SECTION 3

GENERAL DESCRIPTION OF THE RIVER BASIN

This section provides a general overview of the river basin that may be affected by continued operation and maintenance (O&M) of Yuba County Water Agency's (YCWA or Licensee) Yuba River Development Project (Project). For the purpose of this Pre-Application Document (PAD), a river basin refers to the total land area contributing runoff to a particular point in a given river.

This section is divided into 6 subsections. Section 3.1 provides a description of the river basin, Section 3.2 describes river reaches potentially affected by the Project, Section 3.3 describes the climate in the basin, Sections 3.4 and 3.5 provide information regarding major land and water uses within the basin, Section 3.6 provides a table of streams and tributaries in the Project Vicinity,[1] and Section 3.7 lists the major dams and diversion structures in the basin. Figure 3.1-1 shows the Yuba River Basin. The amount of water diverted out of the basin upstream and downstream of the Project is discussed in Section 7.2.8 of the PAD.

3.1 Affected River Basin

The Project is located in Yuba, Sierra, and Nevada counties, California, on the mainstem Yuba River, the North Yuba River, and the Middle Yuba River, including Oregon Creek, a tributary to the Middle Yuba River. A portion of the land within the Federal Energy Regulatory Commission (FERC) Project Boundary[2] is located on public land managed as the Plumas National Forest (PNF) and the Tahoe National Forest (TNF) by the United States Department of Agriculture, (USDA) Forest Service (Forest Service).

The Project consists of 3 developments: New Colgate, New Bullards Bar Minimum Flow, and Narrows 2, which range in elevation from 2,049 feet to 280 feet.[3] The Project does not include any canals, flumes, or transmission lines. In total, the Project includes:

- 1 dam and associated storage reservoir – New Bullards Bar
- 2 diversion dams – Our House and Log Cabin
- 2 diversion tunnels – Lohman Ridge and Camptonville
- 2 underground power tunnels – New Colgate and Narrows 2
- 1 above ground penstock – New Colgate
- 3 powerhouses – New Colgate, New Bullards Bar Minimum Flow, and Narrows 2
- 7 recreation areas, all on New Bullards Bar Reservoir – Emerald Cove Marina, Hornswoggle Group Camp, Schoolhouse Family Camp, Dark Day Campground, Dark Day Boat Ramp, Garden Point Campground and Madrone Cove Campground.

[1] For the purposes of this document, the Project Vicinity is defined as the area surrounding the Project on the order of a United States Geological Survey (USGS) 1:24,000 topographic quadrangle.

[2] The existing Federal Energy Regulatory Commission (FERC) Project Boundary is the area that Licensee uses for normal Project operations and maintenance, and is shown on Exhibits G, J, and K of the current license.

[3] All elevation data are in United States Department of Commerce (USDOC), National Oceanic and Atmospheric Association (NOAA), National Geodetic Survey (NGS) Vertical Datum of 1988 (NAVD 88).

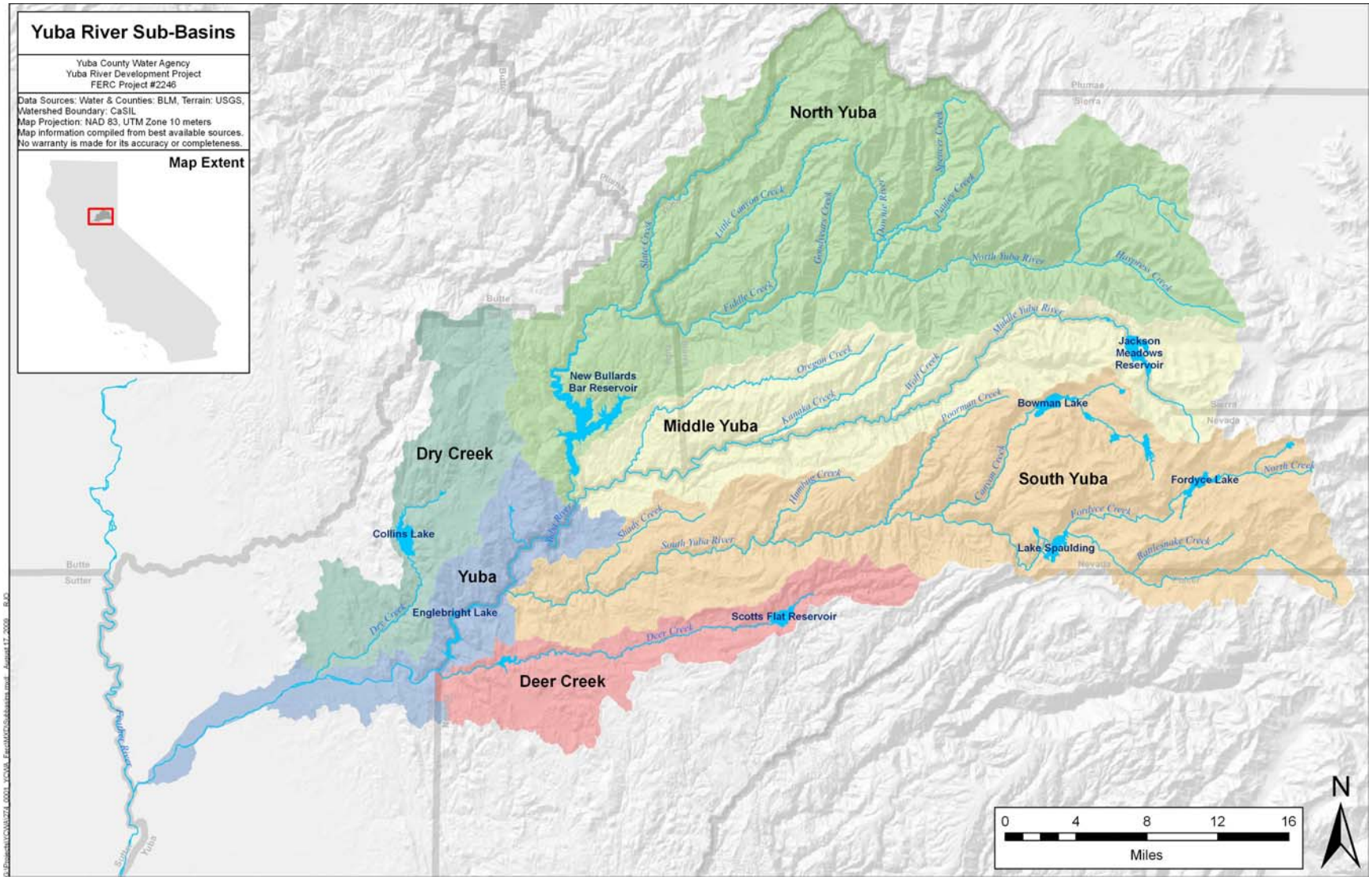

Figure 3.1-1. Sub-basins of the Yuba River.

3.1.1 Overview of the Yuba River Basin

The Yuba River drains approximately 1,339 square miles of the western Sierra Nevada, including portions of Sierra, Placer, Yuba, and Nevada counties, and is formed by the forks of the North Yuba, the Middle Yuba, and the South Yuba rivers.

The average annual unimpaired flow of the Yuba River from 1975 to 2004 at the United States Geological Survey's (USGS) Smartville[4] Gage at river mile (RM) 23.6 (which is below the confluence with Deer Creek) is 2,340,000 acre-feet (ac-ft), and ranged from a maximum of approximately 4,700,000 ac-ft in 1995 to a minimum of approximately 360,000 ac-ft in 1977. The gage is located downstream of the United States Army Corps of Engineers' (USACE) Englebright Dam, which is not part of the Project.

3.1.1.1 North Yuba River Sub-basin

The North Yuba River originates at Yuba Pass at an elevation of 6,701 feet near State Highway 49 in Sierra County. The highway follows the river downstream from the community of Downieville for about 14 miles, where the river departs from the road and flows westward to where it enters the Project's New Bullards Bar Reservoir. The reservoir was completed in 1969 and is the sole storage reservoir for the Project, located between RM 2.3 and 18.1.[5] In total, the North Yuba River is about 43.3 miles long.

Flow in the sub-basin upstream of New Bullards Bar Reservoir is unrestricted (i.e., no significant dams or water diversions) except for the Slate Creek Diversion Dam, a part of South Feather Water and Power Agency's (SFWPA) South Feather Power Project (FERC Project No. 2088). SFWPA's Slate Creek Diversion Tunnel has a maximum capacity of 848 cubic feet per second (cfs) of water out of Slate Creek to Sly Creek Reservoir on Lost Creek, a tributary to the South Fork Feather River. SFWPA's water rights limit Slate Creek diversions to 600 cfs and at times diversions are limited to 500 cfs due to high water elevations in Sly Creek Reservoir. Additional information on South Feather Power Project annual diversion amounts can be found in Section 7.2.8 of this PAD.

New Bullards Bar Reservoir is deep and thermally stratified, and has a retention time of about six months. The reservoir has a dendritic shape with three arms. The narrow center arm is the longest of the three arms at about 13 miles and extends up the North Yuba River to just upstream of the Slate Creek confluence. The slightly wider northeast arm extends upstream about 4 miles, and is formed primarily by Willow and Badger creeks. The northwest arm, the shortest of the three at about 1 mile long, is formed by Little Oregon and Burnt Bridge creeks. The portion of reservoir north of New Bullards Bar Dam near Garden Point is the widest portion of the reservoir at about 2 miles wide. Most of the land surrounding New Bullards Bar Reservoir is primitive (i.e., no roads or residential communities).

[4] In 2008, the people of this community petitioned to have the name changed to Smartsville, with an 's' in the middle of the name. However, the USGS gage refers to the former spelling of the community name. Therefore in this document, the community is referred to as such.

[5] River miles on the North Yuba River begin at RM 0.0 at the confluence of the North Yuba River with the Middle Yuba River and extend upstream on the North Yuba River.

The reservoir has a total storage capacity of 966,103 ac-ft with a minimum operating level of 234,000 ac-ft, leaving 732,103 ac-ft of regulated capacity. Licensee typically operates New Bullards Bar Reservoir by capturing winter and spring runoff from rain and snowmelt. Consequently, New Bullards Bar Reservoir reaches its peak storage at the end of the spring runoff season, and then is gradually drawn down as water is released into the North Yuba River. Water is released through the New Bullards Bar Minimum Flow Powerhouse at the base of the dam, and through the New Colgate Power Tunnel and New Colgate Powerhouse discharge to the main stem Yuba River. The reservoir usually reaches its lowest elevation in mid-winter. The annual drawdown in normal water years is about 90 feet. The reservoir does not undergo significant daily changes in elevation.

New Bullards Bar Reservoir is used to provide irrigation water to about 90,000 acres of farmland in western Yuba County. Releases of water from storage are made through the spring and summer to provide flows that are diverted downstream at USACE's Daguerre Point Dam at RM 12.0 on the main stem of the Yuba River. Water is released from storage in the fall for diversion at USACE's Daguerre Point Dam for rice stubble decomposition and waterfowl habitat.

New Bullards Bar Reservoir is also the main flood control facility for the lower Yuba River area. About 23 percent (170,000 ac-ft) of the usable capacity of the reservoir is held in reserve from October through May for flood control purposes[6].

In addition to providing power and downstream water supply, Licensee pumps water directly from New Bullards Bar Reservoir to supply water to the Cottage Creek Water Treatment Plant for domestic and recreational uses adjacent to the reservoir. This pumping averages approximately 6 ac-ft per year. This relatively minimal level of pumping does not affect Project operations. Licensee anticipates that pumping of similar magnitude will continue during the period of the new license.

New Bullards Bar Dam (RM 2.3) is the fourth dam constructed in the Bullards Bar area. The first dam was a timber crib, rock-filled diversion dam that was constructed in 1899, and washed out a year later. In 1900, a 30-foot-tall masonry rock dam was built to replace the washed out dam. The rock dam is still in place and is located about 1,000 feet downstream of New Bullards Bar Dam. Licensee maintains this dam as a weir to measure instream flow releases from New Bullards Bar Dam. The third dam was Bullards Bar Dam, a 200-foot-tall concrete-arch dam constructed by a group of investors led by Harry Payne Whitney in 1922-1923 and acquired by Pacific Gas and Electric Company (PG&E) a few years later. Bullards Bar Dam was inundated in 1969 when New Bullards Bar Dam and Reservoir began operation. Bullards Bar Dam is located about 1 mile upstream from New Bullards Bar Dam in New Bullards Bar Reservoir, and is not normally exposed.

The drainage area at New Bullards Bar Dam is 488.6 square miles, approximately 49.4 square miles[7] of which lie upstream of SFWPA's Slate Creek Diversion Dam.

[6] The USACE contributed $12 million to the construction of New Bullards Bar Dam in exchange for flood control space the reservoir would provide.

[7] Drainage area based on USGS gage information for gage No. 11413300, Slate C bl Div Dam Nr Strawberry CA. http://waterdata.usgs.gov/nwisweb/local/state/ca/text/11413300-manu.html.

From New Bullards Bar Dam, the North Yuba River flows southwest another 2.3 miles to where it converges with the Middle Yuba River to form the main stem of the Yuba River. This confluence is at an elevation of about 1,350 feet near the unincorporated town of North San Juan. The total drainage area of the North Yuba River is 491 square miles.

3.1.1.2 Middle Yuba River Sub-basin

The Middle Yuba River originates at an elevation of approximately 7,200 feet along the northern side of Meadow Lake Hill, and flows westerly for about 41.4 miles to the Project's Our House Diversion Dam located at RM 12.1,[8] southwest of the community of Camptonville near the Sierra/Nevada county line.

Like the North Yuba River, the Middle Yuba River basin is steep, rugged, sparsely populated, and mostly vegetated with coniferous forests. Middle Yuba River flows upstream of the Project are reduced by upstream projects. Nevada Irrigation District's (NID) Jackson Meadows Reservoir (RM 47.1) and Milton Diversion Dam (RM 44.9), both parts of NID's Yuba-Bear Hydroelectric Project (FERC Project No. 2266), affect flows entering the Project. Jackson Meadows Reservoir has a gross storage capacity of 67,435 ac-ft of water and the Milton Diversion Dam can divert up to 450 cfs of water from the Middle Yuba River to Bowman Lake on Canyon Creek, a tributary to the South Yuba River. Additional information on annual amounts of diversions by these facilities can be found in Section 7.2.8 of this document.

Our House Diversion Dam and its associated Lohman Ridge Diversion Tunnel can divert about 810 cfs of water from the Middle Yuba River to Oregon Creek. The dam has no appreciable storage capacity. The diversion pool fluctuates passively (i.e., storage is not actively exercised by the operator, but depends on the balance between diversion and inflow) from a minimum pool when natural inflows are at or below the downstream minimum flow requirement and no diversion is occurring, to a maximum pool size of approximately 280 ac-ft when inflows are greater than diversion capacity and the facility is spilling. The drainage area at Our House Diversion Dam is 144.8 square miles, 39.8 square miles of which lies upstream of NID's Milton Diversion Dam.

From Our House Diversion Dam, the Middle Yuba River flows west about 12 miles to where it converges with the North Yuba River at elevation 1,350 feet. The total drainage area of the Middle Yuba River is 210 square miles.

Oregon Creek, a tributary to the Middle Yuba River, originates at an elevation of approximately 5,600 feet and flows southwesterly for about 21.4 miles to where it converges with the Middle Yuba River.

One Project facility is located on Oregon Creek: Log Cabin Diversion Dam at RM 4.1.[9] The dam and its associated Camptonville Diversion Tunnel can divert about 1,100 cfs of water from

[8] River miles on the Middle Yuba River begin at RM 0.0 at the confluence of the Middle Yuba River with the North Yuba River and extend upstream on the Middle Yuba River.

[9] River miles on Oregon Creek begin at RM 0.0 at the confluence of Oregon Creek with the Middle Yuba River and extend upstream on Oregon Creek.

Oregon Creek to New Bullards Bar Reservoir. The dam has no appreciable storage capacity. The diversion pool fluctuates passively from a minimum pool when natural inflows are at or below the downstream minimum flow requirement and no diversion is occurring, to a maximum pool size of approximately 90 ac-ft when inflows are greater than diversion capacity and the facility is spilling. The drainage area at the dam is approximately 29.1 square miles.

Like the North and Middle Yuba rivers, Oregon Creek is steep, rugged, sparsely populated, and mostly vegetated with coniferous forests. Flow in Oregon Creek upstream of the Project is entirely unrestricted.

3.1.1.3 South Yuba River Sub-basin

No Project facilities are located on the South Yuba River.

The South Yuba River originates at an elevation of about 7,200 feet near Castle Peak and Donner Lake, and flows southwest to its confluence with the main stem Yuba River (RM 30.7)[10] near the community of Bridgeport at USACE's Englebright Reservoir, a non-Project facility, at an elevation of about 527 feet. The total drainage area of the South Yuba River is 352 square miles. The majority of the basin is steep, rugged, and sparsely populated, with small communities in the lower elevation areas.

There are numerous dams and diversions on the South Yuba River (Table 3.6-1) and its tributaries. PG&E's Drum-Spaulding Project (FERC Project No. 2310) has 19 reservoirs on the South Yuba and its tributaries, with a total of 144,644 ac-ft of storage. The largest Drum-Spaulding Project facility, Spaulding Dam (RM 42.0) creates Lake Spaulding, with a gross storage capacity of 75.912 ac-ft. At Spaulding Dam, PG&E can divert a combined total of 947 cfs out of the South Yuba River sub-basin into the Drum and South Yuba canals. Water from the Drum Canal continues to the Drum Forebay and then to the Drum Afterbay on the Bear River. Water from the South Yuba Canal continues on to the South Fork of Deer Creek via the Deer Creek Powerhouse, part of the Drum-Spaulding Project. Additional information on annual amounts of diversions by these facilities can be found in Section 7.2.8 of this document.

NID's Yuba-Bear Hydroelectric Project (FERC Project No. 2266) has five reservoirs on Canyon and Jackson creeks, tributaries to the South Yuba River, with a total of 90,647 ac-ft of storage. The largest of these facilities is Bowman Lake, with a gross storage capacity of 68,363 ac-ft. Water is diverted from Bowman Lake, from smaller tributaries to the South Yuba River, and to Lake Spaulding, but is not diverted out of the South Yuba River basin through NID facilities. Diversions out of the South Yuba River sub-basin are made exclusively through PG&E's Drum and South Yuba canals. Additional information on annual amounts of diversions by these facilities can be found in Section 7.2.8 of this document.

[10] River miles on the Yuba River begin at RM 0.0 at the confluence of the Yuba River with the Feather River and extend upstream on the Yuba River.

3.1.1.4 Yuba River Sub-basin

Two Project facilities are located on the mainstem Yuba River: 1) New Colgate Powerhouse (RM 33.9) located at the north side of the river about 1.7 miles upstream of USACE's Englebright Reservoir; and 2) Narrows 2 Powerhouse (RM 23.9), located at the north side of the river about 0.1 mile downstream of USACE's Englebright Dam. PG&E's Narrows 1 Powerhouse, part of PG&E's Narrows Project (FERC Project No. 1403) is located on the opposite side of the Yuba River, just downstream of the Narrows 2 Powerhouse.

From the confluence of the North Yuba River and the Middle Yuba River, the Yuba River flows southwest about 40 miles to its confluence with the Feather River in Marysville, California, at an elevation of approximately 60 feet. The total drainage area of the Yuba River downstream of the confluence of the North Yuba River and Middle Yuba River is 95 square miles. Rural agricultural areas and semi-rural agricultural communities flank the mainstem Yuba River as it leaves the Sierra foothills and enters the Central Valley (YCIT 2004). The area is primarily used for annual field and vegetable crops, tree crops, and livestock grazing (YCDA 2005). To the south of the Yuba River downstream of USACE's Englebright Dam is a feature known as the Yuba Goldfields – an area of over 8,000 acres heaped with hydraulic mine tailings created during the California Gold Rush (CDWR 1999). At one time, as many as 12 large bucket-type dredges crawled across the goldfields unearthing riches for some and leaving behind mountains of aggregate. Now, just one dredge is active. At times, flows in this area become sub-surface, flowing through and within the aggregate field of hydraulic mining deposits.

The main stem of the Yuba River includes two USACE debris dams. USACE's Englebright Dam (RM 24.0) was constructed in 1941 by the California Debris Commission, a unit of USACE, which now owns and operates the dam and related facilities. The primary purpose of the dam when constructed was to trap sediment derived from anticipated hydraulic mining operations in the Yuba River watershed. Large-scale hydraulic mining in the Sierra Nevada was halted in 1884, but resumed on a limited basis until the 1930s. Although no hydraulic mining in the upper Yuba River watershed resumed after construction of the dam, the historical mining sites continued to contribute sediment to the river. The dam forms USACE's Englebright Reservoir, which is about 9 miles long and has a gross storage capacity of about 70,000 ac-ft.

Similar to USACE's Englebright Dam, USACE's Daguerre Point Dam was constructed by the California Debris Commission to prevent hydraulic mining debris from the Yuba River watershed from flowing into the Feather and Sacramento rivers. The dam, which was constructed in 1906 and rebuilt in 1964 following damage from floods, has no appreciable storage capacity.

The lower Yuba River refers to the 24-mile section of the river between USACE's Englebright Dam and the confluence with the Feather River southwest of Marysville. Instream flow requirements are specified for the lower Yuba River at the Smartville Gage, located approximately 2,000 feet downstream from USACE's Englebright Dam, and at USGS' Marysville Gage (RM 6.2). Below the Smartville Gage, accretions, local inflow, and runoff contribute, on average, approximately 200,000 ac-ft per year to the lower Yuba River. Much of the accretion flows are contributed by Deer and Dry creeks. The total drainage area of Deer

Creek is 89 square miles and the total drainage area of Dry Creek is 108 square miles. Deer Creek flows into the Yuba River at approximately RM 22.7. Dry Creek flows into the Yuba River at RM 13.6, approximately 2 miles upstream of USACE's Daguerre Point Dam. The flow in Dry Creek is regulated by Browns Valley Irrigation District's (BVID) operation of Merle Collins Reservoir, located on Dry Creek about 8 miles upstream from its confluence with the Yuba River. In recent years, irrigation diversions from the lower Yuba River at USACE's Daguerre Point Dam and upstream at BVID's Pumpline Diversion Facility have totaled approximately 300,000 ac-ft per year. Irrigation diversions are expected to increase to about 350,000 ac-ft annually when the new Wheatland Canal service area is fully developed.

3.1.2 Overview of Feather River Basin, Sacramento River, and Delta

The Yuba 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 Forest Service as part of the PNF. 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 State Water Project (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 the Oroville Reservoir, the second largest reservoir in the Sacramento River basin and part of the California Department of Water Resources (CDWR) 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, the largest river in California, which provides water for municipal, agricultural, recreational, and environmental purposes throughout northern and southern California.

3.2 Stream Reaches

Provided here (Table 3.2-1) are descriptions of stream reaches potentially affected by continued Project operations.

Table 3.2-1. Stream Reaches Potentially Affected by Continued Project Operations

River	Reach	Description
DIRECT/INDIRECT EFFECTS		
North Yuba River (18.1 River Miles)	New Bullards Bar Reservoir	Approximately 15.8 miles of the North Yuba River canyon from the normal maximum water surface elevation of the reservoir at RM 18.1 to New Bullards Bar Dam at RM 2.3.
	New Bullards Bar Dam Reach	Approximately 2.3 miles of the North Yuba River from the New Bullards Bar Minimum Flow Release Powerhouse at RM 2.3 to the confluence of the North Yuba River with the Middle Yuba River at RM 0.0.
Oregon Creek (4.2 River Miles)	Log Cabin Diversion Dam Impoundment	Approximately 0.1 mile of Oregon Creek canyon from the normal maximum water surface elevation of the impoundment at RM 4.2 to the dam at RM 4.1.
	Log Cabin Diversion Dam Reach	Approximately 4.1 miles of Oregon Creek from RM 4.1 to the confluence of Oregon Creek with the Middle Yuba River.
Middle Yuba River (12.1 River Miles)	Our House Diversion Dam Impoundment	Approximately 0.1 mile of the Middle Yuba River canyon from the normal maximum water surface elevation of the impoundment at RM 12.1 to the dam at RM 12.0.
	Our House Diversion Dam Reach	Approximately 7.5 miles of the Middle Yuba River from Our House Diversion Dam at RM 12.0 to the confluence of the Middle Yuba River and Oregon Creek at RM 4.5.
	Oregon Creek Reach	Approximately 4.5 miles of the Middle Yuba River from the confluence of the Middle Yuba River and Oregon Creek at RM 4.5 to the confluence of the Middle Yuba River with the North Yuba River at RM 0.0.
Yuba River (28.3 River Miles)	Middle/North Yuba River Reach	Approximately 5.8 miles of the Yuba River from the confluence of the North Yuba River with the Middle Yuba River at RM 39.7 to the New Colgate Powerhouse at RM 33.9.
	New Colgate Powerhouse Reach	Approximately 1.7 miles of the Yuba River from New Colgate Powerhouse at RM 33.9 to the normal maximum water surface elevation of USACE's Englebright Reservoir at RM 32.2.
	USACE's Englebright Reservoir	Approximately 8.2 miles of the Yuba River canyon from the normal maximum water surface elevation of USACE's Englebright Reservoir at RM 32.2 to USACE's Englebright Dam at RM 24.0.
	Narrows 2 Powerhouse Reach	Approximately 12.5 miles of the Yuba River from the Narrows 2 Powerhouse at the base of USACE's Englebright Dam at RM 24.0 to the normal maximum water surface elevation of the impoundment formed by USACE's Daguerre Point Dam at RM 11.5.
	USACE's Daguerre Point Dam Impoundment	Approximately 0.1 mile of the Yuba River from the normal maximum water surface elevation of the impoundment at RM 11.5 to the dam at RM 11.4.
CUMULATIVE EFFECTS		
Yuba River (11.4 miles)	USACE's Daguerre Point Dam Reach.[1]	Approximately 11.4 miles of the Yuba River from the USACE's Daguerre Point Dam to the confluence of the Yuba River and the Feather River at RM 0.0.

[1] In the Lower Yuba River Accord proceeding, this reach and the "Narrows 2 Powerhouse Reach" have been referred to as the "above USACE's Daguerre Point Dam" and "below USACE's Daguerre Point Dam" reaches.

Appendix D to this PAD includes a set of 1:24,000 scale maps that show the Project facilities and stream reaches described above. The maps also include river miles and local features such as tributaries, roads, facilities (e.g., dams, gages, and powerhouses), topography, and the FERC Project Boundary.

3.3 Climate

The Project Region,[11] which includes the sub-basins shown in Figure 3.1-1, encompasses two different climate terrains. One typifies the high Sierra climes of the eastern Project Region, and the other typifies the Central Valley lowlands in the western Project Region. The transition zone in between these two climate terrains shares characteristics of each of these terrains. The lower elevation areas, west and south of New Bullards Bar Reservoir, experience hot, dry summers and cool winters with substantial rainfall, but never appreciable snowfall. The higher elevation areas constitute much of the North, Middle, and South Yuba river watersheds, and are characterized by significant winter snowfall accumulation at elevations over 4,000 to 5,000 feet. The snowpack then melts during the spring and early summer months, eventually giving way to warm, dry summers. Areas of moderate elevation in the Project Region (between 500 and 4,000 feet) experience a mélange of the high-elevation and low-elevation climate: predominantly rainy winters with heavier precipitation than low-elevation areas, occasional snowfall with short-lived accumulation, and the ubiquitous warm, dry summers. Overall, the climate within the Project Region has the typical characteristics of a mixed-elevation Mediterranean climate.

The National Weather Service (NWS) maintains a monitoring station (Number 048207) located at Sierra City, California, at an elevation of approximately 4,700 feet, located near the confluence of the North Yuba River and Haypress Creek, which is representative of the Project Region's higher-elevation climate. July air temperatures at Sierra City range from an average high of 86.6 degrees Fahrenheit (°F) to an average low of 52.6°F. The average high temperature for January is 47.2°F, while the average low temperature is 28°F. Average annual snowfall at Sierra City totals 100.4 inches in depth, 84 percent of which occurs from December through March. Annual mean total precipitation at Sierra City is 63.83 inches, most of which (65%) occurs from December through March. The summer months (June through August) produce just 3 percent of the total annual average precipitation. The remaining 32 percent of precipitation in the area occurs during spring and fall.

The NWS monitoring station at Marysville (Number 045385) provides a climate history representative of the lower-elevation areas in 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 average a high of 96.4°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 inches, and falls exclusively as rain, with 67 percent falling during the winter months from December through March. June through

[11] For the purpose of this document, Project Region is defined as the area surrounding the Project on the order of a county or national forest.

August precipitation averages only one-quarter of an inch, generally resulting from rare summer thunderstorms (WRCC 2009).

3.4 Major Land Uses

Lands within the Project-affected sub-basins have a patchwork of ownership. At the upper elevations above the USACE's Englebright Dam, the Forest Service manages a majority of the public land as parts of the PNF and TNF. Other land managers and owners above elevation 3,000 feet include private corporations such as timber companies. Below elevation 3,000 feet, land is predominantly privately owned, with small portions owned and managed by the Forest Service as part of the TNF, or administered by United States Department of Interior (USDOI) Bureau of Land Management (BLM) as part of the Sierra Resource Management Area (SRMA).

The portions of land within the Project Area[12] managed by federal agencies are administered according to their respective resource management plans: TNF Land and Resource Management Plan (LRMP) for the Forest Service and the Sierra Resource Management Plan (SRMP) for BLM. The Forest Service LRMP divides the TNF into 109 Management Areas. The Project occupies lands within six of the Management Areas (Forty-Niner, Pendola, Oregon, Bullards, Moonshine, and South Yuba). The Project Area within the TNF boundary is predominantly managed for timber, grazing, and recreation.

BLM's SRMP was developed to address necessary administrative changes in consumptive uses, and the need for BLM to coordinate resource protection protocols between Nevada and California agencies.

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. The Yuba County General Plan features two community-specific plans near the Project Area: Camptonville (population 242), and Log Cabin (population 282). In general, the majority of Yuba, Sierra and Nevada county lands in the Project Region upstream of USACE's Englebright Reservoir are designated for agricultural, timber, grazing, and open space uses. At the lower elevations of the Project-affected sub-basins, downstream of USACE's Englebright Reservoir, the lands are more often designated as residential and agricultural.

Refer to Section 7.9 of this PAD for a detailed description of land use in the Project Vicinity.

3.5 Major Water Uses

The Central Valley Regional Water Quality Control Board (CVRWQCB), in its Water Quality Control Plan Report (Basin Plan) (CVRWQCB 1998), identifies streams and watersheds with

[12] For the purposes of this document, the Project Area is defined as the area within the FERC Project Boundary and the land immediately surrounding the FERC Project Boundary (i.e., within about 0.25 mile of the FERC Project Boundary) and includes Project-affected reaches between facilities and downstream to the next major water controlling feature or structure.

unique Hydro Unit (HU) numbers.[13] The Project and the area downstream of the Project falls within two Basin Plan HUs: 1) HU 517, which includes all waters of the North, Middle and South Yuba rivers upstream of USACE's Englebright Dam including New Bullards Bar Reservoir; and 2) HU 515.3, which includes the Yuba River from USACE's Englebright Dam to the Feather River. Designated beneficial uses of surface water in these units are shown by HU in Table 3.5-1.

Table 3.5-1. Beneficial uses of surface water within the Project Area and the area downstream as designated by HU in the Basin Plan.

Designated Beneficial Use Description from Basin Plan, Section II		Designated Beneficial Use by HU from Basin Plan, Table II-1		
		Use	Sources to USACE's Englebright Reservoir	USACE's Englebright Dam to the Feather River
			HU 517	HU 515.3
Municipal and Domestic Supply (MUN)	Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.	MUNICIPAL AND DOMESTIC SUPPLY	Existing	--
Agricultural Supply (AGR)	Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation (including leaching of salts), stock watering, or support of vegetation for range grazing.	IRRIGATION	Existing	Existing
		STOCK WATERING	Existing	Existing
Industry	Uses of water for industrial activities that depend primarily on water quality.	INDUSTRIAL PROCESS SUPPLY (PROC)	--	--
	Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.	INDUSTRIAL SURVICE SUPPLY (IND)	--	--
	Hydropower generation	POWER (POW)	Existing	Existing
Water Contact Recreation (REC-1)	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.	CONTACT	Existing	Existing
		CANOEING AND RAFTING	Existing	Existing
Non-Contact Water Recreation (REC-2)	Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water. These uses include, but are not limited to, picnicking, sunbathing, hiking, beach-combing, camping, boating, tide-pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.	OTHER NON-CONTACT	Existing	Existing
Freshwater Habitat[1]	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.	WARM[1]	--	Existing
	Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.	COLD[1]	Existing	Existing

[13] Basin Plan Hydro Unit (HU) codes do not correspond to Hydrologic Unit Code (HUC) numbers as defined by the Water Resources Council; the Regional Water Quality Control Boards (RWQCB) use the HU codes primarily for state-level water quality purposes.

Table 3.5-1. (continued)

Designated Beneficial Use Description from Basin Plan, Section II		Designated Beneficial Use by HU from Basin Plan, Table II-1		
		Use	Sources to USACE's Englebright Reservoir	USACE's Englebright Dam to the Feather River
			HU 517	HU 515.3
Migration of Aquatic Organisms (MGR)	Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.	WARM[2]	--	Existing
		COLD[3]	--	Existing
Spawning (SPWN)	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.	WARM[2]	--	Existing
		COLD[3]	Existing	Existing
Wildlife Habitat (WILD)	Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation or enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.	WILDLIFE HABITAT	Existing	Existing

Source: CVRWQCB 1998

[1] Resident does not include anadromous. Any hydrologic unit with both WARM and COLD beneficial use designations is considered COLD water bodies for the application of water quality objectives.

[2] Striped bass, sturgeon and shad.

[3] Salmon and steelhead.

Refer to Section 7.2 of this PAD for a detailed description of water use in the Project Vicinity.

3.6 Project-Affected Basin Streams and Tributaries

Table 3.6-1 provides a list of named tributaries and named secondary tributaries to the Yuba River. Some of the tributaries presented here are intermittent or ephemeral in nature and contribute water to the Yuba River only part of the year.

Table 3.6-1. Streams and tributaries to the North, Middle, South, and main stem Yuba River.

Tributary	Secondary Tributaries
UPSTREAM OF THE YUBA RIVER DEVELOPMENT PROJECT	
North Yuba River	
	Salmon Creek
	Haypress Creek
	Jim Crow Creek
	Downie River
	Woodruff Creek
	Goodyears Creek
	Fiddle Creek
	Cherokee Creek
	Canyon Creek
Middle Yuba River	
	Pass Creek
	East Fork Creek
	Wolf Creek
	Bloody Run
	Kanaka Creek
	Indian Creek
South Yuba River	
	Rattlesnake Creek
	Fordyce Creek

Table 3.6-1. (continued)

Tributary	Secondary Tributaries
UPSTREAM OF THE YUBA RIVER DEVELOPMENT PROJECT	
	Rucker Creek
	Fall Creek
	Canyon Creek
	Scotchman Creek
	Poorman Creek
	Humbug Creek
	Spring Creek
	Rock Creek
	Rush Creek
	Shady Creek
	French Corral Creek
WITHIN THE YUBA RIVER DEVELOPMENT PROJECT AREA	
North Yuba River	
	Slate Creek
	Deadwood Creek
	Hampshire Creek
	Lost Creek
	Empire Creek
	Indian Creek
	Mill Creek
	Willow Creek
	Little Oregon Creek
	Cottage Creek
Middle Yuba River	
	Grizzly Creek
	Oregon Creek
	Moonshine Creek
	Clear Creek
	Yellowjacket Creek
Yuba River	
	Sweetland Creek
	Dobbins Creek
DOWNSTREAM OF THE YUBA RIVER DEVELOPMENT PROJECT	
	Woods Creek
	Deer Creek
	Sanford Creek
	Dry Creek

Source: USDOI, United States Geological Survey (USGS), National Hydrology Dataset (NHD).

Additional information about the morphology and hydrology of the Project Area is included in Sections 7.1 and 7.2 of this PAD.

3.7 Basin Dams

There are approximately 46 major dams and diversions in the Yuba River Basin, with a combined storage capacity of 1,358,113 ac-ft of water (Table 3.7-1). Thirty-eight of these dams are upstream of the Project and account for about 17 percent of the total storage capacity. Within the Project Area, there are two major dams with a combined storage capacity of 1,011,103 ac-ft (75% of the combined storage capacity of the basin). Seven dams are downstream of the Project; these can store about 8 percent of the combined storage capacity of the basin.

Table 3.7-1. Owners and capacities of dams and diversions in the Yuba River Basin.

Owner	FERC Project No.	River/Tributary	Dam / Diversion	Reservoir Gross Storage Capacity (ac-ft)
UPSTREAM OF THE YUBA RIVER DEVELOPMENT PROJECT				
North Yuba River				
SFWPA	2088	Slate Creek	Slate Creek Diversion Dam	none
Middle Yuba River				
NID	2266	Middle Yuba River	Jackson Meadows Dam	67,435
NID	2266	Middle Yuba River	Milton Main and South Dam	295
NID	2266	Wilson Creek	Wilson Creek Diversion Dam	none
South Yuba River				
NID	2266	Jackson Creek	Jackson Lake Dam	1,330
NID	2266	Canyon Creek	French Lake Dam	13,940
NID	2266	Canyon Creek	Faucherie Lake Dam	3,980
NID	2266	Canyon Creek	Sawmill Lake Dam	3,034
NID	2266	Canyon Creek	Bowman-Spaulding Conduit Diversion Dam	none
NID	2266	Canyon Creek	Bowman Lake Dam	68,383
NID	2266	Texas Creek	Texas Creek Diversion Dam	none
PG&E	2310	Texas Creek	Upper Rock Lake Dam	207
PG&E	2310	Texas Creek	Lower Rock Lake Dam	48
PG&E	2310	Texas Creek	Culbertson Lake Dam	3,150
PG&E	2310	Texas Creek	Upper Lindsey Lake Dam	180
PG&E	2310	Texas Creek	Middle Lindsey Lake Dam	1,100
PG&E	2310	Texas Creek	Lower Lindsey Lake Dam	293
PG&E	2310	Fall Creek	Feeley Lake Dam	739
PG&E	2310	Fall Creek	Carr Lake Dam	150
NID	2266	Clear Creek	Clear Creek Diversion	none
NID	2266	Fall Creek	Fall Creek Diversion Dam	none
NID	2266	Trap Creek	Trap Creek Diversion	none
PG&E	2310	Rucker Creek	Blue Lake Dam	1,163
PG&E	2310	Rucker Creek	Rucker Lake Dam	648
NID	2266	Rucker Creek	Rucker Creek Diversion	none
PG&E	2310	Unnamed Creek	Fuller Lake Dam	1,127
PG&E	2310	Fordyce Creek	Meadow Lake Dam	4,935
PG&E	2310	Fordyce Creek	White Rock Lake Dam	570
PG&E	2310	Fordyce Creek	Lake Sterling Dam	1,764
PG&E	2310	Fordyce Creek	Fordyce Lake Dam	49,903
PG&E	2310	South Yuba River	Kidd Lake Dam	1,505
PG&E	2310	South Yuba River	Upper Peak Lake Dam	1,736
PG&E	2310	South Yuba River	Lower Peak Lake Dam	484
PG&E	2310	South Yuba River	Lake Spaulding Dam	75,912
YCWA	--	Dobbins Creek	Lake Francis Dam	1,905
WITHIN YUBA RIVER DEVELOPMENT PROJECT AREA				
North Yuba River				
YCWA	2246	Middle Yuba River	Our House Diversion Dam	none
YCWA	2246	Oregon Creek	Log Cabin Diversion Dam	none
YCWA	2246	North Yuba River	New Bullards Bar Dam	966,103
USACE	--	Yuba River	Englebright Dam	70,000
DOWNSTREAM OF THE YUBA RIVER DEVELOPMENT PROJECT				
Yuba River				
NID	--	South Fork Deer Creek	Cascade Canal Diversion Dam	none
NID	--	Deer Creek	Scotts Flat Dam	49,000
NID	--	Deer Creek	Deer Creek Diversion Dam	none
Lake Wildwood Assoc.	--	Deer Creek	Anthony House Dam	3,840
BVID	3075	Dry Creek	Virginia Ranch Dam	57,000
USACE	--	Yuba River	Daguerre Point Dam	none

BVID= Browns Valley Irrigation District, NID=Nevada Irrigation District, SFWPA=South Feather Water and Power Association

3.8 List of Attachments

None.