# **Chapter 3. Affected Environment**

# 3.1 Introduction

This section describes the affected environment of Contra Loma at a level of detail commensurate with the programmatic/planning nature of this RMP. Subsequent project-level environmental compliance documents may need to be prepared by Reclamation or the managing partner(s) in the future to address environmental resources that may be affected by management actions and projects carried out under the selected RMP alternative. This chapter describes resources and features that could be affected under any of the alternatives. Some resources such as climate are described for the purpose of context, although project-related impacts to these resources, regardless of the selected project alternative, would be minor.

Much of the data used to describe the environmental setting of Contra Loma was collected using a GIS format. Figures are used to show Contra Loma's layout, including features, facilities, and infrastructure, as well as areas of sensitive resources (e.g., vegetation communities) and potential hazards (e.g., geological faults). The discussion and figures in this chapter, and the impact analyses presented in Chapter 4, are intended to serve as a guide to future development plans within the planning horizon by identifying potential environmental constraints.

# 3.2 Land Use and Management

## 3.2.1 Current Uses and Activities

Current uses at Contra Loma include recreational uses, grazing, operations and maintenance, and reservoir management. EBRPD has constructed recreational facilities on the south side of the reservoir to support the various recreational opportunities offered at Contra Loma and has developed trails throughout the area for hiking, biking, and equestrian uses. The City has developed community facilities on the land it manages to support soccer, baseball, picnicking, and other sports and community activities. Recreational uses are allowed in most areas of Contra Loma, with the exception of the Reclamation Zone north of the dam. Group activities, such as parties, performances, special events, or similar gatherings, are allowed with a special use permit from EBRPD.

EBRPD's park office is located south of, and adjacent to, the swim lagoon. The office adjoins the buildings housing the showers and changing rooms. The park office building also includes the corporation yard where EBRPD stores vehicles and maintenance equipment. The corporation yard is enclosed on all sides by cinder block walls and by the office building, except for a 16-foot wide driveway on the south side of the yard. A storm drain system provides drainage for the corporation yard; this system drains to the reservoir. The EBRPD police substation is located in the former park residence building approximately 250 feet southwest of the park office. There is currently no park residence at Contra Loma. A service yard and materials storage area is located 500 feet west of the park office.

Grazing is allowed on the 454 acres of rolling grasslands surrounding the reservoir in accordance with the current grazing license. Grazing is used for fire suppression in order to protect the recreational facilities and nearby residential areas. The grazing license allows for a livestock carrying capacity of 389 animal unit months (i.e., the amount of grazing forage needed for one mature cow and nursing calf per month) for the grazed land (Figure 1-2). Livestock grazing is currently rotated between multiple enclosures, and cattle are not allowed near the reservoir in order to protect water quality. EBRPD grazes livestock on about 60 percent (about 68,000 acres) of its regional parklands, including its Black Diamond Mines Regional Preserve adjacent to Contra Loma. Grazing and pasture are important land uses in Contra Costa County. In 2000, 168,890 acres of the County were in pasture and range land, which includes land used for grazing of large farm animals and dry farming of grains for feed (Contra Costa County 2005).

Contra Loma is located entirely within the City and has been designated by the City's General Plan as open space (City of Antioch 2003a) as it serves as a transitional area between the developed portions of the City and extensive open space to the southwest. Contra Loma is surrounded by residential uses to the north and south, the City golf course to the east, residential uses along the eastern half of the southern boundary, open space along the western half of the southern boundary, and open space and undeveloped land to the west (Figure 3-1).

The City owns the adjacent 201-acre parcel to the east of Contra Loma that comprises the majority of the golf course (i.e., excluding the 5.7 acres of land leased to the City by Reclamation). The golf course includes 18 holes, a driving range and practice area, a pro shop, and a clubhouse with dining and beverage facilities.

EBRPD owns the open space lands to the south and west and manages them as part of the 5,300acre Black Diamond Mines Regional Preserve. The preserve provides recreational opportunities and preserves a portion of the area's history relating to Native American uses, ranching, as well as coal and sand mining. A portion of land directly west of Contra Loma is privately-owned. The City's general plan land use designation for the privately-owned land is Estate Residential and the City has zoned the land as Planned Development District.

# 3.2.2 Land Ownership and Management in Contra Loma

The U.S. Government owns Contra Loma, which consists of the 80-acre reservoir and approximately 661 acres of land surrounding the reservoir (Figure 3-1). Reclamation is the Federal agency charged with administering Contra Loma. EBRPD, the City, and CCWD are responsible for managing Contra Loma in accordance with each agency's management agreement, license, or contract.

CCWD has been operating and maintaining the reservoir for domestic water supply under contract with Reclamation since 1967. On September 18, 1972, Reclamation and EBRPD entered into a management agreement transferring responsibility from Reclamation to EBRPD for the development, construction, administration, operation, and maintenance of public recreation, recreation facilities, and other uses within Contra Loma, including the water surface area of the reservoir but excluding 20 acres directly north of the dam known as the Reclamation Zone. This agreement clarifies that the rights of EBRPD under this agreement are subordinate to the rights of the United States relating to the use of the lands and water areas for water regulation and other project purposes. Reclamation and its contractor CCWD retained responsibility for the



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5.7 acres currently leased by Reclamation to the City for golf course use.

Lone Tree Golf Course (owned and managed by the City of Antioch)

Contra Loma Reservoir RMP/EIS

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Figure 3-1 Land Ownership and Management

Frederickson Lane

**Residential Land Uses** 

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Reclamation Zone and management authority for the reservoir for purposes of its operation and use of CVP water supplies. According to the current management agreement with Reclamation, EBRPD has the authority to issue special use permits, licenses, and concession contracts to other entities as well as the responsibility to manage and maintain recreational facilities and uses at Contra Loma. The City operates and manages the Community Park in the northeastern portion of Contra Loma under a license agreement granted by EBRPD.

In 1981, 5.7 acres of land on the eastern side of Contra Loma adjacent to the City's Lone Tree Golf Course was removed from EBRPD's management area and has been leased to the City for golf course. The lease expired in 2011; however, Reclamation and the City are pursuing issuance of a new license in order to allow continued use of the land for golf. Although, this land is owned by the U.S. Government, it is not part of the Contra Loma Recreation Area and is, therefore, not covered in this RMP/EIS. Issuance of a new license to the City will require separate environmental analysis and approval from Reclamation. In conjunction with this lease of land to the City in 1981, EBRPD agreed to accept the use of a 3.9-acre City-owned parcel adjacent to the northeast corner of the Recreation Area (Figure 3-1). The lease between the City and EBRPD for the 3.9 acres of City-owned land also expired in 2011. Because this 3.9-acre parcel is owned by the City, it is not part of Contra Loma, and future use of this area will be determined by the City.

In 1985, EBRPD transferred management of approximately 47 acres of Contra Loma to the City under a license agreement that allowed the creation of the Community Park. The license agreement was amended in 1990 and it has been extended through December 31, 2013. Pursuant to this license agreement, management and maintenance of the Community Park is the responsibility of the City.

# 3.2.3 Land Uses and Zones

Reclamation uses WALROS as a management tool for classifying water and land use zones in terms of recreational experience. The primary goal of WALROS is to provide planners and managers with a framework and procedure for making better decisions in order to conserve a spectrum of high-quality and diverse water- and land-based recreation opportunities. In 2009, the WALROS system replaced its predecessor, WROS, which placed more emphasis on water-based recreation than land-based recreation.

In October 2008, Reclamation identified two WROS classifications for Contra Loma Reservoir. The southern half of the reservoir is classified as S4 and the northern half of the reservoir is classified as RD6 (Figure 1-2). The S4 zone is influenced by the developed recreation areas, high visitor use, and corresponding managerial presence along the southern shore. Facilities along the south shore include the swim lagoon, picnic areas, concessions, boat launch, parking lots, and Regional Park administrative facilities. The RD6 zone receives less use and has fewer facilities than the S4 zone, and is less developed than the S4 zone (Bureau of Reclamation and California Department of Parks and Recreation 2008). These zones are similar, though not identical, to the S and RD zones under the WALROS system. The 2008 WROS inventory did not identify classifications for the land portions of Contra Loma.

As the managing partner, EBRPD prepared a park-specific LUDP for Contra Loma to define allowed uses, describe the desired park character, provide guidance for future development and

use of the Regional Park, describe access and circulation, and designate areas for development or preservation (East Bay Regional Park District 1975a). The LUDP established a natural environment unit and recreation clusters in Contra Loma based on the anticipated and desired uses of each area (East Bay Regional Park District 1975a). The natural environment unit and recreation clusters encompass the 80-acre reservoir and all of the surrounding land except for the 20-acre Reclamation Zone, which encompasses the dam and its pumping facilities. The Reclamation Zone is reserved for use by Reclamation and CCWD.

The natural environment unit was designated to protect natural resources and provide more passive recreational opportunities with minimal development (East Bay Regional Park District 1975a). This unit encompasses the steeper hillsides and the majority of the reservoir surface and shoreline. This unit offers hiking trails, scenic views, fishing, and informal picnicking. Some of this unit is used for livestock grazing.

The recreation clusters were designated in Contra Loma to focus recreational activities and facility development within specified areas that are most conducive to recreation, such as those areas that have ease of access, are generally flat, and are close to water or other facilities (East Bay Regional Park District 1975a). The following four use areas were designated within the recreation clusters: the beach-marina cluster on the south shore of Contra Loma Reservoir, the day camp cluster in the northeast portion of Contra Loma (where the current Community Park is), the picnic meadow cluster to the east of the reservoir, and the equestrian facility or special use area in the southeast corner. These areas include the lands south, east, and northeast of the reservoir and in the southeast portion of Contra Loma adjacent to residential development.

# 3.3 Recreation

The Contra Loma Recreation Area was opened to the public in 1968 with limited recreational development. Currently, recreation at Contra Loma is available within the Contra Loma Regional Park and the Community Park managed by EBRPD and the City, respectively.

# 3.3.1 Contra Loma Regional Park

EBRPD classifies Contra Loma as a regional park because of its outstanding natural features and its outdoor recreational opportunities for public enjoyment and education (East Bay Regional Park District 1975a).

EBRPD operates the Regional Park to provide outdoor recreational and educational opportunities, while managing the park's natural and cultural resources. Recreational activities at the park include picnicking, fishing, boating, windsurfing, kayaking, canoeing, swimming, hiking, bicycling, horseback riding, and wildlife viewing. The Regional Park is open to the public daily from 5:00 a.m. to 10:00 p.m., although the park's vehicle entrance gate hours vary throughout the year. EBRPD collects fees for parking, dogs, swimming, boat inspection and launching, windsurfing, and fishing. Visitation has increased annually in recent years, as shown in Table 3-1.

Year	Visitors			
2005	123,147			
2006	124,122			
2007	133,629			
2008	145,556			
2009	141,986			
2010	147,395			

#### Table 3-1. Annual Visitation to Contra Loma Regional Park (2005–2010)

Source: Rivoire, pers. comm. 2010; Bondurant, pers. comm. 2011a

The Regional Park contains various facilities that support the recreational uses offered at the park, such as trails, picnic tables, a large swimming pool (i.e., "swim lagoon"), food concession, parking areas, fishing docks, and a boat launch, as well as facilities for managing the land, such as fencing, access gates, and roads. EBRPD has offices, maintenance equipment and facilities, law enforcement vehicles, and a radio communication system onsite. The Regional Park has potable (drinking) water, restrooms and showers, portable chemical toilets, electricity, and telephones. Many, but not all, of the recreational facilities are ADA-compliant. The Regional Park has wheelchair accessible drinking water, parking, and restrooms. The shaded picnic areas near the swim lagoon are wheelchair accessible, and the swim lagoon has an accessible pool lift.

Most of the developed recreational facilities are located along the south side of the reservoir, which corresponds with the beach-marina recreational cluster identified in EBRPD's LUDP. A large manicured lawn with planted shade trees covers much of this area. Developed facilities in this area include picnic sites, the swim lagoon, the boat launch, a fishing dock, a fish cleaning station, restrooms, showers, changing rooms, drinking fountains, a food concession, an equestrian staging area, and several trails. Most of the parking areas are also located here (Figure 1-2).

Contra Loma Reservoir provides recreational fishing opportunities for children and adult anglers of varying skill levels. Annual visitation data suggest that angler use has been increasing and will continue to increase. The reservoir supports 14 species of fish, including eight species of game fish. EBRPD and the California Department of Fish and Wildlife (CDFW) stock rainbow trout and channel catfish in the reservoir. The reservoir also supports self-sustaining populations of largemouth bass, crappie, redear sunfish, and bluegill, which are also popular with anglers. A state fishing license and an EBRPD Fishing Access Permit are required for all anglers 16 years and older. Additional details about the reservoir's fishery are provided in Section 3.11 (Fisheries).

To protect the reservoir's domestic water supply from pathogens such as *Cryptosporidium*, the Department of Health Services (DOHS) (predecessor to California Department of Public Health [CDPH]) issued a compliance order to CCWD in 1999 requiring CCWD to either cease body contact activities in the reservoir or discontinue using the reservoir for drinking water supply. In response to this order, CCWD and EBRPD built the swim lagoon along the south side of the reservoir in 2001 (Figure 1-2) and swimming is no longer allowed in the reservoir. The swim lagoon is separated from the reservoir, ensuring that water from the lagoon does not enter the

reservoir. The lagoon has a concrete bottom; water is recirculated through filters and is disinfected and treated before it is returned to the lagoon, similar to a large swimming pool. The swim lagoon is surrounded on three sides by a manicured lawn, and four permanent umbrellas installed in the lawn provide shade. The swim lagoon and an adjacent lawn area are surrounded by a fence. The swim lagoon is staffed with life guards when it is open (seasonally from May through September) with varying hours throughout the season. Swim lagoon entrance fees are collected in addition to park entrance fees. Showers, changing rooms, picnic tables, and a food concession stand are available adjacent to the lagoon outside the fence. Concession stand hours are the same as swimming hours.

Windsurfing and limited boating are allowed on the reservoir. Body contact with the reservoir is highly restricted to protect the reservoir's domestic water supply from pathogens. To minimize body contact with the water, windsurfers must shower before entering the water and wear wet suits. Visitors may launch small boats (up to 17 feet long). To protect water quality, only electric motors are allowed; gasoline-powered engines are prohibited. Kayaks and canoes are allowed on the reservoir; however, paddlers using self-bailing kayaks must shower before launching and wear wet suits while boating. To protect against potential infestations of invasive zebra and quagga mussels, all boats are inspected by trained EBRPD staff prior to launching. All boats and aquatic gear must be dry prior to entering the reservoir.

A trail network within the Regional Park provides hiking, bicycling, and equestrian access to most areas of the park, as well as connections to the Community Park and other nearby trail systems (Figure 1-2). The trail system includes 0.75 mile of paved trails along the east and south shores of the reservoir. These paved trails provide access to the gravel-surfaced West Shore Trail, which is wheelchair accessible when trail conditions are favorable with respect to mud and the quality of the gravel surface. The West Shore Trail has a gravel surface. Several trails on the south side of the Regional Park connect with the trail system in EBRPD's Black Diamond Mines Regional Preserve, which provides connections to Mt. Diablo and other parks and trails within the EBRPD system.

The East Shore Trail and other trails on the north side of the Regional Park provide access to the Community Park, the Delta De Anza Regional Trail (also known as the Contra Costa Canal Trail), and the Mokelumne Trail. Trails in the northwest portion of the park provide access to adjacent residential communities. Bicycles may be ridden on designated trails and on fire or service roads, unless otherwise posted. Bicycles are not permitted in areas posted "No Bicycles," or on narrow (e.g., single track) hiking or narrow equestrian trails. Horses may be ridden on most trails within the Regional Park. An equestrian staging area with a hitching post, a horse watering trough, picnic tables, and a large gravel parking lot for trailers is located near the south shore of the reservoir.

Dogs are allowed in the Regional Park provided they are leashed and under control while in developed areas and areas posted with signs requiring use of leashes. Dogs are allowed off-leash in open space and undeveloped areas of the Regional Park.

Alcoholic beverages are not allowed in the Regional Park.

Special events and programs are allowed in the Regional Park with prior authorization from EBRPD. Running meets and day-camp programs, sometimes including swimming lessons and a junior lifeguard program, are held at the Regional Park. No camping facilities are provided, and overnight camping in the park is prohibited.

## 3.3.2 Antioch Community Park

The Community Park currently receives approximately 50,000 visitors annually. The most popular activities at the park involve use of the sports fields for softball, soccer, football, league sports and tournaments. Other popular activities include picnicking, walking, jogging, and bicycling.

The Community Park includes various facilities that support the recreational uses offered at the park, such as barbeque pits, picnic areas, restrooms, multi-use sports fields, a children's play area, youth play area, horseshoes, trails, and parking areas, as well as management facilities such as fencing, access gates, and driveways (Figure 1-3). Many, but not all, of the recreational facilities are in compliance with ADA. The Community Park has potable (drinking) water, restrooms, and electricity.

Most facilities are located in the western half of the Community Park. The driveway entrance at the intersection of James Donlon Boulevard and Blythe Drive is the primary access point to the Community Park. Facilities in this location include the main parking lot with approximately 230 spaces, a large group picnic area known as the Jensen Family Picnic Grove, individual picnic tables, barbeque pits, three multi-use sports fields (fields 1, 2, and 3; see Figure 1-3) with flood lights, children's and youth play areas, and restrooms. A paved trail from the western end of the parking lot leads to the Regional Park.

The eastern half of the Community Park includes two sports fields (fields 4 and 5), a second parking lot with approximately 230 spaces, and open space areas. An unpaved trail from the eastern end of the parking lot leads to the Regional Park. The Contra Costa Canal and the adjacent Delta De Anza Regional Trail run along the entire northern boundary of the Community Park.

The Community Park has a total of five sports fields. The three multi-use sports fields in the western half of the park (fields 1, 2, and 3) have softball diamonds, dugouts, bleachers, water fountains, nearby restrooms, and flood lights for nighttime use. These fields are used for softball, baseball, football, soccer, and kickball. The two sports fields in the eastern half of the Community Park (fields 4 and 5) are used primarily for soccer, but are also used for baseball, softball, football, rugby, and outdoor volleyball. The City has recently improved these fields by replacing the grass surface with synthetic turf, installing furnishings, perimeter fencing, concrete paving, an electrical/storage building, sports field lighting, perimeter irrigation and landscaping, drainage structures, and pavement. With the installation of lights, these fields are now used at night.

Sports fields 1, 2, and 3 develop muddy conditions during the rainy season that can render them temporarily unusable. To protect the turf and public safety, the City does not allow the fields to be used when wet.

# 3.4 Visitor Access and Circulation

## 3.4.1 General Access

Contra Loma is located in Antioch in northeastern Contra Costa County near the junction of State Route (SR) 4 and SR 160 (Figure 1-1). SR 4 is located approximately 1.5 miles north of Contra Loma and is the primary freeway serving the recreation area. SR 4 connects with Interstate (I-) 680 15 miles west of Antioch, providing access to and from other parts of the San Francisco Bay Area. East of Antioch, SR 4 passes through the City of Brentwood, providing access to and from the San Joaquin Valley. From Antioch, SR 160 heads north toward Rio Vista. Lone Tree Way and Contra Loma Boulevard are the primary surface streets connecting SR 4 to Contra Loma. Lone Tree Way also provides access to Contra Loma from Brentwood.

Vehicle access to the Regional Park is from Contra Loma Boulevard on the south side of the park. Frederickson Lane provides vehicle access to Contra Loma Boulevard from Golf Course Road (a major collector road) and several other streets providing access from Lone Tree Way (Figure 3-2). Vehicle access to the Community Park is from James Donlon Boulevard, which runs along the northern boundary of Contra Loma. James Donlon Boulevard is a four-lane street that provides access to Contra Loma Boulevard and Lone Tree Way. Lone Tree Way and James Donlon Boulevard are primary arterial streets. The section of Contra Loma Boulevard between SR 4 and James Donlon Boulevard is also an arterial street. Pedestrians and bicyclists may also reach Contra Loma via the Delta De Anza Trail, which connects to the Mokelumne Trail.

Within the City, peak hour congestion at freeway intersections and other major local intersections that serve the freeway system or local employment centers generally occurs during weekday mornings and afternoons (City of Antioch 2003a).

The Bay Area Rapid Transit District (BART) provides commuter rail service throughout much of the San Francisco Bay Area. The nearest BART station to Contra Loma is the Pittsburg/Bay Point station located 7 miles west of Antioch. Tri Delta Transit provides bus service to Antioch and nearby cities. Tri Delta Transit has several routes serving the Contra Loma area; however, most of these routes are commuter routes limited to weekdays. Tri Delta Transit has one weekend route that provides service to Contra Loma and the BART station. The nearest bus stop to Contra Loma is located at the intersection of Contra Loma Boulevard and James Donlon Boulevard, about a third of a mile from the Community Park entrance.

## 3.4.2 Contra Loma Regional Park

Visitor access to the Regional Park is by car, foot, bicycle, or horseback. Car access is from the southern park entrance and pedestrian access is through one of several pedestrian entrances (Figure 3-2). Two pedestrian entrances provide access to the Regional Park from the Community Park. A paved trail leading from the west side of the Community Park provides access to the Regional Park at the eastern end of Contra Loma Dam. An unpaved trail provides access from the eastern end of the Community Park to the northeast corner of the Regional Park. Three other pedestrian entrances are located on the northwest side of the Regional Park, and provide access to adjacent residential areas. All of these pedestrian entrances have gates that prohibit vehicle access. Visitors may also access the southern portion of the Regional Park by hiking, bicycling, or riding on horseback on one of several trails leading from the adjacent Black Diamond Mines Regional Preserve.



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Figure 3-2 Roads and Access

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Circulation within the Regional Park is provided by the park's road and trail network. Immediately north of the entry kiosk the entrance road splits in three directions. The boat launch and a parking area are located approximately 500 feet north of the intersection. The road to the east leads to the east shore of the reservoir and the road to the west leads to the south shore of the reservoir (Figure 3-2).

The half-mile-long park road that leads to the east shore of the reservoir has a gravel surface. This road provides access to two parking lots, the east shore, and the trail system in the eastern portion of the Regional Park. The trails east of the reservoir include Old Ranch Loop, Swale Trail, and East Shore Trail. These trails provide access to areas north and east of the reservoir, including the Community Park, the Contra Loma Dam, and the east shore of the reservoir.

The road that leads west from the entry kiosk provides access to the south shore recreation areas. Parking is available in three lots and the equestrian staging area. Some parking lots are paved, and others have a gravel surface. The visitor road ends at the western parking lot near the park office. Several service roads for EBRPD staff continue west, providing access to the park office, corporation yard, police substation, and storage area. These service roads also serve as walking trails.

A network of trails provides access to the southern, western, and northwestern areas of the Regional Park, and connects with trails to the to the east shore (Figure 3-2). These trails include the West Shore, Stewartville, Ridge, Lake View, and Old Homestead Loop trails. The West Shore Trail runs along the west shore of the reservoir and provides access to the west shore fishing dock and the dam. Stewartville Trail runs along the park entrance road south shore of the reservoir.

The Ridge and Lake View trails provide access to the ridges south and west of the reservoir with views of the reservoir and beyond. An unnamed paved trail runs along the south shore of the reservoir from the entry kiosk to the swim lagoon, and provides wheelchair access to the swim lagoon, park office, several picnic areas, restrooms, and the south shore fishing dock.

The Regional Park has a parking capacity of 1,093 vehicles. Visitation is generally highest on weekends and holidays from Memorial Day weekend through Labor Day. Parking shortages are rare and typically only occur on hot weekend days once or twice every couple of years (Bondurant, pers. comm. 2011a).

## 3.4.3 Antioch Community Park

The primary access point to the Community Park is the driveway entrance at the intersection of James Donlon Boulevard and Blythe Drive. Vehicles entering the Community Park here may park in the main parking lot, which has approximately 230 spaces. The parking lot provides access to the Jensen Family Picnic Grove, picnic tables, barbeque pits, play areas, restrooms, and sports fields 1, 2, and 3. A paved trail from the western end of the parking lot leads to the Regional Park (Figure 3-2). A second vehicle entrance and another parking lot are located on James Donlon Boulevard at the northeast corner of the Community Park. This parking lot has approximately 230 spaces and provides access to sports fields 4 and 5. An unpaved trail from the eastern end of the parking lot leads to the Regional Park. Several paved trails provide internal

access within the Community Park. The Delta De Anza Regional Trail runs along the entire northern boundary of the Community Park.

# 3.5 Utilities

Public utilities at Contra Loma include water service, wastewater service, solid waste disposal, electricity, and telephone and radio service. Information was obtained from staff of the EBRPD and the City, and from the EBRPD Master Plan and the City's General Plan.

# 3.5.1 Water Service

Water service at Contra Loma is provided by the City via a long-term contractual agreement with CCWD for up to 125,000 acre-feet of CVP water per year. Drinking water is available at eight locations in the Regional Park; most of these locations are near the swim lagoon, park office, concession stand, and boat launch area (Figure 3-3). A watering station for horses is also provided at the equestrian staging area near the Lake View Trail between the boat launch area and main parking lot. EBRPD irrigates the cattle grazing and landscaped portions of the Regional Park from an allocation of up to 100 acre-feet per year of water from the reservoir (Rivoire, pers. comm. 2010; Miller, pers. comm. 2011).

At the Community Park, the City provides potable water to two restrooms, the concession building/snack bar, one community picnic area, and five individual picnic areas. Irrigation water is used over most of the park, which has turf, low ground cover, and approximately 100 mature trees. The Community Park experiences heaviest use of both potable and irrigation water during the peak visitor season, May through October (City of Antioch Recreation Department 2010).

# 3.5.2 Wastewater Service

The Regional Park has eight restroom facilities. These facilities are cleaned and visually inspected daily by park staff. The restrooms at the park office and the shower facility near the swim lagoon are connected to the City's sewer service through a lift station; although EBRPD drawings do not show the connection, EBRPD believes it may be in the area of Grimsby Drive (Stoneham, pers. comm. 2011). The other six restrooms are chemical toilets that are visually inspected daily and pumped biweekly by EBRPD. EBRPD has stated that the existing chemical toilets are not sufficient for the current level of use (Rivoire, pers. comm. 2010).

All wastewater service at the Community Park is handled by the Delta Diablo Sanitation District (DDSD) which includes two restrooms and the concession building/snack bar (City of Antioch Recreation Department 2010).

# 3.5.3 Solid Waste Disposal

Allied Waste provides solid waste collection, disposal, recycling, and yard waste services to the City, including Contra Loma (City of Antioch 2003b). Trash bins and recycling bins are distributed throughout Contra Loma. The park staff gathers the trash and deposits it in one main dumpster, which is emptied by Allied Waste.



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Figure 3-3 Utilities

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#### 3.5.4 Electricity

Electric service is provided by Pacific Gas and Electric (PG&E) to the office, the kiosk, the police substation, the boat ramp, and several irrigation pumps throughout the recreation area (Miller, pers. comm. 2011). No electric outlets are available at picnic sites. The Regional Park's monthly electrical usage ranges from approximately 25,610 to 70,579 kilowatt hours per month. PG&E also provide electrical service to the Community Park, but the City receives a combined electrical bill for all City properties, so electrical usage at the Community Park is difficult to determine. Separate electrical service is provided by PG&E to the dam.

No natural gas service is provided to Contra Loma.

#### 3.5.5 Telephone and Radio

Telephone service is provided by AT&T to the park office, police substation, and entry kiosk (via microwave connection to the office phone system). Public telephones are available at the park office/concession area.

Radio communication is used by public safety personnel and other staff, and communication problems have been noted (Rivoire, pers. comm. 2010).

# 3.6 Public Health and Safety

This section addresses existing conditions and management policies regarding public health and safety at Contra Loma. Specific topics addressed are fire protection, police service, boating and swimming safety, natural hazards, and general public safety. Safety issues related to wildland fires, dam failure, and hazardous materials are described in Section 3.16 (Hazards), and safety issues related to seismicity and other potential geologic hazards are described in Section 3.12 (Geologic and Soils Resources).

#### 3.6.1 Fire Protection

Since 1963, the EBRPD Fire Department has provided fire protection and emergency medical services to visitors of the East Bay regional parks under the authority of California Public Resources Code Section 5561.6. The fire department is responsible for providing fire protection in Contra Loma. Strategies include fire abatement and suppression, comprehensive fire prevention programs, fire investigation services, delivery of pre-hospital emergency medical care, and emergency medical transportation (East Bay Regional Park District 2011a). The department has local mutual aid agreements with Contra Costa and Alameda counties and the California Department of Forestry and Fire Protection (Cal Fire) and is a party to the Statewide Master Mutual Aid Program.

In general, EBRPD lands are predominately classified as State Responsibility Areas for fire protection. Contra Loma, like several other EBRPD parks, is located within a Local Responsibility Area, meaning that the Contra Costa County Fire Protection District (CCCFPD), which is the local fire protection district, has the legal responsibility to provide fire protection in the Regional Park. The EBRPD's role is to provide a strong secondary wildland fire response in support of the local fire protection district. EBRPD maintains a Type 4 engine (designed for wildland fires) at Contra Loma Station 8, located at the west end of Frederickson Lane in

Antioch. The station is usually unstaffed, but when nearby fires or extreme fire danger conditions occur, three firefighters are stationed there.

EBRPD provides fire suppression, prevention, emergency medical services, rescue, and initial hazardous materials response to incidents within the parks. From 2006 to 2008, EBRPD responded to the Regional Park for five fires and 51 emergency medical incidents. Compared with other EBRPD parks, this is a low rate of fire occurrence and a high rate of medical responses (Bondurant, pers. comm. 2011a). EBRPD's Wildfire Hazard Reduction and Resource Management Plan does not apply directly to Contra Loma, as this park was outside the study area of the plan. However, EBRPD uses the state-of-the-art fuels treatment methods (including grazing and mowing), mitigation measures, and BMPs outlined in the plan at Contra Loma (East Bay Regional Park District 1996). More information about wildfire protection and prevention is provided in Section 3.16 (Hazards).

Emergency response time standards vary by the level of urbanization of a service area, with faster target response times for urbanized areas (Burr Consulting 2009). National Fire Protection Association guidelines call for career fire departments to respond within 6 minutes 90 percent of the time. The response time guideline established by the California Emergency Medical Services Authority for emergency medical calls is 5 minutes in urban areas, 15 minutes in suburban or rural areas, and as quickly as possible in wilderness areas. EBRPD responds to all incidents as quickly as possible. In 2007, EBRPD's 90th percentile response time was 18 minutes and its median response time for all calls was 12 minutes. Although EBRPD met response time guidelines for suburban or rural areas in most instances, it did not meet the guidelines 90 percent of the time due to the remote locations of many incidents.

According to Contra Costa Local Agency Formation Commission, EBRPD fire stations have significant deficiencies, as many are merely unstaffed storage sheds for equipment (Burr Consulting 2009). Rather than undertaking major improvements to the old stations, EBRPD prefers to construct new stations and demolish the older stations. This is due in part because none of the existing fire stations have sleeping quarters, and EBRPD is often requested to perform overnight fire-watches by Cal Fire.

The CCCFPD provides fire suppression, paramedic emergency medical services, technical rescue, water rescue, and fire prevention and investigation services to much of the County (Contra Costa County Fire Protection District 2010). The CCCFPD operates 30 fire stations and responds to approximately 45,000 incidents annually. CCCFPD's service area includes the City, including Contra Loma. The nearest fire stations to Contra Loma are Station 83 at 2717 Gentrytown Drive, approximately 1.5 miles north of Contra Loma, and Station 82 on Bluerock Drive between Lonetree Way and Boulder Drive, approximately 1.25 miles east of Contra Loma (City of Antioch 2003b).

## 3.6.2 Police Service

EBRPD operates an independent Public Safety Division that patrols its entire regional park system, including Contra Loma. At the height of the summer season, the Public Safety Division is staffed by approximately 500 personnel, with 67 sworn police officers who derive their authority under California Penal Code Section 830.1. In addition, the division employs 195 seasonal lifeguards, 175 members in Volunteer Trail Safety Patrols, and 48 firefighters (see "Fire Protection" above). Specialized units include the Air Support Unit, Marine Patrol, Equestrian Patrols, K-9 Unit, Special Enforcement Unit, Investigations Unit, and a 24-hour 9-1-1 Communications Center.

Contra Loma is located in Beat 2 of the EBRPD Police Department (East Bay Regional Park District 2010a). A substation of the EBRPD Public Safety Division is located within the Regional Park in the former park residence (East Bay Regional Park District 2011b). EBRPD public safety officers regularly patrol EBRPD parklands. In addition, the park is patrolled by helicopter as part of EBRPD's routine park management program. Initial response and reporting of incidents is generally provided by park rangers performing routine maintenance and safety patrols, although members of the public sometimes report incidents directly to the Antioch police or the CCCFPD. The Volunteer Trail Safety Patrol supports the EBRPD staff. Patrol members educate park visitors about EBRPD resources, programs, facilities, and rules. They operate in an observe-and-report role, working to foster positive relationships among user groups. Volunteers also assist with other related services within the parks.

The Antioch Police Department provides crime prevention and law enforcement services within the City's boundaries, including backup services to Contra Loma (City of Antioch 2003a). Operating from a central station at 300 L Street, the Antioch Police Department maintains a combination of professional sworn officers, non-sworn positions, and volunteer positions. The City is divided into six geographical areas, or beats. Beat 3 encompasses the western and southwestern portions of the City, including Contra Loma (City of Antioch 2003b). Police calls are categorized by the City's Police Department under the following priorities:

- Priority 1 designates crimes in progress or life-threatening situations.
- Priority 2 designates calls that demand immediate attention, but are not crimes in progress or life threatening situations.
- Priority 3 designates those calls that do not require immediate response and can be dealt with as soon as is practical.

In 2000, response times in Beat 3 were 7:02 minutes for Priority 1 calls; 11:27 minutes for Priority 2 calls; and 27:30 minutes for Priority 3 calls (City of Antioch 2003b). As of July 2011, the police department reports that the Community Park has been the site of three grand thefts, but no automobile thefts or personal crimes (City of Antioch 2011a).

## 3.6.3 Boating and Swimming

Water-related recreation at the Contra Loma Reservoir is managed by EBRPD and is open yearround for anglers and boats up to 17 feet long. CCWD operates the reservoir for domestic water supply. CDPH prohibits body contact recreation in water supply reservoirs. To comply with this prohibition, in June 2002 EBRPD placed the following restrictions on activities permitted in the reservoir (Contra Costa Water District 2009):

• No body contact swimming is allowed in the main reservoir. Swimming may only be done in the swim lagoon.

- Kayaking (with a self-bailing bilge) and windsurfing are allowed only after an individual has showered at the installed outdoor shower. Wetsuits must be worn by windsurfers and float tubers.
- Recreational boating is only allowed for boats powered by electric motors, sails, or paddles and oars. No gasoline-powered engines are allowed.

The swim lagoon is separated from the reservoir by a concrete-lined earthen berm that has a built-in synthetic liner. The lagoon water is circulated through a drainage and pumping system, which includes an on-site treatment plant; and the water is chlorinated using sodium hypochlorite. Wastewater from the treatment plant is discharged to the sanitary sewer. The lagoon water does not mix with the water in the main body of the reservoir at any time.

For safety reasons, swimming is permitted in the swim lagoon only when a lifeguard is on duty. The lagoon is open daily during summer and on weekends during April, May, and September (East Bay Regional Park District 2008).

In 2009, there were 956 boaters recorded at Contra Loma Reservoir, and in 2010, there were 911. Many more people go to Contra Loma to swim than to use boats, with more than 57,000 swimmers recorded in 2010. Table 3-2 provides a summary of lifeguard activity at the swim lagoon from 2006 to 2010.

Activity	2006	2007	2008	2009	2010
Attendance	56,586	59,325	60,955	53,394	57,319
Rescues	11	15	7	11	14
Missing Person	21	6	11	6	6
First Aid (minor)	287	305	220	139	135
First aid (major)	1	10	2	7	3

Table 3-2. Lifeguard Activity at the Contra Loma Swim Lagoon (2006–2010)

Source: Bondurant, pers. comm. 2011b

## 3.6.4 Natural Hazards

Hiking trails can bring the public into contact with wildlife and natural pests, including snakes, ticks, and mosquitoes.

EBRPD has prepared a public information pamphlet on the various types of snakes that are present on its properties (East Bay Regional Park District 2005). The pamphlet emphasizes how to avoid snakes, their value to the ecosystem, and emergency procedures in case of snakebite.

#### 3.6.5 General Public Safety

Even though CCWD manages and operates Contra Loma Reservoir, Reclamation maintains ultimate jurisdiction over the reservoir as a water supply facility of the CVP. The 20-acre Reclamation Zone north of the dam is reserved for operation and maintenance of the facility. Access to this area is restricted to authorized personnel only.

The City Office of Emergency Services provides disaster preparedness information and training to City residents (City of Antioch 2011b). The City maintains a community emergency disaster warning system using television and radio to address the full range of potential emergencies, including earthquakes, severe winter storms, wildland fires, and hazardous materials events.

Contra Loma contains paved and unpaved hiking, bicycling, and equestrian trails. EBRPD strongly encourages all bicycle riders to wear helmets while using trails.

Dogs are allowed off leash in open spaces and undeveloped areas of the Regional Park; these areas must be at least 100 yards from developed areas or separated by fences. Dogs on leashes are allowed in parking lots, picnic sites, lawns, and other developed areas. However, dogs are not permitted at the swim lagoon or on the beach, in wetlands or marshes, or in designated nature study areas (East Bay Regional Park District 2011c).

# 3.7 Hydrology

Contra Loma Recreation Area generally drains to the north from the foothills of the Diablo Range toward the Sacramento-San Joaquin Delta (Delta). About 350 acres of the 741-acre recreation area drains to Contra Loma Reservoir and the remainder drains to the municipal reservoir east of Contra Loma, the Contra Costa Canal, or the City's storm drain system.

## 3.7.1 Contra Loma Reservoir

Contra Loma Dam is 107 feet high, and its crest is 30 feet wide and 1,050 feet long. Contra Loma Reservoir is classified as an off-stream reservoir, which means that its water is primarily supplied from a source other than direct surface runoff. The reservoir is impounded by Contra Loma Dam and by two dikes along its eastern shore (Contra Costa Water District 2009). The majority of the reservoir's water originates in the Delta and is made available under Contract No. 175r-3401A-LTR1 between Reclamation and CCWD. Water for the reservoir is diverted from the Delta at the Rock Slough and Old River intake sites, and is then conveyed by the Contra Costa Canal to Contra Loma where it is pumped uphill from the canal to the reservoir. The pumping plant is located near the toe of the dam and uses three pumps that can deliver a combined maximum of up to 21.16 cubic feet per second of water to the reservoir.

The reservoir also catches a small amount of surface runoff from the Oil Canyon watershed, which drains a portion of the Diablo Range to the southeast of Contra Loma. Runoff from Oil Canyon comingles with the water pumped from the Contra Costa Canal and is used by CCWD. Water that flows over the spillway during unusual storm events goes into the City's storm drain system and eventually drains to the Delta.

The reservoir's total watershed is about 680 acres; about 350 acres of which are within the Regional Park. Most of remaining acres are located in EBRPD's Black Diamond Mines Regional Preserve located adjacent to the southern boundary of Contra Loma (Figure 3-4). The portion of the reservoir's watershed that lies within the recreation area is roughly bound by the rolling hills to the west and south, and by the Regional Park's main entrance road. The Community Park does not drain to the reservoir and, therefore, is not located within its watershed.

Soils within the reservoir's watershed are made up primarily of clays, and its land cover is characterized by grass, brush, and some tree cover. These conditions indicate a good potential for surface runoff; however, the watershed's relatively small area limits the amount of precipitation that is captured.

In order to quantify the amount of surface runoff captured by the reservoir's contributing watershed, an approximate hydraulic model was developed using the Soil Conservation Service (SCS) method outlined in *Urban Hydrology for Small Watersheds* (States Department of Agriculture 1986) in conjunction with the Army Corps of Engineers' (Corps) Hydraulic Modeling Software (HEC-HMS). This method estimates surface runoff using a number of parameters, including watershed area, watershed length, slope, soil type(s), and rainfall.

The SCS method assigns an empirical parameter called the SCS Curve Number to each hydrologic soil group to help predict the surface runoff associated with the soil type. The soil type in this watershed consists mostly of the Altamont-Fontana complex underneath lightly grazed open pasture and grasslands, resulting in an average curve number of 71 (Department of Agriculture 1986).

In general, hydraulic modeling is used to predict the amount of surface runoff for 10-, 20-, 50-, and 100-year storm events so that downstream facilities can be designed to accommodate those flow regimes. Because the reservoir's watershed is relatively small and the only downstream facility is the reservoir, the hydraulic model was designed to estimate only the total monthly runoff based on average monthly precipitation for the City (Figure 3-5). The following worst-case scenario assumptions were built into the reservoir watershed model: the soil within the watershed is assumed to be saturated before the rainfall event and the average monthly rainfall is distributed on a continuous basis throughout the entire month. These assumptions tend to produce a higher estimate of the total runoff volumes, and actual runoff volumes may be lower depending on existing conditions.

The results from the HEC-HMS model are illustrated in Figure 3-6. As shown, the Contra Loma Reservoir receives nearly all of its surface runoff from November through March. The total yearly amount of runoff is only about 106.5 acre-feet, which is equal to about 4 percent of the reservoir's total storage capacity. The contributing watershed area within the recreation area boundary accounts for approximately 51 percent of the total watershed area. Because the soil types within the recreation area are generally similar to one another, it is reasonable to assume that about 51 percent of the total surface runoff round within the recreation area boundary. Based on this assumption, runoff from within the recreation area equals about 2 percent of the reservoir's total storage capacity.



North State Resources, Inc.

Contra Loma Reservoir RMP/EIS

Figure 3-4 Drainage

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# 3.7.2 Other Drainages

About 350 acres of the 741-acre recreation area drains to the Contra Loma Reservoir, and the remainder drains elsewhere. Approximately 95 acres in the southeast corner of the recreation area drain to an unnamed creek that parallels Frederickson Lane and which then flows into the municipal reservoir (Figure 3-4). Another 89 acres on the east side of the recreation area drain east overland toward the municipal reservoir. Approximately 160 acres in the northeast corner of the recreation area (including the Community Park) drain northward toward the Contra Costa Canal. Some of this water may be pumped into Contra Loma Reservoir, and the rest flows westward toward other CCWD facilities. Approximately 33 acres in the northwest portion of the recreation area drain to the northwest toward the adjacent neighborhood, where flows join the City's storm drain system. Approximately 14 acres drain west toward an unnamed creek that flows northward to the City's storm drain system.

## 3.7.3 Reservoir Operations

Contra Loma Reservoir has a maximum capacity of 2,627 acre-feet at a maximum stage height of 211 feet (i.e., the spillway elevation). The reservoir surface area is 115 acres at the spillway elevation (Contra Costa Water District 2009). Under typical operating conditions, reservoir storage ranges between approximately 690 and 2,000 acre-feet, depending on supply needs and hydrologic conditions (Contra Costa Water District 2009). From 2005 to 2009 the dam was operated at stage elevations between 190.80 feet and 205.70 feet (1,179 acre-feet and 2,152 acre-feet, respectively), with an average monthly stage elevation of 202.19 feet (1,887 acre-feet). As shown in Figure 3-7, stage elevations during that period varied widely during the rainy season (November to March) but typically remained at an elevation of around 204 feet during dry months (Contra Costa Water District, unpublished data).



Figure 3-7. Reservoir Elevation Changes (2005-2009)

Because Contra Loma Reservoir is not a principal water storage reservoir, the dam is not actively managed on a daily basis. Figure 3-7 is a graphical representation of the average yearly changes in reservoir level from 2005 through 2009. As shown in Figure 3-8, reservoir storage did not change on 46 percent of the days during this period. On days when storage was adjusted, the most common daily stage differential was about 0.1 feet. This increment equates to between 5 and 8 acre-feet of water exchange per day (depending on stage height), with 8 acre-feet being the statistical mode (Contra Costa Water District, unpublished data).

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Figure 3-8. Graphical representation of the numbers of days per year (as a percent) that Contra Loma Reservoir undergoes an operational change in storage.

The amount of water stored in the reservoir decreases more often than it increases, which indicates that the water is released from the reservoir more often than it is pumped in (Figure 3-8). However, Figures 3-9 and 3-10 show that reservoir releases occur at lower rates (typically at 8 acre-feet per day) when compared with storage additions (typically between 9 and 39 acre-feet per day) (Contra Costa Water District, unpublished data).

From 2005 through 2009, most operational activity occurred during the months of April and May, with reservoir storage decreasing in April by an average of 341.80 acre-feet and reservoir storage increasing in May by an average of 356.80 acre-feet. During this period, the range of the elevation change in the reservoir in April and May averaged 4.79 and 5.06 feet, respectively. For all other months, total monthly storage increases averaged 52.40 acre-feet while monthly decreases averaged 49.77 acre-feet (Contra Costa Water District, unpublished data).

# Percentage of Days per Year of Storage Decrease for Various Volume Ranges



Figure 3-9. Graphical representation of the numbers of days per year (as a percent) Contra Loma Dam decreases reservoir storage volume at various volume ranges.



Figure 3-10. Graphical representation of the number of days per year (as a percent) Contra Loma Dam increases reservoir storage volume at various volume ranges.

# 3.8 Water Quality

Water quality in Contra Loma Reservoir is heavily influenced by the primary source of its water: the Delta. Water for the reservoir is diverted from the Delta at the Rock Slough and Old River intake sites and is then conveyed by the Contra Costa Canal to Contra Loma, where it is pumped uphill from the canal to the reservoir. The canal also periodically conveys water returned from Contra Loma Reservoir and other CCWD system storage reservoirs during periods when those reservoirs are at full storage capacity.

## 3.8.1 Potential Sources of Contamination within the Reservoir Watershed

The watershed that drains into the reservoir is about 680 acres. About 350 acres of the reservoir's watershed are within the Regional Park, and most of the remaining area is located in EBRPD's Black Diamond Mines Regional Preserve, which is located adjacent to the southern boundary of Contra Loma. The Community Park does not drain to the reservoir and, therefore, does not contribute contaminants to the reservoir. Several land uses, activities, and natural sources within the reservoir's watershed have the potential to affect the quality of the reservoir water.

Recreational activity in the Regional Park has the potential to affect reservoir water quality, although EBRPD and CCWD manage recreation in a manner that protects water quality. As described previously, body contact with the reservoir is highly restricted to protect the reservoir's domestic water supply from human-borne pathogens and viruses. The swim lagoon is hydrologically separated from the reservoir, thereby ensuring that lagoon water does not enter the reservoir; however, overflow of the swim lagoon could temporarily compromise water quality within the reservoir if its treatment system fails, although the likelihood of failure and resulting contamination is remote.

To further minimize body contact with the reservoir, windsurfers must shower before entering the water and wear wet suits. Kayaks and canoes are allowed on the reservoir, but paddlers using self-bailing kayaks must shower before launching and wear wet suits while boating. No gasoline-powered engines are allowed on the reservoir to prevent contamination from petroleum products and exhaust byproducts. All boats are inspected by trained staff prior to launching in order to protect the reservoir against infestation by non-native quagga mussels (*Dreissena rostriformis bugensis*) and zebra mussels (*Dreissena polymorpha*), collectively referred to as dreissenids. No wet boats or gear are allowed on the reservoir.

Equestrian activities and dog walking have the potential to introduce animal waste into the reservoir through surface runoff; however, plastic waste bags are provided in various locations and dog owners are encouraged to dispose of dog waste in garbage cans. In addition, hiking, biking, and equestrian activities can cause small amounts of localized erosion, and the resulting sediment can be transported to the reservoir by surface runoff.

Cattle grazing is allowed on 454 acres of grasslands surrounding the reservoir in accordance with the grazing license issued by EBRPD for the purpose of fire suppression (Figure 1-2). Most of the grazing in the recreation area is within the reservoir's watershed. Grazing within the watershed also occurs in the Black Diamond Mines Regional Preserve, which is located upstream from Contra Loma. Cattle grazing can impair water quality not only through transport of feces from surface runoff, but also through the process of cattle-induced erosion and

subsequent transport of sediment. Within Contra Loma, grazing is rotated between multiple enclosures, and cattle are not allowed near the reservoir itself to protect water quality; however, one small ephemeral stream flows through the southern part of the grazed area into the reservoir. This ephemeral stream could transport fecal matter and sediment directly into the reservoir.

The restrooms and showers at the park office near the swim lagoon are connected to the City's sewer service. Chemical toilets are also located in various parts of the Regional Park to supplement the permanent facilities. All restroom facilities are inspected and maintained at regular intervals by EBRPD staff or contractors. Restrooms and portable toilets that are properly used and maintained represent a very limited potential source of biological contamination to the reservoir. However, improper use, plumbing system failure, or accidental spills or overflow of portable toilets could cause contamination.

The fish cleaning facility located adjacent to the boat launch area of the marina often contaminates the reservoir due to improper disposal of fish cleaning waste. EBRPD has proposed relocating the fish cleaning facility away from the reservoir to prevent this from occurring. Reclamation is currently preparing separate environmental documentation for this project.

Other potential sources of contamination include chemical and sediment runoff from roads and parking lots, animal waste from local and transient wildlife, litter, potential spills or runoff from portable chemical toilets, human waste deposited outside of a designated restroom, and natural erosion and sedimentation processes.

## 3.8.2 Water Quality Protection

Section 303 of the Federal Clean Water Act requires states to adopt water quality standards that designate uses of navigable waters and associated water quality standards. The California Water Code (Section 13240) requires preparation and adoption of water quality control plans (i.e., basin plans). Basin plans are implemented by each Regional Water Quality Control Board (RWQCB). Basin plans consist of a designation or establishment of beneficial uses to be protected for the waters within a specified area, water quality objectives to protect those uses, and an implementation program needed for achieving the objectives. Basin plans identify both numeric and narrative water quality objectives that apply to all surface waters in the basin. Delta waters and the Contra Loma Reservoir are covered in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins prepared by the Central Valley RWQCB (Central Valley Regional Water Quality Control Board 2009). This basin plan covers all of the Sacramento and San Joaquin River basins. Beneficial uses of the Contra Loma Reservoir include municipal and domestic drinking water supply, recreation, warm freshwater habitat, and wildlife habitat.

Drinking water quality is regulated at the Federal, state, and local levels. The Safe Drinking Water Act (SDWA) is the main Federal law that ensures the quality of drinking water in the U.S. The SDWA authorizes the Environmental Protection Agency (EPA) to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water. The EPA also oversees the states, localities, and water suppliers who implement these standards. States are given primary enforcement responsibility for public water systems in their state if they meet certain requirements.

In California, Title 22 of the California Code of Regulations (CCR) sets numeric primary and secondary drinking water standards to protect public health. California's standards meet or exceed the standards set forth in the Federal SDWA. The CDPH oversees water quality regulations for public water systems through its Drinking Water Program. In addition to Title 22 drinking water standards, Section 115825(b) of the California Health and Safety Code prohibits recreational body contact with reservoirs that store water for domestic use. Much of CCWD's water quality monitoring at the Contra Loma Reservoir is performed to ensure compliance with Title 22 provisions.

Title 22 provides primary drinking water standards, called maximum contaminant levels (MCLs), for 92 contaminants. Numerical MCLs are provided for 90 of these contaminants, and treatment techniques are provided for the two contaminants for which MCLs are not feasible. These primary contaminants include inorganic chemicals such as aluminum, antimony, and arsenic; radionuclides such as uranium and radium; volatile organic chemicals such as benzene and carbon tetrachloride; non-volatile synthetic organic chemicals such as chlordane; and disinfection byproducts such as bromate. Title 22 also includes secondary MCLs for 16 contaminants such as copper and iron as well as physical attributes such as color and odor.

The EPA developed the Long Term 2 Enhanced Surface Water Treatment Rule to provide additional protection for drinking water from disease-causing microorganisms sometimes found in surface water sources. These microorganisms include water-borne pathogens such as *Cryptosporidium* and *Giardia* that can cause diarrhea, vomiting, or stomach cramps as well as other health risks. *Cryptosporidium* is a significant concern in drinking water because it may contaminate surface waters used as drinking water sources, it is resistant to chlorine and other disinfectants, and it has caused waterborne disease outbreaks in other public water systems. Consuming water with *Cryptosporidium* can cause gastrointestinal illness that may be severe in people with weakened immune systems such as infants and the elderly and may be fatal in people with severely compromised immune systems such as cancer and Acquired Immune Deficiency Syndrome patients. Other pathogens of concern regulated by EPA and CDPH include *Escherichia coli* (E. coli) and other coliform bacteria.

Dreissenids represent another type of hazard to public drinking water systems. Once established, these non-native mussels can clog water intake and delivery pipes and other infrastructure, requiring costly maintenance and repairs to drinking water systems. These mussels also adhere to boats and pilings, foul recreational beaches, compete with native mussels, disrupt natural food webs, and bioaccumulate toxins. Quagga and zebra mussels were first detected in the Great Lakes in the late 1980s and have since spread unchecked throughout much of the eastern U.S. In January 2007, the first population of dreissenid mussels in the western U.S. was discovered in Lake Mead, and they have recently been found in several California reservoirs.

The Contra Loma Reservoir supports populations of Asiatic clam (*Corbicula fluminea*), a freshwater species native to Asia. Asiatic clams live in many reservoirs, lakes, rivers, and canals in California, including the Delta. The clam is also found throughout much of the U.S. (Geological Survey 2011). These clams burrow in reservoir sediments. Certain short-term water quality conditions can occasionally cause large clam die-offs, causing the clam shells to release the dead clam bodies, which float to the surface. These die-offs can affect water quality and create unpleasant odors (Contra Costa Water District 2010a). Asiatic clams have been known to

clog water intake and delivery pipes and other infrastructure in reservoirs, thereby increasing operating costs (Geological Survey 2011).

# 3.8.3 Water Quality Monitoring Programs

CCWD has instituted several water quality monitoring programs in support of regulatory compliance and for operations and maintenance of its water system infrastructure (Contra Costa Water District 2010b). CCWD monitors water quality in the reservoir for Title 22 primary and secondary drinking water standards and to meet the requirements of Compliance Order No. 02-04-97CO-007 (as amended) pertaining to microbiological (e.g., *Cryptosporidium, E. coli, Giardia*) water quality in the reservoir after completion of the swim lagoon. This order was issued to CCWD by the DOHS (predecessor to CDPH).

Physical analysis and water quality testing for inorganic pollutants and synthetic and volatile organic chemicals occurs annually in October. Testing for asbestos is performed every 9 years, with the next sampling event scheduled for 2017. Radiochemistry testing is performed every 3 years, usually during the first week of January. Microbiology testing is performed monthly. CCWD also tests the reservoir water for physical parameters such as temperature, pH, and dissolved oxygen; phytoplankton; quagga and zebra mussels; non-native aquatic plant species; and stratification.

CCWD's water quality testing indicates that chemical and biological contamination of the reservoir rarely occurs. Between 2006 and 2010, CCWD sampled and tested for 194 different water quality analytes, including microbes. Only two of the non-microbial analytes had at least one sample that was equal to or exceeded its MCL (Contra Costa Water District 2010c). These analytes are color and iron, and both are derived from natural sources within the reservoir watershed as shown in Table 3-3.

Analyte (source)	Reporting Unit	MCL Level	Maximum	Minimum	Median	Total Samples	Samples ≥MCL (as %)
Secondary Standards							
Color (naturally occurring organic materials)	Color Unit	15	20	15	20	5	5 (100%)
Iron (natural deposits)	µg/L	300	1100	100	205	58	17 (29%)

Table 3-3. Analytes in Contra Loma Reservoir with at Least One Sampling Result Equalto or Greater Than the Designated MCL (2006–2010)

Source: Contra Costa Water District 2010c

Notes: µg = microgram, L = liter

Every month, CCWD tests for biological pathogens by sampling reservoir water in two locations: near the dam and near the swim lagoon in the vicinity of the former swimming beach. This testing helps monitor the effectiveness of the swim lagoon at controlling human introduction of microbial pathogens into the reservoir. CCWD tests for *E. coli*, fecal coliform bacteria, nonsheen bacteria, and total coliform at the former beach. *E. coli* is an indicator of possible fecal contamination. Fecal coliform are specific to warm-blooded animals, and serve as indicators of human waste contamination. Total coliform includes bacteria found not only in

mammal waste, but also in soils. CCWD tests for these pathogens as well as *Cryptosporidium* and *Giardia* at the dam.

CCWD testing data show that pathogens in the reservoir are generally well below standards most of the time. However, total coliform levels have often exceeded standards and *E. coli* and fecal coliform have occasionally exceeded standards (Contra Costa Water District 2010c). As shown in Table 3-4, *E. coli* and fecal coliform exceeded standards in at least one sample each from both the dam and the former beach sites; however, median count values for *E. coli* and fecal coliform remained low, indicating that microbial levels for these pathogens remain low most of the time. It is also important to note that the median and maximum levels for these pathogens at the dam were equal to or higher than those at the former beach, suggesting that Delta water, which enters the reservoir at the dam, is the primary source of these pathogens.

Analyte	Reporting Location	Reporting Unit	Standard	Median	Maximum	Total Samples	Samples ≥Standard (as %)
Giardia lamblia	Dam	cysts/L	1	<0.1	<0.1	60	0 (0%)
Cryptosporidium	Dam	oocysts/L	1	<0.1	<0.1	60	0 (0%)
Total coliform	Dam		1000	785	39,000	90	53 (59%)
Total coliform	Former beach	cfu/100 ml		505	33,000	60	23 (38%)
E. coli	Dam		200	6.5	920	70	2 (3%)
E. coli	Former beach	cfu/100 ml		3	920	40	5 (12%)
Fecal coliform	Dam	200	200	7.5	270	24	1 (4%)
Fecal coliform	Former beach	cfu/100ml (5 samples for 30 day period)		5.5	220	24	1 (4%)

Table 3-4. Microbiological Water Quality Results for Contra Loma Reservoir (2006-2010)

Source: Source: Contra Costa Water District 2010c

Notes: cfu = colony forming units, ml = milliliter, L = liter

Approximately 38 percent of the samples collected at the former beach and 59 percent of the samples collected at the dam contained total coliform levels above the standard. Importantly, the median and maximum levels for total coliform were higher at the dam than the former beach, again suggesting that Delta water is the primary source of these bacteria. Although total coliform levels are not a direct indicator of microbial contamination, increased counts may indicate fecal sources of contamination. *Giardia* and *Cryptosporidium* counts were well below standards at the dam and do not appear to cause water quality problems for the reservoir.

CCWD monitoring has not identified any adult quagga or zebra mussels or veligers (the freefloating larval form of dreissenids) in Contra Loma reservoir (Contra Costa Water District 2010c).

# 3.9 Vegetation

Contra Loma Recreation Area is designated by the EBRPD as an open space area with developed recreation occurring in limited areas. As a result, vegetation at Contra Loma has been retained in or restored to its natural state to the extent feasible for an area that has been cultivated, grazed, or inhabited by Euro-Americans since the mid-1800s.

# 3.9.1 Vegetation Communities Assessment

The vegetation communities described in this section are classified based on the habitat descriptions provided in *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer Jr. 1988), which is a component of the California Wildlife Habitat Relationship (CWHR) System (California Department of Fish and Game 2011) used by CDFW. The CWHR habitat types present within Contra Loma include annual grassland, blue oak woodland, valley foothill riparian, fresh emergent wetland, riverine, lacustrine, urban, and barren. Field reconnaissance surveys of the study area were conducted by Reclamation's consultant North State Resources, Inc. (NSR) on October 20 and 22, 2010 by walking meandering transects that covered all habitats. Observations were made at each distinct habitat unit and the dominant plant species were recorded. Any areas that appeared suitable for special-status species were noted. Potentially significant features were also documented with photographs (Appendix F.1). On March 30, 2011, NSR conducted a focused botanical survey for stinkbells (*Fritillaria agrestis*), a plant classified by the California Native Plant Society (CNPS) as California Rare Plant Rank (RPR) 4.2, uncommon in California. The locations of stinkbells occurrences were mapped using a Trimble Pathfinder Pro XH GPS capable of sub-foot accuracy.

The descriptions and locations of aquatic, wetland, and riparian habitats are based on the reconnaissance-level surveys performed in October 2010, which did not include a formal delineation of these features or a determination of their Corps jurisdictional status. The habitat assessment is intended to provide a general description of the types of wetland and aquatic features at Contra Loma, including intermittent streams, seasonal wetlands, fresh emergent wetlands, riparian habitat, and open water. The jurisdictional boundaries and wetland classifications of the aquatic features at Contra Loma are subject to refinement if or when a formal delineation is performed.

Each of the habitats at Contra Loma is described below; Figure 3-11 illustrates the location and areal extent of these habitats and Table 3-5 provides acreages and percentages for all habitats at Contra Loma.

# 3.9.2 Upland Habitats

There are five upland habitats present at Contra Loma: annual grassland, valley foothill riparian, blue oak woodland, urban, and barren.

**Annual Grassland** Annual grassland is the dominant habitat at Contra Loma, covering 73 percent of the study area. The annual grassland at Contra Loma has historically been grazed and is composed primarily of non-native grasses and forbs. Dominant grasses and forbs include smooth brome (*Bromus hordeaceus*), slender wild oats (*Avena barbata*), Italian rye grass (*Lolium multiflorum*), yellow star thistle (*Centaurea solstitialis*), white-stem filaree (*Erodium moschatum*), and mouse-ear chickweed (*Cerastium glomeratum*).

	Acreage in Study Area	Percentage of Study Area				
Habitat	(acres)	(percent)				
Upland						
Annual grassland	541	73.0				
Valley foothill riparian	8	1.1				
Urban	48	6.5				
Barren	37	5.0				
Upland Total	634	85.6				
Blue Oak Woodland	13	1.8				
Wetland and Aquatic						
Riverine	4	0.5				
Fresh emergent wetland	8	1.1				
Lacustrine	68	9.2				
Wetland and Aquatic Total	80	10.9				
Restoration Area	14	1.9				
TOTAL – ALL HABITATS	741	100				

# Table 3-5. Habitat Composition at Contra Loma Reservoir and Recreation Area

Five very large valley oak trees (*Quercus lobata*) are present within the annual grassland habitat near the northeast corner of Contra Loma. These trees are very old (estimated between 50 and 150 years of age) and are important for their habitat value and acorn production. They may also be historically, culturally, and visually important to the community. The locations of these trees are shown in Figure 3-11.

**Valley Foothill Riparian** The valley foothill riparian habitat covers a little more than 1 percent of Contra Loma, and is primarily present along the intermittent stream corridors downslope from the Contra Loma and Antioch Municipal reservoirs near the northern boundary of the recreation area. Narrow fringes of valley foothill riparian habitat also occur along portions of the Contra Loma Reservoir shoreline. These areas are prone to periodic saturation or inundation from precipitation, high reservoir levels, irrigation runoff from the sports fields and landscaped areas, or possibly from seepage from Antioch Municipal Reservoir.

The valley foothill riparian habitat is composed mostly of large valley oaks, cottonwoods (*Populus fremontii*), and red willows (*Salix laevigata*), with an understory of Himalayan blackberry (*Rubus discolor*), poison oak (*Toxicodendron diversilobum*), and mulefat (*Baccharis salicifolia*). The narrow band of riparian habitat along the Contra Loma Reservoir is primarily composed of willows (*Salix* spp.) and mulefat.

**Blue Oak Woodland** Blue oak (*Quercus douglasii*) woodland occurs on the north-facing slope of a hillside in the southwest corner of Contra Loma (Figure 3-11). Blue oak is the dominant tree species in this scattered woodland. Interior live oak (*Q. wislizenii*) is a minor component of this habitat, and the understory is an extension of the surrounding annual grassland. The blue oak woodland within Contra Loma, which covers approximately 1.8 percent of the study area, is

contiguous with blue oak woodland that is scattered along the hillslopes to the west and south towards Mount Diablo.

**Urban** About 6.5 percent of the recreation area is classified as urban. Vegetation communities found in urban settings vary widely and are typically characterized by areas where the native vegetation has been mostly or entirely cleared for residential, commercial, industrial, transportation, or recreational uses. Urban vegetation communities are usually composed of irrigated lawns, ornamental plantings, and trees that have been retained from the original habitat, or planted for landscaping or shade.

The CWHR categorizes urban habitat into five different vegetation structure types: tree grove, street strip, shade tree/lawn, lawn, and shrub cover. Tree groves are often located in urban parks, green belts, and cemeteries. Urban tree groves may vary in tree height, spacing, crown shape, and understory conditions, but generally have a continuous canopy. Street strip vegetation is located along roadsides and typically includes a ground cover of grass. Shade tree/lawn areas are characteristic residential and recreational landscapes and often mimic the appearance of natural savannas. Lawns are composed of a variety of grasses that are continuous and are maintained at a uniform height, irrigated, and fertilized. Shrub cover refers to areas that are commonly landscaped and maintained with hedges, as typically found in commercial districts.

The five types of urban vegetation structure often occur in various combinations, creating habitat complexity, which can be more valuable to wildlife than any one individual unit (California Department of Fish and Game 2011).

At Contra Loma, the urban habitat includes four of the five vegetation structure types: tree grove, street strip, shade tree/lawn, and lawn. All of these vegetation structure types are shown collectively as urban habitat in Figure 3-11. The urban habitat is most prevalent in the picnic areas and sports fields. Native trees that occur within the urban area at Contra Loma include Oregon ash (*Fraxinus latifolia*), black walnut (*Juglans californica* var. *hindsii*), Fremont cottonwood, blue oak, valley oak, and interior live oak. Non-native landscaping trees include fig (*Ficus* sp.) and eucalyptus (*Eucalyptus* sp.) associated with a historic residence.

**Barren** Barren habitat is defined by a relative absence of vegetation. Any vegetation community with less than 2 percent total herbaceous vegetation cover and less than 10 percent cover by tree or shrub species is considered barren. Contra Loma is approximately 5 percent barren. Barren area can include both urban and ruderal (i.e., disturbed or weedy) settings where the vegetation is sparse, as defined by the percent cover criteria. Two types of barren areas are defined within Contra Loma (Figure 3-11): gravel/compacted dirt, such as that found in gravel and dirt roads and parking areas, and hardscape, such as that found in paved roads and paved parking areas.


North State Resources, Inc.

Contra Loma Reservoir RMP/EIS

Figure 3-11 Habitat Map

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### 3.9.3 Wetland and Aquatic Communities

Three wetland and aquatic habitats occur within Contra Loma: riverine, fresh emergent wetland, and lacustrine. These communities cover approximately 11 percent of the study area, and the location and areal extent of these habitats is shown in Figure 3-11.

**Riverine** The riverine habitat is typically associated with a linear body of water flowing in a channel with a defined bed and bank. These linear water bodies can flow perennially, intermittently, or ephemerally, depending on water input.

- Perennial streams have flowing water year-round during a typical year, and the water table is located above the streambed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water.
- Intermittent streams have flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water.
- Ephemeral streams depend on precipitation, so they typically only flow during and after rain or other precipitation. Ephemeral streambeds are located above the water table year-round. Groundwater is not an important source of water for ephemeral streams.

Riverine habitat commonly includes hydrophytic (water-loving) vegetation, which can either grow from the stream bottom or along the banks. This vegetation can be sparse when water volume and movement are substantial or can be dense in slower moving waterways where plants can root themselves easily.

A small amount (0.5 percent) of the riverine community within Contra Loma consists of intermittent streams. Portions of these streams have sufficient water flow and scour to discourage the colonization of hydrophytic plants. Flatter stream sections have slow-moving water, which allows water to collect and saturate the soil while promoting the growth of seasonal wetland plants in and along the margins of these drainages. While still classified as a riverine habitat, these areas also exhibit characteristics of seasonal wetland habitat. Both the steeper and the flatter portions of these streams are mapped as riverine in Figure 3-11, with the areas that are more channelized and lacking vegetation sub-classified as intermittent streams and the areas where seasonal ponding occurs sub-classified as seasonal wetlands. Common wetland plants in the riverine habitat include ryegrass (*Lolium* spp.), curly dock (*Rumex crispus*), hyssop loosestrife (*Lythrum hyssopifolium*), Baltic rush (*Juncus balticus*), flowering quillwort (*Lilaea scilloides*), cattails (*Typha* spp.), dallisgrass (*Paspalum dilatatum*), nutsedge (*Cyperus eragrostis*), and cocklebur (*Xanthium* spp.).

**Fresh Emergent Wetland** The fresh emergent wetland habitat is typically associated with a year-round water source. This habitat is typically dominated by plant species that are erect, rooted, herbaceous, and hydrophytic, and that are adapted to conditions of prolonged inundation. Common plant species present in this vegetative community include perennial wetland species such as cattails and tules (*Scirpus* spp.). In some cases, fresh emergent wetlands can occur in areas with less frequent inundation where they can often support a wider variety of water-tolerant plants. Within Contra Loma, dense fresh emergent wetland vegetation is located along several

sections of the reservoir's southern shoreline. These areas support abundant cattails and tules, as well as several willow species. In the northeast corner of Contra Loma, there is an area that is frequently saturated and that supports fresh emergent wetland vegetation. This wetland is similar in composition to those found around the reservoir shoreline and is composed primarily of cattails, rushes (*Juncus* spp.), tules, and poison hemlock (*Conium maculatum*). Approximately 8 acres of fresh emergent wetland are found in the Contra Loma Recreation Area.

**Lacustrine.** The lacustrine habitat is characterized by open water that is too deep for emergent vegetation to become established. In Contra Loma, the plant-free portion of the reservoir is lacustrine habitat, and covers approximately 9.2 percent of the area. Eurasian watermilfoil (*Myriophyllum spicatum*) is a non-native aquatic plant which grows along some portions of the reservoir shoreline. Mats of watermilfoil can inhibit recreational use by entangling boat propellers and fishing lines.

**Restoration Area.** Several vegetation restoration areas are treated as inclusions within the annual grassland habitat (Figure 3-11). These areas are locations where EBRPD has endeavored to cultivate native plants and/or create quail habitat. Native trees and shrubs have been planted just south of the gravel/dirt parking areas on the south side of the reservoir. EBRPD has also placed brush piles adjacent to portions of the restoration area to provide shade and cover for quails. Another plant restoration area has been designated along the intermittent stream located near the southwest corner of the reservoir. At this location, the stream has been fenced off with wire mesh to protect the young plants from damage caused by herbivores such as cows and deer. Typical restoration plantings include young saplings of ash (*Fraxinus* sp.), willow, and oaks. The restoration plantings are treated as inclusions in the annual grassland habitat since they are not yet well established and provide minimal cover.

## 3.9.4 Special-Status Plant Species

This section discusses special-status plant species that occur in the region and describes the potential for these plants to occur within Contra Loma. For the purpose of this evaluation, special-status plant species include plants that are (1) listed as threatened or endangered under the California Endangered Species Act or the Federal Endangered Species Act; (2) designated as rare by CDFW; (3) state or Federal candidate or proposed species for listing as threatened or endangered; (4) listed by the CNPS as having a California RPR of 1A, 1B, 2A, 2B, or 3; or other special status conveyed by CNPS.

A list of special-status plant species considered in this assessment was compiled by obtaining an official species list from the U.S. Fish and Wildlife Service (USFWS) Sacramento Office for the *Antioch South, California* U.S. Geological Survey (USGS) quadrangle (Fish and Wildlife Service 2013) (Appendix F.2); performing queries for records contained within the California Natural Diversity Database (CNDDB) for the *Antioch South, California* USGS quadrangle (California Department of Fish and Wildlife 2013a) (Appendix F.3.1) and the CNPS on-line inventory for the *Antioch South, California* USGS quadrangle and eight surrounding quadrangles (California Native Plant Society 2013) (Appendix F.4); by reviewing botanical literature for the region; and by reviewing existing programmatic documents relating to the use and operation of Contra Loma. These efforts identified 59 special-status plant species known to occur in the vicinity of Contra Loma. These plant species were then reviewed to determine the potential for each species to occur within Contra Loma based on the presence or absence of suitable habitat.

EBRPD botanist Wilde Legard was also consulted as part of the review process as he has surveyed and monitored the habitats at Contra Loma for over 13 years (Legard, pers. comm. 2011).

No Federally listed or state-listed plants were determined to have the potential to occur within Contra Loma (Appendix F.5); however, the following five special-status plants were determined to have a low potential to occur within Contra Loma:

- big tarplant (*Blepharizonia plumosa*) (RPR 1B.1);
- round-leaved filaree (*California macrophylla*) (RPR 1B.1);
- Mt. Diablo fairy lantern (Calochortus pulchellus) (RPR 1B.2);
- Diablo helianthella (Helianthella castanea) (RPR 1B.2); and
- San Antonio Hills monardella (Monardella antonina ssp. antonina) (RPR 3).

Contra Loma is surrounded by a heavily urbanized community, and professional and lay botanists visit the park regularly. The East Bay Chapter of CNPS has maintained a database of regionally occurring rare plants in Alameda and Contra Costa counties since the 1980s (Lake 2010). The five plant species listed above have been reported during the last 20 years within a few miles of Contra Loma at sites containing habitats that are generally similar to those found within Contra Loma (California Department of Fish and Game 2011); however, the potential for these plants to occur within Contra Loma is considered low because none of these plants have ever been documented as occurring at Contra Loma (California Department of Fish and Game 2011; Legard, pers. comm. 2011). The general habitat requirements of these five plants are listed in Appendix F.5, and these plants are not discussed further in this document.

Only one special-status plant, stinkbells, is known to occur at Contra Loma, and this species has been monitored by EBRPD since 1998 (Legard, pers. comm. 2011). Stinkbells is designated as RPR 4.2 and is ranked as fairly threatened in California (California Native Plant Society 2013). Although a RPR of 4.2 would not typically result in a plant designation of "special status," the East Bay CNPS has designated stinkbells as an A-ranked rare and unusual plant in Alameda and Contra Costa counties (Lake 2010), hence it is considered a "special status" plant in the RMP/EIS.

Stinkbells is a perennial wildflower that is endemic to California. It grows primarily in grasslands on areas of clay soil. The inflorescence is borne on an erect stem less than 2 feet tall and has several nodding flowers. Stinkbells flower between March and June and have an unpleasant odor. Known threats to this species include development and grazing. On the March 30, 2011 reconnaissance survey, 19 individual stinkbells were observed within three distinct clumps. All are within the area of the mapped populations that have been monitored by EBRPD since 1998 (Figure 3-11). The reported stinkbells population at Contra Loma has averaged about 200 individuals; the apparent decline in 2011 may be caused by more grazing than occurred in 2010 (Legard, pers. comm. 2011).

### 3.9.5 Invasive Plant Species

Invasive plant species can threaten or disrupt native species and vegetation communities by altering nutrient cycles, increasing fire hazard (including intensity and severity), and altering hydrologic cycles; creating changes in sediment deposition and erosion; dominating habitats and displacing native species; hybridizing with native species; and promoting non-native animal species (Bossard et al. 2000). Invasive plants, once introduced into an area, spread without assistance and can alter the native vegetation community or habitat they have invaded.

For the purposes of this evaluation, invasive plant species are defined as vascular plant species that are (1) rated as an A, B, C, or Q species by the California Department of Food and Agriculture (CDFA) (California Department of Food and Agriculture 2007); and/or (2) rated as a High, Moderate, or Limited for invasive properties by the California Invasive Plant Council (Cal-IPC), which maintains a list of invasive plants that threaten California's wildlands (California Invasive Plant Council 2006). Plants rated by the CDFA as A, B, or C are pests of known economic or environmental detriment. Plants rated as A are either not known to be established in California or are present in a limited distribution that allows for the possibility of eradication or successful containment. Plants rated as B, if present in California, are of limited distribution. Plants rated as C, if present in California, are usually widespread. Plants rated as Q are suspected to be of economic or environmental detriment, but their status is uncertain because of incomplete identification or inadequate information.

Reconnaissance surveys conducted in 2010 and 2011 identified 23 invasive and/or noxious nonnative plant species occurring at Contra Loma. None of these plants are listed as noxious weeds in accordance with Section 2814 of the Federal Noxious Weed Act of 1974; however, they are rated as noxious or invasive by either the CDFA or Cal-IPC. The native status of all plants observed at Contra Loma, including CDFA and Cal-IPC noxious weed ratings where appropriate, included in Appendix F.6. Noxious weed species that were observed or that are known to occur at Contra Loma during surveys in 2010 and 2011 are listed in Table 3-6.

Common Name (Scientific Name)	Cal-IPC1	CDFA2	Observed3	Known to Occur4
slender wild-oat (Avena barbata)	Moderate	n/a	х	Х
wild oat (Avena fatua)	Moderate	n/a	—	х
black mustard (Brassica nigra)	Moderate	n/a	Х	Х
ripgut brome (Bromus diandrus)	Moderate	n/a	Х	_
soft brome (Bromus hordeaceus)	Limited	n/a	—	х
red brome (Bromus madritensis ssp. rubens)	High	n/a	х	
Italian plumeless thistle (Carduus pycnocephalus)	Moderate	С	—	х
yellow star-thistle (Centaurea solstitialis)	High	С	х	х
bull thistle (Cirsium vulgare)	Moderate	n/a	х	Х
poison hemlock (Conium maculatum)	Moderate	n/a	х	
Bermuda grass (Cynodon dactylon)	Moderate	n/a	—	Х
tall fescue (Festuca arundinacea)	Moderate	n/a	—	Х
barley (Hordeum murinum)	Moderate	n/a	_	Х

Table 3-6. Noxious Weed Species Observed or Known to Occur at Contra Loma

Common Name (Scientific Name)	Cal-IPC1	CDFA2	Observed3	Known to Occur4
Italian ryegrass (Lolium multiflorum)	Moderate	n/a	х	Х
hyssop loosestrife (Lythrum hyssopifolium)	Limited	n/a	х	—
alkali mallow ( <i>Malvella leprosa</i> )	N/A	С	—	Х
California burclover (Medicago polymorpha)	Limited	n/a	—	Х
Eurasian milfoil (Myriophyllum spicatum)	High	n/a	х	—
bristly ox-tongue (Picris echioides)	Limited	n/a	—	Х
radish ( <i>Raphanus sativus</i> )	Limited	n/a	—	Х
Himalayan blackberry (Rubus discolor)	High	n/a	х	—
milk thistle (Silybum marianum)	Limited	n/a	х	Х
puncture vine (Tribulus terrestris)	N/A	С	—	Х

### Table 3-6. Noxious Weed Species Observed or Known to Occur at Contra Loma

Sources: <sup>1</sup> California Invasive Plant Inventory (Cal-IPC 2006)

<sup>2</sup> Encycloweedia (California Department of Food and Agriculture 2007)

<sup>3</sup> Observed by NSR biologist in 2010 or 2011

<sup>4</sup> Wild Plants of Contra Loma Regional Park (East Bay Regional Park District 2003)

Notes: Plants rated as C, if present in California, are usually widespread.

# 3.10 Wildlife

Contra Loma is designated by the EBRPD as an open space habitat area (East Bay Regional Park District 1996) with some focused areas designated for developed recreation. As a result, past management of Contra Loma has been focused on protection of native vegetation communities and the wildlife species that use them, as well as on active and passive recreation.

### 3.10.1 Habitat Assessment

As discussed in Section 3.9 (Vegetation), vegetation community types and wildlife habitats described in this section are classified based on the descriptions provided in *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer Jr. 1988), which is a component of the CWHR System (California Department of Fish and Game 2011) used by CDFW.

The criteria used for the CWHR query included vegetation community type and geographic area. All vegetation community stages were included, and no community elements were excluded. The query results provide a general index of predicted wildlife species occurrences within the vegetation communities that are present in Contra Loma, which are discussed in detail below. Table 3-5 in Section 3.9 identifies the various vegetation community types and subtypes present at Contra Loma. There is significant overlap in the species expected to occur in some of these vegetation communities because of their close proximity to each other. For this reason, the precise acreage and percentage of area classified in each vegetation community type is less meaningful for the evaluation of wildlife species that may occur in the area.

Field reconnaissance surveys of the study area were conducted by NSR on October 20 and 22, 2010. The entire area was walked, and field maps were used to gain bearings and aid in classifying habitat types. Observations were made at each distinct habitat unit, and animal

species present were recorded. A list of animal species observed within the study area is attached as Appendix F.7. Any habitats able to support special-status species were noted on field maps and documented with photographs. Any wildlife observed was photographed (when possible) to document resident species.

## **Upland Vegetation Communities**

Five upland vegetation communities are present at Contra Loma: annual grassland, valley foothill riparian, blue oak woodland, urban, and barren. Wildlife species found within each of these vegetation communities is described below. Figure 3-11 illustrates the location and areal extent of the corresponding vegetation community types within Contra Loma.

**Annual Grassland.** Characteristic wildlife species found in annual grasslands include reptiles such as western fence lizard (Sceloporus occidentalis), common garter snake (Thamnophis sirtalis), and western rattlesnake (Crotalis viridis); mammals such as black-tailed jackrabbit (Lepus californicus), California ground squirrel (Spermophilus beechevi), Botta's pocket gopher (Thomomys bottae), western harvest mouse (Reithrodontomys megalotis), California vole (Microtus californicus), American badger (Taxidea taxus), mule deer (Odocoileus hemionus), and covote (*Canis latrans*); and birds such as burrowing owl (*Athene cunicularia*), horned lark (Eremophila alpestris), and western meadowlark (Sturnella neglecta). Annual grassland also provides important foraging habitat for turkey vulture (*Cathartes aura*), northern harrier (*Circus* cyaneus), American kestrel (Falco sparverius), white-tailed kite (Elanus leucurus), and redtailed hawk (Buteo jamaicensis). Wildlife species observed in the annual grassland at Contra Loma during the reconnaissance-level surveys included numerous coyotes and ground squirrels as well as several avian species including turkey vulture, red-tailed hawk, American kestrel, Brewer's blackbird (Euphagus cvanocephalus), and mourning dove (Zenaida macroura). Approximately 30 cattle were observed in the southwest quadrant of the study area during the surveys.

**Valley Foothill Riparian.** Valley foothill riparian vegetation communities provide habitat for a wide diversity of wildlife. The presence of water associated with this upland vegetative community attracts numerous mammals, birds, amphibians, and reptiles. Common mammals found in this cover type include mule deer, raccoon (*Procyon lotor*), coyote, striped skunk (*Mephitis mephitis*), deer mouse (*Peromyscus maniculatus*), harvest mouse, and dusky-footed woodrat (*Neotoma fuscipes*). Numerous birds are also typically found in this cover type, including yellow warbler (*Dendroica petechia*), northern flicker (*Colaptes auratus*), white-tailed kite, Cooper's hawk (*Accipiter cooperii*), red-shouldered hawk (*Buteo lineatus*), song sparrow (*Melospiza melodia*), and black-headed grosbeak (*Pheucticus melanocephalus*). Some amphibians and reptiles found in riparian areas include red-legged frog (*Rana draytonii*), Pacific tree frog (*Pseudacris regilla*), sharp-tailed snake (*Contia tenuis*), California alligator lizard (*Elgaria multicarinata multicarinata*), and common garter snake. Wildlife species observed in the riparian vegetation community at Contra Loma during the reconnaissance-level surveys included northern flicker, red-shouldered hawk, song sparrow, black phoebe (*Sayornis nigricans*), and European starling (*Sturnus vulgaris*).

**Blue Oak Woodland.** Blue oak woodlands produce acorns which are eaten by a variety of species, including acorn woodpeckers (*Melanerpes formicivorus*), western scrub-jays (*Aphelocoma californica*) and mule deer. Snags and trees containing cavities occur here,

providing nesting habitat for birds such as the western bluebird (*Sialia mexicana*), tree swallow (*Tachycineta bicolor*), and northern flicker, as well as potential roost sites for bats. Raptors, including the red-tailed hawk, American kestrel, and great horned owl (*Bubo virginianus*), may also nest in these woodlands. Coyote and gray fox (*Urocyon cinereoargenteus*) may forage here, and wildlife species dominant in annual grassland habitat (see above) flourish beneath the oak canopy. Wildlife species observed in the blue oak woodland vegetation community at Contra Loma during the reconnaissance-level survey included mule deer, western scrub-jay, northern flicker, red-tailed hawk, and western fence lizard.

**Urban.** Urban land cover, which at Contra Loma consists largely of landscaped areas surrounding the developed park facilities, can provide habitat for several mammal, reptile, and amphibian species and can provide nest, cover, and forage areas for several bird species. Common bird species in urban areas are the house finch (Carpodacus mexicanus), northern flicker, rock dove (Columba livia), American crow (Corvus brachyrhynchos), dark-eyed junco (Junco hyemalis), Brewer's blackbird, house sparrow (Passer domesticus), bushtit (Psaltriparus minimus), European starling, mourning dove, western scrub-jay, and mockingbird (Mimus polvglottos). Common mammals using urban habitat include raccoon, opossum (Didelphis virginiana), striped skunk, black-tailed jackrabbit, ground squirrel, and cottontail rabbit (Sylvilagus audubonii). Some amphibians and reptiles expected in urban areas would be the California slender salamander (Batrachoseps attenuates), Pacific tree frog, alligator lizard, gopher snake (*Pituophis catenifer*), and western fence lizard. Wildlife species observed in the urban areas at Contra Loma during the reconnaissance-level survey included numerous ground squirrels and domesticated waterfowl (ducks and geese), cottontail rabbit and black-tailed jackrabbit, as well as several avian species including western scrub-jay, American robin (Turdus *migratorius*), and Brewer's blackbird.

**Barren.** Within Contra Loma there are two types of barren land cover: hardscape, which includes roadways and paved parking areas; and gravel/compacted dirt, which includes dirt roads and trails, as well as some unpaved parking areas. These areas provide minimal habitat value for animals in Contra Loma. In some cases, mammals such as ground squirrels can use the gravel and compacted dirt substrates found along roads, trails, and parking lots to help create burrows. The compacted soils associated with these areas allow for stable burrow walls that tend to hold their shape effectively. Ground squirrels can burrow under the adjacent hardscape areas, such as roadways and paved parking areas, which provide additional burrow stability and protection from predators. Sometimes special-status species such as western burrowing owl and San Joaquin kit fox (*Vulpes macrotis mutica*) use abandoned ground squirrel burrows at these locations for breeding purposes. Wildlife species observed in the barren areas during the reconnaissance-level survey at Contra Loma included a grey fox and numerous ground squirrels along the edges of the barren habitat. Some of the birds observed were white-tailed kite, red-tailed hawk, turkey vulture, and western scrub-jay.

### Aquatic Vegetative Communities

Wildlife species that occur in aquatic habitats typically depend on water for all their life processes or significant portions of their life cycles. Three aquatic vegetative communities are present in Contra Loma: riverine, fresh emergent wetland, and lacustrine.

**Riverine.** Like the riparian and wetland vegetation communities, riverine habitat is important because it provides essential habitat for certain terrestrial and aquatic species. When water is present, many of the animal species that occur in the fresh emergent wetland and riparian vegetative communities can be found in the riverine habitat. In addition, amphibians such as Pacific tree frog, western toad (*Bufo boreas*), and California tiger salamander (*Ambystoma californiense*) and passerine birds such as Brewer's blackbird, red-winged blackbird (*Agelaius phoeniceus*), and brown-headed cowbird (*Molothrus ater*) may be present. During the dry season, a variety of small mammals use riverine areas, including deer mouse, California vole, and long-tailed weasel (*Mustela frenata*). Raptors such as white-tailed kite, northern harrier, and red-tailed hawk may also forage in this habitat. Wildlife species observed in the riverine habitat at Contra Loma during the reconnaissance-level surveys included northern flicker, song sparrow, black phoebe, and mourning dove.

**Fresh Emergent Wetland.** The fresh emergent wetland vegetation community is important for a wide variety of wildlife species. Representative water birds that forage and rest in permanent wetlands include great blue heron (*Ardea herodias*), great egret (*Ardea alba*), mallard (*Anas platyrhynchos*), American coot (*Fulica americana*), common merganser (*Mergus merganser*), and double-crested cormorant (*Phalacrocorax auritus*). Amphibians and reptiles in this habitat type include bullfrog (*Rana catesbeiana*), red-eared slider (*Chrysemys scripta elegans*), garter snake, possibly western pond turtle (*Emys marmorata*) and red-legged frog. Some of the wildlife species observed at Contra Loma in the fresh emergent wetland habitat during the reconnaissance-level survey were mallard, Canada goose (*Branta canadensis*), western grebe (*Aechmophorus occidentalis*), American coot, red-winged blackbird, great egret, and great blue heron.

Lacustrine. Amphibians such as California red-legged frog and bullfrog and reptiles such as western pond turtle and garter snake can use the lacustrine habitat of the reservoir for foraging. Reservoirs provide important habitat for various ducks, including mallard, green-winged teal (*Anas caroliniensis*), cinnamon teal (*Anas cyanoptera*), gadwall (*Anas strepera*), American wigeon (*Anas americana*), and American coot. Shore and wading birds, including double-crested cormorant, great blue heron, great egret, and several gull (*Laridae* spp.), species can also be found in reservoirs. Wildlife species observed in the lacustrine habitat during the reconnaissance-level survey at Contra Loma included double-crested cormorant, Canada goose, western grebe, and common merganser.

Twenty fish species, including eight species of sport fish, are known to be present in Contra Loma Reservoir. Many of these species were introduced into the reservoir from the Contra Costa Canal, which gets its water from the Delta. Primary species found in the reservoir during spring surveys from 2002 through 2011 are largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), threadfin shad (*Dorosoma petenense*), redear sunfish (*Lepomis microlophus*), channel catfish (*Ictalurus punctatus*), white catfish (*Ameiurus catus*), and rainbow trout (*Oncorhynchus mykiss*). See Section 3.11 (Fisheries) for an expanded discussion of the reservoir fishery.

### 3.10.2 Special-Status Wildlife Species

For the purposes of this evaluation, special-status wildlife species include those that are (1) designated as threatened or endangered by the state or Federal governments (i.e., "listed

species"); (2) proposed for state or Federal listing as threatened or endangered; (3) candidates for state or Federal listing as threatened or endangered; and/or (4) identified by CDFW as species of special concern and/or California fully protected species.

A list of special-status wildlife species considered in this assessment was compiled by obtaining an official species list from the USFWS Sacramento Office for the *Antioch South, California* USGS 7.5-minute quadrangle (Fish and Wildlife Service 2013) (Appendix F.2); performing queries for records contained in the CNDDB for the *Antioch South, California* USGS 7.5-minute quadrangle (California Department of Fish and Wildlife 2013a; Appendix F.3.1) and the area within a 5-mile radius of Contra Loma (Appendix F.3.2); reviewing biological literature applicable to the Contra Loma region; and reviewing existing programmatic documents relating to the use and operation of Contra Loma. These efforts identified a total of 29 special-status animal species known to occur in the vicinity of Contra Loma. Accordingly, these species were reviewed in depth as part of this assessment to determine the potential for each species to occur within Contra Loma based on the presence or absence of suitable habitat. Based on a review of the habitat requirements, 14 special-status wildlife species have the potential to occur in Contra Loma (Table 3-7). A brief description of the geographic range, habitat requirements, and status for each of these species is provided in the table and a more detailed description of each of these species is provided below.

In addition, an analysis was made of bird species which are subject to the Federal Migratory Bird Treaty Act of 1918 (MBTA, 16 U.S. Code [USC] 703-711) that may be present. Birds protected by the MBTA which are known to be present and may also breed at Contra Loma include great egret, mallard, American coot, great blue heron, double-crested cormorant, Canada goose, western grebe, common merganser, northern flicker, song sparrow, black phoebe, mourning dove, western burrowing owl, white-tailed kite, American kestrel, red-tailed hawk, red-shouldered hawk, turkey vulture, western scrub-jay, American robin, red-winged blackbird, Brewer's blackbird and various gull species. Many other bird species protected by the MBTA may be present at Contra Loma periodically; however, site surveys or other documented sources have not confirmed the presence of these other species.

Species	Status				
(Scientific Name/				Potential Occurrence at	Nearest Recorded
Common Name)	Federal <sup>1</sup>	State <sup>2</sup>	Habitat Description	Contra Loma	Occurrence
			Amphibians	5	
<i>Ambystoma californiense</i> California tiger salamander	FT	ST	Quiet water in ponds, vernal pools, seasonal wetlands, and streams are used for breeding. Adults emerge from their subterranean burrows for only a few weeks a year during the late winter and early spring after heavy rains. Suitable upland habitat includes woodland and grassland.	Yes. The wetlands that pond seasonally along intermittent streams south of the reservoir provide potential breeding habitat. Suitable upland refuges, especially ground squirrel burrows, are present in the annual grassland adjacent to these wet areas.	Several CNDDB occurrences are documented along the southern boundary of Contra Loma.
<i>Rana draytonii</i> California red-legged frog	FT	CSC	Marshes, slow parts of streams, lakes, reservoirs, ponds, and other permanent sources of deep water with dense, shrubby or emergent riparian vegetation; requires 11 to 20 weeks of permanent water for larval development. When not breeding, the red-legged frog may be found in damp wooded areas typically adjacent to waterways or seasonal ponds.	Yes. The fresh emergent wetlands within Contra Loma Reservoir provide the necessary habitat components for breeding; however, the presence of sport fish and bull frogs within the reservoir (predators to red-legged frog) make successful breeding less likely.	Nearest occurrence is within Black Diamond Mines Regional Preserve south and west of Contra Loma.
Reptiles					
<i>Emys marmorata</i> Western pond turtle		CSC	Permanent or nearly permanent water in a wide variety of habitats; requires basking sites; upland nest sites may be found up to 0.25 mile from water.	<b>Yes.</b> Potential habitat is present in Contra Loma Reservoir. Suitable habitat for the western pond turtle may occur in Contra Loma Reservoir and within the seasonal ponds along several of the intermittent streams south of the reservoir.	Western pond turtle occurrences are recorded in similar habitats throughout Contra Costa County and surrounding counties.

Species	Status		_		
(Scientific Name/				Potential Occurrence at	Nearest Recorded
Common Name)	Federal <sup>1</sup>	State <sup>2</sup>	Habitat Description	Contra Loma	Occurrence
Masticophis lateralis euryxanthus Alameda whipsnake	FT	ST	Northern coastal scrub and chaparral communities, especially when they occur adjacent to ungrazed grassland or oak woodland savanna where rodent populations are high. Rodents are not considered prime prey, but their burrows are favorite retreat areas for this snake. Grasslands are also considered an important habitat component because of their foraging value, and some female whipsnakes have been identified laying eggs in grassy fields. Rock outcrops are considered especially important hunting habitat for this snake. The western fence lizard is the primary prey species and prime habitats have high populations of this lizard. Inhabits south-facing slopes and ravines where shrubs form a vegetative mosaic with oak trees and grasses.	Yes. Coastal scrub or chaparral communities are not present in Contra Loma; however ungrazed grasslands with high rodent populations and burrows do occur. Rock outcroppings also occur in Contra Loma, and western fence lizards were abundant during site visits. The grassland areas of Contra Loma could provide habitat for the snake, especially the south- facing slopes along the southern portion of the study area.	Twenty-four CNDDB occurrences are documented within 5 miles of the study area. These occurrences support the likelihood that whipsnakes occur in the study area.
	1	1	Birds	1	1
<i>Circus cyaneus</i> Northern harrier		CSC	Marshlands, grasslands, meadows, and desert sinks. Mostly found in flat or hummocky open areas. Nesting occurs on the ground in these habitats.	<b>Yes.</b> Potential nesting and foraging habitat is present in the grasslands and fresh emergent wetlands throughout Contra Loma.	Northern harrier occurs in habitats similar to Contra Loma in Contra Costa County.

Species	Status				
(Scientific Name/				Potential Occurrence at	Nearest Recorded
Common Name)	Federal <sup>1</sup>	State <sup>2</sup>	Habitat Description	Contra Loma	Occurrence
<i>Elanus leucurus</i> White-tailed kite		SFP	Open grasslands, meadows, or marshes for foraging. Nesting and perching often occurs in isolated, dense-topped trees near foraging areas.	<b>Yes.</b> Potential foraging habitat is present in the grasslands, fresh emergent wetlands, and riverine habitat throughout Contra Loma. Several large, dense-topped trees within the Contra Loma study area could be used as nesting locations.	Observed onsite during the survey.
Agelaius tricolor Tricolored blackbird	_	CSC	Requires open water, preferably emergent wetland for nesting, but will also nest in thickets of willow and other shrubs. Forages in grassland and cropland areas with insect prey.	<b>Yes.</b> Potential nesting habitat is present in the fresh emergent wetlands along the reservoir shoreline. Foraging habitat is present in the grassland habitat surrounding the reservoir.	Tricolored blackbird occurs in habitats similar to Contra Loma in Contra Costa County.
<i>Lanius ludovicianus</i> Loggerhead shrike		CSC	Open habitats with sparse shrubs and trees that contain perches for scanning. Fairly dense shrubs and brush are needed for nesting.	<b>Yes.</b> Potential foraging areas are present within the annual grassland and riverine habitat of Contra Loma. Moderate-quality nesting habitat occurs in some of the trees and shrubs associated with the riparian areas adjacent to the grassland habitat.	Loggerhead shrike occurs in habitats similar to Contra Loma in Contra Costa County.
Athene cunicularia hypugaea Western burrowing owl	_	CSC	Open, dry, nearly level grassland, prairie, and desert floor with low- growing vegetation. Subterranean nester that generally uses existing mammal burrows, most notably those of the California ground squirrel.	<b>Yes.</b> Potential nesting and foraging habitat occurs throughout Contra Loma within the grassland habitat. Numerous ground squirrel holes were observed throughout Contra Loma that could be used as nesting sites.	There are 31 known CNDDB occurrences for this species within 5 miles of Contra Loma. This species is highly likely to occur within the study area.
Asio flammeus Short-eared owl	_	CSC	Freshwater and saltwater marsh areas, lowland meadows, and irrigated fields; tall grass and tules used for daytime cover; nests on dry ground concealed by vegetation.	<b>Yes.</b> Potential habitat is present in the fresh emergent wetlands around the reservoir.	Short-eared owl occurs in habitats similar to Contra Loma in Contra Costa County.

Species	Status				
(Scientific Name/				Potential Occurrence at	Nearest Recorded
Common Name)	Federal <sup>1</sup>	State <sup>2</sup>	Habitat Description	Contra Loma	Occurrence
			Mammals		
<i>Vulpes macrotis mutica</i> San Joaquin kit fox	FE	ST	Annual grasslands or grassy open stages with scattered shrubby vegetation; need loose-textured sandy soils for burrowing and a suitable prey base.	Yes. Potential foraging and denning habitat is available in grassland areas of Contra Loma. Numerous ground squirrels observed in the study area would provide a good prey base. The presence of many coyotes within Contra Loma greatly reduces the likelihood of San Joaquin kit fox breeding within the study area, as coyotes are very aggressive to foxes.	A CNDDB occurrence for this species is documented within Contra Loma.
<i>Taxidea taxus</i> American badger	_	CSC	Herbaceous, shrub, and open stages of most upland habitats with dry, friable soils. May reuse old burrows or dig new ones for dens.	<b>Yes.</b> Potential habitat and an abundant ground squirrel prey base are available in the grasslands of Contra Loma.	There are three recent CNDDB occurrences documented for this species within 5 miles of Contra Loma. It is likely that this species occurs within Contra Loma.
<i>Antrozous pallidus</i> Pallid bat	_	CSC	Open, dry habitats. Roosts in caves, crevices, mines, hollow trees, and buildings.	Yes. Potential foraging habitat present throughout Contra Loma. Roosting habitat could include park facilities and buildings or rock outcrops in the hills west of the reservoir.	Pallid bat occurs in habitats similar to Contra Loma in Contra Costa County.
Corynorhinus townsendii Townsend's big-eared bat	_	CSC	Humid coastal regions of northern and central California. Roosting occurs in limestone caves, lava tubes, mines, or buildings where they cling to open areas, hanging from walls or ceilings.	<b>Yes.</b> Potential foraging habitat is present throughout Contra Loma. Roosting habitat could include park facilities and buildings.	Townsend's big-eared bat occurs in habitats similar to Contra Loma in Contra Costa County.

Notes: Federal status1: September 2011

FE = Listed as endangered under the Endangered Species Act FT = Listed as threatened under the Endangered Species Act

State status<sup>2</sup>: January 2011

ST = Listed as threatened under the California Endangered Species Act

CSC = Species of special concern as identified by the CDFW

SFP = Fully Protected by the California Department of Fish and Game

**San Joaquin kit fox.** San Joaquin kit fox is Federally listed as endangered and state listed as threatened. San Joaquin kit fox is associated with open habitats such as arid grasslands, alkali sinks, and open woodlands of the San Joaquin Valley and the surrounding foothills. San Joaquin kit fox typically forages in grassland areas. Kit fox is usually associated with loosely textured soils that are suitable for excavating dens; badgers and coyotes sometimes initiate the excavation. Dens are typically dug on relatively level slopes, suggesting a preference for deep, friable (easily crumbled) soils. Den entrances are typically 5 to 10 inches in diameter, with 3- to 6-foot ramps of excavated soil. The distribution of San Joaquin kit fox populations is thought to be related to the availability of denning sites, particularly natal denning sites, which are often moved several times throughout the season. Artificial features such as culverts and roadbeds are occasionally used for dens. San Joaquin kit fox prey includes ground squirrels, black-tailed jackrabbit, kangaroo rats, and insects.

Potential foraging and denning habitat is abundant within the annual grassland areas of Contra Loma. The soil is friable, allowing foxes to excavate dens, and there are numerous ground squirrel populations upon which to prey. Ten occurrences of San Joaquin kit fox have been documented by CNDDB within 10 miles of the study area and one occurrence has been recorded within Contra Loma. Most of the records are from the early 1990s while the most recent occurrence was in Contra Loma in 1995 (California Department of Fish and Wildlife 2013a). This record shows that two individuals were observed near the south end of the reservoir near a small drainage in the annual grassland.

Although the habitat at Contra Loma appears viable for use by San Joaquin kit fox, the presence of many resident coyotes in the area greatly reduces the site's suitability for this species. Coyotes are very aggressive towards foxes. For this reason, San Joaquin kit fox is unlikely to breed within the study area. If the species is present in Contra Loma, it is most likely to be transitory, as no natal dens have been found at Contra Loma. Neither San Joaquin kit fox nor sign of kit fox dens, scat, or tracks were observed during the reconnaissance-level surveys.

**California tiger salamander.** California tiger salamander is both Federally listed and state listed as threatened. California tiger salamanders inhabit grasslands and oak savannas in the valleys and low hills of central and coastal California. Habitat conversion has eliminated the species from much of its former range (Shaffer et al. 1993; Fisher and Shaffer 1996). Adults spend most of their lives underground, typically in the burrows of ground squirrels and other burrowing animals. During winter rains between November and March, adults emerge from underground retreats to feed, court, and breed. Adults migrate up to one mile from burrows to breeding sites. Eggs are deposited in seasonal ponds and hatch into larvae. The ponds must contain water for a minimum of eight weeks to hatch and for metamorphs to leave pools, although it can take considerably longer for larvae to complete their development (Fish and Wildlife Service 2004). Following transformation, juvenile salamanders seek refuge underground where they remain until the next winter rains.

Potential salamander habitat at Contra Loma occurs in intermittent stream corridors with areas of seasonal ponding. Most of these locations are along the southern half of the study area. Specifically, the intermittent stream near the northeast corner of the study area and areas just beyond the southern boundary of the study area contain optimal seasonally wet conditions and are located near adjacent upland grassland habitat with abundant burrows for adult salamanders.

Several CNDDB occurrences document California tiger salamander observations along these particular waterways. There are 26 CNDDB records within 5 miles of the study area (California Department of Fish and Wildlife 2013a).

**California red-legged frog.** California red-legged frog is Federally listed as threatened and is classified by CDFW as a California species of special concern. This amphibian species inhabits quiet pools in streams, marshes, and ponds. This species is typically found near breeding sites, which include coastal lagoons, marshes, springs, permanent and semi-permanent natural ponds, and ponded and backwater portions of streams, as well as artificial impoundments, such as stock, irrigation and siltation ponds. Sufficient pond depth (at least 3 feet) and shoreline cover are both critical habitat components because they provide a means of escape from predators. Eggs are typically attached to emergent vegetation in permanent pools. Aestivation habitat, which is required for periods of dormancy, can be up to 300 feet from a stream corridor or pond and includes natural features such as boulders, rocks, trees, shrubs, and logs.

Potential habitat at Contra Loma may occur in the intermittent stream corridors where pools remain inundated long enough for frog metamorphosis to occur. Contra Loma Reservoir contains all of the habitat requirements necessary for successful breeding as well; however, the reservoir contains a large population of predatory fish and amphibian species that would make it very difficult for red-legged frog tadpoles to reach adulthood. Sport fish such as bass, green sunfish (*Lepomis cyanellu*), bluegill, and catfish can decimate tadpole populations. Similarly, the bullfrogs at Contra Loma Reservoir can prey heavily on young frogs. This intense predation typically prevents red-legged frog are documented within the study area; however, there are 19 recorded occurrences within 5 miles of the study area, the closest being near and within the Black Diamond Mines Regional Preserve, south and west of Contra Loma (California Department of Fish and Wildlife 2013a).

Alameda whipsnake. Alameda whipsnake (*Masticophis lateralis euryxanthus*) is both Federally listed and state listed as threatened. This snake inhabits chaparral and scrub habitats within Alameda, Contra Costa, and possibly western San Joaquin and northern Santa Clara counties. The Alameda whipsnake typically prefers shrub communities, but is also found in adjacent habitats such as grasslands and oak savanna. These snakes are good climbers that can escape into shrubs or trees. They also seek shelter in rock piles, outcrops, or small mammal burrows (Stebbins 1985). This fast-moving, diurnal snake hunts primarily small lizards, especially the western fence lizard, but will also eat frogs, snakes, and birds. Its home range is typically 5 to 21.5 acres in size and can overlap home ranges of many other individuals.

Although coastal scrub or chaparral communities are not present in Contra Loma, the annual grasslands present in the study area contain numerous small mammal burrows in which the snake could take refuge. Additionally, western fence lizards were abundant during site visits, indicating a robust prey base for the snake. For these reasons, the annual grassland areas within the study area could provide adequate habitat for the snake. Twenty-four CNDDB occurrences are documented within 5 miles of the study area (California Department of Fish and Wildlife 2013a). These occurrences support the likelihood that whipsnakes occur in the study area.

White-tailed kite. White-tailed kite is a state-designated fully protected raptor, and is also on the list of birds protected under the MBTA. It breeds between February and October, and feeds on rodents, small reptiles, and large insects in such habitats as fresh emergent wetlands, annual grasslands, pastures, and ruderal vegetation. Unlike other raptors, kites often roost, and occasionally nest, communally; therefore, disturbance of a relatively small roost or nesting area could affect a large number of birds. Kites tend to nest in large, dense-topped, isolated trees near suitable foraging habitat.

The annual grassland, riverine, and fresh emergent wetland habitats within the study area provide ample foraging ground for this species. Several large, dense-topped trees within the Contra Loma study area could be used as nesting locations. There are abundant small mammals, reptiles, and insects within the study area. Although there are no CNDDB records within the study area, there are two CNDDB records within 5 miles of the study area. White-tailed kites were observed within the study area during the reconnaissance surveys (California Department of Fish and Wildlife 2013a).

Western pond turtle. Western pond turtle is listed as a California species of special concern and is found in the quiet waters of ponds, marshes, creeks, and irrigation ditches. This species requires basking sites such as partially submerged logs, rocks, mats of floating vegetation, or open mud banks. When water temperatures are low and air temperatures are warmer than water temperatures, it frequently basks on logs or other objects out of the water. When air temperatures become too warm, western pond turtles water-bask by lying in the warmer surface water layer with their heads out of the water. In colder areas, the hibernation period is passed underwater in the soft mud on the bottom of the lake or waterway. Mating typically occurs in late April or early May but may occur year-round. Nests are located in upland areas up to 0.25 miles from the aquatic site. Hatchling turtles are thought to emerge from the nest and move to aquatic habitats in the spring.

Suitable habitat for the western pond turtle may occur in Contra Loma Reservoir and within the seasonal ponds along several of the intermittent streams south of the reservoir. Two CNDDB occurrences are documented within 5 miles of the study area (California Department of Fish and Wildlife 2013a).

**Northern harrier.** Northern harrier (*Circus cyaneus*) is a California species of special concern, and is also on the list of birds protected under the MBTA. This species is found across most of North America. In California, the northern harrier is found in grasslands, marshes, and other open habitats throughout the state. Nests are built on the ground in areas where long grasses or marsh plants provide cover and protection. Harriers hunt for a variety of prey, including rodents, birds, frogs, reptiles, and insects, by flying low and slow in a traversing manner, and using both sight and sound to detect prey items.

Potential nesting and foraging habitat is present in the annual grasslands and fresh emergent wetlands of Contra Loma. No CNDDB occurrences of this species are recorded within 5 miles of the study area (California Department of Fish and Wildlife 2013a).

**Tricolored blackbird.** Tricolored blackbird (*Agelaius tricolor*) is a California species of special concern, and is also on the list of birds protected under the MBTA. It is endemic to the Central

Valley and coastal valleys of California. This species is highly gregarious, forming large flocks in both breeding and non-breeding seasons. Nests are built near or over water and occasionally in agricultural fields. Recently, tricolored blackbirds have displayed increased tendencies toward nesting in patches of blackberry, willows, mustard, thistles, nettles, and even grasses.

The fresh emergent wetland habitat along the margins of Contra Loma Reservoir may provide suitable habitat for this species. Foraging habitat is present in the grassland habitat surrounding the reservoir. No CNDDB occurrences of this species are recorded within 5 miles of the study area (California Department of Fish and Wildlife 2013a).

**Loggerhead Shrike.** Loggerhead shrike (*Lanius ludovicianus*) is a California species of special concern, and is also on the list of birds protected under the MBTA. Loggerhead shrike is a common resident in lowlands and foothills throughout California, and prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. The greatest density of this species occurs in open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats. Loggerhead shrikes build well-concealed nests on stable branches in shrubs or trees with dense foliage. The diet of the loggerhead shrike includes small birds, mammals, amphibians, reptiles, fish, carrion, large insects, and various invertebrates. This species forages from a perch that is at least 2 feet above the ground, but is often much higher. Loggerhead shrikes frequently cache prey on thorns, sharp twigs, and wire barbs, or in the forks of branches. The breeding season for loggerhead shrike is from March to August.

Suitable foraging areas are present within the annual grassland and riverine habitat of the study area. Moderate-quality nesting habitat occurs in some of the trees and shrubs associated with the riparian areas adjacent to the grassland habitat. No CNDDB occurrences of this species are recorded within 5 miles of the study area (California Department of Fish and Wildlife 2013a).

**Western Burrowing Owl.** Western burrowing owl is a California species of special concern, and is also on the list of birds protected under the MBTA. Burrowing owls are year-round residents in generally flat, open, dry grasslands, pastures, deserts, and shrub lands and in grasses, forbs, and open shrub stages of pinyon-juniper and ponderosa pine habitats. In North America they range from the western Canadian provinces south through southern Mexico. They typically use the burrows of ground squirrels and other small mammals for nesting and cover, but may also use artificial structures such as roadside embankments, levees, and berms. They can exhibit a high degree of site fidelity, often reusing burrows year after year. Occupancy of suitable burrowing owl habitat can be verified at a site by observation of a pair of burrowing owls during their breeding season or, alternatively, by the presence of molted feathers, cast pellets (regurgitated masses of bone, fur, and other indigestible material), prey remains, eggshell fragments, or excrement at or near a burrow.

Suitable habitat for foraging and nesting occurs within the annual grasslands of the study area. Numerous burrows in which the owls could nest occur throughout the grassland areas, with higher concentrations in the southern half of the study area. There are 31 known CNDDB occurrences for this species within 5 miles of Contra Loma (California Department of Fish and Wildlife 2013a). Due to the presence of suitable habitat for foraging and nesting, this species is highly likely to occur within the study area.

**Short-eared owl.** Short-eared owl (*Asio flammeus*) is a California species of special concern, and is also on the list of birds protected under the MBTA. In California, short-eared owls nest at only a few of their former breeding locations, and in northwestern California they breed only in coastal areas where conditions are prime. The short-eared owl is a ground nester and lives in open country, including grasslands, wet meadows, and cleared forests. Current threats to short-eared owls include the decline and degradation of marsh and tall grassland habitats resulting from grazing pressure.

Potential nesting and foraging habitat is present in the annual grasslands and fresh emergent wetlands throughout Contra Loma, although nesting is more likely to occur closer to coastal areas. No CNDDB occurrences of this species are recorded within 5 miles of the study area (California Department of Fish and Wildlife 2013a).

American badger. American badger is a California species of special concern. Badgers are highly specialized fossorial (adapted for burrowing or digging) mammals found throughout almost all of California. They are found in a range of habitats that contain friable soils and relatively open ground, where they dig in pursuit of prey and to create dens for cover and raising of young. Badgers are carnivorous and prey primarily on rodents, including ground squirrels.

Potential habitat occurs within the annual grasslands present in the study area. Soils in these areas are friable and numerous ground squirrels are present throughout the grassland areas. There are three recent CNDDB occurrences documented for this species within 5 miles of Contra Loma, generally occurring south of the study area (California Department of Fish and Wildlife 2013a). It is likely that this species occurs within the study area boundaries.

**Pallid bat.** Pallid bat (*Antrozous pallidus*) is a California species of special concern. The pallid bat is a locally common species in low elevations of California and occurs throughout most of the state. This species occupies a wide variety of habitats, including grasslands, shrublands, woodlands, and forests from sea level up into montane, mixed conifer forests. Pallid bat is most common in open, dry habitats with rocky areas for roosting. This species is a year-round resident throughout most of its range. Day roosts include caves, crevices, mines, and occasionally hollow trees and buildings. This species is very sensitive to disturbance of roost sites.

The pallid bat could use any of the vegetative communities present within the study area as foraging habitat. Roosting habitat could include park facilities and buildings, rock outcrops in the hills west of the reservoir, and possibly a few hollow tree cavities observed in some of the riparian areas near the northeast corner of the study area. No CNDDB occurrences of this species are recorded within 5 miles of the study area California Department of Fish and Wildlife 2013a).

**Townsend's big-eared bat.** Townsend's big-eared bat (*Corynorhinus townsendii*) is a California species of special concern. It ranges throughout western North America from British Columbia to the central Mexican highlands. Recent information suggests that this species is declining throughout the west. Townsend's big-eared bat is typically a cave-dwelling species; however, this species is also found in human-made structures such as old mine workings and buildings. Unlike many species that take refuge in crevices, this species only roosts in the open, hanging from walls and ceilings, where it is relatively easily detected, but is also particularly

vulnerable to disturbance (Pierson and Rainey 1998). Maternity roosts and winter hibernacula are restricted to caves, old mines, buildings, and rock ledges.

Suitable foraging habitat is present throughout Contra Loma in any of the vegetative communities present within the study area. Suitable roosting habitat is limited in the study area, but could include some of the park facilities and buildings. No caves are present in the study area. No CNDDB occurrences of this species are recorded within 5 miles of the study area (California Department of Fish and Wildlife 2013a).

# 3.11 Fisheries

### 3.11.1 Recreational Fishery

Contra Loma Reservoir is a popular recreational fishing destination. Recreational fishing is allowed all around the reservoir except for the immediate area of the dam and spillway. As described previously, a state fishing license and an EBRPD Fishing Access Permit are required for all anglers 16 and older. Pedestrian access to the reservoir is provided by a network of trails, and anglers may fish from shore, from two floating fishing docks (Figure 1-2), or from boats. There is one boat launch and anglers may launch boats of up to 17 feet provided they pay the boat launch fee and pass a required boat inspection for aquatic invasive species. No gasoline-powered engines are allowed on the reservoir, but electric motors are permitted. Anglers may also use float tubes, but each angler must possess a life jacket and must wear waders or a wetsuit to limit body contact. There is a fish cleaning station at the boat launch facility; however, EBRPD is currently working on relocating this facility further away from the reservoir within the same area as described in Section 3.8.1 (Water Quality). Park hours are set by EBRPD and adjust seasonally to daylight hours. Park curfew is from 10:00 p.m. to 5:00 a.m., however, unauthorized nighttime fishing sometimes occurs.

Because the fishing docks float, their elevations vary with the reservoir level. When the reservoir level is sufficiently low, the angle of the ramps leading from the shore down to the docks becomes too steep for safe passage, and the docks are closed. Sometimes the reservoir level is so low that the docks cannot float and they rest on the sloping shoreline. Anglers sometimes fish from the floating boat dock adjacent to the boat launch, especially when the fishing docks are closed.

CCWD currently has a draft macrophyte (aquatic plants visible with the naked eye) management plan for Contra Loma Reservoir. The goals of this plan are to (1) control problem macrophyte beds in order to ensure boat access, and (2) control non-native plant species in the reservoir. Routine procedures to monitor macrophyte development include annual GPS surveys that document types of species present as well as the approximate location, coverage, and growth of existing macrophyte beds. Control of macrophytes has been limited to herbicide applications to non-native species and specific tule beds along the shoreline (Contra Costa Water District undated). Short-term treatment have included spot treatment with Sonar® to control non-natives and spot treatment with Rodeo® to control tules. No long-term treatment procedures have been developed for Contra Loma Reservoir.

### 3.11.2 Fisheries Resources

There are currently 20 known fish species, including eight species of game fish, in Contra Loma Reservoir (Table 3-8). Primary species found in the reservoir during spring surveys from 2002 through 2011 were largemouth bass, bluegill, black crappie, threadfin shad, redear sunfish, channel catfish, white catfish, and rainbow trout (Figure 3-12). Other species include bigscale logperch, common carp, Sacramento blackfish, warmouth, green sunfish, white crappie, goldfish, prickly sculpin, and inland silversides (Alexander, pers. comm. 2011). Many of these species occur in small numbers and/or are not self-sustaining in the reservoir.

Family	Common Name	Scientific Name
Acipenseridae	White sturgeon	Acipenser transmontanus
Atherinopsidae	Inland silverside	Menidia beryllina
Centrarchidae	Bluegill	Lepomis macrochirus
	Green sunfish	Lepomis cyanellus
	Largemouth bass	Micropterus salmoides
	Redear sunfish	Lepomis microlophus
	Black crappie	Pomoxis nigromaculatus
	White crappie	Pomoxis annularis
	Warmouth	Lepomis gulosus
Clupeidae	Threadfin shad	Dorosoma petenense
Cyprinidae	Common carp	Cyprinus carpio
	Goldfish	Carassius auratus
	Sacramento blackfish	Orthodon microlepidotus
Cottidae	Prickly sculpin	Cottus asper
Ictaluridae	Channel catfish	Ictalurus punctatus
	White catfish	Ameiurus catus
Moronidae	Striped Bass	Morone saxatilis
Percidae	Bigscale logperch	Percina macrolepida
Poeciliidae	Mosquitofish	Gambusia affinis
Salmonidae	Rainbow trout	Oncorhynchus mykiss

Table 3-8. Fish Species Occurring in Contra Loma Reservoir

Many of the fish species present have been unintentionally introduced from the Delta via the Contra Costa Canal. The recently completed Rock Slough Fish Screen Project at the head of Contra Costa Canal was constructed to prevent the entrainment of Federally protected species such as Delta smelt at the Rock Slough Intake of the Contra Costa Canal. The new screen also minimizes fish entrainment and significantly reduces the potential for fish introductions into Contra Loma Reservoir from the Contra Costa Canal.



Source: Alexander, pers.comm. 2011.



The most popular game fish in Contra Loma Reservoir is rainbow trout. However, since the reservoir does not provide habitat suitable for self-sustaining, year-round coldwater fish, trout are stocked as part of a mostly seasonal put-and-take sport fishery. This species is planted and caught by anglers when the water is relatively cool (less than 72° Fahrenheit [°F]) from mid-September to mid-June. Hatchery-produced catchable trout are stocked annually through funds derived from EBRPD fishing access permits and to a lesser extent by the CDFW. EBRPD plants rainbow trout that average 1 pound each and the CDFW plants trout that average 1/2 pound each. The stocking records for rainbow trout are provided in Table 3-9.

Although the reservoir is managed as a put-and-take fishery, there is some limited survival and growth as evidenced by the 17.6-pound lake-record rainbow trout caught in April of 2001. Unlike warm water game fish in the reservoir, the rainbow trout fishery is not limited by reservoir operations. The limiting factors for the coldwater fishery are stocking rates and angler harvest. Rainbow trout stocking rates for Contra Loma Reservoir have fluctuated between 10,500 and 17,406 pounds/year over the past ten years, and have had an average stocking rate of 13,950 pounds.

	Chanr	nel Catfish (po	unds)ª	Rainl	bow Trout (po	unds)
Year	EBRPD	CDFW	Total	EBRPD	CDFW	Total
2000	3,500	1,500	5,000	7,000	9,200	16,200
2001	1,000	500	1,500	5,500	5,000	10,500
2002	3,750	500	4,250	7,347	6,000	13,347
2003	4,250	1,000	5,250	10,906	6,500	17,406
2004	4,025	500	4,525	7,750	5,500	13,250
2005	5,287	0	5,287	10,250	3,500	13,750
2006	3,005	1,000	4,005	9,750	2,550	12,300
2007	3,962	0	3,962	11,050	1,500	12,550
2008	3,500	0	3,500	8,750	4,000	12,750
2009	3,500	0	3,500	10,649	3,500	14,149
2010	3,050	0	3,050	13,265	4,000	17,265

Table 3-9. Stocking Records for Contra Loma Reservoir between 2000 and 2010

Source: Source: Alexander, pers. Comm. 2011

Notes: <sup>a</sup>EBRPD trout plants average 1 fish/pound and the CDFW trout plants average 2 fish/pound. Catfish size varies slightly, but is on average 1 fish/pound.

Contra Loma Reservoir supports the highest largemouth bass densities of any EBRPD reservoir (Alexander, pers. comm. 2011). Mark-recapture studies have been conducted annually by EBRPD since 2007 (Figure 3-12) using the Lincoln-Peterson Index estimation method. In the near-shore habitat of the reservoir between 2007 and 2011, the average estimated number of largemouth bass greater than 11 inches in total length has been 662, and has fluctuated from a maximum of 1,235 in 2007 to a minimum of 158 in 2010 (Figure 3-13). Based on the available data, the largemouth bass abundance in Contra Loma Reservoir fluctuates widely; however, during the five available years of data, the population has declined (Figure 3-13). Additionally, the percent composition of bluegill and black crappie has increased during this time period (Figure 3-12). The observed decline of largemouth bass could be a function of numerous factors including, but not limited to, a decrease in successful spawning and recruitment, increased angler harvest, increased competition and/or predation by other fish species (including bluegill and black crappie), or sampling variation.

Based on the maximum fork lengths of largemouth bass captured during annual electrofishing surveys between 2001 and 2011 (Figure 3-14), the average and maximum size of fish has remained relatively stable, with the average bass measuring 9.5 inches with larger fish up to 24 inches (Alexander, pers. comm. 2011). The recent increase in average largemouth bass size indicates that there may be fewer young fish in the population which suggests there has been less successful reproduction or survival over the past few years (assuming equal sampling effort and standardization year-to-year). The maximum size of largemouth bass sampled in the reservoir has increased from 1.9 pounds in 1999 to 12.9 pounds in 2008. The current record largemouth bass is 13.1 pounds and was caught by an angler in 2006.



Figure 3-13. Estimated largemouth bass population using Lincoln-Peterson Index method at Contra Loma Reservoir, 2007-2011. (Source: Alexander, pers. Comm. 2011)



Figure 3-14. Average and maximum fork lengths of largemouth bass captured during annual electrofishing surveys on Contra Loma Reservoir, 2001-2011. (Source: Alexander, pers. comm. 2011)

The reservoir's self-sustaining population of largemouth bass is very popular with a segment of the sport fishing public but is not augmented by planting; therefore, the reproduction and growth of this species of game fish is very important in maintaining a successful fishery. Because the largemouth bass fishery is self-sustaining and is more susceptible to overharvest, EBRPD has

recommended that all bass be released after catching. Largemouth bass and sunfish (such as black crappie and bluegill) spawn during the spring when water temperatures begin to warm. Typically, in this region of California, the prime spawning months for bass and sunfish occurs from late March through early June. Following hatching and initial care by the adults, fry are attracted to the habitat-rich near shore area of the south and west shoreline of the reservoir. These areas are dominated by emergent vegetation such as bulrush and cattail, as well as submerged vegetation such as watermilfoil and pond weed (*Elodea* spp.) that provide a source of food and protective cover.

EBRPD has identified seasonal reservoir fluctuations as a limiting factor for the largemouth bass fishery. EBRPD and CCWD currently have a verbal agreement to limit reservoir fluctuations during the critical spawning period for largemouth bass and other warm water fish; however, water supply and reservoir operation and management take precedence over management for recreation, including fisheries (Alexander, pers. comm. 2011). The magnitude of the reservoir level increases (within 4 to 6 feet) is not expected to be particularly problematic for warm water fish in Contra Loma Reservoir because the change is not likely to be sufficient to reduce water temperatures to less than suitable levels for egg development or to cause nest abandonment. Conversely, daily reservoir decreases of up to 1.6 feet, particularly for several consecutive days, could cause nest abandonment by adult bass, which, in turn, could leave spawning nests susceptible to predation from other fishes, particularly the bluegill and redear sunfish that are abundant in this reservoir. Under extreme drawdown conditions, nests can be left out of the water to desiccate and a substantial portion of that year's reproductive capacity can be lost. Limiting abrupt and/or large decreases in reservoir elevation during the spring and early summer spawning period is one way to minimize risks to largemouth bass spawning success and to ensure a healthy self-sustaining population. Because reservoir operation is outside the scope of the RMP, reservoir level fluctuations would continue with or without the RMP.

Because sunfish typically spawn in the relatively shallow littoral (shoreline) areas of the reservoir, their reproductive success can also be affected by large water fluctuations during the critical months of April and May. As with largemouth bass, large abrupt or sustained fluctuations can disrupt spawning by taking the spawning nests out of the suitable depth and temperature ranges and placing them in water that is too shallow, too deep, or not the right temperature for proper egg maturation. However, based on annual surveys the existing reservoir operations appear to allow for successful reproduction and recruitment to the sunfish population. Black crappie are also a popular warm water game fish in the reservoir. They have similar life cycle, habitat, and cover requirements as largemouth bass and are also susceptible to breeding disruptions caused by changes in the water level. Even so, it is characteristic for this species to exhibit substantial population fluctuations.

Black crappie abundance has increased in recent years (Figure 3-12), and many large (>9 inch) fish have been captured during annual electrofishing surveys and by anglers. The average black crappie captured during electrofishing surveys between 2009 and 2011 has been 8 to 10 inches and the maximum size black crappie capture was 15 inches (Alexander, pers. comm. 2011). The current lake record is 4.1 pounds.

Striped bass also provide a trophy fishery for anglers targeting this species. Before the recent completion of the Rock Slough Fish Screen Project, striped bass had been pumped into the

reservoir from the Delta. Striped bass within the reservoir have grown to large sizes by preying on planted trout and other resident fish species. Striped bass numbers are relatively low (Figure 3-12), but the potential for hooking a large specimen creates a very popular fishery. The current lake record for striped bass is 40 pounds. The Rock Slough Fish Screen will minimize further introduction of striped bass to the reservoir.

Channel catfish are planted and caught during the warm summer months from June through mid-September. The planted channel catfish average 1 pound each, but larger catfish are also planted. The catfish sport fishery is intended to supplement angling opportunities during the warm summer months when conditions are less conducive for trout and is managed as a put-and-take fishery. The average size and number of catfish stocked into the reservoir between 2000 and 2010 are provided in Table 3-9. On average, 3,984 pounds of channel catfish are stocked annually. Stocking rates have remained relatively stable over the past 10 years (Table 3-9) and many of the planted channel catfish remain in the reservoir and grow to large sizes. The current lake record is 26.4 pounds. Neither catfish species (channel or white) has been documented to naturally reproduce in the reservoir; therefore, the primary factors likely limiting the abundance and growth of catfish in Contra Loma are annual stocking rates and angler harvest. However, no data are currently available on the harvest rate of catfish.

According to a plaque posted at a Contra Loma information kiosk, a 58-inch white sturgeon was caught by an angler at the reservoir in 2003; however, annual electro-fish surveys have not found sturgeon.

Since approximately 1996, Contra Loma Reservoir has provided recreational fishing opportunities in the form of fishing derbies for the public. These derbies are intended to attract children with special needs, senior citizens, and children from the surrounding area. New anglers are invited to participate through the EBRPD's Parks Express Program and through the Delta Striped Bass Association's annual "Learn to Fish" day. In October 2009, over the duration of these annual events, 147 special-needs children, 87 seniors, and over 528 local children experienced a special day of trout fishing. These annual fishing events attract more new anglers each year and are an important component of the recreational opportunities at Contra Loma Recreation Area.

Fishing regulations for Contra Loma Reservoir are set in part by the State Fish and Game Commission. Current fishing harvest regulations are provided in Table 3-10. As described above, EBRPD encourages, but doesn't require, anglers to practice catch and release with largemouth bass and catfish.

Fish Species	Size Limit	Number per day
Trout	No limit	5
Catfish	No limit	5
Largemouth bass <sup>1</sup>	12-inch minimum	5
Striped bass	18-inch minimum	2
Crappie, bluegill, and sunfish	No limit	25

 Table 3-10. Current Limits on Fish Harvest from Contra Loma Reservoir

Source: East Bay Regional Park District 2010c

<sup>1</sup> Largemouth bass is a species of black bass.

### 3.11.3 Special-Status Fish Species

For the purposes of evaluation, special-status fish species include those that are: 1) designated as threatened or endangered by the state or Federal government ("listed species"); or 2) proposed for state or Federal listing as threatened or endangered; and/or 3) candidates for state or Federal listing as threatened or endangered; and/or 4) identified by the CDFW as species of special concern and/or California fully protected species. A list of special-status fish species considered for analysis in this section was compiled through obtaining an official species list from the USFWS Sacramento Office (Fish and Wildlife Service 2013), informal discussions with the CDFW and USFWS, and reviewing biological literature applicable to the study area (Table 3-11).

The Delta provides suitable habitat for many of the species listed in Table 3-11, and because the reservoir's water source is the Delta, fish species could have been carried into the reservoir via the Contra Costa Canal. To date no special-status fish species have been captured or identified in the reservoir. Furthermore, special-status species that might have made it in to the reservoir are not likely to have survived due to a lack of suitable habitat that would support most of these species. In addition, any new entrainment of fish, including special-status species, is highly unlikely with the installation of the new Rock Slough Fish Screen at the intake pump station for the Contra Costa Canal. The screen size was designed to be more restrictive than the National Marine Fisheries Service criteria (i.e., 3/32 inch or 2.25 millimeters) in order to protect larval Delta smelt and would, therefore, protect the smallest and most vulnerable special-status fish from entrainment.

Common Name/ Scientific Name	Status¹ (Federal/ State)	General Habitat Description	Potentially Suitable Habitat?	Nearest Recorded Occurrence
Delta smelt (Hypomesus transpacificus)	T/E	Inhabit the Sacramento- San Joaquin Delta estuary in open, shallow waters.	<b>No.</b> Suitable habitat for this species does not occur in Contra Loma Reservoir. Contra Loma is not part of designated critical habitat for this species.	Delta smelt are present in the Sacramento-San Joaquin Delta.
Longfin smelt (Spirinchus thaleichthys)	—/Т	Inhabit the Sacramento- San Joaquin Delta estuary in open, shallow waters.	<b>No.</b> Suitable habitat for this species does not occur in Contra Loma Reservoir.	Longfin smelt are present in the Sacramento-San Joaquin Delta.

 Table 3-11. Special-Status Fish Species with Potential to Occur in the Contra Loma

 Recreation Area

Common Name/	Status <sup>1</sup> (Federal/	General Habitat	Potentially Suitable	Nearest Recorded
Steelhead, California Central Valley Distinct Population Segment (DPS) (Oncorhynchus mykiss)	T/—	Spawn and rear in the upper Sacramento and San Joaquin rivers and their tributaries.	No. Suitable habitat for this species does not occur in Contra Loma Reservoir. Contra Loma is not part of an existing tributary system that supports this species and it is not part of designated critical habitat for this species.	Central Valley DPS steelhead are present in the Sacramento-San Joaquin Delta.
Central Valley spring-run Evolutionarily Significant Unit (ESU) Chinook salmon (Oncorhynchus tshawytscha)	T/T	Spawn and rear in the upper Sacramento and San Joaquin rivers and their tributaries.	<b>No.</b> Suitable habitat for this species does not occur in Contra Loma Reservoir. Contra Loma is not part of an existing tributary system that supports this species and it is not part of designated critical habitat for this species.	Central Valley spring-run Chinook salmon are present in the Sacramento-San Joaquin Delta.
Sacramento River winter-run ESU Chinook salmon (Oncorhynchus tshawytscha)	E/E	Spawn and rear in the upper Sacramento and San Joaquin rivers and their tributaries.	<b>No.</b> Suitable habitat for this species does not occur in Contra Loma Reservoir. Contra Loma is not part of an existing tributary system that supports this species and it is not part of designated critical habitat for this species.	Sacramento River winter-run Chinook salmon are present in the Sacramento-San Joaquin Delta.
Green sturgeon (Acipenser medirostris)	T/—	Require streams, rivers, and estuarine habitat as well as marine waters during their life cycle	<b>No.</b> Suitable habitat for this species does not occur in Contra Loma Reservoir.	Green sturgeon are present in the Sacramento-San Joaquin Delta.
Sacramento splittail (Pogonichthys macrolepidotus)	—/SSC	Inhabit rocky and sandy pools of rivers and lakes. Tolerant of brackish water.	<b>No.</b> Marginally suitable habitat occurs in Contra Loma Reservoir, but this species is not present.	Sacramento splittail are present in the Sacramento-San Joaquin Delta.
Sacramento perch (Archoplites interruptus)	—/SSC	Inhabit sloughs, slow- moving rivers, and lakes, but now mostly reservoirs and farm ponds.	<b>No.</b> Significantly limited within their native range. Most abundant where other centrarchids are absent.	Major localities containing perch in the 1990's included Calaveras Reservoir, Lake Anza, Jewel Lake and gravel pit ponds (Alameda Creek near Niles).

# Table 3-11. Special-Status Fish Species with Potential to Occur in the Contra Loma Recreation Area

Common Name/ Scientific Name	Status <sup>1</sup> (Federal/ State)	General Habitat Description	Potentially Suitable Habitat?	Nearest Recorded Occurrence
Hardhead (Mylopharodon conocephalus)	—/SSC	Inhabit quiet, deep pools of large, warm, clear streams over rocks or sand.	<b>No.</b> Marginally suitable habitat occurs in Contra Loma Reservoir, but this species is not present.	Hardhead are present in the Sacramento-San Joaquin Delta.
Pacific lamprey (Entosphenus tridentatus)	—/SSC	Spawn in freshwater rivers and streams. Inhabit marine waters during their life cycle.	<b>No.</b> Suitable habitat for this species does not occur in Contra Loma Reservoir.	Pacific lamprey are present in the Sacramento-San Joaquin Delta.
River lamprey (Lampetra ayresii)	—/SSC	Spawn in freshwater rivers and streams. Inhabit marine waters during their life cycle.	<b>No.</b> Suitable habitat for this species does not occur in Contra Loma Reservoir.	River lamprey are present in the Sacramento-San Joaquin Delta.

# Table 3-11. Special-Status Fish Species with Potential to Occur in the Contra Loma Recreation Area

<sup>1</sup>Status Notes: E = Endangered; T = Threatened; SSC = CDFW species of special concern.

# 3.12 Geologic and Soil Resources

# 3.12.1 Geology

The geology of the Contra Loma area consists of terrestrial and marine Eocene- to Pliocene-(Tertiary) aged sandstone with lesser amounts of siltstone, conglomerate, and shale (Graymer et al. 1994). Minor amounts of igneous rocks are also present.

Contra Loma is located in the Diablo Range, which is part of the larger Coast Ranges of California. Rocks of both marine and terrestrial origin are present in the Contra Loma area. Most of the rocks that currently form the Coast Ranges were originally oceanic crust and overlying marine sediments of the Pacific Plate. Tectonic forces, which are still active in the region, have subducted (moved underneath) and translated (slid) the Pacific Plate under and against the margin of the North American Plate. This tectonic activity synchronously accreted and uplifted oceanic crust and marine sediments from the Pacific Plate to the western margin of North America.

Concurrently, subduction of the Pacific Plate also formed land masses in the Pacific Ocean near the western margin of North America, either through accumulation of sediment or from the formation of volcanoes. In the ocean trenches where the Pacific Plate was subducted under the North American Plate, large blocks of oceanic crust were broken off while material from both plates was scraped off into these trenches. Continued deposition and uplift brought these rocks above the surface of the ocean, eventually forming discrete land masses offshore of the North American coast. In addition, subduction of the Pacific Plate formed volcanoes that jutted out of the ocean near these trenches. Tectonic activity eventually carried these landforms and their detritus towards the North American Plate and accreted the rocks to the western margin of the North American Plate. The accretion of the oceanic crust, overlying sediments, and terrestrial deposits formed the geology of Contra Loma and its vicinity.

Geologic units in the project vicinity trend west to east and appear as relatively narrow bands of generally less than 1,000 feet in thickness on the Earth's surface (Figure 3-15). Therefore, many geologic units are present near Contra Loma (Table 3-12). Contra Loma Reservoir is flanked by hills that are composed of the Tulare Formation, a poorly consolidated assemblage of siltstone, sandstone, and conglomerate. The bases of the surrounding hills and adjacent flat-lying areas are mostly composed of younger Quaternary-aged surface deposits derived from alluvial deposits and the detritus of the surrounding terrain. The Lawlor Tuff occupies a narrow band that extends from the western margin of the reservoir to the western boundary of the Contra Loma Recreation Area. The higher elevations of Contra Loma south of the reservoir are mainly composed of the Neroly and Cierbo Sandstone units, with a minor amount of Kirker Tuff exposed near the southern boundary.

### 3.12.2 Seismicity and Faults

The San Francisco Bay Area is a seismically active area with numerous well-known active fault complexes, including the San Andreas, Hayward, and Mt. Diablo fault complexes. The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972. It requires the California State Geologist to define earthquake fault zones, and was designed to mitigate the hazards that earthquakes pose to structures and human life (California Public Resources Code 2009). Fault zones are established based on the presence of a fault that is traceable and that has exhibited displacement in the last 11,000 years.

There are no active fault zones identified by the State of California within the Contra Loma Recreation Area, but several active fault zones exist within 17 miles of Contra Loma (Figure 3-15 – see inset). Three suspected inactive faults (Figure 3-15) were mapped within Contra Loma by Reclamation and the Corps between 1962 and 1966 (East Bay Regional Park District 1975b). However, published maps and geospatial data from the USGS or the California Geologic Survey (CGS) do not show these suspected faults. A series of pre-Quaternary-aged faults have been identified approximately 2 miles south of Contra Loma near the southern boundary of Black Diamond Mines Regional Preserve, but they indicate no evidence of displacement in the last 11,000 years.

Because there are active fault zones within 17 miles of Contra Loma, the recreation area may experience severe ground shaking and moderate to heavy damage from a nearby earthquake. The CGS has produced estimates of peak ground acceleration (PGA) values for every given point in California. PGA is a measure of earthquake acceleration on the ground and is measured in units of gravity (g); a value of 1.0 is equal to the force of gravity at the Earth's surface. In general, an area with a PGA of 0.001 g will experience shaking that can be felt by people and an area with a PGA of 0.50 g will experience very strong shaking that well-designed buildings and structures can withstand. PGA values for Contra Loma range between 0.40 g for firm rock and 0.44 g for alluvium (California Geological Survey 2011), which indicates the area has the potential to experience severe shaking and moderate to heavy damage to some buildings and structures. However, well-designed buildings and structures should be able to withstand the expected level of shaking.

Map Unit	Geologic Age	Formation	Description
Qu	Holocene- Pleistocene (Quaternary)	Surface deposits	Surface deposits. Erosional detritus from erosion of surrounding features.
Ttu	Pliocene	Tulare Formation	Poorly consolidated, non-marine grey to maroon siltstone, sandstone, and conglomerate as well as minor amounts of tuff.
TI	Pliocene	Lawlor Tuff	Non-marine, pumiceous, andesitic tuff.
Tn	Miocene	Neroly Sandstone	Blue, volcanic-rich, cross-bedded sandstone and conglomerate; mostly non-marine. Minor tuff deposits.
Tns	Miocene	Neroly Sandstone, with minor siltstone	Local siltstone member.
Tc	Miocene	Cierbo Sandstone	Blue, volcanic-rich sandstone with abundant marine fossils.
Tks	Oligocene	Kirker Tuff	Pumiceous white tuff, minor tuffaceous sandstone, conglomerate, and siltstone. Also mapped as Tkt.
Tmku	Eocene	Markley Formation, upper member	Bedded sandstone, siltstone, and claystone.
Tsu	Eocene	Sidney Flat Shale upper part, Markley Formation, upper member	Black shale with minor siltstone and sandstone.
Tsl	Eocene	Sidney Flat Shale lower part, Markley Formation, upper member	Interbedded shale and sandstone.
Tmkl	Eocene	Markley Formation, lower member	Thin-bedded to massive sandstone, with minor siltstone and mudstone.
Tlu	Eocene	Markley Formation, lower member, upper bed	Upper siltstone bed.
ТΙΙ	Eocene	Markley Formation, lower member, lower bed	Lower siltstone bed.
Tnv	Eocene	Nortonville Shale	Brown to grayish-green mudstone and claystone with minor siltstone and sandstone; marine.
Td	Eocene	Domingene Formation	Locally divided into 2 members: Tdu Brown sandstone with minor mudstone and conglomerate. Tdl Lower member. Siltstone and claystone with minor sandstone and basal conglomerate.
Tmd	Paleocene	Meganos Formation, sandstone member	Medium-grained, light gray to bluish-gray sandstone with carbonaceous laminations; pebble conglomerate present locally at base.
Tmc	Paleocene	Meganos Formation, shale member	Bluish-gray shale with sandstone interbeds.
	•	•	

 Table 3-12. Geologic Units Underlying Contra Loma

Source: Graymer et al. 1994





Contra Loma Reservoir RMP/EIS

### Figure 3-15 **Geology and Faults**

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### 3.12.3 Mineral Resources

There are currently no mineral development activities in or adjacent to Contra Loma. Some areas in EBRPD's adjacent Black Diamond Mines Regional Preserve were previously mined for coal, sandstone, and shale. From the 1860s through the turn of the last century, five coal mining towns thrived in the Black Diamond area: Nortonville, Somersville, Stewartville, West Hartley, and Judsonville. As the location of California's largest coal mining operation, nearly four million tons of coal ("black diamonds") were removed from the earth in the Black Diamond area. After coal mining ceased, underground mining for sand began near the deserted Nortonville and Somersville townsites in the 1920s. The Somersville mine supplied sand used in glass and the Nortonville mine supplied casting sand used in foundries. When sand mining ceased in 1949, more than 1.8 million tons of sand had been removed from the mines (East Bay Regional Park District 2011d).

### 3.12.4 Soils

The soils that cover Contra Loma and adjacent areas are weathering products derived from the underlying or upslope geologic units, and, as a result, the composition and the properties of soils vary within the area. A majority of the soils within Contra Loma are clay-rich soils that have slow infiltration rates and high runoff potential (Figure 3-16 and Table 3-13).

Clay soils in the area exhibit low permeability when compacted, and many of the soils have a relatively high shrink and swell potential (East Bay Regional Park District 1975b). The clay soils are fairly erodible when disturbed, but soils with higher sand and silt content have an even higher potential for erosion when disturbed.

Soil depth to bedrock generally varies by slope grade; soils on steep slopes are generally shallower than soils on gentle slopes. Within Contra Loma, approximately 70 percent of the land has slopes of less than 10 percent and 85 percent of the land has slopes of less than 25 percent. Slopes under 25 percent generally contain soils that are deep (> 40 inches) to moderately deep (20 to 40 inches), and slopes greater than 25 percent generally contain soils that are moderately deep (20 to 40 inches) to shallow (< 20 inches). The shallowest soil in the area is the Millsholm Loam, which is located near the southwest boundary of Contra Loma, while the deepest soil is the Capay Clay, which is located near the northeast boundary.

Map Unit	Map Unit Name	Slope Range %	Soil Depth (in) <sup>1</sup>	Drainage Class <sup>2</sup>	Hydrologic Soil Type <sup>2</sup>	% Sand	% Silt	% Clay	Soil Erodibility (K-factor)
AbD	Altamont Clay	9-15	48	Well Drained	D	22	28	50	.20
AbE	Altamont Clay	15-30	48	Well Drained	D	22	28	50	.20
AcF	Altamont- Fontana Complex <sup>3</sup>	30-50	48/22	Well Drained	D/B	22/18	28/51	50/31	20/37
CaC	Capay Clay	2-9	>72	Moderately Well Drained	D	22	28	50	
CkB	Cropley Clay	2-5	>60	Moderately Well Drained	D	22	28	50	

Table 3-13. Soil Units and Properties within Contra Loma Regional Park\*

Map Unit	Map Unit Name	Slope Range %	Soil Depth (in) <sup>1</sup>	Drainage Class <sup>2</sup>	Hydrologic Soil Type <sup>2</sup>	% Sand	% Silt	% Clay	Soil Erodibility (K-factor)
DdD	Diablo Clay	9-15	42	Well Drained	D	22	28	50	.20
Ld	Lodo-Rock Outcrop Complex <sup>3</sup>	35-55	18/NA	Somewhat Excessively Drained	D/NA	35/ NA	34/ NA	31/ NA	.20
MeG	Millsholm Loam	50-75	12	Well Drained	D	39	37	24	.20
Pb	Pescadero Clay Loam	0-2	>66	Poorly Drained	D	35	34	31	.28
RbC	Rincon Clay Loam	2-9	>60	Well Drained	С	35	34	31	.28
W	W	0	NA	NA	NA	NA	NA	NA	NA

Table 3-13. Soil Units and Properties within Contra Loma Regional Park\*

Notes: \*Soil extent and properties were identified and characterized using the Department of Agriculture's Natural Resource Conservation Service Web Soil Survey Database (Natural Resources Conservation Service 2011)

<sup>1</sup>-Maximum depth to bedrock

<sup>2</sup>- Properties of each soil in the complex listed in order by name and separated by a slash mark ("/").

### 3.12.5 Landslides

Landslides include earthflows, slumps, and translational slides. Landslides and related areas of instability have been mapped within the Contra Loma Recreation Area and adjacent EBRPD lands (Wentworth et al. 1997). Future landslides are most likely to occur within and around places where landslides have previously occurred. One area of unstable terrain is mapped within the eastern half of the Contra Loma Recreation Area (Figure 3-16). The steeper upland terrain of the EBRPD lands contains numerous areas of mapped landslide activity and associated areas of instability. Landslides can occur in response to changes in water content, earthquake shaking, or removal of downslope support. Landslides in the type of terrain that is typically found in the Contra Loma area tend to be shallow and slow moving, and pose minimal threat to public safety. Landslides can, however, deform the ground surface and damage infrastructure.

# 3.13 Climate and Air Quality

### 3.13.1 Climate

The climate in the Bay Area is characterized by dry summers and moderately wet winters, with 75 percent of the average annual rainfall occurring in winter. Precipitation amounts can vary greatly, sometimes within short distances. Annual rainfall can range from less than 16 inches in valley areas to 40 inches in mountainous areas (City of Antioch 2003b). In Antioch, the monthly average precipitation ranges from 0.02 inch (July) to 2.76 inches (January), with an annual average total of 13.09 inches. No snowfall has been recorded for the period from March 1, 1955 to June 30, 2000 (City of Antioch 2003b).


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Contra Loma Reservoir RMP/EIS

Figure 3-16 Soils at Contra Loma Reservoir and Recreation Area

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During the summer months (June, July, and August) the Bay Area experiences little precipitation and winds tend to blow onshore from the north and northwest. Pollution potential is higher during the summer months due to strong northwesterly winds (City of Antioch 2003b). During summer months, the California coast and coastal cities often experience fog and stratus clouds due to heavy condensation.

For the period from March 1, 1955 to June 30, 2000, average high temperatures in Antioch ranged from 53.6°F (January) to 90.9°F (July). The annual average maximum was 73.3°F. During this period, monthly average minimum temperatures ranged from 36.7°F (January) to 57.1°F (July). The annual average minimum was 47.6°F.

Summertime temperatures in the Bay Area are greatly influenced by differential heating between land and water surfaces. Land areas heat and cool more quickly than water areas. This difference often creates a large-scale temperature gradient between the coast and the Central Valley. Small-scale local gradients are also produced near shorelines. On summer afternoons, coastal temperatures can be 35 degrees cooler than inland temperatures. In the winter, the daytime temperature contrast between coastal and inland areas is usually small but the nighttime temperature variation is large, with warmer nighttime temperatures near the coast and cooler nighttime temperatures further inland (City of Antioch 2003b).

Antioch is located on the south side of the Carquinez Strait, the only sea-level gap in the Coast Ranges of California. Strong, persistent winds usually flow westward through the Carquinez Strait. Wind speeds are generally highest in spring and summer and lowest in fall and winter. During the spring and summer, the daily wind speed variation is greatest, with wind speeds peaking in the late afternoon. During fall and winter, wind speeds and directions are more variable (City of Antioch 2003b).

#### 3.13.2 Air Quality

The Bay Area Air Quality Management District (BAAQMD) operates a network of 28 air monitoring stations that measure air quality levels in the Bay Area. The stations nearest to Contra Loma are located in Concord (14 miles to the west) and Bethel Island (9 miles to the east). The Bay Area is in non-attainment for Federal 8-hour ozone standards and for particulate matter (PM) smaller than 2.5 micrometers (PM2.5) (EPA 2014). The county was classified as attainment for PM10 in July 2014.

Ozone is harmful to public health when it occurs at high concentrations near ground level where it can be inhaled. Ozone can damage the tissues of the respiratory tract and lungs. High concentrations can irritate the nose, throat, and respiratory system, and constrict the airways. Ozone can also aggravate other respiratory conditions and can have negative cardiovascular effects.

Ozone is not emitted directly into the air by a source such as a vehicle, but is formed through a complex series of chemical reactions involving other compounds that are directly emitted. These directly emitted pollutants (also known as ozone precursors) include reactive organic gases (ROGs) and nitrogen oxides (NOx). The principal sources of ROGs and NOx are the combustion of fuels and the evaporation of solvents, paints, and fuels. The main sources of ozone precursors in the Bay Area are motor vehicles; evaporation of solvents, fuels, and other petroleum products;

and combustion at industrial and other facilities (Bay Area Air Quality Management District 2010). Ozone levels are usually highest on hot, windless summer afternoons, especially in inland valleys.

The time period required for ozone formation allows the reacting compounds to spread over a large area, producing a regional pollution problem. Ozone problems are the cumulative result of regional development patterns rather than the result of a few significant emission sources. Depending on meteorological conditions, ozone precursors can be transported well away from the source area before ozone concentrations peak.

PM can consist of many types of particles, including chemical elements such as carbon and metals; compounds such as nitrates, sulfates, and organics; or complex mixtures such as diesel exhaust, wood smoke, and geological dust. Acute and chronic health effects associated with high particulate levels include the aggravation of chronic respiratory diseases; heart and lung disease; and coughing, bronchitis, and respiratory illnesses in children. According to the BAAQMD, fine PM may be the air pollutant that is most harmful to public health in the Bay Area. Additional effects of PM include reduced visibility and soiling of buildings. PM may also influence climate change. Sources of PM include combustion of fossil fuels, wood and agricultural burning, and geological dust, which includes construction dust, road dust, and windblown dust (Bay Area Air Quality Management District 2010).

The strong, persistent winds in Antioch reduce the atmospheric potential for localized air pollution. These winds dilute pollutants and transport them to surrounding regions. Pollutants generated or carried through Antioch by the wind are often carried eastward into the Sacramento and San Joaquin valleys. Likewise, pollutants generated in other portions of the Bay Area to the west are transported to Antioch (City of Antioch 2003b).

Ozone precursors (ROG and NOx) are generated within Contra Loma by fossil fuel combustion from motorized vehicle and maintenance equipment use and by evaporation of solvents, fuels, and other petroleum products used for construction and maintenance activities. PM sources within Contra Loma include fossil fuel combustion, dust generated by construction and maintenance activities, and windblown dust. Ozone precursors and PM are also generated by vehicles traveling to and from Contra Loma.

Some types of land uses are considered more sensitive to air pollution than others. Sensitive receptors are facilities that house or attract children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants. Examples of sensitive receptors include hospitals, schools, convalescent facilities, and residential areas. Parks such as Contra Loma may also be considered sensitive receptors because they attract children and are used for aerobic recreation activities. Sensitive receptors in the vicinity of Contra Loma include nearby residential areas.

Particulate air pollutants, from both naturally occurring and human sources, have been monitored by the BAAQMD at several monitoring stations near Contra Loma, but not within or adjacent to Contra Loma (Bay Area Air Quality Management District 2013). Monthly average levels of PM10 (particulates 10 microns and less in size) at the Concord monitoring station in 2012 were 12.6 micrograms per cubic meter (ug-3). In 2012, the maximum 24-hour PM10 level at Concord

was 35 ug-3. In 2012, the monthly average PM10 level at Bethel Island was 14.1 ug-3, with a maximum 24-hour of PM10 level of 52 ug-3. BAAQMD's Concord station monitored a monthly average PM2.5 level of 6.5 ug-3 in 2012 and a maximum 24-hour PM2.5 level of 32.2 ug-3. California maximum 24-hour standards for PM10 were exceeded on one day in 2012 at Bethel Island but were not exceeded at Concord. California and National annual standards for PM10 were not exceeded at either station, nor were California or National PM2.5 standards exceeded at Concord. BAAQMD does not maintain any stations to monitor particulates closer to Contra Loma than these stations, and does not monitor PM2.5 at Bethel Island.

### 3.13.3 Climate Change

Various gases in the earth's atmosphere, classified as atmospheric greenhouse gases (GHG), play a critical role in determining the earth's surface temperature. Prominent GHGs include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, chlorofluorocarbons, and sulfur hexafluoride. Human-generated emissions of GHGs which exceed natural ambient concentrations are responsible for intensifying the earth's natural greenhouse effect and have led to a trend of unnatural warming of the Earth's climate, known as global climate change or global warming (Ahrens 2003).

Evidence for historic warming of the Earth's climate system, including Earth's near-surface air and ocean temperatures, is now considered to be unequivocal, with global surface temperature having increased approximately 1.33°F over the last 100 years. Future global climate change trends and implications for the U.S. are projected to include:

- An increase in global average temperature between 2 and 11°F over the next 100 years;
- More frequent and longer warm weather extremes across North America;
- A decrease in mean annual precipitation in the southwestern U.S. but an increase over the rest of the continent;
- Widespread increases in extreme precipitation, with greater risks of not only flooding from intense precipitation, but also droughts from greater temporal variability in precipitation;
- Sea level rise from 7 to 23 inches by the end of this century; and
- Reduced snowpack in the western mountains, more winter flooding, and reduced summer flows that would adversely affect the supply of water resources (Intergovernmental Panel on Climate Change 2007).

In the Bay Area, climate change is expected to increase the number of high heat days and wildfires, which would likely exacerbate air pollution in the Bay Area and hinder efforts to attain air quality standards for ozone and PM (Bay Area Air Quality Management District 2010).

Unlike criteria air pollutants, such as ozone and PM, which are pollutants of regional and local concern, GHGs are global pollutants; consequently, climate change is a global problem. In the Bay Area, transportation and commercial and industrial sources generate the most GHG

emissions, accounting for about 70 percent of the Bay Area's GHG emissions. Of these sources, passenger vehicles are the largest, generating about 27 percent of the Bay Area's GHGs. Electricity generated for Bay Area utilities, including electricity imported from outside the Bay Area, accounts for about 16 percent of the GHGs generated by the Bay Area (Bay Area Air Quality Management District 2010). GHG sources attributable to Contra Loma's land uses and activities include passenger vehicle trips, electricity use, fossil fuel combustion from motorized vehicles and maintenance equipment, and livestock use.

The City's baseline community wide GHG emissions inventory was completed in February 2008 as part of the City of Antioch Municipal Climate Action Plan, with a grant from the International Council for Local Environmental Initiatives (City of Antioch 2011c). The inventory reveals that for the year 2005, the City released 308,954 metric tons of CO2 (MTCO2e) in 2005 and, if steps are not taken to achieve reductions, the City is projected to emit 75,000 more MTCO2e in 2020. The City's total community-wide GHG emissions in 2005 are equivalent to the emissions generated by 60,000 passenger vehicles.

# 3.14 Noise

Transportation noise is the most dominant source of noise in the City, followed by noise generated from other routine activities and equipment use. The overall amount of traffic has less influence on road noise levels than vehicle speed and the number of trucks (City of Antioch 2003b).

Contra Loma's noise environment is consistent with its suburban/semi-rural setting. Contra Loma is surrounded by residential areas to the north and southeast, a golf course to the east, and open space to the west and southwest. These land uses typically do not generate substantial volumes of noise. James Donlon Boulevard runs along the northern boundary of the Community Park and is the dominant off-site noise source. Noise from James Donlon Boulevard is more noticeable from the Community Park than from the Regional Park. Distance and intervening topography greatly reduce the level of road noise that is audible from most areas of the Regional Park. Frederickson Lane generates transportation noise that is audible in the southeast portion of the Regional Park; however, similar to James Donlon Boulevard, distance and intervening topography greatly reduce the level of road noise that is audible from most areas of the Regional Park. Aircraft overflights are an intermittent contributor to overall background noise levels as there are no major airports near Antioch.

Noise generated within Contra Loma includes vehicle and mechanical equipment noise, maintenance activities, human voices, sports whistles, wildlife and livestock sounds, splashing water, and gate sounds. Noise from vehicles and mechanical equipment includes motors, closing doors and trunks, and tire squeal. Noise from maintenance activities can include equipment and vehicle noise, trash can handling, mowing, and other activities. Human voices in the area usually range from typical conversations to cheers, shouting, and crowd noise associated with sports league play. Noise generated by sports league play at the Community Park includes vehicle noise, sports whistles, and human voices. Sports league play represents a prominent source of noise generated within Contra Loma. Boating is restricted to electric and human-powered vessels; therefore, boat noise is not a substantial noise source within Contra Loma. The highest noise levels at Contra Loma are located near James Donlon Road and other locations with a high concentration of human and mechanical activity. These locations include the Community Park sports fields and parking lots, the high-use recreation areas along the south shore of the reservoir, parking areas, and trash collection areas. Noise levels generated by recreational land uses and activities vary depending on the timing and intensity of use and activity. Most recreational activity, including sports league play, occurs during evenings and weekends, whereas maintenance activities are typically performed during the day. The intensity of various types of recreational activities also varies seasonally.

Sensitive noise receptors include residences, schools, hospitals, and places of worship. The only sensitive noise receptors within <sup>1</sup>/<sub>4</sub> mile of Contra Loma are the residences to the north and southeast. The nearest residences to the Community Park are north of the park on the opposite side of James Donlon Boulevard. These single-family residences are located 400 feet from sports fields 1 through 3 in the western portion of the Community Park, 500 feet from sports fields 4 and 5, and 200 feet from the parking lots. On the east side of the Community Park, single-family residences are located 1,400 feet from sports fields 4 and 5 and 700 feet from the eastern parking lot. Multi-family residences are located several hundred feet northwest of the Community Park.

The nearest residences to the Regional Park are the single-family residences directly adjacent to the northwest boundary of the park and those backing up to Frederickson Lane on the southeast side of the Regional Park. Visitor use in the northwest and southeast portions of the Regional Park near these residences is primarily limited to hiking, which is a relatively quiet activity that does not generate substantial noise. The residential areas within <sup>1</sup>/<sub>4</sub> mile of Contra Loma have already been completely built-out. Therefore, no new residences are expected to be built in the vicinity of Contra Loma. Neither EBRPD nor the City has received noise complaints from nearby residents.

# 3.15 Visual Resources

# 3.15.1 Visual Character of Contra Loma

The visual setting of the Contra Loma Recreation Area is consistent with its location and character as a regional and community park on the northern edge of the Diablo Range. Views from any given location may include rolling grassland, oak woodland, hills and ridges, the reservoir surface, riparian and wetland habitat, the swim lagoon, park buildings, sports fields, picnic areas, roads, parking areas, and nearby suburban land uses (see Photographs 1 through 12 and Figure 3-17).

The primary visual elements of the recreation area include rolling hills and ridges supporting grassland with scattered oaks, grass-covered valleys, the reservoir surface, and the landscaped recreation facilities along the south side of the reservoir and within the Community Park. The dam is not a primary element of views from most locations in Contra Loma. The dam face can be seen from some areas of the Community Park near the dam; but for most of Contra Loma, views of the dam only include a narrow portion of the rocked dam crest rising above the reservoir water.

The primary visual features located outside Contra Loma and visible from within Contra Loma are the grass- and tree-covered foothills of Mt. Diablo to the south and west, and the landscaping, buildings, and structures of the suburban areas of Antioch to the northwest, north, east, and southeast.

## 3.15.2 Views From within Contra Loma

Views from within Contra Loma also vary depending on the viewer's location. Views from locations on or near the reservoir can include the reservoir surface and shoreline, fishing docks, the boat launch, landscaped picnic areas, the swim lagoon, restrooms, shower facilities, the food concession area, and the EBRPD office. Distant views can also include hills, ridges, and suburban land uses near Contra Loma (see Photographs 1 through 6 and Figure 3-17).

Views from within the Community Park can include sports fields, play grounds, picnic areas, parking lots, trails, and restrooms located within the park. Distant views can also include portions of the Regional Park, and nearby hills, ridges, and suburban land uses. The dam face may also be seen from some locations in the northwesternmost portion of the Community Park (see Photographs 7 through 9 and Figure 3-17).

Views to the north and east from the ridge tops along the southern and western margins of Contra Loma include the reservoir and dam, the landscaped facilities along the southern shoreline of the reservoir, grassland, and distant views of Antioch and the Delta beyond. Views to the south and west from these ridges include distant views of suburban land uses and the grass- and tree-covered foothills of the Diablo Range (see Photographs 10 and 11 and Figure 3-17).

# 3.15.3 Views of Contra Loma from Offsite Locations

Views of Contra Loma from offsite vary depending on the viewer's location. Views from the north include the grass-covered face of Contra Loma Dam, the dam facilities, and the landscaping, sports fields, and parking lots of the Community Park. Elevated views of Contra Loma from the north also include the grassy ridges south and west of the reservoir (see Photograph 12 and Figure 3-17). Views from the east, such as from Lone Tree Golf Course or nearby residences, can include rolling grassland, ridges, landscaping, and sports fields. Views from the south and west are limited to the grassy ridges that line Contra Loma's southern and western margins, although very distant views of other portions of Contra Loma may be available from higher elevation viewpoints on the flanks of Mt. Diablo.

Nighttime views of the Community Park are generally dark, except when the sports fields in the western half of the park are illuminated for night time use. Nighttime views of the Regional Park from offsite locations are generally dark, because nighttime lighting is very limited and nighttime activity is minimal.



Photograph 1. View southwest across the reservoir toward the swim lagoon, picnic areas, and distant ridgelines.



Photograph 2. View north across the reservoir toward the dam with a fishing dock in the foreground. Suburban land uses are visible in the distance.



Photograph 3. View east along the reservoir's southern shoreline within the picnic area east of the swim lagoon.



Photograph 4. View northeast across the swim lagoon and reservoir toward the dam. Steam from an exhaust stack is visible in the distance.



Photograph 5. View northeast along the reservoir's southern shoreline toward the boat launch. Wetland and riparian vegetation is visible.



Photograph 6. Picnic, restroom, and shower facilities adjacent to the swim lagoon.



Photograph 7. View north across Antioch Community Park multi-use sports fields with residences in the distance.



Photograph 8. Soccer field in Antioch Community Park.



Photograph 9. Playground in Antioch Community Park.



Photograph 10. View northeast from the Lake View Trail across the reservoir and dam with distant views of Antioch and the Delta.



Photograph 11. View southeast from the southern ridgeline with distant views of suburban land uses and rolling foothills of the Diablo Range.



Photograph 12. View south from offsite. Antioch Community Park is on the left, Contra Loma Dam is on the right, and the Diablo Range foothills are in the distance.



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#### Figure 3-17 Photo Locations

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# 3.16 Hazards

## 3.16.1 Hazardous Materials

Superfund is the Federal government's program to clean up the nation's hazardous waste sites. Table 3-14 lists the three active and five archived hazardous waste sites that are located in the City. The site locations are shown on Figure 3-18. Active sites are sites at which site assessment, removal, remediation, enforcement, cost recovery, or oversight activities are being planned or conducted under the Federal Superfund program; the archive designation indicates that the site is of no further interest under the Superfund program. None of the eight sites in the City are on the National Priorities List. The nearest active site to Contra Loma is the GBF, Inc. dump site, one mile northwest of Contra Loma (U. S. Environmental Protection Agency 2011).

Site Name/ EPA ID	Site Number (see Figure 3-18)	Status	Location	Approximate Distance from Contra Loma
Antioch Radiator Exchange/ CAD982488942	1	Active	908 West 2nd Street, Antioch, CA 94509	3 miles north of Contra Loma
Fulton Shipyard/ CAD009151762	2	Active	307 Fulton Shipyard Road, Antioch, CA 94509	3 miles north of Contra Loma
GBF, Inc., Dump/ CAD980498562	3	Active	Along James Donlon Boulevard, Antioch, CA 94509	1 mile northwest of Contra Loma
Abandoned Drum - Antioch/ CAD981621956	_	Archived	Antioch, CA 94509	Unknown
Antioch Disposal Site/ CAD980496855	4	Archived	Paso Corto and Somersville roads , Antioch, CA 94509	1 mile northwest of Contra Loma
E. I. Dupont de Nemours & Company, Inc./ CAD009151671	5	Archived	Wilbur Avenue at Bridgehead Road, Antioch, CA 94509	4 miles northeast of Contra Loma
Gaylord Container Corporation East Plant/ CAD009148180	6	Archived	Wilbur Avenue at Viera Avenue, Antioch, CA 94509	4 miles northeast of Contra Loma
PG&E Contra Costa Power Plant/ CAT080011489	7	Archived	Wilbur Avenue, Antioch, CA 94509	4 miles northeast of Contra Loma

Source: U. S. Environmental Protection Agency 2011

GeoTracker is the SWRCB's data management system for managing sites that affect groundwater, especially those that require groundwater cleanup, such as Underground Storage Tanks (USTs), Department of Defense, and Site Cleanup Programs, as well as permitted facilities such as operating USTs and land disposal sites. GeoTracker lists five open cleanup cases within two miles of Contra Loma, as shown in Table 3-15. The site locations are shown on Figure 3-18. The nearest site is the City's Yard property located less than 100 feet north of the Contra Loma Recreation Area boundary (State Water Resources Control Board 2011).



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Contra Loma Reservoir RMP/EIS

Site Name/ GeoTracker ID	Site Number (see Figure 3-18)	Cleanup Status	Location	Approximate Distance from Contra Loma
Antioch Yard Property/ SLT5S0383079	8	Open - Site Assessment	James Donlon Boulevard and Tabora Drive, Antioch, CA 94509	Less than 100 feet north of Contra Loma
Tosco - Facility #5963/ T0601300770	9	Open - Site Assessment	2701 Contra Loma Boulevard, Antioch, CA 94509	1.5 miles north of Contra Loma
Former Exxon 7-3615/ T0601300756	10	Open - Remediation	2610 Contra Loma Boulevard, Antioch, CA 94509	1.5 miles north of Contra Loma
Antioch Landfill/ L10003214546	11	Open	Somersville Road, Antioch, CA 94509	1 mile northwest of Contra Loma
PG&E Antioch Service Yard	12	Open - Site Assessment	Somersville and Buchanan roads, Antioch, CA 94509	2 miles north of Contra Loma

# Table 3-15. Open Groundwater Cleanup Sites Recorded within 2 miles of the Contra Loma Reservoir and Recreation Area

Source: State Water Resources Control Board 2011

Storage and handling of hazardous materials within the Regional Park is limited to relatively small quantities of fertilizers, pesticides, fuels, oils, solvents, and other chemicals used by EBRPD for routine operation and maintenance activities. EBRPD employs safe storage and handling practices in compliance with the standards of the Occupational Safety and Health Administration, the California Division of Occupational Safety and Health, and the County. The City does not store hazardous materials at the Community Park. During a recent three-year analysis period, EBRPD fire personnel responded to two hazardous materials incidents at the Regional Park. EBRPD considers Contra Loma to have a moderate rate of hazardous materials occurrence compared to its other parks (East Bay Regional Park District 2010a).

#### 3.16.2 Dam Failure

Contra Loma Reservoir is located above the City. In 1983, Reclamation's Division of Dam Safety conducted a safety analysis of the reservoir and determined that "safe performance of the dam can be expected under all anticipated loading conditions, including the maximum credible earthquake and probable maximum flood events" (City of Antioch 2003a). The overall safety classification of the dam is registered as satisfactory (City of Antioch 2003a). The risk from dam failure to Contra Loma visitors and to the City is low.

In the unlikely event of dam failure, the path of inundation is expected to generally follow the West Antioch Creek drainage northward from the dam to the San Joaquin River. The inundation area would be approximately <sup>3</sup>/<sub>4</sub> mile wide and the anticipated maximum depth would range from 19 feet directly north of the dam to 7 feet at the San Joaquin River near the City's downtown area (City of Antioch 2003a).

#### 3.16.3 Wildland Fires

Wildland fires can occur in many parts of California, including the Bay Area. Contra Loma is within the City and, thus is not under the jurisdiction of Cal Fire. Although lands adjacent to the City limits and surrounding Contra Loma have been mapped by Cal Fire as being Very High Fire

Hazard Severity zones, fire hazard severity in Contra Loma itself has not been mapped. Because Contra Loma is located within the City, it has been designated by Cal Fire as being a Local Responsibility Area, meaning that local fire protection agencies (e.g., City and/or County rather than Cal Fire) are directly responsible for fire suppression (California Department of Forestry and Fire Protection 2009). As discussed in Section 3.6 (Public Health and Safety), EBRPD and the CCCFPD are responsible for fire management in Contra Loma. During the three-year period from 2006 through 2008, EBRPD responded to five fires at the Regional Park, which represents a slightly above-average occurrence of wildland fires when compared to other EBRPD parks (East Bay Regional Park District 2010a).

# 3.17 Cultural Resources

## 3.17.1 Cultural Setting

Prehistoric human occupation of California stretches back over 12,000 years to the late Pleistocene Era (Moratto 1984). Evidence of the earliest known occupation of the Contra Loma region and San Francisco Bay Area was found during archaeological investigations at Los Vaqueros Reservoir, located approximately 11 miles southeast of Contra Loma. The excavations there revealed prehistoric occupation of the East Bay Area from approximately 8,000 years before the present day (BP) to the historic period as late as 200 BP (Milliken et al. 2007). Native peoples engaged in their traditional lifeways until the ethnographic and early historic period just prior to sustained contact with Euro-American groups. The Contra Loma region is situated in an area formerly occupied by the Karkin Costanoan (Ohlone) and Bay Miwok (Milliken et al. 2007). Some of the earliest accounts of the ethnographic Costanoans date to the 1760s when Spain was expanding its empire through exploratory expeditions and the establishment of the mission system in the coastal and inland regions of southern and central California.

Supported by Spanish and later Mexican governments and private individuals the main economic pursuits in the Contra Loma area during the 19<sup>th</sup> century consisted of farming, ranching, and dairying. Several homestead patents in the vicinity of the Area of Potential Effects (APE) were awarded in the 1870s and were occupied by individuals and families engaged in the agricultural industry (Hulaniski 1917). At the same time farms and ranches were being established in the Contra Loma area, the discovery of large deposits of coal in the nearby "Black Diamond" area further spurred agricultural and industrial activity in the Contra Loma region. Mining towns such as Nortonville, Somersville, Stewartville, West Hartley, and Judsonville were important centers from the 1860s through the last years of the 19th century. Although coal mining did not occur within the boundaries of the APE, transportation routes such as wagon roads and railroads passed through the area and connected the mines with Antioch and the larger Bay Area markets.

Following the decline of the coal mining industry in the region, agricultural and ranching pursuits continued to thrive and formed the basis of the regional economy throughout much of the 20th century. In order to support these industries, provide water to the drier southern regions of California, reduce seasonal flooding, and foster continued development in the state, the CVP was established and constructed between the 1930s and 1960s. Part of this state-wide system, one of the largest public works projects in the U.S., is the Delta Division which includes the Contra Loma Dam and Reservoir located within the APE. Contra Loma Dam was completed in 1967 and the reservoir serves as an off-stream water storage facility for the Contra Costa Canal

(also a CVP component; Stene 1994). Completed prior to the full adoption of Section 106 of the National Historic Preservation Act, no cultural resources investigations were conducted before the dam and reservoir were built.

## 3.17.2 Study Methodology

Research into cultural resources issues consisted of several avenues of investigation. These included, but were not necessarily restricted to, archival research conducted through the Northwest Information Center of the California Historical Resources Information System, and reviews of additional sources such as the USGS Historic Topographic Map Collection, the National Register of Historic Places (NRHP), the California Register of Historical Resources, the Contra Costa Historical Society, and documents curated by Reclamation. Research also consisted of Native American community outreach, and a reconnaissance field survey intended to verify the presence and integrity of cultural resources previously identified within and adjacent to the APE .

## 3.17.3 Identified Cultural Resources

Archival research and a reconnaissance field survey resulted in the identification of prehistoric and historic-era cultural resources within Contra Loma. The survey also updated existing information on one prehistoric site (CA-CCo-572) and examined its surrounding vicinity for potentially undocumented components or other unrecorded cultural resources.

This research revealed that 10 cultural resources investigations have been conducted within Contra Loma. These studies resulted in the archaeological survey of approximately 170 acres within Contra Loma (approximately 23 percent of Contra Loma lands including the 80 surface acres of the reservoir) and surveys of about 3.8 miles of roadways and trails within Contra Loma. These studies, along with historic mapping, Reclamation documents, and other sources, indicates that 12 prehistoric and historic-era sites and features have been identified within or immediately adjacent to Contra Loma. These sites represent early Native American use of the landscape and historic-era activities such as ranching, transportation, and water storage and conveyance in and around Contra Loma. Additional sites, features, and artifacts associated with prehistoric and historic-era activities may be present in un-surveyed portions of the APE.

#### **Prehistoric Sites**

*CA-CCo-572.* This site is located within the APE and was originally documented in 2008. A 2011 reconnaissance survey noted the presence of three isolated prehistoric artifacts not documented in the original 1988 records for this site. These artifacts were discovered over 45 meters away from the site and consisted of a single flake to the northwest and a core fragment and single flake to the southeast of the site. These artifacts were of the same lithic material as all the artifacts located on the site: a dark gray to off-white to reddish-yellow cryptocrystalline silicate. Bedrock outcrops are visible on the site surface suggesting shallow soil development.

The site record for CA-CCo-572 was updated following the field survey. The condition of the previously recorded portions of this site appears to be unchanged from the initial recording and no indications of midden soils or subsurface deposits were noted. This site has not been assessed as to NRHP listing eligibility.

*CA-CCo-385.* This site is located adjacent to but outside of the APE. The site consists of prehistoric and historic-era components situated on a hill approximately 200 meters east of the Community Park boundary and north of the Antioch Municipal Reservoir. It is likely that these sites have been destroyed by the development of the surrounding residential neighborhood. CA-CCo-385 was a possible midden with fire-affected rock; quartzite, chalcedony, basalt, and petrified wood debitage; and sandstone and basalt groundstone tools. The site also had a historic component containing an abandoned cattle watering trough, square nails, ceramics, and redwood posts. This site was located in a swale that contained an active spring but is now covered and possibly destroyed entirely by houses and the intersection of Dunes and Andrews Way. This site was not revisited at the time of the 2011 survey and has not been assessed for NRHP listing eligibility.

*CA-CCo-386.* This site, which contains both prehistoric and historic-era artifacts, is located adjacent to but outside of the APE and was documented in the immediate vicinity of CA-CCo-385. A possible midden with fire-affected rock, chert debitage, and sandstone groundstone tools were recorded along with a historic-era component consisting of a fig tree, metal, ceramics, and an unspecified trash scatter. As with CA-CCo-385, this site appears to have been destroyed by residential and roadway construction. Both this site and CA-CCo-385 were situated within lands included in the 1872 Sale-Cash Entry land patent of Benjamin Hockabout (Bureau of Land Management, General Land Office 1872). The 1879 Contra Costa County tax roll listed Dr. Samuel Adams as the landowner. This site was not revisited at the time of the 2011 survey and has not been assessed for NRHP listing eligibility.

## Ranching and Agricultural Sites

*Structure Location.* A structure (possibly a windmill) noted on the 1898 Mount Diablo USGS quadrangle (and later maps) within the APE was not relocated. The mapped location of the structure is currently covered in thick cattails and riparian vegetation along the reservoir shore and covered in thick grasses on the small hill between the reservoir and the road. Although the heavy vegetation could be obscuring at least some remains of the windmill, dam and reservoir construction more than likely destroyed any traces of this structure. This site has not been assessed for NRHP listing eligibility.

Ranch Complex Location. The 1989 Contra Loma Regional Park Land Use Development Plan Amendment and Environmental Impact Report/Environmental Assessment (EIR/EA): Antioch Community Park at Contra Loma (City of Antioch and Bureau of Reclamation 1989) discusses the presence of an old ranch complex in the APE where the Community Park is now located. The EIR/EA includes a discussion of integrating the remnant almond orchard, ornamental eucalyptus trees, and various non-native shrubs into the park infrastructure. The EIR/EA also includes a map that indicates the presence of an old stock pond and the former location of the ranch house. However, there is no indication that the historic-era ranch was formally documented through the California Historic Resource Information System and no evidence of this ranch complex was noted during the 2011 reconnaissance survey. This site has not been assessed for NRHP listing eligibility.

*Historic-era Building Location.* An unidentified building or other structure is depicted on 1898 and 1916 USGS maps of Contra Loma and the surrounding area. This location is presently under the Contra Loma Reservoir. Any traces of this location were almost certainly destroyed or at

least inundated by the construction of the reservoir in the 1960s. Because the site could not be visited and has almost certainly been destroyed, it has not been assessed for NRHP listing eligibility.

#### Historic Transportation Routes

*Empire Railroad.* A segment of the old Empire Railroad alignment cut through the southeasternmost portion of the APE. The feature was related to the Empire Company which was founded in 1876 by George Hawxhurst and John C. Rouse to mine the rich coal veins in the Black Diamond area. Initially, the company transported coal by wagon teams to the coal wharf at Antioch about six miles to the north. The company built the narrow gauge Empire Railroad in 1877 to improve the transport of coal to Antioch and from there to the broader Bay Area markets. The Empire Company ceased operations in 1902 and presumably abandoned their rail line at that time.

This feature has not been recorded as a cultural resource and an examination of the general area of the APE within which the rail alignment would have extended did not reveal any traces of its presence. According to USGS mapping, the Empire Railroad line appears to have been partially realigned and repurposed sometime between 1941 and 1947. The 1941 USGS Mount Diablo quadrangle shows the alignment as a railroad and following the same route as noted on the 1898 Mount Diablo quadrangle map. However, according to the 1947 USGS Mount Diablo quadrangle, the line had been straightened and shifted slightly to the east to conform to the USGS map section line. Around this time the alignment appears to have been converted to a surface road. Due to its realignment and re-purposing, and the lack of any physical evidence for its presence, this feature does not retain any physical integrity or integrity of setting. This site has not been assessed for NRHP listing eligibility.

*Oil Canyon Road.* An early 20<sup>th</sup> century alignment of Oil Canyon Road appears to exist within the APE to the south of the reservoir. It extends due south from the boat launch at the south side of the reservoir to the edge of Contra Loma as a paved road. The alignment continues to the south and outside Contra Loma as a graveled access/ranch road onto private undeveloped land and was noted during the field survey. The portion of the road alignment appears to have been destroyed or at least inundated by the construction of the Contra Loma Dam and Reservoir. This site has not been assessed for NRHP listing eligibility.

*James Donlon Boulevard*. Located along the northern boundary of the APE, this east-west trending road was first documented on the 1898 Mount Diablo USGS topographic quadrangle map. This roadway did not constitute a major route but was merely a local access route throughout much of the 20<sup>th</sup> century. By the latter half of the 20<sup>th</sup> century the road was expanded and ultimately named James Donlon Boulevard presumably in honor of James D. Donlon who served as Mayor of the City of Antioch and as a councilman for many years in the late 19<sup>th</sup> century (Contra Costa County Community Development Department Historic Resources Inventory 2010). This site has not been assessed for NRHP listing eligibility.

#### Water Conveyance and Storage Sites

*Contra Loma Dam and Reservoir.* The Contra Loma Dam and Reservoir are components of the Delta Division of the CVP and constitute an off-stream water storage site for the Contra Costa Canal. The dam, an earth fill structure, was completed in 1967 and has a structural height of 107 feet and a crest length of 1,050 feet. The reservoir measures approximately 80 acres in surface

area and retains 2,100 acre-feet of water. The dam and reservoir are owned by the U.S. Government. CCWD has been operating and maintaining the reservoir, under contract with Reclamation since 1967, as a regulating reservoir for peak or short-term municipal water supplies for CCWD customers, and also for emergency storage and as a backup water supply.

The Contra Loma Dam and Reservoir is an important element in the Delta Division of the CVP system. Even though the facility is of fairly recent construction it will reach the minimum age of 50 years per the NRHP criteria during implementation of the Contra Loma Recreation Area Resource Management Plan. CVP dams such as Contra Loma may be eligible under Criterion A if they are demonstrably associated with the agricultural development of the state or region, played a determining role in the history of the CVP or the Bureau of Reclamation, or created key storage reservoirs associated with the CVP. Reclamation considers and treats the CVP as eligible under Criterion A for its national and local economic contribution to the development of California. Therefore, the dam may be determined eligible for NRHP listing as a contributing property to the CVP (Perry, pers. comm. 2014).

*P-07-002695-Contra Costa Canal.* The Contra Costa Canal, which forms the northern border of APE, was constructed by Reclamation and is part of the larger CVP. The canal is 47 miles long and supplies water along its length from the headgates at Rock Slough in the Delta to the City of Martinez. Construction on the canal began in 1937 and was completed in 1951. The Canal was determined eligible for listing on the NRHP, through consensus with the California State Historic Preservation Officer dated March 9, 2005, due to its association with the CVP and the development of agriculture and irrigation in California.

Antioch Municipal Reservoir. The Municipal Reservoir was created in the late 1920s to serve the citizens of the City of Antioch, is not associated in any with the Contra Loma Dam/Reservoir, and is not situated within or immediately adjacent to the APE. The reservoir was constructed solely to provide water to the City of Antioch. It was not part of a larger system such as the CVP and consequently did not contribute to the broader patterns of water acquisition, conveyance, and distribution. This site has not been assessed for NRHP listing eligibility. The reservoir is situated to the east and outside of the APE and would not be affected by any projects within Contra Loma.

# Current Condition of the APE

A 2011 reconnaissance survey and archival research indicate that large portions of the APE have been subjected to intensive developments that would have disturbed or destroyed identified and presently undocumented cultural resources. These developments consist of the Contra Loma Dam/Reservoir, recreational facilities and infrastructure associated with the Regional Park, which are situated primarily along the south side of the Reservoir. This developed area, including the 80 acres covered by the reservoir, consists of approximately 149.3 acres. Additional recreational features and construction related to the Community Park in the northeast section of the APE have disturbed an additional approximately 36.8 acres. In total, approximately 25 percent of the APE has been disturbed by dam/reservoir and recreation-associated developments. Although many of the individual developments within the APE possess limited footprints (e.g. roads, trails, boat launch, restrooms, etc.), collectively they have affected a fairly large area and have reduced the potential for additional discoveries in those areas in both surface and subsurface contexts. Small intact sites, isolated artifacts, or sparse scatters of archaeological

materials may still exist in these developed areas. However, in general, any larger or potentially significant (per NRHP criteria) cultural resources in these areas likely would have been destroyed or at least damaged by construction activities.

In addition, portions of the APE (approximately 170.62 acres [about 23 percent]) have been subjected to surface archaeological surveys including those conducted in 2011 for this EIS. The 2011 surveys resulted in the identification of only three cultural resources; CA-CCo-572, Contra Loma Dam/Reservoir, and the Contra Costa Canal which is situated outside but immediately adjacent to the northern edge of the APE. However, it is important to note that some of these studies were conducted prior to the development of present-day survey and research methodologies and may not meet today's requirements for identification efforts.

# 3.18 Socioeconomics and Environmental Justice

#### 3.18.1 Population

Table 3-17 presents population figures for California, the County, and the City. Between 2000 and 2010, the population of all of these areas increased. The rates of population growth in the County (10.6 percent) and the City (13.1 percent) were higher than the state average of 10 percent (California Department of Finance 2011a).

Location	2000	2010	% Change 2000-2010						
California	33,871,653	37,253,956	10.0%						
Contra Costa County	948,816	1,049,025	10.6%						
Antioch	90,532	102,372	13.1%						

Table 3-17. Population Estimates for California, Contra Costa County, and Antioch

Source: California Department of Finance 2011a

The County is among the state's most populous counties. Major factors contributing to the County's population growth over the past two decades include close proximity to major employment centers in San Francisco and Oakland; development of new employment centers in the I-680 corridor and the Livermore/Pleasanton area; the availability of rapid transit; and relatively affordable housing prices compared with other parts of the Bay Area. During the 1990s, the County's population growth was strongest in the eastern portion of the County, particularly in Antioch, Brentwood, and Oakley. Over the coming decade, much of the County's population growth is expected to occur in the eastern portion of the County in and around Antioch and in San Ramon (Contra Costa County 2005).

Population growth in the City over the past two decades can be largely attributed to the expansion of employment centers in the Concord/Walnut Creek and Livermore/Pleasanton areas, combined with an increasing lack of affordability in locations closer to the major Bay Area employment centers. The City's large supply of vacant land, attractive physical setting, and accessibility to the SR 4 freeway has attracted large numbers of people to the City (City of Antioch 2003a).

Table 3-18 shows projected growth from 2010 to 2030 (approximately 20 years from present) for California and the County, and Table 3-19 shows projected growth from 2010 to 2025 (approximately 15 years from present) for the City. From 2010 to 2030, the populations of California and the County are projected to grow by 32.2 percent and 35.6 percent, respectively, with average annual increases of 1.6 percent and 1.8 percent, respectively. These projections indicate that the County's population will increase at a slightly higher rate than that of the state (California Department of Finance 2011b). From 2010 to 2025, the population of the City is expected to grow by 16 percent, with an average annual increase of 0.8 percent. This projection shows that the City is expected to grow at about half the rate of California and the County (City of Antioch 2003a).

Location	2010	2030	Change 2010-2030	% Change 2010-2030	Annual % Change	
California	37,253,956	49,240,891	11,986,935	32.2%	1.6%	
Contra Costa County	1,049,025	1,422,840	373,815	35.6%	1.8%	

Table 3-18.	State and Cour	ty Population	Projections	2010-2030
	•••••••••••			

Source: California Department of Finance 2011b

#### Table 3-19. Antioch Population Projections 2010–2025

Location 20	10 2025	2010-2025	2010-2025	% Change
Antioch 102	2,372 118,8	00 16,428	16.0%	0.8%

Source: City of Antioch 2003a

#### 3.18.2 Housing

Table 3-20 presents housing data for California, the County, and the City. Between 2000 and 2010, the total number of housing units and the number of occupied units in the County and the City increased by more than the state average of 12 percent for total and 9.3 percent for occupied. The City experienced a higher increase than the state and the County in both total housing and occupied housing with 15.7 percent and 9.9 percent, respectively. These data support the fact that the City experienced higher growth rates than the rest of the County during that time period. Table 3-20 also shows that the City experienced a greater decrease in occupancy rates (5 percent) than either the state or the County. In other words, the City experienced a greater percent increase in vacancy rates than both the state and the County between 2000 and 2010. The City's 2010 housing occupancy rate (92.5 percent) remains a bit higher than the state's rate of 91.9 percent and lower than the County's rate of 93.8 percent (California Department of Finance 2011c).

	Total	Housing U	nits	Occupie	Occupancy Rate				
Location	2000	2010	% Change 2000- 2010	2000	2010	% Change 2000- 2010	2000	2010	% Change 2000- 2010
California	12,214,549	13,680,081	12.0%	11,502,870	12,577,498	9.3%	94.2%	91.9%	-2.4%
Contra Costa County	354,577	400,263	12.9%	344,129	375,364	9.1%	97.1%	93.8%	-3.4%
Antioch	30,116	34,849	15.7%	29,338	32,252	9.9%	97.4%	92.5%	-5.0%

#### Table 3-20. Housing Occupancy Estimates

Source: California Department of Finance 2011c

As shown in Table 3-21, the median housing values in the City are lower than those in the County and the state, and County home values are higher than those in the state and the City. Between 2000 and 2009, housing values in the City and the County increased by less than the state average. During that period, the median home value in the City increased from \$195,300 to \$256,500 (31.3 percent), the median home value in the County increased from \$253,800 to \$424,500 (67.3 percent), and the median home value in the state increased from \$211,500 to \$384,200 (81.7 percent) (Bureau of Reclamation 2007; City-Data.com 2011).

#### Table 3-21. Median Housing Value

Location	2000 Median (dollars)	2009 Median (dollars)	% Change 2000-2009
California	211,500	384,200	81.7%
Contra Costa County	253,800	424,500	67.3%
Antioch	195,300	256,500	31.3%

Sources: Reclamation 2007; City-Data.com 2011

#### 3.18.3 Employment and Income

Total number of people employed in the County in 2010 was 343,412 (Census Bureau 2010a). The leading occupational categories include managerial/professional and

sales/technical/administrative. Major industries in the County include petroleum refining, telecommunications, retail and financial services, steel manufacturing, prefabricated metals, chemicals, electronic equipment, paper products, and food processing. Over the period between 2000 and 2020, the three largest job growth centers in the County have been, and are projected to be, San Ramon, Concord, and Richmond. Antioch, San Ramon, and Brentwood are expected to experience the largest growth in retail employment (Contra Costa County 2005). The countywide average wage paid per job in 2005 was \$51,416 (California Department of Finance 2011d).

In 2000, the Census reported the City's total civilian labor force to be 43,893; total employment was 41,598. Most of the City's employed residents have sales or office-based jobs, and many of these are located outside the City. Other occupations held by City residents include service industry, construction, and production/transportation jobs. By 2025, service industry jobs are expected to comprise around half of the job opportunities within the City (City of Antioch 2003a).

## 3.18.4 Expenditures for Fishing and Wildlife Viewing

Fishing and wildlife viewing bring visitors and visitor expenditures to recreation areas, such as Contra Loma, and their surrounding regions. Fishing permits and licenses also generate revenues for the issuing government agencies. In 2011 in California, \$2.3 billion was spent on fishing recreation, of which \$1.6 billion was for trip-related expenditures, \$577 million was for equipment purchases, and \$71 million was for the purchase of other items, such as magazines, membership dues, licenses, permits, stamps, and land leasing and ownership. The average expenditure per angler was \$1,333 and the average angler trip expenditure per day was \$68. The average expenditure per wildlife watching participant was \$533 per day with an average trip expenditure of \$65 (Fish and Wildlife Service and Census Bureau 2013). In California, in 2012, sales generated by sport fishing licenses totaled \$56,959,464 (California Department of Fish and Wildlife 2013b).

#### 3.18.5 Environmental Justice

In order to comply with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, data was compiled concerning the ethnic composition and income and poverty levels of the state, the County, and the City. Table 3-22 shows that in 2000, the percentage of non-Hispanic minorities throughout the state was 40.5 percent, and people of Hispanic ethnicity were 32.4 percent of the state's population. By 2010, the percentage of non-Hispanic minorities throughout the state to 42.4 percent and people of Hispanic ethnicity had increased to 37.6 percent of the state's population. During that period, the percentage of people of white ethnicity in the state's population decreased from 59.5 percent to 57.6 percent. People of Hispanic ethnicity represent the largest minority in California (California Department of Finance 2011e).

Table 3-23 shows that in 2000, the percentage of non-Hispanic minorities in the County was 34.5 percent, and people of Hispanic ethnicity were 17.7 percent of the County's population. By 2010, the percentage of non-Hispanic minorities in the County had increased to 41.4 percent and people of Hispanic ethnicity had increased to comprise 24.4 percent of the County's population. During that period, the percentage of white ethnicity in the County's population decreased from 65.5 percent to 58.6 percent. Similar to California, people of Hispanic ethnicity represent the largest minority in the County (California Department of Finance 2011e).

Table 3-24 shows that in 2000, the percentage of non-Hispanic minorities in the City was 34.7 percent, and people of Hispanic ethnicity were 22.1 percent of the City's population. By 2010, the percentage of non-Hispanic minorities in the City had increased to 51.1 percent and people of Hispanic ethnicity had increased to comprise 31.7 percent of the City's population.

During that period, the percentage of white ethnicity in the City's population decreased from 65.3 percent to 48.9 percent. People of Hispanic ethnicity represent the largest minority in the City, but represent a smaller percentage of the City population than they do in the County or throughout the state. Non-Hispanic minorities, however, comprise a substantially higher percentage of the City's population than they do in the State (California Department of Finance 2011e).

The Census Bureau uses a set of income thresholds that vary by family size and composition to determine which families are living in poverty. If a family's total income is less than its

threshold, then that family, and every individual in it, is considered to be living in poverty. Poverty thresholds do not vary geographically, but they are updated annually for inflation using the Consumer Price Index. For individuals who do not live with family members, their own income is compared with the appropriate threshold. According to the Census Bureau, the 2010 poverty threshold is \$11,344 for an individual under 65 years of age and \$22,113 for a family of four with two minor children (Census Bureau 2010b). Table 3-25 shows estimated median household income and poverty levels for the County, the City, and the state. According to the Census Bureau, the percentage of the populations of the County and City at income levels below the poverty threshold was lower than the state average of 13.2 percent, with 8.6 and 12.5 percent, respectively. The median household income for the County (\$93,400) is higher than the state (\$77,596), whereas the median household income for the City (\$57,714) is lower than the state (Census Bureau 2009; Fannie Mae 2011).

Year	Population/ Percent	White	Hispanic <sup>1</sup>	Asian	Black or African American	Native American	Pacific Islander	Other Race	Multi-Race	% Non-white (excluding Hispanic)	Total
2000	Population	20,170,059	10,966,556	3,697,513	2,263,882	333,346	116,961	5,682,241	1,607,646		33,871,648
	Percent	59.5%	32.4%	10.9%	6.7%	1.0%	0.3%	16.8%	4.7%	40.5%	
2010	Population	21,453,934	14,013,719	4,861,007	2,299,072	362,801	144,386	6,317,372	1,815,384		37,253,956
2010	Percent	57.6%	37.6%	13.0%	6.2%	1.0%	0.4%	17.0%	4.9%	42.4%	

 Table 3-22. Population Ethnicity Estimates for California

Source: California Department of Finance 2011e

Notes: ""Hispanic" ethnicity population estimates are accounted for within the estimates for the other ethnicities, but are shown here separately for informational purposes.

Year	Population/ Percent	White	Hispanic <sup>1</sup>	Asian	Black or African American	Native American	Pacific Islander	Other Race	Multi-Race	% Non-white (excluding Hispanic)	Total
	Population	621,490	167,776	103,993	88,813	5,830	3,466	76,510	48,714		948,816
2000	Percent	65.5%	17.7%	11.0%	9.4%	0.6%	0.4%	8.1%	5.1%	34.5%	
2010	Population	614,512	255,560	151,469	97,161	6,122	4,845	112,691	62,225		1,049,025
	Percent	58.6%	24.4%	14.4%	9.3%	0.6%	0.5%	10.7%	5.9%	41.4%	

 Table 3-23. Population Ethnicity Estimates for Contra Costa County

Source: California Department of Finance 2011e

Notes: 1"Hispanic" ethnicity population estimates are accounted for within the estimates for the other ethnicities, but are shown here separately for informational purposes.

Year	Population/Per cent	White	Hispanic <sup>1</sup>	Asian	Black or African American	Native American	Pacific Islander	Other Race	Multi-Race	% Non-white (excluding Hispanic)	Total
2000	Population	59,148	20,024	6,697	8,824	843	360	8,352	6,308		90,532
	Percent	65.3%	22.1%	7.4%	9.7%	0.9%	0.4%	9.2%	7.0%	34.7%	
2010	Population	50,083	32,436	10,709	17,667	887	817	14,310	7,899		102,372
	Percent	48.9%	31.7%	10.5%	17.3%	0.9%	0.8%	14.0%	7.7%	51.1%	

#### Table 3-24. Population Ethnicity Estimates for Antioch

Source: California Department of Finance 2011e

Notes: 1"Hispanic" ethnicity population estimates are accounted for within the estimates for the other ethnicities, but are shown here separately for informational purposes.

#### Table 3-25. Median Family Income and Poverty

Location	Median Household Income (Family of 4)	Number in Poverty¹	Percent in Poverty <sup>1</sup>
California	\$77,596 <sup>1</sup>	4,694,423	13.2%
Contra Costa County	\$93,400 <sup>2</sup>	86,720	8.6%
Antioch	\$57,747 <sup>2</sup>	12,336	12.5%

Sources: City-Data.com 2011; Census Bureau 2010b; Census Bureau 2009; Fannie Mae 2011 Notes: <sup>1</sup> 2009 data; <sup>2</sup> 2010-2011 data

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