affected by the project. This would constitute a significant effect. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3a, BIO-4a, BIO-5a, BIO-5c, BIO-7a, BIO-8a, BIO-8b, and BIO-10a would avoid and minimize potential impacts on wildlife nursery areas for special-status and common wildlife species.

As discussed above, the operation of wind turbines after repowering would adversely affect raptors, other birds, and bats migrating through and wintering in the project area because they could be injured or killed if they fly through the rotor plane of operating wind turbines. This would be a significant and unavoidable impact. Implementation of Mitigation Measures BIO-11b, BIO-11c, BIO-11d, BIO-11e, BIO-11i, BIO-12a, BIO-12b, BIO-14a, and BIO-14d would reduce this impact, but not to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species**

**Mitigation Measure BIO-4a: Implement measures to avoid or protect habitat for valley elderberry longhorn beetle**

**Mitigation Measure BIO-5a: Implement best management practices to avoid and minimize effects on special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-7a: Implement best management practices to avoid and minimize effects on special-status reptiles**

**Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential impacts on special-status and non-special-status nesting birds**

**Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl**

**Mitigation Measure BIO-10a: Implement measures to avoid and minimize potential impacts on San Joaquin kit fox and American badger**

**Mitigation Measure BIO-11b: Site turbines to minimize potential mortality of birds**

**Mitigation Measure BIO-11c: Use turbine designs that reduce avian impacts**

**Mitigation Measure BIO-11d: Incorporate avian-safe practices into design of turbine-related infrastructure**

**Mitigation Measure BIO-11e: Retrofit existing infrastructure to minimize risk to raptors**

**Mitigation Measure BIO-11i: Implement an avian adaptive management program**

**Mitigation Measure BIO-12a: Conduct bat roost surveys**

**Mitigation Measure BIO-12b: Avoid removing or disturbing bat roosts**

**Mitigation Measure BIO-14a: Site and select turbines to minimize potential mortality of bats**

**Mitigation Measure BIO-14d: Develop and implement a bat adaptive management plan****Impact BIO-19c: Potential impact on the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites—Patterson Pass Project (significant and unavoidable)**

Many common wildlife species (e.g., ground squirrels, voles, deer, coyote, raccoon, skunk) and special-status wildlife species (e.g., California red-legged frog, Alameda whipsnake, American badger) are likely to occur in and move through the Patterson Pass project area. Construction activities associated with the Patterson Pass Project and fencing of work areas may temporarily impede wildlife movement through the work area or cause animals to travel longer distances to avoid the work area. This could result in higher energy expenditure and increased susceptibility to predation for some species and is a potentially significant impact. Because the construction period is anticipated to last 6–9 months, it would likely encompass the movement/migration period for some species (e.g., California tiger salamander movement to/from breeding ponds). In particular, smaller animals, whose energy expenditures to travel around or avoid the area would be greater than for larger animals, could be more severely affected. Upon completion of project construction, the new wind turbines would be spaced apart and would not be a barrier to on-the-ground wildlife movement. Additionally, there would be fewer turbines on the ground, and a net increase in the amount of natural area would result from the restoration of decommissioned turbine pads and foundations. This removal of turbines and increase of natural area would partially compensate for this impact. As discussed above for special-status species, the Patterson Pass Project has the potential to affect native wildlife nursery sites (i.e., breeding areas). Because common species may also use these breeding areas, they may also be affected by the project. This would constitute a significant effect. Implementation of Mitigation Measures BIO-1b, BIO-1e, BIO-3a, BIO-4a, BIO-5a, BIO-5c, BIO-7a, BIO-8a, BIO-8b, and BIO-10a would avoid and minimize potential impacts on wildlife nursery areas for special-status and common wildlife species.

As discussed above, the operation of wind turbines after repowering would adversely affect raptors, other birds, and bats migrating through and wintering in the project area because they could be injured or killed if they fly through the rotor plane of operating wind turbines. This would be a significant and unavoidable impact. Implementation of Mitigation Measures BIO-11b, BIO-11c, BIO-11d, BIO-11e, BIO-11i, BIO-12a, BIO-12b, BIO-14a, and BIO-14d would reduce this impact, but not to a less-than-significant level.

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Conduct preconstruction surveys for habitat for special-status wildlife species****Mitigation Measure BIO-4a: Implement measures to avoid or protect habitat for valley elderberry longhorn beetle**

**Mitigation Measure BIO-5a: Implement best management practices to avoid and minimize effects on special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-7a: Implement best management practices to avoid and minimize effects on special-status reptiles**

**Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential impacts on special-status and non-special-status nesting birds**

**Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl**

**Mitigation Measure BIO-10a: Implement measures to avoid and minimize potential impacts on San Joaquin kit fox and American badger**

**Mitigation Measure BIO-11b: Site turbines to minimize potential mortality of birds**

**Mitigation Measure BIO-11c: Use turbine designs that reduce avian impacts**

**Mitigation Measure BIO-11d: Incorporate avian-safe practices into design of turbine-related infrastructure**

**Mitigation Measure BIO-11e: Retrofit existing infrastructure to minimize risk to raptors**

**Mitigation Measure BIO-11i: Implement an avian adaptive management program**

**Mitigation Measure BIO-12a: Conduct bat roost surveys**

**Mitigation Measure BIO-12b: Avoid removing or disturbing bat roosts**

**Mitigation Measure BIO-14a: Site and select turbines to minimize potential mortality of bats**

**Mitigation Measure BIO-14d: Develop and implement a bat adaptive management plan**

**Impact BIO-20a-1: Conflict with local plans or policies—program Alternative 1: 417 MW (less than significant with mitigation)**

The ECAP encourages the preservation of areas known to support special-status species, no net loss of riparian and seasonal wetlands, and protection of existing riparian woodland habitat. Additionally, the ECAP has several policies related to windfarms, including establishing a mitigation program to minimize the impacts of wind turbine operations on bird populations. Loss of special-status species and their habitat, loss of alkali meadow, loss of riparian habitat, and loss of existing wetlands as a result of implementing the program would be in conflict with these policies. This impact is significant; however, implementation of Mitigation Measures BIO-1a through BIO-1e, BIO-3a, BIO-4a, BIO-4b, BIO 5a through 5c, BIO-7a, BIO-7b, BIO-8a, BIO-8b, BIO-9, BIO 10a, BIO-10b, and BIO-15, BIO-16, and BIO-18 would reduce this impact to a less-than-significant level because these measures require the project applicant to minimize impacts on habitat for special-status species and

compensate for the permanent loss of suitable habitat, as well as to ensure that any impacts on riparian and wetlands are compensated for to ensure no net loss of habitat functions and values. The mitigation measures for the impacts of wind turbine operations on bird populations from the repowering program are consistent with the establishment of a mitigation program recommended by the ECAP.

**Mitigation Measure BIO-1a: Conduct surveys to determine the presence or absence of special-status species**

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1c: Avoid and minimize impacts on special-status plant species by establishing activity exclusion zones**

**Mitigation Measure BIO-1d: Compensate for impacts on special-status plant species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Implement measures to avoid, minimize, and mitigate impacts on vernal pool branchiopods and curved-footed hygrotylus diving beetle**

**Mitigation Measure BIO-4a: Implement measures to avoid or protect habitat for valley elderberry longhorn beetle**

**Mitigation Measure BIO-4b: Compensate for direct and indirect effects on valley elderberry longhorn beetle**

**Mitigation Measure BIO-5a: Implement best management practices to avoid and minimize effects on special-status amphibians**

**Mitigation Measure BIO-5b: Compensate for loss of habitat for special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-7a: Implement best management practices to avoid and minimize effects on special-status reptiles**

**Mitigation Measure BIO-7b: Compensate for loss of habitat for special-status reptiles**

**Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential impacts on special-status and non-special-status nesting birds**

**Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl**

**Mitigation Measure BIO-9: Compensate for the permanent loss of foraging habitat for western burrowing owl**

**Mitigation Measure BIO-10a: Implement measures to avoid and minimize potential impacts on San Joaquin kit fox and American badger****Mitigation Measure BIO-10b: Compensate for loss of suitable habitat for San Joaquin kit fox and American badger****Mitigation Measure BIO-15: Compensate for the loss of alkali meadow habitat****Mitigation Measure BIO-16: Compensate for the loss of riparian habitat****Mitigation Measure BIO-18: Compensate for the loss of wetlands****Impact BIO-20a-2: Conflict with local plans or policies—program Alternative 2: 450 MW (less than significant with mitigation)**

The ECAP encourages the preservation of areas known to support special-status species, no net loss of riparian and seasonal wetlands, and protection of existing riparian woodland habitat. Additionally, the ECAP has several policies related to windfarms, including establishing a mitigation program to minimize the impacts of wind turbine operations on bird populations. Loss of special-status species and their habitat, loss of alkali meadow, loss of riparian habitat, and loss of existing wetlands as a result of implementing the program would be in conflict with these policies. The effects under Alternative 2 would be similar to those under Alternative 1, except the overall area of disturbance would be larger because the increased number of turbines and associated infrastructure would entail an estimated 8% increase in total disturbance area. This impact is significant; however, implementation of Mitigation Measures BIO-1a through BIO-1e, BIO-3a, BIO-4a, BIO-4b, BIO 5a through 5c, BIO-7a, BIO-7b, BIO-8a, BIO-8b, BIO-9, BIO 10a, BIO-10b, and BIO-15, BIO-16, and BIO-18 would reduce this impact to a less-than-significant level because these measures require the project applicant to minimize impacts on habitat for special-status species and compensate for the permanent loss of suitable habitat, as well as to ensure that any impacts on riparian and wetlands are compensated for to ensure no net loss of habitat functions and values. The mitigation measures for the impacts of wind turbine operations on bird populations from the repowering program are consistent with the establishment of a mitigation program recommended by the ECAP.

**Impact BIO-20b: Conflict with local plans or policies—Golden Hills Project (less than significant with mitigation)**

The ECAP encourages the preservation of areas known to support special-status species, no net loss of riparian and seasonal wetlands, and protection of existing riparian woodland habitat. Additionally, the ECAP has several policies related to windfarms, including establishing a mitigation program to minimize the impacts of wind turbine operations on bird populations. Loss of special-status species and their habitat (Impacts BIO-1b through BIO-10b), loss of alkali meadow (Impact BIO-15b) loss of riparian habitat (Impact BIO-16b), and loss of existing wetlands (Impact BIO-18b) as a result of implementing the Golden Hills Project would be in conflict with these policies. This impact is significant; however, implementation of Mitigation Measures BIO-1a through BIO-1e, BIO-3a, BIO-4a, BIO-4b, BIO 5a through 5c, BIO-7a, BIO-7b, BIO-8a, BIO-8b, BIO-9, BIO 10a, BIO-10b, and BIO-15, BIO-16, and BIO-18 would reduce this impact to a less-than-significant level because these measures require the project applicant to minimize impacts on habitat for special-status species and compensate for the permanent loss of suitable habitat, as well as ensure that any impacts on



riparian and wetlands are compensated for to ensure no net loss of habitat functions and values. The mitigation measures for the impacts of wind turbine operations on bird populations from the repowering program are consistent with the establishment of a mitigation program recommended by the ECAP.

**Mitigation Measure BIO-1a: Conduct surveys to determine the presence or absence of special-status species**

**Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species**

**Mitigation Measure BIO-1c: Avoid and minimize impacts on special-status plant species by establishing activity exclusion zones**

**Mitigation Measure BIO-1d: Compensate for impacts on special-status plant species**

**Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas**

**Mitigation Measure BIO-3a: Implement measures to avoid, minimize, and mitigate impacts on vernal pool branchiopods and curved-footed hygrotus diving beetle**

**Mitigation Measure BIO-4a: Implement measures to avoid or protect habitat for valley elderberry longhorn beetle**

**Mitigation Measure BIO-4b: Compensate for direct and indirect effects on valley elderberry longhorn beetle**

**Mitigation Measure BIO-5a: Implement best management practices to avoid and minimize effects on special-status amphibians**

**Mitigation Measure BIO-5b: Compensate for loss of habitat for special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-7a: Implement best management practices to avoid and minimize effects on special-status reptiles**

**Mitigation Measure BIO-7b: Compensate for loss of habitat for special-status reptiles**

**Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential impacts on special-status and non-special-status nesting birds**

**Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl**

**Mitigation Measure BIO-9: Compensate for the permanent loss of foraging habitat for western burrowing owl**

**Mitigation Measure BIO-10a: Implement measures to avoid and minimize potential impacts on San Joaquin kit fox and American badger****Mitigation Measure BIO-10b: Compensate for loss of suitable habitat for San Joaquin kit fox and American badger****Mitigation Measure BIO-15: Compensate for the loss of alkali meadow habitat****Mitigation Measure BIO-16: Compensate for the loss of riparian habitat****Mitigation Measure BIO-18: Compensate for the loss of wetlands****Impact BIO-20c: Conflict with local plans or policies—Patterson Pass Project (less than significant with mitigation)**

The ECAP encourages the preservation of areas known to support special-status species, no net loss of riparian and seasonal wetlands, and protection of existing riparian woodland habitat. Loss of special-status species and their habitat (Impacts BIO-1c through BIO-6c), loss of alkali meadow (Impact BIO-15c) loss of riparian habitat (Impact BIO-16c), and loss of existing wetlands (Impact BIO-18c) as a result of implementing the Patterson Pass Project would be in conflict with these policies. This impact is significant; however, implementation of Mitigation Measures BIO-1a through BIO-1e, BIO-3a, BIO-4a, BIO-4b, BIO 5a through 5c, BIO-7a, BIO-7b, BIO-8a, BIO-8b, BIO-9, BIO 10a, BIO-10b, and BIO-15, BIO-16, and BIO-18 would reduce this impact to a less-than-significant level because these measures require the project applicant to minimize impacts on habitat for special-status species and compensate for the permanent loss of suitable habitat, as well as ensure that any impacts on riparian and wetlands are compensated for to ensure no net loss of habitat functions and values.

**Mitigation Measure BIO-1a: Conduct surveys to determine the presence or absence of special-status species****Mitigation Measure BIO-1b: Implement best management practices to avoid and minimize impacts on special-status species****Mitigation Measure BIO-1c: Avoid and minimize impacts on special-status plant species by establishing activity exclusion zones****Mitigation Measure BIO-1d: Compensate for impacts on special-status plant species****Mitigation Measure BIO-1e: Retain a biological monitor during ground-disturbing activities in environmentally sensitive areas****Mitigation Measure BIO-3a: Implement measures to avoid, minimize, and mitigate impacts on vernal pool branchiopods and curved-footed hygrotylus diving beetle****Mitigation Measure BIO-4a: Implement measures to avoid or protect habitat for valley elderberry longhorn beetle**

**Mitigation Measure BIO-4b: Compensate for direct and indirect effects on valley elderberry longhorn beetle**

**Mitigation Measure BIO-5a: Implement best management practices to avoid and minimize effects on special-status amphibians**

**Mitigation Measure BIO-5b: Compensate for loss of habitat for special-status amphibians**

**Mitigation Measure BIO-5c: Restore disturbed annual grasslands**

**Mitigation Measure BIO-7a: Implement best management practices to avoid and minimize effects on special-status reptiles**

**Mitigation Measure BIO-7b: Compensate for loss of habitat for special-status reptiles**

**Mitigation Measure BIO-8a: Implement measures to avoid and minimize potential impacts on special-status and non-special-status nesting birds**

**Mitigation Measure BIO-8b: Implement measures to avoid and minimize potential impacts on western burrowing owl**

**Mitigation Measure BIO-9: Compensate for the permanent loss of foraging habitat for western burrowing owl**

**Mitigation Measure BIO-10a: Implement measures to avoid and minimize potential impacts on San Joaquin kit fox and American badger**

**Mitigation Measure BIO-10b: Compensate for loss of suitable habitat for San Joaquin kit fox and American badger**

**Mitigation Measure BIO-16: Compensate for the loss of riparian habitat**

**Mitigation Measure BIO-18: Compensate for the loss of wetlands**

**Impact BIO-21a-1: Conflict with provisions of an adopted HCP/NCCP or other approved local, regional, or state habitat conservation plan—program Alternative 1: 417 MW (no impact)**

There are no adopted HCP/NCCPs applicable to the program area. The EACCS, while not a formal HCP, provides guidance for the project planning and permitting process to ensure that impacts are offset in a biologically effective manner. As noted above, the mitigation measures set forth in this PEIR are based on measures from the EACCS, with some modifications and additions. Because there are no adopted HCP/NCCPs for the program area and the program would not conflict with the EACCS, there would be no impact.

**Impact BIO-21a-2: Conflict with provisions of an adopted HCP/NCCP or other approved local, regional, or state habitat conservation plan—program Alternative 2: 450 MW (no impact)**

There are no adopted HCP/NCCPs applicable to the program area. The EACCS, while not a formal HCP, provides guidance for the project planning and permitting process to ensure that impacts are offset in a biologically effective manner. As noted above, the mitigation measures set forth in this

PEIR are based on measures from the EACCS, with some modifications and additions. Because there are no adopted HCP/NCCPs for the program area and the program would not conflict with the EACCS, there would be no impact.

**Impact BIO-21b: Conflict with provisions of an adopted HCP/NCCP or other approved local, regional, or state habitat conservation plan—Golden Hills Project (no impact)**

There are no adopted HCP/NCCPs applicable to the Golden Hills project area. The EACCS, while not a formal HCP, provides guidance for the project planning and permitting process to ensure that impacts are offset in a biologically effective manner. As noted above, the mitigation measures set forth in this PEIR are based on measures from the EACCS, with some modifications and additions. Because there are no adopted HCP/NCCPs for the project area and the Golden Hills Project would not conflict with the EACCS, there would be no impact.

**Impact BIO-21c: Conflict with provisions of an adopted HCP/NCCP or other approved local, regional, or state habitat conservation plan—Patterson Pass Project (no impact)**

There are no adopted HCP/NCCPs applicable to the Patterson Pass project area. The EACCS, while not a formal HCP, provides guidance for the project planning and permitting process to ensure that impacts are offset in a biologically effective manner. As noted above, the mitigation measures set forth in this PEIR are based on measures from the EACCS, with some modifications and additions. Because there are no adopted HCP/NCCPs for the project area and the Patterson Pass Project would not conflict with the EACCS, there would be no impact.

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