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Summary

The Department of Water Resources (DWR), the U.S. Bureau of Reclamation (USBR), and local water interests are studying the feasibility of offstream storage north of the Sacramento-San Joaquin Delta. The North-of-the-Delta Offstream Storage Investigation is a continuation of studies started by CALFED, a cooperative effort of State and federal agencies working with communities to revive the Delta ecosystem and improve the quality and reliability of California's water supplies. The CALFED Preferred Programmatic Alternative identified a need for up to 6 million acre-feet of new storage in California; up to 3 million acre-feet of that storage would be located north of the Delta. This study area was identified in the August 2000 CALFED Programmatic Environmental Impact Statement/Environmental Impact Report and Record of Decision. The North-of-the-Delta Offstream Storage Investigation will be used to support the completion of a site-specific environmental impact statement/environmental impact report.

DWR is investigating the feasibility of a new storage reservoir at one of two locations on the west side of the Sacramento Valley: (1) the Newville Reservoir in western Tehama and Glenn counties and (2) the Sites Reservoir in central Colusa County and Glenn County (Figure 1).

Figure 1 Location map of Sites and Newville Project areas (map)

The purpose of this survey is to identify avian species with State or federal special status that are within project areas and to ascertain their occurrence, density, and distribution. These data will provide information necessary to evaluate and compare the potential project effects on these avian species and their habitats.

The presence, density, and distribution of State and federally "listed" species at the proposed reservoir locations were determined through three primary methodologies: monthly avian line transects, bank swallow nesting surveys, and nocturnal owl surveys using pre-recorded calls.

The studies found that nine avian species protected under the State or federal Endangered Species acts may occur within Tehama, Glenn, or Colusa counties. At or near the proposed reservoir locations or associated features, avian surveys identified three of these species—bald eagle, Swainson's hawk, and sandhill crane (Table 1).

Table 1 Occurrence of avian species protected under the State and federal Endangered Species acts at reservoir locations and associated features

Forty-one additional avian species classified as State or federal Species of Concern, federal Migratory Nongame Birds of Management Concern, or State Fully Protected Species may also occur in the Tehama, Glenn, or Colusa counties. Studies identified 31 of these species at one or more reservoir alternatives or associated feature (Table 2).

Table 2 State and federal avian species of concern occurrence at reservoir locations and associated features

Introduction

The Department of Water Resources (DWR), the U.S. Bureau of Reclamation (USBR), and local water interests are studying the feasibility of offstream storage north of the Sacramento-San Joaquin Delta. The North-of-the-Delta Offstream Storage Investigation is a continuation of studies started by CALFED, a cooperative effort of State and federal agencies working with communities to revive the Delta ecosystem and improve the quality and reliability of California's water supplies. The CALFED Preferred Programmatic Alternative identified a need for up to 6 million acre-feet of new storage in California; up to 3 million acre-feet of that storage would be located north of the Delta. This study area was identified in the August 2000 CALFED Programmatic Environmental Impact Statement/Environmental Impact Report and Record of Decision. The North-of-the-Delta Offstream Storage Investigation Report will be used to support the completion of a site-specific environmental impact statement/environmental impact report.

DWR is investigating the feasibility of a new storage reservoir at one of two locations on the west side of the Sacramento Valley: (1) the Newville Reservoir in western Tehama and Glenn counties and (2) the Sites Reservoir in central Colusa County and Glenn County (see Figure 1).

The purpose of this survey is to identify avian species with State or federal special status that are within project areas and to ascertain their occurrence, density, and distribution. These data will provide information necessary to evaluate and compare the potential project effects on these avian species and their habitats.

Authority

Evaluation of potential project impacts on special status avian species is required under the California Environmental Quality Act (CEQA), federal Clean Water Act, and the National Environmental Policy Act. Further, the State and federal Endangered Species acts require that analyses of a project that could result in "take" of a State or federally listed species include an evaluation of alternatives, consultation with respective regulatory agencies, and development of mitigation and avoidance measures. Under the federal Endangered Species Act, "take" includes not only individual animals but their habitats as well. The federal Migratory Bird Treaty Act provides some protection to migratory birds but not their habitat. Likewise, the federal Eagle Protection Act provides protection from take of individual eagles (both bald and golden) but not their habitats.

Scope

This investigation's avian studies are confined to the location of the reservoir inundation areas, a corridor along potential road relocation and conveyance routes, and potential recreation areas. At each location proposed for a reservoir and its associated features, assessments were conducted of the occurrence, distribution, and density of species protected under the State or federal Endangered Species acts, State or federal Species of Concern, State Fully Protected Species, and federal Migratory Nongame Birds of

Management Concern. All data presented in this report were collected between March 1997 and June 2001.

Development of a reservoir can take a long time. During the planning phases, several Species of Special Concern that could occur within the project areas may become formally listed. Therefore, it is prudent to identify their presence and population levels within the project areas early in the planning process. Further, CEQA requires an assessment of project effects on State and federal Species of Concern.

Project Description

DWR, USBR, and local water interests are studying the feasibility of offstream storage north of the Sacramento-San Joaquin Delta. The North-of-the-Delta Offstream Storage Investigation is a continuation of studies started by CALFED agencies. The CALFED Preferred Programmatic Alternative identified a need for up to 6 million acre-feet of new storage in California; up to 3 million acre-feet of that storage would be located north of the Delta. This study area was identified in the August 2000 CALFED Programmatic Environmental Impact Statement/Environmental Impact Report and Record of Decision. The North-of-the-Delta Offstream Storage Investigation Report will be used to support the completion of a site-specific environmental impact statement/environmental impact report.

As a matter of policy, CALFED surface storage programs focus on offstream reservoir sites for new surface storage as well as expansion of existing onstream reservoirs. Onstream reservoir sites are not being pursued because of environmental impacts and implementation difficulties. This policy decision is based on the CALFED Solution Principle that prohibits redirecting impacts. Because construction of new onstream reservoirs could significantly limit the success of the CALFED Ecosystem Restoration Program by redirecting impacts, onstream reservoirs were eliminated from further consideration.

Project Facilities

Two offstream storage sites are under evaluation. Sites Reservoir would be located about 10 miles west of Maxwell (see Figure 1) and formed by constructing dams on Stone Corral Creek and Funks Creek. Evaluation of the Sites Project has focused on a 1.8 million acre-foot (maf) reservoir, although a 1.2 maf reservoir has been considered. A 1.8 maf Sites Reservoir would require construction of nine saddle dams along the southern edge of the Hunters Creek watershed. Potential sources of water supply for the Sites Project are nonirrigation-season flows in the Colusa Basin Drain, the Sacramento River, and local tributaries. Potential conveyance systems from these sources to the reservoir include existing and/or enlarged Tehama-Colusa (T-C) and Glenn Colusa Irrigation District (GCID) canals and a new conveyance facility from the Sacramento River near Moulton Weir and/or from the Colusa Basin Drain to Funks Reservoir on the T-C Canal. All conveyance alternatives would require enlargement of the existing Funks Reservoir. Major project facilities would be situated at the Funks Creek Dam site including outlet works, power plant, intake structure, and maintenance facilities. The Sites Project would also require relocation of two county

roads (Maxwell-Lodoga and Huffmaster roads) and the community of Sites. Recreational use is not an established project purpose; however, five potential recreation facility locations have been identified.

Newville Reservoir would be located about 18 miles west of the community of Orland on North Fork Stony Creek upstream from the existing Black Butte Reservoir (see Figure 1). Construction of a dam on North Fork Stony Creek at Newville and a saddle dam at Burrows Gap would form Newville Reservoir. Alternative reservoir sizes being evaluated are 1.9 maf and 3.0 maf. Up to five additional saddle dams would be required for the 3.0 maf alternative. Potential water sources include the Sacramento River, Black Butte Reservoir, and Thomes Creek. Potential conveyance includes the existing or an enlarged T-C Canal with a new conveyance between the GCID and T-C canals; new conveyance from T-C Canal to Black Butte Reservoir and from Black Butte Reservoir to Newville Reservoir. Another potential water source would include diversion and conveyance from Thomes Creek at a location north and west of the Newville Reservoir. Newville Reservoir would require relocation of portions of three county roads: Round Valley Road, Garland Road, and County Road 306. Recreational use is not an established project purpose; however, five potential recreation areas have been identified.

Offstream Storage

Traditionally, reservoirs have been created by constructing dams on major streams. They are considered onstream storage. In contrast, an offstream storage reservoir is typically constructed off of a major stream, but it may be located on a small or seasonal stream that contributes a minor share of the water supply of the reservoir. Offstream storage involves diverting water out of a major stream and transporting the water through various conveyance systems to a reservoir. Therefore, offstream storage investigations include extensive evaluation of diversions and conveyance facilities to carry water to the reservoirs.

Water stored in offstream reservoirs provides opportunities to increase dry-year water supply reliability and to improve the timing of water availability for multiple uses in an environmentally sensitive manner. Additional water supply can provide improved flexibility for agencies that own and operate or contract for offstream storage water supply. Storing water under excess flow conditions improves water supply reliability for environmental, urban, and agricultural water users in dry years and may improve water quality for all beneficial uses.

Offstream storage allows water to be diverted and stored outside of the irrigation season when streamflows are highest or not critical to fish migration. This stored water can be released for local agricultural and refuge use in exchange for diversions that would have occurred from the Sacramento River when fish migration could be impaired. Such an exchange program reduces diversions of water from the Sacramento River during the irrigation season and, therefore, reduces diversion impacts to the Sacramento River fishery.

Water that otherwise would have been diverted from the Sacramento River for local irrigation in late spring and summer could be either released for downstream beneficial uses or stored in Shasta Lake. This operational method could result in increased storage and more cold water pool in Shasta Lake during the spring and early summer, which may benefit winter-run salmon in the Sacramento River.

Habitat

Avian species occurrence, density, and distribution are strongly correlated with habitat diversity, especially structural diversity (MacArthur and MacAuthur 1961, Cody 1968, Balda 1969, Karr and Roth 1971, Wilson 1974). Major wildlife habitats within the proposed reservoir locations and associated features are listed in Table 3. Habitat areas for road relocations and conveyance routes listed in the table represent a 1,500-yard wide corridor. Actual habitat modifications in these locations would be significantly less.

Table 3 Summary of vegetative communities at reservoir locations and associated features

Sites and Newville reservoirs are strongly dominated (88 and 82 percent, respectively) by annual grassland habitats (Figure 2). These are generally disturbed annual grasslands subject to highly variable amounts and intensities of both year-round and seasonal grazing (Figure 3). These grasslands are dominated by non-native species including yellow star thistle *(Centaurea solstitalis),* Italian ryegrass *(Lollium sp.),* and wild oats *(Avena sp).* Grassland habitats within California have been subject to widespread replacement of native perennial and annual species by non-native species. Pre-European contact estimates of the amount of grassland habitat within California are approximately 19 million acres (CPIF 2000a). Loss of historical grassland habitat (primarily in the Central Valley to agricultural conversion) is estimated at 64 percent (CPIF 2000a).

Figure 2 Typical annual grassland habitat

Figure 3 Typical land use within the annual grassland habitat

Blue oak woodlands occur on the more upland reservoir rim areas of Sites and Newville reservoirs and occupy 3.5 and 10.8 percent of the reservoir area, respectively (Figure 4). These woodlands typically have low to moderate canopy closures with tree sizes ranging from 6 to 18 inches in diameter. Blue oak woodlands in the project areas tend toward increased tree size and shrub understory density on north-facing slopes. Early successional tree stages are generally lacking except along road right of way and other ungrazed areas. Shrub understory is generally lacking. Snags and dead and down woody materials are uncommon. As with annual grassland habitats, grazing is the principal land use of these blue oak woodlands. However, several large blocks of blue oak woodland habitat are being harvested within the study areas for fuel. Approximately 7 million acres of oak woodland habitat are present in California (CPIF 2000b).

Figure 4 Typical blue oak woodland habitat

Blue oak/foothill pine habitat occurs in minor amounts at Sites and Newville reservoirs (0.78 to 2.1 percent, respectively). This vegetative community is common on Sites road relocation corridors and is the dominant community at the Thomes Creek diversion and conveyance facilities. Blue oak/foothill pine habitat within the project areas generally exhibits greater blue oak canopy closures and better developed shrub understory than blue oak woodlands (Figure 5). Foothill pine overstory generally tends to be sparse but consistent. Principal land use in this vegetative community is grazing. Oak/foothill pine habitat occurs on approximately 2.52 million acres in California (CGAP 2000).

Figure 5 Typical blue oak/foothill pine habitat

Approximately twice as much wetland habitat is present within the Newville Reservoir inundation area (390 acres) as is present within the Sites Reservoir

inundation area (196 acres). Within both areas, temporary wetland is the dominant wetland type. At the Sites Reservoir inundation area, approximately 19 acres of alkaline wetlands and 2 acres of emergent wetlands are present (Figure 6). Within the Newville Reservoir inundation area, 3 acres of alkaline wetlands and 6 acres of emergent wetland habitat have been mapped. Statewide estimate of freshwater emergent wetland habitat is approximately 576,000 acres (CDFFP 1988).

Figure 6 Emergent wetland habitat (roadside ditch)

Chaparral habitat is present at Sites Reservoir (5 acres) and Newville Reservoir (363 acres). Chaparral stands at Sites Reservoir are predominantly small, open stands of manzanitas *(Arctostaphylos sp.)* and buckbrush *(Ceanothus cuneatus).* Buckbrush and chamise *(Adenostoma fasiculatum)* dominate chaparral stand composition at Newville Reservoir (Figure 7). Large relatively unbroken chaparral stands are present along the two Sites southwest road relocation corridors. Scattered foothill pine infrequently occurs in association with chaparral stands within the project areas. More open chaparral stands are grazed by livestock, but cattle generally avoid mature, dense chamise stands as they lack an herbaceous layer. Chamise and mixed chaparral occur on approximately 7.76 million acres in California (CDFFP 1988).

Figure 7 Chaparral habitat (chamise)

Riparian habitat at Sites and Newville reservoirs occupies 2.7 and 0.4 percent, respectively, of the total inundation areas. The majority of stream channels within these reservoirs lacks riparian growth and is dominated by grassland vegetation with an occasional mature cottonwood *(Populus fremontii*), willow *(Salix sp.),* or valley oak *(Quercus lobata)* (see Figure 6). Riparian stands are limited in distribution and confined to the immediate vicinity of the stream channel. The Thomes Creek diversion and conveyance would affect approximately 337 acres of riparian habitat or 24 percent of the facility impact area. A relatively thin strip of mature riparian vegetation is present at the Sites new conveyance route intake on the Sacramento River (Figure 8). Valley riparian habitat occurs on approximately 49,000 acres in California (CDFFP 1988).

Figure 8 Mature riparian habitat along the Sacramento River near the Sites new conveyance intake

A minor amount of agricultural habitat is present within the Sites Reservoir inundation area. These habitats are principally nonirrigated grain in several patches within the southern half of the reservoir area. No agricultural habitats are present within the Newville inundation area. Agricultural habitats are the dominant habitat types along the Sites new conveyance route. The primary agricultural type is rice. However, orchard, irrigated pasture, irrigated grain, and irrigated cropland also occur along this corridor. A substantial amount of agricultural habitat is present along the T-C Canal to Black Butte conveyance route in the form of commercial eucalyptus stands. Approximately 12.95 million acres of agricultural habitats are present in California (CGAP 2000).

Minor amounts of valley oak woodland occur within both reservoir inundation areas including approximately 6 acres within the Sites Reservoir area and 14 acres within the Newville Reservoir area. A substantial amount (86 acres) of mature valley oak woodlands occur on the Black Butte to Newville conveyance route corridor. Valley oak woodlands occur on approximately on 250,000 acres in California (CGAP 2000)

Juniper woodlands are only present within the Newville Reservoir area. This habitat occurs on south-facing slopes with shallow soils. Stand densities are low, and tree sizes are generally less than 10 inches in diameter. Juniper woodland habitats occur on approximately 1.47 million acres in California (CDFFP 1988)

Shale barrens are present only within the Newville project area with 110 acres within the Newville Reservoir inundation area and 112 acres associated with the Thomes Creek diversion and conveyance.

Methods

To determine presence, density, and distribution of State and federally listed species at reservoir locations and associated features, three primary methodologies were used: monthly avian line transects, annual bank swallow surveys, and annual owl surveys using pre-recorded calls.

Line transects were established in representative habitat within proposed reservoir locations as access was acquired. Standard avian line transect methodology was used (Emlen 1971). Transect locations and habitats are identified in figures 9a and 9b and figures 10a–10c. Transect length and total miles of transect surveyed information are identified in Table 4. Acreage by habitat type for each transect are displayed in Appendix A. Access for transect survey was obtained at different times resulting in different numbers of transect repetition for each season and for each project feature.

Sampling at the existing Funks Reservoir serves two purposes: (1) It allows evaluation of the environmental effects associated with possible enlargement of the reservoir, and (2) it allows an assessment of the species that could be supported by a low-elevation reservoir on the western edge of the Sacramento Valley.

Line transects were surveyed on foot or from a vehicle at a rate of 20 to 30 minutes per mile. Surveyors recorded all detected avian species that are listed under the State or federal Endangered Species acts, State or federal Species of Concern, State Fully Protected Species, and federal Migratory Nongame Birds of Management Concern. The distance from the transect line to the point of detection was recorded using a Tasco Lasersite Rangefinder. Detections were recorded on field data sheets (Appendix B) in 100-yard increments. Maximum range of the rangefinder of 800 yards (either side of the transect line) was used as the outer limit of the transect. State and federally listed species detected outside the 800-yard limit were noted (presence) but not included in density estimates. Both 10X40 binoculars and a 15X60 spotting scope were used for field identification. Recorded information included species, number of individuals, and lateral distance from the transect line at the point of first sighting.

Data treatment and analyses followed methods of Balph and others (1977). This method of line transect data analyses involves plotting all avian detections by species and distance (in 100-yard increments) from the transect line on each date sampled. Surveyors discarded all detections beyond the distance (100-yard increment) with the greatest number of detections of each species. The remaining number of individuals of each species were totaled then divided by the area sampled to develop a density. For example, if the greatest number of individuals of species “A” occurred in the 300- to 400-yard increment, then only detections less than 400 yards were totaled. Area sampled in this example equals the length of the transect multiplied by 400 yards multiplied by 2 (reflecting both sides of the transect line). This method of line transect data analysis provides greater precision in density estimates by allowing the field data to be used to determine differences in detectability between species and within the same species at different points in their life

Figure 9a Sites Reservoir alternative: Transect locations and habitats, west section (map)

Figure 9b Sites Reservoir alternative: Transect locations and habitats, east section (map)

Figure 10a Newville Reservoir alternative: Transect locations and habitats, west section (map)

Figure 10b Newville Reservoir alternative: Transect locations and habitats, middle section (map)

Figure 10c Newville Reservoir alternative: Transect locations and habitats, east section (map)

Table 4 Summary of avian transect lengths and total miles surveyed

cycle. Equipment included vehicle, binoculars, spotting scope, tripod, watch, clipboard, data sheets, and rangefinder. Monthly transect results were consolidated into seasonal groups for density analyses. Seasons were defined based on the dates used by the California Wildlife Habitat Relationships Program for seasonal bird reports (Zeiner and others 1990). These seasonal breakdowns are based on documented migration and residency patterns of California species (Table 5). Avian surveys were not conducted during periods of precipitation, high wind, or reduced visibility (fog or smoke). The same experienced observers conducted all sampling.

Table 5 Seasonal breakdown used in avian occurrence data analyses

Bank swallow surveys involved walking all permanent and ephemeral stream reaches with downcut channels during the bank swallow breeding season (May through July). All vertical banks were inspected for the presence of bank swallow burrows. All foraging swallows were identified to species. All detections of burrows or foraging bank swallows were recorded. Equipment included GPS unit, binoculars, notebook, pencil, and maps.

Owl surveys were conducted at night along the previously identified line transect routes during May or June. Sampling was initiated at dusk. Methodology involved broadcasting pre-recorded calls using a tape recorder with external speaker at half-mile intervals. Each species call (burrowing owl, short-eared owl, and long-eared owl) was broadcast for 30 seconds followed by 30 seconds of silence to detect return calls. Three repetitions of each call/listen cycle were conducted for each species at each half-mile interval along the line transects. All owl detections were logged. Equipment included tape player with external directional speaker, prerecorded owl tapes, flashlight, notebook, GPS unit, and pencil. Owl surveys were not conducted during periods of high wind or precipitation. Additionally, burrowing owl sightings were collected from field crews conducting cultural resource surveys within the Sites Reservoir inundation zone. These crews covered the entire inundation area of Sites Reservoir and associated features by walking the ground with a 10- to 20-meter separation between observers.

Results and Discussion

A compilation of State and federal special status species that could occur within the proposed reservoirs was developed from several sources including Natural Diversity Database (Appendix C), California Wildlife Habitat Relationships Program (Appendix D), literature review, landowner interviews, U.S. Fish and Wildlife Service Species Lists (Appendix E), and consultation with species experts.

In addition to density estimates for special status species, all birds detected during field work at the reservoir locations and associated features were recorded on each transect repetition. These detections indicate presence only and are based on both visual observations and call detections. Species occurrence information tabulated per transect run for each project feature is presented in Appendix F. Surveys detected more than 175 species of birds.

The results and discussion section is organized under three major headings:

- Avian Species Protected Under the State or Federal Endangered Species Acts
- State or Federal Special Status Species
- General Birds

Under each heading—Avian Species Protected Under the State or Federal Endangered Species Acts and the State or Federal Special Status Species—is a short description of species occurrence by project feature followed by a species-by-species discussion of distribution and density estimates for each reservoir and project feature. Appendix G provides a listing of species densities by season for each reservoir and project feature.

Table 6 Avian species protected under the State or federal Endangered Species acts that may occur in Tehama, Glenn, and Colusa counties

Avian Species Protected Under the State or Federal Endangered Species Acts

Nine State or federally listed avian species may occur within Tehama, Glenn, or Colusa counties (Table 6). Three of these species—bald eagle *(Haliaeetus leucocephalus)*, Swainson's hawk *(Buteo swansoni)*, and sandhill crane *(Grus canadensis)*—were identified during avian transect sampling at or near the proposed reservoirs or associated features. (See Table 1)

American Peregrine Falcon *(Falco peregrinus anatum)*

The peregrine falcon is a California Endangered Species. It was recently federally "delisted" by the U.S. Fish and Wildlife Service (USFWS). These falcons are a very uncommon nesting species within the northern Coast Range. This species generally selects high cliffs near lakes, rivers, or wetlands for nesting. Man-made structures including tall buildings or bridges also have been used in California for nesting (Jurek 1989). During winter, peregrines use a wide variety of habitats including agricultural croplands and annual grasslands for foraging. Peregrine falcons in California generally remain near their breeding territories year round (Jurek 1989). However, peregrines from as far away as Alaska pass through or winter in California (Anderson and others 1988).

No peregrine falcons have been observed at any of the reservoir alternatives or associated features. No potentially suitable cliff nest sites are present within the inundation zones of Sites reservoir. Approximately 1.5 miles north of the proposed Newville Reservoir is a potentially suitable cliff nest site. Both golden eagles and prairie falcons are known to nest on this cliff.

Figure 11 Adult and immature bald eagles

Bald Eagle (*Haliaeetus leucocephalus leucocephalus*)

Bald eagles are classified as a federal threatened species and as a State Endangered Species (Figure 11). This species has been proposed for federal delisting. More than 100 pairs are known to nest in California; the wintering population is estimated to be in excess of 1,500 birds. Wintering bald eagles use a wide variety of habitats in Tehama, Glenn, and Colusa counties including lacustrine, riverine, and riparian habitat; emergent wetland; annual and perennial grasslands; wet meadow; and agricultural croplands. Nesting bald eagles are restricted to habitats associated with large, fish-bearing lakes, reservoirs, and rivers with suitable nest trees (Lehman 1979).

Sporadic winter use by both adult and immature bald eagles has been documented at each of the proposed reservoir locations (Table 7a and 7b). Winter use was an order of magnitude greater at Funks Reservoir than within either of the reservoir inundation areas. Fish and a large concentration of waterfowl are available as prey for bald eagles wintering at Funks Reservoir. Up to five bald eagles have been observed perched around the reservoir on one date. The California Department of Fish and Game (DFG) conducted extensive winter bald eagle surveys along the length of Thomes Creek as part of the Thomes–Newville Reservoir studies in the 1980s. These studies confirmed extensive use of Thomes Creek by wintering bald eagles (DFG 1983). Estimated wintering bald eagle densities at project features associated with Thomes and Stony creeks were substantially greater than those associated with reservoir inundation zones.

Tables 7a and 7b Summary of bald eagle densities at Sites Reservoir and Newville Reservoir and associated features

A single adult bald eagle was present at Funks Reservoir during May 1999 and within the Newville Reservoir footprint during June 2000. No nests, adult pairs or nesting behavior were observed at any project feature. No indication of nesting other than these two sightings of adult birds during the breeding season has been observed. No suitable nesting habitat is present in the vicinity of either reservoir inundation area.

Figure 12 Bank swallow nesting habitat

Bank swallow (*Riparia riparia*)

Bank swallows are a State threatened species. These swallows are migratory, colonial cavity nesters and use a variety of habitats in and around the Sacramento Valley (Figure 12). Nesting is restricted to riparian, lacustrine, or riverine habitats with vertical cliffs or banks composed of sandy or loamy soils near water (Garrison and others 1987). Foraging activities occur primarily over riparian habitat where insects are taken on the wing. Nesting does not normally occur on ephemeral stream systems or on compacted clay or gravelly substrates.

Bank swallow surveys were not conducted at the proposed Newville Reservoir location as part of this study. Bank swallow surveys within Sites

Reservoir and associated features have failed to detect any sign of nesting bank swallows. The incised channel of virtually all of the streams within Sites and Newville reservoirs contain some unvegetated vertical banks. All streams within the reservoir areas are ephemeral with only limited ponded water present by June 15 during most years. Sandy or loamy soils are generally absent from these reservoir locations. However, limited northern rough-winged swallow nesting was observed in clay soils within both of the reservoir alternatives. Northern rough-winged *(Stelgidopteryx serripennis)* swallow nesting is not restricted to areas near water, nor are these swallows as selective as bank swallows in the composition of the cliffs or banks used for nesting.

Bank swallows are known to nest at several locations along Thomes Creek. At least two small historical colony locations have been identified on Thomes Creek above Paskenta. Access restrictions have limited evaluation of downstream bank swallow habitats at Newville Reservoir and downstream areas for both reservoirs.

Mountain Plover (*Charadrius montanus*)

The mountain plover is a California Species of Special Concern and is proposed for federal listing as a threatened species by USFWS. This species of shorebird does not nest in California. Wintering mountain plovers are present in California between September and mid-March (Graul 1972). Wintering habitat consists of sparse, short, grasslands, and plowed fields in the Central and Imperial valleys. Recent census data suggest that the Central Valley supports 16 to 23 percent of the wintering mountain plover use in California (Hunting 1998). This species' historical range is generally described as south of Sacramento and Yolo counties (Grinnel and Miller 1944, Jurek 1973).

No mountain plovers were detected at either of the reservoir alternatives or associated features. Potentially suitable wintering habitat is present along portions of the Sites new conveyance route.

Northern Spotted Owl (*Strix occidentalis caurina*)

The northern spotted owl is classified as a federal Endangered Species. This subspecies of the spotted owl occurs throughout the mountainous portions of northwest California including the extreme western portions of Tehama, Glenn, and Colusa counties. Suitable nesting habitat includes extensive stands (100 to 600 acres) of dense, multilayered, mature or old growth coniferous forest. Although some downslope movement during winter has been observed, little or no use of low-elevation grassland or open oak habitat has been observed in Northern California.

No northern spotted owls were observed during avian sampling at any of the proposed reservoir locations. Suitable nesting and foraging habitat is absent from the vicinity of the project areas.

Figure 13 Wintering sandhill cranes

Greater Sandhill Crane (*Grus canadensis tabida*)

The greater sandhill crane is a California threatened species (Figure 13). Greater sandhill cranes currently breed in Great Basin habitats in Northern

California where they select open, shallow lacustrine, irrigated pasture, or wetland habitats for nesting. Saline waters are avoided. No reproduction in Tehama, Glenn, or Colusa counties has been observed. However, large numbers of both greater and lesser sandhill cranes winter in the interior of the Sacramento Valley. The wintering population of greater sandhill cranes is estimated at 5,000 to 6,000 individuals and primarily occurs from the Butte Basin south (DFG 1994). Winter habitat consists of grasslands, croplands—corn, sorghum, barley, rice—or emergent wetlands.

No sandhill crane use has been detected at either reservoir alternative (Table 8). Thirteen sandhill cranes (possibly greater sandhill cranes) were observed flying over the Sites southwest road relocation route during February 2001. No actual habitat use was observed at this location. However, suitable wintering habitat is present along the Sacramento Valley portion of this road relocation. Eleven sandhill cranes (possibly greater sandhill cranes) were observed foraging in a flooded rice field along the Sites new conveyance route in late January 2001. More than 80 percent of the Sites new conveyance route is dominated by rice agriculture and suitable for wintering crane use. Potentially suitable sandhill crane wintering habitat is absent from the Newville Reservoir area and associated features.

Table 8 Summary of sandhill crane densities at Sites Reservoir and associated features (birds/square mile)

Swainson's Hawk (*Buteo swainsoni*)

The Swainson's hawk is a State listed threatened species. This migratory raptor is present within the Sacramento Valley during the breeding season (March through September). Swainson's hawks use desert, grassland, and cropland where scattered large individual trees or small groves of large trees are present. This species forages primarily over irrigated pasture or croplands. Approximately 80 percent of the estimated statewide population (550 individuals) occurs in the Central Valley (DFG 1993).

No observations of Swainson's hawks were made within the inundation area of either reservoir alternative (Table 9). A single foraging Swainson's hawk was observed on the Sites Reservoir transect on August 30, 2000. This observation was outside the inundation area approximately a mile downstream from the Sites damsite. Foraging Swainson's hawks were observed over alfalfa fields on two occasions along the Sacramento Valley portion of the Sites southeast road relocation. One observation of a Swainson's hawk was made along the Sites new conveyance route on August 23, 2000. Suitable nesting and foraging habitat is present along portions of the Sites southeast road relocation and Sites new conveyance routes. However, no Swainson's hawk nests were detected during the current sampling effort.

Table 9 Summary of Swainson's hawk densities at Sites Reservoir and associated features (birds/square mile)

No observations of Swainson's hawks were made at any of the Newville Project facilities. However, Swainson's hawks were occasionally observed foraging over irrigated pasture and grassland habitats on the Stony Creek fan below Black Butte Reservoir outside of the Newville conveyance route survey area.

Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)

The western yellow-billed cuckoo is a California Endangered Species and federal candidate species. This migratory species does not winter in California. Several small isolated breeding populations occur in suitable habitat along the Sacramento River. Suitable nesting habitat consists of extensive (25 acres or larger) riparian forest with dense understory (willow) near slow moving waters. Walnut orchards adjacent to riparian areas have also been used successfully as nesting habitat (Laymon 1980).

No western yellow-billed cuckoos were observed at either reservoir location or associated features. The only suitable nesting habitat associated within any project feature is at the Sites new conveyance intake at the Sacramento River. Both the mature riparian habitat and adjacent walnut orchard in this area were intensively surveyed for cuckoos during the breeding season using pre-recorded calls at 100 yard calling increments. No cuckoos were detected.

Willow Flycatcher (*Empidonax traillii*)

The willow flycatcher is a California Endangered Species. This migratory species arrives in Northern California during May and leaves by mid-September. Breeding habitat is extensive, dense, ungrazed stands of willow near slow moving water and meadow edge. Migrating willow flycatchers are infrequently observed in Tehama, Glenn, or Colusa counties. Remsen (1978) reported that willow flycatchers were no longer present as a nesting species within the Central Valley.

No willow flycatchers were detected during the current sampling effort at either of the reservoir alternatives or associated features. No suitable willow flycatcher habitat has been observed at either of the reservoir alternatives.

State and Federal Special Status Species

Forty-three avian species classified as either California Species of Special Concern, federal Species of Concern, Migratory Nongame Birds of Management Concern, or California Fully Protected Species may occur within Tehama, Glenn, or Colusa counties (Table 10). Thirty-three of these species have been observed within the project areas during the course of this investigation (see Table 2). The special status species that could occur in Tehama, Glenn, or Colusa counties but have not been observed are Aleutian Canada goose *(Branta canadensis leucopareia)*, Barrow's goldeneye *(Bucephala islandica)*, black swift *(Cypseloides niger)*, hermit warbler *(Dendroica occidentalis)*, least bittern *(Ixobrychius exilis)*, northern goshawk *(Accipiter gentiles)*, olive-sided flycatcher *(Contopus cooperi)*, and Vaux's swift *(Chaeturs vauxi)*.

Table 10 State and federal special status that occur in Tehama, Glenn, and Colusa counties

Aleutian Canada goose (*Branta canadensis leucopareia*)

The Aleutian Canada goose is a subspecies of the common Canada goose. This species was recently federally delisted and is currently considered a federal Migratory Nongame Bird of Management Concern. Aleutian Canada geese winter in the Sacramento and San Joaquin valleys. Wintering concentrations near Colusa and Modesto have been documented (USFWS 1998). Wintering Aleutian Canada geese use a variety of open habitats

where they forage for green shoots and seeds of cultivated grains and native herbaceous species. This species uses open water areas as a safe roost area during migration.

No Aleutian Canada geese were observed during the course of the field surveys at either reservoir area or associated project features. On some winter survey dates, large numbers of wintering Canada geese were present at Funks Reservoir and along the Sites new conveyance route. These areas may provide habitat for Aleutian Canada geese during winter or migration.

American Bittern (*Botaurus lentiginosus*)

The American bittern is classified as a Migratory Nongame Bird of Management Concern by USFWS (Figure 14). This species uses emergent wetland habitats and occurs year-round in the Tehama, Glenn, and Colusa counties.

Figure 14 American bittern (Colusa County)

No bittern use was observed within the inundation zone of either reservoir alternative or any Newville Project features. Potentially suitable habitat of adequate size is generally lacking within the reservoir inundation areas. American bitterns are common in rice fields and associated irrigation ditches and drains along the Sites new conveyance route and the Sites southeast road relocation (Table 11). A single observation of a bittern was made at Funks Reservoir where adequate emergent wetland cover is generally absent.

Table 11 Summary of American bittern densities at Sites Reservoir and associated features (birds/square mile)

American White Pelican (*Pelecanus erythrorhynchos*)

The American white pelican is a California Species of Special Concern (Figure 15). Habitats include rivers, natural lakes, reservoirs, and larger farm ponds containing fish. Historically, white pelicans nested on large lakes throughout California (Grinnell and Miller 1944). This species may travel long distances between forage and resting areas. These pelicans are gregarious, and flocks can contain large numbers of individuals.

Figure 15 American white pelican (Black Butte Reservoir)

No pelicans were observed within either reservoir inundation area (Table 12a and Table 12b). Suitable habitat is generally lacking except on the larger farm ponds. Small groups of pelicans were observed on Funks Reservoir during winter and fall. The density estimate of 2.5 pelicans per square mile identified for the Sites southwest road relocation represents a large flock circling over a chamise stand on a single date. No habitat use was observed at this location. Small numbers of pelicans were observed year-round along the Sites new conveyance route. Most observations of habitat use along this route occurred at the Sacramento River or near the Delevan National Wildlife Refuge. Sporadic use by small numbers of American white pelicans was documented on Black Butte Reservoir during summer and fall. No nesting or attempted nesting was observed at any project feature.

Tables 12a and 12b Summary of American white pelican densities at Sites and Newville reservoirs and associated features (birds/square mile)

Barrow's Goldeneye (*Bucephala islandica*)

Barrow's goldeneye, a California Species of Special Concern, is an uncommon winter visitor to California. No breeding by this secondary cavity nester has been documented within California for many years. Nesting habitat is near alkaline lakes or slow moving rivers with abundant

submerged aquatic vegetation and open water. Wintering habitats are riverine and lacustrine waters with rocky bottoms.

No Barrow's goldeneye has been observed at any of the reservoirs or associated features. However, a Sites Reservoir landowner reported the presence of a single Barrow's goldeneye within an ephemeral stock pond during winter 1998. This report was not confirmed. No suitable nesting habitat currently exists within the project areas. Potentially suitable wintering habitat is present at Funks Reservoir and along portions of the Sites new conveyance route.

Bell's Sage Sparrow (*Amphispiza belli belli*)

The Bell's sage sparrow, a subspecies of the common sage sparrow, is classified as a State and a federal species of concern. This species occurs year-round in western Tehama, Glenn, and Colusa counties where it frequents dense chaparral stands.

Sage sparrows are absent from the reservoir footprints. However, sage sparrows commonly occur in suitable chaparral habitat along both Sites southwest road relocations and within the inundation area of the Thomes Creek diversion. Density estimates are not available for this species.

Black Swift (*Cypseloides niger*)

The black swift is a State and federal Species of Concern and a federal Migratory Nongame Bird of Management Concern. This migratory species occurrence in Tehama, Glenn, and Colusa counties is generally restricted to the extreme eastern edge of Tehama County in the Sierra Nevada. Black swifts have very specific habitat requirements for nesting. This species nests on cliffs and frequently occurs in moist microhabitats including behind or adjacent to waterfalls.

No black swifts were detected during the course of any of the field surveys. Potentially suitable habitat is absent from the project areas. However, potentially suitable nesting habitat may be present upstream of the Newville Project area within the Thomes Creek canyon.

Black Tern (*Chlidonias niger*)

Black tern is a State and federal Species of Concern and a federal Migratory Nongame Bird of Management Concern. This migratory species occurs in the Central Valley portion of Tehama, Glenn, and Colusa counties. Black terns use lakes, ponds, rivers, wetlands, moist grassland, and agricultural habitats. It is unknown if this species currently breeds within the Sacramento Valley.

Table 13 Summary of black tern densities at Sites Reservoir and associated features (birds/square mile)

No black tern habitat use was observed at Sites or Newville Reservoir inundation areas. Sites new conveyance was the only project feature where black terns were observed (Table 13). Moderate summer densities of 1.3 birds per square mile were documented along this conveyance route with most use associated with foraging birds over flooded rice fields. No black tern use was observed at Funks Reservoir, which provides potentially suitable foraging habitat.

Burrowing Owl (*Athene cunicularia*)

The burrowing owl is a State and federal Species of Concern and a federal Migratory Nongame Bird of Management Concern (Figure 16). This semicolonial, year-round resident uses grassland habitats and a variety of early successional stages of open shrub and forest vegetative types where suitable burrows and perches are present.

Figure 16 Burrowing owl (Colusa County)

Small scattered groups of burrowing owls were detected within the Sites Reservoir inundation area during diurnal avian line transect sampling (Table 14a). Most of these observations were in upland settings near the grassland/blue oak habitat edge. However, a few individual sightings were made in open grassland habitat along stream channels. Sampling with pre-recorded calls was useful for determining presence of burrowing owls. Responses were received at 42 percent of the call locations within Sites Reservoir indicating wide distribution at this location. Development of a population estimate is not possible with the results of this owl calling sampling. Cultural Resource survey crews were responsible for a large number of burrowing owl sightings. This crew covered the Sites inundation area on grid transects spaced at 10- to 20-meter intervals. Burrowing owls were detected along the Sites north road relocation alignment during winter and fall. The Newville Reservoir area appears to provide equally suitable burrowing owl habitat as that identified within the Sites Reservoir area (Table 14b). However, this species was rarely detected within the inundation zone of Newville Reservoir on either diurnal line transects, nocturnal call transects, or through observations by other survey crews. Burrowing owls were rarely detected along the Black Butte to Newville conveyance route but regularly observed along the Newville southeast road relocation.

Tables 14a and 14b Summary of burrowing owl densities at Sites and Newville reservoirs and associated features (bird/square miles)

California Gull (*Larus californicus*)

The California gull is a California Species of Special Concern. This species is abundant within the Sacramento Valley during the nonbreeding season where it frequents lacustrine, riverine, croplands, and landfill sites. California gull breeding occurs only on the east side of the Sierra and Cascades. There is some speculation that this species may have bred historically within the Sacramento Valley. Low-elevation reservoirs near foraging areas are used extensively by wintering California gulls.

Small numbers of California gulls were identified at Funks Reservoir during fall, winter, and spring (Table 15a). A small number of gulls were also observed foraging in a freshly plowed field within the Sites Reservoir footprint outside the avian transect sampling period. Loafing and foraging uses were observed throughout the fall and spring along the Sites new conveyance route where small groups of gulls were frequently encountered during avian transect sampling. California gull density estimates should be considered as minimum values due to the difficulty in accurately identifying adult and juvenile gulls at any distance.

Table 15a and 15b Summary of California gull densities at Sites and Newville reservoirs and associated features (birds/square mile)

California gulls were not identified within the Newville Reservoir footprint (Table 15b). A small number of gull occurrences were documented along the T-C Canal to Black Butte conveyance route.

California Horned Lark (*Eremophila alpestris actia*)

The California horned lark is a California Species of Special Concern (Figure 17). This year-round resident is locally abundant in grasslands or other open habitats with low, sparse vegetation.

Figure 17 California horned lark (Newville Project Area)

The California horned lark is one of the most common breeding species in grassland habitats within the project areas. Highest densities were generally associated with areas of very short sparse grasslands. Horned lark density within the Sites Reservoir inundation area ranged from 1.7 birds per square mile to 7.2 birds per square mile (Table 16a). The highest lark densities were observed along the Sites north road relocation where densities greater than 20 birds per square mile were recorded during spring, summer, and fall. High densities of horned larks were encountered during spring sampling of Sites recreation areas. The winter horned lark density of 12.8 birds per square mile on the Sites new conveyance route represents a few fairly large flock observed on plowed croplands.

Table 16a and 16b Summary of California horned lark densities at Sites and Newville reservoirs and associated features (birds/square mile)

Seasonal horned lark densities within the Newville Reservoir inundation zone ranged from 2 birds per square mile to more than 20 birds per square mile (Table 16b). Portions of the south road relocation route are in grassland habitat, which contains relatively high densities of horned larks. Only a relatively short portion of the T-C Canal to Black Butte conveyance route is outside commercial eucalyptus grove. These areas also contained relatively high summer horned lark densities.

California Thrasher (*Toxostoma redivivum*)

The California thrasher was recently included as a federal Species of Concern and a federal Migratory Nongame Bird of Management Concern. California thrashers occur in the foothill portions of Tehama, Glenn, and Colusa counties. This year-round resident occurs in dense, mature chaparral stands where it forages on the ground.

Density estimates for California thrasher are not available due to its recent status change. However, this species occurred on the Sites southwest road relocation, Newville south road relocation, and within the Thomes Creek diversion. California thrashers were identified on 14.2 to 37.5 percent of the transect runs at these locations. Potentially suitable habitat is generally lacking within the Sites Reservoir inundation area. Some potentially suitable habitat is present within the Newville Reservoir area.

Common Loon (*Gavia immer*)

Common loon is classified as a State and federal Species of Concern and as a Migratory Nongame Bird of Management Concern. The inland distribution of this species is extremely irregular and associated with large natural lakes and some reservoirs, generally above 5,000 feet elevation. This uncommon wintering species requires deep freshwater lakes with adequate small food fish.

Common loons were observed only at Funks Reservoir and only during spring and fall migration (Table 17). Individual loons were observed on Funks Reservoir on two occasions. Funks Reservoir represents the only lacustrine habitat within the project area, excluding some of the larger farm ponds.

Table 17 Summary of common loon densities at Sites Reservoir and associated features (birds/square miles)

Cooper's Hawk (Accipiter cooperii)

Cooper's hawk is a California Species of Special Concern. This year-round resident frequents forest edge habitats. However, a variety of nonforest habitats (including agricultural and open grassland habitats) can be used by wintering birds.

Cooper's hawks were identified within both reservoir alternates and most project features (Table 18a and Table 18b). The highest densities were recorded along the Sites new conveyance route during winter (1.89 birds per square mile). Observed use along this 13.5-mile long route was concentrated near the Sacramento River riparian habitat and along the narrow eucalyptus corridor separating the Delevan National Wildlife Refuge from commercial rice agricultural lands. No Sites alternative feature was associated with Cooper's hawk summer use.

Tables 18a and 18b Summary of Cooper's hawk densities at Sites and Newville reservoirs and associated features (birds/square mile)

The highest Cooper's hawk densities associated with the Newville alternative occurred along the south road relocation. Surprisingly high densities were also recorded within the extensive eucalyptus groves along the T-C Canal to Black Butte conveyance route. The only summer detections of Cooper's hawks in the study areas were associated with the vast commercial eucalyptus groves along this conveyance route.

Figure 18 Double-crested cormorant

Double-Crested Cormorant *(Phalacrocorax auritus)*

The double-crested cormorant, a California Species of Special Concern, occurs year-round in the Sacramento Valley and surrounding foothill areas (Figure 18). This species uses natural lakes, rivers, and reservoirs where fish prey species are present. Snags, unvegetated islands, cliffs, jetties, booms, buoys, and transmission lines are used as perches. Summer use within Sacramento Valley foothill reservoirs is common.

Within the Sites Project area, double-crested cormorants were documented year-round at both Funks Reservoir and along Sites new conveyance (Table 19a). At Funks Reservoir the highest densities were recorded in winter (1.78 birds per square mile) with the lowest densities (0.38 birds per acre) in the spring. Highest concentrations of double-crested cormorants observed along the Sites new conveyance route were associated with the Sacramento River and Colusa Basin Drain.

Tables 19a and 19b Summary of double-crested cormorant densities at Sites and Newville reservoirs and associated features (birds/square mile)

A single observation was recorded of a cormorant in flight over the Newville footprint (Table 19b). The relatively high cormorant density on the Newville north road relocations was associated with a series of four fairly large ponds along this road relocation route. The highest cormorant densities within the study area were spring use at Black Butte Reservoir on the Black Butte to Newville conveyance route. Small groups of cormorants were frequently observed perched on flooded snags within the reservoir.

Ferruginous Hawk *(Buteo regalis)*

This relatively uncommon winter migrant is classified as a State and federal Species of Concern and a Migratory Nongame Bird of Management Concern. Ferruginous hawks are present in the Sacramento Valley from September through mid-April and use large tracts of open grasslands for winter foraging habitat.

Sporadic individual sightings of wintering ferruginous hawks were made at both the Sites and Newville Reservoir inundation areas (Tables 20a and 20b). No observations were made at associated features.

Tables 20a and 20b Summary of ferruginous hawk densities at Sites and Newville reservoirs and associated features (birds/square mile)

Golden Eagle (Aquila chrysaetos)

The golden eagle is a California Species of Special Concern and a State Fully Protected Species and also falls under the protection of the federal Eagle Protection Act (Figure 19). This large raptor nests throughout Northern California except in the Sacramento Valley or within the dense forests along the North Coast. Extensive wintering use of the Sacramento Valley can occur. This species forages in open habitats including grasslands, savannas, and early seral stages of open shrub and tree habitats.

Figure 19 Golden eagle at Sites project area

The golden eagle is one of the most common large raptors year-round within the project areas (Table 21a and Table 21b). Several active golden eagle nests were identified around the reservoir rim areas of Sites Reservoir including nesting activity in, or near, three of the five Sites recreation areas. Golden eagle densities within the Sites inundation area ranged from 0.18 to 0.31 birds per square mile with the highest density recorded during the winter. The highest densities associated with any Sites Project features were spring and fall densities of 0.73 birds per square mile on the southeast road relocation. Along the Sites new conveyance route, golden eagles were only recorded during winter and only along the western end of the route where agricultural croplands meet the foothills.

Tables 21a and 21b Summary of golden eagle densities at Sits and Newville reservoirs and associated features (birds/square mile)

Golden eagle densities averaged slightly less at Newville Reservoir than at Sites Reservoir on a seasonal basis. Several active golden eagle nest sites were located outside of the reservoir inundation area. The highest density documented (2.2 birds per square mile) during the current investigation occurred during winter within the Thomes Creek diversion and along the associated conveyance route. Relatively high density was also recorded along the Newville south road relocation (1.47 birds per square mile).

Hermit Warbler (*Dendroica occidentalis*)

The hermit warbler is a federal Species of Concern. This migratory warbler occurs in the higher elevations of extreme western Tehama, Glenn, and Colusa counties during the breeding season (April through September). Nesting hermit warblers occur in a variety of mature conifer stands including ponderosa pine, mixed conifer, Douglas fir, redwood, red fir, and Jeffery pine. During spring and fall migration this species may occur in lower elevation habitats including mature hardwoods and pine plantations.

Hermit warblers were not observed at either of the offstream storage reservoir alternatives or their associated features. Suitable nesting habitat is not present at these low-elevation reservoir locations (all less than 1,210 feet elevation). Potentially suitable migration habitat may be present. However, no hermit warbler has been observed at any time of year during this investigation.

Lark Sparrow (*Chondestes grammacus*)

The lark sparrow is a federal Species of Concern and a federal Migratory Nongame Bird of Management Concern. This species is one of the more common breeding birds within open blue oak habitats. However, a variety of open habitats is used by this year-round resident, including grasslands and open riparian habitats.

Lark sparrows were not a special status species when this evaluation was initiated. Density estimates for this species are based on transect data collected between October 1998 and June 2001.

Lark sparrows were present within the Sites Reservoir inundation area year-round at densities ranging from 0.73 to 2.52 birds per square mile (Table 22a). Highest densities were associated with individual oak trees in grassland habitat or in relatively open oak stands.

Tables 22a and 22b Summary of lark sparrow densities at Sites and Newville reservoirs and associated features (birds/square mile)

Although large flocks of lark sparrows occurred sporadically in winter, this species was generally widely distributed throughout the breeding season. The greatest density was found along the Sites southwest road relocation (creek route) where as many as 84.4 birds per square mile occurred. Winter and spring lark sparrow use along the Sites new conveyance route was concentrated near the Sacramento River riparian habitat and adjacent orchards.

Lark sparrows occurred year-round at Newville Reservoir and most associated features (Table 22b). Somewhat surprisingly, this species occurred regularly within the commercial eucalyptus groves along the T-C Canal to Black Butte conveyance route. The density estimate of 69.11 birds per square mile recorded along the Newville south road relocation is strongly influenced by the presence of a large flock on a single date.

Lawrence's Goldfinch (*Carduelis lawrencei*)

The Lawrence's goldfinch is a federal Species of Concern and a federal Migratory Nongame Bird of Management Concern, which primarily occurs in Tehama, Glenn, and Colusa counties during the breeding season (March through September). Limited wintering use has been observed. This species breeds and forages in open oak or shrub habitats near water.

Table 23 Summary of Lawrence's goldfinch densities at Sites Reservoir and associated features (birds/square mile)

Lawrence's goldfinches have not been observed within the Newville project area and only sporadically within the Sites Project area (Table 23). However, suitable nesting habitat exists throughout both project areas. Lawrence's goldfinches were frequently encountered in mixed flocks with other goldfinches. Only rarely were individuals of this species encountered even during the breeding season.

Least Bittern (*Ixobrychus exilis*)

The least bittern is a State and federal Species of Concern and a federal Migratory Nongame Bird of Management Concern. This species occurs along the Sacramento River in eastern Glenn and Colusa counties from April through September. Least bitterns use dense emergent vegetation for reproduction and foraging.

No least bitterns were detected at either of the reservoir locations or associated features. Adequate amounts of suitable habitat for this reclusive species are present along portions of the Sites new conveyance route. Some of the farm ponds and roadside ditches within the reservoir areas have a limited amount of emergent vegetation present. However, adequate amounts of potentially suitable habitat for this species are absent from all reservoir locations.

Lewis's Woodpecker *(Melanerpes lewis)*

Lewis's woodpecker is currently classified as a federal Species of Concern and a federal Migratory Nongame Bird of Management Concern. This woodpecker occurs year-round in western Tehama, Glenn, and Colusa counties. Preferred habitat includes open oak and conifer habitats with snags.

Lewis's woodpecker was not identified as a special status species when field surveys began. Lewis's woodpecker density estimates are based on transect data collected between September 2000 and June 2001. This woodpecker occurred infrequently within the Sites Reservoir inundation area during spring and fall. Densities ranged as high as 0.24 birds per square mile (Table 24a). Suitable habitat is generally lacking in the northern portion of the reservoir area.

Tables 24a and 24b Summary of Lewis's woodpecker densities at Sites and Newville reservoirs and associated features (birds/square mile)

Lewis's woodpecker densities were much greater within the Newville Reservoir area than at Sites. Fall and winter densities greater than 17 birds per square mile were calculated (Table 24b). The highest Lewis's woodpecker densities occurred along the Black Butte to Newville conveyance route where fall densities exceeded 62 birds per square mile. This conveyance route passes through fairly extensive open valley oak woodlands, which supported much higher densities than the adjacent upland blue oak habitat. Moderate densities of Lewis's woodpeckers were present at the Thomes Creek diversion and conveyance. No summer use was recorded at any reservoir location or project feature.

Loggerhead Shrike (*Lanius ludovicianus*)

The loggerhead shrike is a State and federal Species of Concern and a federal Migratory Nongame Bird of Management Concern. This shrike occurs in open habitats with infrequent perch sites (trees, shrubs, fences, and power lines). Loggerhead shrikes forage over open, sparse, low herbaceous cover. This territorial species occurs yearlong in the Colusa, Glenn, and Tehama counties with both resident and migrants present during the winter.

The loggerhead shrike is one of the more common and widespread avian species in grassland habitats within the project areas. This shrike's abundance appears to decrease rapidly with increasing tree density. For this reason shrikes are absent from the two Sites southwest road relocation routes (Table 25a). Loggerhead shrike densities within the Sites Reservoir inundation area ranged from 0.67 to 2.29 birds per square mile. Use of roads as a survey route may introduce bias into the population estimates for this species. Frequently roads have adjacent fences and or power lines, which provides foraging perches for this species and may artificially increase density estimates over those obtained in grasslands where foraging perches are absent.

Tables 25a and 25b Summary of loggerhead shrike densities at Sites and Newville reservoirs and associated features (birds/square mile)

Loggerhead shrikes generally had slightly higher seasonal densities within the Newville Reservoir inundation area than at Sites (Table 25b). The greatest shrike densities were observed along the Newville south road relocation route during summer at more than 7 birds per square mile.

Figure 20 Long-billed curlew along Sites new conveyance route

Long-billed Curlew (Numenius americanus)

The long-billed curlew is a State and federal Species of Concern and a federal Migratory Nongame Bird of Management Concern that winters in the Sacramento Valley (Figure 20). This large shorebird uses a variety of open habitats in the Sacramento Valley during the winter including croplands, mudflats, flooded areas, and open grasslands.

Tables 26a and 26b Summary of long-billed curlew densities at Sites and Newville reservoirs and associated features (birds/square mile)

Long-billed curlews were present sporadically within the Sites Reservoir inundation area throughout the winter and spring (Table 26a). Large flocks (for example, greater than 300 individuals) were occasionally encountered foraging in the grassland habitats when the soils were at or near saturation. Extensive use of vernal pool areas was also observed. All curlew observations at Funks Reservoir were of birds foraging in exposed mudflats. The grasslands surrounding Funks Reservoir are ungrazed, relatively tall, dense, and apparently unsuitable for curlew foraging habitat. Curlew use along the Sites new conveyance route occurred in both flooded rice fields and within annual grassland habitats along the westernmost end of the route.

Long-billed curlew use at Newville Reservoir and associated features was substantially less than that recorded at Sites Reservoir and its associated features (Table 26b). Both project areas are predominantly annual grassland, and the Newville Reservoir area contains twice as many wetland acres as found within Sites. Proximity of Sites Reservoir to the rice-growing region and wetland habitats at State and federal wildlife refuges may lead to the increased curlew use over that at the Newville Project area.

Long-eared Owl *(Asio otus)*

The long-eared owl is a California Species of Special Concern and a federal Migratory Nongame Bird of Management Concern. This species occurs year-round in valley and foothill locations in Tehama, Glenn, and Colusa counties. Preferred nesting habitat is reported as dense riparian and live oak stands near open areas or forest/grassland edges.

Long-eared owls were regularly observed at a single location along the Sites new conveyance route during summer (Table 27). Although no long-eared owls were detected along diurnal transect routes, nocturnal censusing with prerecorded taped calls indicate that long-eared owls are common along the blue oak/grassland edge habitats at Sites Reservoir. Long-eared owl responses were obtained at 54 percent of the half-mile segments sampled within Sites Reservoir. This species appears to be less common in extensive, open grassland habitats. However, an active nesting pair of long-eared owls was observed one-half mile northeast of the Sites inundation area in an isolated cottonwood tree in grassland habitat. No long-eared owl responses were detected during Newville Project area nocturnal owl sampling.

Table 27 Summary of long-eared owl densities at Sites Reservoir and associated features (birds/square mile)

Merlin (Falco columbarius)

The merlin, a California Species of Special Concern, is an uncommon winter visitor to the Sacramento Valley and adjacent foothill area from September to May. This small falcon forages in low-elevation, open habitats frequently near water. Wetlands, lakeshores, and other open habitats near dense tree stands (for cover) are frequently used during winter.

During diurnal transect sampling a single merlin was encountered (Table 28). This observation occurred in open grassland habitat near the southern end of Newville Reservoir. A single merlin was also observed within the Sites Reservoir footprint outside of transect sampling. The Merlin appears to be a very uncommon winter visitor in the project areas.

Table 28 Summary of merlin densities at Newville Reservoir and associated features (birds/square mile)

Northern Goshawk (Accipiter gentilis)

The northern goshawk is a State and federal Species of Concern and a federal Migratory Nongame Bird of Management Concern. This uncommon year-round resident frequents mid- to high-elevation, mature, dense, coniferous forests for reproduction. Some limited winter use of low-elevation foothill riparian habitat has been documented.

No goshawks were encountered during avian transect sampling at either reservoir location or associated features. Further, potentially suitable nesting habitat is not present within these reservoirs, which are at elevations less than 1,210 feet elevation.

Northern Harrier *(Circus cyaneus)*

The northern harrier, a California Species of Special Concern, is a common year-round resident that uses a variety of open habitats including meadows, wetlands, annual and perennial grasslands. This species seldom uses forest or woodland habitats, although some forest/grassland edge habitats are used. Agricultural habitats that mimic tall dense grasslands or fresh water emergent vegetation types are also used as foraging habitats.

Northern harriers are a relatively common species in both reservoir inundation areas during fall, spring, and winter (Tables 29a and 29b). Relatively minor summer use has been documented within the Sites Reservoir area, and no summer use has been observed at Newville Reservoir. Relatively high densities (>1 bird per square mile) have been documented at Funks Reservoir and along the Sites new conveyance route.

Tables 29a and 29b Summary of northern harrier densities at Sites and Newville reservoirs and associated features (birds/square mile)

Northern harriers occurred seasonally at all Newville features. Relatively high densities were encountered during fall sampling along the Newville south road relocation and along the Thomes Creek diversion and conveyance.

Olive-sided Flycatcher *(Contopus cooperi)*

Olive-sided flycatcher was recently identified as a federal Species of Concern and a federal Migratory Nongame Bird of Management Concern. This flycatcher occurs in extreme western Tehama, Glenn, and Colusa counties. Preferred habitat includes mixed conifer, montane hardwood conifer, Douglas fir, redwood, red fir, and lodgepole pine. Most common in forested habitats near openings.

Olive-sided flycatchers have not been observed at either reservoir location or associated features. Potentially suitable habitat is generally absent at these low-elevation project areas.

Osprey (*Pandion haliaetus*)

Osprey is a California Species of Special Concern. Ospreys are found on larger lakes, reservoirs, and river systems throughout most of Northern California during spring, summer, and early fall. Suitable nesting habitat requires large, clear, fish-bearing waters with nearby snags, open crown, or dead-topped live trees.

Tables 30a and 30b Summary of osprey densities at Sites and Newville reservoirs and associated features (bird/square mile)

Within the Sites Project area, osprey occurred only along the Sacramento River portion of the Sites new conveyance (Table 30a). No nests were identified in this area, but foraging adults were observed sporadically throughout the breeding season.

One July sighting of an individual osprey occurred along Stony Creek below Newville Reservoir (Table 30b). This record represents the only osprey sighting in either inundation area transect. An active osprey nest is present below Black Butte Dam. Foraging osprey were occasionally encountered near this location on the T-C Canal to Black Butte conveyance route. An active osprey nest was also present on the Black Butte to Newville conveyance route. Both adult and nestling osprey were regularly observed at this nest on Black Butte Reservoir.

Prairie Falcon (*Falco mexicanus*)

The prairie falcon, a California Species of Special Concern, nests in inland portions of the northern Coast Range and winters in this area as well as within the Sacramento Valley. Preferred nesting habitat is a variety of open habitats (primarily perennial grasslands, savannas, rangeland, or open agricultural types) with a nearby sheltered cliff ledge. Winter migrants use a variety of open habitats.

Individual prairie falcons are occasionally present at the Sites Reservoir inundation area during both winter and fall (Table 31a). Densities are generally low (0.05 to 0.08 birds per square mile). The season occurrence of this species suggests that breeding does not occur in the project vicinity. At the Sites recreation areas, the relatively high density during spring is the result of a single sighting and a very small area surveyed.

Tables 31a and 31b Summary of prairie falcon densities at Sites and Newville reservoirs and associated features (birds/square mile)

Prairie falcons are present year-round at the Newville Reservoir inundation area (Table 31b). At least two nest locations have been identified in the immediate project vicinity. Seasonal density estimates within the Newville Reservoir inundation area ranged from 0.04 to 0.06 birds per square mile.

Purple Martin (*Progne subis*)

The purple martin is a California Species of Special Concern. This migratory species returns to Northern California during March and migrates south during September. A variety of habitat types are used for reproduction in the Coast Range including both hardwood and coniferous habitats. Preferred breeding habitat includes open, older forests and woodlands with suitable snags for nesting. This species forages for insect over a variety of habitats near the nest site including forest, woodland, chaparral, and riparian habitats.

Potential breeding habitat is generally absent from the project areas. No purple martins were observed at Sites Reservoir or associated features. The only record of purple martin use in the project areas was in the upper portion of the Thomes Creek diversion (Table 32). Two purple martins were detected during summer foraging over riparian habitat along Thomes Creek.

Table 32 Summary of purple martin densities at Newville Reservoir and associated features (birds/square mile)

Red-breasted Sapsucker *(Sphyrapicus ruber)*

The red-breasted sapsucker is classified as a federal Species of Concern and as a federal Migratory Nongame Bird of Management Concern. Red-breasted sapsuckers breed in higher elevations in extreme western Tehama and Glenn counties and winter throughout the project areas. Wintering habitat includes sparse-to-moderate canopy closure classes of riparian and deciduous hardwood stands.

Red-breasted sapsuckers were not a special status species when field surveys were initiated. Density estimates for this species are based on transect data collected September 2000 to June 2001.

No red-breasted sapsuckers were detected at Sites Reservoir or associated features after September 2000. However, this species was present on approximately 25 percent of the transect runs along the Sites southwest road relocation prior to September 2000. Within the Newville Reservoir inundation area this species was observed during winter, spring, and fall (Table 33). The greatest densities were recorded during spring (0.37 birds per acre). Although a few observations occurred in riparian habitat, most habitat use occurred in open oak habitats at the north end of the reservoir. Moderate densities were also documented along the Black Butte to Newville conveyance route during fall. This species was also observed on the Newville north and south road relocations prior to September 2000.

Table 33 Summary of red-breasted sapsucker densities at Newville Reservoir and associated features (birds/square mile)

Rufous Hummingbird (*Selasphorus rufus*)

The rufous hummingbird is a federal Migratory Nongame Bird of Management Concern. The species' range is primarily restricted to the North Coast. However, this migratory hummingbird does occasionally occur in the extreme northwestern corner of Tehama County. Preferred habitats include riparian, open oak woodlands, and chaparral.

This species was not a special status species when field surveys were initiated. Density estimates are for the period September 2000 to June 2001. However, transect records indicate that no rufous hummingbirds were observed on any transect prior to September 2000. Further, only one individual was observed over the course of the field surveys. A single male rufous hummingbird was present within the Thomes Creek diversion area during fall (Table 34). This sighting occurred in an area of sparse oak overstory and moderate shrub understory.

Table 34 Summary of rufous hummingbird densities at Newville Reservoir and associated features (birds/square mile)

Sharp-shinned Hawk (*Accipiter striatus*)

The sharp-shinned hawk is a California Species of Special Concern with a widespread winter distribution in Northern California. Nesting is restricted to a variety of moderate-to-dense, even-aged, single-layered forest habitats including hardwood habitats (black oak and foothill riparian). Proximity to water and northern exposures are attributes preferred for the nest location. This species is not known to nest in Colusa County.

Sharp-shinned hawks occurred regularly at low densities (0.04 to 0.18 birds per acre) during the nonbreeding season within the Sites Reservoir inundation area (Table 35a). Sharp-shinned hawks were observed foraging in both open grassland habitats and within blue oak/foothill pine habitats in this area. The only breeding season use recorded was within the riparian habitat of Grapevine Creek on the Sites southwest road relocation. Wintering sharp-shinned hawk densities were substantially greater along the Sites new conveyance route at (0.38 birds per acre) than in the Sites Reservoir inundation area. Many of the winter and fall sharp-shinned hawk observations along this route were hawks foraging in dense weedy cover associated with agricultural canals and drains in open habitats. At the Sites recreation areas, the high density estimate during spring is more a reflection of the minor amount of area surveyed than a high number of birds detected.

Tables 35a and 35b Summary of sharp-shinned hawk densities at Sites and Newville reservoirs and associated features (birds/square mile)

Seasonal occurrence of sharp-shinned hawks was more restricted at Newville Project area than at Sites (Table 35b). Most sharp-shinned hawk detections in the Newville Reservoir were associated with riparian vegetation along Stony Creek.

Short-eared Owl (*Asio flammeus*)

The short-eared owl is a California Species of Special Concern and a federal Migratory Nongame Bird of Management Concern. Short-eared owls occur in open habitats including perennial grasslands, irrigated pasture, and wetlands. Forest and woodland areas are avoided.

Table 36 Summary of short-eared owl densities at Sites Reservoir and associated features (birds/square mile)

Short-eared owls were observed during diurnal avian line transects at only two project features, Funks Reservoir and Sites New Conveyance (Table 36). No use of the Newville Project area was observed.

No summer use was recorded at any project feature. Short-eared owls were regularly observed on the Sites new conveyance route in the vicinity of Delevan National Wildlife Refuge at densities ranging from 0.21 birds per acre in spring to 0.75 birds per acre in winter. Nocturnal owl calling identified the presence of a short-eared owl at one location along the

Sacramento Valley portion of the Sites southeast road relocation and at two locations along the Sites new conveyance route. Nocturnal owl sampling failed to identify short-eared owls at the Newville Reservoir area or any associated features.

Snowy Egret (*Egretta thula*)

Figure 21 Snowy egret on nest (Glenn County)

Snowy egret was recently added to the list of federal Species of Concern (Figure 21). This egret occurs throughout the Central Valley including Tehama, Glenn, and Colusa counties. Snowy egrets prefer emergent wetlands, ponds, rivers, lakes, irrigation ditches, and areas of saturated soil including rice fields.

No density estimates are available for this species due to its recent status change. However, transect data indicate that snowy egrets were identified on 2.4 and 3.6 percent of the transect runs within the Newville and Sites Reservoir inundation areas, respectively. Snowy egrets were present on at least one-third of the transect runs at Funks Reservoir and the Sites southeast road relocation. The greatest occurrence of this species was along the Sites new conveyance route where snowy egrets were observed on more than 90 percent of the transect runs. Snowy egrets also occurred on the T-C Canal to Black Butte conveyance route on approximately 43 percent of the transect runs.

Tricolored Blackbird *(Agelaius tricolor)*

The tricolored blackbird is a State and federal Species of Concern and a federal Migratory Nongame Bird of Management Concern. This colonial, year-round resident of the Sacramento Valley uses freshwater emergent wetland habitats (primarily cattail and tules) for nesting. This blackbird forages on the ground in a variety of habitats including grasslands, croplands, and seasonally flooded areas. Tricolored blackbirds may travel many miles between nesting and foraging areas.

Foraging tricolored blackbirds commonly occurred within open grassland habitats within the Sites Reservoir area (Table 37a). No nesting was observed within the Sites or Newville Project areas.

Tables 37a and 37b Summary of tricolored blackbird densities at Sites and Newville reservoirs and associated features (birds/square mile)

Suitable nesting habitat is present within the Delevan National Wildlife Refuge near the Sites new conveyance route. Tricolored blackbirds frequently occurred in mixed flocks with Brewer's blackbirds *(Euphagus cyanocephalus)*, red-winged blackbirds *(Agelaius phoeniceus)*, and European starlings *(Strurnus vulgaris)*. High density estimates can result from an observation of a single large flock on a given date as they did with the fall density of more than 47 birds per square mile along the Sites southeast road relocation.

Tricolored blackbird habitat use was observed throughout the Newville Reservoir area at densities up to 13.1 birds per square mile (Table 37b). However, concentrated regular use was detected only at a feedlot situation.

Vaux's Swift (*Chaetura vauxi*)

This swift is a California Species of Special Concern and a federal Migratory Nongame Bird of Management Concern. Vaux's swifts are frequently observed in Northern California during migration and less often during the breeding season. No winter use occurs. Preferred nesting habitat includes an appropriate nest site in a large hollow tree, primarily redwood or Douglas fir. This swift may also nest in chimneys or buildings. Vaux's swifts forage on the wing for insects over many habitat types near nest tree including riparian and lacustrine habitat.

No Vaux's swifts have been observed at either the Sites or Newville Reservoir areas or any associated features.

Western Snowy Plover (*Charadrius alexandrinus nivosus*)

The western snowy plover is a California Species of Special Concern and a federal Migratory Nongame Bird of Management Concern. This plover occurs year-round along the California coast with a very limited summer distribution inland. Central Valley records are primarily from the San Joaquin Valley. This species frequents sandy or gravelly beaches for both foraging and nesting.

No western snowy plover were identified in either the Sites or Newville Reservoir areas or any associated features. However, potentially suitable habitat is present along the Sites new conveyance route and the Sites southeast road relocation.

Figure 22 White-faced ibis along Sites new conveyance route

White-faced Ibis (*Plegadis chihi*)

The white-faced ibis is classified as a State and federal Species of Concern (Figure 22). This species distribution in California is extremely limited. However, this species is relatively common in the rice-growing regions of the Sacramento Valley. Habitats used include freshwater emergent wetlands, wet meadows, shallow lacustrine, and irrigated or flooded pastures, and croplands. Use of vernal pool habitats is not documented. This species requires extensive tall marsh vegetation for nesting.

White-faced ibis were not observed at either Sites or Newville inundation areas. The only observations of this species occurred in rice, natural wetland, or riverine habitats within those Sites Project features within the Sacramento Valley (Table 38). Surprisingly, no ibis detections occurred at Funks Reservoir, which can seasonally provide shallow lacustrine habitat. Ibis were frequently observed in rice fields less than a mile downstream along Funks Creek. White-faced ibis densities ranged from 2.1 to more than 20 birds per square mile along the Sites new conveyance route.

Table 38 Summary of white-faced ibis densities at Sites and Newville reservoirs and associated features (birds/square mile)

White-tailed kite *(Elanus leucurus)*

White-tailed kites are classified as a federal Species of Concern, Migratory Nongame Bird of Management Concern by the USFWS, and as a Fully Protected Species by the DFG. White-tailed kites are found year-round throughout the Sacramento Valley and adjacent foothill areas. Habitat preference includes open or herbaceous stages of most low-elevation vegetative types primarily grasslands, meadows, farmland, and emergent

wetlands. However, white-tailed kites are frequently associated with agricultural areas. Dense stands of trees are used as communal night roost sites.

White-tailed kites were an uncommon species within both reservoir inundation areas (Table 39a and Table 39b). However, one pair of nesting kites was observed in open blue oak habitat near the southern end of Sites Reservoir during one year. This species was commonly observed in cropland habitat downstream from Funks Reservoir and less frequently foraging the ungrazed grasslands around Funks Reservoir. Kites were observed along the length of the Sites new conveyance route with the greatest habitat use associated with irrigated pasture or croplands as opposed to the more commonly occurring rice fields. No communal roost trees were identified.

Tables 39a and 39b Summary of white-tailed kite densities at Sites and Newville reservoirs and associated features (birds/square mile)

Relatively high summer and fall kite densities were observed along the T-C Canal to Black Butte conveyance route (0.30 to 0.68 birds per square mile). Almost none of the kite habitat use observed along this route was associated with the predominant vegetative type (eucalyptus).

Yellow-breasted Chat *(Icteria virens)*

This uncommon warbler is classified as a California Species of Special Concern and a federal Migratory Nongame Bird of Management Concern. This migratory species arrives in California during April and departs by October. Nesting habitats consist of dense riparian understory and other dense shrub habitats near water. Both willow and blackberry patches are used extensively.

No yellow-breasted chats were observed at either of the proposed reservoir locations or any of the associated features. Potentially suitable nesting habitat is generally absent except for a narrow strip of mature riparian habitat along the Sacramento River on the Sites new conveyance route.

Yellow Warbler (*Dendroica petechia brewsteri*)

The yellow warbler is a California Species of Special Concern. This migratory warbler occurs in a variety of woodland and forest habitats in Northern California during the breeding season (April through September). This species prefers open to moderate density forests or woodlands with a dense shrub understory. Yellow warblers are most common in open canopy riparian deciduous habitat.

Yellow warblers are a very uncommon species within the project areas (Table 40a and Table 40b). Sightings within the Sites Reservoir inundation area were restricted to spring in a short reach of riparian habitat between the community of Sites and the Sites damsite. Habitat use along the Sites new conveyance route primarily occurred in the vicinity of the Colusa Basin Drain and the Delevan National Wildlife Refuge.

Tables 40a and 40b Summary of yellow warbler densities at Sites and Newville reservoirs and associated features (birds/square mile)

The only observations of yellow warblers within the Newville Project area occurred during summer in blue oak woodland habitat. The relatively high density estimate represents an observation of a single bird.

General Birds

Species Richness

Species richness (the total number of species) was totaled for each transect run. Average species richness was consistently higher within the Newville Reservoir area as compared to the Sites Reservoir area (Table 41a and Table 41b). Spring species richness averaged greater than other seasons at both reservoir areas. Funks Reservoir winter species richness were substantially higher than during other seasons due to the influx of shorebirds and waterfowl wintering on the reservoir. The Sites new conveyance route had the highest species diversity of any transect sampled during every season. This transect included a wide variety of habitat types including riverine, riparian, orchard, irrigated pasture, irrigated grain, irrigated cropland, wetlands, rice, and annual grassland.

Tables 41a and 41b Average avian species richness at Sites and Newville reservoirs and associated features (bird/square mile)

Commonly Occurring Species

Habitat differences strongly influence the species composition and occurrence associated with reservoir areas and associated features. This section identifies the most commonly occurring avian species associated with each reservoir area or project feature. Occurrence is based on the percentage of transect runs that a given species was recorded. This method of data analyses favors year-round residents over seasonal migrants and habitat generalists over habitat specialists; it does not consider the number of individuals observed. Avian species occurrence information is provided in Appendix F.

The most commonly occurring avian species within the Sites Reservoir inundation area include Brewer's blackbird, western meadowlark *(Sturnella neglecta),* American kestrel *(Falco sparverius),* European starling, red-tailed hawk *(Buteo jamaicensis),* mourning dove *(Zenaida macroura),* turkey vulture *(Cathartes aura),* western scrub jay *(Aphelocoma californica),* loggerhead shrike, and yellow-billed magpie *(Pica nuttalli).* Except western scrub jay, all of these species forage extensively within grassland habitats. Species occurrence unique to this transect include Anna's hummingbird *(Calypte anna),* phainopepla *(Phainopepla nitens),* and brown creeper *(Certhia americana).*

Along the Funks Reservoir avian transect, the most commonly occurring species include mallard *(Anas platyrhynchos),* western meadowlark, western grebe *(Aechmophorus occidentalis),* black phoebe *(Sayornis nigricans),* great-blue heron *(Ardea herodias),* American coot *(Fulica americana),* mourning dove, savannah sparrow *(Passerculus sandwichensis),* Brewer's blackbird, and killdeer *(Charadrius vociferous).* Lacustrine species like mallard, western grebe, great-blue heron, and American coot occurred on virtually every sampling date. Savannah sparrow, a grassland species, occurred more frequently within the ungrazed grassland habitats at Funks Reservoir than at any other location. Species observations unique to this transect include blue-winged teal *(Anas discors),* whimbrel *(Numenius phaeopus),* redhead *(Aythya americana),* common loon, and horned grebe *(Podiceps auritus).*

The most commonly occurring species along the Sites north road relocation include American kestrel, Brewer's blackbird, house sparrow *(Passer domesticus),* mourning dove, western meadowlark, black phoebe, European starling, killdeer, loggerhead shrike, northern harrier, oak titmouse *(Baeolophus inornatus),* red-tailed hawk, turkey vulture, white-breasted nuthatch *(Sitta carolinensis),* and yellow-billed magpie. House sparrows, and to a lesser extent yellow-billed magpies, were associated with several ranch structures along the transect route.

Along the Sites southeast road relocation, the most commonly occurring avian species include killdeer, mourning dove, western meadowlark, American crow *(Corvus brachyrhynchos*), American kestrel, European starling, house sparrow, black phoebe, Brewer's blackbird, great blue heron, loggerhead shrike, northern mockingbird *(Mimus polyglottus),* red-tailed hawk, red winged blackbird, and savannah sparrow. House sparrow and northern mockingbird were associated with ranch structures, and great blue heron and red-winged blackbirds were associated with rice agriculture.

Along the Sites southwest road relocation (creek route) the most commonly occurring avian species include acorn woodpecker *(Melanerpes formicivorus),* American kestrel, lesser goldfinch *(Carduelis psaltria), northern* flicker *(Colaptes auratus*), oak titmouse, western meadowlark, western scrub jay, white-breasted nuthatch, California towhee *(Pipilo crissalis),* red-tailed hawk, and western bluebird *(Sialia mexicana).* This species association is strongly influenced by the predominance of oak habitats along this transect route.

Along the Sites southwest road relocation (ridge route) the most commonly occurring avian species include American kestrel, lesser goldfinch, oak titmouse, western scrub jay, white-breasted nuthatch, wrentit *(Chamaea fasciata*), acorn woodpecker, bushtit *(Psaltriparus minimus*), California towhee, mourning dove, western bluebird, and yellow-billed magpie. Although this transect route includes extensive chaparral habitat, wrentit was the only chaparral-dependent species with high occurrence.

The most commonly occurring avian species along the Sites new conveyance route include black phoebe, Brewer's blackbird, European starling, great-blue heron, great egret *(Ardea alba),* killdeer, marsh wren *(Cistothorus palustris),* mourning dove, northern harrier, pied-billed grebe *(Podilymbus podiceps*), red-tailed hawk, ring-necked pheasant *(Phasianus colchicus),* turkey vulture, western meadowlark, and yellow-billed magpie. This transect encompasses the greatest habitat diversity of any transect in the study and consistently had the greatest species richness. The influence of rice agricultural habitat is seen in the high occurrence of great-blue heron, great egret, marsh wren, pied-billed grebe, and ring-necked pheasant. Species occurrences unique to this transect include black tern, Brewer's sparrow *(Spizella breweri),* common snipe *(Gallingo gallingo),* great-tailed gackle *(Quiscalus mexicanus),* willit *(Catoptrophorus semipalmatus),* northern shrike *(Lanius excubitor),* least sandpiper *(Calidris minutilla),* herring gull *(Larus argentatus),* and short-billed dowitcher *(Limnodromus griseus).*

At Sites recreation areas the most commonly occurring avian species include western meadowlark, acorn woodpecker, oak titmouse, turkey vulture, American crow, American kestrel, and Nuttall's woodpecker *(Picoides nuttallii).*

Figure 23 Western meadowlark (Newville project area)

The most commonly occurring avian species within the Newville Reservoir inundation area include acorn woodpecker, Brewer's blackbird, European starling, mourning dove, western scrub jay, American kestrel, oak titmouse, red-tailed hawk, turkey vulture, western meadowlark (Figure 23), and white-breasted nuthatch. Not surprisingly, many of these species were also the most commonly occurring species within the Sites Reservoir area. The greater area of oak habitat in the Newville Reservoir transect in comparison to the Sites Reservoir transect shows in the higher frequency of occurrence of oak titmouse, acorn woodpecker, and white-breasted nuthatch. Species occurrences unique to this transect include band-tailed pigeon *(Columba fasciata),* plumbeous vireo *(Vireo plumbeus*), and mountain quail *(Oreortyx pictus).*

Along the Newville north road relocation transect the most commonly occurring avian include northern flicker, oak titmouse, western meadowlark, acorn woodpecker, western scrub jay, Brewer's blackbird, and yellow-billed magpie. Canyon wren *(Catherpes mexicanus)* was only detected on this transect.

The most commonly occurring avian species occurring along the Newville south road relocation transect include acorn woodpecker, American kestrel, mourning dove, Nuttall's woodpecker, oak titmouse, turkey vulture, western meadowlark, western scrub jay, Bewick's wren *(Thryomanes bewickii),* California quail *(Callipepla californica),* loggerhead shrike, rock wren *(Salpinctes obsoletus),* savannah sparrow, and white-breasted nuthatch. The presence of patches of shrub habitats along the transect route is expressed in the high occurrence of Bewick's wren and California quail. A large area of rock outcrop in the portion of the transect crossing Rocky Ridge provides habitat for rock wren.

Along the T-C Canal to Black Butte conveyance route, the most commonly occurring avian species include black phoebe, mourning dove, red-tailed hawk, turkey vulture, western meadowlark, American crow, European starling, great-blue heron, killdeer, and lesser goldfinch.

The most commonly occurring avian species along the Black Butte to Newville Reservoir transect include mourning dove, oak titmouse, acorn woodpecker, European starling, western meadowlark, western scrub jay, Brewer's blackbird, great-blue heron, Lewis's woodpecker, and white-breasted nuthatch. The large acreage of open oak woodland habitat along this transect route result in the high occurrence of Lewis's woodpecker.

Along the Thomes Creek diversion and conveyance route transect the most commonly occurring avian species include acorn woodpecker, black phoebe, California quail, lesser goldfinch, northern flicker, oak titmouse, western bluebird, western meadowlark, and western scrub jay. Several avian species occurrences were unique to this area including American dipper *(Cinclus*

mexicanus), purple martin, Stellar's jay *(Cyanocitta stelleri),* and rufous hummingbird.

DFG Harvest Species

Thirty-three DFG harvest species were observed during avian transect sampling (Table 42). Twelve of these species were present within the Sites Reservoir inundation area including American crow, California quail, Canada goose (Branta canadensis), canvasback (Aythya valisineria), common merganser (Mergus merganser), mallard, mourning dove, ring-necked duck (Aythya collaris), ring-necked pheasant (Figure 24), rock dove (Columba livia), snow goose (Chen caerulescens), and wood duck (Aix sponsa). Canada goose was infrequently observed (3.6 percent of the transect runs). Canada goose use primarily occurred on moist grasslands during winter periods of dense fog in the Sacramento Valley and clear conditions in the inundation area. Snow geese were observed in flight over the inundation area; no habitat use was observed. Limited breeding season use by mallard, common merganser, and wood duck were observed annually in stream channels and farm ponds. Winter and migration use of farm ponds and stream channels by other waterfowl species including canvasback and ring-necked duck were also noted. California quail occurred on more than 67 percent of the sampling runs. Most California quail observations were associated with riparian habitat. However, infrequent observations occurred where a shrub layer was present in other habitat types. Mourning doves occurred on more than 94 percent of the transect runs. This species was present during virtually every sampling date except on a few occasions during midwinter. Ring-necked pheasants occurred on more than half the sampling runs and were generally associated with dense herbaceous cover (dryland grain, ungrazed roadsides). Wild turkeys (Meleagris gallopavo) were never observed within the Sites Reservoir inundation zone. However, turkeys were irregularly (12.5 percent of the transect runs) detected along the Sites southwest road relocation.

Table 42 DFG harvest species occurrence by project feature

Figure 24 Ring-necked pheasants (Funks Reservoir)

Funks Reservoir had the greatest number of waterfowl species (22) and the highest species occurrence rates for canvasback, bufflehead *(Bucephala albeola),* common goldeneye *(Bucephala clangula),* mallard, blue-winged teal, redhead, and ring-necked duck.

The Sites new conveyance route also supported a high number of waterfowl species (15) and the highest occurrence rates for American coot, cinnamon teal *(Anas cyanoptera),* common moorhen *(Gallinula chloropus),* gadwall *(Anas strepera),* northern pintail *(Anas acuta),* and northern shoveler *(Anas clypeata).*

Twenty DFG harvest species observed within the Newville Reservoir inundation area during transect sampling. These species were American crow, American widgeon *(Anas americana),* band-tailed pigeon, bufflehead, California quail, Canada goose, cinnamon teal, common goldeneye, common merganser, hooded merganser *(Lophodytes cucullatus),* lesser scaulp *(Aythya affinis),* mallard, mourning dove, mountain quail, ring-necked duck, ring-necked pheasant, rock dove, snow goose, wild turkey and wood duck. Breeding season use was observed for American crow, California quail, common merganser, mallard, mourning dove, mountain quail, ring-necked

pheasant, rock dove, wild turkey and wood duck. Band-tailed pigeon observations were restricted to winter overflights rather than habitat use. Wild turkeys were observed on nearly 50 percent of the sampling runs, primarily within riparian habitat. Mourning doves were detected on every sampling run, and California quail occurred on more than 80 percent of the dates sampled. Mountain quail were observed very infrequently (2.4 percent of the transect runs). Ring-necked pheasant occurred less frequently than within the Sites Reservoir inundation area. Absence of agricultural cover crops within the Newville Reservoir inundation area may be a factor in the lower rate of pheasant occurrence. With the exception of mallard, common merganser, and wood duck, no waterfowl breeding season use was observed within the Newville inundation area.

The highest transect occurrence of Canada geese was on the T-C Canal to Black Butte transect. Canada geese were frequently observed (57.1 percent of the transect runs) along this conveyance route near Stony Creek. Nine DFG harvest species were detected on the Thomes Creek diversion and conveyance route. The highest transect occurrence for California quail and American widgeon was within this area.

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