SECTION 3

EXISTING ENVIRONMENT AND POTENTIAL PROJECT EFFECTS

In addition to this introductory information, this section is divided into two subsections. Section 3.1 provides a general description of the river basin in which the Project occurs. Section 3.2 provides existing, relevant and reasonably available information regarding the resources, as well as known or potential Project effects on these resources.

3.1 General Description of the River Basin

3.1.1 Existing Water Projects in the Bear River Basin

Four existing water projects, all of which are under FERC's jurisdiction, occur in the Bear River Basin. Together, these four projects have a combined FERC-authorized capacity of 277.95 MW, of which the Camp Far West Project represents approximately 2.4 percent of the total capacity. Each of these water projects is described briefly below.

3.1.1.1 Drum-Spaulding Project

PG&E's 190-MW Drum-Spaulding Project, FERC Project No. 2310, is located on the South Yuba River, Bear River, North Fork of the North Fork American River and tributaries to the Sacramento River Basin in Nevada and Placer counties, California. Major project reservoirs include Lake Spaulding (74,773 ac-ft) on the South Yuba River and Fordyce Lake (49,903 ac-ft) on Fordyce Creek. In addition, the Drum-Spaulding Project includes numerous smaller reservoirs on tributaries to the South Yuba River, and diversions from the South Yuba River to Deer Creek via the South Yuba and Chalk Bluff Canals (maximum capacity of 107 cfs) and to the Bear River via the Drum Canal (840 cfs). In anticipation of the expiration of the initial license on April 30, 2013, PG&E filed with FERC an application for a new license on April 12, 2011. In that application, PG&E requested FERC split the existing license into three separate licenses, one each for the Upper Drum-Spaulding Project, Lower Drum-Spaulding Project and Deer Creek Project. Since the initial license expired, PG&E has operated the Project under annual licenses from FERC and is expected to continue to do so until a new license is issued.

3.1.1.2 Yuba-Bear Hydroelectric Project

NID's 79.3-MW Yuba-Bear Hydroelectric Project, FERC Project No. 2266, is a water supply/power project constructed in the 1960s, though some project facilities were initially constructed in the late 1800s. The project includes a storage reservoir on the Middle Yuba River (i.e., Jackson Meadows Reservoir) with a gross storage capacity of 69,205 ac-ft, five storage reservoirs on Canyon Creek (i.e., Jackson, French, Faucherie, Sawmill and Bowman) with a combined gross storage capacity of 90,790 ac-ft, and a storage reservoir on the Bear River (Rollins Reservoir) with a gross storage capacity of 58,682 ac-ft. The Project also includes a

diversion with a maximum capacity of about 450 cfs via the Milton-Bowman Diversion Dam from the Middle Yuba River to Bowman Lake on Canyon Creek, and a diversion with a maximum capacity of about 300 cfs via the Bowman-Spaulding Canal from Bowman Lake on Canyon Creek to PG&E's Lake Spaulding on the South Yuba River. In anticipation of the expiration of the initial license on April 30, 2013, NID filed with FERC an application for a new license on April 15, 2011. Since the initial license expired, NID has operated the Project under annual licenses from FERC and is expected to continue to do so until a new license is issued.

3.1.1.3 Lake Combie/Combie North Aqueduct Projects

The 1.5-MW Lake Combie Project, FERC Project No. 2981, along with the 0.35-MW Combie North Aqueduct Project, FERC Project No. 7731, are FERC-exempt power projects constructed in the 1980s at NID's Van Geisen Dam, that forms Lake Combie, on the Bear River. The dam was originally constructed in 1928. Lake Combie has a gross storage capacity of 5,555 ac-ft.

3.1.1.4 Camp Far West Hydroelectric Project

The existing Camp Far West Hydroelectric Project is described in Section 2 of this PAD.

3.1.2 The River Basin

Provided below is a description of the general setting of the Project Vicinity. The discussion focuses primarily on the Project Area. A general description of the Feather River downstream of the Bear River confluence and the Sacramento River is also provided for reference.

Figure 3.1-1 is a streambed gradient profile of the Bear River and its tributaries from and including Camp Far West Reservoir, the most upstream Project facility, to the Bear River's confluence with the Feather River. Figure 3.1-2 shows Bear River drainage sub-basins.

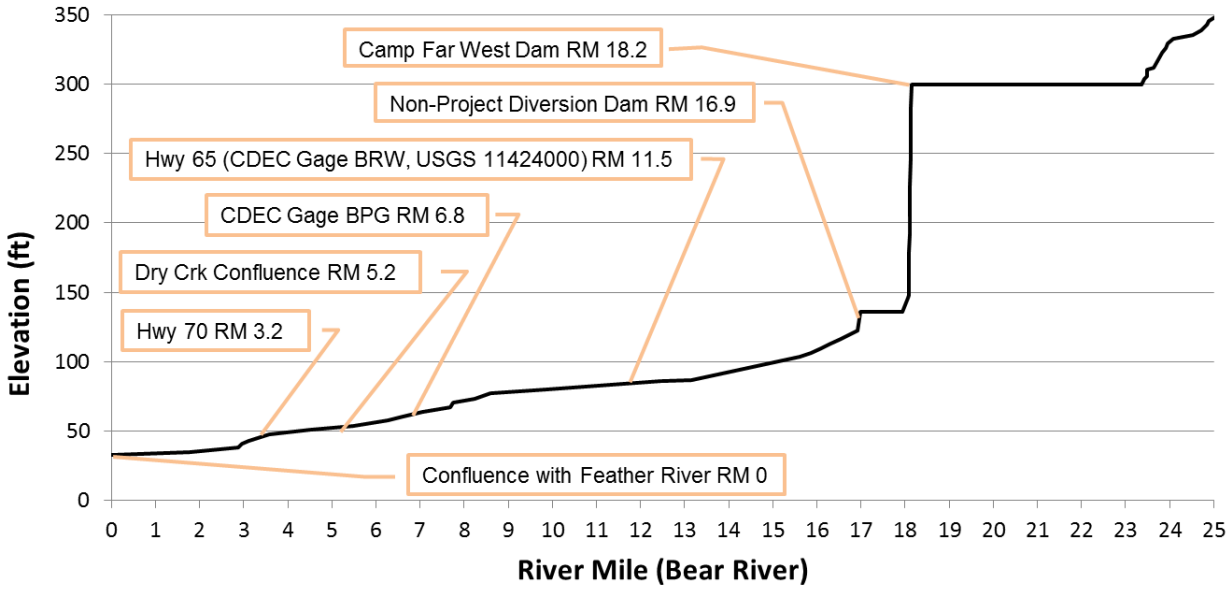

Figure 3.1-1. Streambed gradient of the Bear River from Camp Far West Reservoir, the most upstream Project facility, to the Bear River's confluence with the Feather River.

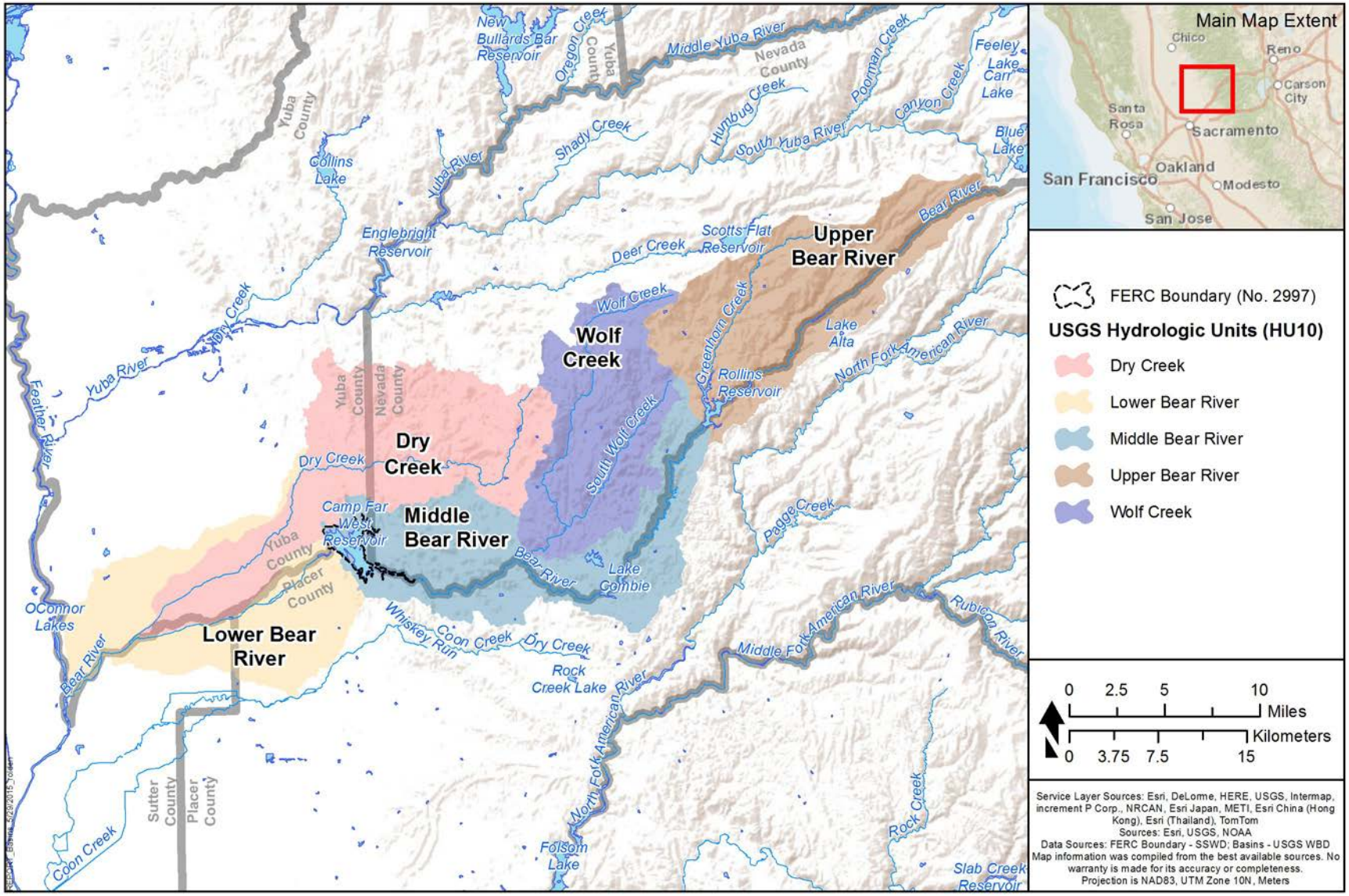

Figure 3.1-2. Bear River drainage sub-basins.

3.1.2.1 Bear River Basin

The Bear River basin is on the western slope of the Sierra Nevada and is bounded by the Yuba River basin to the north, the American River basin to the south, and the Feather River basin to the west. The Bear River originates near Emigrant Gap in Nevada County in Township 17 North, Range 12 East at an elevation of approximately 4,900 ft and then flows southwesterly for approximately 75 mi to its confluence with the Feather River northeast of the town of East Nicolaus, CA, at an elevation of about 50 ft. The Bear River drains approximately 400 sq mi in Yuba, Nevada, Sutter, and Placer counties. The average annual flow of the Bear River from WY 1975 to WY 2014 as measured at the USGS Gage 11424000, *Bear River at Wheatland*, at RM 11.5 is 376 cfs, and the annual flow has ranged from a maximum of approximately 1,191 cfs in WY 1983 to a minimum of approximately 3 cfs in WY 1977.

Upstream of Camp Far West Reservoir at RM 74.5, PG&E's Drum-Spaulding Project Drum Canal can add up to 840 cfs of water to the natural flow in the Bear River at PG&E Drum Forebay, which is at elevation (El.) 4,756 ft and has a gross storage capacity of 621 ac-ft. Other small impoundments in the Bear River include PG&E's Drum Afterbay at RM 65.9, which is at El. 3,383 ft, and NID's Dutch Flat Afterbay at RM 60.5, which is at El. 2,740 ft and has a gross storage capacity of 1,397 ac-ft. Major storage reservoirs in the Bear River occur at RM 50.4 (NID's Rollins Reservoir at El. 2,171 ft with a gross storage capacity of 58,682 ac-ft) and at RM 37.2 (NID's Lake Combie at El. 1,600 ft with a gross storage capacity of 5,555 ac-ft). Out-of-basin diversions occur at RM 50.3 (PG&E's Bear River Canal with a maximum capacity of 470 cfs) and at RM 37.2 (NID's Combie Phase I Canal with a maximum diversion of 200 cfs).

From the Van Giesen Dam, the Bear River flows another 13.8 mi until it reaches the NMWSE (i.e., El. 300 ft) of Camp Far West Reservoir at RM 23.4.

Camp Far West Reservoir is relatively shallow and has an average retention time of about 4 months. The reservoir has two main arms. The longer arm extends approximately 5.2 mi upstream of the dam into the Bear River, and the shorter arm extends upstream about 2.4 mi into Rock Creek, a small tributary to the Bear River. The lower portion of the Bear Creek arm is the widest portion of the reservoir at about 1-mi wide. Most of the land surrounding Camp Far West Reservoir is undeveloped (i.e., no roads or residential communities), with the exception of the recreation areas.

Based on recent bathymetric surveys, the Camp Far West Reservoir has a gross storage capacity of 93,740 ac-ft, which results in a surface area is 1,886 ac and a shoreline length of 29 mi. At the minimum operating pool (El. 175 ft),[1] the reservoir has a gross storage of 1,310 ac-ft and a surface area of 55 ac.

Similar to the other reservoirs in the Bear River Basin, the normal operation for Camp Far West Reservoir is to fill as early in the season as sufficient water becomes available and to then spill the excess flows over the ungated spillway. Because the reservoir is primarily fed by rainfall-

[1] Minimum operating pool is the sill elevation of the low level intake structure, whereby no additional releases can be made from the reservoir.

produced runoff and releases from upstream reservoirs, it is difficult to predict the amount of inflow anticipated before the end of the season. Therefore, SSWD retains within the reservoir all of the inflow except for instream flow requirements until the beginning of the irrigation season. Since the reservoir is operated as a fill-and-spill system, its effect on downstream flood flows is erratic, as it may range from complete control to only minor surcharge regulation.

The reservoir normally reaches its maximum level in January when the basin produces its heaviest runoff. The water level starts to decline in mid-April, at the beginning of the irrigation season, and reaches its lowest point (usually around El. 178 ft) in mid-October when irrigation deliveries are no longer made.

Power is produced at Camp Far West Powerhouse during the winter/early spring months when the reservoir is spilling and during the spring and summer months when releases are being made for irrigation and to meet instream flow requirements. Because of the generating unit's operating characteristics, power can only be generated when the elevation of the reservoir water surface is at or above 235 ft and when the flow is greater than 270 cfs. If these two criteria cannot be met, water is released through the low-level outlet. This condition normally occurs each year starting in September and continuing into the fall until such time that surplus flows are available to be passed through the powerhouse.

During the irrigation season, up to a maximum of 530 cfs passes through the turbine in conformance with downstream irrigation and instream flow requirements. However, during the heavy runoff period, when spilling from the reservoir occurs, a greater quantity of water is routed through the powerhouse to its maximum limit of 725 cfs.

The existing Camp Far West Dam is the second dam built at this location. The original dam was a 50-ft high concrete gravity structure, built by the CFWID in 1927.

The drainage area at Camp Far West Dam is 281.8 sq mi, approximately 70 percent of the total Bear River drainage area.

From Camp Far West Dam, the Bear River flows southwest another 1.3 mi to a 38-ft high non-Project diversion dam where up to 475 cfs of Bear River water is diverted into SSWD's Conveyance Canal. Approximately 40 cfs of that water is re-diverted from the first 0.5-mi of the canal to the CFWID, with the remaining water going to SSWD's customers. In addition, up to 35 cfs of Bear River water is diverted at the non-Project diversion dam into CFWID Camp Far West Canal on the north bank.

From the non-Project diversion dam, the Bear River flows another 16.9 mi to where it empties into the Feather River.

3.1.2.2 Feather River, Sacramento River and Delta

The Bear River discharges into the Feather River, whose basin encompasses a broad variety of terrain, climate, historic use, and flora and fauna. Over 80 percent of the upper Feather River watershed is federally-owned land managed by the U.S. Department of Agriculture, Forest

Service as part of the Plumas National Forest. Approximately 11 percent of the upper Feather River watershed is alluvial valleys that are predominantly privately-owned and used for livestock grazing. The rest of the land is used for other agricultural purposes, urban development and wildlife habitat.

Water originating from the Feather River drainages provides significant amounts of water to California's SWP, which provides water to meet urban and agricultural demands. The Feather River Basin also produces significant forest and agricultural outputs. Flow in the lower Feather River is controlled mainly by releases from Lake Oroville, the second largest reservoir in the Sacramento River basin and part of DWR's Oroville Project (FERC Project No. 2100), and by flows from the Yuba and Bear rivers. As with many Sierra Nevada foothill streams and rivers, the Feather River Basin has historically been influenced by large-scale gold mining operations. To a lesser degree, gold mining operations still continue within the western slope watersheds.

The Feather River drains into the Sacramento River, which provides water for municipal, agricultural, recreational, and environmental purposes throughout northern and southern California. The Sacramento River is the largest river system in California, yielding 35 percent of the state's water supply. Most of the Sacramento River flow is controlled by the United States Department of Interior, Bureau of Reclamation (Reclamation's) Shasta Dam and Reservoir, and river flow is augmented by imports of Trinity River water through Clear and Spring Creek tunnels to the Reclamation's Keswick Reservoir. Immediately below Keswick Dam, the river is deeply incised in bedrock with very limited riparian vegetation.

The upper Sacramento River is often defined as the portion of the river from Princeton (i.e., RM 163; downstream extent of salmonid spawning in the Sacramento River) to Keswick Dam (i.e., the upstream extent of anadromous fish migration and spawning). The Sacramento River is an important corridor for anadromous fishes moving between the ocean and the Delta and upstream river and tributary spawning and rearing habitats. The upper Sacramento River is differentiated from the river's "headwaters," which lie upstream of Shasta Reservoir. The upper Sacramento River provides a diversity of aquatic habitats, including fast-water riffles and shallow glides, slow-water deep glides and pools, and off-channel backwater habitats (Reclamation 2004).

The lower Sacramento River is generally defined as the portion of the river from Princeton, CA, to the Delta at approximately Chipps Island near Pittsburg, California. The lower Sacramento River is predominantly channelized, leveed and bordered by agricultural lands. Aquatic habitat in the lower Sacramento River is characterized primarily by slow water glides and pools, is depositional in nature, and has lower water clarity and habitat diversity, relative to the upper portion of the river.

The Delta is a vast, low-lying inland region located east of the San Francisco Bay area, at the confluence of the Sacramento and San Joaquin rivers. Geographically, this region forms the eastern portion of the San Francisco estuary, which includes San Francisco, San Pablo and Suisun bays. An interconnected network of water channels and man-made islands, the Delta stretches nearly 50 mi from Sacramento south to the City of Tracy, and spans almost 25 mi from Antioch east to Stockton (Public Policy Institute of California 2007). The Delta is a complex area for both anadromous fisheries production and distribution of California water resources for

numerous beneficial uses. Approximately 42 percent of the state's annual runoff flows through the Delta's maze of channels and sloughs, which surround 57 major reclaimed islands and nearly 800 un-leveed islands (WEF Website 2006). The Delta also includes the federal Central Valley Project Jones Pumping Plant and the SWP's Banks Pumping Plant (i.e., export pumps) in the south Delta. Water withdrawn from the Delta provides for much of California's water needs, including both drinking water and water for agricultural irrigation purposes.

3.1.2.3 Potentially-Affected Bear River Stream Reaches

Table 3.1-1 provides a description of stream reaches in the Bear River Basin potentially affected by continued Project operations.

Table 3.1-1. Stream reaches in the Bear River Basin potentially affected by continued Project operations.

River	Reach Name in PAD	Description
DIRECT/INDIRECT EFFECTS		
Bear River (1.3 mi)	Camp Far West Reach	Approximately 1.3 mi of the Bear River from Camp Far West Dam at RM 18.2 to the non-Project Diversion Dam at RM 16.9.
CUMULATIVE EFFECTS[1]		
Bear River (16.9 mi)	Lower Bear River	Approximately 16.9 mi of the Bear River from the non-Project diversion dam at RM 16.9 to the confluence of the Bear River and the Feather River at RM 0.0.

3.1.2.4 Bear River Basin Streams and Tributaries

Table 3.1-2 provides a list of named tributaries and named secondary tributaries to the Bear River. Some of the tributaries are intermittent or ephemeral in nature and contribute water to the Bear River during only part of the year.

Table 3.1-2. Streams and tributaries to the Bear River.

Tributary	Secondary Tributaries
UPSTREAM OF THE PROJECT	
Wolf Creek, Steephollow Creek, Greenhorn Creek, Little Bear Creek	Numerous
WITHIN THE PROJECT	
Rock Creek, Long Ravine	--
DOWNSTREAM OF THE PROJECT	
Dry Creek	Best Slough

Source: USGS, National Hydrology Dataset.

3.1.2.5 Bear River Basin Dams

There are approximately 11 major dams and diversions in the Bear River Basin, with a combined storage capacity of approximately 155,940 ac-ft of water (Table 3.1-3). All of the dams except one are upstream of the Project and account for about 40 percent of the total storage capacity. The Project accounts for the other 60 percent of storage.

Table 3.1-3. Owners and capacities of dams and diversions in the Bear River Basin.

Owner	FERC Project No.	River / Tributary	Dam / Diversion	Reservoir Gross Storage Capacity (ac-ft)
PG&E	2310	Bear River	Drum Afterbay Dam	150.4
PG&E	2310	Off Channel	Alta Forebay Dam	19.4
PCWA	NA	Off Channel	Lower Boardman Canal Diversion Dam	Negligible
NID	2266	Off Channel	Dutch Flat No. 2 Forebay Dam	159.8
NID	2266	Bear River	Dutch Flat Afterbay Dam	1,359.2
NID	2266	Off Channel	Chicago Park Forebay Dam	103
NID	2266	Bear River	Rollins Dam	54,453
PG&E	2310	Bear River	Bear River Diversion Dam	Negligible
NID	2981 (Exempt)	Bear River	Van Geisen Dam (Lake Combie)	5,555
SSWD	2997	Bear River	Camp Far West Dam	93,740
SSWD	7580 (Exempt)	Bear River	Camp Far West Diversion Dam	Negligible
Total	**4 Projects**	--	**11 Dams/Diversions**	**155,539.8 ac-ft**

Key:
PG&E – Pacific Gas and Electric Company
PCWA – Placer County Water Agency
NID – Nevada Irrigation District
SSWD – South Sutter Water District

Figure 3.1-3 depicts the general location of each of the dams in Table 3.1-3.

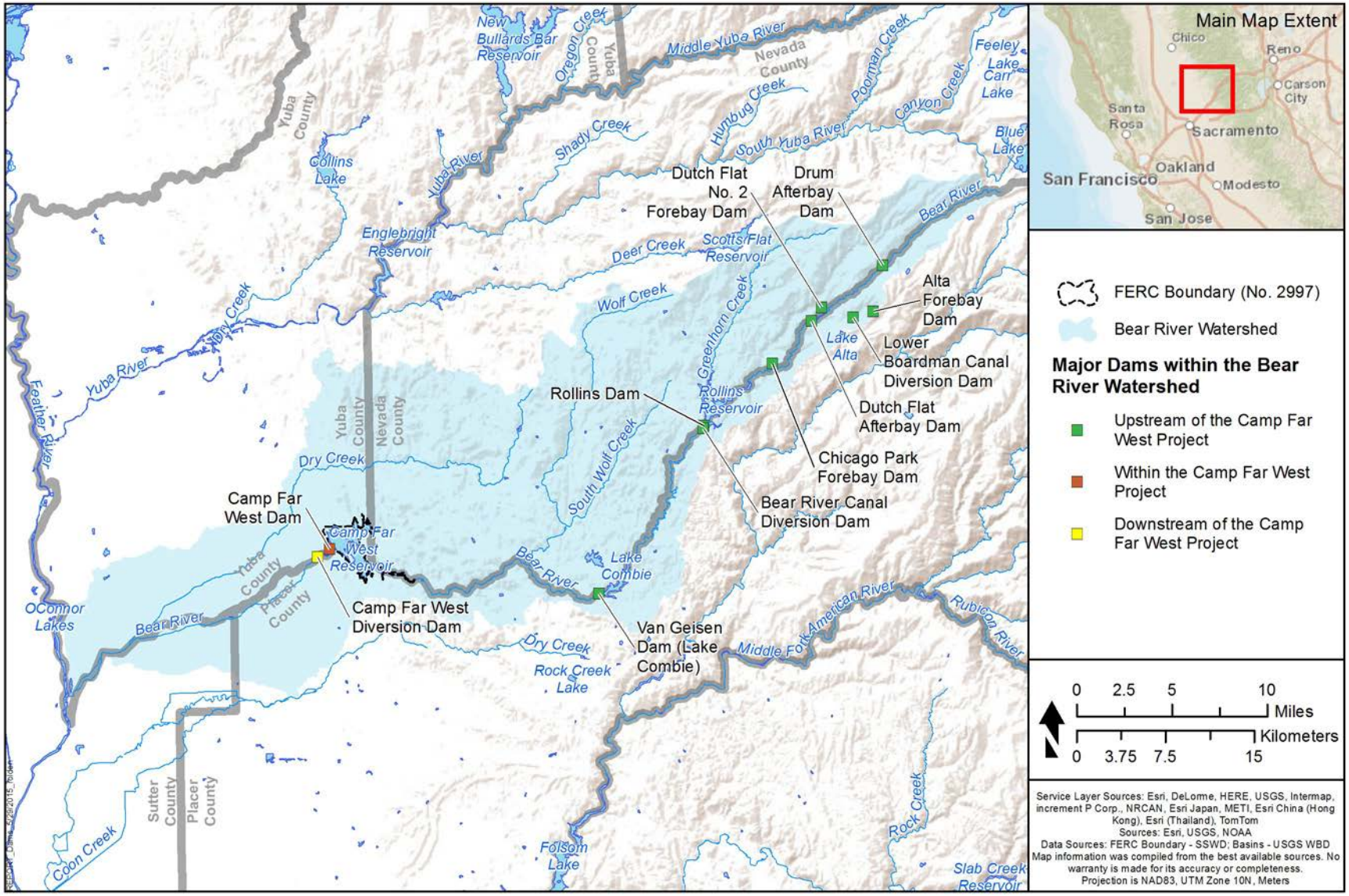

Figure 3.1-3. General location of dams within the Bear River watershed.

3.1.3 Climate

The Project Region,[2] which includes the sub-basins, excluding the Upper Bear River sub-basin, shown in Figure 3.1.2, experience hot, dry summers and cool winters with substantial rainfall, but no appreciable snowfall. The National Weather Service monitoring station Number 045385 at Marysville, at an elevation of approximately 75 ft, provides a climate history representative of the Project Region. These areas occupy the eastern Central Valley and rolling, western Sierra foothills, and can experience high summer temperatures, mostly unmitigated by the "Delta breezes" that are present further south and west in California's Central Valley. July air temperatures at Marysville, California, average a high of 96.4 degrees Fahrenheit (°F), and a low of 62.0°F. Average January high and low temperatures are 54.1°F and 38.0°F, respectively. Annual average precipitation totals 21.59 in., and falls exclusively as rain, with 67 percent falling during the winter months from December through March. June through August precipitation averages only 0.25-in., generally resulting from rare summer thunderstorms (WRCC 2009).

3.1.4 Major Land Uses

The topography around Camp Far West Reservoir consists of rolling hills and many oak trees with elevations from 150 to 320 ft. Slopes range from 2 to 30 percent and rock outcrops are common.

The area immediately adjacent to the reservoir is owned by SSWD and accessible to the public. Beyond that, land in the vicinity is rural in nature with large parcel (e.g., 20 ac or larger) homesteads and cattle ranching. Beale Air Force Base is located approximately 11 mi northwest of the dam.

Hydraulic mining for gold was prevalent in the Bear River and other watersheds in the Sierra Nevada during the latter half of the 19th century. Underground mining of hardrock (i.e., lode) gold-quartz vein deposits also was important in the Bear River watershed.

The Dairy Farm Mine, located in Placer County on the southeast side of the reservoir, produced copper, zinc, and gold from a deposit along the south shore of Camp Far West Reservoir, part of the Foothill Copper-Zinc Belt. Open pit mining was used at the Dairy Farm Mine during the 1920s and 1930s. When the water level in the reservoir is high, the pit is inundated by the reservoir, whereas at lower water levels, the pit is hydraulically isolated (Alpers et al. 2008).

The counties are the primary agencies for establishing land use policies for private land within the river basins and sub-basins. The county general plans provide the land use policies for each county. The Yuba County General Plan was adopted in 1996, and is currently being revised. Nevada County and Sierra County also adopted their general plans in 1996.

[2] In this PAD, "*Project Region*" is defined as the area surrounding the Project on the order of a county.

3.1.5 Major Water Uses

The CVRWQCB, in its Basin Plan (CVRWQCB 1998) identifies existing beneficial uses of the waters in the Project Area as Municipal and Domestic Supply, Agricultural Supply, Power, Contact Recreation, Non-contact Recreation, Warm Freshwater Habitat, Cold Freshwater Habitat and Wildlife Habitat. The Basin Plan identifies potential beneficial uses of the water as Migration of Aquatic Organisms and Spawning (Table 1.3-2.).

3.2 Existing Environment and Effects

Section 3.2 is divided into 13 sub-sections, by major resource areas:

- Geology and Soils (Section 3.2.1)
- Water Resources (Section 3.2.2)
- Aquatic Resources (Section 3.2.3)
- Terrestrial Resources (Section 3.2.4)
- Threatened and Endangered Species (Section 3.2.5)
- Recreation Resources (Section 3.2.6)
- Land Use (Section 3.2.7)
- Aesthetic Resources (Section 3.2.8)
- Socioeconomic Resources (Section 3.2.9)
- Cultural Resources (Section 3.2.10)
- Tribal Interests (Section 3.2.11)
- Air Resources (Section 3.2.12)
- Noise (Section 3.2.13)

In general, and with some exceptions where appropriate, each of the sub-sections in Section 3.2 is organized by geographic relationship to the Project: 1) resources immediately upstream of the Project (i.e., the 13.8-long section of the Bear River from Van Giesen Dam that forms Lake Combie to the NMWSE of Camp Far West Reservoir); 2) resources directly/indirectly affected by the Project (i.e., the area surrounding the Project facilities to the 1.3-mi long section of the Bear River from Camp Far West Dam to the non-Project diversion dam; and 3) resources cumulatively affected by the Project (i.e., the 16.9-mi long section of the Bear River from the non-Project diversion dam to the Feather River). In addition, where appropriate, existing information is noted as either a source document (i.e., contains original data collected by the author) or anecdotal information. The amount of detail included in the description of each existing resource is commensurate with the importance of the resource in the relicensing.