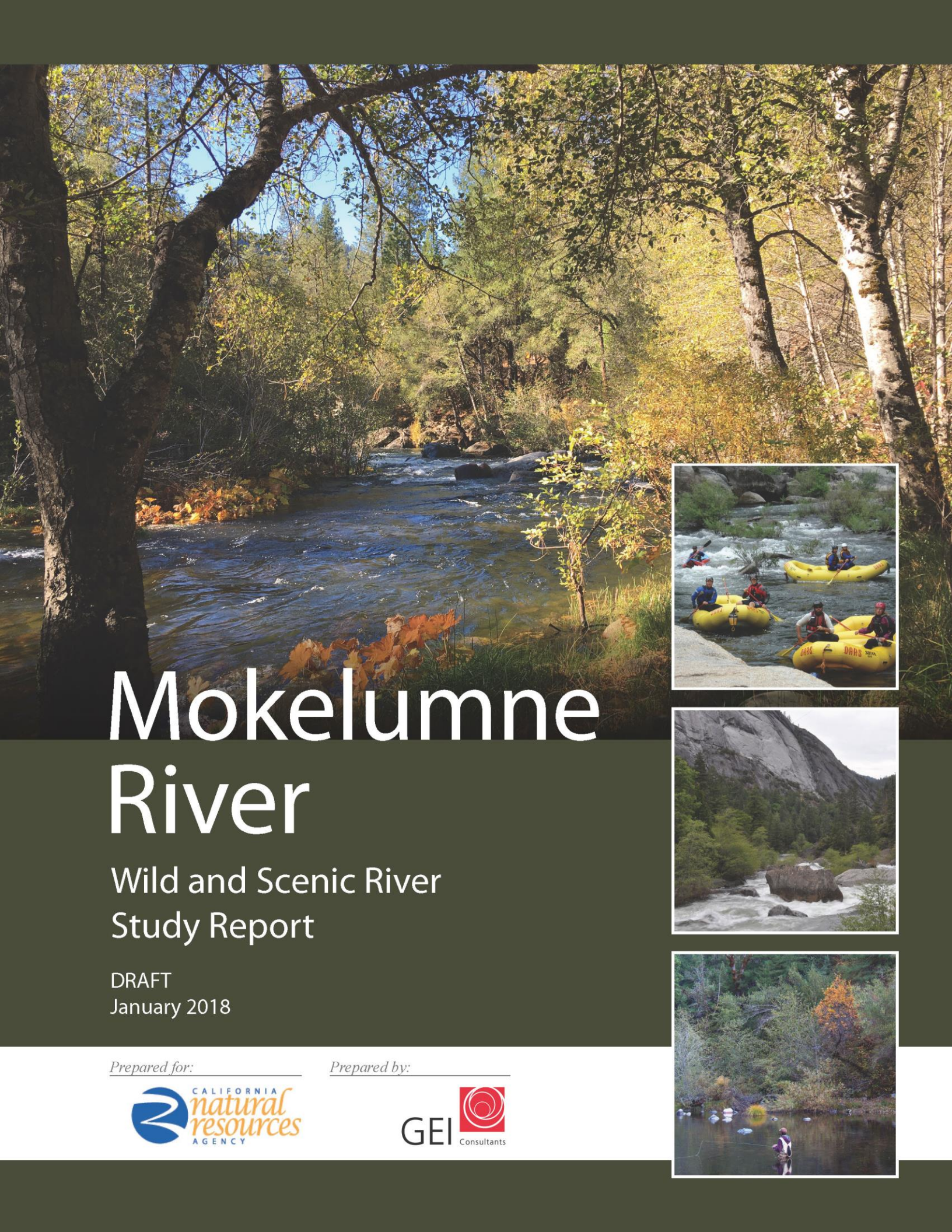




Mokelumne River

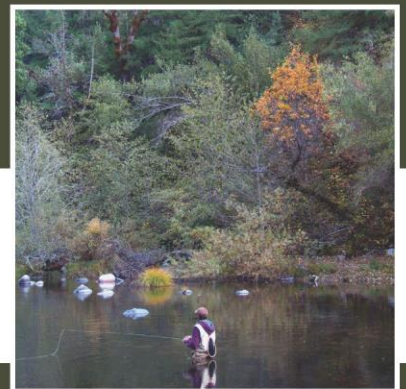
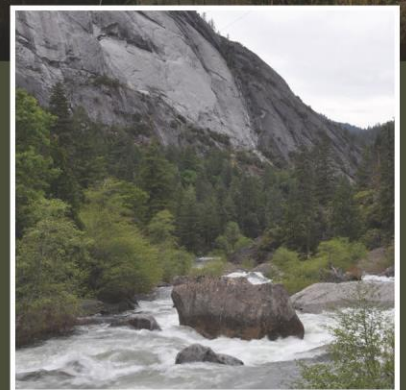
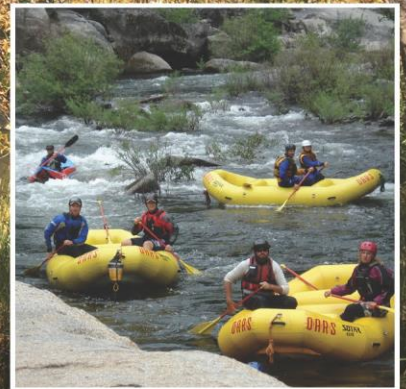
Wild and Scenic River Study Report

DRAFT
January 2018

Prepared for:



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Mokelumne River Wild and Scenic River Study Report

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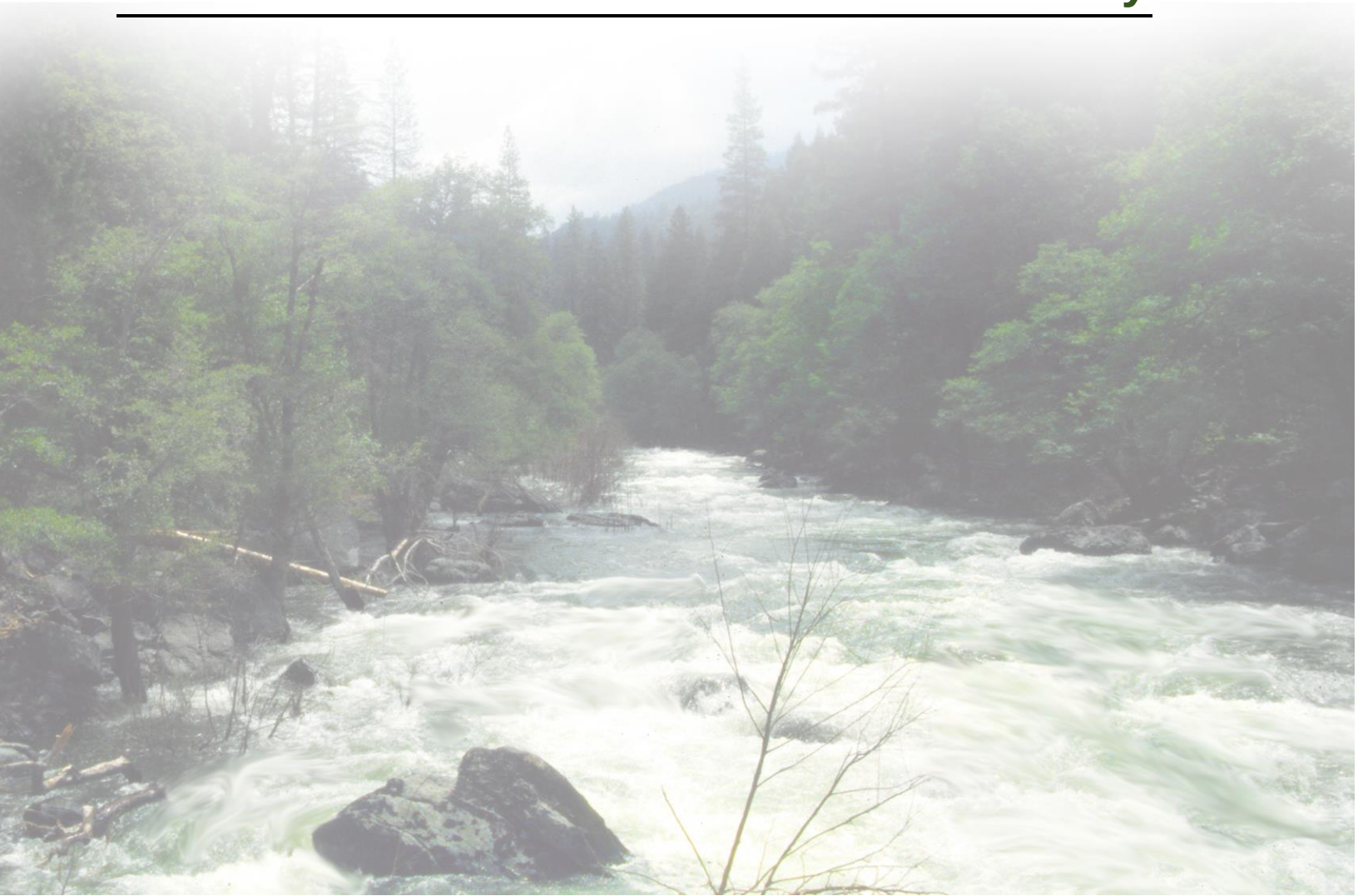
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January 2018

Project No. 1702798

Executive Summary



Executive Summary

The California Wild and Scenic Rivers Act (Act) was passed into law in 1972 to preserve designated rivers or river segments that are free-flowing and possess extraordinary wildlife, fishery, scenic, or recreational values. Assembly Bill No. 142 (AB 142), signed into law on October 9, 2015, requires the Secretary of the California Natural Resources Agency (CNRA) to evaluate five segments of the North Fork Mokelumne River and Mokelumne River for inclusion in the California Wild and Scenic Rivers System (System). Segments A – E possess extraordinary recreational values; Segments A, B, and C1 possess extraordinary scenic values. The segments were classified under the Act as wild, scenic, or recreational, which reflect existing level of development, not extraordinary resource values:

- **Segment A1:** North Fork Mokelumne River from 0.50 mile downstream of the Salt Springs Dam to Bear Creek confluence (**Recreational**); **Segment A2:** Bear Creek confluence to 0.50 mile upstream of the Tiger Creek Powerhouse (**Wild**).
- **Segment B:** North Fork Mokelumne River from 1,000 feet downstream of the Tiger Creek Afterbay Dam to State Highway Route 26 (**Wild**).
- **Segment C1:** North Fork Mokelumne River from 400 feet downstream of the small reregulating dam at the outlet of the West Point Powerhouse to the southern boundary of Section 12, T6N R12E (**Wild**); **Segment C2:** Section 12 boundary to confluence of the North and Middle Forks Mokelumne River (**Recreational**).
- **Segment D:** Main stem Mokelumne River from the confluence of the North and Middle Forks to 300 feet upstream of the Electra Powerhouse (**Scenic**).
- **Segment E:** Main stem Mokelumne River from 300 feet downstream of the small reregulating dam downstream of the Electra Powerhouse to the Pardee Reservoir flood surcharge pool at 580 feet elevation above mean sea level (**Recreational**).

Existing water uses, water rights, and land uses generally would not be affected by designation, except special conditions may apply to timber harvesting within 200 feet of designated segments. PG&E facilities, operations, maintenance, and repair would not be affected by designation. Any new dams on the designated segments or dams impounding water on designated segments would be precluded. Potential future local water projects are conceptual and cannot be considered “feasible” at this time. With respect to future new water rights, the Mokelumne River is a fully appropriated stream from March 1 to November 30, which is a limitation on future water development. Future local water projects would need to meet prevailing environmental laws and with river designation, would also need to be designed to avoid adverse effects on the free-flowing condition and natural character of designated segments, particularly on the extraordinary scenic and recreational values for which the segments were designated.

This study recommends including the segments listed above into the System with special provisions to protect existing water rights application 5647X03 and future local water development projects designed to avoid adverse effects on the free-flowing condition and natural character of designated segments, as well as on the extraordinary scenic and recreational values for which the segments would be designated.

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Abbreviations and Acronyms

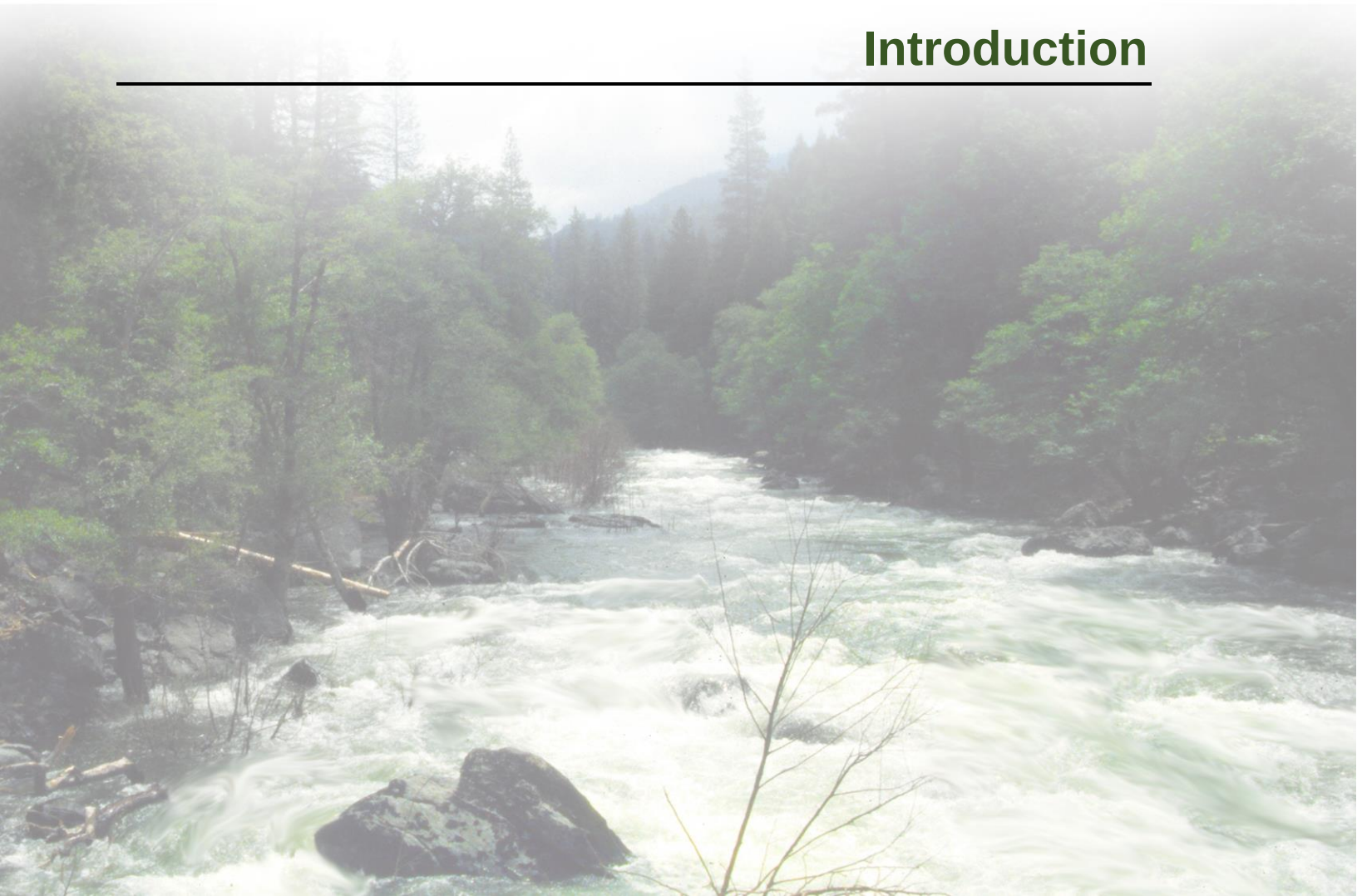
AB 142	Assembly Bill No. 142
Act	California Wild and Scenic Rivers Act
ACWA	Alpine County Water Agency
AFY	acre-feet per year
AN	Above Normal
ARSA	Amador Regional Sanitation Authority
AWA	Amador Water Agency
BLM	U.S. Bureau of Land Management
BN	Below Normal
CAWP	Central Amador Water Project
CCWD	Calaveras County Water District
CD	Critically Dry
CDBW	California Department of Boating and Waterways
CDEC	California Data Exchange Center
CDFFP	California Department of Forestry and Fire Protection
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
cfs	cubic feet per second
CNDDDB	California Natural Diversity Database
CNRA	California Natural Resources Agency
CPUD	Calaveras Public Utility District
CRB	California Research Bureau
CWC	California Water Commission
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utility District
ERC	Ecological Resources Committee
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
JPA	Joint Powers Authority
JVID	Jackson Valley Irrigation District
MAC	Mokelumne-Amador-Calaveras
MOCASIM	Mokelumne Calaveras Simulations Model

MokeWISE	Mokelumne Watershed Interregional Sustainability Evaluation
MRWPA	Mokelumne River Water and Power Authority
MW	megawatt
National Act	National Wild and Scenic Rivers Act
NHI	Natural Heritage Institute
NSJWCD	North San Joaquin Water Conservation District
OHV	Off-highway vehicle
PG&E	Pacific Gas and Electric Company
PRC	Public Resources Code
RFI	Request for Information
Secretary	Secretary of the California Natural Resources Agency
SEMP	Stream Ecology Monitoring Program
SFA	State Filed Application
SMS	Scenery Management System
SWRCB	State Water Resources Control Board
System (or State System)	California Wild and Scenic Rivers System
UMRWA	Upper Mokelumne River Watershed Authority
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UWMP	Urban Water Management Plan
VSPUD	Valley Springs Public Utility District
WARMF	Watershed Analysis and Risk Management Framework
WID	Woodbridge Irrigation District

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Chapter 1

Introduction



Chapter 1. Introduction

1.1 Study Need

The California Wild and Scenic Rivers Act (Act) (Public Resources Code [PRC], Section 5093.50 et seq.) was passed into law in 1972 to preserve designated rivers or river segments that are free-flowing and possess extraordinary wildlife, fishery, scenic, or recreational values. The Act designates rivers or segments of rivers in the State as wild, scenic, or recreational for purposes of preserving the highest and most beneficial uses of those rivers. The Legislature and Governor can include rivers directly into the California Wild and Scenic Rivers System (System or State System) without study, or require the Secretary of the California Natural Resources Agency (Secretary) to study and submit to the Governor and the Legislature a report that analyzes the river's suitability or unsuitability for addition to the System. Each report must contain specified information and recommendations with respect to the proposed designation.

Assembly Bill No. 142 (AB 142), signed into law by Governor Brown on October 9, 2015, requires the Secretary to evaluate the following five segments of the North Fork Mokelumne River and Mokelumne River for inclusion in the System:

- Segment A: North Fork Mokelumne River from 0.50 mile downstream of the Salt Springs Dam to 0.50 mile upstream of the Tiger Creek Powerhouse;
- Segment B: North Fork Mokelumne River from 1,000 feet downstream of the Tiger Creek Afterbay Dam to State Highway Route 26 (SR-26);
- Segment C: North Fork Mokelumne River from 400 feet downstream of the small reregulating dam at the outlet of the West Point Powerhouse to the confluence of the North and Middle Forks Mokelumne River;
- Segment D: Main stem Mokelumne River from the confluence of the North and Middle Forks to 300 feet upstream of the Electra Powerhouse; and
- Segment E: Main stem Mokelumne River from 300 feet downstream of the small reregulating dam downstream of the Electra Powerhouse to the Pardee Reservoir flood surcharge pool at 580 feet elevation above mean sea level.

AB 142 requires the Secretary to complete these studies and submit reports with recommendations on these rivers to the Governor and Legislature by December 31, 2017. Given the importance of including several key cornerstone studies in this report that were only recently completed by the Amador Water Agency (AWA) in September 2017 (AWA 2017), Calaveras County Water District (CCWD and CPUD) in November 2017 (CCWD 2017), and the California Research Bureau in early January 2018 (CRB 2018), the Secretary requested and obtained a 3-month extension until March 31, 2018, to submit this study to the Governor and Legislature. AB 142 includes the five study segments designated for potential addition into the System, with certain protections afforded to State Wild and Scenic Rivers, until study

completion and the implementation of any recommendation to add segments of the Mokelumne River to the System, or December 31, 2021, whichever occurs first.

1.2 Study Purpose and Requirements

The primary study purpose is to meet the requirements specified in AB 142, including the following specifically identified requirements therein:

- Determine whether the nominated river segments are free-flowing and contain one or more extraordinary wildlife, fishery, scenic, or recreational values (eligibility determination)
- Determine what classification (wild, scenic, or recreational) is appropriate for any eligible segment (classification determination)
- Determine the suitability or unsuitability of any eligible segment for inclusion in the System based on consideration of:
 - eligibility and classification determinations;
 - potential effects of proposed designation on future water requirements, including the ability of public agencies and utilities within the Mokelumne River watershed to meet current and projected future water requirements through the development of new and more reliable water supplies from the Mokelumne River and its tributaries (only feasible projects to meet foreseeable demands will be considered);
 - potential effects of climate change on river values and current and projected water supplies;
 - feasibility studies and assessments included within the implementation plan of the Mokelumne Watershed Interregional Sustainability Evaluation, Final Report dated June 12, 2015 (7a, 7b, 7d, and 7f);
 - instances when the Secretary has determined pursuant to Section 5093.55 that a water diversion facility may be constructed on a river or segment of a river that is part of the System;
 - instances when the State Water Resources Control Board (SWRCB) has approved an application to appropriate water from a river or a segment of a river that is part of the System and what restrictions, if any, were placed on the appropriation of water as a result of the river's or segment of a river's inclusion in the System;
 - public input from a broad range of stakeholders;
 - information contained in PRC Section 5093.547, which includes:
 - one or more public hearings within the local area to receive public comments and suggestions with respect to the suitability or unsuitability of the river and river segments designated as potential additions to the System;
 - current status of land ownership and use in the immediate environment, and the reasonably foreseeable potential uses of the land and water which will be enhanced, foreclosed, or curtailed if the river or river segments were included in the System; and

- need for future flood control facilities or improvements, potential conjunctive uses of water with the region and the Sacramento-San Joaquin Delta (Delta), local groundwater management planning studies or programs, and any fishery restoration projects or facilities that will be enhanced, foreclosed, or curtailed if the river or river segment is included in the System.
- Make a clear recommendation on the suitability or unsuitability of each of the designated segments of the Mokelumne River to the System.

AB 142, through PRC Section 5093.56, also specifies that no department or agency of the State may assist or cooperate, whether by loan, grant, license or otherwise, with any department or agency of the Federal, State, or local government, in the planning or construction of a dam, reservoir, diversion, or other water impoundment facility that could have an adverse effect on the free-flowing condition and natural character of any existing river segments in the System or the five Mokelumne River segments designated for study herein until after the study period and implementation of any recommendations have been completed, or December 31, 2021, whichever comes earlier. Section 5093.56, however, does not apply to, and does not in any way affect, AWA's water rights application 5647X03 pending before the SWRCB. Moreover, Section 5093.56 does not prejudice, alter, affect in any way, or interfere with the maintenance, repair, or operation by the Pacific Gas and Electric Company (PG&E) of the Mokelumne River Project (Federal Energy Regulatory Commission [FERC] No. 137) currently under the 2001 FERC license for the project, the incorporated settlement agreement, and any adjustment of flows permitted to occur pursuant to the license for enhancing ecological resources.

1.3 Report Organization

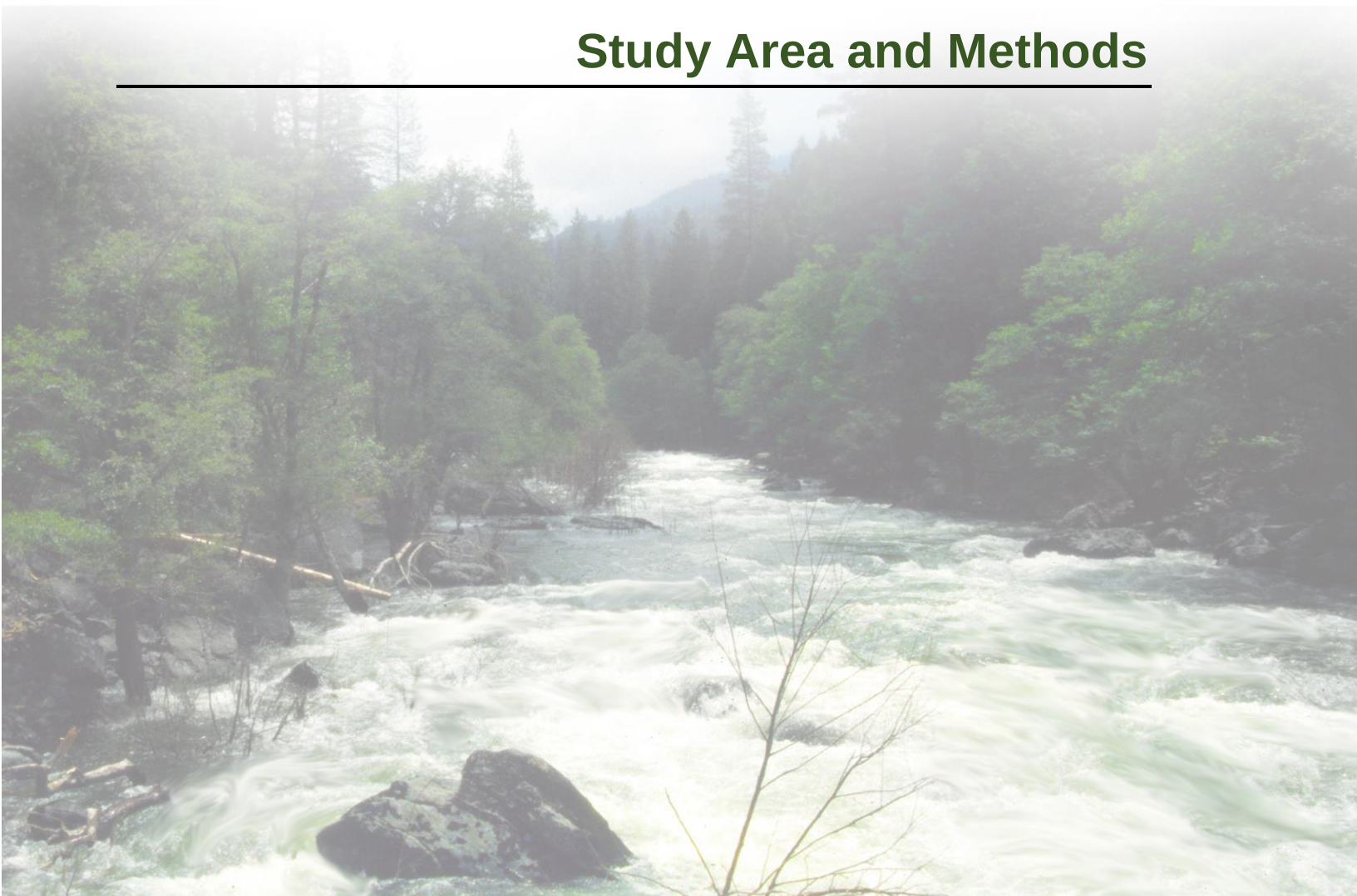
The content and format of this report are designed to meet the requirements of AB 142. The report is organized as follows:

- **“Executive Summary”** provides a 1-page summary of the key study conclusions and recommendations.
- **Chapter 1, “Introduction,”** identifies the need for this study, study purpose and requirements, and the report organization.
- **Chapter 2, “Study Area and Methods,”** presents the location, study area, primary data sources, study methodology, stakeholder and public input, and key provisions of the California Wild and Scenic Rivers Act.
- **Chapter 3, “Mokelumne River Water Development and Issues Summary,”** summarizes key issues regarding this study.
- **Chapter 4, “Eligibility Evaluation,”** presents separate evaluations of wildlife, fishery, scenic, and recreational resources and values, and whether these values are considered to be extraordinary.
- **Chapter 5, “Suitability Evaluation,”** discusses potential suitability and unsuitability of designating eligible river segments, including potential effects on existing and future water and land uses.
- **Chapter 6, “Comparison with Designated State Wild and Scenic Rivers,”** compares designated eligible Mokelumne River segments with other designated State Wild and Scenic Rivers.

- **Chapter 7, “Alternatives and Recommendation,”** summarizes alternative recommendations and provides a clear recommendation for suitability or unsuitability of eligible Mokelumne River segments.
- **Chapter 8, “List of Preparers, Acknowledgments, and Photo Credits,”** lists individuals who were involved in oversight or preparation of this report, their education, and years of experience.
- **Chapter 9, “References,”** provides a bibliography of sources cited in this report.
- **Technical Appendices** contain background information as follows:
 - **Appendix A:** Assembly Bill No. 142
 - **Appendix B:** California Wild and Scenic Rivers Act and Brief History
 - **Appendix C:** Reviewed Literature
 - **Appendix D:** Federal Energy Regulatory Commission No. 137: Protection, Mitigation, and Enhancement Measures Recommended to be Included in New Project License, Section 4(e) Conditions, and Other Mandatory License Conditions
 - **Appendix E:** California Research Bureau, Findings on Impacts from Wild and Scenic River Designations
 - **Appendix F:** Stakeholder and Public Input

Chapter 2

Study Area and Methods



Chapter 2. Study Area and Methods

2.1 Location and Study Area

2.1.1 Location

The study area is located along the North Fork and main stem Mokelumne River, south of the City of Jackson in Amador County and north of the community of Mokelumne Hill in Calaveras County (**Figure 2-1**). The Mokelumne River is formed by the confluence of several forks that rise in the central Sierra Nevada in the Stanislaus National Forest. The 62-mile-long North Fork originates at Highland Lakes at an elevation of 8,584 feet above mean sea level. From its source, the North Fork flows north then west for 28 miles to Salt Springs Dam and Reservoir. Below Salt Springs Dam, at the eastern end of the study area, the North Fork receives flows from the Bear River along with other smaller tributaries and then passes through PG&E's Tiger Creek Reservoir before joining with the Middle Fork Mokelumne River southeast of Pine Grove. The confluence of the North and Middle Forks forms the main stem of the Mokelumne River, which continues to flow west-southwest past Mokelumne Hill and into Pardee Reservoir.

2.1.2 Study Area

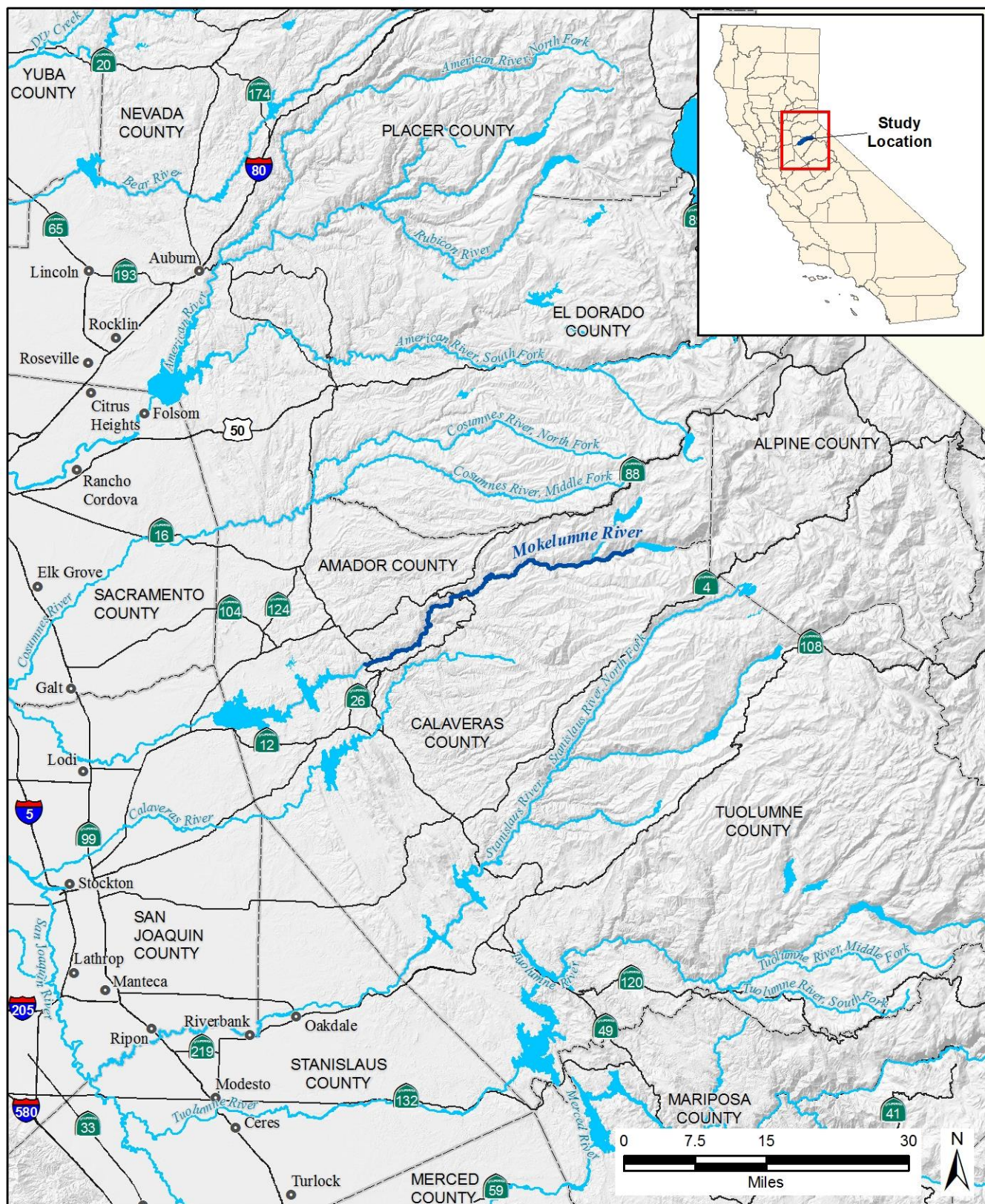
PRC Section 5093.549 identifies five specific segments of the North Fork and main stem Mokelumne River as potential additions to the California Wild and Scenic Rivers System. The project study area begins at the northeastern end of Segment A 0.5 mile below Salt Springs Dam (at an elevation of approximately 3,600 feet), and ends at the Pardee Reservoir flood surcharge pool at 580 feet.

Under the Act, boundaries of designated rivers extend "up to the first line of permanently established riparian vegetation." This means that only the area of the river channel between the upstream and downstream segment boundaries of a designated river is covered under the Act. The "immediate environments" pertain only to the land "immediately adjacent" to designated river segments (PRC Sec. 5093.52). To fully evaluate resources that might contribute to a river's eligibility, and land and water uses that might contribute to a river's suitability, however, a broader area of investigation is needed.

Resource evaluations considered three nested study areas: regional, secondary, and primary. This distinction was used effectively for studies completed for previous additions to the State System (The Resources Agency 1994a, 1994b, 1988a, 1988b, 1988c). The regional study area generally coincides with the Mokelumne River watershed above Pardee Reservoir. A general description of the regional study area resources provides a broad perspective on which specific resources were evaluated and also encompasses the local areas upstream of Pardee Reservoir where Mokelumne River water is used and existing, and potentially future, water infrastructure is located.

The secondary study area includes all areas within approximately 1 mile of Segments A–E. Elevations within the secondary study area range from approximately 6,200 feet at the top of the canyon south of Salt Springs Reservoir to 580 feet at the Pardee Reservoir flood surcharge pool. The secondary study area includes the entirety of the river canyon between the upper and lower boundaries of the nominated river segments (**Figure 2-2**).

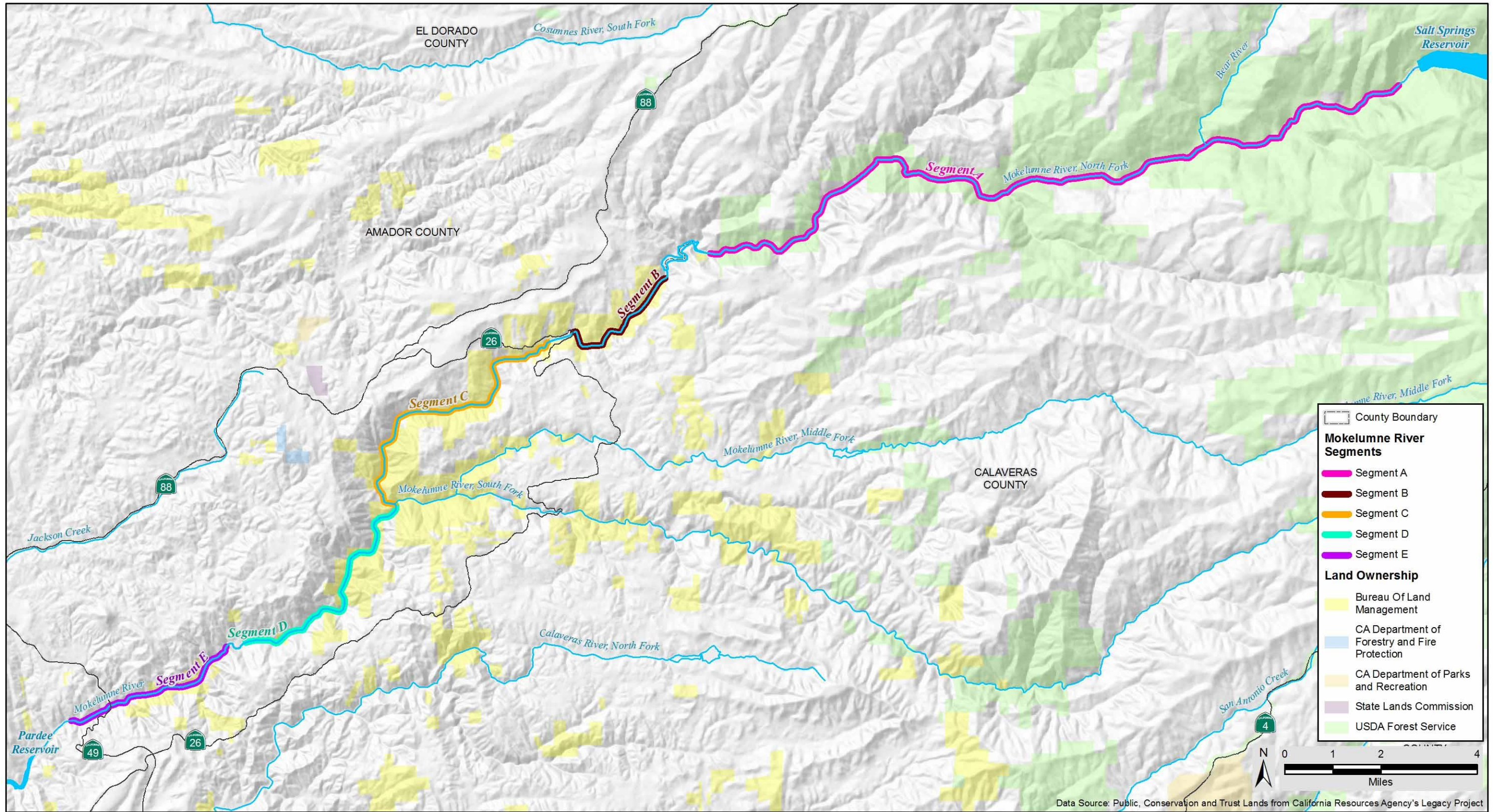
Figure 2-1. Study Area Location



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Source: GEI Consultants, Inc., 2017

Figure 2-2. Mokelumne River Wild and Scenic River Study Segments



Source: GEI Consultants, Inc., 2017

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Use of a 1-mile-wide secondary study area facilitates a resource inventory within the general environment of the river under study. Unless otherwise noted, "study area" refers to the secondary study area throughout this report, which includes the river and the canyon slopes adjacent to the river.

The primary study area coincides with the boundaries established in the Act and extends up to the first line of permanently established riparian vegetation within the upper and lower boundaries of the nominated river segments. For scenic and recreational resources and values, the secondary and primary study areas were combined because both resources are not limited to just the river and its immediate environs but are evaluated based on scenic views inclusive of a larger viewshed and recreational resources and amenities within and adjacent to the immediate environs of the river.

2.2 Primary Data Sources

2.2.1 Mokelumne River Project Licensing and Relicensing

PG&E owns and operates the Mokelumne River Project for hydropower generation in the upper watershed of the North Fork and main stem Mokelumne River. Pursuant to Sections 4(e) and 15 of the Federal Power Act (FPA), PG&E is required to periodically file a relicensing application for the continued operation and maintenance of the 206-megawatt (MW) Mokelumne River Project (FERC No. 137). As part of its 2001 relicensing, PG&E filed a Settlement Agreement to continue to produce much-needed hydropower but also includes numerous enhancements to the existing aquatic and terrestrial environments, recreation, and cultural resources (PG&E et al. 2000). The Settlement Agreement was signed by 10 parties including PG&E, U.S. Forest Service (USFS), U.S. Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG, now the California Department of Fish and Wildlife [CDFW]), California Department of Boating and Waterways (CDBW), Natural Heritage Institute (NHI), American Whitewater, Friends of the River, and Foothill Conservancy in a collaborative relicensing process.

Key documents developed during the Mokelumne River Project (FERC No. 137) relicensing process include a Draft Environmental Assessment, a Rationale Report describing the basis of the Settlement Agreement, the Relicensing Settlement Agreement, and a FERC Order (FERC 2001). In addition, PG&E is required to submit an annual report to FERC and USFS detailing ongoing stream ecology monitoring or study efforts, proposed changes, and any unresolved issues by May 31 of each year. Similar summary reports are also required after every 5 years of operation, beginning after the completion of proposed system changes under the license. The 5-year Summary Report was issued in 2011 while a 10-year was issued in 2016 (PG&E 2010, 2017). Based on the results of these summary reports, the study plans for Riparian Vegetation Monitoring, Stream Geomorphology Monitoring, and the Water Quality Monitoring are periodically modified with the most recent revision occurring in 2011. These FERC reports and related documents supporting the comprehensive development of the Mokelumne River Project for all beneficial public purposes have provided important background material for this study.

2.2.2 Water Rights Applications 5647 and 5648

Existing water rights and uses must also be considered in determining suitability and impacts of State Wild and Scenic River designation for specific segments of the Mokelumne River. The majority of water rights in the upper Mokelumne watershed derive from Water Rights Applications 5647 and 5648 filed by the State of California on July 30, 1927, under the provisions of the Feigenbaum Stats. 1927, c. 286, p. 508, which are now codified, as, amended, in Act, Part 2, Division 6 of the California Water

Code (CWC), commencing with Section 10500. These State Filed Applications (SFAs) reserve a total of 20,000 acre feet of water per annum (AFY) for direct diversion from the Mokelumne River and its tributaries for beneficial use in Amador County and for diversion to storage such quantity of water as is required to produce a safe yield to be later applied to beneficial use.

While planning for construction of the Central Valley Project in 1927, the State enacted various Area of Origin Laws which reserved a preferential right to areas where water originates in meeting future water needs. The Area of Origin Laws include i) The County of Origin Law (1931), ii) The Watershed Protection Statute (1933), and iii) The Delta Protection Act (1959). The laws were enacted to ensure that areas in which water originates have adequate water supply for present and future needs. These laws provided Amador and Calaveras Counties with a preferential right to access Mokelumne River water for future use for irrigation and domestic purposes. These rights were later quantified by the California Department of Water Resources (DWR) in 1959 after the East Bay Municipal Utility District (EBMUD) entered into separate Release from Priority agreements with Amador and Calaveras Counties to secure priority access to water rights for the Camanche Dam and Reservoir Project. While the Release from Priority agreements reduced the seniority of their County of Origin reserves, Calaveras County retained a preferential right to access 27,000 AFY of Mokelumne River water to meet future needs for irrigation and domestic uses. Amador County similarly retained a similar preferential right to 20,000 AFY of Mokelumne River water for direct diversion to beneficial use and diversion to storage for use to meet future needs.

Water purveyors in Amador and Calaveras Counties have filed various applications with the SWRCB for partial assignment or reassignment of Mokelumne River water rights under SFAs 5647 and 5648 for beneficial uses of water. AWA currently has filed pending Water Right Application 5647X03 requesting approval to directly divert up to 1,050 acre-feet per year (AFY) of water from Bear River and North Fork Mokelumne River and store up to 1,400 AFY in Lower Bear River Reservoir in connection with AWA's Central Amador Water Project (CAWP) (AWA 2017b). Under Section 1348 of the California Water Code, such applications are required for all projects where the proposed direct diversion is greater than 3 cubic feet per second (cfs) or storage is greater than 200 AFY. Documents related to SWRCB's administration of these water right applications, including petitions, notices, decisions, permits, licenses, cancellations, and revocations, have provided important information on current water use for this study.

2.2.3 Mokelumne-Amador-Calaveras Integrated Regional Water Management Plan

In 2005, DWR began implementing the Integrated Regional Water Management (IRWM) planning process aimed at encouraging collaborative planning among diverse stakeholders of water supply and demand and related water quality, ecological, and environmental resources for planning horizon of 20 years or more. The IRWM organizational and planning requirements are set forth in the IRWM Planning Act, CWC §10530 et seq.

The Mokelumne-Amador-Calaveras (MAC) IRWM region was formed by stakeholders in the upper watershed, whose primary water supply is surface water from the Mokelumne River, to update the IRWM plan in 2013. The MAC IRWM planning process was governed by the Upper Mokelumne River Watershed Authority (UMRWA), a Joint Powers authority (JPA) established by Alpine, Amador, and Calaveras Counties and six water-related special districts including AWA, CCWD, Calaveras Public Utility District (CPUD), EBMUD, Jackson Valley Irrigation District (JVID), and Alpine County Water Agency (ACWA). Other participating stakeholders included eight cities and special districts, five environmental stewardship organizations, four disadvantaged communities, PG&E, Sierra Pacific

Industries, USFS, and Amador Regional Sanitation Authority (ARSA), a JPA established by Amador County, Sutter Creek, and Amador City. (UMRWA 2013.)

The MAC IRWM Plan estimated past water supply and demand in the region using 2010 as the base year. Projections were also made for future water supply and demand through 2030. While these projections did not incorporate climate change impacts, the results of other Statewide and regional climate studies were summarized. Stakeholders submitted 38 projects which were reviewed and rated based on effectiveness in implementing 23 resource management strategies determined to be applicable to the region. In 2015, the region submitted a Proposition 84 IRWM Implementation Grant application for the Lake Camanche Service Lateral Replacement Project, the Sheep Ranch Drinking Water Compliance Project, and MAC Region Water Conservation Program. However, the grant application was not selected for funding by DWR. (UMRWA 2013.)

2.2.4 Mokelumne Watershed Interregional Sustainability Evaluation Program

The Mokelumne Watershed Interregional Sustainability Evaluation (MokeWISE) Program was formed in 2011 by stakeholders from the Mokelumne-Amador-Calaveras and Eastern San Joaquin IRWM regions after securing separate Proposition 84 IRWM planning grants from DWR. MokeWISE was initiated to develop a program for comprehensive and sustainable management of surface and groundwater water resources within both the upper and lower Mokelumne River watersheds. The two IRWM regions had previously engaged in the Mokelumne River Forum, which facilitated discussion and improved understanding of their respective water issues and interests but opted to pursue separate IRWM plans because of significant differences in their water supply issues. Despite these differences, a diverse group of 27 stakeholders participated in MokeWISE including water purveyors, local and State agencies, districts, non-governmental organizations, and private entities from Amador, Calaveras, and San Joaquin Counties, as well as the EBMUD service area. (UMRWA and SJGBA 2015.)

The MokeWISE Program began by establishing 48 management objectives including water supply, demand, water quality, recreation, flood management, data management, environment, collaboration, avoided consequences, and other human values. Three intermediate reports were prepared to guide resource evaluations including a Baseline Environmental Conditions Report, a Water Availability Analysis, and a Climate Change Memorandum. An implementation plan was developed which includes six ecosystem and habitat restoration projects, three recycled water projects, three groundwater management projects, two water conservation projects, four surface storage and reservoir reoperation projects, three local infrastructure projects, and four policies and initiatives that were determined to be technically-feasible, beneficial, attainable, and compatible with the program objectives. A final report was also prepared in 2015 which summarizes the intermediate reports and describes the process used to gather 36 potential projects proposed by various entities and perform preliminary screening to select 25 broadly-supported projects with a projected cost of more than \$100 million. (UMRWA and ESJGBA 2015.)

2.2.5 Upper Mokelumne Watershed Assessment and Planning Project

The Upper Mokelumne River Watershed Authority undertook a study aimed at providing improved understanding of the sources, magnitude, and opportunities to manage water quality pollution loads in the Mokelumne River through improved watershed management. Funding for the assessment was provided by the CALFED Bay-Delta Watershed Program through Proposition 13 and Proposition 50

grants administered by SWRCB for implementing Nonpoint Source Pollution Control programs. A decision support system was developed in the Watershed Analysis and Risk Management Framework (WARMF), a simulation model which allows computation of streamflow and water quality conditions based on land use/land cover data and supports analysis of future watershed management scenarios. WARMF tools were also implemented for modeling impacts of wildland fires and high vulnerability areas which could transport heavy contaminant loads to waterbodies. (UMRWA 2007.)

The study concluded that water quality pollution levels in the Upper Mokelumne Watershed are generally well below regulatory benchmarks for most parameters. With higher flows and undeveloped rural land, the North Fork Mokelumne River was found to be the most pristine of the major subwatersheds. The main stem of the Mokelumne River also has excellent water quality as its flow is dominated by flow contributions from the North Fork Mokelumne River. Concentrations of several water quality contaminants along the Middle and South Fork Mokelumne River were higher than those along the North Fork and main stem Mokelumne River. Microbial contamination is currently the most significant water quality challenge facing the watershed with *Cryptosporidium* concentrations on the main stem exceeding the human health benchmark and concentrations of fecal coliforms notably higher along the Middle and South Forks than on the North Fork. Analysis of contaminant loading patterns indicated that the septic systems could be a significant contributor of fecal coliform.

Vulnerability analysis using model simulations also identified wildfires as a potential source of adverse water quality impacts. The most severe impacts were associated with high severity burn areas or many mild burn areas throughout the watershed such as those caused by many separate small fire incidents over time or a lightning ignition which could generate a scattering of burn areas. A watershed management plan was developed to address the vulnerabilities identified (UMRWA 2007). It included recommendations for 14 management measures maintaining or improving source water quality or providing incidental water quality benefits. Four measures were aimed at reducing sources of contaminants. Four measures for managing contaminated flows and six sediment management measures were also included. The final project report which was completed in 2007 also identified potential funding sources to be pursued for project implementation.

2.2.6 MOCASIM Modeling Studies

Mokelumne River Water and Power Authority (MRWPA) is a joint powers authority formed in 1990 with the goal of increasing the quantity and reliability of water supplies and hydropower in the San Joaquin County. MRWPA filed Water Right Application 29835 for the direct diversion off the Mokelumne River of 110,000 AFY and storage of up to 434,000 AFY, with a diversion period from December through June at combined rates of up to 1,620 cfs. In 2003, MRWPA initiated development of the Mokelumne River Regional Water Storage and Conjunctive Use Project (also referred to as the MORE Water Project) to identify opportunities to capture unappropriated flows from the Mokelumne River for storage and beneficial use (MRWPA 2004). The Mokelumne Calaveras Simulations Model (MOCASIM) was developed by MRWPA under the MORE Water Project to quantify water availability by simulating streamflow from the upper Mokelumne River watershed, analyzing reservoir operations at Pardee and Camanche Reservoirs, and assessing water available from reservoir releases after accounting for downstream water use and flow requirements. In 2012, MOCASIM was updated to include water storage, instream flows and diversion operations under PG&E's Upper Mokelumne River Project (FERC No. 137), and downstream flows under Lodi Decrees and Joint Settlement Agreement (UMRWA and ESJGBA 2015).

Since its development, simulation results from MOCASIM have been used in several water availability studies. MRWPA has used MOCASIM results in feasibility studies for Water Right Application 29657 to divert unappropriated flows in wet years from the South Fork of the American River upstream of Folsom Reservoir, or from Nimbus Lake on the Lower American to EBMUD's Mokelumne Aqueduct (San Joaquin County 2011). AWA has also used MOCASIM results in environmental impact studies for pending Water Right Application 5647X03 which seeks to directly divert up to 1,050 acre-feet per year (AFY) of water from Bear River and North Fork Mokelumne River and store up to 1,400 AFY in Lower Bear River Reservoir in connection with the Central Amador Water Project (AWA 2017b).

MOCASIM was also used to perform extensive water availability analysis under MokeWISE program to assess the baseline water availability and to project future water availability under climate change. For baseline conditions in 2010, the simulations show potential for an average of 253,500 AFY of unallocated water below Camanche Dam. By 2040, the potential unallocated water is projected to fall to 230,000 AFY. Results also indicate that there is generally more unallocated water in the months from January to May in both the baseline and 2040 periods. (UMRWA and ESJGBA 2015.)

2.2.7 Local Urban Water Management Plans

DWR requires every urban water supplier that either provides over 3,000 AFY, or serves more than 3,000 urban connections, to prepare and submit an Urban Water Management Plan (UWMP) every 5 years with the latest updates occurring in 2015. The plans are required to support long-term resource planning and ensure availability and reliability of water supplies to meet existing and future water demands over a 20-year planning horizon. The plans are also required to report progress on 20% reduction in per-capita urban water consumption by the year 2020, as required in the Water Conservation Bill of 2009 SBX7-7. Detailed requirements for the submitted UMWPs are laid out in the Urban Water Management Planning Act, CWC §10608 et seq.

AWA and CCWD both completed their 2015 UWMPs in June 2016. AWA established baseline water use at 731 gallons per capita per day and set its 2020 goal for 20% reduced water usage at 495 gallons per capita per day. The Agency analyzed its water supplies and projected demands and demonstrated that it expects to have adequate supplies to fully meet demands through 2040 even during multiple-dry years. (AWA 2016.)

By comparison, CCWD established baseline usage of 240 gallons per capita per day and set its 2020 target at 192 gallons per capita per day. Analysis of water supply resilience shows that CCWD has adequate water supplies to meet demands in the Mokelumne River watershed during normal years and during the first year of drought through 2040. However, during multiyear droughts increased conservation associated with implementation of its Water Shortage Contingency Plan must be implemented as supplies are inadequate. (CCWD 2016.)

2.2.8 Amador and Calaveras Long-Term Needs and Water Supply Studies

In 2017, Amador and Calaveras Counties conducted independent studies to assess their current and projected future water supply needs (AWA 2017a, CCWD and CPUD 2017). The studies were undertaken for the dual purposes of providing information to the California Natural Resources Agency's (CNRA's) assessment of State Wild and Scenic River designation in compliance with AB 142, and informing long-term, system-wide water and project planning to meet current and future water needs. The two studies employed similar methodologies for estimating future water demand which assume that

current land use designations under their County General Plans will ultimately be built out. The studies also evaluated the impacts of climate change projections on future water supply and demand, and identified potential projects for enhancing resilience and meeting future water needs.

In Amador County, the *Long-Term Needs and Water Supply Study* was undertaken by AWA. Using projected future water supply and demand under three climate change scenarios, the study concluded that Amador's future water needs would ultimately exceed its current water rights if existing land use designations under the County General Plan are built out. The study recommended initiating implementation of projects proposed through the MokeWISE and MAC IRWMP to ensure future water needs are met. The study expresses concern that State Wild and Scenic River designation could potentially impede the AWA's ability to develop water supply projects using water from the North Fork Mokelumne River and to pursue any storage expansion projects in tributaries unless the designation explicitly allows for such projects. (AWA 2017a.)

CCWD and CPUD jointly undertook the *Calaveras County Mokelumne River Long-Term Water Needs Study*. The agencies supply water sourced from the Middle and South Fork Mokelumne River and their tributaries. Taking into account climate change impacts on hydrology and water requirements after buildout of existing land use designations under the County General Plan, the agencies project that they will require full assignment of their existing water rights from the Mokelumne River to meet future water needs. The study also analyzed future resilience of existing baseline infrastructure under four future development alternatives, each composed a set of water infrastructure projects and concludes that a significant expansion of storage infrastructure is required to provide proposed service areas with a reliable water supply to meet future long-term needs. The study similarly expresses concern that State Wild and Scenic River designation could potentially impede future upstream storage projects needed to meet future water supply needs and to supply water in a prolonged drought, even under baseline water use conditions. (CCWD and CPUD 2017.)

2.2.9 Federal Wild and Scenic River Studies

Relevance to State Wild and Scenic River Study

The 1972 California Act was patterned after the 1968 National Wild & Scenic Rivers Act (National Act). The State and National Acts share similar criteria and definitions in regard to the purpose of protecting rivers; identifying free-flowing rivers with extraordinary (State) or outstandingly remarkable (Federal) values suitable for protection; establishing a study process for evaluating the eligibility and suitability of including rivers into their respective Wild and Scenic River Systems; and designating river segments as wild, scenic, or recreation (both Acts share an identical classification system). The primary purpose of both the State and National Acts is to protect free-flowing rivers with extraordinary (State) and outstandingly remarkable (Federal) values, respectively, and prohibit new water impoundments on designated rivers. There are numerous differences between the State and National Acts, which will not be summarized here because the National Act generally has little bearing on this report prepared under the State Act; where similarities or differences between the Acts arise or are pertinent, they are explained.

The State-designated Mokelumne River segments under study have been evaluated for inclusion in the National Wild and Scenic Rivers System: Segment A (USFS 1990) and Segments B-E (BLM 2007). This site-specific information is useful in providing background information on resources in each segment and for classifying specific river segments (wild, scenic, or recreational) because the classifications are defined similarly between the State and National Acts. However, differences between

the conclusions of this report and the Federal studies would not be particularly noteworthy because the entire context of State Wild and Scenic River designations is unique to California resources, eligibility, suitability, domestic water rights, existing and proposed water projects, and State laws; while National Wild and Scenic River designations are made in the context of the United States and Federal eligibility, suitability, and laws. Likewise, similarities in conclusions of this report and the Federal studies would not be particularly noteworthy because the State Act was patterned after the National Act and they share similar eligibility, classification, and suitability processes.

In conclusion, this State study was conducted independent from the Federal studies, but used the Federal studies as credible and available references, no different than other references with available and useful data and analyses. The following sections summarize key findings from the USFS (1990) and BLM (2007) Wild and Scenic River evaluations of the Mokelumne River.

U.S. Forest Service 1990 Wild and Scenic River Evaluation

The North Fork Mokelumne River forms a portion of the shared boundary between the Eldorado and Stanislaus National Forests. In 1990, USFS prepared the *Wild and Scenic River Study Report/Environmental Impact Statement on the North Fork Mokelumne River* (USFS 1990). USFS (1990) evaluated what is defined as Segment A in this study, found cultural resources as the only outstandingly remarkable value, and made several alternative recommendations. The USFS recommendations regarding eligibility and suitability are subject to further review and possible modification by the USFS Chief, the Secretary of Agriculture, and the President of the United States. Final decisions on Wild and Scenic River designations have been reserved by the Congress to itself. Since 1990, no action has been taken on Federal Wild and Scenic River designation of any part of the Mokelumne River, including Segment A.

USFS noted that Segment A is part of the 12,200-acre Mokelumne Archaeological Special Interest Area established by the Eldorado National Forest. Approximately 85% of Segment A has been inventoried for cultural resources, and over 100 prehistoric and historic sites have been recorded, more than half of which were determined to be largely intact. Dating of the archaeological materials indicated at least a 2,000-year occupational history in Segment A, which is rare in California. USFS concluded that the high number of prehistoric sites along the North Fork, the high degree of site integrity, and the high research potential indicate that the archaeological resources in Segment A are outstandingly remarkable. No other resource was determined to be outstandingly remarkable.

USFS stated that recreation activities on National Forest lands consist primarily of primitive and dispersed camping, fishing, swimming, and hiking, along with rock climbing on Calaveras Dome on the south side of the canyon. USFS relied on recreational data collected in the 1980s, which indicated very little recreational visitor use in Segment A and only a “negligible” amount of white water rafting and kayaking on the river. The USFS report was prepared many years before the Devil’s Nose whitewater boating put-in area in Segment A was installed (between 2002 and 2005). Additionally, improvements in whitewater boating equipment (such as self-bailing rafts and kayaks designed for more extreme whitewater conditions), increased popularity of whitewater boating as an outdoor activity, and improved availability and access (via the internet) to river conditions and flow information have contributed to an increased use along the Devil’s Nose Run. Segment A now receives a high degree of whitewater boating use during spring when water flows are high.

The south side of the river canyon throughout Segment A was assigned to the USFS’ highest scenic attractiveness classification rating, while the north side of the canyon was assigned a moderate rating.

However, USFS did not find Segment A to have outstandingly remarkable scenic values primarily because of the numerous man-made structures and facilities that are present outside of the State study segments such as Salt Springs Dam and related facilities and PG&E's Tiger Creek facilities, which substantially detract from the viewshed upstream and downstream of Segment A, respectively. These human-made elements include the 332-foot-high concrete Salt Springs Dam, several paved access roads to the top and bottom of the dam, security fencing, signage of various kinds in several different locations, steel lattice electrical towers and electrical lines, parking lots, Salt Springs Powerhouse, Tiger Creek Canal and Conduit (a 15-foot-wide open concrete flume), three houses (operated by PG&E) immediately adjacent to the river and associated roadway access and parking areas, and a concrete bridge.

Segment A in this State study, however, does not begin until 0.5 mile downstream of the Salt Springs Dam and excludes the PG&E facilities at Tiger Creek, and therefore does not include any of the above-listed man-made structures or facilities. The Tiger Creek Canal and Conduit are located on the side of the canyon high above the river and hidden by the topography when in Segment A downstream of the Bear River.

A summary of the USFS study segments, outstandingly remarkable values, and preliminary classifications are presented in **Table 2-1**.

Table 2-1. U.S. Forest Service Mokelumne River Wild and Scenic River Segments and Proposed Designations

CNRA (Current) Study Segment	USFS Study Segments	USFS-Designated Outstandingly Remarkable Values	Preliminary USFS Classification
CNRA Segment A: From 0.5 mile below Salt Springs Dam to 0.5 mile upstream of the Tiger Creek Powerhouse.	USFS Segment A: From Bruce's Crossing to the western USFS boundary near the Tiger Creek Afterbay. USFS Segment B1: From 1 mile west of the Bear River confluence to Bruce's Crossing. USFS Segment B2: From the Bear River confluence to 1 mile downstream (west). USFS Segment B3: From Salt Springs Dam to the Bear River confluence.	Cultural Resources (Archaeological and Historical) for all Segments	USFS Segment A: Wild USFS Segment B1: Wild or Recreational USFS Segments B2 and B3: Recreational

Notes: CNRA = California Natural Resources Agency; USFS = U.S. Forest Service
Source: United States Forest Service 1990; data compiled by GEI Consultants, Inc., in 2017

U.S. Bureau of Land Management 2007 Wild and Scenic River Evaluation

In 2007, BLM prepared the *Wild and Scenic River Eligibility and Suitability* analysis as part of the *Sierra Proposed Resource Management Plan and Final Environmental Impact Statement* (Appendix E in BLM 2007). This document included evaluation of what is defined as Segments B, C, D, and most of E in CNRA's study, and preliminarily identified outstandingly remarkable values (cultural resources, water quality, and scenic values) in all segments.

BLM determined that the historical/cultural values were especially evident in Segment E, including early hydroelectric projects, chlorination plants associated with hard rock gold mining, and a Miwok

ceremonial building. The BLM analysis also noted that Segment D contains a historic bridge located at Ponderosa Way, and that although Segments B–E had not been fully surveyed for cultural resources, numerous archaeological and historical features were expected to be present.

Water quality in the North Fork and Main Stem Mokelumne River was rated extremely high. The BLM analysis indicated that most of the Basin Plan objectives have been met in Segments B–E. BLM noted that the watershed is generally undeveloped, and FERC licensing requirements mandate that PG&E operate its hydropower facilities in compliance with Basin Plan objectives. Furthermore, EBMUD supplies water to 1.2 million customers in the East Bay area from Pardee Reservoir, and therefore it has a strong interest in maintaining high water quality in the watershed.

As determined by BLM, outstanding scenic values in Segments B–E include steep granitic canyon walls rising 1,000 feet or more and cascading water along the river that provide remarkable scenic vistas along the canyon rim and from the river itself. The North Fork canyon is undeveloped and access is very limited. BLM assigned the highest scenic classification rating to Segments B and C, a moderate rating to Segment D, and a lower rating to Segment E where houses, roads, hydroelectric facilities, and recreation facilities are adjacent to the river.

A summary of the BLM study segments, outstandingly remarkable values, and preliminary classifications are presented in **Table 2-2**.

Table 2-2. U.S. Bureau of Land Management River Segments and Proposed Designations

CNRA (Current) Study Segments	BLM Study Segments	BLM Preliminary Outstandingly Remarkable Values	BLM Preliminary Classification
Segment B: 1,000 feet below the Tiger Creek Afterbay to Highway 26	300 feet below the Tiger Creek Afterbay to Highway 26	Cultural Resources, Water Quality, and Scenic Values	Recreation
Segment C: 400 feet downstream of the reregulating dam at the outlet of the West Point Powerhouse to the confluence of the North and Middle Forks Mokelumne River.	300 feet below the West Point Powerhouse to 300 feet upstream of the Ponderosa Bridge	Cultural Resources, Water Quality, and Scenic Values	Wild
Segment D: Confluence of the North and Middle Forks to 300 feet upstream of the Electra Powerhouse			
Segment D: Confluence of the North and Middle Forks to 300 feet upstream of the Electra Powerhouse	300 feet upstream of the Ponderosa Bridge to 300 feet upstream of Electra	Cultural Resources, Water Quality, and Scenic Values	Scenic
Segment E: 300 feet downstream of the reregulating dam downstream of the Electra Powerhouse to the Pardee Reservoir flood surcharge pool at 580 feet	300 feet below the Electra Afterbay to 100 feet below the Highway 49 bridge	Cultural Resources, Water Quality, and Scenic Values	Recreation

Notes: CNRA = California Natural Resources Agency; BLM = U.S. Bureau of Land Management
Sources: United States Bureau of Land Management 2007; data compiled by GEI Consultants, Inc., in 2017

2.3 Study Methodology

The study methodology is based on obtaining and reviewing available published and unpublished literature, maps, videos, photographs, and relevant websites for the five study segments. Information summarized above in Section 2.2, “Primary Data Sources,” provided the basis of the analysis. Several report preparers were generally familiar with the study area and resources, but a field trip to access each study segment was made on October 27, 2017. Key study staff attended AWA’s public meeting on its long-term water supply study held July 18, 2017 and a similar CCWD public meeting on its long-term water supply study held August 28, 2017.

Data sources reviewed for this study for relevant information are presented in Appendix C, “Reviewed Literature.”

The general methodology and rationale for developing this study is qualitative and similar to that used during the previous State studies of the West Walker River, East Fork Carson River, McCloud River, Deer Creek, and Mill Creek (The Resources Agency 1988a, 1988b, 1988c, 1994a, and 1994b). A conceptual diagram of the methodology is presented in **Figure 2-3**.

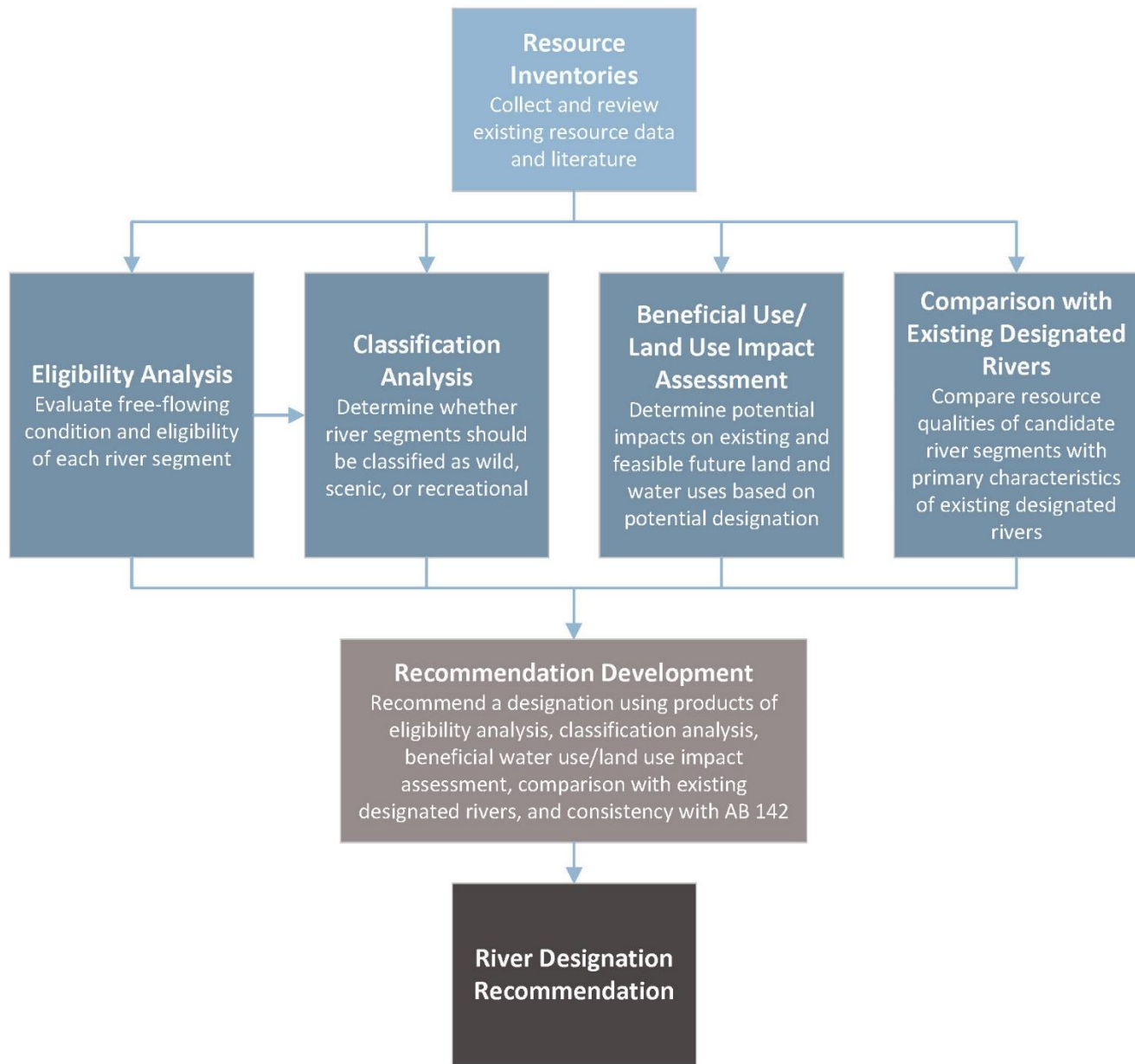
Each river segment was evaluated for its eligibility (free-flowing with one or more extraordinary wildlife, fishery, scenic, or recreational values); classification (if eligible) as wild, scenic, or recreational; and suitability for inclusion (if eligible) in the State Wild and Scenic Rivers System. The provisions in AB 142 for evaluating the Mokelumne River study segments and their suitability for inclusion in the System were important guideposts in the suitability analyses and recommendations.

2.4 Stakeholder and Public Input

The current study is well known to key stakeholders that were involved in the development and passage of AB 142. CNRA sent out a Request for Information (RFI) to numerous key stakeholders on June 27, 2017, at the initiation of this study (Appendix F-1). Stakeholders responding with information that informed this study include:

- Amador Water Agency
- American Whitewater
- Calaveras County Water District
- Calaveras-Amador Mokelumne River Authority
- Calaveras Public Utilities District
- East Bay Municipal Water District
- Foothill Conservancy
- Friends of the River
- Jackson Valley Irrigation District
- Pacific Gas and Electric Company
- Sierra Nevada Conservancy
- Upper Mokelumne River Watershed Authority
- U.S. Bureau of Land Management
- U.S. Forest Service – Eldorado National Forest
- U.S. Forest Service – Stanislaus National Forest

Figure 2-3. River Evaluation Flowchart



The stakeholder mailing list is presented in Appendix F-2. All parties contacted regarded information were helpful in providing requested reports and data or referring study authors to relevant websites available to access.

The study was delayed to receive and evaluate four key reports important for evaluation as part of the suitability analysis:

- AWA Long-Term Needs and Water Supply Analysis (AWA 2017a) available in August 2017;
- CCWD Long-Term Water Supply Analysis (CCWD 2017) available in late August 2017;
- Pacific Institute Report on AWA's Long-Term Needs and Water Supply Analysis (Pacific Institute 2017) available in September 2017; and

- California Research Bureau memorandum on Regulatory Impact of Wild & Scenic Rivers Designation (Update to 2005 Wolk Memo) (California Research Bureau 2018) available in January 2018.

An administrative Draft Report was provided to, and follow-up briefings were held with, key stakeholders in January 2018 to obtain preliminary input.

This Draft Report was made available to the public and stakeholders on January 26, 2018. A notice of the Draft Report's availability on CNRA's website (<http://resources.ca.gov/programs-projects/wildandscenic>) and of a public meeting on February 15 at 6-8pm at the Mokelumne Hill Town Hall (8282 Main Street, Mokelumne Hill, CA 95245) to receive input on the Draft Report was posted in three local newspapers (Calaveras Enterprise, Ledger Dispatch, and Sacramento Bee). CNRA issued a press release on January 26, 2018, and sent it directly to all stakeholders listed in Appendix F-2. Stakeholders and the public were given at least 30 days to provide written comments on the Draft Report (by February 28, 2018). Written comments received on the Draft Report will be presented in Appendix F-3 of the Final Report but will not be responded to directly. All written comments on the Draft Report, and written and verbal comments received at the public meeting, will be carefully considered by CNRA when developing the Final Report.

2.5 Main Provisions of the California Wild and Scenic Rivers Act

2.5.1 Overview

To provide a framework for the evaluation of the Mokelumne River, the main provisions of the California Wild and Scenic Rivers Act (PRC Sec. 5093.50 et seq.) are summarized below. The Act begins with the following legislative declaration (PRC Sec. 5093.50):

It is the policy of the State of California that certain rivers which possess extraordinary scenic, recreational, fishery, or wildlife values shall be preserved in their free-flowing state, together with their immediate environments, for the benefit and enjoyment of the people of the state. The Legislature declares that such use of these rivers is the highest and most beneficial use and is a reasonable and beneficial use of water within the meaning of Section 2 of Article X of the California Constitution. It is the purpose of this chapter to create a California Wild and Scenic Rivers System to be administered in accordance with the provisions of this chapter.

Appendix B presents the Act as amended and a brief history.

2.5.2 Definitions

The Act defines "free-flowing" as "existing or flowing without artificial impoundment, diversion, or other modification of the river." The presence of low dams, diversion works, and other minor structures does not automatically bar a river from being considered for inclusion in the System. (PRC Sec. 5093.52.) Several rivers, such as the Klamath, Trinity, Eel, and lower American Rivers, are included in the System despite substantial flow modifications by pre-existing upstream impoundments and diversions.

The Act defines "river" as "the water, bed, and shoreline of rivers, streams, channels, lakes, bays, estuaries, marshes, wetlands, and lagoons, up to the first line of permanently established riparian vegetation" (PRC Sec. 5093.52[c]). The latter phrase ("up to the first line of permanently established riparian vegetation") was added in a 1982 amendment and represents a reduction in the area of streambed and shoreline potentially subject to the Act's protection.

The Act defines "immediate environments" only generally as the land "immediately adjacent" to designated segments (PRC Sec. 5093.52[h]). This definition, which was added in the 1982 amendments, represents a reduction in the land area potentially subject to the Act's protection.

The Act defines "special treatment areas" as those areas defined as special treatment areas in CCR, Title 14, Section 895.1, as in effect on January 1, 2004, as that definition applies to wild and scenic river segments designated from time to time in Section 5093.54, and also includes areas within 200 feet of either side of the watercourse transition line of a state-designated recreational river segment designated in Section 5093.54 that may be at risk during timber operations (PRC Sec. 5093.52[h]). Additional provisions in PRC Section 5093.68 define temporary restrictions within the 200-foot zone if timber harvest operations adjacent to designated river segments would result in imminent and substantial damage to soil, water, or timber resources or to fish and wildlife habitat.

2.5.3 Classification of Rivers

Rivers or segments of rivers included within the California System are classified by the Legislature as wild, scenic, or recreational (PRC Sec. 5093.53). The Secretary, however, may recommend classifications to the Legislature. Classifications are based on the level of watershed development when river segments are designated as follows:

- *Wild rivers* are free of impoundments and generally are inaccessible except by trail, with primitive watersheds or shorelines and unpolluted waters.
- *Scenic rivers* are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped but accessible in places by roads.
- *Recreational rivers* are readily accessible by road or railroad, may have some development along their shorelines, and may have been impounded or diverted in the past.

The classification terms are a guide to the level of existing development, not a description of any particular extraordinary value identified for the potential or designated river. For example, "recreational" or "scenic" river segments (so designated because of their level of development) may not possess recreational or scenic extraordinary values, respectively; eligibility and classification are completely independent analyses.

2.5.4 Components of California System

The Act originally designated certain segments and tributaries of the following rivers as components of the California System: Smith River and tributaries, Klamath River and tributaries, and the Scott, Salmon, Trinity, Eel, Van Duzen, North Fork American, and American Rivers. The Secretary may recommend to the Legislature other rivers qualifying for inclusion in the System. (PRC Sec. 5093.54.)

Amendments to the Act in 1982 specified that the Legislature is responsible for classifying or reclassifying rivers by statute. The Secretary may recommend such legislation, including specific land use restrictions for each particular classification (PRC Sec. 5093.546), as specified in AB 142. The 1982 amendments statutorily classified all river segments in the System consistent with Federal classifications under the National Act (PRC Sec. 5093.545).

Previous Additions to California System

In 1986, the Act was amended to establish for the first time a study process modeled after Federal law for potential additions to the System (PRC Secs. 5093.547, 5093.548). The Legislature also has clearly retained the *de facto* right to designate and include rivers in the State System outright without studies. The history of additions to the California system are as follows:

- 1988-1989 – Study reports were prepared for the West Walker, East Fork Carson, and McCloud Rivers (The Resources Agency 1988a, 1988b, 1988c). The West Walker (and tributary Leavitt Creek) and East Fork Carson Rivers were included in the System in 1989. The McCloud River (and tributary Squaw Valley Creek) were not included in the System, but were afforded specific protection through special language prohibiting construction of water impoundment facilities on eligible river segments (PRC Sec. 5093.542).
- 1995 – Study reports were prepared for Deer and Mill Creeks (The Resources Agency 1995a, 1995b). Neither creek was included in the System in 1995 but were afforded specific protection through special language prohibiting construction of water impoundment facilities on eligible river segments (PRC Sec. 5093.70).
- 1999 – The South Yuba River was added to the System without study.
- 2003 – The Albion and Gualala Rivers were added to the System without study.
- 2005 – The North Fork Cache and Cache Creeks were added to the System without study.

Potential Additions to California System

AB 142 requires the Secretary to study and submit to the Governor and Legislature a report on the suitability or unsuitability of five segments of the Mokelumne River designated by the Legislature as potential additions to the System. This study has been prepared to meet AB 142 requirements and determine the eligibility and suitability of the five designated segments for inclusion in the System.

2.5.5 Legal Effects of Inclusion in California System

Water Impoundment Facilities

In general, no dam, reservoir, diversion, or other water impoundment facility may be constructed on any river segment included in the System. This prohibition does not apply to temporary flood storage facilities on the Eel River. (PRC Sec. 5093.55.) The prohibition of water impoundments also does not apply to construction of temporary impoundments for recreational purposes on segments of rivers with a history of these impoundments; the Secretary cannot authorize these temporary recreational impoundments, however, without first making a number of findings (PRC Sec. 5093.67).

Water Diversion Facilities

No water diversion facility may be constructed on any river included in the System unless the Secretary determines that the facility is needed to supply domestic water to local residents and that the facility will not adversely affect the river's free-flowing condition and natural character (Sec. 5093.55).

Water Rights

Wild and Scenic River designation does not affect existing water rights and facilities. Proposed changes in existing rights and facilities or applications for new water rights and facilities on designated segments are subject to the in-county domestic-use restriction and the non-degradation standard. Designated segments are considered fully appropriated streams by the SWRCB Division of Water Rights. Potential effects on existing and future water rights is always a major concern of water agencies, and commonly addressed in the legislative process with special provisions when river segments are added to the System (see “Special Provisions” below).

Non-Degradation Standard

Agencies of the State of California (State) may not assist local, State, and Federal agencies in the planning or construction of any dam, reservoir, diversion or other water impoundment facility that could adversely affect the free-flowing condition and natural character of river segments included in the System (PRC Sec. 5093.56) or of rivers otherwise protected under the Act (PRC Sec. 5093.542 and 5093.70). In addition, State agencies are required to protect the free-flowing character and extraordinary values of designated State rivers (PRC Sec. 5093.61). Local government agencies are required to exercise their duties consistent with the policy and provisions of the California Wild and Scenic Rivers Act (PRC Sec. 5093.61).

Exercise of State and Local Powers

State and local agencies must exercise their existing powers consistent with the Act's policies and provisions (PRC Sec. 5093.61). This provision ties the requirement of the Act to all other existing authorities. The Act does not, however, change the land use regulatory powers or authorities of State and local agencies granted by other laws (PRC Sec. 5093.58).

Fish and Wildlife

The Act does not affect the State's jurisdiction or responsibility over fish and wildlife (PRC Sec. 5093.62).

Land Use

State and local agencies must exercise their existing powers consistent with the Act's policies and provisions (PRC Sec. 5093.61). This provision ties the requirements of the Act to all other existing authorities. The Act does not, however, change the land use regulatory powers or authorities of State and local agencies granted by other laws (PRC Sec. 5093.58).

For timber harvest management purposes, special treatment areas identifying significant resource features are established along rivers in the System (PRC Section 5093.68) and are further defined in California's Forest Practice Rules as a 200-foot wide area on each side of the designated river (14 CCR 895.1). Although the Act includes provisions for the suspension of timber operations in special treatment

areas, the Forest Practice Rules do not specifically prohibit or restrict forest practices in special treatment areas.

Eminent Domain

The Act does not permit the taking of private property for public uses without just compensation (PRC Sec. 5093.63). The Act has never been used in its 45-year history to condemn or otherwise take land.

Emergency Water Use for Fire Protection

Emergency water use during wildfires is not explicitly addressed in the Act, and this issue has been raised with respect to AB 142. Temporary use of waters from Mokelumne River reservoirs, forebays, or afterbays, which are all excluded from segments being studied for inclusion in the System, would not be of sufficient quantity or duration to adversely affect the free-flowing condition, natural character, or any extraordinary resources of designated segments. Emergency use of Mokelumne River waters during wildfires will be unaffected with designation, as it was recently during wildfire in the Mokelumne River watershed.

Special Provisions

The Legislature has chosen to include special provisions for many designated rivers, especially upon their addition or protection within the System. Most rivers added to the System after the original designation in 1972 have special provisions, primarily to ensure protection of existing and/or future water rights and water developments consistent with the Act's intent to provide protection against adverse effects on the free-flowing condition, natural character, and extraordinary values of designated river segments. Only the Albion and Gualala Rivers have been added to the System without special provisions. Rivers not added to the System have at times been afforded the Act's prohibition against construction of dams, diversions, or other water impoundments on river segments (i.e., McCloud River [and tributary Squaw Valley Creek], Deer Creek, and Mill Creek).

Smith River Watershed

In 1982, the Act was amended to allow a mining project to proceed at a site on Gasquet Mountain within the Smith River watershed. Twelve tributaries were excluded from the System, although the prohibition against construction of water impoundment facilities on these tributaries was extended. (PRC Sec. 5093.66.)

West Walker and East Fork Carson Rivers

In 1989, the West Walker River and a major tributary (Leavitt Creek) and the East Fork Carson River were included in the System after State Wild and Scenic River studies were conducted (The Resources Agency 1988a, 1988b). Other special provisions included in the Act were as follows:

- The Legislature finds and declares that, because the East Fork Carson River and West Walker River are interstate streams, and a source of agricultural water and domestic water for communities within the counties of Alpine and Mono where they originate, it is necessary that the following special provisions apply:
 - Nothing in this subdivision shall be construed to prohibit the replacement of diversions or changes in the purpose of use, place of use, or point of diversion under existing water rights,

except that (i) no replacement or change shall operate to increase the adverse effect, if any, of the preexisting diversion facility or place or purpose of use, upon the free-flowing condition and natural character of the stream, and (ii) after January 1, 1990, no new diversion shall be constructed unless and until the secretary determines that the facility is needed to supply domestic water to the residents of any county through which the river or segment flows and that the facility will not adversely affect the free-flowing condition and natural character of the stream. (PRC Sec. 5093.54[f].)

McCloud River

In 1989, the McCloud River and its major tributary (Squaw Valley Creek) were not included in the System after a State Wild and Scenic River study was conducted (The Resources Agency 1988c). The Act's prohibition against construction of dams, reservoirs, diversions, or other water impoundment facilities on its eligible river segments, however, was extended to them. Other special provisions included in the Act were as follows:

- All State agencies exercising powers under any other provision of law with respect to the protection and restoration of fishery resources shall continue to exercise those powers in a manner to protect and enhance the fishery of those segments designated in subdivision (b). In carrying out this subdivision, any exercise of powers shall be consistent with PRC Section 5093.58.
- Nothing in this section shall prejudice, alter, affect in any way, or interfere with the construction, maintenance, repair, or operation by PG&E of the existing McCloud-Pit development (FERC No. 2106) under its license, or prevent PG&E from constructing a hydroelectric generating facility by retrofitting the existing McCloud Dam if the operation of the facility does not alter the existing flow regime below the dam. (PRC Sec. 5093.542.)

Deer and Mill Creeks

In 1995, Deer and Mill Creeks were not included in the System after studies were completed (The Resources Agency 1995a, 1995b). Similar to the McCloud River, the Act's prohibition against construction of dams, reservoirs, diversions, or other water impoundment facilities on Deer and Mill Creeks' eligible river segments was extended to them. Other special provisions were included in the Act as follows:

- Based on a review of comprehensive technical data, the Legislature has determined that potential beneficial uses must be balanced to achieve protection of the unique fishery resources and existing water rights of Mill Creek and Deer Creek in the manner specified in this section. In lieu of including Mill Creek and Deer Creek in the System, the continued management of stream resources in their existing natural condition consistent with the terms of this section represents the best way to protect the unique fishery of Mill Creek and Deer Creek. Maintaining the existing free-flowing conditions of Mill Creek and Deer Creek to protect their fisheries is the highest and most beneficial use of the unappropriated waters of Mill Creek and Deer Creek within the segments designated in subdivisions (b) and (c), and is a reasonable use of water within the meaning of Section 2 of Article X of the California Constitution.
- Except for the maintenance of existing flood control facilities and projects by public agencies or private landowners or emergency flood control activities or repairs required due to acts of God, provided that those activities or projects do not interfere with the passage of migrating anadromous fish, no State agency shall assist or cooperate with, whether by loan, grant, license, or otherwise, any

agency of the Federal, State, or local government in the planning or construction of any dam, reservoir, diversion, or other water impoundment facility that could have an adverse effect on the free-flowing conditions of Mill Creek and Deer Creek, or on their wild runs of spring-run chinook salmon.

- All State agencies exercising powers under any other provision of law with respect to the protection and restoration of fishery resources shall continue to exercise those powers in a manner that protects and enhances the fishery of the segments designated in subdivisions (b) and (c). In carrying out this subdivision, any exercise of powers shall be consistent with PRC Section 5093.58.
- Nothing in this section shall prejudice, alter, affect in any way, delay, or interfere with the implementation or construction of any fishery restoration or improvement project that is authorized, required, or recommended pursuant to the Central Valley Project Improvement Act (Public Law 102-575) or the Upper Sacramento River Fisheries and Riparian Habitat Management Plan developed pursuant to Chapter 885 of the Statutes of 1986, or of any other fishery restoration or improvement project.
- Nothing in this chapter shall prejudice, alter, affect in any way, delay, or interfere with existing water rights; implementation of those rights; historic water use practices; and replacement, maintenance, repair, or operation of diversions and diversion facilities; or changes in the purposes of use, places of use, points of diversion, or ownership of existing water rights, except that no change shall operate to increase the adverse effect, if any, of the preexisting diversion facility or place or purpose of use upon the free flowing and natural character of the stream. (PRC Section 5093.70.)

South Yuba River

In 1999, the South Yuba River was included in the System without study. Other special provisions were included in the Act as follows:

- Nothing in this subdivision shall prejudice, alter, delay, interfere with, or affect in any way, the existing rights of the Placer County Water Agency, the implementation of those rights; any historic water use practices; the replacement, maintenance, repair, operation, or future expansion of existing diversions, storage, powerhouses, or conveyance facilities or other works by the Placer County Water Agency; or changes in the purpose of use, places of use, points of diversion, or ownership of those existing water rights; nor shall anything in this subdivision preclude the issuance of any governmental authorization needed for utilization of those rights, except that no changes shall operate to increase the adverse effect, if any, of the preexisting facilities or places, or the purposes of use upon the free-flowing and natural character of the river segment designated herein. (PRC Sec. 5093.54[g].)

Cache Creek

In 2005, Cache Creek (and the North Fork Cache Creek) was included in the System without study. Other special provisions were included in the Act as follows:

- The designation of Cache Creek under paragraphs (1) and (2) shall not prejudice, alter, delay, interfere with, or affect in any way, the existing water rights of the Yolo County Flood Control and Water Conservation District, or public water agencies within the Cache Creek watershed lying in the County of Lake, including the range of operations permitted under these existing water rights; any historic water use practices within existing water rights; or the replacement, maintenance, repair, or

future expansion within existing water rights of existing diversion, storage, powerhouse, or conveyance facilities or other works by the Yolo County Flood Control and Water Conservation District or public water agencies within the Cache Creek watershed lying in the County of Lake.

- The designation of Cache Creek under paragraphs (1) and (2) shall not prejudice, alter, delay, interfere with, or affect any changes to the existing water rights of the Yolo County Flood Control and Water Conservation District, including changes to the purpose of use, place of use, points of diversion, quantity of water diverted, or ownership, or applications by the district for new water rights; provided, that the changes or applications do not involve the construction of a dam, reservoir, diversion, or other water impoundment facility within the segments of Cache Creek designated in paragraphs (1) and (2). Any such change or application shall be subject to all applicable constitutional, statutory, and judicial requirements, including the public trust doctrine.
- As the waters of the Cache Creek watershed are the sole source of supply within that watershed for the County of Lake, the designation of Cache Creek under paragraphs (1) and (2) shall not prejudice, alter, delay, interfere with, or affect any changes to the existing water rights of the public water agencies within the Cache Creek watershed lying in the County of Lake, including changes to the purpose of use, place of use, points of diversion, quantity of water diverted, or ownership, or applications by these agencies for new water rights; provided, that the changes or applications do not involve the construction of a dam, reservoir, diversion, or other water impoundment facility within the segments of Cache Creek designated in paragraphs (1) and (2). Any such change or application shall be subject to all applicable constitutional, statutory, and judicial requirements, including the public trust doctrine.
- The designation of Cache Creek under paragraphs (1) and (2) shall not impair or affect in any way activities to manage or remove invasive or nonnative plants and animal species.
- The designation of Cache Creek under paragraphs (1) and (2) shall not impair or affect in any way activities to remediate mercury pollution; provided, that this activity does not involve the construction of a dam, reservoir, diversion, or other water impoundment facility within the segments of Cache Creek designated in paragraphs (1) and (2).
- Neither the Governor nor an employee of a State agency or department shall apply to a secretary, department, agency, or other entity of the Federal government for the designation of any portion of Cache Creek as a component of the National Wild and Scenic Rivers System under the Federal Wild and Scenic Rivers Act (16 United States Code Sec. 1271 et seq.).
- Neither the Governor nor an employee of a State agency or department shall expend funds preparing, filing, or otherwise submitting an application to a secretary, department, or other entity of the Federal government for the designation of any portion of Cache Creek as a component of the National Wild and Scenic Rivers System under the Federal Wild and Scenic Rivers Act (16 United States Code Sec. 1271 et seq.). (PRC Sec. 5093.54[j].)

2.5.6 Management of California System

The 1972 Act required the Secretary to prepare and submit to the Legislature for approval management plans for each river in the System and to administer the System to protect scenic, recreational, fishery, and wildlife values without unreasonably limiting compatible timber harvesting, grazing, and other uses. In 1979, these responsibilities were delegated to CDFG.

The 1982 amendments repealed these provisions. Instead, CNRA is now required to conduct studies funded by the Legislature and may make recommendations to the Legislature for protecting and enhancing of the System. CNRA also is required to coordinate State agency activities affecting the System with activities of other Federal, State, and local agencies. CDFW is required to conduct studies specifically funded by the Legislature and to make recommendations relating to salmon and steelhead habitat restoration, fish and wildlife enforcement requirements, fisheries management data development, and legislation needed to protect the System's fish and wildlife values. (PRC Sec. 5093.69.)

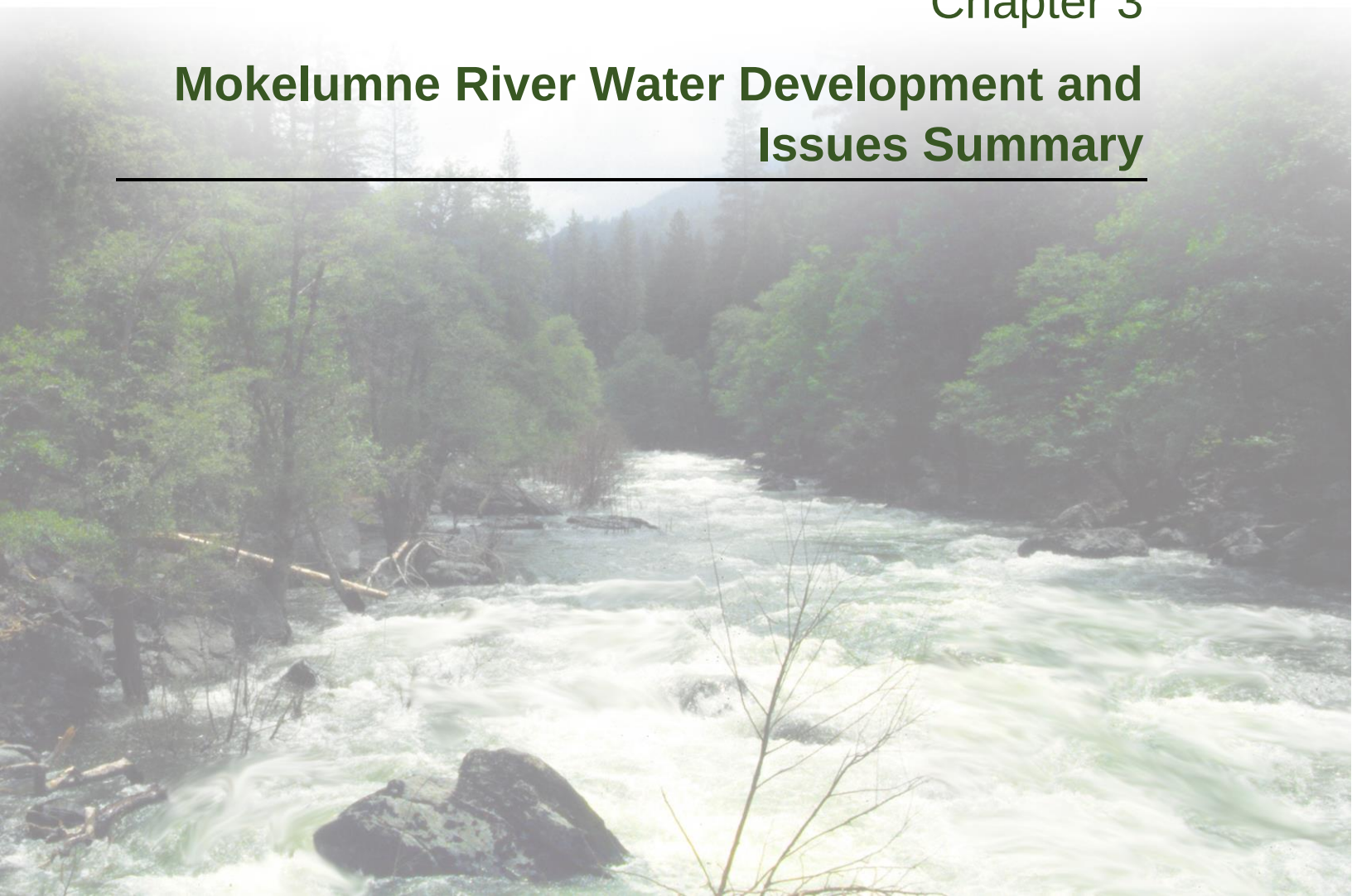
2.6 Compliance with Assembly Bill 142

AB 142 is the driving force for this study and provides general guidance and specific information to include in the study report (Appendix A). AB 142 requirements, therefore, have been addressed in this study report, particularly with respect to PRC Section 5093.548. The focus of the report is on:

- determining eligibility of the five designated river segments in PRC Section 5093.549;
- classifying eligible river segments as wild, scenic, or recreational;
- evaluating effects of including river segments into the State System on existing and future land and water uses (particularly with respect to future water uses);
- presenting alternatives and making a clear recommendation;
- complying with AB 142 and the California Wild and Scenic Rivers Act in developing this study report; and
- providing for public input from a broad range of stakeholders.

Chapter 3

Mokelumne River Water Development and Issues Summary



Chapter 3. Mokelumne River Water Development and Issues Summary

3.1 Introduction

This chapter summarizes water development in the Mokelumne River watershed and the pertinent issues that have been identified, primarily with respect to any effects on existing water development projects and water rights and, especially, with respect to any future water development projects and water rights, that may arise from including one or more segments of the Mokelumne River into the California Wild and Scenic River System.

3.2 Hydroelectric Development

PG&E has owned and operated the Mokelumne River Project (FERC No. 137) in the upper Mokelumne River watershed since the first dams were constructed between 1901 and 1903. The project includes seven storage reservoirs (with no hydropower plants) at Upper Blue, Lower Blue, Twin, and Meadow Lakes in Alpine County; and Bear River Reservoir, Lower Bear River Reservoir, and Lake Tabeaud in Amador County. The project includes four hydropower developments with a combined generation capacity of 210.8 MW: Salt Springs (43.5 MW), Tiger Creek (54.4 MW), West Point (14 MW), and Electra (98.9 MW).

PG&E diverts flow into a series of canals and pipelines for delivery of water to powerhouses at high elevation. An intake at Lower Bear Reservoir diverts water into a tunnel for conveyance to Salt Springs Reservoir. Another intake diverts water from Salt Springs Reservoir and conveys it at high elevation to create head at Salt Springs Powerhouse. The Tiger Creek Conduit, which conveys water over 17.3 miles from Salt Springs to Tiger Creek Powerhouse, has intakes at Cole Creek, Bear River, and at the Tiger Creek Regulator. The West Point Tunnel conveys water from Tiger Creek Afterbay to West Point Powerhouse. From there, the Electra Tunnel is used to convey water to Lake Tabeaud, which serves Electra Powerhouse. Lake Tabeaud also serves as the diversion point for Amador Canal, which conveys water for consumptive uses within Amador County. (FERC 2001.)

The most recent PG&E's FERC license for the project was issued in 2001 with expiration in 2031 (FERC 2001). The license includes 30 biological and recreational management provisions which impact reservoir operations during Wet, Above Normal, Below Normal, Dry, and Critically Dry water year types as determined by forecasts of inflow to Pardee Reservoir. Many of the provisions have been developed under the terms of the Mokelumne Relicensing Settlement Agreement (PG&E et al. 2000) reached between PG&E and nine other stakeholders: USFS, BLM, USFWS, CDFG, CDBW, NHI, American Whitewater, Friends of the River, and Foothill Conservancy. Impacts of the provisions are monitored and reviewed regularly by PG&E under the Stream Ecology Monitoring Program (SEMP), and recommendations are developed in consultation with the Ecological Resources Committee (ERC) and USFS to adapt implementation as needed to achieve biological and recreational objectives.

The resource management provisions ensure that patterns of flow through the North Fork Mokelumne River mimic the annual flow cycle and interannual variability of the full natural flow of the river but with flow volumes reduced due to storage in the upstream reservoirs. Flows are also governed by the Lodi Decrees, a series of court decisions from 1938 which recognize the City of Lodi's right to 3,600 AFY of groundwater percolating from the Mokelumne River and require PG&E and EBMUD to avoid direct impacts on groundwater levels through operations of their upstream reservoirs. The Settlement Agreement flow requirements are presented in Appendix D (PG&E et al. 2000). These flow requirements provide the fundamental operational flow regime throughout the Mokelumne River basin and study area and would not change or be affected by inclusion of any or all of the five segments into the California Wild and Scenic Rivers System. Furthermore, AB 142 specifically excludes consideration of key reaches of the Mokelumne River study area where PG&E facilities are located.

3.3 Existing Water Rights and Water Supply

The SWRCB administers water rights in California and recognizes riparian, appropriative, and prescriptive water rights claims. A riparian water right is a right to use the natural flow of water on non-public land that touches a lake, river, stream, or creek. Under the California Water Code, no permit is required for up to 4,500 gallons per day for immediate use or 10 AFY of water storage for domestic purposes or livestock watering purposes. Prescriptive water rights can only be acquired through adverse possession of a water right from an existing holder by a court. Water uses which began prior to the establishment of the State Water Commission Act are recognized as Pre-1914 appropriative water rights and are granted the highest seniority. Post-1914 appropriative water rights are permitted by SWRCB and granted seniority based on date and amount after beneficial use has been established and a license has been issued.

As part of the Mokelumne River Project, PG&E has acquired 10 appropriations licenses, totaling about 1 million AFY, for water diversion and storage for power generation since 1922. These appropriations are for non-consumptive water uses, and the licenses include locations and amounts of flow diversions and storage, as well as locations for subsequent release of diverted water back to the river system. PG&E has also filed several Statement of Water Diversion and Use Claims for various power and water systems it operated in Meadow and Deer Creeks in Alpine County; Bear River, Mill Creek, and Tiger Creek in Amador County; and Mill Creek in Calaveras County. These pre-1914 claims include both non-consumptive and consumptive water uses.

While planning for construction of the Central Valley Project (in 1931 and 1933) and the State Water Project (in 1959), the State enacted various Area of Origin Laws which reserved a preferential right to areas where water originates in meeting future water needs. The Area of Origin Laws include i) The County of Origin Law (1931), ii) The Watershed Protection Statute (1933), and iii) The Delta Protection Act (1959). The laws were enacted to ensure that areas in which water originates have adequate water supply for present and future needs. These laws provided Amador and Calaveras Counties with a preferential right to access Mokelumne River water for future use for irrigation and domestic purposes. These rights were later quantified by DWR in 1959 after EBMUD entered into separate Release from Priority agreements with Amador and Calaveras Counties to secure priority access to water rights for the Camanche Dam and Reservoir Project. While the Release from Priority agreements reduced the seniority of their County of Origin reserves, Calaveras County retained a preferential right to access 27,000 AFY of Mokelumne River water to meet future needs for irrigation and domestic uses. Amador County similarly retained a similar preferential right to 20,000 AFY of Mokelumne River water for direct diversion to beneficial use and diversion to storage for use to meet future needs.

In Amador County, water diverted from the Mokelumne River for use in the Amador Water System and the Central Amador Water Project count towards the County of Origin reserve. The water right for the Amador Water System is owned by PG&E but is contracted in perpetuity to Amador County under existing agreements. Mokelumne River water supplied to JVID from Pardee Reservoir also counts towards the County of Origin reserve for Amador County. In Calaveras County, CPUD uses water rights derived from partial assignment of the County of Origin reserve to supply water from the South Fork Mokelumne. Calaveras County is able to petition for partial assignment on its County of Origin reserve from all three river systems named in SFA 5648: the Mokelumne, Stanislaus, and Calaveras Rivers. However, the North Fork Mokelumne River is the only river named in the SFAs from which Amador County can petition for assignment of its County of Origin reserve. Accessing new water rights will be limited as all reaches of the Mokelumne River upstream from the diversion points of Woodbridge Irrigation District (WID), below Pardee Reservoir, have been declared fully appropriated from March 1 to November 30 each year by SWRCB since 1998, 20 years prior to this State Wild and Scenic River evaluation of the study area (SWRCB Order WR 98-08).

Other major water rights holders located on the Lower Mokelumne River downstream of the segments under evaluation include EBMUD, WID, and North San Joaquin Water Conservation District (NSJWCD). Under the Lower Mokelumne River Project (FERC No. 2916), EBMUD has rights to divert and store up to 316,250 AFY of Mokelumne River water (including local runoff contributions) for municipal and recreation uses but withdrawals for beneficial uses are limited to 224,037 AFY. EBMUD also has rights to divert and store up to 853,000 AFY for hydropower generation. Under existing water rights and agreements with EBMUD, WID and NSJWCD have rights to consumptive use of up to 60,000 AFY and 20,000 AFY of Mokelumne River water, respectively. Actual amounts of water available for use are determined annually by instream flow requirements for Critically Dry, Dry, Below Normal, Above Normal, and Wet water year types under the terms of a joint settlement agreement between EBMUD, USFWS, and CDFG.

Water agencies rely on storage reservoirs to firm up their water rights, ensuring the water is available for diversion and use when needed. Amador County has negotiated arrangements to store water in PG&E's reservoirs as part of its Upper Mokelumne hydropower generation facilities. Many of these reservoirs were constructed prior to 1903. Using these old storage reservoirs without improvement carries significant disadvantages including loss of storage capacity due to accumulated sediment and concerns about the residual life of the infrastructure.

While Alpine County is not designated as a place of use under SFA 5648, its location upstream of designated places of use has been successfully used to petition for release from priority and assignment of County of Origin reserve for irrigation and domestic use, consistent with the general purpose of the original filing (SWRCB Decision 1648). Alpine County could request additional water allocations in the future as its needs increase. Reservoir sedimentation, pending seismic improvements at Upper Blue Lake (7,300 AF) and winter operations at other high elevation reservoirs including Lower Blue Lake (5,100 AF), Twin Lakes (1,210 AF), and Meadow Lake (5,660 AF), also impact usable storage capacity and timing of flow releases from the upper watershed in Alpine County.

3.4 Watershed and Environmental Resource Protection

The Mokelumne River watershed and environmental resources are protected by numerous Federal and State environmental laws. Most relevant and important at present is the existing protection offered by the State and National Wild and Scenic Rivers Acts. PRC Sec. 5093.56 protects the five designated study segments of the Mokelumne River from planning or construction of a dam, reservoir, diversion, or

other water impoundment facility that could have an adverse effect on the free-flowing condition and natural character of the five study segments until after the study period and implementation of any recommendations have been completed, or December 31, 2021, whichever comes first (with exceptions to protect AWA's water rights application 5647X03 pending before SWRCB or affect in any way or interfere with the maintenance, repair, or operation by PG&E of the Mokelumne River Project (FERC No. 137). Likewise, the Federal Wild and Scenic River Studies (USFS 1990 and BLM 2007) provide similar protections from new dams and diversions while the river segments are still under consideration for National Wild and Scenic River designation, as they are and have been since these studies were completed.

The FERC license includes several flow protection, mitigation, and enhancement measures that serve ecological and recreational needs long the Upper Mokelumne River, including minimum streamflows, required ecological pulse flows, recreational flows, and carefully managed ramping rates. Minimum streamflows, recreational flows, and ecological pulse flows, based on water year type, are required at several compliance points along the study area, including North Fork Mokelumne River below Salt Springs Reservoir Dam, North Fork Mokelumne River below Tiger Creek Afterbay Dam, and North Fork Mokelumne River below Electra Diversion Dam. Minimum streamflows and carefully considered ramping rates serve to protect habitat for the foothill yellow-legged frog, a California special-status species which is known to occur in Segment A, and could also occur in downstream segments where monitoring has not been conducted. Recreational flows facilitate whitewater recreation by providing boatable flows along popular whitewater runs in the study segments, including Devil's Nose Run, Tiger Creek Run, Electra-Middle Bar Run, and Ponderosa Run (although Ponderosa recreational flow releases have been temporarily reallocated to Electra-Middle Bar). Flow information is publicly available and allows recreationalists to plan their activities to coincide with recreational flows and ecological pulse flows.

Minimum streamflows may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of PG&E. Additionally, PG&E is excused from complying with ramping rate requirements in the event of law enforcement or search and rescue activities, regulatory compliance, or equipment malfunction or failure that is directly related to providing the specified ramping rates. PG&E operates the Mokelumne River Project under a multi-party Settlement Agreement and a FERC project license that incorporates the elements of the Settlement Agreement with USFS 4(e) Conditions. An Ecological Resources Adaptive Management Program was developed as a key component of the Settlement Agreement, including a three-part, 5-year monitoring schedule (15 years total) to evaluate the ecological effectiveness of the Project's streamflow regime. The Stream Ecology Monitoring Program (SEMP) includes fish population monitoring to be implemented during each 5-year SEMP period. Fisheries monitoring will continue through 2021. Within the study segments, there are seven sites that are surveyed annually via snorkel assessment.

The study area watershed is relied upon by many users and the watershed is the subject of many ongoing and recently completed studies addressing water supply, habitat, and wise use of the Mokelumne River's resources. Several agencies and stakeholders are conducting ongoing studies and evaluations. MokeWISE, which has several projects underway, is expected to yield a scientifically based and broadly supported water resources program that includes comprehensive and sustainable approaches to water resources management in the Mokelumne River watershed. Additionally, the Upper Mokelumne Salmonid Restoration Team recently completed surveys to support a study examining the reintroduction of salmon and steelhead into the Upper Mokelumne River.

3.5 Climate Change

The Mokelumne River watershed enjoys a montane, Mediterranean climate characterized by warm, dry summers from May to September and cold, wet winters from October to April. Annual precipitation ranges from 33.6 inches a year at Tiger Creek Power House to 42.3 inches a year at Salt Springs Power House. However, there is significant interannual variability with annual precipitation ranging from less than 50% of average in the driest years to over 60% above average in the wettest. This is because most of the annual precipitation is contributed by a few precipitation storms, many of which are produced by atmospheric river events. A small change in the number, location, and strength of atmospheric river events can result in a large change in total annual precipitation.

Using data from the California Data Exchange Center (CDEC) database, Full Natural Flow¹ at West Point on the North Fork Mokelumne River is estimated at 618,778 AFY. Full Natural Flow at Mokelumne Hill is similarly estimated at 747,714 AFY, which puts the annual runoff contribution of the South and Middle Forks at approximately 129,000 AFY (about 17% of the upper watershed). Runoff generation currently peaks during the spring snowmelt season in May, and about 60% of the watershed's annual runoff is generated between April and July. However, historical patterns of precipitation and runoff generation could be altered in future due to climate change.

In 2016, the California Water Commission completed development of 2030 and 2070 future climate projections for use in evaluating proposed water storage projects under the State's Water Storage Investment Program. These projections were prepared to fulfill the requirements of Executive Order B-30-15 (2015) and AB 1482 (2015) which require State agencies to account for climate change in project planning and investment decisions. The projections show average Statewide temperature could be 1.5 - 3.0 degrees Fahrenheit (°F) warmer by 2030 and 2.9 – 8.3°F warmer by 2070 compared to the reference period (1981-2010). Average Statewide precipitation projections ranging from a 7.0% reduction to a 23.8% increase by 2030 and from a 14.5% reduction to a 35.9% increase by 2070 compared to the same reference period (California Water Commission 2016).

Climate change scenarios used in the MAC Integrated Regional Water Management Plan (IRWMP) similarly project an increase in mean annual temperature of 3.8 – 7.2°F by 2040 and 5.4 - 10.8°F by end of century (UMRWA 2013). The projected increases are not evenly distributed through the year. Rather, the seasonal cycle will be characterized by colder winter spells and longer, hotter summer months than under the historical climate. Projected impacts of climate change on mean annual precipitation in the Mokelumne River watershed range from a 20% reduction to a 10% increase to by 2040. Projections of end of century precipitation change range from decreases of 25% to increases of 77%. The large range of precipitation change projections could also be accompanied by increased interannual variability with more frequent and increased extreme floods and longer, more severe droughts (UMRWA 2013).

A major impact of warming is a loss of snowpack storage as more precipitation is received as rain instead of snow and spring snowmelt occurs earlier. Climate projections from the Fourth National Climate Assessment also suggest that the Sierra Nevada could experience a 21.8% reduction in winter snow water equivalent by 2050 and a 89.0% reduction by 2100 for a high warming scenario (USGCRP

¹ Full Natural Flow (or Unimpaired Flow) is the total volume of water naturally produced by a river basin that would flow past a particular point of interest if no diversions, storage or imports of water were taking place in the watershed above that point.

2017). Climate change analysis from the MAC IRWMP indicate that a 7°F temperature increase could result in a 38% shift of spring (April - July) runoff to winter (November - March) (UMRWA 2013).

Shifting 38% spring runoff to winter would be equivalent to releasing about 173,000 AF of water from storage in the upper watershed in winter. The Amador Long Term Water Needs Study similarly estimates a 58% increase in December to March flows and a corresponding summer decrease at Salt Springs Reservoir by 2100 (AWA 2017). The water management implications of the shift would be significant unless the excess winter runoff could be stored or diverted and stored and made available for use during the warmer summer months when water use is highest.

Using runoff projections under 2030 and 2070 climate conditions from the Water Storage Investment Program, the Calaveras County Long-Term Water Needs Study estimates a 10% net reduction of annual runoff in the South and Middle Fork Mokelumne watersheds due to climate change. Seasonal flows are projected to peak about a month earlier compared to historical conditions in these watersheds, which receive a significant portion of their annual precipitation in the form of rain rather than snow. (CCWD and CPUD 2017a.)

Another major impact of the projected temperature increases from climate change is increased water demands for agricultural, municipal, and industrial uses. Sources of increased water demand due to climate change identified in the MokeWISE Report include water for fighting increased wildfires, increased industrial cooling needs, increased domestic use, and increased agricultural demands due to longer growing seasons (UMRWA and ESJGBA 2015). In its Long-Term Water Needs Study, Amador County estimates increased demand due to climate change of 3% to 16% by 2100 (AWA 2017).

Fish, wildlife, and vegetation distributions and abundance also are being modified due to climate change. Warmer and lower river flows would adversely affect trout production. Wildlife migration patterns and food sources would likely change, as would the blooming periods of plants. Each fish, wildlife, and plant species would have a different tolerance to climate change. Recreational activities would also be affected by modified flow patterns, with kayaking and rafting opportunities potentially adversely affected by reduced flow availability. Scenic values would remain less changed.

3.6 Current Key Stakeholders and Positions

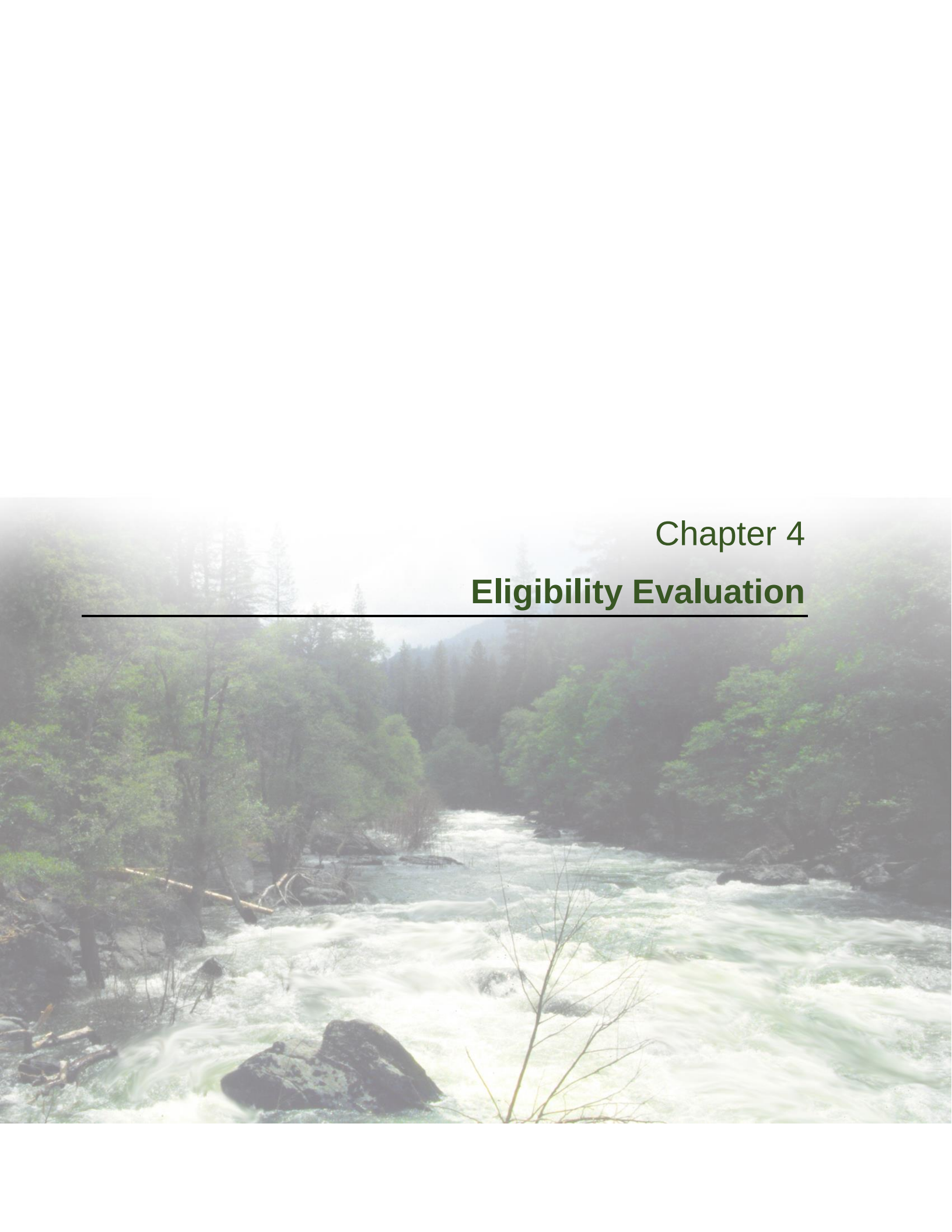
The local water agencies and purveyors in Amador and Calaveras Counties anticipate that they will need full assignment of their existing water rights on the Mokelumne River to meet future water demands. They assert that new legislation such as the Sustainable Groundwater Management Act will cause them to transition existing groundwater systems and surface water systems with unreliable or poor-quality water supplies to Mokelumne River water supplies. The water agencies seek to ensure that State Wild and Scenic River designation does not reduce their access to water available under existing water rights, contractual agreements, County of Origin reserves from SFAs, and future water rights. The agencies also seek to ensure that State Wild and Scenic River designation does not prevent them from undertaking future infrastructure maintenance, enhancement, or development projects needed to store and deliver water to firm up their existing water rights or acquire new water rights (AWA 2017; CCWD and CPUD 2017a).

Environmental stakeholders led by Foothill Conservancy, Calaveras Planning Coalition, and Friends of the River assert that the water agencies can share the river with other users who seek to enjoy the recreational, scenic, and ecological opportunities. They question the validity of 1) water use projections extending more than 30 years into the future, 2) using land use categories from the general plan to

estimate future water use, and 3) overly conservative and unrealistic conservation assumptions and computations of future water demand estimates in the Amador and Calaveras long-term water needs studies (Pacific Institute 2017). The environmental stakeholders also question the value of proposing long-term water projects without analyzing the economic viability of project options relative to the willingness or ability of water users to pay for the resulting water supplies or the willingness of local residents and visitors to accept major modifications to local rivers, streams, and lakes. Having participated in two negotiated settlement agreements with PG&E and EBMUD over hydropower operations on the Mokelumne River, the environmental stakeholders believe the water agencies are missing an opportunity to work collaboratively with other river users to define and implement viable solutions and projects that meet respective water supply, ecological, and recreational goals of all stakeholders.

PG&E must operate the Mokelumne River Project in compliance with its most recent FERC license issued in 2001 with expiration in 2031 (FERC 2001). The license includes 30 biological and recreational management provisions which impact reservoir operations. PG&E desires flexibility to maintain and operate its Mokelumne River Project within existing constraints but without any potential further constraints that State Wild and Scenic River designation may bring. Likewise, EBMUD desires to maintain flexibility in its operations and infrastructure planning to meet its water supply and power generation obligations, particularly at Pardee Reservoir. In April 2012, the EBMUD Board of Directors unanimously agreed to drop the future expansion of Pardee Reservoir from its Water Supply Management Plan 2030. In March 2015, the Board approved by unanimous consent Resolution No. 34024-15 supporting a California Wild and Scenic River designation for the Mokelumne River.

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Chapter 4

Eligibility Evaluation

4.1 Wildlife Values



Chapter 4. Eligibility Evaluation

4.1 Wildlife Values

Wildlife values are an important component of the Mokelumne River ecosystem, which supports a wide variety of terrestrial and semi-aquatic wildlife species, including special-status species. Some species have restricted ecological requirements that are provided by the river and its associated habitats, while others provide recreational enjoyment for many Californians. Habitat quality and diversity are important determinants of the wildlife resources an area supports. Breeding, feeding, and resting habitats are critical components necessary for species survival, growth, and reproduction. Physical and biological habitat conditions typically determine the range, distribution, and abundance of wildlife species. In addition, most wildlife species are sensitive to habitat disturbance, particularly those that are dependent on habitats with very limited coverage, such as riverine and riparian areas.

4.1.1 Data Sources and Methodology

Wildlife values in the Mokelumne River study area were evaluated based on review of biological resource databases and websites and other available information sources. A generalized vegetation map was prepared based on the USFS Region 5 CalVeg mapping database (USFS 2017a). Detailed maps and information for riparian vegetation along the river (PG&E 2017a) were also reviewed. Information on special-status wildlife occurrences was obtained from the CDFW California Natural Diversity Database (CNDDDB) (CDFW 2017a). A list of resources under jurisdiction of USFWS that could occur in the Mokelumne River study area was obtained from the USFWS Information for Planning and Conservation website (USFWS 2017a), and the USFWS online map of critical habitat for Federally threatened and endangered species (USFWS 2017b) was reviewed.

Discussion of common and special-status wildlife species that are known to occupy, or have potential to occupy, the Mokelumne River study area is based on habitat associations, CNDDDB occurrences, wildlife agency and other wildlife observation websites (e.g., eBird), results of recent and ongoing wildlife studies, and environmental documents completed for projects in the area. Ongoing studies include amphibian monitoring conducted as part of the Mokelumne River Project (FERC No. 137) Stream Ecology Monitoring Program (PG&E 2017b). Several ecological studies have been recently conducted in the Power Fire area (ACCG 2017 and Fogg et al. 2017), and environmental documents evaluating restoration actions in the area (USFS 2005 and 2017) have been prepared. Information from these data sources is incorporated into the wildlife discussions below.

4.1.2 Resource Characterization

Regional Study Area

The Mokelumne River basin and other west slope drainages in the region flow from high elevations in the Sierra Nevada to the foothills, then on to the San Joaquin and Sacramento Rivers. Elevations in these river basins range from near sea level to 11,000 feet. The broad range of associated physical conditions results in high habitat variability and diverse alpine, montane, foothill, and valley ecosystems, that support a wide diversity of wildlife assemblages.

Secondary Study Area

The secondary study area for wildlife resources includes all areas within 1 mile of Segments A through E. Elevation within this study area ranges from approximately 6,200 feet, at the top of the canyon south of Salt Springs Reservoir, to approximately 550 feet in the river channel downstream of State Route 49. Wildlife habitat in the secondary study area is typical of the region. This portion of the Mokelumne River drainage provides a diverse array of habitats, ranging from mid-elevation to foothill and valley vegetation types and associated dominant species. Although the river in this area has been modified by installation and operation of hydroelectric facilities, which have reduced habitat quality for aquatic species, habitat quality for terrestrial wildlife species is generally high, and the area provides habitat for a variety of common and special-status wildlife species.

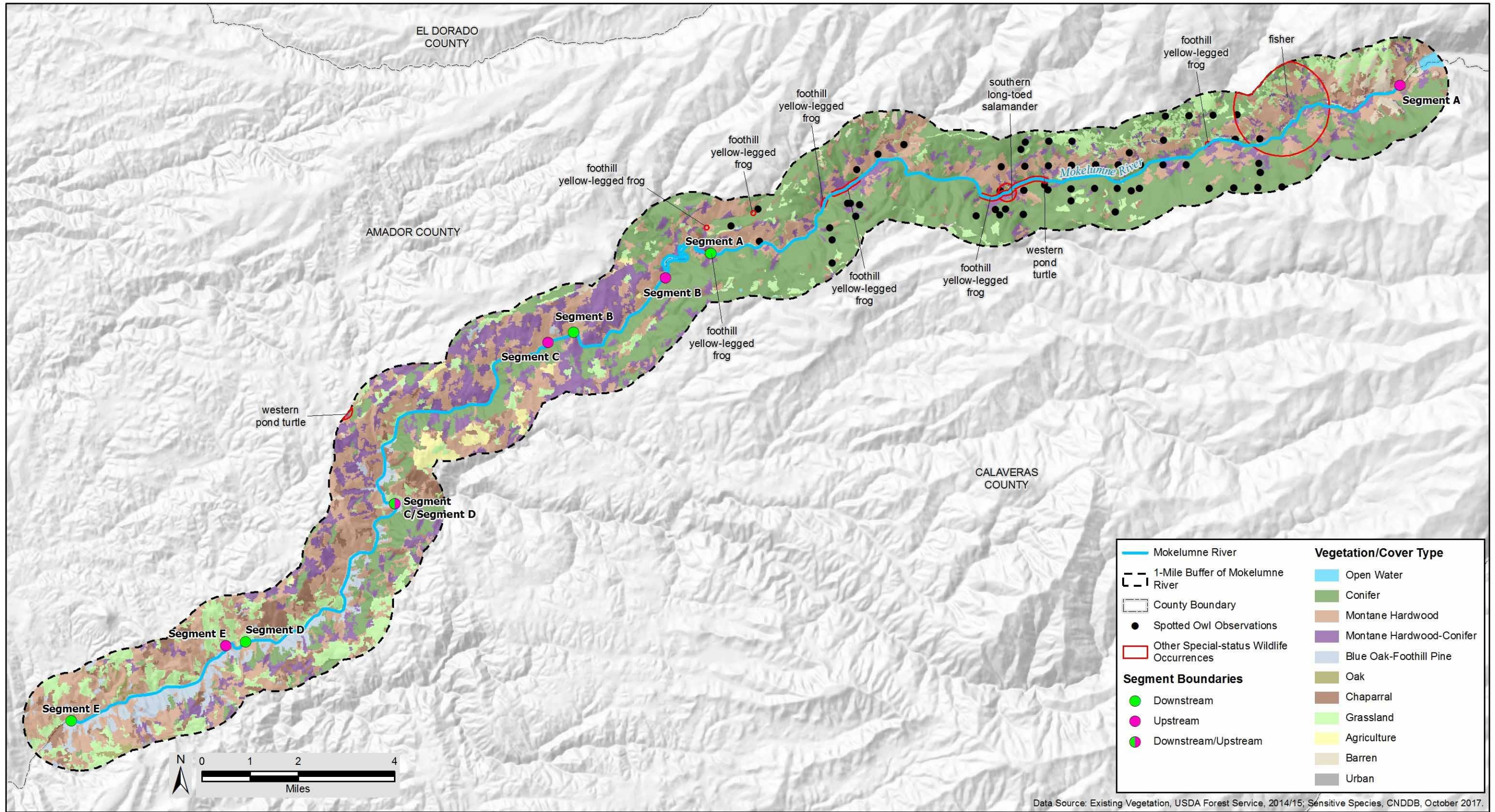
The very steep slopes of the river canyon below Salt Springs Reservoir are densely forested, particularly on the south side. The steep, rugged terrain and limited vehicle access points preserve a low level of human disturbance in most segments. Even in portions of the study area that are accessible by road, human activity is primarily limited to hydroelectric operations and river recreation. The presence of this relatively undisturbed perennial river flowing through a variety of vegetation communities substantially increases habitat quality and wildlife use in the area. In addition, throughout all but a small downstream portion of Segment A, the river represents the southern boundary of Salt Springs State Game Refuge, in which all hunting is prohibited. This further reduces human disturbance in the area and protects game species. The study area supports summer and winter habitat for mule deer (*Odocoileus hemionus*), including several areas of critical winter habitat: the Salt Springs Herd occurs on the north side of the river, and the Railroad Flat Herd occurs on the south side of the river (CDFW 2017b).

Wildlife habitat has been affected by two recent fires. The 2004 Power Fire burned on the north side of the river canyon in Segment A, and the 2015 Butte Fire burned adjacent to both sides of the river in Segment D and most of Segment E. These fires burned extensive areas of chaparral and conifer and hardwood forest and woodland immediately adjacent to and upslope of the river. Post-fire erosion and sedimentation likely deteriorated water quality and other habitat values for wildlife that rely on the river and adjacent habitat in the short term, but recent wildlife studies in the Power Fire area and nearby unburned habitat indicate a diverse assemblage of bird and bat species occurs in or near the burned area (ACCG 2017). However, habitat and species composition may be permanently altered to some extent, depending on the long-term dominance of exotic plants in areas of high fire severity and if climate change affects successional vegetation stages.

Wildlife Habitat Descriptions

A generalized vegetation map was prepared based on the USFS Region 5 CalVeg mapping database (USFS 2017a). In some cases, specific vegetation alliances were consolidated into more general vegetation classes, because they provide similar habitat characteristics from a wildlife perspective and/or the individual alliances represent a very small proportion of the study area. Vegetation and other cover types present within the secondary study area are shown in **Figure 4-1**. The primary vegetation types include conifer, montane hardwood, montane hardwood-conifer, blue oak-foothill pine, chaparral, and grassland. Less widespread cover types include barren, agriculture, oak woodland, and urban. Mapped vegetation/cover types and characteristic associated wildlife species are described below. Habitat descriptions and wildlife associations are primarily based on the California Wildlife Habitat Relationships System and its *Guide to Wildlife Habitats of California* (Mayer and Laudenslayer 1988), supplemented by documented wildlife observations from the study area. Riparian vegetation is not mapped, because of its very limited distribution in the overall secondary study area, but this habitat is also described, based on results of ongoing studies conducted in Segments A through D of the Mokelumne River and associated tributaries.

Figure 4-1. Existing Vegetation and Special-status Wildlife Occurrences in the Mokelumne River Secondary Study Area



Source: GEI Consultants, Inc., 2017

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Open Water

Open water in the secondary study area includes the Mokelumne River channel, reservoirs associated with in-channel dams, and tributary creeks. These features provide critical habitat for species that are primarily associated with aquatic habitat, as well as the numerous terrestrial species that rely on the river and perennial tributaries for water. Common terrestrial wildlife species known or likely to use these waters include several wholly or semi-aquatic amphibians and reptiles, such as Sierra newt (*Taricha sierra*), California toad (*Anaxyrus boreas halophilus*), Sierran treefrog (*Pseudacris sierra*), foothill yellow-legged frog (*Rana boylei*), American bullfrog (*Lithobates catesbeianus*), western pond turtle (*Actinemys marmorata*), Sierra gartersnake (*Thamnophis couchii*), and mountain gartersnake (*Thamnophis elegans elegans*). Common birds known to occur in the secondary study area that primarily forage in or near aquatic habitat include double-crested cormorant (*Phalacrocorax auritus*), Canada goose (*Branta canadensis*), wood duck (*Aix sponsa*), mallard (*Anas platyrhynchos*), green-winged teal (*Anas carolinensis*), common merganser (*Mergus merganser*), American coot (*Fulica americana*), killdeer (*Charadrius vociferus*), spotted sandpiper (*Actitis macularius*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), belted kingfisher (*Megaceryle alcyon*), and American dipper (*Cinclus mexicanus*).

Riparian

A corridor of riparian vegetation occurs along the river channel throughout the study area. This corridor is fairly continuous along the entire length of the river, though it is generally narrow and along some reaches is the width of just one tree or shrub. In several areas where rock slopes extend all the way to the river channel, riparian vegetation is absent. Because this habitat represents a very small proportion of the overall secondary study area, it is not shown in Figure 4-1. However, a description of the extent, composition, and condition of riparian vegetation in Segments A through D is provided in the recent 10-Year Summary Report of Mokelumne River Project riparian vegetation monitoring efforts (PG&E 2017a). The overall condition of the riparian corridor during 2016 field surveys was healthy and overwhelmingly dominated by native species. Species assemblages at most monitoring sites have remained similar over time, since PG&E monitoring efforts began in 2002. Dominant species at some sites have changed in response to natural successional processes and flow disturbance, but age structure is indicative of a healthy community, with a combination of young and mature woody riparian plants. High flows in winter 2016-2017 likely reduced the extent of riparian vegetation, but this is a dynamic community, and it will undoubtedly recover in time.

White Alder Alliance and Arroyo/Narrowleaf Willow Alliance are the dominant riparian vegetation alliances in Segments A through E of the Mokelumne River. Other riparian alliances that occur to a much lesser extent along the river include Fremont Cottonwood Alliance, Black Cottonwood Alliance, Bigleaf Maple Alliance, and Oregon Ash Alliance. Mountain dogwood (*Cornus nuttallii*), western azalea (*Rhododendron occidentale*), and bigleaf maple (*Acer macrophyllum*) are dominant species along the narrow tributaries, such as Tiger Creek.

White alder accounted for 47.3 percent of the total vegetated stream bank length in the riparian study area in 2016 (PG&E 2017a). It is nearly the sole alliance in the upper portion of Segment A and is present throughout all segments. White alder (*Alnus rhombifolia*) is dominant or co-dominant in the tree canopy, and associate species include bigleaf maple, Oregon ash (*Fraxinus latifolia*), Fremont cottonwood (*Populus fremontii*), black cottonwood (*Populus trichocarpa*), Douglas fir (*Pseudotsuga menziesii*), and willow (*Salix* spp.). Within the riparian study area, this alliance is distributed in wide and

narrow corridors along the stream banks, mid-channel bars, floodplains, and terraces of the river and tributary creeks.

The Arroyo/Narrowleaf Willow Alliance is also prevalent throughout the study area. In combination, the willow alliances accounted for 38.2 percent of the total vegetated stream bank length in the riparian study area in 2016 (PG&E 2017a). Willow species found in the study area during 2009 and 2016 riparian monitoring surveys included narrowleaf willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*), Jepson's willow (*Salix jepsonii*), mountain willow (*Salix eastwoodiae*), red willow (*Salix laevigata*), Lemmon's willow (*Salix lemmonii*), and Pacific willow (*Salix lucida*). The willow alliances were present throughout all segments within the study area and were typically established as wide and narrow corridors on wide floodplain terraces.

Riparian vegetation along the river and tributaries in the secondary study area supports many of the same wildlife species that are associated with the adjacent open water habitat, as well as many additional terrestrial species. Abundance and diversity of wildlife in riparian habitats is typically very high, due to vegetation structure; microclimate conditions; and availability of water, food, and cover. This habitat provides escape cover, nesting cover, dispersal and travel corridors, and forage for a wide variety of wildlife species. In addition to the species associated with open water, terrestrial salamanders and a wide variety of reptiles, birds, and mammals use the riparian corridors in the study area. Reptiles likely to occur include northwestern fence lizard (*Sceloporus occidentalis occidentalis*) and Sierra alligator lizard (*Elgaria coerulea palmeri*). Birds that have been documented along the river include red-shouldered hawk (*Buteo lineatus*), Anna's hummingbird (*Calypte anna*), black phoebe (*Sayornis nigricans*), Pacific-slope flycatcher (*Empidonax difficilis*), yellow warbler (*Setophaga petechia*), Wilson's warbler (*Cardellina pusilla*), yellow-breasted chat (*Icteria virens*), warbling vireo (*Vireo gilvus*), Swainson's thrush (*Catharus ustulatus*), Bullock's oriole (*Icterus bullockii*), spotted towhee (*Pipilo maculatus*), song sparrow (*Melospiza melodia*), and black-headed grosbeak (*Pheucticus melanocephalus*). Mammals known or likely to occur include ringtail (*Bassariscus astutus*), gray fox (*Urocyon cinereoargenteus*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), mule deer, black bear (*Ursus americanus*), mountain lion (*Puma concolor*), and bobcat (*Lynx rufus*).

Conifer

Conifer forest is the primary habitat south of the river, particularly in Segments A and B. Dominant conifer species in the study area are Douglas fir, ponderosa pine (*Pinus ponderosa*), incense cedar (*Calocedrus decurrens*), white fir (*Abies concolor*), and foothill pine (*Pinus sabiniana*). Hardwoods such as canyon live oak (*Quercus chrysolepis*) and black oak (*Quercus kelloggii*) and understory shrubs such as deerbrush (*Ceanothus integerrimus*) and manzanita (*manzanita* spp.) also occur in this habitat.

Conifer forest often supports a diverse vegetation structure including tall coniferous trees, a mid-canopy of hardwood trees, and ground cover that includes thick leaf litter to grasses, forbs, and shrubs. This vegetative diversity provides important diversity in food and cover for wildlife. Large conifers provide nesting platforms for large raptors, including northern goshawk (*Accipiter gentilis*) and California spotted owl (*Strix occidentalis occidentalis*), while dense shrub cover provides shelter and nest sites for smaller birds and mammals, and acorns and berries are important food sources. Typical amphibian and reptile species in conifer forests include Ensatina salamanders, western fence lizard, northern rubber boa (*Charina bottae*), and California mountain kingsnake (*Lampropeltis zonata*). Several woodpecker species and other common birds are closely associated with coniferous forest and known to occur in the river canyon, including band-tailed pigeon (*Patagioenas fasciata*), Steller's jay (*Cyanocitta stelleri*), western wood-pewee (*Contopus sordidulus*), ruby-crowned kinglet (*Regulus calendula*), red-breasted

nuthatch (*Sitta canadensis*), brown creeper (*Certhia americana*), hermit thrush (*Catharus guttatus*), Townsend's warbler (*Setophaga townsendi*), yellow-rumped warbler (*Setophaga auduboni*), western tanager (*Piranga ludoviciana*), chipping sparrow (*Spizella passerina*), and dark-eyed junco (*Junco hyemalis*). Large mammals, such as mule deer, black bear, mountain lion, and bobcat, and many small mammals, such as American marten (*Martes americana*), squirrels, and chipmunks, occur in this community.

Montane Hardwood

Montane hardwood forest and woodland occurs throughout the secondary study area, primarily north of the river. Typical montane hardwood habitat is composed of a pronounced hardwood tree layer, with an infrequent and poorly developed shrub layer, and a sparse herbaceous layer. In the Sierra Nevada, steep, rocky south slopes of major river canyons are often extensively covered with canyon live oak (*Quercus chrysolepis*) and scattered old-growth Douglas fir. Elsewhere, overstory associates include typical mixed conifers (e.g., Douglas fir, ponderosa pine, incense cedar, and foothill pine), black oak (*Quercus kelloggii*), interior live oak (*Quercus wislizenii*), and Pacific madrone (*Arbutus menziesii*). Associated understory vegetation includes shrubs such as Manzanita spp., poison-oak (*Toxicodendron diversilobum*), California wildrose (*Rosa californica*), and a few forbs and grasses.

Animal species characteristic of montane hardwood habitat include birds and mammals that use acorns as a major food source, such as wild turkey (*Meleagris gallopavo*), mountain quail (*Oreortyx pictus*), band-tailed pigeon, California scrub-jay (*Aphelocoma californica*), Steller's jay, acorn woodpecker (*Melanerpes formicivorus*), western gray squirrel (*Sciurus griseus*), California ground squirrel (*Otospermophilus beecheyi*), dusky-footed woodrat (*Neotoma fuscipes*), black bear, and mule deer. Deer also use the foliage of several hardwoods to a moderate extent. Many amphibians and reptiles are found on the forest floor in montane hardwood habitat, including those listed above for conifer forest and riparian habitat. Additional bird species commonly associated with hardwood forest include Lewis's woodpecker (*Melanerpes lewis*), ash-throated flycatcher (*Myiarchus cinerascens*), oak titmouse (*Baeolophus inornatus*), white-breasted nuthatch (*Sitta carolinensis*), and black-throated gray warbler (*Setophaga nigrescens*).

Montane Hardwood-Conifer

Areas of montane hardwood-conifer are distributed throughout the secondary study area, but this habitat is most common north of the river in Segments B and C. Montane hardwood-conifer habitat includes both conifers and hardwoods, often as a closed forest; at least one-third of the trees are conifer and at least one-third are broad-leaved. This habitat often occurs in a mosaic-like pattern with small pure stands of conifers interspersed with small stands of broad-leaved trees. Relatively little understory occurs under the dense canopy, but ground and shrub cover can be extensive following disturbance such as fire or logging. In the Sierra Nevada, common associates include black oak, black cottonwood, canyon live oak, bigleaf maple, white alder, dogwood, Douglas fir, incense cedar, and ponderosa pine. Wildlife species that occur in montane hardwood-conifer habitat include those discussed above for each of these distinct habitat types.

Blue Oak-Foothill Pine

Blue oak-foothill pine habitat occurs south of the river in Segments D and E. Blue oak (*Quercus douglasii*) and foothill pine typically comprise the overstory of this habitat, but blue oak is often more abundant. Tree species typically associated with this habitat include interior live oak and California buckeye (*Aesculus californica*). At lower elevations, where blue oak dominates the canopy, the understory tends to be primarily annual grasses and forbs. At higher elevations where foothill pines and

sometimes interior live oaks dominate the canopy, the understory usually includes patches of shrubs in addition to grasses and forbs. Common shrub species include several ceanothus spp. and manzanita spp., California coffeeberry (*Rhamnus californica*), poison oak, and blue elderberry (*Sambucus nigra* ssp. *caerulea*).

Blue oak-foothill pine habitat provides shade, shelter, nesting, and foraging habitat for a diversity of wildlife species, although no species is totally dependent on it for breeding, feeding, or cover. Many of the species mentioned above under conifer and hardwood habitats and below oak woodland are likely to occur in blue oak-foothill pine woodland.

Oak Woodland

A small amount of oak woodland, primarily blue oak woodland, is present in Segment E. Blue oak is the dominant species in this vegetation type, comprising 85 to 100 percent of the trees present. The most common associate in the canopy is interior live oak, but valley oak (*Quercus lobata*) can occur in areas with deep soil. Associated shrub species include poison oak, coffeeberry, buckbrush (*Ceanothus cuneatus*), California buckeye, and manzanita spp. The ground cover is comprised mainly of nonnative annuals.

In addition to species mentioned above for montane hardwood habitat, oak woodland also provides habitat for Pacific gopher snake (*Pituophis catenifer catenifer*) and valley garter snake (*Thamnophis sirtalis fitchi*). Oaks are a critical habitat component for cavity-nesting birds, including species such as woodpeckers that excavate nest holes in living and dead trees, and those that subsequently use existing cavities, such as western screech owl (*Megascops kennicottii*), ash-throated flycatcher, white-breasted nuthatch, oak titmouse, western bluebird (*Sialia mexicana*), and violet-green swallow (*Tachycineta thalassina*). As mentioned previously, acorns are an important food source for many species.

Chaparral

Chaparral habitat is primarily limited to the lower portion of Segment A and to Segments D and E. Several chaparral habitats occur in the secondary study area, the most common of which is mixed chaparral. Mixed chaparral is a structurally homogeneous brushland type. At maturity, this habitat is typically a dense, nearly impenetrable thicket with greater than 80 percent absolute shrub cover. Mixed chaparral is a floristically rich type that supports hundreds of species of woody plants; dominant species in mixed chaparral include shrub oaks and several species of ceanothus and manzanita. Commonly associated shrubs include whiteleaf and common manzanitas (*Arctostaphylos viscida* and *Arctostaphylos manzanita*), buckbrush, Lemmon ceanothus (*Ceanothus lemmonii*), chaparral whitethorn (*Ceanothus leucodermis*), chamise (*Adenostoma fasciculatum*), birchleaf mountain mahogany (*Cercocarpus betuloides*), yerba santa (*Eriodictyon californicum*), California buckeye, poison-oak, Fremont and wavyleaf silktassel (*Garrya fremontii* and *Garrya elliptica*), and coffeeberry. At higher elevations, montane chaparral includes species such as greenleaf manzanita (*Arctostaphylos patula*), mountain whitethorn (*Ceanothus cordulatus*), snowbrush (*Ceanothus velutinus*), and deerbrush. Lower elevations support the fire-adapted chamise-redshank chaparral on dry, steep slopes, which are dominated by chamise or redshank (*Adenostoma sparsifolium*) but can support many of the associates found in mixed chaparral.

Chaparral provides habitat for many wildlife species, including deer that feed on ceanothus. Deer also use this habitat for escape cover, wintering habitat, and fawning habitat, particularly when chaparral occurs near riparian areas. Smaller herbivores use chaparral habitat when grasses are not abundant; rabbits and hares, for example, forage on the twigs, leaves, and bark of chaparral plants. Several snakes

are also likely to occur in chaparral, such as California striped racer (*Coluber lateralis lateralis*), gopher snake, and northern Pacific rattlesnake (*Crotalus oreganus oreganus*). Birds use chaparral for protection from predators, food sources, roosting, and nesting sites; species that are primarily associated with chaparral habitats include wrentit (*Chamaea fasciata*), phainopepla (*Phainopepla nitens*), fox sparrow (*Passerella iliaca*), and rufous-crowned sparrow (*Aimophila ruficeps*). These and other wildlife find shade in chaparral during the hot summer and shelter from winds and cooler weather in winter.

Grassland

Grassland habitat in the secondary study area includes both annual and perennial grasslands. This habitat typically occurs on the upper canyon slopes and bluffs, except for in Segments D and E, where it also occurs on lower slopes and extends to the river in several locations. Annual grassland habitat includes open grasslands dominated by nonnative annual plant species, such as wild oat (*Avena fatua*), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), wild barley (*Hordeum spontaneum*), and foxtail fescue (*Vulpia myuros*). Common forbs include broadleaf filaree (*Erodium botrys*), redstem filaree (*Erodium cicutarium*), true clovers, bur clover (*Medicago polymorpha*), popcorn flower (*Plagiobothrys tenellus*), and California poppy (*Eschscholzia californica*). Perennial grasses, found in moist, lightly grazed, or relic native grassland areas, include purple needlegrass (*Stipa pulchra*) and Idaho fescue (*Festuca idahoensis*).

Grassland provides foraging habitat for numerous wildlife species that use this community as their primary habitat, and it provides breeding, resting, and escape cover for many species that inhabit surrounding areas. Characteristic reptiles that breed in grassland habitats include western toad, western fence lizard, valley garter snake, gopher snake, and northern Pacific rattlesnake. Birds typically found in this community include white-tailed kite (*Elanus leucurus*), red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), loggerhead shrike (*Lanius ludovicianus*), and mourning dove (*Zenaida macroura*). Birds such as ring-necked pheasant (*Phasianus colchicus*), western meadowlark (*Sturnella neglecta*), and homed lark (*Eremophila alpestris*) nest in grassland vegetation. Grassland can provide important foraging habitat for larger mammals such as coyote (*Canis latrans*), because the habitat typically supports large populations of smaller prey species, including black-tailed jackrabbit (*Lepus californicus*), California ground squirrel, Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), and California vole (*Microtus californicus*).

Barren

The secondary study area includes several areas of barren habitat, which is defined by the absence of vegetation. These areas are primarily associated with canyon walls above the Mokelumne River in Segment A. In areas such as these, where there is little or no vegetation, structure of the non-vegetated substrate can be a critical component of the habitat. Rocky river canyon walls above open water are preferred foraging habitat for many bats, which may also roost in caves and crevices in the rocks. A high diversity of bat species has been documented in the river canyon (ACCG 2017). These rock faces may also include ledges or other platform that provide suitable nest sites for peregrine falcon (*Falco peregrinus anatum*) and golden eagle (*Aquila chrysaetos*), and they are likely used by rock wren (*Salpinctes obsoletus*), canyon wren (*Catherpes mexicanus*), and white-throated swift (*Aeronautes saxatalis*).

Agriculture

Agricultural land in the secondary study area is limited to several areas of deciduous orchard (likely apples and walnuts) in Segment C, primarily on top of the bluff south of the river. It is not known what

crop these orchards produce, but they appear to have been in place since at least 1998, based on aerial photography. Typically, orchards are uniformly planted, monotypic, and intensively managed, which limits the value of these habitats for wildlife. Some birds and mammals, however, have adapted to using orchards. Orchards in the secondary study area are likely used by a variety of birds and other wildlife, because they are relatively small areas interspersed within other more natural habitats and often occur immediately adjacent to woodland and forest.

Urban

Several small areas of habitat mapped as urban occur in the secondary study area. These areas are associated with hydroelectric facilities and rural residences on the canyon slopes and bluffs above the river. As with agricultural habitats, development and associated lawns and ornamental vegetation typically support low wildlife diversity. However, because these very small portions of the study area are adjacent to natural habitats, a reasonable number of species likely occur in them.

Special-Status Species

Several special-status species are known to occur in the secondary study area, or could occur based on habitat conditions. Special-status species are plants and animals legally protected under State and Federal Endangered Species Acts or other regulations and species considered sufficiently rare by the scientific community to qualify for such listing. Special-status wildlife species considered in this evaluation include those in one or more of the following categories:

- animals that are listed, proposed for listing, or candidates for possible future listing as threatened or endangered under the Federal Endangered Species Act;
- animals that are listed or proposed for listing as threatened or endangered under the California Endangered Species Act;
- animal species of special concern to CDFW; and
- animals fully protected by the California Fish and Game Code.

The CNDDDB was reviewed for documented occurrences of special-status wildlife. Figure 4-1 includes special-status wildlife occurrences recorded in the CNDDDB from the secondary study area.

Table 4-1 provides information on each special-status wildlife species that was included in the CNDDDB search results or on the USFWS Information for Planning and Conservation website (USFWS 2017a), including each species' regulatory status, habitat requirements, and potential to occur in the secondary area. Five special-status species have been recently documented in the secondary study area: foothill yellow-legged frog (*Rana boylei*), western pond turtle (*Emys marmorata*), golden eagle, bald eagle (*Haliaeetus leucocephalus*), and California spotted owl. Sierra Nevada yellow-legged frog (*Rana sierrae*) is known to occur at high elevations, just outside the study area boundary, and fisher has historically been documented in the study area. Several additional species also have some potential to occur in the study area, as described in Table 4-1.

Primary Study Area

The Mokelumne River primary study area includes the river channel and immediately adjacent terrestrial habitat, which generally includes the riparian habitat described above.

Table 4-1. Special-Status Wildlife with Potential to Occur in the Secondary Study Area

Species	Status ¹		Habitat Requirements	Potential for Occurrence in the Study Area
	Federal	State		
Invertebrates				
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	T	–	Closely associated with blue elderberry, which is an obligate host for the beetle larvae.	Low—elevation at the downstream end of Segment E is nearly 600 feet, but most occurrences of this species are below 500 feet.
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	T	–	Vernal pools, including a wide range of sizes and depths, and on many different geologic surfaces.	Very low—suitable seasonal wetland habitat is unlikely to occur in the study area.
Amphibians				
Southern long-toed salamander <i>Ambystoma macrodactylum sigillatum</i>	–	SSC	High elevation meadows and lakes surrounded by coniferous forest; in non-breeding season, adults use mammal burrows and moist areas under litter, logs, and rocks.	Low—has been reported from Segment A, but CNDDDB account indicates it may be an identification or mapping error or that larvae may have been washed downstream, because of the atypical elevation and habitat (all other occurrences in the region are above 6,500 feet).
Yosemite toad <i>Anaxyrus canorus</i>	T	SSC	High elevation wet meadows in central Sierra Nevada; also occurs in seasonal ponds in subalpine coniferous forest.	Very low—most of the study area is below the elevation range for this species, and the nearest known occurrence is over 12 miles east of Salt Springs Reservoir.
Sierra Nevada yellow-legged frog <i>Rana sierrae</i>	E	T	Montane ponds, lakes, and streams, typically with shallow, exposed, and gently-sloping shorelines.	Moderate—documented in Cole Creek, approximately 3 miles upstream of Segment A and 1 mile north of Salt Springs Reservoir; however, suitable habitat within the species' elevation range occurs in a very small portion of the study area.
Foothill yellow-legged frog <i>Rana boylei</i>	–	CT	Small to fairly-large streams and riffles with cobble- and boulder-sized substrate.	Present—known to occur at various locations in Segment A; could also occur in downstream segments where monitoring has not been conducted.
California red-legged frog <i>Rana draytonii</i>	T	SSC	Lowlands and foothill areas, in or near permanent deep water with dense, shrubby riparian or emergent wetland vegetation.	Low—Mokelumne River within the study area does not provide suitable habitat, but could occur if suitable ponds and small creeks are present elsewhere.
Reptiles				
Western pond turtle <i>Emys marmorata</i>	–	SSC	Permanent or nearly permanent water bodies in a variety of habitat types, including ponds, marshes, rivers, streams, and irrigation ditches.	Present—Habitat in the Mokelumne River is not optimal, but one adult was observed in a Segment A pool, during foothill yellow-legged frog surveys; also known from smaller creeks in the local region.

Table 4-1. Special-Status Wildlife with Potential to Occur in the Secondary Study Area

Species	Status ¹		Habitat Requirements	Potential for Occurrence in the Study Area
	Federal	State		
Birds				
Northern goshawk <i>Accipiter gentilis</i>	–	SSC	Coniferous and montane riparian forest; typically nests on north-facing slopes near water.	High—Known to occur in the river canyon and could nest on forested slopes in the study area; several nest sites were documented in the local region in the 1990s.
Golden eagle <i>Aquila chrysaetos</i>	–	FP	Variety of habitats in foothills, mountains, high plains, and dessert; primarily nests on cliffs in steep canyons, but also in large trees in open areas	Present—Known to occur in the study area; could nest on canyon cliffs.
Bald eagle <i>Haliaeetus leucocephalus</i>	–	E	Coastal shorelines and wetlands, lakes, reservoirs, and rivers. Nests in large trees, typically in mountain and foothill forests and woodlands near reservoirs, lakes, and rivers.	Present—Known to occur in the study area, but nesting does not appear to have been confirmed.
American peregrine falcon <i>Falco peregrinus anatum</i>	–	FP	Wide range of habitats; nests on cliffs, banks, dunes, mounds, and human-made structures near wetlands, lakes, rivers, and other water bodies.	High—Known to occur in the river canyon and has nested near Salt Springs Reservoir; could nest on cliffs above the river.
Great gray owl <i>Strix nebulosa</i>	–	E	Mixed conifer and red fir forest habitat, in or on edge of meadows; Requires large diameter snags in a forest with high canopy closure.	Moderate—Few documented occurrences in the local region, but at least one pair has recently nested at middle elevations in the Cosumnes River drainage; other occurrences in the region are from high elevations (over 8,000 feet).
California spotted owl <i>Strix occidentalis occidentalis</i>	–	SSC	Primarily coniferous and montane hardwood forests at middle elevations in the Sierra Nevada.	Present—Numerous observations in Segment A, including immediately adjacent to the river.
Tricolored blackbird <i>Agelaius tricolor</i>	–	CE	Nests in dense cattails and tules, riparian scrub, grain crops, and other low dense vegetation; forages in grasslands and agricultural fields.	Low—Mokelumne River within the study area does not provide suitable habitat; could occur if suitable habitat is present elsewhere; nest colony recently documented at Pardee Reservoir.
Mammals				
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	–	SSC	Variety of habitats, but prefers mesic habitats; roosts in caves, mines, tunnels, buildings, or other human-made structures.	High—Known to occur in the river canyon and to roost in abandoned mine shafts and buildings along other rivers in the region.
Sierra Nevada red fox <i>Vulpes vulpes necator</i>	C	T	Variety of montane habitats; prefers forest interspersed with meadows and other open areas and requires dense vegetation and rocky areas for cover and den sites	Low—No recent local occurrences and may have been extirpated from the region; typically occurs above 7,000 feet in the Sierra Nevada.

Table 4-1. Special-Status Wildlife with Potential to Occur in the Secondary Study Area

Species	Status ¹		Habitat Requirements	Potential for Occurrence in the Study Area
	Federal	State		
Fisher <i>Pekania pennanti</i>	PT	CT	Large areas of mature, dense coniferous and deciduous riparian areas with high canopy closure; uses cavities, snags, logs, and rocky areas for cover and den sites.	Moderate—No recent occurrences in the study area, but was historically documented in Segment A and upstream of Salt Springs Reservoir.

¹ **Status Definitions:**

Federal Listing Categories

T = Threatened
E = Endangered
C = Candidate for listing as Endangered
PT = Proposed Threatened
– = No status

State Listing Categories

T = Threatened
E = Endangered
CT = Candidate Threatened
CE = Candidate Endangered
FP = Fully Protected
SSC = Species of Special Concern
– = No status

Sources: FERC 1996; USFS 2005 and 2017b; ACCG 2017; CNDDDB 2017; eBird 2017; Fogg et al. 2017; USFWS 2017a and 2017c; based on data compiled by GEI Consultants, Inc. in 2017

Segment A

Segment A is a long (more than 17 miles), rugged reach of the Mokelumne River that extends from approximately 3,600 feet in elevation at the upstream end to approximately 2,400 feet at the downstream end. Adjacent habitat is characterized by steep, high, forested canyon slopes. There is a fairly contiguous, but typically very narrow, corridor of riparian vegetation. The upper portion of the segment is dominated by White Alder Alliance, but Arroyo/Narrowleaf Willow Alliance occurs in the more downstream sections. In 2004, the nearly 17,000-acre Power Fire burned much of the northern slope of the canyon downstream of Salt Springs Reservoir, including along the river's edge in several locations.

Two small USFS campgrounds are present on the north side of the river in the upper portion of the segment and one campground is on the south side of the river, adjacent to Moore Creek. This area is accessible by a road along the north side of the river, but human disturbance is likely relatively limited in this area for much of the year, because of its remoteness. The most common human activities are likely whitewater recreation, fishing, and bird watching, all relatively passive and low-disturbance activities. Because the Salt Springs State Game Refuge on the north side of the river extends to the river channel along most of the segment, little or no disturbance from hunting is expected to occur.

In general, habitat conditions in Segment A appear to be excellent for wildlife species that occupy narrow river canyons on the west slope of the Sierra Nevada. Many common wildlife species are likely to use the river and immediately adjacent vegetation and large cliffs. In addition, two special-status species, foothill yellow-legged frog and western pond turtle, are known to occupy the river in this segment. Several observations of California spotted owl also have been recorded from the immediate vicinity of the river channel. Fisher appears to have historically occurred in this segment, based on a 1965 observation described in the CNDDDB as 3 river miles downstream of Salt Springs Reservoir; despite the lack of recent records, this species could still be present. Additional special-status species could nest and roost in adjacent forest and cliffs, including northern goshawk, peregrine falcon, golden eagle, and Townsend's big-eared bat. Although southern long-toed salamander has been reported from this portion of the river, the record appears to be suspect, because of the atypically low elevation and habitat.

Although Segment A provides excellent habitat for wildlife and is known to support several special-status species, the wildlife values are similar to other western Sierra Nevada rivers at these elevations and are not considered to be extraordinary.

Segment B

The approximately 3-mile long Segment B channel is bordered by a narrow corridor of riparian vegetation. Elevation ranges from approximately 2,200 feet at the upstream end to 1,800 feet at the downstream end. Canyon slopes adjacent to this segment are relatively steep and densely forested. Riparian vegetation in this reach is dominated by Arroyo/Narrowleaf Willow Alliance, with regular patches of Alder Alliance and several patches of Fremont Cottonwood Alliance. This segment appears to provide high-quality wildlife habitat, though the area may experience a moderate level of human disturbance because of easy access from State Route 26 at the downstream end and a road adjacent to the full length of the segment, typically less than 200 feet upslope from the river. Whitewater recreation, swimming, and fishing are likely popular activities along this segment.

Despite the moderate levels of human disturbance, a diverse array of wildlife species is likely to use habitat in this segment. No known occurrences of special-status species have been specifically documented in this segment, but foothill yellow-legged frog is likely to occur and western pond turtle could occur. Conifer and montane hardwood forest adjacent to this segment may also be suitable for northern goshawk and California spotted owl, despite the lack of known documented occurrences.

Although Segment B provides excellent habitat for wildlife and likely supports several special-status species, the wildlife values are similar to other western Sierra Nevada rivers at these elevations and are not considered to be extraordinary.

Segment C

Segment C is an approximately 7-mile segment of the Mokelumne River that ranges from approximately 1,800 feet to 1,000 feet in elevation. Riparian vegetation is dominated by Arroyo/Narrowleaf Willow Alliance, with extensive patches of Alder Alliance in some portions and limited Fremont Cottonwood Alliance, Bigleaf Maple Alliance, and Oregon Ash Alliance patches. Except for at each end of this segment, there is no road access, resulting in a very remote feel with low levels of human activity, except at the privately-owned Roaring Camp Mining Company, located just upstream of the confluence of the middle and south forks; Roaring Camp offers 20 cabins and tent camping sites along the river and various recreational activities. The adjacent canyon slopes appear to be less densely forested than upstream segments, but the diversity of habitat types likely results in a high diversity of wildlife species. Because of its remoteness, and habitat diversity, wildlife likely thrive in this river segment. Although no special-status species are known from the segment, foothill-yellow legged frog and western pond turtle are likely to occur.

Although Segment C provides excellent habitat for wildlife and likely supports several special-status species, the wildlife values are similar to other western Sierra Nevada rivers at these elevations and are not considered to be extraordinary.

Segment D

Although much of the area adjacent to the approximately 5-mile Segment D burned in the 2015 Butte Fire, the riparian corridor appears to be in good condition. Riparian vegetation is dominated by Red/Narrowleaf Willow Alliance, with extensive patches of Alder Alliance and some Fremont

Cottonwood Alliance, Oregon Ash Alliance, and Bigleaf Maple Alliance patches. Conditions for aquatic wildlife may have been adversely affected by post-fire erosion and sedimentation, but this is likely to be a temporary effect. Road access to this segment, which ranges from approximately 1,000 to 700 feet in elevation, is limited to each end and one location at the middle of the segment. As a result, human disturbance throughout most of the segment is likely very low. Despite the recent fire, Segment D provides high-quality wildlife habitat. Although species diversity and abundance may have been reduced by the fire, most affected species are likely to recover over time. No special-status species are known to occur in this segment, but foothill-yellow legged frog and western pond turtle could occur.

Although Segment D provides high-quality habitat for wildlife and may support special-status species, the wildlife values are similar to other western Sierra Nevada rivers at these elevations and are not considered to be extraordinary.

Segment E

The approximately 4-mile-long Segment E has relatively flat relief, with elevation ranging from approximately 700 feet at the upstream end to 580 feet at the downstream end. The river in this segment is also much wider than upstream segments, with fewer large boulders and more cobble-sized substrate. Segment E is very accessible, with Electra Road extending from Highway 49 near the downstream end all the way to the upstream end. For these reasons, the segment is a popular recreation destination and human disturbance is relatively high. Despite the human disturbance, Segment E likely provides good habitat for a variety of wildlife species, though no special-status species are known or likely to occur.

Although Segment D provides very good habitat for wildlife, the wildlife values are similar to other western Sierra Nevada rivers at these elevations and are not considered to be extraordinary.

All Segments

The study area extends from an elevation of approximately 3,600 feet to 580 feet. The river segments are fairly remote except for Segment E, which has easy paved road access along much of its length. Habitat for wildlife is generally excellent and supports a wide range of wildlife species, including several special-status species. Wildlife species and expected abundance, however, appear to be fairly similar to that present in other mid-elevation western Sierra Nevada rivers in central and northern California. For this reason, the wildlife resources and values, when evaluated as a whole from the top of Segment A to the bottom of Segment E, do not constitute extraordinary wildlife resources or values in any segment or in the study area as a whole.

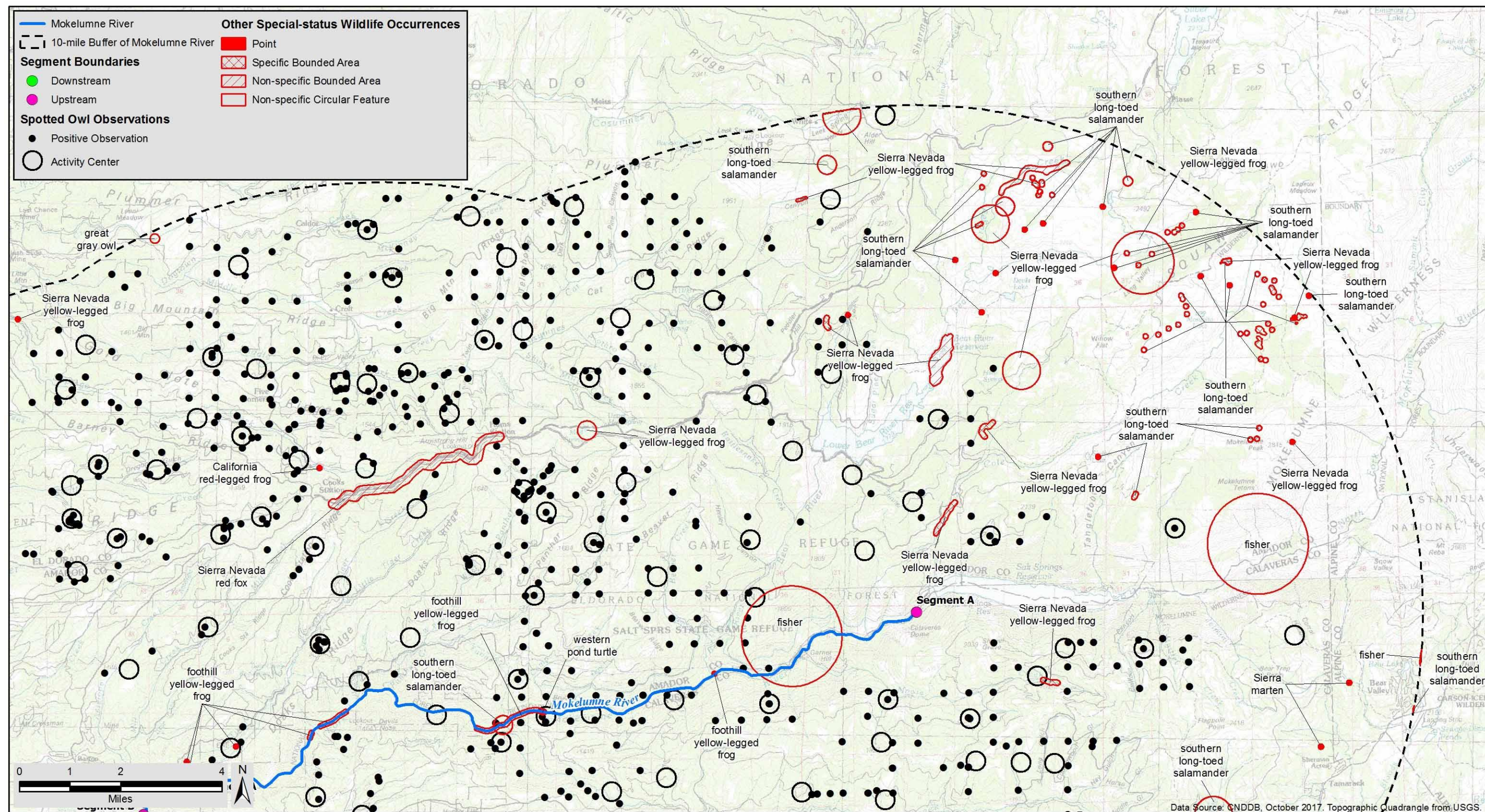
4.1.3 Extraordinary Resource Values

Because of their generally undisturbed character, wild and scenic rivers often support high densities and diversities of wildlife species, including many special-status species. Wildlife resources associated with Segments A through E of the Mokelumne River are very good to excellent, because these river segments provide habitat for a broad diversity of common bird, mammal, amphibian, and reptile species and for several special-status species that are known to occupy, or have potential to occupy, the area. Hydroelectric operations and recreational use somewhat reduce the quality of wildlife habitat, but most of the river segments are relatively undisturbed and the quality of riparian areas remains relatively high.

Despite the high-quality habitat and wildlife use by a diversity of species, including some special-status species, the wildlife values of the Mokelumne River study area segments are not unique to the

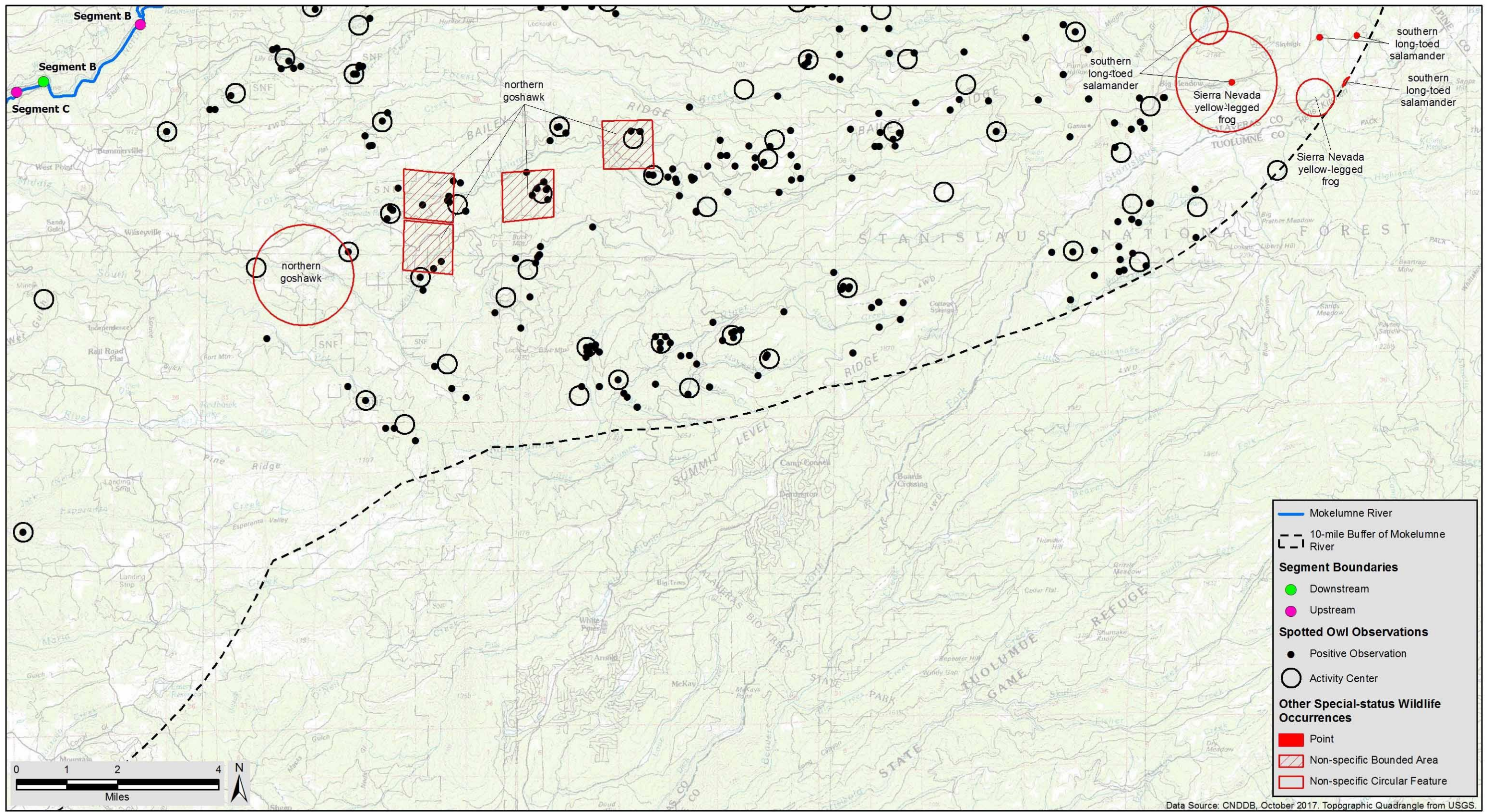
region and can be found in similar west slope drainages of the central Sierra Nevada. In addition, the special-status species that are known from the river or likely to occur are also present in other drainages in the region, as shown in **Figure 4-2**. Therefore, wildlife values are not considered extraordinary in the context of this evaluation for any of the study area segments or in the study area as a whole.

Figure 4-2a. Special-status Wildlife Occurrences within 10 Miles of the Primary Study Area



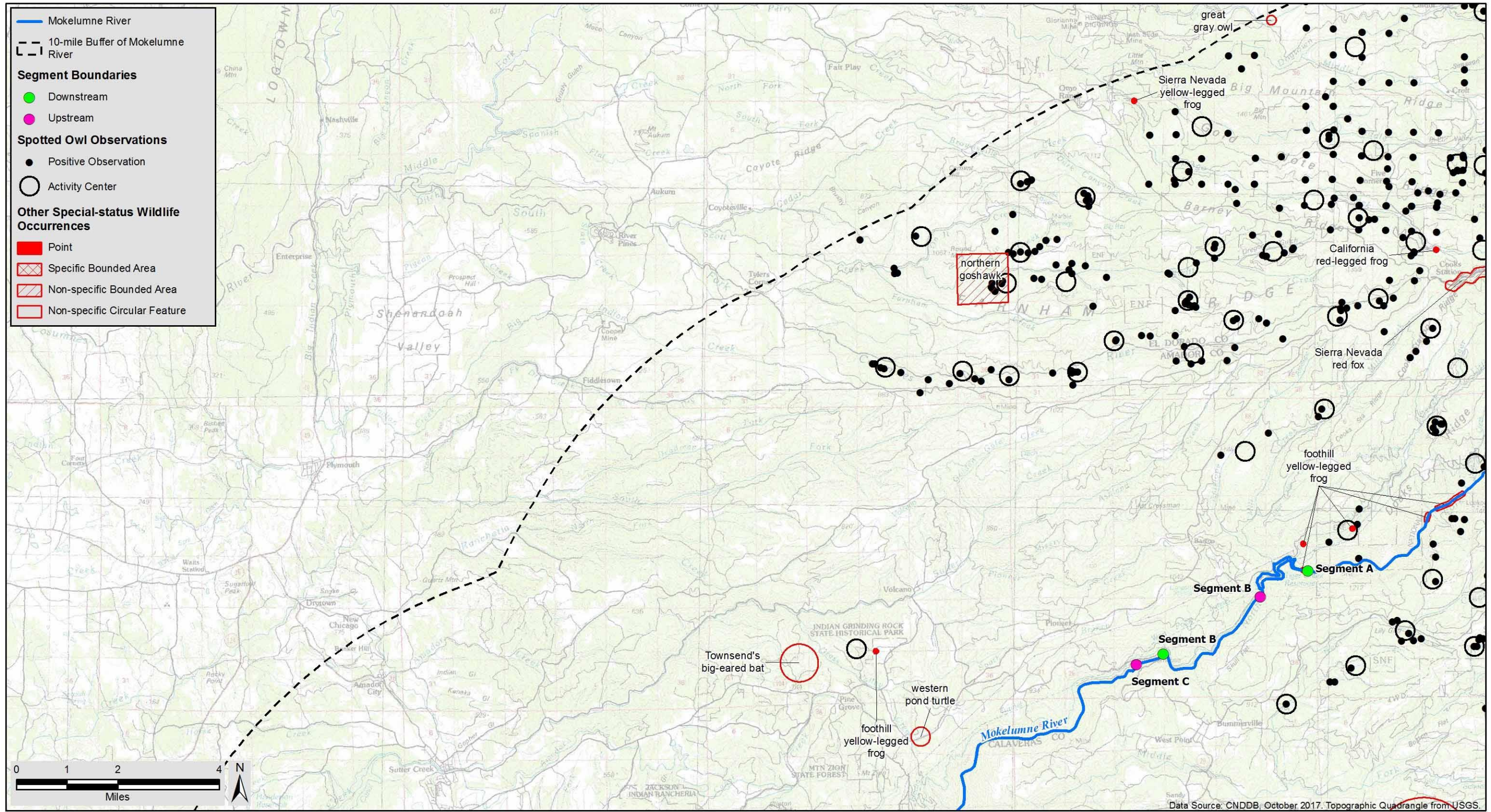
Source: GEI Consultants, Inc., 2017

Figure 4-2b. Special-status Wildlife Occurrences within 10 Miles of the Primary Study Area



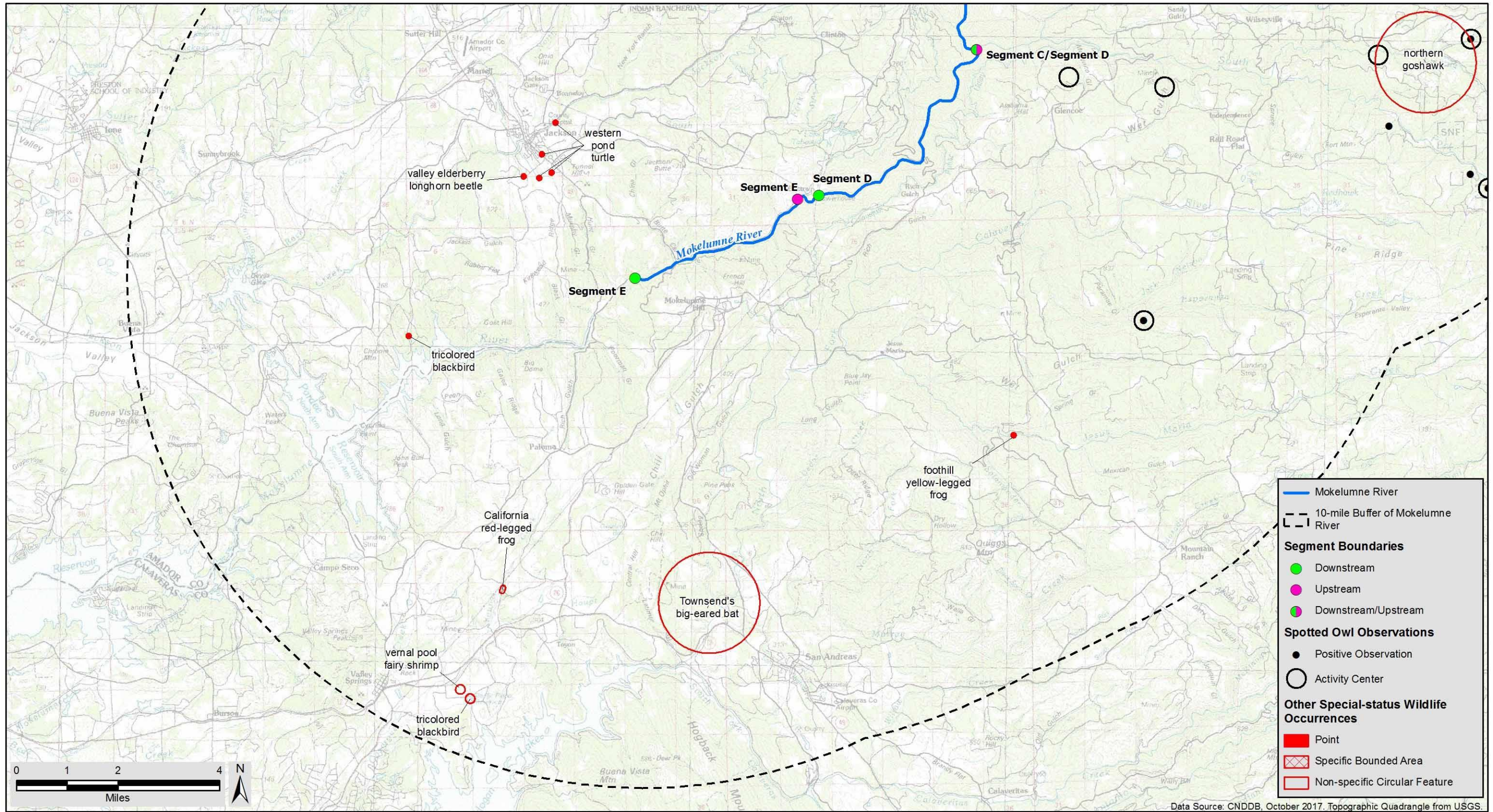
Source: GEI Consultants, Inc., 2017

Figure 4-2c. Special-status Wildlife Occurrences within 10 Miles of the Primary Study Area



Source: GEI Consultants, Inc., 2017

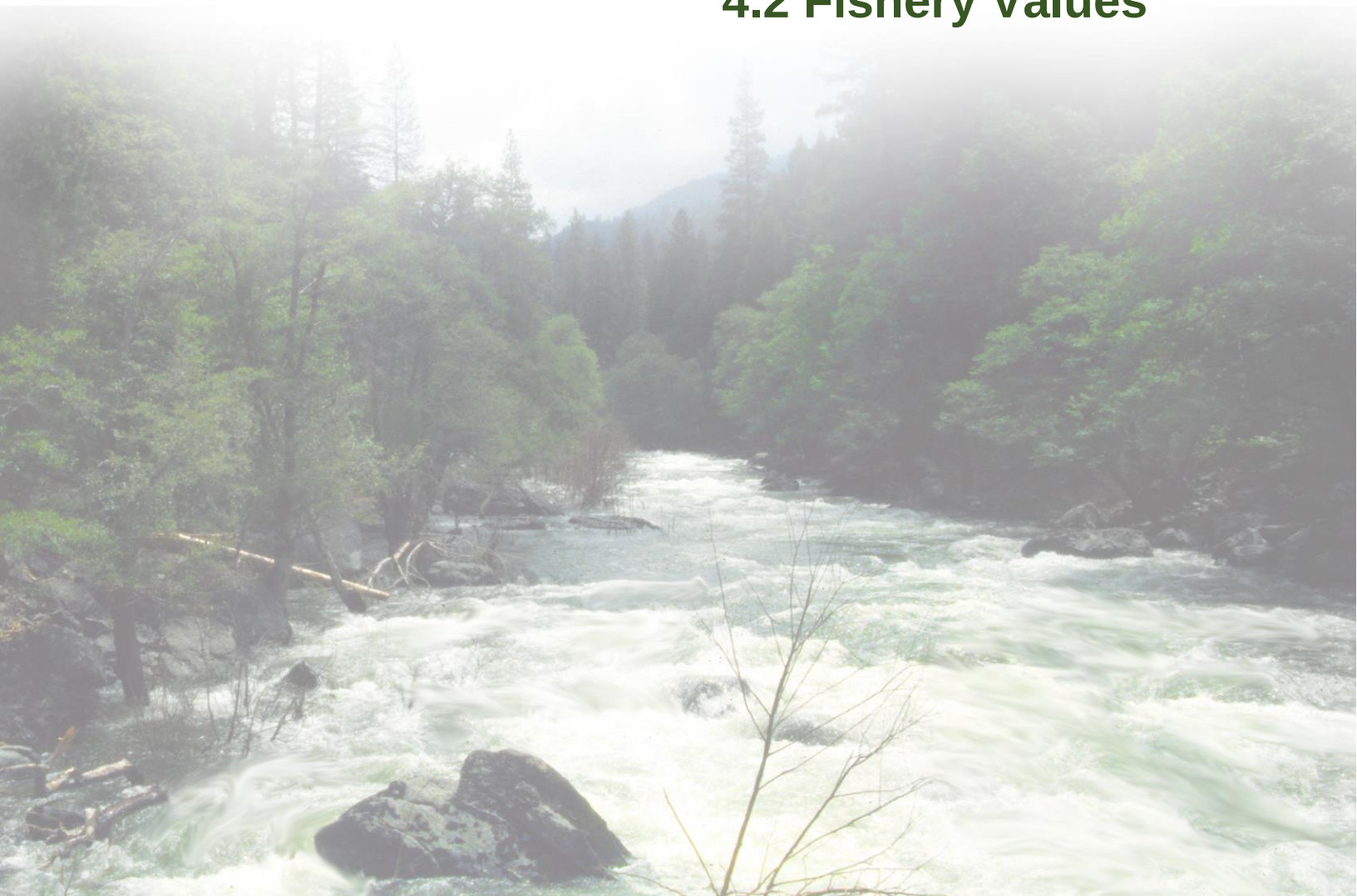
Figure 4-2d. Special-status Wildlife Occurrences within 10 Miles of the Primary Study Area



Source: GEI Consultants, Inc., 2017

Data Source: CNDDB, October 2017. Topographic Quadrangle from USGS.
16Nov2017 RS Z:\Projects\1702798_MokelumneRiver\1702798_G002_SensitiveSpecies_Animals.mxd

4.2 Fishery Values



4.2 Fishery Values

Fishery values comprise an important and integral part of existing natural resources in California. Aquatic environments ranging from small mountain streams to large valley rivers and from small pristine ponds to large artificial impoundments sustain a diverse array of fish species. The assemblage of fishes is unique and provides significant benefits to the people of California. Fisheries resources are a dominating factor in local economies in certain regions of the State, and commercial salmon fisheries and recreational fisheries for salmon and trout are nationally significant. California's fisheries resources, both historically and presently, have contributed immensely to California's wealth of natural resources, recreational opportunities, and its economy.

California fishes depend on the maintenance of aquatic communities in which they survive, grow, and reproduce. Land use activities and water resources development can modify habitats and increase, reduce, or eliminate fish populations. The California Wild and Scenic Rivers System provides protection to selected important fishery habitat in California. One of the primary reasons cited for designating rivers to wild and scenic river status was to protect these important resources. Fishery resources are, therefore, considered critically important in the evaluation of rivers nominated for inclusion in the System.

4.2.1 Data Sources and Methodology

The fisheries resources evaluation of the study area was based primarily on studies conducted as part of PG&E's Mokelumne River Project (FERC No. 137) FERC relicensing and compliance process. These documents provide the most complete description of the current fish assemblage. The Federal Wild and Scenic River studies (USFS 1990, BLM 2007), published reports obtained from State and Federal agencies, agency file data, MokeWISE reports, and angler survey data were also reviewed for supplementary information on habitat conditions and fish populations within the five study segments. A field reconnaissance was conducted on October 27, 2017 to road-accessible river sites and discussions were held with individuals knowledgeable about State Wild and Scenic River eligibility studies and fisheries resources.

4.2.2 Resource Characterization

Regional Study Area

The Mokelumne River watershed drains 2,143 square miles in parts of Alpine, Amador, Calaveras, San Joaquin, and Sacramento Counties. Elevations range from sea level at the confluence with the San Joaquin River to 10,400 feet at the crest of the Sierra Nevada in the headwaters of the North Fork Mokelumne River.

The Mokelumne watershed divide borders the basins of the American River on the north, the Calaveras and Stanislaus Rivers to the south, and the Carson River to the east. The American, Calaveras, and Stanislaus Rivers, like the Mokelumne, drain westward into the Central Valley, while the Carson River flows eastward into the Great Basin. Drainage within the Mokelumne River watershed generally occurs from east to west with perennial streams originating in the Sierra Nevada. The river is colloquially divided into the Upper Mokelumne River, which stretches from the headwaters to Pardee Reservoir in the Sierra foothills, and the Lower Mokelumne River, which refers to the portion of the river below Camanche Dam.

The Lower Mokelumne River below Camanche Dam provides habitat for Central Valley fall-run Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*O. mykiss*). These fish historically migrated upstream of the present site of Camanche Dam to a natural waterfall (approximately 30-feet high), which was a complete barrier to upstream migration. The waterfall reportedly occurred near Arkansas Ferry, between Camanche and Pardee Reservoirs. The historic natural barrier was approximately 10 river miles upstream of Camanche Dam and downstream of all proposed reaches being evaluated (Sacramento Daily Union 1881 and Pacific Rural Press 1886 and 1889 as cited in Boyd 2014). The Mokelumne River Fish Hatchery was built in 1964, a year after the completion of Camanche Dam to supplement anadromous salmonid populations in the watershed.

The Lower Mokelumne River is home to at least 35 species of fish (Merz 2001). In addition to salmon and trout, common native fish include prickly sculpin (*Cottus asper*), and Sacramento sucker (*Catostomus occidentalis*). The non-native western mosquitofish (*Gambusia affinis*), largemouth bass (*Micropterus salmoides*), and bluegill (*Lepomis macrochirus*) are also plentiful (Merz 2001).

Secondary Study Area

The part of the basin above Pardee Dam is referred to as the Upper Mokelumne River and drains about 550 square miles, or 25.7% of the total watershed. The upper watershed is situated principally in Alpine, Amador, and Calaveras Counties and consists mostly of wilderness managed under various Federal designations. Most of the Mokelumne River headwaters lie within the Stanislaus and Eldorado National Forests. Much of the upper watershed is also protected under the 105,165-acre Mokelumne Wilderness. The 62-mile North Fork Mokelumne River originates at Highland Lakes at an elevation of 8,584 feet. From its source, it flows north then west for 28 miles to Salt Springs Reservoir, which is the upper-most boundary of river segments under evaluation.

The headwaters contain four natural lakes which have been enlarged by adding dams to Upper Blue, Lower Blue, Twin, and Meadow Lakes. Over the years, most of these lakes have been stocked with a combination of rainbow trout, brown trout (*Salmo trutta*), Lahontan cutthroat trout (*O. clarkii henshawi*), brook trout (*Salvelinus fontinalis*), and/or lake trout (*S. namaycush*). Many of these trout species have been either intentionally or accidentally introduced to the headwater stream segments in the high Sierra. Historically, large portions of the headwaters, including the lakes, were likely fishless; nearly all lakes and streams in the Sierra Nevada above 6,000 feet were historically fishless, inclusive of the Mokelumne River drainage (Knapp 1996).

Primary Study Area

The primary study area is the North Fork Mokelumne River beginning downstream of Salt Springs Reservoir and ending as the Mokelumne River upstream of Pardee Reservoir. The primary study area contains the five river segments being evaluated.

PG&E's Mokelumne River Project is located on the Mokelumne River, North Fork Mokelumne River and several tributaries, and the Bear River. Portions of the project occupy lands within the Stanislaus and Eldorado National Forests, and lands managed by BLM. The project has four power developments downstream of the headwater lakes (Upper Blue, Lower Blue, Twin, and Meadow Lakes): Salt Springs, Tiger Creek, West Point, and Electra. Trout populations within the North Fork Mokelumne River have benefited from minimum instream flow requirements established for these facilities through the FERC licensing and relicensing processes. Flows are now provided on a year-round basis in river reaches which were likely to be intermittent or inhospitable to trout (Knapp 1996).

Recent fisheries surveys conducted by PG&E (2017) identified 13 species (seven native and six nonnative) present at various locations from the headwaters downstream to the Electra Powerhouse, including in Segments A, B, C, and D (**Table 4-2**). California roach, riffle sculpin, and hardhead minnow are listed as California species of special concern. The North Fork Mokelumne River was extensively stocked with rainbow trout between 1930 and 2008 by the California Department of Fish and Game (CDFG) for recreational fishing but stocking has not occurred since 2008 (CDFW 2017). Currently, there are populations of rainbow trout (*Oncorhynchus mykiss*), brown trout, and kokanee salmon in Segment E below Electra Powerhouse and above Pardee Reservoir (CDFW 2017).

Table 4-2. Fish species observed during Mokelumne River Project fish population monitoring

Family	Common Name	Scientific Name	Native?
Salmonidae	steelhead/rainbow trout	<i>Oncorhynchus mykiss</i>	Yes
	Lahontan cutthroat trout	<i>Oncorhynchus clarki henshawi</i>	No ¹
	brown trout	<i>Salmo trutta</i>	No
	brook trout	<i>Salvelinus fontinalis</i>	No
Cyprinidae	Sacramento pikeminnow	<i>Ptychocheilus grandis</i>	Yes
	hardhead minnow	<i>Mylopharodon conocephalus</i>	Yes
	California roach	<i>Lavinia symmetricus</i>	Yes
	speckled dace	<i>Rhinichthys osculus</i>	Yes
	Lahontan redbreast	<i>Richardsonius egregius</i>	No ¹
	green sunfish	<i>Lepomis cyanellus</i>	No
Catostomidae	Sacramento sucker	<i>Catostomus occidentalis</i>	Yes
	Tahoe sucker	<i>Catostomus tahoensis</i>	No ¹
Cottidae	Riffle sculpin	<i>Cottus gulosus</i>	Yes

Notes:

¹ Species only found upstream of Salt Springs Reservoir and all study segments.

Source: Pacific Gas and Electric Company 2017

Segment A

The river segment between Salt Springs Reservoir and Tiger Creek Afterbay is approximately 17 miles. Snorkel surveys conducted in 2015 at three sites within this segment showed the assemblage of identifiable fish to be largely composed of rainbow trout (37%) and unidentified juvenile species (56%), hypothesized to be a mixture of young-of-year cyprinids and suckers (PG&E 2016). Other species observed at these sites included brown trout (4%) and speckled dace (3%).

This species assemblage is typical and common in western Sierra Nevada rivers at this elevation above major impoundments. No special-status species were found in this segment. The trout populations support recreational fishing, but are not so abundant or contain trophy sized fish such that the fishery values would be deemed to be extraordinary. The past history of trout stocking is also not extraordinary or unique as it is a common practice in many other mid-elevation western Sierra Nevada rivers. Therefore, for the reasons specified above, the fishery values within Segment A are not considered to be extraordinary resource values.

Segment B

The river segment between Tiger Creek Afterbay and State Highway 26 is approximately 3 miles. Snorkel surveys conducted in 2015 at one site within this segment found only rainbow and brown trout to be present (PG&E 2016). The composition was split 50/50 between rainbow and brown trout. Other species are likely present but were not observed during these surveys. The fish assemblage in this segment is likely similar to that of Segment A based upon similar habitat characteristics and elevations.

For the reasons specified above for Segment A, the fishery values within Segment B are not considered to be extraordinary resource values.

Segment C

The river segment from West Point Powerhouse to the confluence of the North Fork Mokelumne River and the Middle Fork Mokelumne River is approximately 7 miles. Snorkel surveys conducted in 2015 at two sites within this segment showed the assemblage of identifiable fish to be largely composed of pikeminnow/hardhead (70%) (PG&E 2016). Other species observed at these sites included rainbow trout (4%), brown trout (2%), and California roach (9%). This segment appears to support a transitional fishery in which the fish assemblage shifts from coldwater species to species more tolerant of warm water. The observed transition in species composition is typical in most west-slope Sierra rivers below 1,500 feet elevation as the rivers transition from mountain to foothill environs.

This species assemblage is typical and common in western Sierra Nevada rivers at this elevation above major impoundments. While the presence of at least one California species of special concern (California roach) is notable, this species is found in many western Sierra Nevada rivers at this elevation. The trout populations are a smaller component of the fish assemblage, support recreational fishing, but are not so abundant or contain trophy sized fish such that the fishery values would be deemed to be extraordinary. Therefore, for the reasons specified above, the fishery values within Segment C are not considered to be extraordinary resource values.

Segment D

The river segment from the confluence of the North Fork Mokelumne River and Middle Fork Mokelumne River to the Electra Powerhouse is approximately 4 miles. Snorkel surveys conducted by PG&E and Amador County indicate that trout abundance decreases rapidly in the vicinity of the confluence, with Sacramento pikeminnow and Sacramento sucker predominating in downstream reaches (PG&E 2017; Amador County 1987). Snorkel surveys conducted in 2015 at one site within this reach showed the species composition to be dominated by Sacramento pikeminnow/hardhead minnow (64%) (PG&E 2016). Of 197 fish observed, only one brown trout was identified and no rainbow trout. One riffle sculpin was identified as being present at this site. Sculpin are inherently difficult to observe during snorkel surveys based on their cryptic coloration and benthic orientation. Their coloration and behavior may lead to underestimated abundance when relying on snorkel surveys. Other fish observed were a mixture of California roach, speckled dace, and unidentified juveniles.

This species assemblage is typical and common in western Sierra Nevada rivers at this elevation above major impoundments. While the presence of species of special concern (California roach and hardhead minnow) is notable, these species are found in many western Sierra Nevada rivers at this elevation. Brown trout remain as the only trout species and support good recreational fishing, and are not so abundant or contain trophy sized fish such that the fishery values would be deemed to be extraordinary.

Therefore, for the reasons specified above, the fishery values within Segment D are not considered to be an extraordinary resource value.

Segment E

The river segment from the Electra Powerhouse to Pardee Reservoir extends for approximately 5.4 miles. The fish population in this reach is characteristic of a “pikeminnow-hardhead-sucker assemblage” interspersed with trout and other species which likely migrate upstream out of the reservoir (PG&E 1993 as cited in FERC 1996). This segment is also used by kokanee salmon migrating upstream from Pardee Reservoir to spawn during fall.

This species assemblage is typical and common in western Sierra Nevada rivers at this elevation above major impoundments. While the presence of species of special concern (hardhead minnow and probably California roach) is notable, these species are found in many western Sierra Nevada rivers at this elevation. No trout are present during the warm-water conditions that typically prevail in this segment. Kokanee salmon, an introduced species, and other species migrating from large reservoirs upstream to spawn is common. Therefore, for the reasons specified above, the fishery values within Segment E are not considered to be extraordinary resource values.

All Segments

A total of 5,961 fish from four taxonomic families representing 13 different species were found throughout the primary study area (PG&E 2017). The majority (78%) of these fish were from the trout family (Salmonidae). In general, the fish assemblages are typical of the west-slope Sierra and foothills for the Sacramento–San Joaquin Ichthyological Province, with higher-elevation sites characterized by a “rainbow trout assemblage” and lower-elevation sites characterized by a “pikeminnow–hardhead-sucker assemblage” (Moyle 2002).

Climate change, aging water infrastructure, successive years of drought, and increased demand for water resources has precipitated strong declines in salmonids throughout California. Compounding this, longitudinal and lateral disconnections from historical spawning and rearing habitat has triggered a loss of salmonid life history diversity, making species less resilient to change. As a result, reintroductions of anadromous salmonids to historical habitats has occurred or is proposed as a recovery strategy. Dam removal, trap and haul above high dams, reintroduction of captive bred animals, and improving lateral connectivity to historical floodplain habitat are proposed methods to improve salmonid life history diversity, abundance, population redundancy and, ultimately, resilience to change. (Knight and Lusardi 2017.)

A collaborative effort is underway to develop a pilot project and assess the feasibility of reintroducing fall-run Chinook salmon above Pardee Reservoir on the Mokelumne River (UMRWA 2015). Reintroduction above Pardee Reservoir could allow salmon to use habitats to approximately 1 mile above the North Fork Mokelumne River and Middle Fork Mokelumne River confluence for a total of approximately 11-12 miles of habitat (i.e., lower portion of Segment C and Segments D and E). At this time, the Mokelumne River is not a State priority for reintroduction, and numerous steps (pilot project; feasibility, impact, and habitat suitability assessments; stakeholder consensus building; and agency approvals) will be required for such a project to move forward. (Childress and Workman 2017.) Given the infancy of this project, and the number of questions regarding its ultimate feasibility, it is not considered to be a feasible project at this time. Consequently, it was given minimal consideration in the determination of whether Segments C, D, and E maintain extraordinary fishery resource values.

4.2.3 Extraordinary Resource Values

The fisheries species assemblages in Segments A – E are typical and common in western Sierra Nevada rivers at these elevations above major impoundments. While the presence of species of special concern (California roach, hardhead minnow, and possibly riffle sculpin) is notable, these species are found in many western Sierra Nevada rivers at these mid-elevational ranges. Although they contribute to the recreational fishery in the Mokelumne River study area, rainbow trout, brown trout, and kokanee salmon populations are not considered extraordinary. Efforts to introduce Chinook salmon above Pardee Reservoir are still in their infancy with numerous major hurdles remaining before such a project can be successfully implemented. Therefore, for the reasons specified above, the fishery values within Segments A - E are not considered to be an extraordinary value when considered individually by segment or when considering all segments in their entirety.

4.3 Scenic Values



4.3 Scenic Values

High-quality scenery, especially scenery with natural-appearing landscapes, enhances our lives and benefits society as a whole. People are concerned about the quality of their environment, including the aesthetic value of landscapes. As urban pressure demands more land for development, natural-appearing landscapes that were once plentiful are becoming scarce. In addition, scenic landscapes, particularly in recreational settings, help to determine the success of local recreation and tourism.

Research findings support the logic that scenic quality and naturalness of the landscape directly enhance human well-being, both physically and psychologically, and contribute to other important human benefits. Specifically, these benefits include people's improved physiological well-being as an important by-product of viewing interesting and pleasant natural appearing landscapes with high scenic diversity. (USFS 1995.)

The visual quality of an area or scene is defined by the combination of natural and cultural characteristics found there and the values that people associate with them. The evaluation of scenic values resources to determine whether these resources are extraordinary includes a consideration of geology, hydrology, vegetation, recreation, cultural, and other resources.

4.3.1 Data Sources and Methodology

General

Information regarding the scenic resources of the study area was obtained primarily from the Federal Wild and Scenic River studies (USFS 1990, BLM 2007); websites with photographs of the study area; a field reconnaissance conducted on October 27, 2017 to road-accessible river sites; several other informal visits to various segments; and discussions with individuals knowledgeable about State Wild and Scenic River eligibility studies and scenic resources.

The river corridor is the primary feature and focus of the area and a major determinant of scenic quality. Scenic resources of the river corridor were described qualitatively. No attempt was made to map scenic resources of the corridor or identify the relative importance of viewing locations. Instead, scenic resources were evaluated based on a general assumption that nearly all areas of the corridor could be visible to people traveling cross country on trails, roads, or by kayak in or adjacent to the river, as well as people traveling on slopes above the river on trails and roads.

Specific USFS Visual Assessment Methodology

The North Fork Mokelumne River forms a portion of the shared boundary between the Eldorado and Stanislaus National Forests. USFS assessed the visual resources of Segment A in an EIS prepared for the *Wild and Scenic River Study Report, North Fork Mokelumne River* (USFS 1990). In addition, the scenic resources of Segments C, D, and most of E were evaluated by BLM as part of the *Sierra Proposed Resource Management Plan and Final Environmental Impact Statement* (BLM 2007).

Because the USFS' scenery management system (SMS) (USFS 1995) has already been applied to approximately 45 percent of the area being assessed for wild and scenic river status, the evaluation of scenic values in this study is based largely on the principles and procedures of the SMS. BLM's scenic classification system is similar to the USFS, although it entails fewer steps in the evaluation process. Under the USFS SMS, an existing landscape character description is provided. Next, scenic attractiveness classes are assigned to determine the relative scenic value of lands within a particular

landscape character. Scenic attractiveness classes are defined as follows: Class A—distinctive, Class B—typical or common, and Class C—indistinctive. The landscape elements of landform, vegetation, rocks, cultural (i.e., man-made) features, and water features are described in terms of their line, form, color, texture, and composition. The scenic integrity, which indicates the degree of intactness and wholeness of the landscape, is also described. Finally, a scenic class rating is assigned to indicate the relative scenic importance of each segment. Generally, scenic classes 1–2 have a high value, classes 3–5 have moderate value, and classes 6–7 have low value. Existing USFS and BLM visual classifications are provided in the detailed discussions of each segment below.

4.3.2 Resource Characterization

Regional Study Area

The North Fork Mokelumne River below Salt Springs Dam, and the main stem Mokelumne River to Pardee Reservoir, contain unique geological features and diverse vegetation, wildlife, cultural, recreation, and scenic resources that are largely unspoiled. The study area is located within the Sierra Nevada Landscape Province, which is characterized by hilly, rugged terrain with numerous rock outcroppings; steep-walled canyons; moderately dense to very dense forests of mixed conifer, oak woodland, and pine; and generally deep, fast-running streams with numerous rapids and pools.

The approximately 39.5-mile-long study area begins 0.5 mile downstream of the Salt Springs Dam at an elevation of approximately 3,600 feet and ends at the northern edge of the Pardee Reservoir flood surcharge pool at an elevation of approximately 580 feet. The stream flows generally southwest, and forms the border between Amador County to the north and Calaveras County to the south. Calaveras Dome—a bare, exfoliating dome of granite on the south side of the river southwest of Salt Springs Dam—rises to a height of approximately 5,600 feet. The river corridor consists primarily of public land (USFS and BLM), with lesser amounts of open space in private ownership.

Much of the study area lies with the Eldorado and Stanislaus National Forests, as well as BLM’s Sierra Management Unit. However, because of the steep terrain and associated difficulty of access to Segments A–D, most of the study area is lightly visited as compared to other areas of these USFS and BLM lands.

Public access to scenic and recreational resources along the river corridor in the study area is available from the following roadways:

- Ellis Road to Salt Springs Reservoir Road (Segment A). This paved local road descends approximately 3,200 feet from Highway 88 via steeply sloping switchbacks to the North Fork Mokelumne River at Bear Creek. Salt Springs Reservoir Road (gravel surface) continues northeast and parallels the river upstream for approximately 3 miles to the Salt Springs Dam, crossing the river twice on two concrete bridges in the study area.
- Tiger Creek Road (Segments A/B). This paved local road descends approximately 900 feet from Highway 88 near Barton to the Tiger Creek Reservoir and Powerhouse.
- Highway 26/Red Corral Road (Segment B). This paved two-lane highway descends approximately 600 feet from Highway 88 near Ranch House Estates and crosses the main stem Mokelumne River on a concrete bridge.
- Ponderosa Way (Segment D). This one-lane dirt road descends approximately 1,100 feet from Highway 26 at Rich Gulch to the remains of a timber and metal-framed bridge across the river.

- Electra Road (Segment E). This one- and two-lane gravel road parallels the north side of the river for approximately 3 miles from Highway 49 upstream to the Electra Powerhouse.
- Big Bar Launch Road (Segment E). This short, paved two-lane access road parallels the south side of the river for approximately 1,000 feet west of Highway 49.

Highway 49 crosses over the main stem Mokelumne River between Amador and Calaveras Counties in Segment E. Highway 49 from Placerville in El Dorado County south to Angels Camp in Calaveras County has been determined eligible (but not officially designated) for a State Scenic Highway designation. Highway 88 is a designated State Scenic Highway and a USFS-designated Scenic Byway from the Dew Drop Ranger Station (near the intersection of Highway 88 and Shake Ridge Road) east to the Nevada state line (California Department of Transportation 2017). To access Ellis Road and Segment A of the study area, recreationists must travel on the State- and USFS-designated portion of Highway 88.

Secondary and Primary Study Areas

The secondary and primary study areas are discussed together for scenic resources. The primary study area consists of the five river segments. The visual character and quality of scenic resources in each segment are described below. Typical views within each segment are represented by photographs presented at the end of this Section 4.3.

Segment A

Segment A begins 0.5 mile below Salt Springs Dam and ends 0.5 mile upstream of the Tiger Creek Powerhouse, a distance of approximately 17 river miles. The river elevation in Segment A ranges from approximately 3,600 feet at the eastern end to approximately 2,400 feet at the western end. Salt Springs Dam is not visible from the north end of Segment A due to a slight bend in the river and the intervening vegetation. Salt Springs Reservoir Road parallels the river, and is located near the river in terms of elevation from the Salt Springs Dam downstream to the confluence with the Bear River (approximately 3 miles). Although Salt Springs Reservoir Road is not visible from the river corridor, the two concrete bridges where Salt Springs Reservoir Road crosses over the river in Segment A are visible. An overhead transmission line with steel lattice towers is present along the river corridor. From the river, the lattice towers are not visible due to the heavy vegetation. Where the power lines cross the river, they are visible overhead; however, they do not stand out in the landscape. The middle and southern portions of Segment A are accessible only by boat or by hiking downhill from dirt roads located higher on the canyon walls.

The Moore Creek, White Azalea, and Mokelumne River Campgrounds, operated by the Eldorado National Forest, are located near the bridge crossing at the intersection of Forest Route 7N08 with Salt Springs Reservoir Road. The campgrounds are small and consist of dirt sites (covered with fallen pine needles) among the trees. There are no services such as sewer, running water, or electrical hookups, and the campgrounds cannot accommodate large recreational vehicles due to the difficulty of road access. The campgrounds have been designed according to USFS recreation and scenic guidelines; therefore, they blend in with the surrounding landscape. From the river corridor, only the sites immediately adjacent to the river are visible. The campgrounds are lightly used, and when the sites are not occupied the campgrounds appear to be a natural part of the surrounding landscape.

The river corridor in Segment A is very heavily forested and consists primarily of tall ponderosa pines, incense cedar, and California black oak along with understory shrubs and riparian vegetation. Fir trees

are also present throughout Segment A. The vegetation is lush and green, including many low-growing ferns and mosses, creating a cool, moist environment that provides a welcome sense of relief during the hot summer months. In spring, native white dogwood trees and numerous wildflowers in a variety of colors are in bloom. In fall, the deciduous trees scattered throughout the river corridor and the steep canyon walls turn a golden yellow color, adding to the scenic beauty.

Water flows are controlled via Salt Springs Reservoir Dam under PG&E's licensing agreement with FERC. In spring and early summer, water levels and flow rates are high due to runoff from snowmelt and spring storm events. During this time, the North Fork is a popular destination for kayakers. A well-known feature within Segment A consists of a series of rapids and waterfalls at the base of Devil's Nose, which rises to a height of approximately 4,600 feet on the south side of the river. West Panther Creek and Deer Creek contribute flows to the North Fork Mokelumne in this area, which consists of white-water rapids and very large boulders within and on both sides of the river. Water levels throughout the study area drop gradually throughout summer and fall until winter rainfall events begin. However, even during low water years, the water is deep and swift in most places with numerous rapids; thus, wading across the river is generally not possible with one exception. Bruce's Crossing is a ford across the North Fork Mokelumne south of the confluence with Blue Creek. At Bruce's Crossing, the river forms a long shallow pool over small cobbles permitting access through the water to both sides of the river during summer and early fall. Numerous large to very large granite boulders ranging from car-sized to house-sized are exposed within and adjacent to the river corridor throughout Segment A, which add to the scenic quality and result in scenic variety around each bend in the river. The grey to black colors of the large boulders provide a strong contrast with the green vegetation.

In Segment A, the river flows through a deep canyon with steep high walls that are vegetated with trees and shrubs. Calaveras Dome, an approximately 1,500-foot-high exposed granite slab popular with rock climbers, is located within the study area on the south side of the river, just below Salt Springs Reservoir. Calaveras Dome towers over the river corridor in the northern portion of Segment A, providing a sense of drama due to the extreme slope and exposed rock face. Climbers accessing Calaveras Dome travel on Ellis Road to Salt Springs Reservoir Road, crossing the North Fork Mokelumne at Forest Route 7N08. The steeply sloping canyon walls form a strong contrast with the linear nature of the river corridor. The viewshed throughout Segment A exhibits a high degree of vividness, intactness, and unity. Segment A is located within the Eldorado National Forest's Mokelumne River Canyon Archaeological District, which has been determined to be eligible for the National Register of Historic Places. In addition, the Mokelumne River Canyon was designated as an Archaeological Special Interest Area in the 1988 Eldorado National Forest Land and Resource Management Plan, based on the North Fork's extensive high-quality archaeological values. Over 100 prehistoric and historic sites have been inventoried in the area, more than half of which were determined to be largely intact (USFS 1990). Some of these features, such as bedrock mortars used by native peoples to grind acorns, are visible to recreationists along the river corridor.

As mentioned above, USFS evaluated most of Segment A for potential eligibility as a national wild and scenic river (USFS 1990). USFS assigned the north side of the river in Segment A to scenic attractiveness Class B (typical or common), and the south side of the river to Class A (distinctive). For purposes of this evaluation, scenic attractiveness Class A (distinctive) has been assigned to the study area throughout Segment A on both sides of the river. Foreground and middleground views from locations throughout Segment A are variable in terms of form, line, texture, and color. This variability, combined with the high degree of intactness and unity, contributes to the scenic attractiveness of the area. The visual mass of the green vegetation contrasts favorably with the rounded forms and grey colors

of the large boulders and the linear river with white-water rapids, waterfalls, and plunge pools. The dense tree cover contrasted with low-growing ferns and riparian vegetation results in a mixture of texture in the foreground and middleground views, especially when viewed in combination with the coarse texture of the boulders and the steep canyon walls, particularly where large, exfoliating slabs of granite are exposed. The water in the river provides a softening effect in terms of texture.

Background views in Segment A encompass the softly rounded heavy tree canopy, and the angular nature and coarse appearance of the steeply sloping canyon walls. Segment A exhibits a pleasing degree of visual diversity in terms of the variety and intermixing of the natural vegetative, rock, and water elements of the landscape. Although two small concrete bridge crossings are visible in the northern portion of Segment A, and occasionally power lines are visible crossing the river high overhead, these few manmade features do not stand out in the landscape. Furthermore, three USFS campgrounds in the northern portion of Segment A have been designed to blend in with the landscape in a natural manner, and therefore appear as small open areas composed of dirt and pine needles underneath the taller tree canopy. The middle and southern portions of Segment A have no visible man-made features of any kind.

In summary, because Segment A has a wide variety of views with a harmonious composition, the scenic integrity for Segment A as a whole is considered to be high. Recreationists visit this area because they are expecting a remote, natural-appearing, unspoiled wilderness experience. Segment A meets visitor expectations in this regard in terms of scenery and aesthetics, and therefore for purposes of this study, Segment A has been assigned to USFS SMS scenic class 1 (highest value). The scenic views and values in Segment A are considered to be extraordinary based on the combination and unique integrity of the geologic, hydrologic, vegetation, recreation, and cultural resources in this segment.

Segment B

Segment B begins 1,000 feet downstream of the Tiger Creek Afterbay Dam and ends at the Highway 26 (Red Corral Road) bridge crossing, a distance of approximately 2.8 river miles. The river elevation in Segment B ranges from approximately 2,200 feet at the eastern end to approximately 1,800 feet at the western end. The Tiger Creek Afterbay Dam is not visible from Segment B due to a bend in the river. In Segment B, the canyon walls along the river corridor are high and steeply sloped, similar to Segment A. Because the elevation in Segment B is slightly lower, the vegetation mix contains somewhat more chaparral and deciduous native oak trees. However, the tree cover is still thick and heavy, and includes some fir trees as well as pines. Low-growing ferns and mosses are present along the river corridor, along with scattered patches of wildflowers. The river corridor is lined with areas of exposed rock along the edges, which provide a pleasing contrast in texture, line, and color with the water and vegetation. Although the very large car- and house-sized boulders are present, they are somewhat fewer in number as compared to Segment A. The river itself consists of less whitewater, with stretches of longer, deep pools interspersed with sections of rapids. The dense vegetation on the canyon walls in the viewshed, when combined with the riparian vegetation and the stream and boulders, form aesthetically pleasing and picturesque views throughout Segment B. Although Segment B is considerably shorter than Segment A, there is still a substantial variety in the views as the river meanders, and each view is composed of harmonious elements that form a unique and memorable picture. The viewshed exhibits a high degree of vividness, intactness, and unity.

The Highway 26 bridge crossing forms the western end of Segment B. The bridge is approximately 40 feet above the river, and is constructed on four sets of concrete piers, two on each side of the river channel; therefore, it stands out in the viewshed. The bridge contains a light-colored metal safety guardrail along both sides of the roadbed, and several warning signs related to the river level are present

on the concrete below the roadbed. Although the bridge does detract from the intactness and unity in the viewshed of this area, the bridge is only visible for the last 200 feet of Segment B. From the north side of the Highway 26 bridge crossing, a gated gravel road provides hiking and angler access upstream along the river. However, the road is not visible from the river corridor due to intervening topography and vegetation.

For purposes of this evaluation, USFS scenic attractiveness Class A (distinctive) was assigned to the study area for Segment B. Foreground and middleground views from locations throughout Segment B are variable in terms of form, line, texture, and color, which contributes to the scenic attractiveness of the river corridor. The visual mass of the green vegetation provides a pleasing contrast with the rounded forms and grey colors of the rock- and boulder-lined river corridor with its rapids and pools. The water in the river provides a softening effect in terms of texture. Background views in Segment B encompass the irregular nature of the scattered pyramidal conifers among the lower-growing chaparral and mounded forms of deciduous trees. The heavily treed canyon walls, which are still high and steep in Segment B, lend a distinctiveness to the views throughout this segment. The only detracting feature in Segment B is the Highway 26 road crossing, which is only visible from the last 200 feet (out of a total 2.8 river miles) of Segment B.

In summary, the scenic integrity for Segment B as a whole is considered to be high. Recreationists visit this area because they are expecting a remote, natural-appearing, unspoiled wilderness experience. Segment B meets visitor expectations in this regard in terms of scenery and aesthetics, and therefore for purposes of this evaluation, Segment B has been assigned to USFS SMS scenic class 2 (high value). Similar to Segment A, the scenic views and values in Segment B are considered to be extraordinary based on the combination and unique integrity of the geologic, hydrologic, vegetation, recreation, and cultural resources in this segment.

Segment C

Segment C begins on the North Fork Mokelumne River 400 feet downstream of the re-regulating dam at the outlet of the West Point Powerhouse (southwest of the Highway 26 bridge crossing) and ends at the confluence of the North and Middle Forks of the Mokelumne River. Segment C encompasses approximately 11 river miles. The river elevation in Segment C ranges from approximately 1,800 feet at the eastern end and approximately 1,000 feet at the western end. A triple strand of high-tension powerlines crosses the river twice downstream of the eastern end of Segment C; however, the power lines are high above the river and do not substantially detract from the scenery along the river corridor. A house is present approximately 40 feet above the river on the north side of the river corridor, approximately 0.25 mile downstream from the eastern end of Segment C (off Hagerman Road). The house is partially visible from a short section of the river, but does not detract from the viewshed. Portions of the middle segment of the river corridor in Segment C, where the river narrows, are lined with slabs of exposed rock, which contrast strongly with the water, vegetation, and patches of exposed earth along the canyon walls. The river corridor in the middle section of Segment C is quite narrow, with a series of rapids and waterfalls over exposed rock slabs. However, most of the river corridor is lined with cobbles and boulders, which are not nearly as large as those contained in Segments A and B.

Segment C is not accessible from any public road. Because of the lower elevation in Segment C, the vegetation consists of substantially greater amounts of chaparral. However, in the upper portion of Segment C, heavy vegetation is present both along the river corridor and on the hillsides. The canyon walls in Segment C are tall and steeply sloped. The river corridor contains more areas of quiet pools with short sections of rapids with short cascades in the upper and lower portions of Segment C. Segment

C also contains several interesting geologic formations, including free-standing tall columns of rock, that contribute to the scenic quality.

The lower reach of Segment C (from the southern boundary of Section 12, T6N, R12E to the Middle Fork Mokelumne River confluence) widens at Clinton Bar near the Roaring Camp Mining Company property, which includes approximately 1,500 feet of riverfront. The canyon walls in this area contain large open areas composed of grasses (which are brown in summer and fall) interspersed with scattered stands of shrubs and trees. The Roaring River Mining Company operates a tent camp and cabin sites with picnic tables at the river's edge, along with vehicle parking areas, a mess hall, and various administration buildings, which are immediately adjacent to and visible from the river corridor. The company also has a BLM permit to conduct suction dredging operations for gold on adjacent public lands. This area is gently sloping and generally open to the river, with only a few scattered trees. The campsites, cabins, and other buildings represent a variety of architectural styles that clearly stand out in the viewshed of the river corridor. Thus, the lower reach of Segment C exhibits a low degree of intactness and unity.

BLM (2007) has designated Segment C as Visual Resource Management (VRM) Class 1, which is assigned to areas where a management decision has been made to maintain a natural landscape, the "wild" designation in a national wild and scenic river, national wilderness areas, and other congressionally and administratively designated areas where decisions have been made to preserve a natural landscape. The objective for Class I management areas is to preserve the existing character of the landscape. BLM management objectives for land designated as Class 1 state that the level of change to the landscape should be very low and must not attract attention (BLM 1986).

For purposes of this evaluation, USFS scenic attractiveness Class A (distinctive) was assigned to the upper reach of Segment C (above the southern boundary of Section 12, T6N, R12E) and upstream of the Roaring Camp Mining Company. Although the river corridor contains more chaparral and fewer evergreen trees, the river corridor and canyon walls are still high, steeply sloped, and heavily vegetated in this upper reach of Segment C. Foreground and middleground views from locations throughout the upper reach of Segment C are variable in terms of form, line, texture, and color, which contributes to the scenic attractiveness of the river corridor. The visual mass of the green vegetation provides a pleasing contrast with the rounded forms and grey colors of the rock- and boulder-lined river corridor with its rapids and pools. The water in the river provides a softening effect in terms of texture. Background views in the upper reach of Segment C encompass the green mounded forms of deciduous and evergreen trees on the canyon walls, which provide a pleasing contrast to the rock-lined water corridor. The heavily treed canyon walls, which are still high and steep in Segment C, lend a distinctiveness to the views throughout the middle and upper reaches of this segment. Because human presence is light, the area has a strong feeling of remoteness and solitude. The upper reach of Segment C is intact and unified, and of high scenic quality. Considering the overall appearance of the upper reach of Segment C, for purposes of this evaluation the upper reach has been assigned to USFS SMS scenic class 2 (high value).

The lower reach of Segment C (from the southern boundary of Section 12, T6N, R12E to the Middle Fork Mokelumne River confluence), which includes the Roaring Camp Mining Company property and associated mining operations on public lands, was assigned to USFS Scenic attractiveness Class B (typical or common). The canyon walls in this area have a coarser texture and the green colors are more muted, tending towards olive green rather than bright green. The canyon walls in this area contain large open areas composed of grasses (which are brown in summer and fall) interspersed with scattered stands of shrubs and trees. Furthermore, the Butte Fire burn area is visible in middleground and background

views to the south and east. Because the canyon walls are not as high or as steep, the contrast between the river corridor and the canyon is not as great compared to Segment A, Segment B, and the upper reach of Segment C. This area includes views of the Roaring Camp Mining Company campgrounds and buildings from the river corridor, which results in a low degree of intactness and unity. Considering the overall appearance of this lower reach of Segment C, for purposes of this evaluation it has been assigned to USFS SMS scenic class 4 (moderate value).

Similar to Segments A and B, the scenic views and values in the upper reach of Segment C (upstream of the southern boundary of Section 12, T6N, R12E) are considered to be extraordinary based on the combination and unique integrity of the geologic, hydrologic, vegetation, recreation, and cultural resources in this segment.

The scenic views and values in the lower reach of Segment C (from the southern boundary of Section 12, T6N, R12E to the Middle Fork Mokelumne River confluence) in the vicinity of the Roaring Camp Mining Company, are not considered to be extraordinary due to the presence of numerous, non-unified human elements.

Segment D

Segment D begins on the main stem of the Mokelumne River at the confluence of the North and Middle Forks and ends 300 feet upstream of the Electra Powerhouse, a distance of approximately 5.25 river miles. The river elevation in Segment D ranges from approximately 1,000 feet at the eastern end to approximately 700 feet at the western end. The entirety of Segment D is located within the area of the Butte Fire, which burned approximately 70,800 acres in September and October 2015. As with many forest fires in the region, patches or stands of green trees are interspersed with areas where all of the vegetation has burned. Charred stumps and boles of trees are visible on the hillsides above the river corridor throughout Segment D. Much of the smaller understory vegetation has burned leaving large areas of annual grasses (that are brown in summer) and patches of exposed rock on the canyon walls throughout Segment D. However, low growing vegetation is regenerating throughout the area, providing a view of scattered low-growing greenery interspersed with burned brown and black shrubs and trees in some areas, while in other areas, the vegetation on the hillsides is intact. Trees and shrubs immediately adjacent to the river are generally still present and did not burn in the fire; the green riparian vegetation provides a pleasing contrast with the brown colors and harsh angular lines of the burn areas. Grasses and scattered stands of wildflowers are present during spring and summer.

A variety of interesting rock formations are present along the river corridor immediately adjacent to the river. As compared to the very large boulders in Segments A and B, the rocks in Segment D are angular, with sharper edges, and have been upthrown and tilted due to geologic activity. Striations in the rocks comprising different layers are visible throughout this segment, thus adding to the scenic interest. The remains of the historic Ponderosa Bridge across the river are visible from the river corridor approximately midway downstream in Segment D. The bridge has been constructed approximately 30 feet above the river on concrete pier foundations, with an arched steel girder structure over the former roadbed. The roadbed itself was constructed of timbers, which burned several decades ago. The overhead steel girder structure stands out in the viewshed from a small area of the river corridor and contrasts strongly with the river and the canyon walls. A house is visible in the eastern portion of Segment D near the top of the canyon. Because of the height above the river corridor, the house appears small in scale, and with its brown color and shingle style, it blends in with the canyon walls and does not detract from the viewshed. Due to the intervening topography and vegetation located along the riverbank, the Electra Power Plant is not visible from the western end of Segment D.

In 2007, BLM designated the northern half of Segment D as VRM Class I (defined above), and the southern half of Segment D from the Ponderosa Bridge to Electra as VRM Class II. The Class II designation is applied to areas of high scenic quality regardless of the level of viewer sensitivity; it may also be applied to areas of moderate scenic quality where viewer sensitivity is very high (BLM 1986). The objective for Class II management areas is to retain the existing character of the landscape. Management activities may be seen, but should not attract the attention of the casual observer.

For purposes of this evaluation, Segment D has been assigned to scenic attractiveness Class C (indistinctive). As a result of the Butte Fire, much of the vegetation burned within the Segment D. Thus, many of the views in Segment D include dead standing timber and grassland that are brown in summer and fall, with low-growing vegetation that has regenerated on the hillsides. Although green trees and other riparian vegetation are present immediately adjacent to the river, the color contrasts between the burned areas and the green vegetation are strong throughout Segment D on both sides of the river throughout the viewshed. Because of the high canyon walls, the burned vegetation throughout the viewshed contrasts strongly with the water in the river corridor at the base of the canyon. Thus, the focus of the views tend to be on the canyon walls rather than on the river. Because of the general lack of trees on the canyon walls as a result of the fire, and the nature of the rock formations adjacent to the river, the viewshed generally appears angular in nature, with harsh textures, straight lines, and dark colors. There is a lack of variety in the views. There is little elevation change in Segment D, and therefore the river is composed primarily of long deep pools interspersed with short areas of rapids. Because the human presence is light, the area has a strong feeling of remoteness and solitude. Due to the Butte Fire, Segment D currently exhibits a moderately low degree of scenic quality and scenic integrity. Over time, the forest will regenerate and the trees will grow back, thus improving the scenic quality. However, much of the viewshed in Segment D consists of wilderness typical of the Sierra Nevada foothills, particularly throughout the Eldorado and Stanislaus National Forests. Public access to Segment D is limited, and therefore the area is lightly visited other than paddlers during spring. Considering the overall appearance of Segment D, for purposes of this evaluation it has been assigned to USFS SMS scenic class 5 (moderately low value). However, over time, as the forest regenerates and recovers from the fire, the scenic quality is expected to improve to class 3 (moderately high value).

Although Segment D provides scenic attractiveness, the scenic views and values are similar to other western Sierra Nevada rivers at these elevations and are not considered to be extraordinary.

Segment E

Segment E begins at the main stem of the Mokelumne River 300 feet downstream of the reregulating dam downstream of the Electra Powerhouse, and ends at the Pardee Reservoir flood surcharge pool. Segment E encompasses a distance of approximately 3.5 river miles. The river elevation in Segment E ranges from approximately 700 feet at the eastern end to approximately 580 feet at the western end. Most of Segment E—from the eastern end to a point approximately 1,300 feet upstream from the Highway 49 bridge crossing (approximately 2.5 miles)—lies within the Butte Fire burn area. The vegetation in the burned portion of Segment E appears to similar to that described above for Segment D. However, more of the riparian vegetation immediately adjacent to the streambed was saved in Segment E during the firefighting efforts due to the proximity of houses and the Electra Powerhouse facilities. There is very little elevation change in Segment E; therefore, the river is wider and slower in this segment. Few rapids are present and only in very short segments. The canyon walls are not as high and are more gently sloped as compared to the upper river segments, particularly in the vicinity of the Highway 49 bridge crossing and the southern end of Segment E.

The north side of the river canyon contains little vegetation in the way of trees or shrubs, both before the Butte Fire and today (2017). From the river corridor, the north side of the canyon consists primarily of grassland interspersed with scattered oak trees. The south side of the river canyon was more heavily vegetated before the fire, consisting of chaparral and deciduous trees, interspersed with a few evergreens. The Butte Fire burned through this area in patches, leaving some stands of vegetation intact, while others were completely destroyed. Thus, from the river corridor, the south side of the river consists of areas of intact heavy vegetation and areas of dead and blackened trees and shrubs interspersed with low-growing vegetation that is regenerating.

Most of Segment E is accessible by roads. Electra Road parallels the north side of the river from Highway 49 to the eastern end of this segment at the powerhouse. In addition, west of the Highway 49 bridge crossing, Big Bar Launch provides a roadway and parking area for approximately 1,000 feet on the south side of the river. Segment E is heavily used by recreationists throughout the year. The Electra Powerhouse area includes a day-use area with picnic tables and a public restroom. Informal picnicking and camping, along with hiking, fishing, swimming, and boating, occurs along this stretch of the river during summer. Electra Road is visible from the river corridor throughout its entire length. There are several homes near the river on both the north and south sides that are partially visible. The reregulating dam downstream of the Electra Powerhouse is visible from the river corridor at the extreme eastern end of Segment E. The dam consists of approximately six large, curved segments constructed of concrete, with concrete abutments on the north and south sides. Water flows between each of the segments. Viewed from a distance of 300 feet (at the eastern end of Segment E), the curved nature of the dam segments with water flowing between them, and the grey color of the concrete, help it to blend in better with the landscape. Nevertheless, the dam is clearly a manmade structure that contrasts with the natural features of water, vegetation, and rocks. The Highway 49 bridge at Big Bar is visible for approximately 800 feet upstream and approximately 300 feet downstream in Segment E. The bridge is approximately 30 feet above the river and is constructed of concrete, with concrete piers on both sides of the waterway. Downstream of the Highway 49 bridge is the Big Bar launch facility operated by BLM; the parking area and large bare area for boat assembly and launching are visible from the river corridor. There are several short sections of rapids not far downstream from the bridge, and then the river becomes calm again with long slow pools. The canyon walls are much more gradual in terms of slope and not nearly as high as the river segments farther east. Heavier, more dense stands of trees are present on the south side of the river as compared to the north side. Vegetation in Segment E consists of oaks, foothill pines, and chaparral. The viewshed in Segment E exhibits a moderate degree of vividness, intactness, and unity.

In 2007, BLM designated most of Segment E as VRM Class III (moderate value). The Class III designation is applied to areas of moderate scenic quality with a high level of viewer sensitivity (BLM 1986). The objective for Class III management areas is to partially retain the existing character of the landscape. Management activities may attract attention, but should not dominate the view of the casual observer.

For purposes of this evaluation, Segment E has been assigned to scenic attractiveness Class C (indistinctive). As a result of the Butte Fire, part of the vegetation burned within the Segment E. Thus, views in the northern portion of Segment E are composed of stands of living trees in some areas and dead standing timber and bare earth, with low-growing vegetation that has regenerated, in other areas. Throughout Segment E, the northern side of the canyon consists primarily of grasslands with scattered oaks, which is typical of the Sierra Nevada foothills. The southern side of the canyon contains heavier stands of foothill vegetation (oaks, foothill pines, and chaparral). Along the river corridor, riparian vegetation and a thin ribbon of foothill vegetation are present. Roads, houses, and the Highway 49

bridge are visible along with recreationists and their vehicles, boats, and campers throughout most of Segment E in spring, summer, and fall. There is little elevation change in Segment D, and therefore the river is composed primarily of long deep pools interspersed with short areas of rapids. The color, forms, and textures do not exhibit a wide degree of variety, and the scenic integrity of Segment E is moderate. The viewshed in Segment E includes several recreational areas. Considering the overall appearance of Segment E, for purposes of this evaluation it has been assigned to USFS SMS scenic class 4 (moderate value).

Although Segment E provides scenic attractiveness, the scenic views and values are similar to other western Sierra Nevada rivers at these elevations and are not considered to be extraordinary.

All Segments

Most of the study area (Segments A–C) are difficult to access because of the steep canyon walls; therefore, these segments are lightly visited and there is little evidence of human-caused changes in the ecosystem or the viewshed. Segments A, B, and the upper reach of Segment C upstream of the southern boundary of Section 12, T6N, R12E (Segment C1) provide excellent examples of river corridors that are generally pristine and unaltered, with generally heavy tree cover, and a wide stream with white-water rapids and pools lined with huge boulders and exposed slabs of granite. The canyon walls are high and steep, with frequent exposures of exfoliating granite slabs.

The lower reach of Segment C from the southern boundary of Section 12, T6N, R12E downstream to the Middle Fork Mokelumne River confluence (Segment C2) includes the Roaring River Mining Camp facilities, which are visible from the river, along with southern and eastern views of vegetation that burned on the canyon walls in the Butte Fire. Although difficult to access and including few human structures, portions of the vegetation on the canyon walls throughout Segment D was burned in the Butte Fire in 2015. Over time, the forest trees will regenerate. Vegetation immediately adjacent to the river corridor is still lush and green. Regeneration of low-growing vegetation on the canyon walls has already begun; therefore, the canyon walls in Segment D contain green low-growing vegetation interspersed with stands of burned trees in some areas, but stands of intact trees in other areas. The river itself contains long stretches of quiet pools rimmed by exposed slabs of granite, with occasional short stretches of rapids.

Segment E is heavily used by recreationists and is located at a very low transitional foothill elevation (580–700 feet). The river is wide, and the current is much slower in this segment, with only a few short areas of rapids. Most of the river is framed by typical cobble-sized rocks with occasional boulders. Chaparral and native oak trees predominate. The canyon walls are much lower and have a gentler slope. The viewshed in Segment E is typical of stream corridors throughout the Sierra foothills.

As a whole, Segments A–E traverse several Sierra Nevada ecological communities as the stream descends from approximately 3,600 feet to approximately 580 feet along a distance of nearly 40 river miles. Despite the 2015 Butte Fire in Segment D and the upper portion of Segment E, most of the Mokelumne River canyon is heavily vegetated, and the burn areas are already revegetating with low-growing vegetation. Over time, the stands of burned trees will also be repopulated with new trees as seeds are dispersed. However, Segments C2, D, and E have more human development, less unique geologic features, and a less intact viewshed as presented above for these segments. Although these lower segments provide scenic attractiveness, the scenic views and values are similar to other western Sierra Nevada rivers at these elevations and are not considered to be extraordinary. When viewed as a

whole, the individual segment results are not changed; Segments A, B, and C1 have extraordinary scenic values and Segments C2, D, and E have attractive but not extraordinary scenic values.

4.3.3 Extraordinary Resource Values

The Mokelumne River flows through a diverse ecosystem as the elevation changes from the eastern end below Salt Springs Dam (3,600 feet) to the western end at the Pardee Reservoir flood surcharge pool (580 feet). As described above, Segment A, Segment B, and Segment C1 downstream to the southern boundary of Section 12, T6N, R12E are considered to have extraordinary scenic values. The views throughout these river segments are particularly memorable and vivid due to the harmony in composition of the heavy vegetation, frequent water rapids and plunge pools, car- and house-sized boulders in and adjacent to the river, high and steeply sloping canyon walls, and exposed granite slabs. There is a wide degree of variety in the views along these segments. Vivid views of such unique and diverse scenic resources, especially rugged Sierra landscapes that contain a pristine and lively stream with heavy tree cover, are rare. The viewsheds exhibit a high degree of vividness, intactness, and unity, as well as a pleasing and memorable diversity of scenery that changes as the river meanders.

When considered individually and as a whole with Segments A, B, and C1, the lower Segments C2, D, and E have scenic attractiveness but are similar to other west Sierra Nevada rivers at these elevations and are not considered to be extraordinary.

Representative Photographs: Scenic Values

Representative Photographs - Segment A



A-1 Typical view of North Fork Mokelumne River near upstream end of Segment A showing exposed granite in the canyon and large boulders along the river channel



A-2 North Fork Mokelumne River and Calaveras Dome



A-3 View of rapids and large boulders in summer on North Fork Mokelumne River

Representative Photographs - Segment A (continued)



A-4 North Fork Mokelumne River looking downstream at exposed granite slabs and large boulders in the river channel



A-5 Typical view of heavy vegetation along North Fork Mokelumne River

Representative Photographs - Segment B



B-1 Typical view of heavy vegetation along North Fork Mokelumne River



B-2 Typical view of exposed granite and glide pool along North Fork Mokelumne River

Representative Photographs - Segment B (continued)



B-3 Typical view of rapids, large boulders, and heavy vegetation in North Fork Mokelumne River



B-4



B-5

Typical views of river channel showing rapids, glide pools, exposed granite, and heavy vegetation along North Fork Mokelumne River

Representative Photographs - Segment C



C-1 Typical view of North Fork Mokelumne River



C-2 Riparian vegetation and boulders along North Fork Mokelumne River

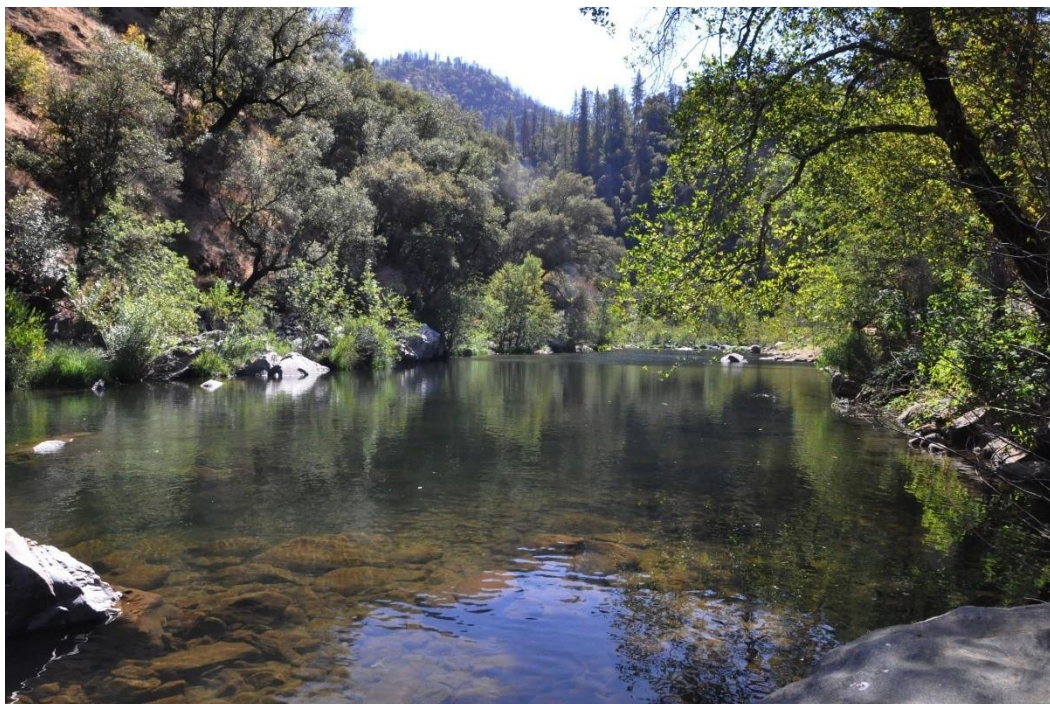
Representative Photographs - Segment C (continued)



C-3 Rapids and exposed rocks along North Fork Mokelumne River



C-4 Exposed column of rock at Mokelumne River



C-5 Typical view of pool and riparian vegetation along North Fork Mokelumne River

Representative Photographs - Segment D



D-1 Typical view of long glide pool with riparian vegetation and the Butte Fire burn area, main stem Mokelumne River



D-2 Exposed bedrock along the river channel and the Butte Fire burn area, main stem Mokelumne River

Representative Photographs - Segment D (continued)



D-3 Typical view of main stem Mokelumne River showing river channel with chaparral and grassland on the hillsides



D-4 Typical view of river pool and riparian vegetation along main stem Mokelumne River

Representative Photographs - Segment E



E-1 Typical view of river pool and oak woodland along the main stem Mokelumne River



E-2 Typical view of long river glide pool, oak woodland, and Electra Road along main stem Mokelumne River

Representative Photographs - Segment E (continued)

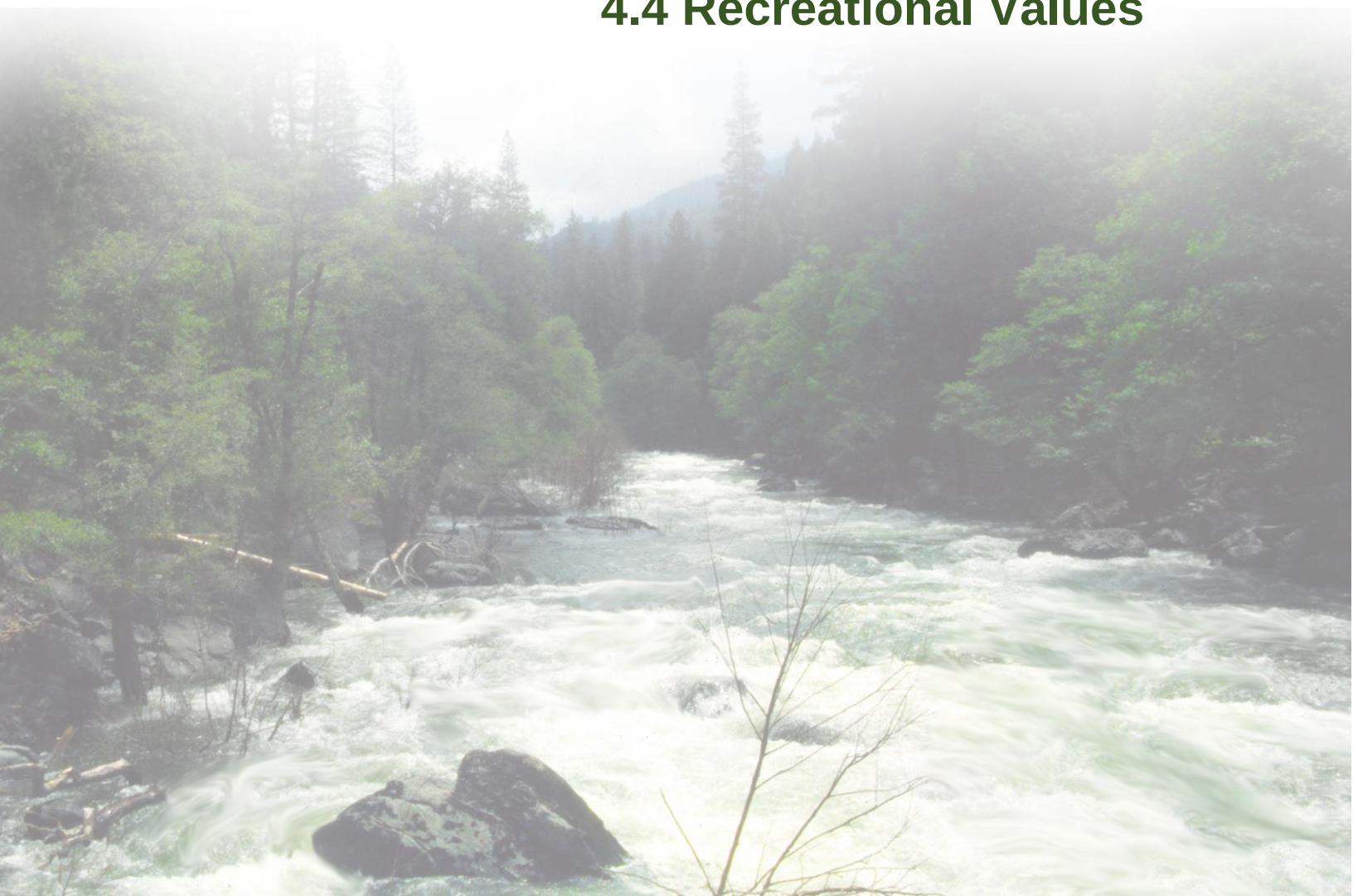


E-3 Typical view of long river glide pool, Electra Road, and the Butte Fire burn area along main stem Mokelumne River



E-4 Typical view of wide river channel, Electra Road, and north side of canyon with oaks and grassland along main stem Mokelumne River

4.4 Recreational Values



4.4 Recreational Values

The free-flowing waters of rivers and streams are a primary attraction for people pursuing outdoor recreational opportunities worldwide. Whether a major focus of recreational activities (boating, swimming, angling, etc.), or simply as part of the background scenery, humans have been drawn to rivers as a recreational resource throughout history. Streams and rivers, with their diverse and dynamic characters, and accompanying breadth of river-based activities, offer some of the greatest opportunities for solo or group outdoor recreation. Because of the intense competition for water resources in California and accompanying pressure on the few remaining free-flowing rivers, it is important to identify water-based recreational opportunities and to protect extraordinary recreational resources and values when appropriate for Californians and out-of-state visitors. Not surprisingly, recreational values, along with other resources, are a key component of evaluating rivers for their eligibility as a State Wild and Scenic River.

4.4.1 Data Sources and Methodology

The North Fork Mokelumne River recreation resource evaluation was based on Federal Wild and Scenic River studies (USFS 1990, BLM 2007); online and printed documents primarily from PG&E, EBMUD, and Foothill Conservancy; online resources pertaining to specific recreational activities; and personal communications with Foothill Conservancy and Friends of the River staff to obtain the most current recreational data for the area. Additional information was obtained during a field reconnaissance conducted on October 27, 2017 to road-accessible river sites, and discussions with individuals knowledgeable about State Wild and Scenic River eligibility studies and recreational resources. Recreational resources of the river corridor were described qualitatively.

4.4.2 Resource Characterization

Regional Study Area

The Mokelumne River above Pardee Dam is referred to as the Upper Mokelumne River and drains about 550 square miles. The upper watershed is situated principally in Alpine, Amador, and Calaveras Counties and consists mostly of wilderness managed under various Federal designations. Most of the Mokelumne and Cosumnes River headwaters lie within the Stanislaus and Eldorado National Forests. Much of the upper watershed is also protected under the 105,165-acre Mokelumne Wilderness. The 62-mile North Fork Mokelumne River originates at Highland Lakes at an elevation of 8,584 feet. From its source, it flows north then west for 28 miles to Salt Springs Reservoir, which is the upper-most boundary of the study area.

Secondary Study Area

The Mokelumne River descends through several distinct geological and biological zones. Recreation use along the river varies accordingly with these zones and with the availability of public access. The secondary study area includes the river and adjacent canyon.

The opportunity for solitude is excellent in the North Fork Mokelumne River canyon. Many visitors to the area are attracted by the remoteness of the canyon; the sheer canyon walls and topographic relief in excess of 2,000 feet contribute to the sense of primitive isolation in much of the study area. The North Fork Mokelumne River canyon is undeveloped and access is very limited. Much of the North Fork Mokelumne River is extremely remote with steep topography that prevents access to just a few areas except for the most adventurous users.

Land within Segment A is managed by the Stanislaus and Eldorado National Forests. BLM manages 13.7 miles of river within Segments B-E, which contain 3,738 acres of public land (approximately 60%) within a half-mile of the river (BLM 2007). Lands adjacent to various other small parcels along the river corridor below Tiger Creek Afterbay are owned/managed by private interests, and access may be limited to the channel below the ordinary high-water mark of the river, unless otherwise posted.

PG&E and EBMUD both own and operate land and infrastructure, respectively, in the Mokelumne River watershed, with PG&E operations located upstream of EBMUD. Pardee Reservoir is owned and operated by EBMUD, while upstream hydroelectric facilities are owned and operated by PG&E. PG&E operations are oriented toward electricity generation. EBMUD operations are primarily focused on water supply to its service area.

Primary Study Area

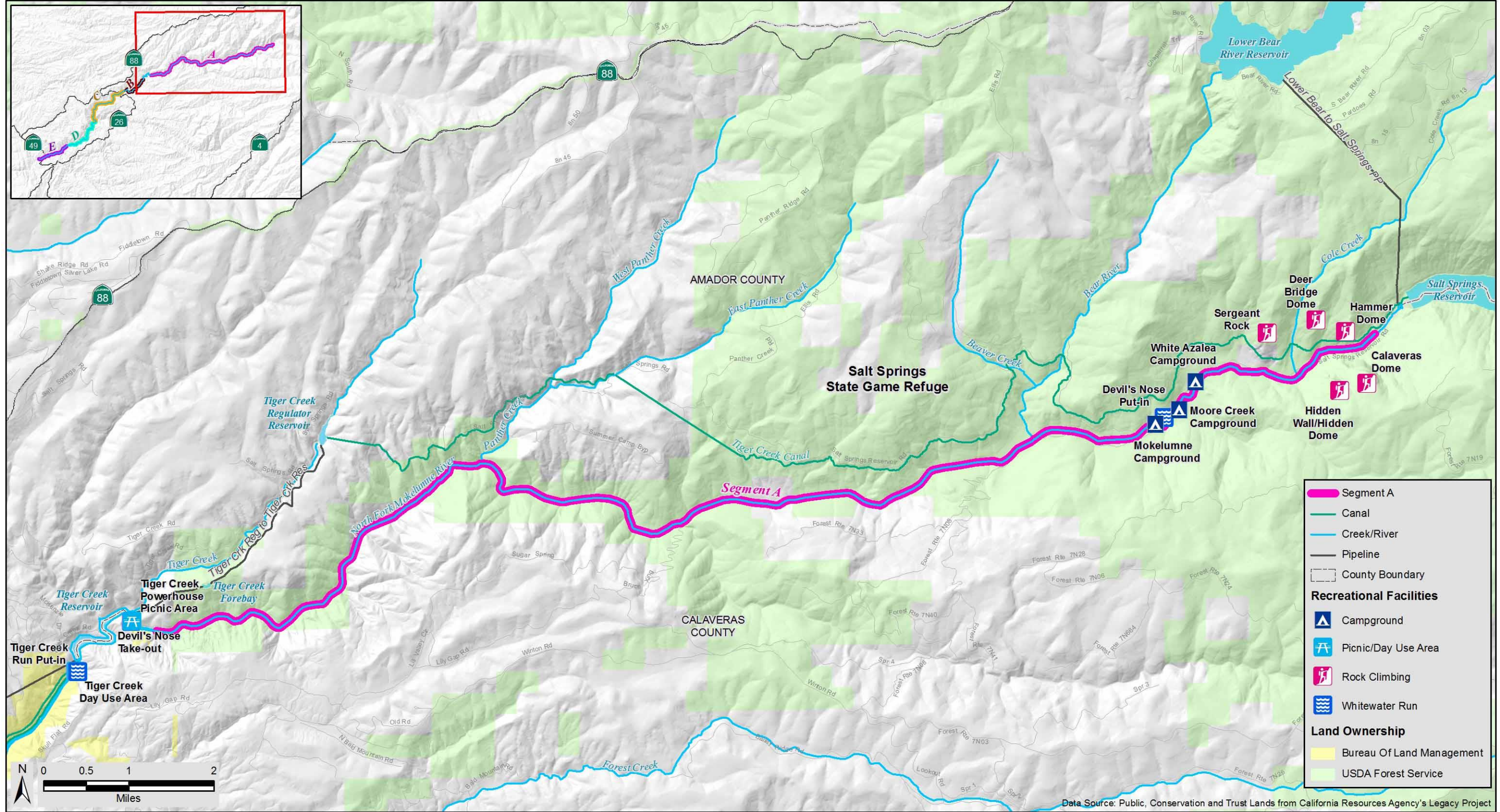
River Segments A-E are presented in Figures 4-3 through 4-7, respectively. River flows, and therefore recreation in Segments A – E, are influenced substantially by PG&E operations. PG&E has owned and operated the Mokelumne River Project (FERC No. 137) in the Upper Mokelumne Watershed since the first dams were constructed between 1901 and 1903. Salt Springs Reservoir and downstream PG&E diversions in particular modify flows in the study area. The most recent PG&E's FERC license for the project was issued in 2001 with expiration in 2031. The license includes 30 biological and recreational management provisions which impact operations of the reservoirs during Wet, Above Normal, Below Normal, Dry, and Critically Dry water year types as determined by forecasts of inflow to Pardee Reservoir.

The prescribed flow release schedule to be implemented by PG&E, as the Licensee, was crafted in part to serve recreational uses (primarily whitewater boating) on the river during various water year types as follows:

In Below Normal (BN), Above Normal (AN), and Wet water years, the Licensee shall release water stored in Salt Springs Reservoir and/or Lower Bear River Reservoir to result in streamflows of at least 900 cfs (700 cfs in BN years) on the following days, times, and runs in the period beginning two weekends prior to Memorial Day weekend and ending June 15 and prior to the start of spill at Salt Springs Reservoir Dam: (a) two non-consecutive weekend days between 10 AM and 12 Noon at the Devils Nose Run whitewater boating put-in, (b) three weekends of two consecutive weekend days (total of six days) between 10 AM and 2 PM at the Tiger Creek Run whitewater boating put-in, and (c) one weekend day between 10 AM and 2 PM at the Ponderosa Way Run whitewater boating put-in.

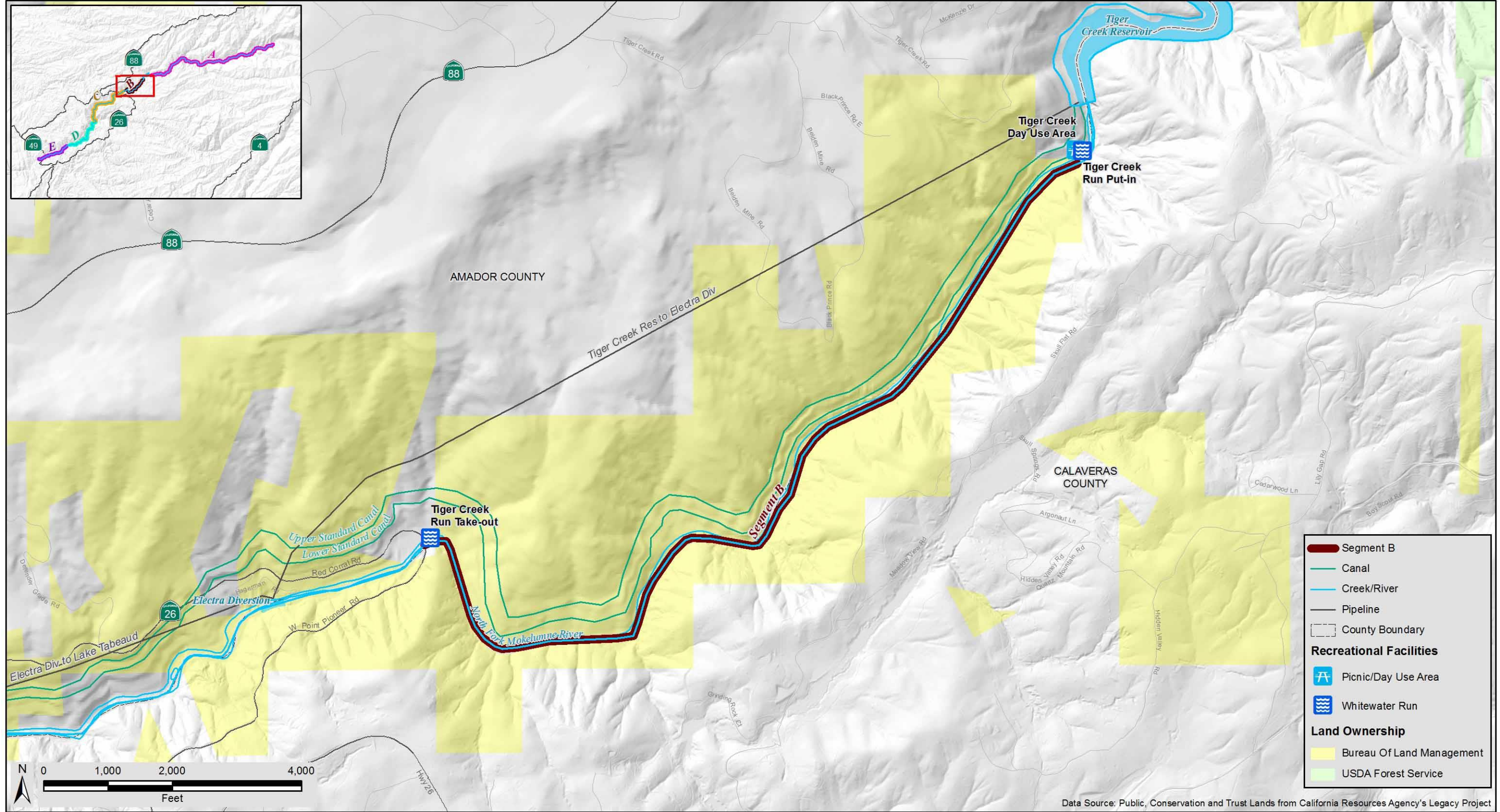
If Salt Springs Reservoir begins to spill prior to completion of the scheduled water release days such that streamflows of at least 900 cfs (700 cfs in BN years) occur at the scheduled days, times, and reaches without releasing water, no further water releases are required for recreation. However, whether resulting from water releases, spill flows, accretions, or a combination of the three, the actual days, times, and runs with streamflows of at least 900 cfs (700 cfs in BN years) shall not be less than specified above unless due to circumstances beyond the Licensee's reasonable control. In the event the specified number of days, times, and runs are not achieved, the Licensee shall provide 1 weekend day of streamflow of at least 700 cfs between 10 AM and 4 PM at the Electra Run whitewater boating put-in either in July, August, or September for each specified day not achieved.

Figure 4.3 Mokelumne River - Segment A



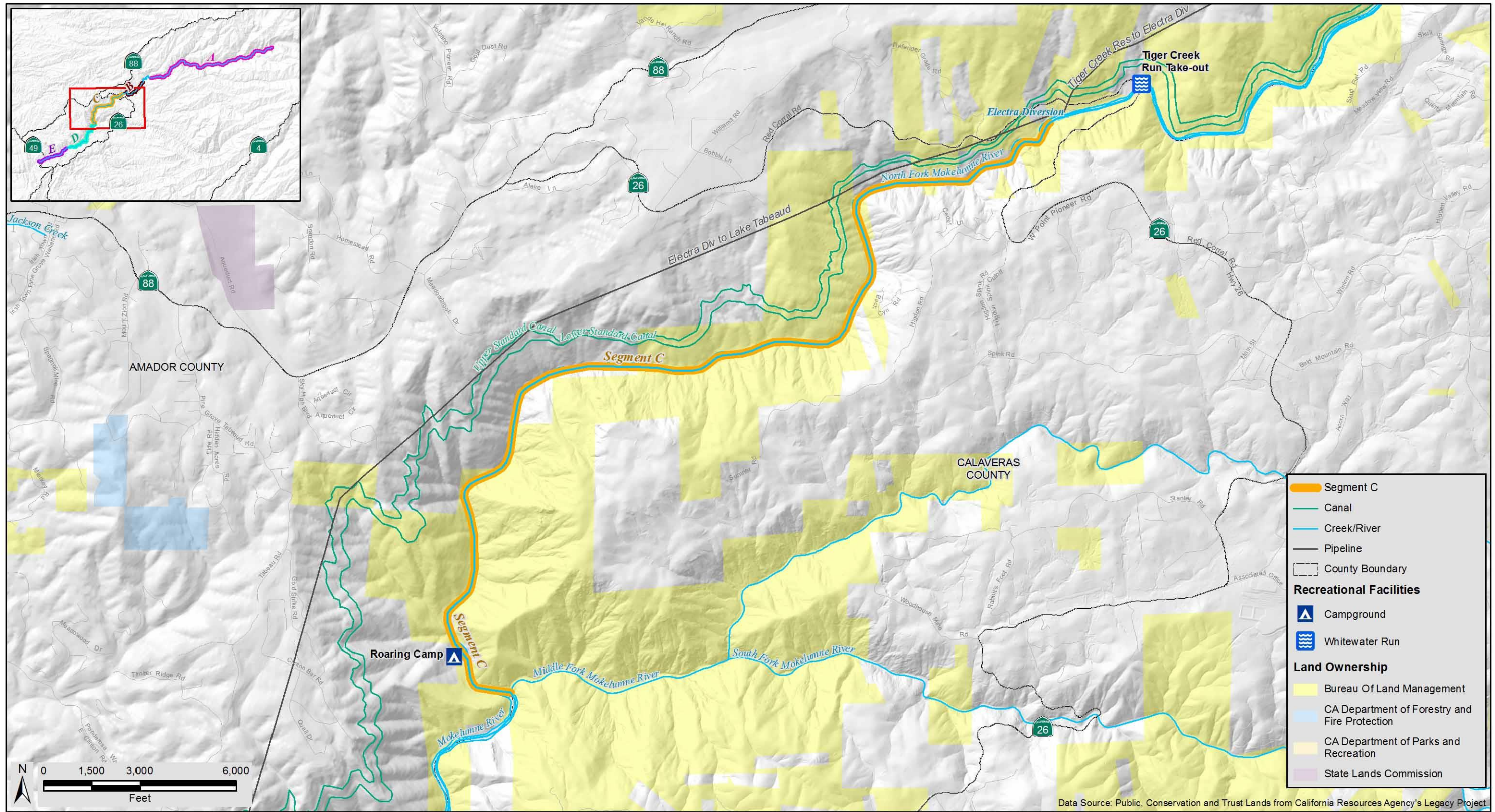
Source: GEI Consultants, Inc., 2017

Figure 4.4 Mokelumne River - Segment B



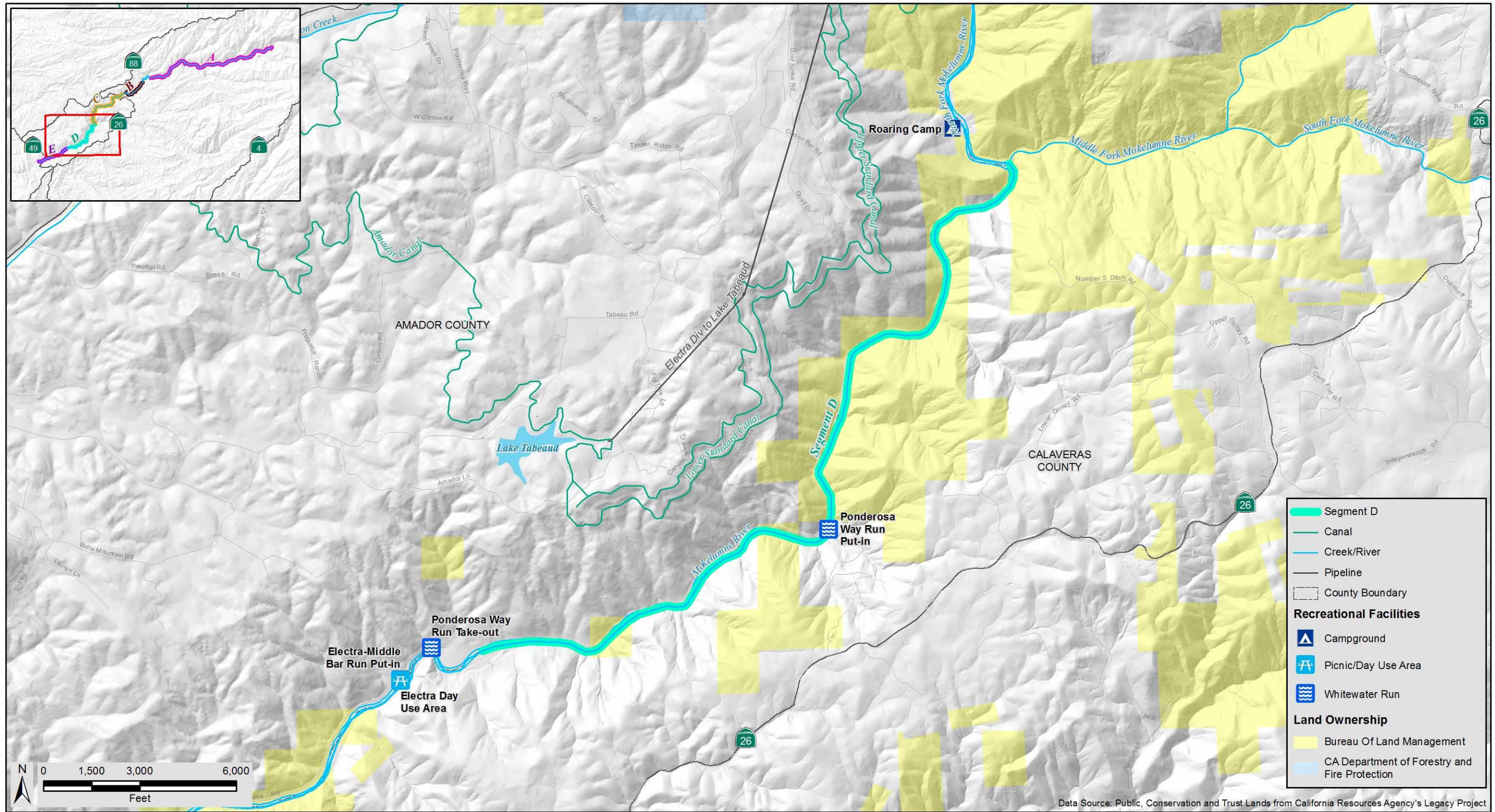
Source: GEI Consultants, Inc., 2017

Figure 4.5 Mokelumne River - Segment C



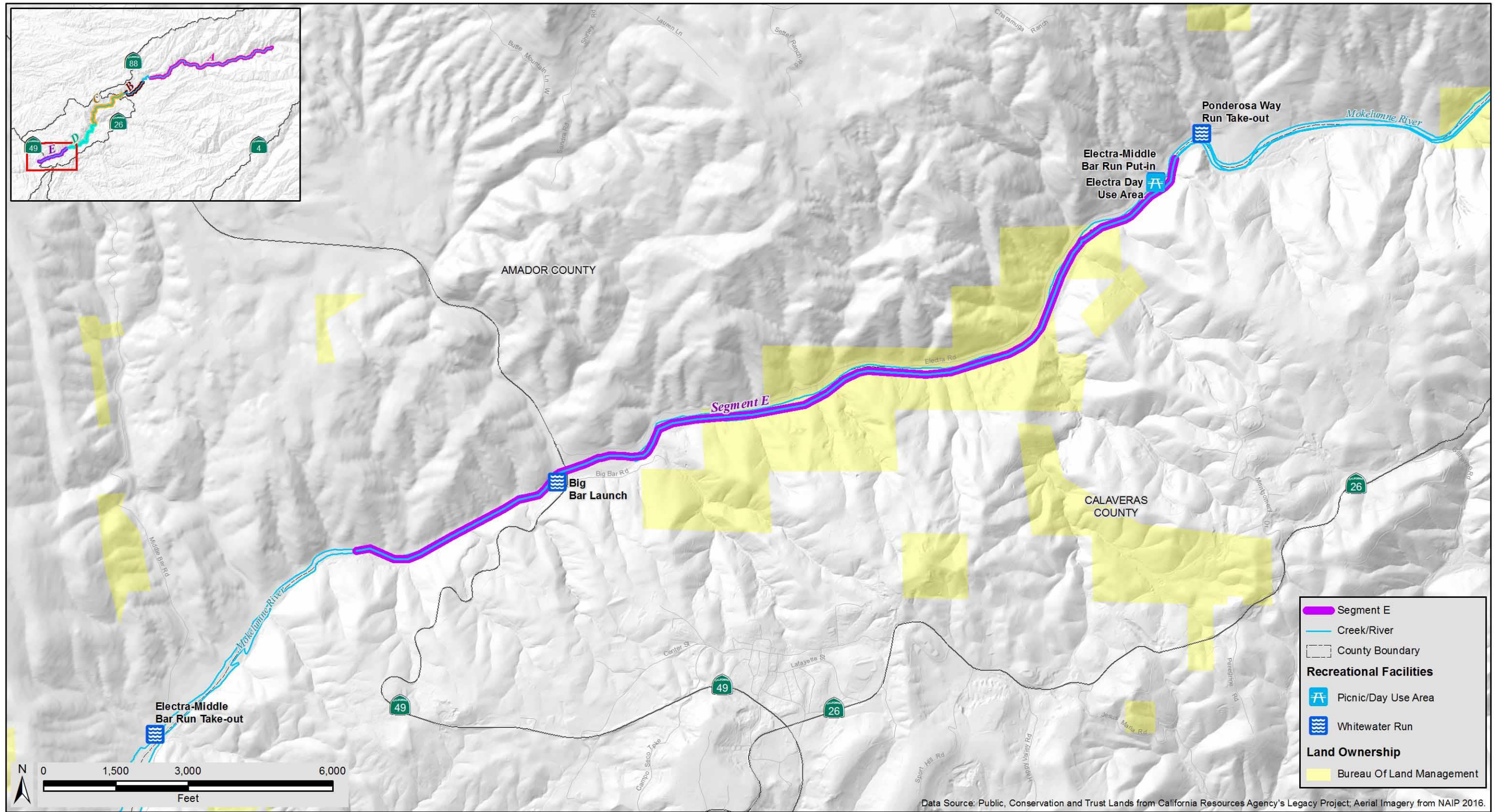
Source: GEI Consultants, Inc., 2017

Figure 4.6 Mokelumne River - Segment D



Source: GEI Consultants, Inc., 2017

Figure 4.7 Mokelumne River - Segment E



Source: GEI Consultants, Inc., 2017

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In addition to the streamflows specified above for the Devils Nose, Tiger Creek, and Ponderosa Way Runs, the Licensee shall provide streamflows of at least 700 cfs between 10 AM and 4 PM at the Electra Run whitewater boating put-in an average of three out of every four weekend days between May 1 and June 15 and an average of two out of every four weekend days between June 16 and July 31.

In Dry and Critically Dry (CD) water years, the Licensee shall provide recreation streamflows of at least 700 cfs between 10 AM and 4 PM at the Electra Run whitewater boating put-in an average of one out of every four weekend days between May 15 and June 30 and a minimum of 9 weekend days equally spread among the months of July, August, and September.

In Dry and CD water years, the Licensee shall provide recreation streamflows in the Devils Nose, Tiger Creek, and Ponderosa Way Runs matching the days, times, and reaches specified for BN water years upon a determination by the Ecological Resource Committee and USFS, for areas within its jurisdiction, that such streamflows can be provided without unacceptable environmental impact. If provided, these recreation streamflows shall replace the recreation streamflows on the Electra Run in July, August, and September described in the immediately preceding paragraph (FERC 2001).

While many whitewater boating opportunities exist on the river, commercial operations do not currently exist. Information regarding recommended flows and schedule for whitewater boating in the study area is summarized in detail in **Table 4-3**. Appendix D also provides information on flow releases.

Table 4-3. Whitewater Boating Information for Study Area Runs

Study Area Segment	Run	Difficulty	Length (mi)	Boatable Flows (cfs) (range/minimum recommended)			Season
				Rafts	Kayaks	Inflatable Kayak	
A	Devil's Nose	Class III-V	15	700-4,000	500-2,000	400	Year round from natural flows or from scheduled seasonal releases
B	Tiger Creek Dam	Class III-IV	3	600-2,500	600-2,500	500	Late spring - early summer natural flows or from scheduled seasonal releases
D	Ponderosa	Class II-III	3	400-2,000	400-2,000	400-2,000	Spring during wet years or from scheduled releases
E	Electra – Middle Bar	Class II+-III-	3.2-5.1	800-4,000	300-3,000	450	Year round from natural flows, or from scheduled seasonal releases

Source: cacreeds.com 2007, 2010, 2012; and americanwhitewater.com 2017

The study area consists of five segments. The recreational opportunities for each segment are described below. Typical recreational activities within each segment are represented by photographs presented at the end of this Section 4.4.

Segment A

Segment A begins 0.5 mile below Salt Springs Dam and ends 0.5 mile upstream of the Tiger Creek Powerhouse, a distance of approximately 17 river miles. The river elevation in Segment A ranges from approximately 3,600 feet at the eastern end to approximately 2,400 feet at the western end. The recreational resources and values are considered extraordinary in Segment A as discussed below.

Whitewater Boating

Although the study area is bounded by Salt Springs Dam on the east end and Tiger Creek Afterbay on the west end, Segment A of the river is without documented impoundment, diversion, straightening, riprapping, or other modifications. This segment encompasses the 15-mile long Devil's Nose whitewater run. This steep (averaging 61 feet-per-mile gradient, with some areas over 100 feet-per-mile gradient) and scenic run is rated Class III-V under normal flows and has recently received greater recognition in the whitewater community due to scheduled higher releases (negotiated during the recent FERC relicensing process) that have created more dependable flows in this segment for whitewater boating. This run has been compared to the most scenic runs in California by experienced paddlers (americanwhitewater.org 2013, awetstate.com 2009). A river ranger is on site during days of recreational flow releases. (Pete Bell pers. comm.)

The Devil's Nose Run may be run during spring and early summer from reservoir spill resulting from snowmelt and/or FERC-required recreational releases. Additionally, BLM takes periodic headcounts on days of recreational flow releases, and as part of ongoing discussions, as more whitewater boating participants are observed along certain reaches, flows may be adaptively managed to provide additional flows to those reaches in support of growing recreational boater numbers. Currently, in a BN, AN, or Wet water year, PG&E provides recreational flows for 2 weekend days to be scheduled between two weekends prior to Memorial Day Weekend and June 15. Discussions are currently underway to extend the eligible recreational flow date range from two weekends prior to Memorial Day weekend and ending June 15 to ending after the July 4 holiday. (PG&E 2005.)

The put-in for this run is located just upstream of the Mokelumne Campground, at the designated Devil's Nose River Access site. The river upstream of this section (a portion of which falls within the study area), near Calaveras Dome, can be accessed by road for its entire length up to the base of Salt Springs Dam, but the upstream reach is very steep with many boulders (rated Class V+) and is not frequented by boaters due to multiple hazards (Pete Bell pers. comm.).

From the Devil's Nose River Access put-in to approximately the Bear River confluence, the run includes several Class III-IV rapids. From the Bear River confluence to Devil's Nose, the run is made up of mostly Class II-III rapids, with a few rated Class IV. The run steepens and enters a granite gorge between Devil's Nose and the Tiger Creek Powerhouse take-out and is solidly Class V, with many longer rapids for which scouting is recommended. Mokelumne Falls is located near the end of this reach along with a gauging weir that can be run or easily portaged by advanced paddlers.

PG&E provides a signed take-out at a developed picnic and day-use area just upstream of the Tiger Creek Powerhouse, on the north side of the river (Devil's Nose Whitewater Takeout). From the picnic area, it is a short level walk past the powerhouse to a designated free parking area. This day-use area closes at 6:30pm.

Although this reach includes several Class II-III rapids along the 10-mile middle portion of the run, the run is recommended only for expert boaters, due to the presence of Class IV-V rapids and the lack of a takeout with road access anywhere between the put-in and the take-out at Tiger Creek Powerhouse. Runnable flows for the Devil's Nose Run are between 600-4,000 cfs, but boating at flows below 2,000 cfs is recommended (americanwhiteater.org 2013, cacreeks.com 2009). This run offers solitude and a more primitive experience for paddlers.

Fishing

As described in Section 4.2, “Fishery Values,” this segment supports rainbow trout and brown trout. Access to fishing along this segment is provided at the White Azalea, Moore Creek, and Mokelumne Campgrounds and Devil’s Nose River Access. Anglers can also access the river along a portion of this segment by hiking down from the USFS road, anywhere from the upstream boundary of the study area to just downstream of Mokelumne Campground, where the road moves away from the river and access becomes more difficult. Fishing along the remainder of this segment may be difficult due to the lack of road or trail access. Anglers do not frequent this area on days of recreational flow releases, since the higher flows on these days may change fish behavior and make fishing difficult (Pete Bell pers. comm.).

Past studies have found angler use along much of the North Fork Mokelumne River in the study area is less than capacity because of limited access. A qualitative angler survey conducted by USFS personnel in 1979 for the area between Bruce Crossing and the Salt Springs Dam indicated that the overall fishery was judged as “fair,” with medium-to-high angler use (USFS 1990). Angler reports have discussed the reduced quality of fishing in the upper portion of the study area due to water level fluctuations from hydropower generation and the resulting effect on fish species and their macroinvertebrate food sources (ecoangler.com 2008).

Camping

Segment A includes several publicly-accessible camping opportunities along the North Fork Mokelumne River. These campgrounds are heavily used during the summer season and are enjoyed by families, whitewater boaters, and day users.

White Azalea Campground is operated by USFS and located on Forest Road 8N50 (Salt Springs Road), on the north side of the river at an elevation of 3,500 feet. As of 2017, general access to the site is from the north only, via Forest Road 92 (Ellis Road) due to damage limiting access from other roads in the watershed. In addition to camping, this campground and the surrounding area is used as a base for swimming, fishing, picnicking, and access to Salt Springs Reservoir and the Mokelumne Wilderness several miles to the east of the site. It has six tent spaces with portable toilets and no potable water supply. There are no fire rings, tables, or bear boxes. The campground is open year-round but access may be limited by snowfall. Restroom cleaning is provided mid-May to mid-November only and trash must be packed out (USFS 2017a).

Moore Creek Campground is operated by USFS and located on Forest Road 7N08, on the south side of the river at an elevation of 3,200 feet. As of 2017, general access to the site is from the north only, via Forest Road 92 (Ellis Road) due to damage limiting access from other roads in the watershed. In addition to camping, this campground and the surrounding area is used as a base for swimming, fishing, picnicking, and access to Salt Springs Reservoir and the Mokelumne Wilderness several miles to the east of the site. It has fourteen spaces (eight tent) with tables at some sites, vault toilets, and no potable water supply. There are no fire rings or bear boxes. The campground is open year-round but access may be limited by snowfall levels occurring on higher elevation roads that must be used to access the campground. Restroom cleaning is provided mid-May to mid-November only and trash must be packed out (USFS 2017a).

Mokelumne Campground is operated by USFS and located on Forest Road 8N50 (Salt Springs Road), on the north side of the river at an elevation of 3,200 feet. As of 2017, general access to the site is from the north only, via Forest Road 92 (Ellis Road) due to damage limiting access from other roads in the

watershed. In addition to camping, this campground and the surrounding area is used as a base for swimming, fishing, picnicking, and access to Salt Springs Reservoir and the Mokelumne Wilderness several miles to the east of the site. It has fourteen spaces (five tent, nine trailer) with tables at some sites, vault toilets, and no potable water supply. There are no fire rings, bear boxes, or trailer hook-ups/dump stations. The campground is open year-round but access may be limited by snowfall. Restroom cleaning is provided mid-May to mid-November only and trash must be packed out (USFS 2017a).

Off-highway vehicles (OHVs) are not allowed in any Segment A campgrounds which contributes to an opportunity for solitude along the North Fork Mokelumne River (USFS 2017b).

Dispersed camping is allowed on all Stanislaus and Eldorado National Forest lands as long as the site is at least 100 feet away from streams and other water bodies, except around select lakes well outside of the Mokelumne River canyon. Dispersed camping offers the opportunity for visitors to camp outside of the designated sites discussed above.

Day-use Activities - Picnicking, Swimming, Gold Panning

Picnic tables are provided at some campsites at the Moore Creek and White Azalea Campgrounds. The Mokelumne Campground does not have picnic tables but this area along with the designated Devil's Nose River Access site is heavily used for picnicking and swimming in nearby deep pools at the upper end of the Devil's Nose Run (USFS 1990). Picnicking is also allowed at dispersed areas along the river on USFS lands.

A day-use area is maintained by PG&E just below Salt Springs Dam, on the north side of the river. This area provides four tables and a pit toilet but is technically outside of the study area, which is delineated as beginning 0.5 mile below Salt Springs Dam.

There are two existing historic mines along Segment A: Garnet Hill and Monte Christo. The Garnet Hill Mine, located 2 miles west of the Salt Springs Reservoir, has been idle since 1954, but historically it was a source of garnet and epidote crystals. The Monte Christo Mine, to the west of Devils Nose, was once an underground gold mine. The nearby East Gold Belt vein systems are not as extensive as those of the Mother Lode. No substantial gold deposits have been found within or adjacent to Segment A. (USFS 1990.) As with other west slope Sierra rivers, incidental gold panning likely occurs.

Hiking

The Upper Mokelumne River Canyon segment of the Mokelumne Coast to Crest Trail extends from the Highway 4 crossing of Ebbetts Pass to the south through Stanislaus National Forest and Carson-Iceberg Wilderness lands, before entering the study area at the Moore Creek Campground. The portion of the trail between Moore Creek and Tiger Creek is still in the planning stages. Additionally, since this entire segment lies on USFS lands, the public can hike or backpack off-trail anywhere in the forest. No other established trails lie within the study area along the river corridor.

Climbing, Canyoneering, and Gorge Scrambling

Several known climbing routes are located adjacent to the North Fork Mokelumne River, particularly along Segment A and offer crack and slab climbing along sport and traditional routes. The area offers secluded and uncrowded climbing for all skill levels. Climbing year round is possible with the base of

the domes lying at approximately 4,000 feet. Access to the area is via Highway 88 and Ellis Road from the north. Winter access is from Tiger Creek Road out of the town of Pioneer. Two main trails access Calaveras Dome. Hammer Dome and other climbing routes on the north side of the river are accessed by walking along the aqueduct from the east where it crosses under the road (rockclimbing.com 2017).

Calaveras Dome

The 1,200-foot Calaveras Dome offers routes up to 12 pitches in length. Shorter routes are available and some top-roping is possible. The Hidden Wall/Hidden Dome area lies adjacent to Calaveras Dome on the south side of the river and offers multiple routes.

Hammer Dome

The 600-foot Hammer Dome offers shorter and more moderate climbing than Calaveras Dome. Although easier, this area offers multi-pitch routes up to six pitches (rockclimbing.com 2017).

Deer Bridge Dome/Silver Streak Slab

This area consists of south facing slabs, west of Hammer Dome and is rarely visited by climbers, offering a secluded climbing experience even on holiday weekends. Routes here can also be top roped by scrambling, west along the base of the dome, and then up and east toward the top (mountainproject.com 2017).

Sergeant Rock

Sergeant Rock lies approximately 0.5 mile west of Hammer Dome and offers multiple climbing routes (thecrag.com 2017).

Hunting

The entire study area lies within CDFW deer and black bear hunting Zone D5, quail zones Q1 and Q3, and is also open to sooty, blue, and ruffed grouse; band-tailed pigeon; and American crow. CDFW is responsible for issuing hunting licenses and tags for areas under public and private ownership within the study area.

Black bear and mule deer are the two most common big game species in the area. Black bear are found throughout the study area. Three herds of mule deer, one resident and two migratory, have been documented by past studies (USFS 1988). The Statewide mule deer population has fluctuated between approximately 420,000 and 685,000 over the past 25 years. Zone D5 population numbers have ranged from approximately 30,000 to 56,000 in the past 5 years (CDFW 2017a).

The two migratory deer herds use the study area primarily as winter range. The Railroad Flat herd uses the southern side of the North Fork Mokelumne River as a winter range. The second migratory deer herd, the Salt Springs herd, winters along the northern side of the river. The deer herds do not appear to migrate across the river, but individuals may cross the river during migration periods. PG&E has constructed deer bridges across the Tiger Creek Regulatory Canal to facilitate deer migration (USFS 1990).

Over half of Segment A lies within the Salt Springs State Game Refuge, where hunting is prohibited by law (CDFW 2010). The North Fork Mokelumne River forms the southern boundary of the refuge, from Salt Springs Dam to just downstream of Bruce Crossing. Access to the remainder of Segment A is difficult as there are no roads or trails within the area.

Wildlife Viewing

Following the 2004 Power Fire, the area between Salt Springs Reservoir and Tiger Creek Powerhouse has become a popular birding destination. The abundance and diversity of species in the post-fire landscape is a regionally recognized resource for birders. In addition, bald eagles are known to occur at Salt Springs Reservoir. The river and adjacent forest in Segment A are recognized as important habitat for northern goshawk, California spotted owl, American marten, foothill yellow-legged frog, black bear, and mule deer. As part of the FERC settlement, flow along this segment is managed not only for boating uses, but also to support various life stages of the foothill yellow-legged frog. This area is also known for abundant displays of wildflowers during spring.

Cultural Resources

The importance of Native American cultural resources within the study area was recognized by the establishment of the Mokelumne Archeological Special Interest Area in the Eldorado National Forest Land and Resource Management Plan (USFS 1988) and determining that the Mokelumne River Canyon Archaeological District is eligible for the National Register of Historic Places. Cultural analysis of the region indicates that the canyon has been occupied by humans for at least 2,000 years, and hundreds of prehistoric and historic era sites have been identified through archaeological investigations. The integrity of the recorded sites is unusually high, with more than half of the sites either undisturbed or showing impacts only from erosion. The high site integrity combined with the sheer number and diversity of sites in a limited area is uncommon. The sites represent a rare opportunity to understand the cultural history of the region (Wirth 1985).

Off-highway Vehicle Use

Although Eldorado National Forest allows OHV use in some areas of the forest well to the north of the study area, there are no designated OHV areas or trails within the study area (USFS 2017b). OHVs are not allowed in USFS campgrounds located in Segment A which contributes to an opportunity for solitude along the North Fork Mokelumne River. Use of OHVs is not common along this segment and is prohibited in most areas due to the presence of a multitude of important cultural sites documented along the river corridor. Use of OHVs is not allowed on paved roads in the Eldorado National Forest and is prohibited, in general, on paved roads in California, reducing the opportunity for OHV use in the study area (DMV 2017).

Winter Sports

Winter use near the Mokelumne River is generally light. No developed winter use facilities are in the vicinity of the study area. However, some snowmobiling, snowshoeing, and cross-country skiing occur to the north of the study area, along the Silver Bear winter recreation area trails which are most easily reached from the Iron Mountain Sno-Park Staging Area on Highway 88 and the maintained winter trail system ends near Cole Creek, to the north of the study area (USFS 2017b). The steepness of the Mokelumne River canyon and lack of winter sports facilities generally precludes winter use within the canyon.

Conclusion

Segment A provides a wealth of recreational activities in a relatively remote, natural-appearing, and unspoiled area. The segment and adjacent areas offer camping, fishing, hiking, climbing, day-use activities, hunting, a State game refuge, and contain cultural resources that represent high site integrity combined with a large number and diversity of archaeological sites. Moreover, Segment A encompasses

the 15-mile long Devil's Nose whitewater run. This steep and scenic run is rated Class III-V under normal flows and has recently received greater recognition in the whitewater community due to scheduled higher releases resulting from the recent FERC relicensing process). Based on the combination of these unique recreational opportunities, in a setting that is considered to have extraordinary scenic values, Segment A is considered to have extraordinary recreational resources and values. Due to a sharp contrast in the accessibility (and related recreational opportunities) upstream and downstream of the confluence with the Bear River, Segment A has been subdivided into Segments A1 and A2, as summarized below.

The upper portion of Segment A upstream of the confluence with the Bear River (Segment A1) is easily accessible by road and offers developed recreational facilities.

The lower portion of Segment A below the confluence with the Bear River (Segment A2) is remote and within a deep canyon. In a complete contrast with Segment A1, Segment A2 is difficult to access and only by several dirt roads generally high above the canyon and with limited river access due to the steep canyon slopes. Segment A2 provides a remote riverine experience for those individuals willing to access this segment.

Segments A1 and A2 provide extraordinary recreational opportunities in contrasting ways with Segment A1 providing highly developed recreational opportunities and Segment A2 providing remote recreational opportunities. Overall, the recreational values in both Segments A1 and A2 are considered to be extraordinary.

Segment B

Segment B begins 1,000 feet downstream of the Tiger Creek Afterbay Dam and ends at the Highway 26 (Red Corral Road) bridge crossing, a distance of approximately 2.8 river miles. The river elevation in Segment B ranges from approximately 2,200 feet at the eastern end to approximately 1,800 feet at the western end. The recreational resources and values are considered extraordinary in Segment B as discussed below.

Whitewater Boating

The Tiger Creek Run on the North Fork Mokelumne is a 3-mile-long, Class III-IV run under normal flows and is suitable for small rafts/catarafts, open canoes, hard shell kayaks, inflatable kayaks, and riverboards. The run provides an intermediate/advanced boating experience with easy road access to the put-in and take-out areas and most rapids are easy to scout and portage and paddlers have the opportunity to run this section multiple times in one day due to easy access. The run is characterized by granite cliffs and slabs rising out of the water and forested hillside views with an average gradient of 72 feet/mile (awetstate.com 2007, Holbek and Stanley 1988). Although the run has always been open to the public, more reliable flows along the Tiger Creek section were brought about during negotiations between PG&E and American Whitewater. PG&E typically provides approximately 6-9 days of recreational flows on this run at a minimum of 700 cfs, according to the FERC license agreement. However, during Dry and CD years, 2 flow days from Devil's Nose are transferred to Tiger Creek to protect foothill yellow-legged frog populations; these flows, although released for ecological purposes, may result in runnable flows for whitewater boaters. Runnable flows are also provided in the early spring when Tiger Creek Afterbay Dam spills in above normal to wet water years. PG&E maintains and reports real time flow gauge readings to the public below Tiger Creek Afterbay Dam on an hourly basis allowing paddlers to

take advantage of boatable flows throughout the year (American Whitewater 2014). A river ranger is on site during days of recreational flow releases (Pete Bell pers. comm.).

The put in for this run is located just below Tiger Creek Dam where parking and easy walking access to the river is provided by PG&E at the Tiger Creek Afterbay Day Use Area (PG&E 2017). A sign is located on the north side of the river alerting boaters to the upcoming take-out area at Highway 26 (also known as Red Corral Road) maintained by BLM with a small parking area and pit toilet (cacreeks.com 2010).

This run includes 10 rapids along its length, including three challenging Class IV and several Class III “ledge drop” rapids. This reach is identified by paddlers as an excellent training ground for “creeking,” an advanced form of paddling, without the safety risk associated with paddling a Class V reach where similar river features are often found. This run is unique due to its length, accessibility, and level of difficulty. Similar runs are not available to boaters in the Sierra. The most analogous (although not identical) runs to the Tiger Creek Run would be the Gorge or Chili Bar Runs on the South Fork American River; however, these runs are longer, crowded, located in fee areas, and require a much longer shuttle, making multiple runs in a day more difficult. The timing of the flow releases on the Mokelumne River makes it among the last Class IV reaches in the Sierra runnable each summer. BLM has determined from their whitewater recreation visitor surveys that an average of 500 to 600 paddlers visit Tiger Creek annually during the 7-9 days of scheduled recreational flow releases. For the 2014 recreational flow season, 709 total paddlers were documented (American Whitewater 2014).

Fishing

This segment supports rainbow and brown trout. Fishing at the Tiger Creek Powerhouse outlet is a popular activity at this site. Anglers can access the river along this entire segment by hiking down short, steep trails from the River Road, along the north side of the river. Anglers do not frequent this area on days of recreational flow releases, since the higher flows on these days may change fish behavior and make fishing difficult (Pete Bell pers. comm.)

Camping

There is no developed camping located within Segment B of the study area. In lower segments (B, C, D, and E) of the river, between the USFS boundary and Pardee Reservoir, there are no camping facilities (with the exception of Roaring Camp, discussed in Segment C) because it is private land and there is little public access except for public day-use areas, bridge crossings, and the river corridor below the ordinary high-water mark, per State law.

Past studies and plans, including the Eldorado National Forest Land and Resource Management Plan (USFS 1988) and the North Fork Mokelumne Wild and Scenic River Study/Environmental Impact Statement (USFS 1990) and online research have not identified any additional opportunities or plans to increase the size or number of campgrounds along the river, as there are few sites with adequate level ground and/or access to facilitate additional developed or primitive campground construction.

Day-use Activities - Picnicking, Swimming, Gold Panning

This segment includes the Tiger Creek Day Use Area maintained by PG&E. This day-use area includes a parking lot, barbeque grills, two picnic tables, and a pit toilet. This area is heavily used by families, especially for picnics, fishing, and swimming. The area just upstream of the Highway

26 bridge provides a calm area for swimming and is characterized by vegetation and granite slabs used for water play. Stairs cut into the granite slab on the north side of the river allow for safe use entry/exit for swimmers (PG&E 2017). The 7-foot-deep pools in this segment provide water sport opportunities in a free-flowing river that is relatively rare in the mid-elevation Sierra (USFS 1990).

Segments B-E are located within the historic Mother Lode Belt and several mining claims exist along Segments B-E of the study area. Because placer gold deposits occur in the river channel, the river has potential for recreational panning, sluicing, and suction dredging activities throughout its length (BLM 2007). Gold-panning is popular at day-use areas along the lower study area segments, including Tiger Creek.

Hiking

Visitors can hike/walk along the gravel River Road that parallels the river on the north side, along this entire segment. Another segment of the Mokelumne Coast to Crest Trail, the Middle Mokelumne, would extend from the Tiger Creek Forebay to the Highway 49 bridge; however, this segment is still in the planning stages and a specific alignment does not exist (MC2CT 2017).

Climbing, Canyoneering, and Gorge Scrambling

There are no known climbing destinations along Segment B.

Hunting

As discussed in Segment A, the entire study area lies within CDFW deer and black bear hunting Zone D5, quail zones Q1 and Q3, and is also open to sooty, blue, and ruffed grouse; band-tailed pigeon; and American crow. CDFW is responsible for issuing hunting licenses and tags for areas under public and private ownership within the study area. However, Segment B is surrounded by privately owned lands, so public access for hunting along the river corridor would be difficult.

Wildlife Viewing

Segment B is not known for any specific wildlife viewing opportunities along the river. Additionally, as foothill yellow-legged frog is not observed in this segment or downstream, it is slightly easier to manage the river for recreational flows releases without causing impacts to sensitive species (Pete Bell pers. comm.).

Cultural Resources

Segment B is not known for any specific cultural resources. However, Miwok and their ancestors called the river canyon home for more than 2,500 years and the river canyon is a historic trade route that linked the indigenous people of the western Sierra with Eastern Sierra and Great Basin tribes (BLM 2007). Given the numerous cultural resources discovered along the Mokelumne River, there are likely other existing cultural sites along this segment.

Off-highway Vehicle Use

As discussed in Segment A, use of OHVs is not allowed on paved roads in the Eldorado National Forest and is prohibited, in general, on paved roads in California, reducing the opportunity for OHV use in the study area (DMV 2017). Use of OHVs is not common along this segment.

Winter Sports

As mentioned in Segment A, winter use near the Mokelumne River is generally light. The steepness of the Mokelumne River canyon generally reduces winter use within the canyon.

Conclusion

Segment B provides a wealth of recreational activities in a relatively remote, natural-appearing, and unspoiled area. The segment and adjacent areas primarily offer fishing, hiking, and day-use activities. Most importantly, the Tiger Creek whitewater run on the North Fork Mokelumne is a 3-mile-long, Class III-IV run under normal flows and is suitable for small rafts/catarafts, open canoes, hard shell kayaks, inflatable kayaks, and riverboards. The run provides an intermediate/advanced boating experience with easy road access to the put-in and take-out areas and most rapids are easy to scout and portage and paddlers have the opportunity to run this section multiple times in one day due to easy access. This run is unique due to its length, accessibility, and level of difficulty. Similar runs are not available to boaters in the Sierra. The timing of the flow releases on the Mokelumne River makes it among the last Class IV reaches in the Sierra runnable each summer. Based on these attributes, Segment B maintains extraordinary recreational resources and values.

Segment C

Segment C begins on the North Fork Mokelumne River 400 feet downstream of the re-regulating dam at the outlet of the West Point Powerhouse (southwest of the Highway 26 bridge crossing) and ends at the confluence of the North and Middle Forks of the Mokelumne River. Segment C encompasses approximately 11 river miles. The river elevation in Segment C ranges from approximately 1,800 feet at the eastern end and approximately 1,000 feet at the western end. The recreational resources and values are considered excellent, but not extraordinary, in Segment C as discussed below.

Whitewater Boating

There are no locally recognized whitewater runs along this section of the river. Maps indicate the river is runnable from just below the West Point Powerhouse for over a mile to near the Amador-Columbia mine; however, access is very difficult in this area as the take-out would require cross-country hiking upslope to the Hagerman Road Extension which has been recently reported to be gated and inaccessible (Evatt pers. comm.). Downstream of this area, the gradient increases and drops over 1,000 feet in the approximately 3 miles to the Middle Fork confluence (cacreeks.com 2010). One group ran the river below West Point Powerhouse during high flows in 2009 and reported several 30-foot waterfalls and many rapids that required scouting and extensive portaging (Foothill Conservancy 2017).

Access to this segment of river (with the exception of the Roaring Camp area) is very difficult and would be through cross-country travel as there are no roads or trails in this area. Due to its geomorphology, the section below Amador-Columbia Mine is a narrow channel overgrown with riparian vegetation in many areas. This section also flows through a deep gorge and is characterized by many pools and waterfalls that would be negotiable only by expert kayakers during high water years, as the average river gradient is approximately 500 feet per mile and there are several 30-foot waterfalls to be negotiated along this section of river.

Fishing

This segment supports small populations of rainbow and brown trout. As described in previous sections, access to this area is very difficult and the number of anglers using this area is unknown, but low due to access difficulties.

Camping

Within Segment C, camping is allowed by reservation at the privately-owned Roaring Camp Mining Company, located on the North Fork Mokelumne River at Clinton Bar, just upstream of the confluence of the north and middle forks. Roaring Camp offers 20 cabins and tent camping sites along the river and is popular for multi-generational family vacations and reunions. Cabins are equipped with a fire ring and grill. Many activities are available at Roaring Camp including swimming, fishing, hiking, miniature golf, family-style games, and horseshoe pits, in addition to a small mining museum. In addition to camping, Roaring Camp offers reservation only day-use river activities including gold panning and cookouts. BLM has issued a lease to Roaring Camp for the use of public lands adjacent to their private lands in this part of the canyon and Roaring Camp works an active mining claim (BLM 2007).

Day-use Activities - Picnicking, Swimming, Gold Panning

The only designated day-use areas along this segment are at the privately-owned Roaring Camp Mining Company property, just upstream of the Middle Fork confluence. The road down to Roaring Camp is also a private road, further limiting day-use access. As described previously, the rest of this area is very difficult to access and is devoid of roads or trails to provide river access for day-use activities.

Hiking

There are no designated trails in this segment and access to the river on foot is very difficult except in areas immediately adjacent to powerhouses and their service roads. All other access is by cross-country hiking from adjacent roads and ridgetops.

Climbing, Canyoneering, and Gorge Scrambling

Segment C flows mostly through a steeper gorge characterized by many pools and waterfalls (except for the short stretch near Roaring Camp) that lends these sections to canyoneering and scrambling activities. Access to these areas is very limited.

Hunting

As discussed in Segment A, the entire study area lies within CDFW deer and black bear hunting Zone D5, quail zones Q1 and Q3, and is also open to sooty, blue, and ruffed grouse; band-tailed pigeon; and American crow. CDFW is responsible for issuing hunting licenses and tags for areas under public and private ownership within the study area. However, Segment C is surrounded by privately owned lands, so public access for hunting along the river corridor would be difficult.

Wildlife Viewing

Segment C is not known for any specific wildlife viewing opportunities.

Cultural Resources

Segment C is not known for any specific cultural resources. However, the Roaring Camp facility is located on the site of an old 49er Gold Rush mining site, at Clinton Bar. Additionally, Miwok and their ancestors called the river canyon home for more than 2,500 years and the river canyon is a historic trade route that linked the indigenous people of the western Sierra with Eastern Sierra and Great Basin tribes (BLM 2007). Given the numerous cultural resources discovered along the Mokelumne River, there are likely other existing cultural sites along this segment.

Off-highway Vehicle Use

As discussed in Segment A, use of OHVs is not allowed on paved roads in the Eldorado National Forest and is prohibited, in general, on paved roads in California, reducing the opportunity for OHV use in the study area (DMV 2017). Use of OHVs is not common along this segment as there are no unpaved roads or trails.

Winter Sports

As mentioned in Segment A, winter use near the Mokelumne River is generally light. The steepness of the Mokelumne River canyon generally precludes much winter use within the canyon.

Conclusion

The upper portion of Segment C (Segment C1) is remote and within a deep canyon. While lacking readily available whitewater boating and other recreational amenities and values, Segment C1 provides a remote riverine experience for those individuals willing to access this segment.

The lower portion of Segment C (Segment C2) contains the privately-owned Roaring Camp Mining Company at Clinton Bar. In a complete contrast with Segment C1, Segment C2 is readily accessible, and Roaring Camp offers 20 cabins and tent camping sites along the river and is popular for multi-generational family vacations and reunions, and offers swimming, fishing, hiking, miniature golf, family-style games, and horseshoe pits, in addition to a small mining museum. In addition to camping, Roaring Camp offers reservation only day-use river activities including gold panning and cookouts.

Segments C1 and C2 provide excellent recreational opportunities in contrasting ways with Segment C1 providing remote recreational opportunities and Segment C2 providing highly developed recreational opportunities. Overall, the recreational values in Segment C are considered to be excellent but not extraordinary.

Segment D

Segment D begins on the main stem of the Mokelumne River at the confluence of the North and Middle Forks and ends 300 feet upstream of the Electra Powerhouse, a distance of approximately 5.25 river miles. The river elevation in Segment D ranges from approximately 1,000 feet at the eastern end to approximately 700 feet at the western end. The entirety of Segment D is located within the area of the Butte Fire, which burned approximately 70,800 acres in September and October 2015. The recreational resources and values are considered excellent, but not extraordinary, in Segment D as discussed below.

Whitewater Boating

Access to the upper portion of this river segment is difficult and the only developed access is at Roaring Camp. In addition, the upper portion of this segment is characterized by the same access

and river conditions as those described above for Segment C. However, the lower portion of Segment D is recognized as the Ponderosa Run (Martin 1974).

The Ponderosa Run is a 3-mile-long, Class II-III run under normal flows with an average gradient of 30 feet per mile (awetstate.com 2009). The put-in for this segment is at the Ponderosa Way bridge. PG&E maintains a designated Ponderosa Way Whitewater Take-Out Area that is open year-round (PG&E 2017). As part of the FERC Settlement, this section should receive: in BN, AN, and Wet water years, releases from Salt Springs Reservoir and/or Lower Bear River Reservoir to result in streamflows of at least 900 cfs (700 cfs in below normal water years) on one weekend day between 10 a.m. and 2 p.m. in the period beginning two weekends prior to Memorial Day weekend and ending June 15 and prior to the start of spill at Salt Springs Reservoir Dam. However, flows prescribed for the Ponderosa Way Run have been temporarily moved to the Tiger Creek Run due to the difficulty of accessing the Ponderosa Way Put-in by vehicle, caused by road damage, most recently during the 2016-2017 winter storms, and also due to recent vandalism of restroom and signage at the designated put-in. However, this route is negotiable by foot and many boaters and other recreationists walk down Ponderosa Way to access the river. Once these issues are resolved, the designated flows will be moved back to serve the Ponderosa Way Run (Pete Bell. Pers. comm.).

Segment D often has low water because PG&E often diverts a portion of flows around this river segment to support hydropower generation. Because of the lack of regular high flows, trees and brush grow thick along the bank and sometimes out into the river bed. At higher flows, the river flows through trees on the side in many locations. This section of the Mokelumne River is runnable only at the peak springtime flow of wet years or during a recreational flow release, but the presence of the uncontrolled Middle Fork Mokelumne River upstream also contributes flow to this reach (americanwhitewater.com 2017).

Fishing

Similar to Segment C, access to the river in this area is very limited and occurs mostly in the upstream and downstream vicinities of the Roaring Camp Mining Company and the Ponderosa Way bridge. In the past, this area has been reported to provide good fishing opportunities for brown and rainbow trout (Roaring Camp 2017). However, according to recent surveys, this segment supports mostly pikeminnow/hardhead and of the 197 fish observed, only one brown trout was identified and no rainbow trout. The remainder of fish observed were nongame fish that are not sought by anglers.

Camping

There is no developed or primitive camping available within Segment D of the study area. In lower segments (B, C, D, and E) of the river, between the USFS boundary and Pardee Reservoir, there are no camping facilities (with the exception of Roaring Camp, discussed in Segment C) because it is private land and there is little public access except for public day-use areas, bridge crossings, and the river corridor below the ordinary high-water mark, per State law.

Day-use Activities - Picnicking, Swimming, Gold Panning

As described previously, this area is very difficult to access and is devoid of roads or trails to provide river access for day-use activities with the exception of the area near the Ponderosa Way bridge. Although the road is closed on the north side of the river, access is available from the south during all seasons but winter; the road is gated during the rainy season to protect the condition of the road. Although steep and inaccessible upstream of this section, the river calms and creates large

pools in the vicinity of the old Ponderosa Way bridge, and this has been a popular day use and swimming destination used by local residents for decades.

Hiking

There are no designated trails in this segment and access to the river on foot is very difficult except in areas immediately adjacent to powerhouses and their service roads. All other access is by cross-country hiking from adjacent roads and ridgetops.

Climbing, Canyoneering, and Gorge Scrambling

Segment D flows mostly through a rugged, steep gorge characterized by many pools and waterfalls that lends these sections to canyoneering and scrambling activities. Access to these areas is very limited but groups have led successful gorge scrambling trips in the section below the Middle Fork Mokelumne confluence (Sierra Club 2012)

Hunting

As discussed in Segment A, the entire study area lies within CDFW deer and black bear hunting Zone D5, quail zones Q1 and Q3, and is also open to sooty, blue, and ruffed grouse; band-tailed pigeon; and American crow. CDFW is responsible for issuing hunting licenses and tags for areas under public and private ownership within the study area. However, Segment D is surrounded by privately owned lands, so public access for hunting along the river corridor would be difficult.

Wildlife Viewing

This segment is not known for any specific wildlife viewing opportunities.

Cultural Resources

The only documented cultural resource in Segment D is the historic Ponderosa Way bridge, built in 1934. The pony truss bridge is still in place but its wooden roadbed is missing due to fire damage. A complete cultural survey of this river segment has not been conducted but it is expected to contain additional historical and cultural sites (BLM 2007).

Off-highway Vehicle Use

As discussed in Segment A, use of OHVs is not allowed on paved roads in the Eldorado National Forest and is prohibited, in general, on paved roads in California, reducing the opportunity for OHV use in the study area (DMV 2017). Use of OHVs is not common along this segment.

Winter Sports

As mentioned in Segment A, winter use near the Mokelumne River is generally light. The steepness of the Mokelumne River canyon generally precludes much winter use within the canyon.

Conclusion

Segment D flows mostly through a rugged, steep gorge characterized by many pools and waterfalls. The Ponderosa Run is a 3-mile-long, Class II-III whitewater run under normal flows. The put-in for this segment is at the Ponderosa Way bridge. PG&E maintains a designated Ponderosa Way Whitewater Take-Out Area that is open year-round. Overall, the recreational values in Segment C are considered to be excellent but not extraordinary.

Segment E

Segment E begins at the main stem of the Mokelumne River 300 feet downstream of the reregulating dam downstream of the Electra Powerhouse, and ends at the Pardee Reservoir flood surcharge pool. Segment E encompasses a distance of approximately 3.5 river miles. The river elevation in Segment E ranges from approximately 700 feet at the eastern end to approximately 580 feet at the western end. Most of Segment E—from the eastern end to a point approximately 1,300 feet upstream from the Highway 49 bridge crossing (approximately 2.5 miles)—lies within the Butte Fire burn area. The recreational resources and values are considered extraordinary in Segment E as discussed below.

Whitewater Boating

The Electra-Middle Bar Run is a 5-mile-long, Class II-II+ run under normal flows (portions are considered Class III above 1,500 cfs), with an average gradient of 17 fpm, making it a good recreational resource for training beginning paddlers since the difficulty of rapids increases as the run progresses (awetsate.com 2008, cacrecks.2009). This run is also accessible for standup paddleboarders, which is a fun new activity gaining popularity on easier whitewater runs. The river in this segment is characterized by swiftwater, riffles and eddies. This is also a scenic run with dependable year-round flows due to PG&E power generation activities. PG&E posts real-time, hourly flow data for the public. Each year, PG&E provides 3 days of recreational flows on the Electra Run at a minimum of 700 cfs in spring and 9 more days through summer during AN, BN and Wet water years. In addition to these flows prescribed for the Electra Run, if the 2 days of flow on the Devil's Nose Run and/or 6 days of flow on the Tiger Creek Run are not provided, then PG&E will provide 1 day of flow for each specified day not achieved on these runs on the Electra Run to provide whitewater boating opportunities on a different portion of the river. Additionally, during Dry or CD water years when flows are provided for Tiger Creek, they replace the 9 days of prescribed recreational flows on the Electra Run, during summer. (PG&E 2005.) A river ranger is on site during days of recreational flow releases (Pete Bell pers. comm.).

The put in for this run is well-marked and maintained by PG&E as the Electra Day Use Area with parking, sanitary facilities, and a large beach for launching boats, swimming, and fishing (PG&E 2017, awetstate.com 2008). The take-out for this run is at the designated BLM Big Bar River Access, at the Highway 49 bridge, where there is a large, pull-through parking area and pit toilets. By using the Big Bar take-out, beginning paddlers can avoid the most difficult rapid on this run. Alternately, paddlers can continue to the designated Middle Bar take-out, 2 miles downstream. A third option for paddlers, is to put-in at Big Bar and lap the most difficult rapid, Devil's Toiletbowl, to practice more difficult boating skills. The Middle Bar reach was formerly restricted from access to boaters but due to the popularity of adding this segment to the Electra Run (extending it by 2 miles) access was negotiated and since 2003, EBMUD maintains this designated take-out and day-use area with picnic tables, two pit toilets, and parking to accommodate 25 vehicles (EBMUD 2017, americanwhitewater.com 2017). Construction of the Big Bar and Middle Bar river access facilities was funded by the CDBW under the Boating Trails Act, which authorizes CDBW to pursue activities, which will increase opportunities for recreational boating on designated waterways.

Additionally, this run is easily accessible for regionally-important events, such as the Mokelumne River races. The Sierra Club Loma Prieta Paddlers have hosted an annual slalom and downriver kayak, canoe, and standup paddleboard race along the Electra Run, every September since 1978. This event has hosted up to 80 competitors in some years (mokeraces.com 2017, American Whitewater 2014).

The Electra-Middle Bar Run has been studied by BLM to assess the feasibility of allowing commercial rafting companies access to this reach; an environmental assessment was prepared, however the ability to run a pilot study for commercial use was thwarted by the recent drought and the current status of a pilot project is unknown (Katherine Evatt pers. comm.). Since 2007, O.A.R.S. has taken visitors down the river as a fundraising benefit for the Foothill Conservancy, these trips draw tourists from throughout northern California, in demonstration of the feasibility of commercial operations along this segment, but no plans for commercial operations have been finalized (Calaveras Enterprise 2014).

Fishing

This segment supports pikeminnow/hardhead, suckers, trout and other species which likely migrate out of the Pardee Reservoir (PG&E 1993 as cited in FERC 1996). This segment is also used by kokanee salmon migrating upstream from the reservoir to spawn during the fall months. Rainbow trout are planted annually from February through late May or June and these fish may migrate up into the lower segment of the study area, drawing anglers to the area. The river along this segment is accessible by hiking down from Electra Road that parallels the segment on the north side from the Electra Powerhouse to the Highway 49 bridge at Big Bar.

From the Middle Bar bridge, fishing is allowed on the river year-round. Upstream of Highway 49, fishing is allowed during the general trout season (last Saturday in April until November 15th (CDFW 2017b). Most of the best fishing opportunities fall between July and October (perfectfly.com 2017).

Camping

There are no opportunities for developed or primitive camping within Segment E of the study area. In lower segments (B, C, D, and E) of the river, between the USFS boundary and Pardee Reservoir, there are no camping facilities (with the exception of Roaring Camp, discussed in Segment C) because it is private land and there is little public access except for public day-use areas, bridge crossings, and the river corridor below the ordinary high-water mark, per State law.

Day-use Activities - Picnicking, Swimming, Gold Panning

This segment is very popular and heavily used for day-use activities. PG&E maintains the Electra Day Use Area and Fishing Access, open year-round. This area includes parking, picnic tables, barbeque grills, and restrooms. In addition to the popular swimming beach near the powerhouse, this section of river has very mild rapids, so while they are popular for beginning kayakers (previous section) this area is also very popular for swimmers and those floating the river by inner tube, there are many areas along this segment where users can stop at small beaches along the river or swim in pools. Parking is allowed along the 3-mile-long Electra Road, paralleling the river on the north side, which allows easy river access for day users. However, a small portion of the downstream-most portion of this segment is off-limits to swimmers. A sign placed by EBMUD along the river marks the easternmost boundary of Pardee Reservoir. It is against State law to allow body contact recreation within the reservoir boundary, like would occur during swimming. Only "incidental" body contact is allowed, as one may experience as a non-motorized boater.

Hiking

The Camanche-Pardee section of the Mokelumne Coast to Crest trail extends into this segment of the study area. However, the trail only intersects the study area at two places, slightly downstream of Del Orto Gulch and slightly downstream of Garavanta Gulch along a pedestrian-only narrow

gauge portion of the trail. This portion of the trail can be accessed from numerous locations near Camanche and Pardee Reservoirs, and the closest access to the study area is on the north side of the Middle Bar bridge near the take-out for the Electra-Middle Bar Run (EBMUD 2016).

Users may also enjoy a hike/walk or cycling along Electra Road on the north side of the river. The majority of the 3-mile road is located within 30 feet of the river bank as it climbs at less than a 1 percent grade. Wildflower viewing along the Electra Road is a popular activity.

Climbing, Canyoneering, and Gorge Scrambling

There are no known climbing destinations along Segment E.

Hunting

As discussed in Segment A, the entire study area lies within CDFW deer and black bear hunting Zone D5, quail zones Q1 and Q3, and is also open to sooty blue and ruffed grouse, band-tailed pigeon, and American crow. CDFW is responsible for issuing hunting licenses and tags for areas under public and private ownership within the study area. However, Segment C is surrounded by privately owned lands, so public access for hunting along the river corridor would be difficult.

Wildlife Viewing

The river corridor along the Electra Road is a popular area for birdwatching due to easy access and high species diversity.

Cultural Resources

Cultural sites along Segment E include early hydroelectric projects, chlorination plants associated with hard rock gold mining, and the former site of a Miwok ceremonial building associated with Pedro O'Connor, a well-known Miwok leader and dancer (Maniery and Dutschke 1989). Early hydroelectric projects such as the remains of the Blue Lakes and original Electra power plants, including their associated features (houses, ditches, roads, transmission lines, etc.) are hydroelectric power projects built around the turn of the century with financial backing of European Prince Andre Poniatowski and San Francisco banker W.H. Crocker, both historically well-known, regionally influential people. The powerhouses and their features have been largely reduced to concrete footings yet they are surviving examples of early hydroelectric operations (BLM 2007.).

Chlorination plants are located on the south side of the river canyon. The Boston Mine is an extensive hard rock gold mining complex that includes the remains of several mills and two well-preserved chlorination plants used to separate gold from refractory sulphide concentrates (BLM 2007).

Pedro O'Connor used a conically shaped building (no longer standing) for ceremonial purposes in the early 1900s (Maniery and Dutschke 1989). Native Americans consider this an important site because it was one of the last surviving ceremonial buildings in the area. A complete cultural survey of this river segment has not been conducted but it is expected to contain historical and cultural sites since the Miwok and their ancestors called the river canyon home for more than 2,500 years and the river canyon is a historic trade route that linked the indigenous people of the western Sierra with Eastern Sierra and Great Basin tribes (BLM 2017). Given the numerous cultural resources discovered along the Mokelumne River, there are likely other existing cultural sites along this segment.

Off-highway Vehicle Use

As discussed in Segment A, use of OHVs is not allowed on paved roads in the Eldorado National Forest and is prohibited, in general, on paved roads in California, reducing the opportunity for OHV use in the study area (DMV 2017). Use of OHVs is not common along this segment.

Winter Sports

As mentioned in Segment A, winter use near the Mokelumne River is generally light. However, Segment A is accessible to the public during winter.

Conclusion

Segment E is easily accessible and very popular and heavily used for day-use activities. PG&E maintains the Electra Day Use Area and Fishing Access, open year-round. This area includes parking, picnic tables, barbeque grills, and restrooms. In addition to the popular swimming beach near the powerhouse, this section of river has very mild rapids, so while they are popular for beginning kayakers, this area is also very popular for swimmers and those floating the river by inner tube. The Electra-Middle Bar Run is a 5-mile-long, Class II-II+ run under normal flows (portions are considered Class III above 1,500 cfs), making it a good recreational resource for training beginning paddlers since the difficulty of rapids increases as the run progresses. This run is also accessible for standup paddleboarders. Additionally, this run is easily accessible for regionally-important events, such as the Mokelumne River races. The Sierra Club Loma Prieta Paddlers have hosted an annual slalom and downriver kayak, canoe, and standup paddleboard race along the Electra Run, every September since 1978. Segment E offers unique recreational values combining easy accessibility, whitewater boating, and a plethora of day-use activities; recreational values are therefore considered to be extraordinary.

All Segments

When evaluated individually, Segments A – E range from extraordinary to excellent recreational resources and values as described above. However, the recreational resources and values when considered as a whole through Segments A – E are considered to be extraordinary given the wide variety of unique and diverse recreational opportunities. Although by themselves, Segments C and D were considered to have excellent but not extraordinary recreational values, these two segments combined offer additional recreational resources such as a remote and deep river canyon (Segment C1), a wide variety of developed recreational opportunities at Roaring Camp (Segment C2), and additional whitewater boating opportunities at the Ponderosa Run (Segment D). Taken together, Segments A-E provide approximately 40 miles of recreational opportunities that include numerous camping, day-use, and various types of whitewater boating opportunities, augmented by the recreational opportunities at privately owned Roaring Camp and the ability for recreationalists to enjoy isolated and remote river canyons or highly accessible river reaches. Consequently, Segments A – E are all considered to provide unique and extraordinary recreational resource values.

4.4.3 Extraordinary Resource Values

Segment A provides an extraordinary recreational resource along its entire length, though for different users in different areas. The upper one-third of the segment is accessible by road; however, the remoteness and prohibition on OHV use in the White Azalea, Moore Creek, and Mokelumne Campgrounds contribute to an opportunity for solitude (especially on weekdays) and a primitive camping experience for families on the banks of the North Fork Mokelumne River. This area also allows

anglers to access the river for rainbow and brown trout fishing and the riverside campgrounds are a popular base for climbers enjoying crowd-free, secluded climbing on Calaveras and Hammer Domes, overlooking the river. Few other domes in the Sierra are as easily accessible by car, and many that are become congested along the climbing and access routes. This area provides a rare, unique, and exemplary experience for climbers.

The entire length of Segment A provides an outstanding recreational experience for whitewater boaters along a steep, 15-mile, Class III-V run that is without impoundments or modifications along its length, allowing boaters to experience a rare and unique wilderness run that is exemplary of Sierra morphology and scenery, but with a maintained put-in and take-out accessible by vehicle, at Devil's Nose River Access and Tiger Creek Dam take-out. This run has gained recognition in the paddling community due to reliable, post-settlement releases, and is considered one of the most scenic runs in California.

Segment B provides extraordinary recreational resource values due to the presence of the Tiger Creek Run and plentiful day-use facilities. The Tiger Creek Run is recognized among the paddling community as a setting for national or regional use and as a unique, rare, and exemplary recreational resource since it provides an opportunity for paddlers to practice "creeking" skills on Class IV rapids and Class III "ledge-drops" without the safety risk associated with paddling a Class V reach where similar river features are often found. This recreational experience is unique due to its length, ease of accessibility, and level of difficulty not available to boaters in easily accessible portions of the Sierra, and is especially unique due to mandated PG&E flow releases that allow boating on this reach after many other Class IV runs are finished for the summer.

Additionally, as the Tiger Creek Run does not require a long shuttle, paddlers have the opportunity to boat this area more than once in a day, or combine paddling with other family-friendly activities, including picnicking and swimming, due to the availability of the Tiger Creek Day Use Area and a road running the length of the segment. Additionally, visitors can also hike/walk along the gravel River Road that parallels the river on the north side of this entire segment and access deep pools for swimming opportunities along a free-flowing river that is rare in the mid-elevation Sierra.

Segments C and D provide excellent, but not extraordinary, recreational resources and values, offering a very different experience than the other segments. The lower portion of Segment C includes the privately-owned Roaring Camp Mining Company which provides visitors a river-based recreational and cultural experience popular with families at a historic gold mining camp, that is a unique experience along a major river in the Sierras. Many families visit Roaring Camp repeatedly over several years, enjoying the opportunity for swimming along a calm stretch of the river, fishing, and panning/sluice boxing for gold thereby experiencing a part of California history. Segment C upstream and downstream of the developed Roaring Camp facilities, and the upper portion of Segment D, are suitable for canyoneering and gorge-scrambling activities, and provide a backcountry, wild river experience for those recreational users adventurous enough to hike into the canyon. The lower portion of Segment D includes the Ponderosa whitewater run (runnable during high water years and during FERC-mandated releases) and the swimming and day-use area at the Ponderosa Way bridge, that has been popular with locals for decades.

Recreational values provided within Segment E are extraordinary since this segment provides a setting for national or regional use as a recognized training run for beginning whitewater boaters among the paddling community, with a reliable release schedule to support recreation. The Electra-Middle Bar whitewater run is also a unique, rare, and exemplary recreational resource as compared to other rivers in

the region, since this type of run is difficult to find in other areas of the Sierra foothills due to the presence of main stem dams or limited access due to land ownership. This segment also supports competitive events (Annual Mokelumne River Races). Additionally, this segment has the ability to attract visitors from throughout and beyond the immediate vicinity as demonstrated by annual fundraising rafting trips that draw participants from as far away as the Bay Area.

This segment is heavily used for other day-use activities and is especially popular with family's due to the Electra Day Use Area and Fishing Access and designated take-out locations downstream. The segment is also accessible by road for its entire length, and is not a fee area, offering visitors a less crowded experience than is present on other rivers with similar resources, such as the South Fork and Lower American Rivers. The commitment to supporting this area as a recreational resource is demonstrated by the investment made by landowners and resource managers (PG&E, BLM, EBMUD, and CDBW) to provide year-round access to maintained facilities.

Segment E also provides a connection to the Mokelumne Coast to Crest trail, where day users can continue a hike/walk begun along the Electra Road down to Pardee and Camanche Reservoirs, or vice-versa, providing a regionally important connection from lake recreation areas to a Sierra river experience.

Although by themselves, Segments C and D were considered to have excellent but not extraordinary recreational values, these two segments combined offer additional recreational resources such as a remote and deep river canyon (Segment C1), a wide variety of developed recreational opportunities at Roaring Camp (Segment C2), and additional whitewater boating opportunities at the Ponderosa Run (Segment D). Taken together, Segments A-E provide approximately 40 miles of recreational opportunities that include numerous camping, day-use, and various types of whitewater boating opportunities, augmented by the recreational opportunities at privately owned Roaring Camp and the ability for recreationalists to enjoy isolated and remote river canyons or highly accessible river reaches. This array of both relaxing and challenging recreational opportunities and values is unique among western Sierra Nevada rivers and already designated State Wild and Scenic Rivers. Consequently, Segments A – E are all considered to provide unique and extraordinary recreational resource values.

Representative Photographs: Recreational Values

Representative Photographs – Segment A

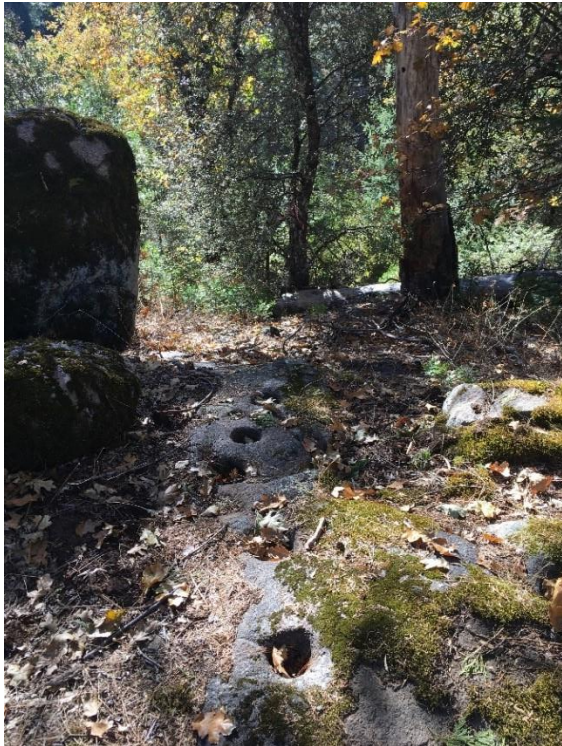


A-1 Mokelumne River Campground



A-2 Wading near Mokelumne River Campground

Representative Photographs – Segment A (continued)



A-3 Riverside Mortar Cultural Site



A-4 Pools for swimming, wading, and angling near campgrounds and day-use areas

Representative Photographs – Segment A (continued)



A-5 Rock climbing occurs at Hammer Dome



A-6 Rock climbing occurs at Calaveras Dome

Representative Photographs – Segment A (continued)

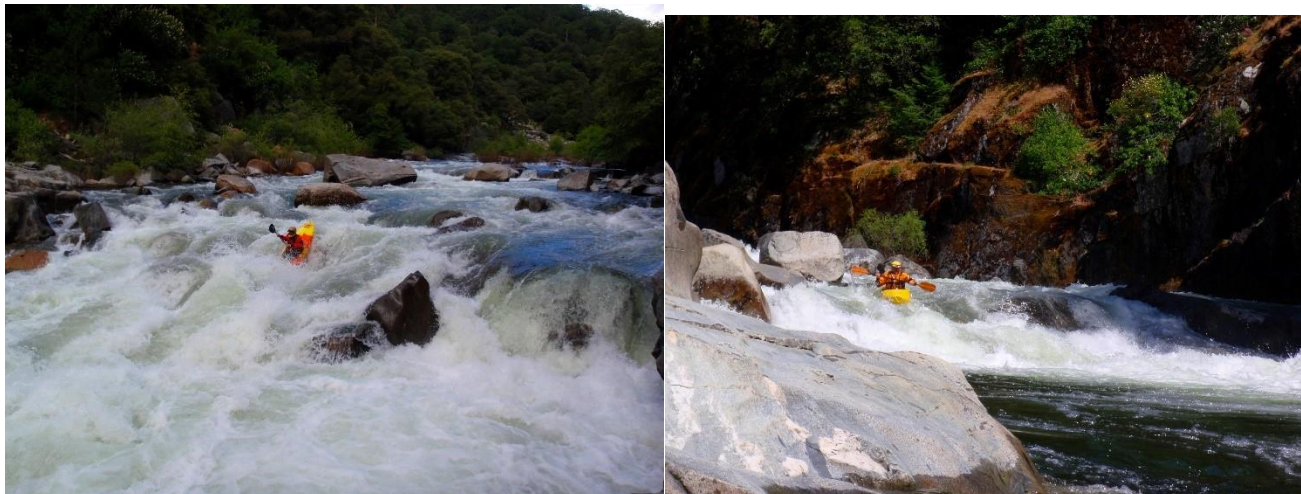


A-7 Angler at Bruce Crossing



A-8 Devil's Nose river access point

Representative Photographs – Segment A (continued)

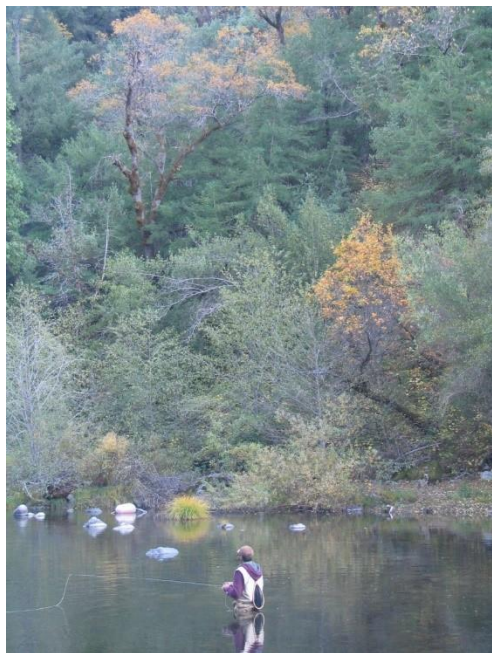


A-9a Kayakers on Devil's Nose Run – running the “Cascade But Bigger” Rapid and scouting Mokelumne Falls



A-9b Kayakers on Devil's Nose Run – running the “Cascade But Bigger” Rapid and scouting Mokelumne Falls

Representative Photographs – Segment A (continued)



A-10 Angler at lower end of Segment A
above Tiger Creek

Representative Photographs – Segment B



B-1 Angler at the Tiger Creek Run



B-2a Swimmers at pools near Highway 26 Bridge

Representative Photographs – Segment B (continued)



B-2b Kayakers at pools near Highway 26 Bridge



B-3 Rafting guide training trip on Tiger Creek Run

Representative Photographs – Segment B (continued)



B-4 Family fishing and kayakers at take-out near Highway 26 Bridge



B-5 Family picnicking and rafters using dedicated take-out for Tiger Creek Run

Representative Photographs – Segment B (continued)

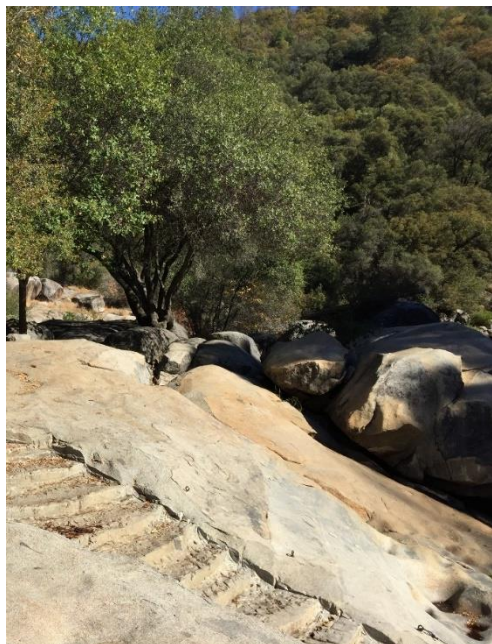


B-6 Kayakers on the Tiger Creek Run



B-7 Signage for boaters at designated Tiger Creek Run take-out

Representative Photographs – Segment B (continued)



B-8 Stairs to provide safe entry/exit for boaters and swimmers at day-use area

Representative Photographs – Segment C



C-1a Riverside picnic areas at Roaring Camp



C-1b Riverside picnic areas at Roaring Camp

Representative Photographs – Segment C (continued)



C-2 Riverside camping at Roaring Camp



C-3 Riverside gold mining at Roaring Camp

Representative Photographs – Segment C (continued)



C-4a Rock diving and swimming at Roaring Camp



C-4b Rock diving and swimming at Roaring Camp

Representative Photographs – Segment C (continued)



C-5 Angling at Roaring Camp



C-6 Floating at Roaring Camp

Representative Photographs – Segment C (continued)



C-7a Backcountry hiking/rock scrambling



C-7b Backcountry hiking/rock scrambling

Representative Photographs – Segment D



D-1a Scrambling to access river downstream of Roaring Camp



D-1b Scrambling to access river downstream of Roaring Camp

Representative Photographs – Segment D (continued)



D-2 Old Ponderosa Way Bridge and swimming, day use, and kayak put-in for Ponderosa Run



D-3 Dropping into Chute Rapid #3 on Ponderosa Run

Representative Photographs – Segment D (continued)



D-4a Inflatable kayaks on Ponderosa Run



D-4b Inflatable kayaks on Ponderosa Run

Representative Photographs – Segment D (continued)



D-4c Inflatable kayaks on Ponderosa Run

Representative Photographs – Segment E



E-1a Drop-in to Devil's Toilet Bowl Rapid



E-1b Chute Rapid

Representative Photographs – Segment E (continued)



E-2 Young rafters on Electra Run



E-3 Floater on Electra Run

Representative Photographs – Segment E (continued)



E-4 Kayakers departing for Electra Run



E-5 Canoeer participating in the Annual Mokelumne River Race – slalom event

Representative Photographs – Segment E (continued)



E-6 Standup paddleboarder participating in the Annual Mokelumne River Race – slalom event



E-7 Tandem kayak participating in the Annual Mokelumne River Race – slalom event

Representative Photographs – Segment E (continued)

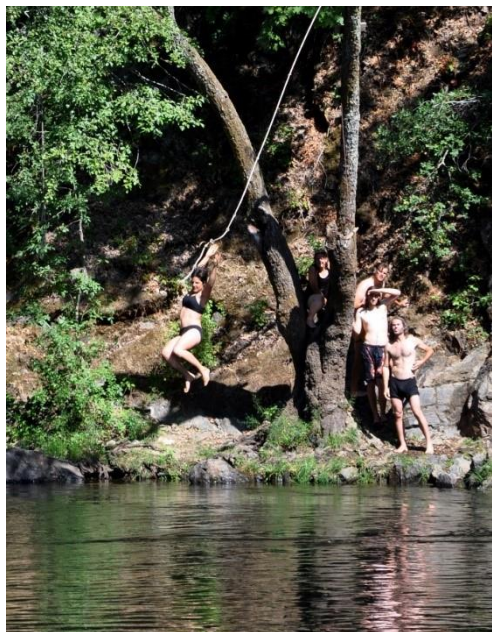


E-8a Day users along Electra Run

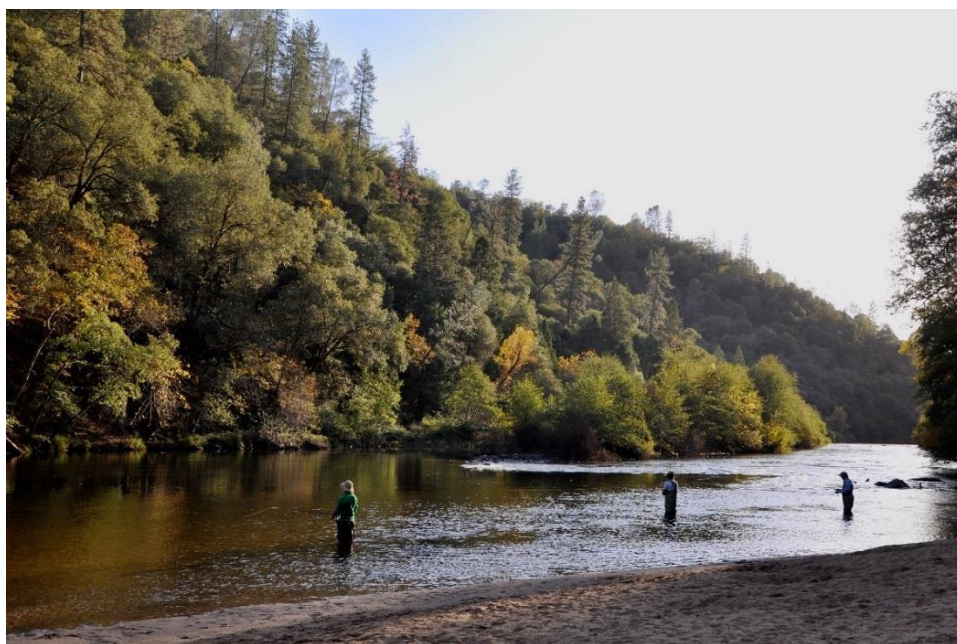


E-8b Day users along Electra Run

Representative Photographs – Segment E (continued)



E-9 Swimmers in Electra Day Use Area



E-10a Fly fishing for kokanee salmon at Electra Day Use Area

Representative Photographs – Segment E (continued)



E-10b Fly fishing at Electra Day Use Area

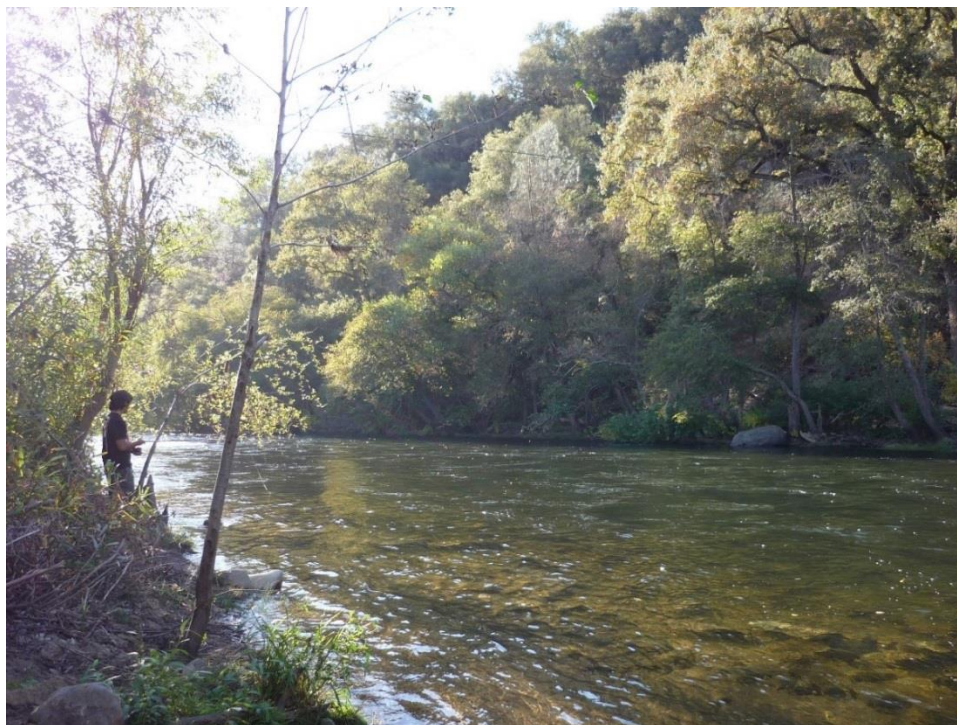


E-11 Spin fishing at Electra Day Use Area

Representative Photographs – Segment E (continued)

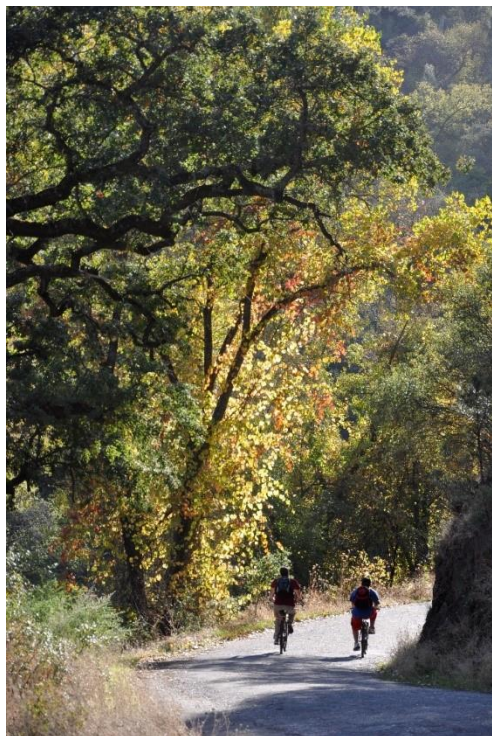


E-12 Big Bar Launch signage



E-13 Fishing below Big Bar Launch

Representative Photographs – Segment E (continued)



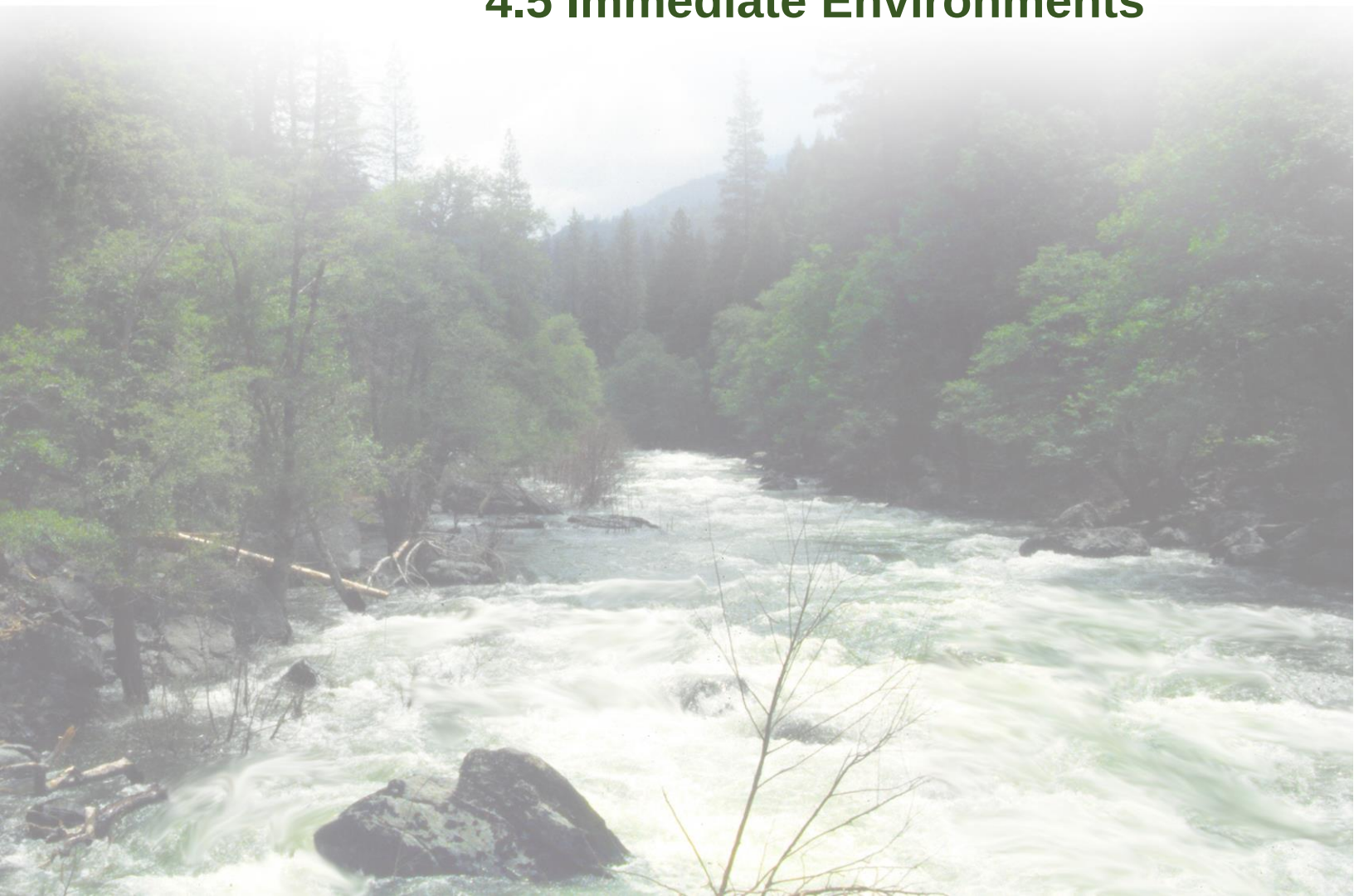
E-14 Bikers on Electra Road
next to river



E-15a Spring wildflowers along Electra Road and river

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4.5 Immediate Environments



4.5 Immediate Environments

The California Wild and Scenic Rivers Act focuses on extraordinary fishery, wildlife, scenic, and recreational values (PRC Sec. 5093.50). These values were discussed in the previous sections of this chapter. The “immediate environments” of rivers included in the State System are also important to be preserved with these four values (PRC Sec. 5093.50) and also can influence the quality of the fishery, wildlife, scenic, and recreational values. For these reasons, this section provides brief summaries of the following additional resources that are part of, and affect, the immediate environments of the Mokelumne River study segments:

- Climate and climate change
- Geology and mineral resources
- Hydrology and water quality
- Botanical resources
- Cultural (archaeological) resources
- Historical resources
- Scientific, educational, and ecological resources

Much of the information presented below was summarized from the two Federal Wild and Scenic River studies of the Mokelumne River (USFS 1990, BLM 2007).

4.5.1 Climate and Climate Change

The study area has a typical Mediterranean climate that consists of warm, dry summers and wet, cold winters. Elevations in the study area range from approximately 3,600 feet at the eastern end to approximately 580 feet at the western end. Therefore, most precipitation falls as rain (rather than snow) from October through April. The average annual precipitation for the period 1951–1998 at the Tiger Creek Powerhouse (elevation 2,355) was approximately 47 inches (University of California Division of Agriculture and Natural Resources 2017).

Climate change is expected to affect river flows and water supply and demand throughout California and in Amador County over the long-term. Climate change could cause more frequent and/or severe droughts, thus increasing the seasonal and annual variability of water demand. Climate change is also expected to shift precipitation patterns so that more winter precipitation falls as rain rather than snow, thus increasing winter streamflows and decreasing spring and summer streamflows of the Mokelumne River. Overall, Sierra Nevada snowpack is also expected to decline by 48–65 percent. Additionally, precipitation is expected to fall in fewer, more intense storms with more frequent long droughts between events as compared to historical precipitation patterns. (RMC 2017.)

Climate change is already affecting biological variables such as distribution and abundance of high elevation animals and plants, animal migration timing, and plant blooming periods. Longer and deeper periods of droughts will also increase the frequency, extent, and magnitude of wildfires in the study area. These changes could alter the fishery, wildlife, scenic, and recreational resources and values in the study area but are long-term and should not change these values to such a degree that the extraordinary scenic or recreational values would not be extraordinary. Rather, climate change would likely play a bigger role in its effect on long-term local and regional water supplies evaluated in Chapter 5, “Suitability Evaluation.”

4.5.2 Geology and Mineral Resources

The study area is located within granitic plutonic rocks, undifferentiated Paleozoic rocks, and the Calaveras Complex (Wagner et al. 1981). The downcutting action of the Mokelumne River over millions of years has eroded the younger surficial sediments and exposed the older granitic rocks that make up the Sierra Nevada geomorphic province. Particularly in Segment A, these erosional forces have exposed granite more than 1,000 feet high along the river canyon. Weathering has also resulted in huge chunks of rock that have broken loose from the canyon walls over millions of years; these rocks are visible as car- and house-sized boulders strewn along the canyon floor. Weathering has also created interesting geological formations, particularly in Segment D, where several large, vertical, freestanding columns of rocks are exposed along the riverbed (see photographs in Section 4.3, “Scenic Values”).

The Garnet Hill Mine is located on the southern side of the North Fork Mokelumne River in Segment A, near the Moore Creek Campground. The first recorded activity in the area occurred during World War I when tungsten ores were first mined; however, reports of fine garnet and epidot crystals from the area were first published in 1896. Mining activity has been sporadic and the Garnet Hill Mine is active only when tungsten prices permit. The most recent commercial activity was during the 1950s; at present, most of the activity at Garnet Hill is centered on the production of andradite and epidot specimens. The mine workings are located in two separate areas. At the summit of Garnet Hill, several pits explored the contact zone and the bulk of the early production came from this area. Near Moore Creek, two adits were driven to explore another contact zone and the bulk of the later production came from this area. The area has been heavily picked over by collectors for many years but specimens can still be hand-dug out of Garnet Hill and near Moore Creek. (Cooper 2002.)

As of February 16, 2006, 45 mining claims had been filed with BLM in Segments C and D, two of which are active. The Roaring Camp Mining Company conducts mining operations on its private lands near the confluence of the North and Middle Forks. BLM has also issued a lease to Roaring Camp for mining public lands adjacent to its private lands in this part of the canyon. Because placer gold deposits occur in the river channel, the river has potential for recreational panning, sluicing, and suction dredging activities throughout its length. There is also a potential for continued lode gold prospecting in historic underground mines. Upstream of Highway 26 in Segment B, the river canyon flows through the Railroad Flat–Buckhorn Lodge gold-bearing mineralized zone. The river canyon cuts through the Glencoe-Pioneer belt of quartz veins in granodiorite of the West Point Pluton, located 1–3 miles downstream of Highway 26 in Segment C. Over 25,000 ounces of gold have been produced from mines in this mineralized zone. More than half of the mining claims are in the Glencoe-Pioneer belt, including claims being worked under the second active notice of operations (which involves the exploration of underground workings). The river canyon intersects another gold-bearing mineralized zone, the Rich Gulch–Volcano trend, 0.5–2.5 miles downstream of the confluence of the North and Middle Forks in Segment D. Finally, downstream of Electra Powerhouse in Segment E, the river canyon flows through the Mokelumne Hill area gold-bearing mineralized zone. Historically, there has been significant gold production from mines in these areas, but no production has been reported for more than 40 years. (BLM 2007.)

4.5.3 Hydrology and Water Quality

The Mokelumne River is formed by the confluence of several forks that rise in the central Sierra Nevada in the Stanislaus National Forest. The 62-mile-long North Fork is the largest, originating at Highland Lakes at an elevation of 8,584 feet. From its source, the river flows north then west for 28 miles to Salt Springs Reservoir. Below Salt Springs Dam, at the eastern end of the study area, the North Fork receives

flows from the Bear River along with other smaller tributaries and then passes through the Tiger Creek Reservoir before joining with the Middle Fork southeast of Pine Grove. The lower portion of the North Fork defines the border between Amador and Calaveras Counties, as well as the border between the Eldorado and Stanislaus National Forests. The confluence of the North and Middle Forks forms the main stem of the Mokelumne River, which continues to flow west-southwest past Mokelumne Hill and into Pardee Reservoir. The Upper Mokelumne River Basin, which includes the study area, drains about 550 square miles of the total Mokelumne River watershed.

Numerous water quality monitoring stations are located throughout the Upper Mokelumne River system, including the North and Middle Forks Mokelumne River, as well as several tributaries. Water quality in the upper watershed is widely regarded as very good, attributed to the general lack of available public access, lack of development, and lack of logging operations due to the steep, high canyon walls. (Upper Mokelumne River Watershed Council undated.)

Water quality in the North Fork and Main Mokelumne River is rated extremely high. Most of the Basin Plan objectives have been met in Segments B–E. Water temperatures during July and August do exceed 68°F downstream of the West Point Power House. However, this would have occurred naturally in the reach's unimpaired hydrograph during hot, summer months. Water temperature downstream of the Electra Power house stays at or below 68°F because of releases at Lake Tabeaud through Electra Power House. EBMUD provides domestic drinking water to 1.2 million customers from the East Bay; 90% of this domestic drinking supply comes from the Mokelumne River. The North Fork and Main Mokelumne River is monitored by PG&E for water quality in meeting the Basin Plan objectives. BLM, USFS, FERC, CDFW, and various nongovernmental organizations are working with PG&E to monitor water quality. BLM expects that water quality from the Mokelumne River will continue to be high because of the undeveloped character of the upper watershed, and the interest by stakeholders and agencies to continue to protect and enhance water quality. (BLM 2007.)

4.5.4 Botanical Resources

A complete description of vegetation/habitat types through all segments of the study area is presented in Section 4.1, “Wildlife Values.” Although no rare plant species were identified in Segment A by USFS (1990), they reported that a study conducted by Amador County in 1987 (for the Devil's Nose/Cross County FERC no. 8759 and 8144 Water-Power Project) indicated favorable habitat may be present in Segment A for six rare plant species: Pleasant Valley Mariposa Lily (*Calochortus clavatus* var. *avius*), Sierra Sedge (*Carex paucifructus*), Congdon's Lewisia (*Lewisia congdonii*), Saw-toothed Lewisia (*Lewisia serrata*), Stebbins' Phacelia (*Phacelia stebbinsii*), and Short-petaled Campion (*Silene invisa*).

4.5.5 Cultural (Archaeological) Resources

Native Americans have used the resources of the present-day North Fork Mokelumne River and the adjacent Mokelumne Wilderness for the last 2,000–10,000 years. When Euro-Americans first arrived in the middle of the 19th century, the Mokelumne River was part of the traditional territories of the Sierra Miwok. These people hunted seasonally for deer, bear, and smaller game and gathered plants for food, fiber, and medicine.

Most of Segment A has been inventoried for cultural resources, and more than 110 prehistoric and historic cultural sites have been recorded. These include single bedrock mortar milling stations (used by Native Americans to grind acorns), multi-feature sites containing flake stone tool scatters, depressions from dwellings and ceremonial roundhouses, petroglyphs, historic mining debris and hydroelectric development

features (remnants of flumes, ditches, and cabin foundations), and 20th century occupation sites. In Segment A, these resources indicate at least a 2,000-year-old occupational sequence. Many of the prehistoric sites represent traces of the Native Americans who entered the Mokelumne River canyon within the last 500–800 years. The Northern Sierran Miwok occupied permanent settlements at an elevation of 2,000–3,000 feet. In summer, native peoples traveled into the mountains and established seasonal camps such as those found in Segment A. Summer dwellings used in the higher elevations consisted of a conical lean-to of bark or a thatched structure over a pole framework. At times, these temporary dwellings were built over a bedrock outcrop to allow grinding of acorns during wet or extremely hot weather. These bedrock mortars are present throughout the study area. The Northern Sierra Miwok used stone knives, bone or flaked stone scrapers, ground stone tools such as manos and mortars, and many other different tools. Many of these tools have been identified throughout Segment A. (USFS 1990.)

Before 1848, the Miwok groups had little contact with the Euro-American settlers, and the Northern Sierra Miwok population may have numbered around 2,000. However, gold miners saturated the region starting in 1848 and overpowered the Miwok populations. Some of the Miwok people, such as those living at Railroad Flat and West Point, were able to maintain some of their traditional values under conditions of change. Many others had to adopt nontraditional lifestyles because seasonal migration patterns and fishing were disrupted with fencing and siltation from mining operations. (USFS 1990.)

Segment D contains the former site of a Miwok ceremonial building associated with Pedro O'Connor. O'Connor, a well-known Miwok leader and dancer, used the conically shaped building (no longer standing) for ceremonial purposes in the early 1900s (Maniery and Dutschke 1989). Native Americans consider this an important site because it was one of the last surviving ceremonial buildings in the area. Although a complete cultural survey of the North Fork Mokelumne from the Tiger Creek Afterbay to the main stem at the Highway 49 bridge has not been conducted, the area is expected to contain numerous historical and cultural sites. (BLM 2007.)

4.5.6 Historical Resources

The first European parties to explore the Mokelumne River were likely Spanish military expeditions in Alta California in the late 18th or early 19th century. The first permanent European settlement was established on the Mokelumne River in 1830, at Happy Valley near present-day Mokelumne Hill, as an outpost for French fur trappers. In 1848, Samuel W. Pearsall found gold at Mokelumne Hill, which by 1850 grew into a boomtown of 15,000 people. (BLM 2007.)

Chlorination plants are located on the south side of the river canyon. The Boston Mine (Ca-Cal-957H) is an extensive hard rock gold mining complex that includes the remains of several mills and two well-preserved chlorination plants used to separate gold from refractory sulphide concentrates. A historic bridge across the river is located on Ponderosa Way. The steel bridge is still in place but its wooden elements were damaged by wildfire. (BLM 2007.)

The Roaring Camp Mining Company is located at Clinton Bar at the western end of Segment C, just before the confluence of the North and Middle Forks of the Mokelumne. Gold mining at Clinton Bar began in the 1850s, when Roaring Camp was accessible only by horseback. (BLM 2007.)

4.5.7 Scientific, Ecological, and Educational Resources

The scientific, ecological, and educational opportunities within the Mokelumne River study area are numerous and wide ranging. The steep, rugged terrain and limited vehicle access points preserve a low level of human disturbance in most segments.

The Mokelumne River study area provides habitat for a variety of common and special-status wildlife species. The presence of this relatively undisturbed perennial river flowing through a variety of vegetation communities substantially increases habitat quality and wildlife use in the area. In addition, throughout most of Segment A, the river represents the southern boundary of Salt Springs State Game Refuge, in which all hunting is prohibited. This further reduces human disturbance in the area and protects game species. The diversity of vegetative communities reflects the area's large elevational gradients (3,600 feet at the upstream end in the east transitioning to 580 feet at the downstream end in the west) and can also be attributed to the variety of other physical gradients present in the study area, including slope, hydrology, geology, and climate. The primary vegetation types include conifer, montane hardwood, montane hardwood-conifer, blue oak-foothill pine, chaparral, and grassland. Riparian vegetation in a thin belt along the river is also present in most locations. Five special-status wildlife species have been recently documented in the study area: foothill yellow-legged frog (*Rana boylei*), western pond turtle (*Emys marmorata*), golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), and California spotted owl (*Strix occidentalis occidentalis*). Sierra Nevada yellow-legged frog (*Rana sierrae*) is known to occur at high elevations just outside the study area boundary, and fisher (*Pekania pennanti*) has historically been documented in the study area.

The North Fork Mokelumne River was extensively stocked with rainbow trout between 1930 and 2008 by CDFG for recreational fishing, but stocking has not occurred since 2008 (CDFW 2017). Fisheries surveys conducted by PG&E (2017) identified 13 species (seven native and six nonnative) present at various locations from the headwaters downstream to the Electra Powerhouse, including steelhead/rainbow trout, Lahontan cutthroat trout, brown trout, and brook trout. In addition, Segment E is also used by kokanee salmon (*Oncorhynchus nerka*, an introduced species) migrating upstream from Pardee Reservoir to spawn during fall. Of the 13 species identified, California roach (*Lavinia symmetricus*), riffle sculpin (*Cottus gulosus*), and hardhead minnow (*Mylopharodon conocephalus*) are listed as California species of special concern. Segments A and E are popular for recreational fishing, although substantially less fishing occurs in Segment A because of the difficulty and time-consuming nature of access.

Segment A is part of the Mokelumne River Canyon Archaeological District and an Archaeological Special Interest Area established by the Eldorado National Forest. Over 100 prehistoric and historic sites have been inventoried in Segment A, more than half of which were determined to be largely intact (USFS 1990). Although Segments B–E have not been inventoried yet, BLM (2007) anticipates that numerous prehistoric and historic sites are present.

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4.6 Eligibility and Classification



4.6 Eligibility and Classification

4.6.1 Eligibility

The California Wild and Scenic Rivers Act preserves designated rivers or river segments that are (1) free-flowing, and (2) possess at least one extraordinary wildlife, fishery, scenic, or recreational value.

Free Flowing

The Act defines "free-flowing" as "existing or flowing without artificial impoundment, diversion, or other modification of the river." The presence of low dams, diversion works, and other minor structures does not automatically bar a river from being considered for inclusion in the System. (PRC Sec. 5093.52.) Several rivers, such as the Klamath, Trinity, Eel, and lower American Rivers, are included in the System despite substantial flow modifications by pre-existing upstream impoundments and diversions. The North Fork Mokelumne River and main stem Mokelumne River have several small PG&E impoundments, but these reaches are excluded from consideration in AB 142. Upstream reservoirs in the watershed, and diversions for power generation by PG&E and local water use occur within the watershed. Although the five study segments are not naturally free-flowing, they are similar to many other rivers, such as those listed above, that have been included in the California Wild and Scenic Rivers System, either in the original Act or as additions. The five river segments, therefore, are considered to be "free flowing" as defined in the Act and compared to other similar river segments included in the State System.

Extraordinary Fishery, Wildlife, Scenic, or Recreational Values

The five study segments were found to each possess extraordinary recreational values. Segments A, B, and C1 were found to possess extraordinary scenic values. Therefore, all five study segments are eligible to be included in the California Wild and Scenic River System, as discussed in Sections 4.1–4.5.

4.6.2 Classification

Eligible segments must be classified as wild, scenic, or recreational based on the condition of the river corridor at the time of the study. These classifications are defined in the California Act (PRC Sec. 5093.53) as follows:

- *Wild rivers*: "those rivers or segments of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted";
- *Scenic rivers*: "those rivers or segments of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads"; and
- *Recreational rivers*: "those rivers or segments of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past".

The classification terms are a guide to the level of existing development, not a description of any particular extraordinary value identified for the potential or designated river. For example, "recreational" or "scenic" river segments (so designated because of their level of development) may not possess

recreational or scenic extraordinary values, respectively; eligibility and classification are completely independent analyses.

These bulleted definitions above were used to classify the five eligible river segments as wild, scenic, or recreational. A conceptual decision tree approach is presented in **Figure 4-8**.

Table 4-4 shows results of the classification analysis as applied to the five eligible Mokelumne River segments. Accessibility (roads vs. trails) and watershed and shoreline (essentially primitive vs. largely primitive and undeveloped) were the two key factors determining whether a segment was wild, scenic or recreational; the waters of both the North Fork Mokelumne River and main stem Mokelumne River are unpolluted and classified as Category 2 water bodies (SWRCB 2015).

The recommended classification of segments (wild, scenic, or recreational) were classified under the Act as follows:

- **Segment A1:** North Fork Mokelumne River from 0.50 mile downstream of the Salt Springs Dam to Bear Creek confluence (**Recreational**); **Segment A2:** Bear Creek confluence to 0.50 mile upstream of the Tiger Creek Powerhouse (**Wild**).
- **Segment B:** North Fork Mokelumne River from 1,000 feet downstream of the Tiger Creek Afterbay Dam to State Highway Route 26 (SR-26) (**Wild**).
- **Segment C1:** North Fork Mokelumne River from 400 feet downstream of the small reregulating dam at the outlet of the West Point Powerhouse to the southern boundary of Section 12, T6N R12E (**Wild**); **Segment C2:** Section 12 boundary to confluence of the North and Middle Forks Mokelumne River (**Recreational**).
- **Segment D:** Main stem Mokelumne River from the confluence of the North and Middle Forks to 300 feet upstream of the Electra Powerhouse (**Scenic**).
- **Segment E:** Main stem Mokelumne River from 300 feet downstream of the small reregulating dam downstream of the Electra Powerhouse to the Pardee Reservoir flood surcharge pool at 580 feet elevation above mean sea level (**Recreational**).

The inclusion of subsegments (A1 and A2) for Segment A is because Segment A has two distinct subsections: A1, which meets the definition for a “recreational” classification; and A2, which meets the definition for a “wild” classification.

The inclusion of subsegments (C1 and C2) for Segment C is because Segment C has two distinct subsections: C1, which meets the definition for a “wild” classification; and C2, which meets the definition for a “recreational” classification.

Table 4-5 summarizes extraordinary values and classification by river segment. **Figure 4-9** depicts the recommended segment classifications graphically.

Figure 4.8

Decision Tree for Classifying River Segments

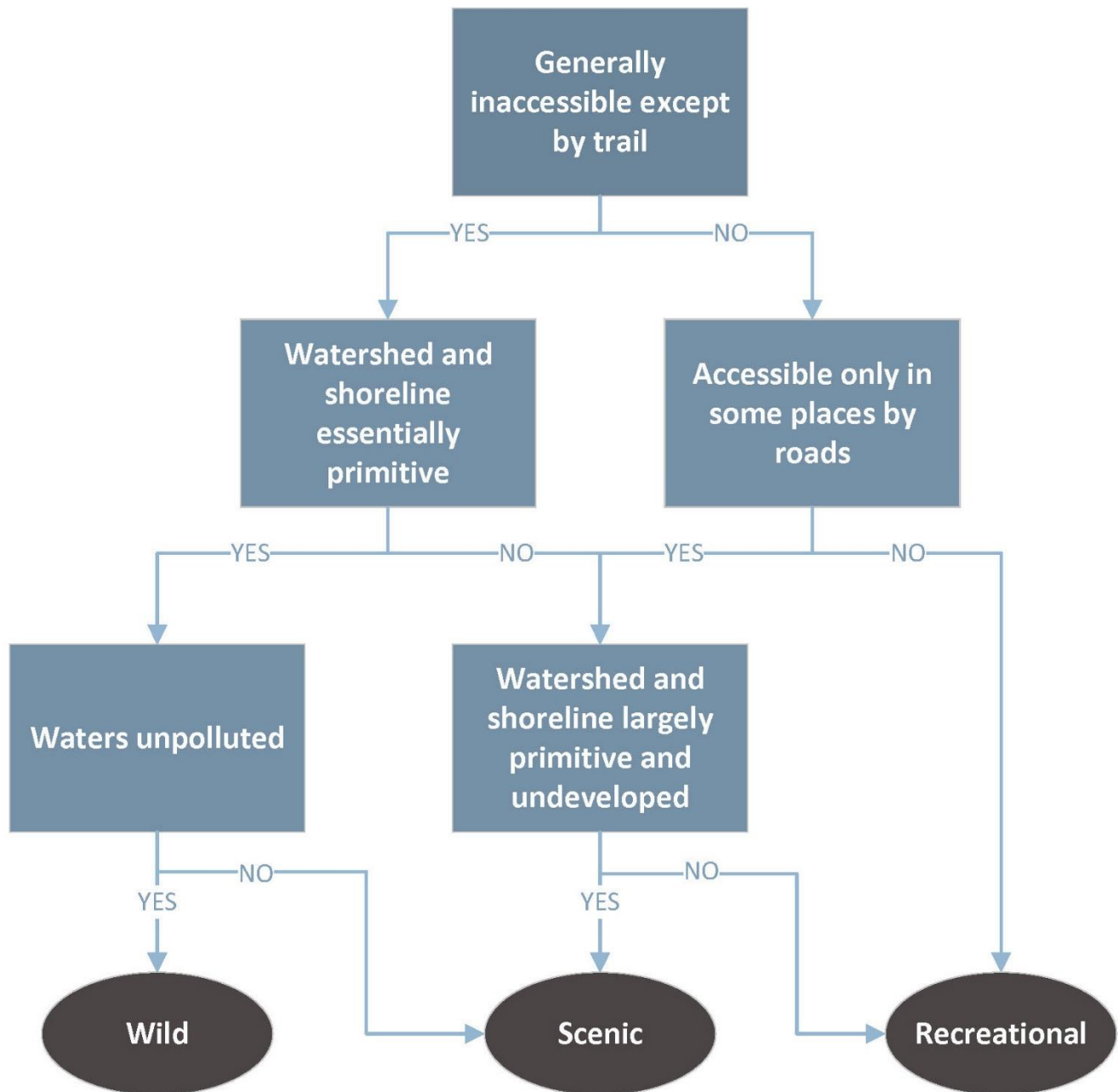


Table 4-4. Mokelumne River Classification Analysis

Segment	Classification – Wild			Classification – Scenic		Classification – Recreational		Recommended Classifications
	Generally Inaccessible Except by Trail	Watershed and Shoreline Essentially Primitive	Waters Unpolluted	Accessible Only in Some Places by Roads	Watershed and Shoreline Largely Primitive and Undeveloped	Readily Accessible by Road or Railroad	Some Development along Shoreline	
A1			✓			✓	✓	Recreational
A2	✓	✓	✓					Wild
B	✓	✓	✓					Wild
C1	✓	✓	✓					Wild
C2			✓			✓	✓	Recreational
D			✓	✓	✓			Scenic
E			✓			✓	✓	Recreational

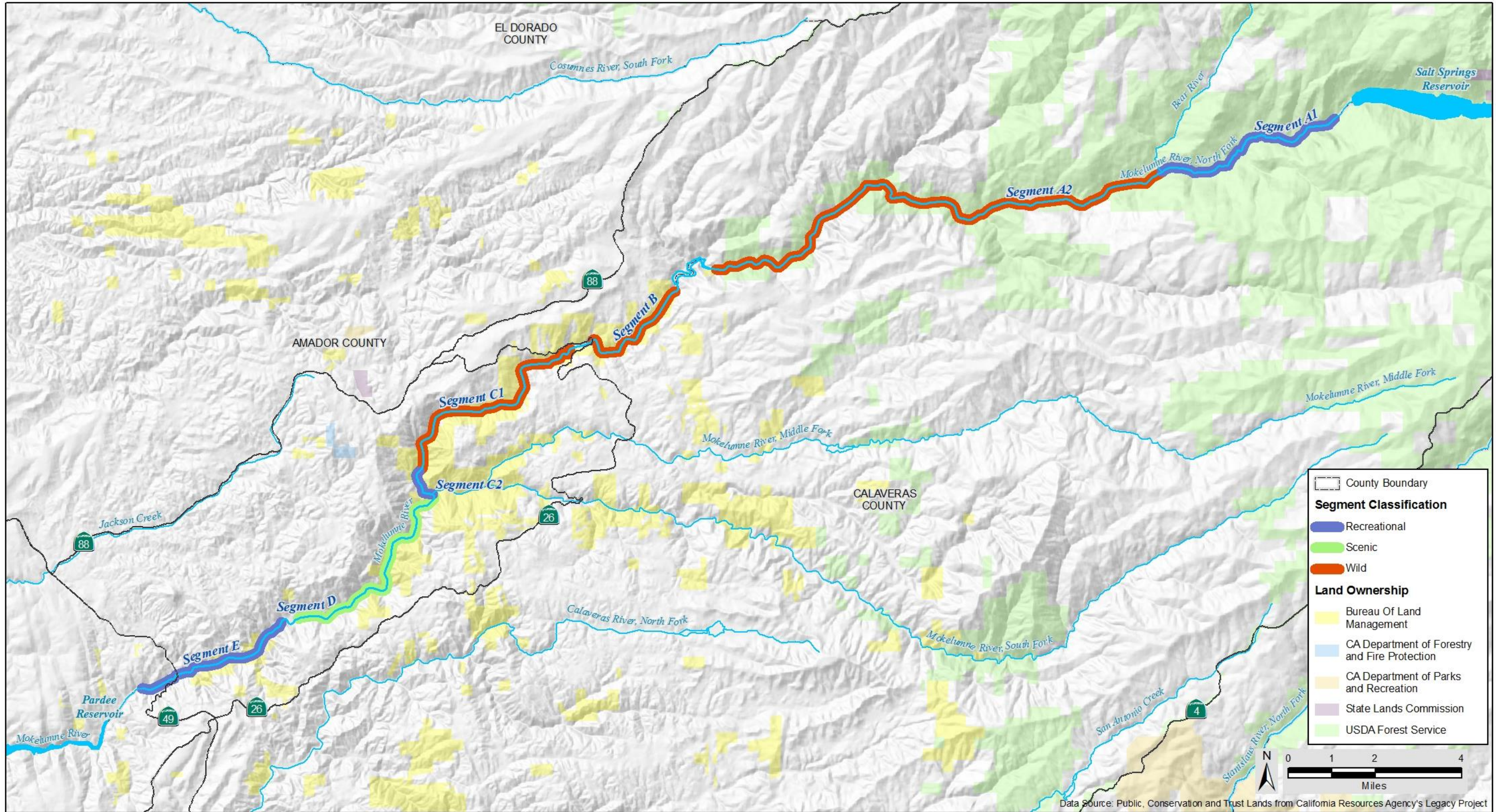
Note:

A segment must meet all criteria within a wild or scenic classification to be classified as wild or scenic. A segment must meet only one criterion with a recreational classification to be classified as recreational.

Table 4-5. Summary of Extraordinary Values and Classification by River Segment

Segment	Extraordinary Values				Classification		
	Wildlife	Fishery	Scenic	Recreational	Wild	Scenic	Recreational
A1			✓	✓			✓
A2			✓	✓	✓		
B			✓	✓	✓		
C1			✓	✓	✓		
C2				✓			✓
D				✓		✓	
E				✓			✓

Figure 4.9 Mokelumne River Segment Classification

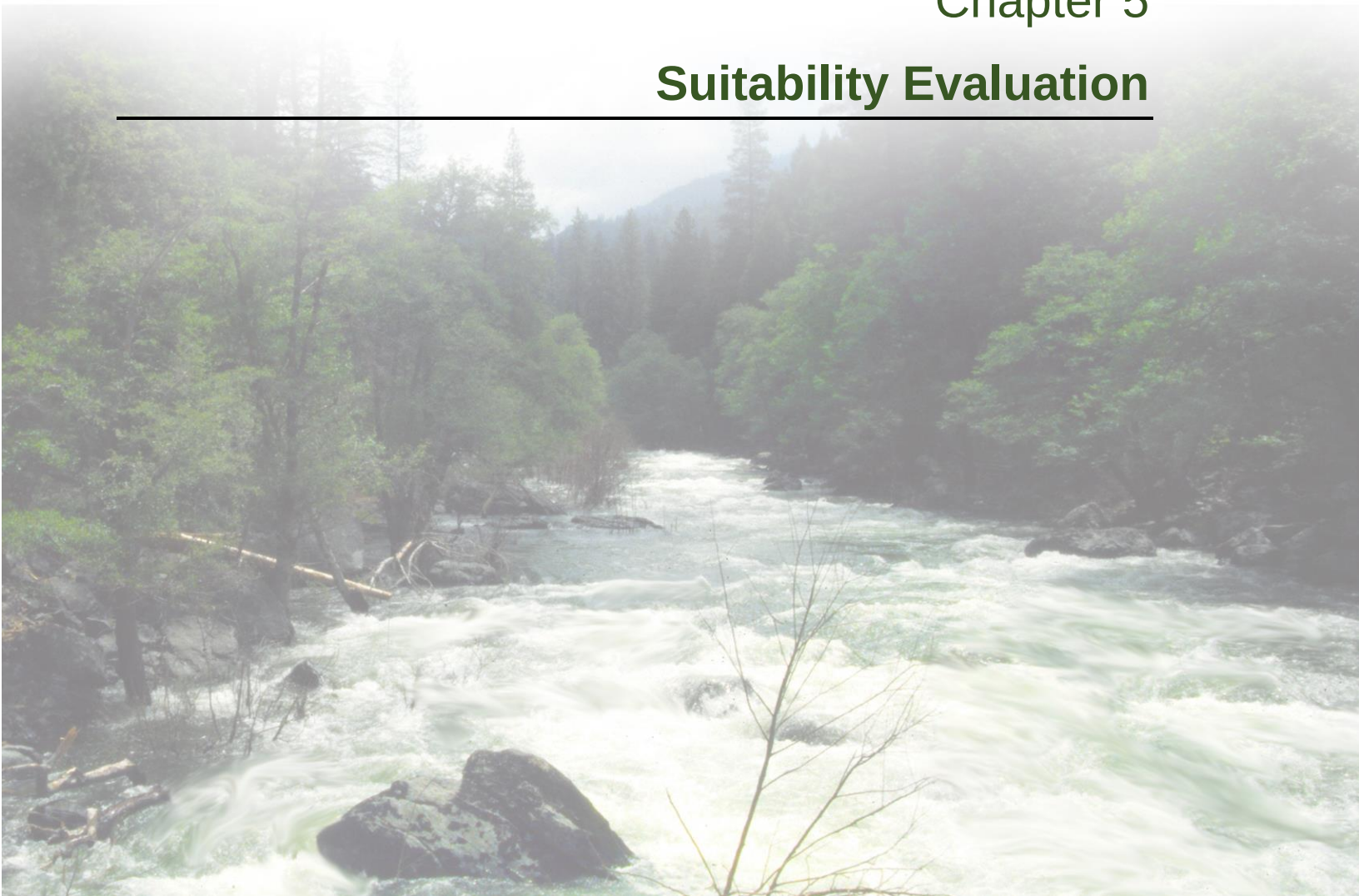


Source: GEI Consultants, Inc., 2017

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Chapter 5

Suitability Evaluation



Chapter 5. Suitability Evaluation

In this chapter, existing and future water and land uses are identified, and the potential impacts associated with wild and scenic river designation are evaluated from several perspectives. Each perspective contributes to a full understanding of the potential ramifications of wild and scenic river designation. Direct impacts on land and water uses resulting from provisions contained within the California Wild and Scenic Rivers Act were assessed. The direct impacts generally occur within the designated river segments. Indirect impacts include the potential effects in the Mokelumne River watershed upstream of the designated river segments and the effects of other State, Federal, and local laws on land and water uses were also assessed.

Four general categories of impacts were used in this analysis. Uses were either enhanced, curtailed, foreclosed, or unaffected by wild and scenic designation. Each category is defined as follows:

- A use is enhanced if it increases or is improved.
- A use is curtailed if it decreases or diminishes.
- A use is foreclosed if it will no longer be allowed.
- A use is unaffected if it will remain unchanged or uninfluenced.

5.1 Land Uses

5.1.1 Existing Land Uses

The North Fork Mokelumne River has its headwaters in Alpine County where it flows through publicly owned land. Alpine is California's least-populated county with a resident population of less than 1,200 and approximately 1,778 residential housing units. Land managed by Federal agencies cover a significant portion of the upper watershed. USFS manages Eldorado National Forest which covers most of the Mokelumne River watershed within Alpine County and 78,079 acres in Amador County including most of segment A. USFS also manages the Stanislaus National Forest in Calaveras County as well as the Mokelumne Wilderness Area which includes parts of both Eldorado and Stanislaus National Forests. BLM manages other Federal lands in the watershed.

Land use in the national forests of the upper Mokelumne River watershed is managed under the Stanislaus National Forest Land Management Plan (USFS 1986) and the Eldorado National Forest Land and Resource Management Plan (USFS 1989). The plans include six major emphasis zones including Designated Lands which are set aside by legal or official designation: High Country Lands that are largely undeveloped, Developed Lands that are managed to emphasize several kinds of developed uses, Wildlife Lands that are managed to maintain viable populations of California spotted owl and northern goshawk, General Forest Lands that are most favorable for growth and harvest of commercial conifer species, and Streamside Management Lands that border lakes and streams. The last major revision of the plans was the 2004 Sierra Nevada Forest Plan Amendment (USFS 2004), which included management goals and strategies to address problems arising from old forest ecosystems and associated species; aquatic, riparian, and meadow ecosystems and associated species; fire and fuels management; noxious weeds; and lower westside hardwood ecosystems.

The Mokelumne Wilderness Area originally covered 50,000 acres nationally designated under the Wilderness Act of 1964 but was expanded to 104,500 acres under the California Wilderness Act of 1984. It is managed with the goal of protecting and restoring 99% of the area as pristine, primitive, and remote natural ecosystems, predominantly unmodified by human activity but with provisions for primitive recreational use and enjoyment activities such as hiking, camping, boating, and managed grazing. (USFS 2000.)

BLM manages approximately 300,000 acres of Federal lands in the Sierra Nevada including Amador (8,260 acres) and Calaveras (34,033 acres) Counties. Land use within these areas is managed using the Sierra Resource Management Plan (BLM 2008). The plan identifies 20.2 miles of the North Fork Mokelumne River as eligible and suitable for Federal Wild and Scenic River designation. Approximately 3,670 acres of land along the river is leased to private entities for grazing. However, grazing activities typically occur outside the potential river designation corridor as much of the land near the river is too steep for grazing. The grazing leases also includes measures such as fences and watering troughs to keep cattle out of the river thus minimizing adverse water quality impacts. (BLM 2008.)

In Amador County, pasture and rangeland cover approximately 156,801 acres while farmlands occupy 155,187 acres in the North Fork Mokelumne River watershed. These lands are typically owned and managed by private entities and local governments. Approximately 93,113 acres are currently set aside for conservation under the Williamson Act and 28,021 acres are designated as timberland preserves. Wine grapes are the largest agricultural crop in Amador County with over 4,206 acres harvested in 2016. Other high value crops include walnuts, olives, kiwis, and pomegranates. Alfalfa, wheat, oats, and other hay crops such as ryegrass and Sudan grass are also grown for fodder on 2,768 acres while irrigated pastures make up 2,050 acres. (Amador County 2016a.)

According to its 2015 Urban Water Management Plan, AWA currently serves 6,902 water connections including 6,375 single family residential, 31 multi-family residential, 347 commercial/institutional, and four industrial treated water users. It also supplies raw water to 139 agricultural irrigation connections and sells water to six other agencies. The population served by AWA is 13,755 which is approximately 36.5% of the total population of Amador County. (AWA 2016.)

Based on its long-term water needs study, Calaveras County expects to deliver Mokelumne River water to areas within the Mokelumne watershed as well as the area between the Mokelumne and Calaveras River watersheds (CCWD and CPUD 2017). Areas within the Mokelumne watershed are currently comprised of Federal lands including Stanislaus National Forest and BLM-managed lands; lands owned by EBMUD; and 6,303 acres of privately-owned farmlands, agricultural reserves, and low-density rural residential. The area between the Mokelumne and Calaveras River watersheds includes 12,926 acres of similarly classified farmlands and low-density rural residential.

5.1.2 Designation Effects on Existing Land Uses

The Secretary is authorized under PRC Section 5093.546 of the California Wild and Scenic Rivers Act to include specific land use restrictions in recommendations for designation of rivers or segments of rivers as wild, scenic, or recreational, although such restrictions are rare. The Act does not specify a set width of land which the designation applies. Instead, it defines a designated river corridor consisting of the area between the first lines of permanently established riparian vegetation on each side of a designated river segment. Most lands which fall within this river corridor definition in the segments under consideration for designation in the Mokelumne River are Federal lands managed by USFS or BLM. Existing land use on Federal lands, such as the Stanislaus and Eldorado National Forests, the

Mokelumne Wilderness, and BLM-managed lands would be unaffected by inclusion of river segments into the State System.

Timber Production

Timber production occurs in the study area. The California Forest Practice Rules require that State-owned and privately owned lands within 200 feet of a designated wild and scenic river be considered a Special Treatment Area for purposes of timber management (14 CCR 895.1). In these areas, "special consideration" must be given to silvicultural methods that are "compatible with the objectives for which the special area was established" (14 CCR 933.4). Any such areas that are proposed for harvesting shall be identified in timber harvesting plans and shall be given special consideration in selecting silvicultural systems and timber operations compatible with the objectives of wild and scenic designation.

Through the development of timber harvest plans, the operator's forester and representatives of the California Department of Forestry and Fire Protection (CDFFP) are to agree on specific practices to protect these areas during any proposed timber harvest subject to State approval. For example, if a segment of the Mokelumne River is included in the State System because of extraordinary scenic values, then special measures to protect scenic values could be required for lands within 200 feet of the designated segment and timber harvest could be curtailed. Moreover, several other State laws with similar provisions would need to be adhered to and also can curtail or foreclose timber production (i.e., California Fish and Game Code Section 1602 [streambed alteration], California Endangered Species Act Section 2081 [special-status species], Regional Water Quality Control Board Clean Water Act Section 401 certification and Section 402 stormwater permit [water quality], and California Environmental Quality Act compliance [all environmental resources including scenic and recreational resources]).

PRC Section 5093.63 regulates timber operations or practices within the boundaries of Special Treatment Areas adjacent to wild, scenic, or recreational river segments that could potentially do harm to soil, water, or timber resources or to fish and wildlife habitat in designated river segments. Expansion of Special Treatment Areas to 200 feet, however, would not significantly change current timber harvest practices or reduce timber production along designated segments. Timber harvesting restrictions and other resource protection measures generally apply along rivers and streams. The primary effects of expanding Special Treatment Areas from Wild and Scenic River designation would be to widen the reduced harvest zone somewhat and to provide additional authority to CDFFP to ensure that protective practices are adopted in these areas. Extending the establishment of a Special Treatment Area to 200 feet is expected to have minor effects on timber harvesting operations and economic activity in the watershed. Neither the California Fish and Game Code nor the California Wild and Scenic Rivers Act, however, confers authority on CDFFP (or CDFW) to limit timber harvest activities on private lands for visual or other quality purposes beyond the 200-foot Special Treatment Zone with one exception: CDFFP does have authority to address visual impacts through the cumulative impact analysis process in the current Forest Practices Rules. No reductions beyond the 200-foot-wide corridor are implied by State Wild and Scenic River designation. Timber management practices on public lands that are administered by USFS and BLM would be unaffected by State Wild and Scenic River designation.

Grazing

Grazing levels are low in the study area and will continue to be low in the future. The California Act does not contain specific language affecting grazing use. Current grazing practices on public and private lands do not significantly affect the free-flowing condition, natural character, immediate environment, or

extraordinary values of the Mokelumne River study segments. Grazing practices would not be affected by State Wild and Scenic River designation.

Agricultural Uses

The California Wild and Scenic Rivers Act imposes no restrictions on agricultural operations on lands adjacent to designated rivers.

Mining

Some limited mining occurs in the study area. The California Act does not contain specific language affecting mining. Any potential mining, however, could be affected if it adversely affected the natural character, immediate environment, or extraordinary scenic or recreational values of designated river segments. The Legislature could also amend the Act in the future to exclude mining sites from the System and allow extraction and refining of newly discovered mineral resources; such an amendment was used to develop strategic metals at a site within the Smith River watershed (PRC Sec. 5093.66).

Recreation

Recreation is one of the primary uses along the river corridor. Wild and Scenic River designation would tend to focus public attention on the scenic, recreational, biological, and other natural values of the Mokelumne River. This awareness would increase river visitation only slightly over levels that likely will be increasing in the future regardless of designation.

Knowledge of, and interest in, State Wild and Scenic Rivers could conceivably increase the use of public and private lands along the river for recreational activities. Wild and scenic designation would increase this use negligibly, however, in relation to the total additional demand placed on such rivers in the future from recreationists. Few people are aware of the California Wild and Scenic Rivers System, fewer still know which rivers are included, and even fewer people still would visit the Mokelumne River simply because it has been included in the State System. Mokelumne River resource values are fairly well known and used by many of the same individuals who would be aware of the river's Wild and Scenic River status. USFS, BLM, and private landowner management priorities that generally maintain and contribute to the Mokelumne River's scenic, recreational, and other resource values would be expected to continue to manage their lands in such a way that maintains or increases recreation.

Fish and Wildlife Habitat Maintenance

Fish and wildlife habitat maintenance in the study area generally consists of maintaining the natural environment. The Act generally will enhance this use by further protecting the free-flowing conditions, natural character, and immediate environments of designated Mokelumne River segments. Activities such as hunting and fishing would continue to be permitted on lands and waters of designated river and streams. Existing stream ecology monitoring activities implemented under the terms of the Mokelumne Relicensing Settlement Agreement (PG&E et al. 2000) would be unaffected, and the added resource protections provided by designation (i.e., preclusion of new dams and impoundments) would help protect the natural environment, fish and wildlife habitats, and native species. Water quality within the designated segments could also be enhanced indirectly by curtailment of construction-related impacts associated with certain types of water projects within the designated river corridor that would adversely affect the free-flowing condition and natural character of the river segments included in the State System, particularly extraordinary scenic and recreational values.

The Act further states that the CDFW director shall conduct studies specifically funded by the Legislature and will make recommendations relating to "enforcement requirements necessary to protect the System from fish or wildlife degradation, the development of information or statistical data necessary to provide the most beneficial management of the fisheries included within the System," and "Legislature action deemed necessary to protect the fishery and wildlife values of the System" (PRC Sec. 5093.69). Consequently, CDFW is given a specific mandate to manage and protect fish and wildlife resources on rivers within the System.

Increased recreational use from designation may affect fish and wildlife habitat and populations, but this impact is negligible when compared to the increased recreational use expected in the future with or without designation.

5.1.3 Future Land Uses

Future land use in Stanislaus and Eldorado National Forests, the Mokelumne Wilderness, and on BLM lands would generally be managed similar to how these lands are currently managed under existing conditions. The Eldorado National Forest Land and Resource Management Plan (1989) found that the North Fork Mokelumne River between Salt Springs Reservoir and Tiger Creek Reservoir was eligible for Federal designation as a Wild and Scenic River. However, because the Federal government did not officially include this river segment into the National System, the management prescriptions of the Mokelumne River Canyon Archaeological District are currently applied to this portion of the North Fork Mokelumne River by the Eldorado National Forest. The USFS management emphasis for the Mokelumne River Canyon Archaeological District consists of:

- managing the area principally for its recreation use substantially in its natural condition,
- providing for inventory and evaluation of archaeological and historical values,
- nominating specific sites for eligibility on the National Register of Historic Places, and
- protecting all significant cultural properties.

The Sierra Resource Management Plan (BLM 2007) recommended designation of the North Fork Mokelumne River below Tiger Creek Dam and the main stem Mokelumne River to Highway 49 into the National System. However, because the Federal government did not officially include this segment into the National System, the BLM management prescription of Visual Resource Class I provides the primary management guidance. The management objective for Class I is to preserve the existing character of the landscape; the level of change to the characteristic landscape should be very low and must not attract attention (BLM 1986).

The eastern third of Amador County consists of forestland. The western two-thirds of Amador County consists primarily of agricultural (range) land. The Amador County General Plan projects that most future growth will be concentrated within existing incorporated communities (such as Jackson, Sutter Creek, and Plymouth), in designated rural Town Centers (i.e., Pine Grove, Buckhorn, and River Pines), and in the proposed Regional Service Center in Martell. Most of the land along the North Fork and main stem Mokelumne River in Amador County is administered by USFS or BLM. In the vicinity of Highway 49, land along the main stem Mokelumne River is privately owned and is designated for agricultural uses. (Amador County 2016b.) Future land use on local government and privately-held lands in the Mokelumne River watershed upstream of Pardee Reservoir would be expected to generally remain similar to existing conditions. Existing land use classifications from general plans are assumed to be maintained through approximately 2100; it would be speculative to assume otherwise. Land uses on non-federal lands within the Mokelumne River watershed in Amador County are classified as

Residential (30%), Agriculture (28%), Mixed Residential/Agriculture Use (14%), Public/Institutional (11%), Commercial (5%), Mixed Residential/Commercial Use (3%), Recreation (3%), Open Space/Other (3%), and Industrial (2%). (AWA 2017.)

Land use on non-federal lands within the Mokelumne watershed are classified in the Calaveras County General Plan as General Agriculture (68%), Residential Rural (12%), Manufacturing (7%), Residential Agriculture (6%), Agriculture Preserve (5%) and Unclassified (2%). Land use on other potential service areas within Calaveras County are classified as General Agriculture (36%), Agriculture Preserve (26%), Residential Agriculture (16%), Residential Rural (13%), Low Density Residential (4%), Unclassified (3%), Recreation (1%), Commercial (1%), Manufacturing (<1%) and Public Service (<1%). (CCWD and CPUD 2017.)

In their long-term water needs studies, Amador and Calaveras Counties both assume existing land use classifications from general plans would be maintained in the future. Water use from general plan land use classifications are used to project water use at buildout. However, with Mokelumne River water already fully allocated from March 1 to November 30, future water use per acre of different land use classes, as well as fire hazard, topography, limited services and infrastructure, market forces, and other constraints, could limit the extent to which existing general plan land use classifications can be built out. While both counties based their future projections on historical data, projections of future water use values per acre in Calaveras County are more than double those values per acre in Amador County for agriculture and residential land use types, as described below. (AWA 2017; CCWD and CPUD 2017.)

Amador County estimated annual water demands for residential, commercial, and institutional land uses using historical data (2008 - 2013) from its water accounts and a projected population growth rate of 1.12% per annum. Water demands were determined assuming water use values of 1.575 AFY/acre for industrial land use adopted in the Land Use/Water Supply Analysis Guidebook (Northern California Water Association 2007) and 1.065 AFY/acre for agricultural land use adopted from CCWD's 2015 Urban Water Management Plan (CCWD 2016) as AWA data are inadequate for these classes.

Calaveras County estimates agriculture annual water demand of 3.1 AFY/acre based on the difference between reference evapotranspiration and precipitation from April to October. It also estimates higher water demand for mixed land uses including residential agriculture (3.25 AFY/acre), rural residential (3.40 AFY/acre), and medium density residential (3.64 AFY/acre). (CCWD and CPUD 2017.)

5.1.4 Designation Effects on Future Land Uses

Land uses are not expected to significantly change from existing conditions. Therefore, impacts to activities on Federal lands, timber production, grazing, agricultural uses, mining, recreation, and fish and wildlife habitat maintenance would be similar to discussion in Section 5.1.2, "Designation Effects on Future Land Uses," i.e., general unaffected except for minor effects on timber production, and these impacts will not be repeated here. This section focuses on future land uses that are tied directly to future water use. Wild and Scenic River designation would have no impact on future land uses in Alpine County and limited impacts on future land use in Amador and Calaveras Counties as described below.

Future land use on local government and privately-held lands outside the designated river corridor would be unaffected by designation.

Future land uses would generally be unaffected by inclusion of river segments into the State System. However, no department or agency of the State could assist or cooperate with, whether by loan, grant,

license, or otherwise, any agency of the Federal, State, or local government in the planning or construction of any dam, reservoir, diversion, or other water impoundment facility that could have an adverse effect on the free-flowing condition and natural character of designated segments, particularly the extraordinary scenic and recreational values. This could potentially have indirect effects on any potential future land use changes resulting from such a water impoundment facility. Depending on the particular land use, the land use could potentially be enhanced, curtailed, or unaffected by State designation. However, no major changes in future land use are envisioned for the Mokelumne River corridor or its watershed.

Some concern is always expressed that State Wild and Scenic River designation may lead to or facilitate Federal designation of the same river segments into the National Wild and Scenic Rivers System, and subject lands to the more extensive requirements of Federal Wild and Scenic River designation. For example, State designation of several river systems including the North Fork American, Eel, Klamath, Lower American, Smith and Trinity River Systems in 1972 was followed by Federal designation in 1982 (CRB 2018). However, not all State designations have been followed by Federal designation as there are 30 other Federally-designated river segments in California that are not State-designated.

Federal designation would extend curtailments of activities such as construction, mineral exploration, and some timber operations to public lands within one-quarter mile on either side of the banks of designated rivers. Federal designation would enhance streamflow, water quality, and stream ecology protections on Federally managed lands within designated segments as it would be applicable to land use planning and projects on Federal lands in Stanislaus and Eldorado National Forests, the Mokelumne Wilderness, and on BLM lands in the Mokelumne River watershed. In the case of the Mokelumne River, however, the five study segments have already been evaluated for Federal designation by the USFS (Segment A) and BLM (Segments B-E) and found to be eligible and suitable, although no formal action has been taken. The BLM study also excluded the private land at Roaring Camp in Segment C (BLM 2007). It is highly unlikely that State Wild and Scenic River designation would somehow now influence Federal action. Moreover, there are currently no plans, nor are any such plans reasonably foreseeable, that California's current Governor or subsequent Governors would apply under Section 2(a)(ii) of the National Act to include the five Mokelumne River segments into the Federal System. Unlike Cache Creek, where no Federal Wild and Scenic River studies have been conducted, the Mokelumne River has already been studied by USFS and BLM for inclusion in the Federal System.

The California Act neither enlarges nor diminishes existing land use regulatory powers of State agencies and local governments (PRC Sec. 5093.58). The Act does, however, require all such entities to exercise their existing powers in a manner consistent with policy and provisions of the Act (PRC Sec. 5093.61). This exercise could take many forms. For example, local governments could enact general plan amendments and zoning ordinances to regulate the type and intensity of adjacent land use, including development of structures and other improvements. Although all economic uses of a parcel cannot be precluded without compensation, some potential uses could be curtailed. These potential effects are speculative, and no development projects or plans to change local land use regulation have been proposed or are known to be under evaluation. Local governments, particularly in rural areas, historically have not expanded land use regulatory powers. Designated State Wild and Scenic Rivers typically have not been managed by State or local governments in a manner that creates potential impacts to existing or future land or water uses. There are no indications from State or local agencies and governments that this trend would not continue. Consequently, it is expected that no impacts would result from changes in State or local regulations related to State Wild and Scenic River designation.

In summary, including the five river segments into the State System land use would generally be unaffected, except within 200 feet of designated river segments where special treatment areas could curtail or foreclose timber operations that may harm soil, water, or timber resources or fish and wildlife habitat, or adversely affect the natural character or extraordinary scenic or recreational values. Other State laws are already in place that could curtail or foreclose timber production so the additional protection afforded by State Wild and Scenic River designation is not particularly onerous. Effects on land use from changes in water availability would be speculative but are addressed in the following sections related to future water uses and potential impacts from Wild and Scenic River designation.

5.2 Water Uses

This analysis of water uses is limited to water supply and hydroelectric generation, two fundamental water uses of the Mokelumne River. It is well known that Mokelumne River water uses include instream uses such as fish and wildlife maintenance, water quality maintenance, recreational uses, and other uses covered by the public trust doctrine. These uses would be enhanced with State Wild and Scenic River designation and are not further addressed. The focus of this analysis is on the fundamental issue areas common to potential State Wild and Scenic River designations: water supply and hydroelectric generation. **Figure 5-1** shows the upper Mokelumne River watershed.

5.2.1 Existing Water Uses

Hydroelectric Generation

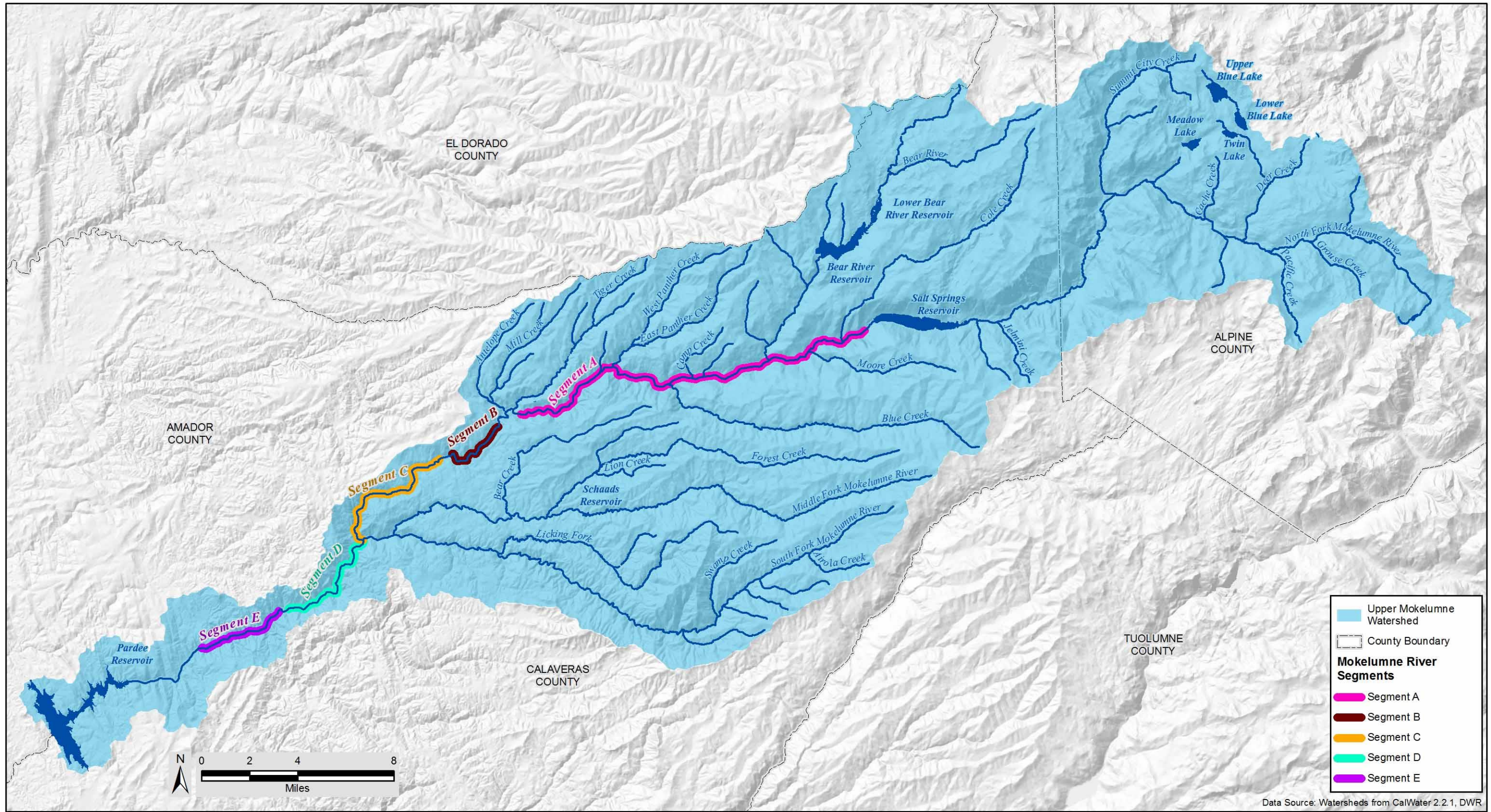
Hydroelectric generation is a critical past, present, and future use of water in the Mokelumne River watershed. Section 2.2.1, “Mokelumne River Project Licensing and Relicensing,” summarizes PG&E’s 206-MW Mokelumne River Project (FERC No. 137) and its 2001 relicensing. AB 142 excludes specific river reaches from potential Wild and Scenic River designation by their omission from the five river segments designated for study and also incorporates special provisions to not “prejudice, alter, affect in any way, or interfere with the maintenance, repair, or operation by the Pacific Gas and Electric Company of the Mokelumne River Project (FERC 137) currently under the 2001 Federal Energy Regulatory Commission license for the project, the incorporated settlement agreement, any license amendments made with the agreement of the parties to the incorporated settlement agreement, and any adjustment of flows permitted to occur pursuant to the license for enhancement of ecological resources” (PRC Code 5093.56[b]). Consequently, PG&E activities are generally only addressed with respect to water supply in subsequent sections.

Water Supply

The major water purveyors in the Upper Mokelumne Watershed (upstream of Pardee Dam) currently supply 12,005 AFY of surface water in Amador County and 3,329 AFY in Calaveras County. They include AWA and JVID in Amador County and CCWD and CPUD in Calaveras County. Domestic and other municipal uses currently account for about 68% of Mokelumne River water use in Amador County with the remaining 32% going to agriculture uses. In Calaveras County, nearly all Mokelumne River water is supplied for domestic and other municipal uses. (AWA 2017; CCWD and CPUD 2017.)

AWA is the primary water supply, wastewater, and stormwater provider for Amador County communities. It operates four major water systems. The largest of these is the Amador Water System which supplies 8,155 AFY to urban communities in Jackson, Martell, Sutter Creek, Sutter Hill, Ione, Amador City, and Drytown, as well as to customers along the Amador Canal. Water for the Amador Water System is diverted at Lake Tabeaud into the Amador Canal for conveyance by gravity to two water treatment plants at Sutter Hill and Ione. (AWA 2017.)

Figure 5-1. Upper Mokelumne River Watershed



Source: GEI Consultants, Inc., 2017

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PG&E previously owned the Amador Water System until 1985 when ownership transferred to Amador County Water Agency (which was later renamed Amador Water Agency in 1995) under a purchase agreement negotiated to settle an eminent domain action. Under the terms of the purchase agreement, AWA can request that PG&E deliver up to 15,000 AFY at a rate not to exceed 30 cfs from Lake Tabeaud, an off-stream reservoir with a capacity of 1,170 AF. Water is diverted from the North Fork Mokelumne River into the Electra Tunnel near the West Point Powerhouse and transmitted to Lake Tabeaud, which serves primarily as a forebay to create head for power generation at PG&E's Electra Powerhouse. Water for the Amador Water System is therefore stored in the larger Lower Bear and Upper Bear Reservoirs farther upstream. (AWA 2017.)

AWA also entered an agreement with PG&E in 1978 to store and divert 1,150 AFY of water at a rate not to exceed 3 cfs for the CAWP under post-1914 appropriative water rights. The CAWP water system supplies upcountry communities in Sunset Heights, Jackson Pines, Pine Grove, Pine Acres, Ranch House Estates and vicinity, Pioneer, Rabb Park, Ridgeway Pines, Silver Lake Pines, Sierra Highlands, Fairway Pines, and the Mace Meadows area. Historically, CAWP diverted the water at the Tiger Creek Afterbay and pumped it 1,200 feet to the Buckhorn Water Treatment Plant for treatment and distribution. Beginning in 2015, CAWP has begun diverting water at Tiger Creek Regulator Reservoir and transmitting it by gravity to the water treatment plant. (AWA 2017.)

AWA also operates two groundwater systems which supply Lake Camanche Village and La Mel Heights subdivisions with approximately 200 AFY. These water systems currently do not receive Mokelumne River water. (AWA 2017.) JVID was established in 1956 as an independent special district under Division 11 of the California Water Code to provide irrigation services in Jackson Valley and the Buena Vista area of southwestern Amador County. The JVID service area includes approximately 13,000 acres of farm and cropland, about 800 residents, a 500-kilowatt hydroelectric generation plant at the base of Lake Amador, a biomass electric facility, two rock quarries, a resort fishing area, and two fish-raising facilities. JVID supplies untreated irrigation water from Lake Amador and the Mokelumne River to customers through a 30-mile delivery system.

JVID owns and operates a 22,000 AF reservoir (Lake Amador) supplied by its main tributary, Jackson Creek. Jackson Creek joins Dry Creek before eventually flowing into the Mokelumne River near its confluence with the Cosumnes River near the town of Thornton. The Jackson Creek watershed is a 56-square mile rainfall-only watershed far downstream of the study segments and is not a dependable or consistent water source. In addition to the Jackson Creek diversion, JVID currently diverts 3,850 AFY of water from Pardee Reservoir, located downstream of the study segments, for agricultural and domestic users in the JVID service area. This water is diverted under SWRCB water right permit 12167, which assigned a portion of SFA 5648. AWA has submitted application 5647X03, which would revert 1,050 AFY from JVID's permit 12167 to AWA leaving JVID with the ability to use 2,800 AFY from the Mokelumne River through Pardee Reservoir diversions.

JVID is scheduled to begin construction in spring 2018 of the JVID Treated Water Project, which is a 176-connection domestic water project to serve existing irrigation customers with treated water. The project would use the Mokelumne River as the primary source of raw water for treatment as part of a Compliance Agreement that JVID signed with the SWRCB Drinking Water Division in 2001. JVID would use its existing diversion facility at Pardee Reservoir, downstream of the study segments. Diversions for the treated water system and ongoing stock watering under Permit 12167 under Application 5648 would be about 1 cfs.

Two water agencies supply water users in the Middle and South Forks Mokelumne River watersheds. CCWD supplies 141 AFY of Mokelumne River water to 582 connections to communities in West Point, Wilseyville, and Bummerville through the West Point water system. Water use in this region consists primarily of single family residential (90%), commercial (5%), institutional (4%), and other users (1%). Mokelumne River water currently accounts for less than 7% of the 2030 AFY total that CCWD delivers to water users; the Calaveras and Stanislaus Rivers are its primary sources. However, CCWD expects to increase use of Mokelumne River water in the future. (CCWD and CPUD 2017.)

CPUD supplies 1,299 AFY of Mokelumne River water to approximately 2,000 connections used by about 5,000 people in the communities of San Andreas, Mokelumne Hill, Glencoe, Paloma, and Rail Road Flat. CPUD stores water in the Jeff-Davis Reservoir near Glencoe, which has a capacity of 2,000 AF. As a small water purveyor delivering less than 3,000 AF and serving less than 3,000 urban connections, CPUD is not required to prepare or submit an Urban Water Management Plan. Unlike CCWD, the Mokelumne River is CPUD's primary water source. Valley Springs Public Utility District (VSPUD) also provides water and wastewater services to the community of Valley Springs within the Mokelumne River watershed in Calaveras County. VSPUD originally drew its water supply from the Mokelumne River but it now relies on groundwater. (CCWD and CPUD 2017.)

Major water users located on the Lower Mokelumne River downstream of the segments under consideration include EBMUD, which currently uses 241,920 AFY; North San Joaquin Water Conservation District (NSJWCD) with 3,021 AFY; and WID with 72,000 AFY.

Taken together, Mokelumne River system includes 867,758 AF of total reservoir storage capacity. About 25.5% of the total reservoir storage capacity is located on the North Fork Mokelumne River and its tributaries while 0.4% located on the Middle Fork and 74.1% on the lower Mokelumne River, downstream of the river segments under consideration. Reservoirs on the lower Mokelumne River include Pardee (209,900 AF), Camanche (430,800 AF), and Woodbridge (2,460 AF).

The Mokelumne River watershed upstream of the segments proposed for State Wild and Scenic River designation includes 13 reservoirs with a combined storage of 221,108 AF. The largest of these are Salt Springs Reservoir (141,900 AF) and Lower Bear River Reservoir (49,100 AF), which together account for 85% of the storage on the North Fork Mokelumne River. Many of the smaller reservoirs were constructed between 1900 and 1903 and have likely lost some storage capacity to siltation.

5.2.2 Designation Effects on Existing Water Uses

The primary goal of the California Wild and Scenic River Act is to preserve designated rivers in their existing state. Water uses existing prior to designation as well as reasonably foreseeable future water uses are taken into consideration when evaluating the eligibility and suitability or non-suitability of a river for designation. Existing consumptive and non-consumptive water uses will therefore be unaffected by State Wild and Scenic River designation (CRB 2018, see Appendix E).

However, existing consumptive and non-consumptive water uses on the North Fork Mokelumne River depend on a series of existing infrastructure including dams, intakes and diversions, and conduits. While river reaches containing these structures have been excluded from the segments under consideration for State designation, existing water uses could potentially be curtailed in the future if designation prevents PG&E and other water users from performing ongoing construction and maintenance works needed to keep existing infrastructure operational or to install and operate replacement structures in the future if needed.

The State Act prohibits any department or agency of the Federal, State, or local government from assisting or cooperating in planning or constructing a dam, reservoir, diversion, or other water impoundment facility on designated river segments (PRC Sec. 5093.56). The prohibitions are also temporarily extended in AB 142 to segments of the Mokelumne River under consideration for potential designation until after the study period and implementation of any recommendations have been completed, or December 31, 2021, whichever comes first. Two exceptions are granted to the prohibitions including AWA's water rights application 5647X03 pending before the SWRCB and PG&E's maintenance, repair, or operation of the Mokelumne River Project (FERC No. 137). However, these exceptions would also expire at the conclusion of the study, at designation, or on December 31, 2021, whichever comes first. Given the general prohibitions of PRC Section 5093.56, specific protections may be considered during inclusion of any Mokelumne River Segments into the State System to ensure existing users can continue to use existing or comparable infrastructure to access water for their preexisting uses.

Conditions of State Wild and Scenic River designation have similarly been used to provide specific protections for preexisting water uses and to guarantee existing water rights in other rivers included in the State System. PRC Section 5093.54(g) grants exceptions to Placer County Water Agency for replacement, maintenance, repair, operation, or future expansion of existing diversions, storage, powerhouses, or conveyance facilities or other works along the South Yuba River. Under PRC Section 5093.54(j), Yolo County Flood Control and Water Conservation District or public water agencies are granted exceptions for replacement, maintenance, repair, or future expansion within existing water rights of existing diversion, storage, powerhouse, or conveyance facilities or other works as part of the Cache Creek designation. Similar protections are also granted to PG&E's FERC No. 2106 McCloud-Pit development although the McCloud is not included in the State System (PRC Sec. 5093.542(e)).

In addition to exceptions for existing infrastructure, specific water rights protections may be needed to water users in the Mokelumne River watershed so they can be ensured of continued access to their existing water rights after designation. These protections could extend to perfected water rights as well as unresolved use claims and unperfected water rights permits. Similar protections are included in the State Act for Mill and Deer Creeks (PRC Sec. 5093.70) and for the East Fork Carson and West Walker Rivers (PRC Sec. 5093.54(f)). The Mill Creek and Deer Creek designations contain exceptions for maintaining existing flood control facilities and projects, and diversions and diversion facilities. It also contains provisions preserving and implementing existing water rights, and continuing existing water rights practices such as changes in the purposes of use, places of use, points of diversion, or ownership of existing water rights.

The special provisions for existing water uses, infrastructure, and water rights in the Mokelumne River can be written to avoid diluting the intent of the California Wild and Scenic Rivers Act to preserve any designated Mokelumne River segments and to maintain their free-flowing conditions, natural character, and extraordinary values. For example, the Mill Creek and Deer Creek designations explicitly prevent the effect of any infrastructure change related to water rights from increasing the adverse effect of the existing diversion facility or place or purpose of use upon the free-flowing condition, natural character, and extraordinary values of the designated river segments. Any future projects required to sustain existing water uses and water rights by proposing changes to existing infrastructure, water rights, or diversion points would be subject to the same regulatory reviews applied by SWRCB to other proposed projects. Existing water rights and uses would be provided additional protection if special provisions are provided in the conditions of State designation.

5.2.3 Future Water Uses

Hydroelectric Generation

Hydroelectric generation will continue into the foreseeable future as it is under existing conditions. PG&E will continue to operate the Mokelumne River Project (FERC No. 137) under its current license, any future licenses issued by FERC, and the settlement agreement. Hydroelectric generation would likely decrease with climate change as rain events intensify and snowpack decreases. Consequently, hydroelectric generation is discussed below only as it relates to water supply.

Water Supply

By 2040, AWA's 2015 Urban Water Management Plan estimates total raw water demand to increase to 13,159 AF consisting of 11,895 AF of potable and raw water supplied primarily from the Mokelumne River and 1,264 AF of recycled water. The projections accounted for expansion of residential, commercial, institutional, and residential agriculture connections. The projections also assume that AWA will serve 95% of projected population growth in the County through new connections around the existing service areas. However, the projections do not include potential new service connections to large agricultural users in JVID and the Shenandoah Valley who could become retail or wholesale customers in the future. Annual water lost from the AWA's system were estimated at 2,236 AF. Total water diversions required from the Mokelumne River to meet the projected total demand of raw water and losses would be 14,131 AF. (AWA 2016.) AWA's long-term needs study estimates future water demands of 14,233 AFY by 2040 including 9,967 AFY in areas currently served by AWA; 881 AFY within the CAWP service area boundary; and 3,385 AFY for the rest of the county. Amador County further estimates that by 2070 total water demands would increase to 24,270 AFY including 14,673 AFY within the AWA service area; 1,981 AFY within the CAWP service area; and 7,616 AFY for the rest of the county. Water demands at buildout are estimated at 34,308 AFY with 19,378 AFY for AWA; 3,082 AFY for CAWP; and 11,848 AFY for the rest of the county. These water demand projections mean that Amador County estimates that it would draw its full appropriative water right by 2040. (AWA 2017.) Implementation of water conservation programs could ensure a portion of the County-of-Origin reserves remains unassigned and available to serve new demands beyond 2040. However, the County has not yet identified any reasonably quantifiable sources of additional water rights to support its growth projections beyond 2040.

According to its 2015 Urban Water Management Plan, CCWD projects total demand for Mokelumne River water supply to existing domestic, commercial, and institutional connections in the West Point service area to increase to 237 AF by 2040; however, these projections do not include agricultural demands which were not quantified due to data inadequacies. The projections also do not include areas served by CPUD which are not subject to urban water management planning requirements. The UWMP also noted that within CCWD's current service area covering approximately 1,150 acres, there are approximately 28,000 acres of currently unserved areas which could potentially be served in the future. (CCWD 2016.)

In their long-term water needs study, CCWD and CPUD project demand for Mokelumne River water in Calaveras County of 10,105 AFY by 2030; 18,589 AFY by 2070; and 25,944 AFY at buildout. Water demands in existing West Point and Jeff Davis service areas are projected to increase by 2,696 AFY at buildout. The bulk of projected future water demands in the county would occur in proposed new service areas including Wallace, Burson, Valley Springs, Jenny Lind/La Contenta, land parcels along the Middle Fork Ditch pipeline, and existing farmlands which are currently not irrigated. While some of the

projected demand could be met with water from the Calaveras River watershed, Calaveras County estimates that it would draw its full appropriate water right at buildout. (CCWD and CPUD 2017.)

Long-term water demand projections prepared by both Amador and Calaveras Counties cannot be supplied reliably without a combination of increased water diversions, increased storage, and modified operations. The counties have also prepared lists of potential future projects to supply their projected long term-water supply deficits. Amador County has identified 11 potential water supply projects to meet its projected long-term water supply deficit of between 13,850 AFY and 16,850 AFY. Calaveras County has identified six potential water supply projects and developed three alternative combinations of these projects to meet its projected long-term water supply needs. (AWA 2017; CCWD and CPUD 2017.)

These projects are all at a conceptual level and cannot be considered to be “feasible” projects as at this time, as specified in AB 142, without more detailed feasibility studies that consider design alternatives, project benefits, capital costs, operations and maintenance costs, tradeoff analyses and alternative selection, project financing, and environmental compliance and permitting.

Three of the eleven potential projects identified by Amador County involve improving existing reservoirs. The largest of these potential projects would involve raise Lower Bear River Reservoir by 32 feet and enhancing related dam infrastructure to increase storage by 18,300 AF. The second project involves retrofitting or replacing Blue Lake and Twin Lake Dams to increase seismic stability and provide carryover storage water through winter with potential yield of 13,000 AF. The third project involves removing accumulated sediment from PG&E reservoirs on the Mokelumne River to increase available storage with potential yield of 9,000 AF. (AWA 2017.)

Amador County has also identified water conservation, recycling, and reuse opportunities with a total potential yield of 6,141 AFY. The Regional Urban Water Conservation Program would yield 5,600 AFY from plumbing retrofits and turf replacement programs to meet conservation standards. Lake Camanche Village Recycled Water Project would involve collaborating with EBMUD to build a regional reclamation system in the Camanche area for irrigation use with a potential yield of 314 AFY. The Amador County Regional Reuse Project would adopt a regional approach to increasing the amount of reclaimed water used for irrigation with a potential yield of 227 AFY. (AWA 2017.)

Potential yields for the remaining five potential future projects by AWA are not yet known. One project would undertake re-operation studies to explore water storage for consumptive use in existing reservoirs which are currently operated for hydropower. Two projects would explore potential groundwater recharge and banking within Amador and Calaveras Counties or farther downstream within the Eastern San Joaquin Groundwater Basin, respectively. One project would assess the feasibility of constructing additional surface storage in Amador and Calaveras Counties while another would perform a needs assessment and evaluate options for providing adequate water supplies to Shenandoah Valley, which lies within the Cosumnes River basin. (AWA 2017.)

Three of the potential projects identified by CCWD and CPUD involve improving existing reservoirs to yield up to 400 AF of additional storage. These projects include expanding Schaads Reservoir by 250 AF to yield an enhanced storage capacity of 1,950 AF; enlarging the Regulating Reservoir by 100 AF to yield an enhanced storage capacity of 150 AF; and rehabilitating Wilson Dam to yield 25 - 50 AF of new storage. One project would improve Middle Fork Mokelumne Pumping Station from its current pumping capacity of 0.44 cfs to an enhanced capacity of 1.5 cfs. It also identified two potential new infrastructure projects. A new Middle Fork Ditch Pipeline with 25 cfs capacity would provide water

deliveries between Schaads Reservoir and Jeff Davis Reservoir and to customers along the pipeline. The other potential project is a new Forest-Middle Fork Dam located approximately 700 feet below the confluence of Forest Creek and the Middle Fork Mokelumne River with storage capacity of 8,000 AF or 12,000 AF. (CCWD and CPUD 2017.)

5.2.4 Designation Effects on Future Water Uses

Under the State Act, other than temporary flood storage facilities permitted pursuant to Section 5093.57, no dam, reservoir, diversion, or other water impoundment facility may be constructed on any river and segment thereof designated in Section 5093.54; nor may a water diversion facility be constructed on the river and segment unless and until the Secretary determines that the facility is needed to supply domestic water to the residents of the county or counties through which the river and segment flows, and unless and until the Secretary determines that the facility will not adversely affect the free-flowing condition and natural character of the river and segment (PRC Sec. 5093.55). A key part of the “natural character of the river and segment” would include the extraordinary values for which the river segment is being included into the State System (i.e., scenic and recreational values for the five Mokelumne River segments), as well as consideration of whether the river segment classification is wild, scenic, or recreational.

CRB conducted an initial review of the regulatory impact on rivers designated as part of the California Wild and Scenic Rivers System in 2005. The results of the first review were documented in an April 2005 memo to the California Assembly Water, Parks and Wildlife Committee on the various impacts of Wild and Scenic River designation. It found no or minor changes to watershed management and to regulatory or permitting processes for projects in or around designated rivers – with the important exception that the California Wild and Scenic Rivers Act specifically prohibits future dams, reservoirs, and water impoundments from being built on designated segments. The operation of existing dams and reservoirs, however, were unimpeded. (CRB 2005.)

The second review by CRB in 2018 examined water rights transactions including Applications; Permits; and Appropriative, Temporary, and Registration Water Rights between 2005 and 2017 (CRB 2018, see Appendix E). The review also included interviews with regulators to assess the regulatory impact on rivers designated as part of the California Wild and Scenic Rivers System. CRB concluded that State Wild and Scenic River designation continues to have a negligible impact on regulation of designated rivers, in particular with respect to adversely affecting water diversion applications on State-designated segments or upstream of such segments. In a review of determinations drafted by the Office of the Secretary in the past 12 years, almost all diversions were approved by the Secretary. There was one 'Potentially Inconsistent' finding by the Secretary (May 2008, A031661/662 on the Eel River), but it was later determined that the river segment was not actually a designated Wild and Scenic River segment. A review of water rights permits in the SWRCB's online database found only one application since 2005 for appropriative, temporary, and small domestic use registration within watersheds with designated State Wild and Scenic Rivers that was rejected. Interviews with regulators confirmed that the impact of the California Wild and Scenic Rivers Act is limited by its regulatory overlap with several other existing State and Federal environmental laws, notably the California Environmental Quality Act and both U.S. and California Endangered Species Acts. (CRB 2018.) Construction of any new dam, reservoir, or other water impoundment facility would be foreclosed on any designated river segment as well as any water impoundment facility that backs up water such that it impounds, temporary or otherwise, a free-flowing river segment included in the State System. Construction of any new or modified dam, reservoir, or other water impoundment facility in undesignated segments of the river would be curtailed but permissible if such a facility does not adversely affect the free-flowing condition and natural character of

designated river segments, particularly the extraordinary scenic and recreational values. Segments of the North Fork Mokelumne River which are not under consideration for designation under AB 142 and to which the curtailment would be applicable include the main stem 1) from 0.50 mile upstream of the Tiger Creek Powerhouse to 1,000 feet downstream of the Tiger Creek Afterbay 97-105 Dam, 2) from State Highway Route 26 to 400 feet downstream of the small reregulating dam at the outlet of the West Point Powerhouse, and 3) 300 feet upstream of the Electra Powerhouse to 300 feet downstream of the small reregulating dam downstream of the Electra Powerhouse. Future reconsideration of plans to raise Pardee Dam would be foreclosed from State participation if Segment E is designated because the inundation created from increasing the height of Pardee Dam would extend into the lower portion of Segment E, which could be included in the State System.

Construction of a new water diversion facility for supplying water for non-domestic uses would also be foreclosed on any designated river segment. Construction of a new water diversion facility on any designated river segment for supplying water for domestic uses would be curtailed but permissible if such a facility would not adversely affect the free-flowing condition and natural character of the river and designated river segments, particularly the extraordinary scenic and recreational values.

The impact of including the five Mokelumne River segments into the State System on future water uses, or on any proposed new water diversion facility, dam, reservoir, or other water impoundment facility in the watershed, along tributaries or on the main stem upstream of designated river segments, is complex because of a moderate number of potential water projects and uncertainty regarding project design, feasibility, and resulting impacts. Proposed facilities, licenses, water rights, and operational changes could be curtailed if those changes would adversely affect the free-flowing condition and natural character of designated river segments, particularly the extraordinary scenic and recreational values which would form the basis of designation. Future projects that result in flow reductions in the designated segments would not be precluded if they do not adversely affect 1) the free-flowing condition 2) natural character, and 3) extraordinary resources of the river segments included in the State System. With respect to the free-flowing condition of the five river segments; these segments are not truly “free-flowing” as substantial natural flows are stored and diverted upstream of the five study segments and between the study segments, yet these segments are still considered free-flowing, and the natural character and extraordinary scenic and recreational values are still present and sufficient to meet the eligibility requirements for including the designated river segments into the State System.

In addition, flow reductions in the five river segments could be permitted if they do not adversely impact the free-flowing condition, natural character, and extraordinary resources of the river segments included in the State System. Including the five river segments into the State System would add consideration of a new project’s effects on the designated segments’ free-flowing condition, natural character, and extraordinary scenic and recreational values to the list of environmental laws that would require compliance by the project proponent. Other environmental regulations such as CEQA would have more impact on a proposed project than the California Wild and Scenic Rivers Act (CRB 2018).

5.2.5 Classification Effects on Future Water Uses

The effects of river classification as wild, scenic, or recreational are not explicit in the State Act. Generally, future water development and other projects will not be allowed to adversely affect the free-flowing condition and natural character of a component of the California System (PRC Secs. 5093.55, 5093.56). The natural character of a river influences to a large degree whether a river is classified as wild, scenic, or recreational. For example, a wild river will have a natural character significantly different from a recreational river.

Classification does not affect the existing uses of a designated river because such uses dictate classification as wild, scenic, or recreational. For instance, an area with a high level of land use and human disturbance will be eligible only as a recreational area, and the natural character of the river and immediate environments will be reflected in the designation.

Classification generally has minimal, if any, effects on future water uses. It is possible, however, that a future project or action may be determined to have a significant impact on the natural character of a wild river segment but not on a recreational river segment. In this context, there are innate differences in classification. Wild rivers are generally afforded the greatest protection, scenic rivers less protection, and recreational rivers the least protection. However, the free-flowing condition, natural character of the river, immediate environment, and extraordinary values for which a river has been included in the State System can be key factors used in determining whether a proposed project or use may have an adverse effect on a State-designated river segment, regardless of classification as wild, scenic, or recreational.

A much greater potential effect on future projects would be if there were adverse effects to the actual values for which the river was designated, in this case, scenic and recreational values, which are independent of classification. Adverse effects on scenic values would be unlikely for most projects because scenic values are not just based on water flow but the surrounding vistas which would be unlikely to change from development of most but the largest water projects. While river flow is critically important to scenic values, the difference between flows at, for example, 400-500 cfs would generally not be substantial on the overall scenic values at any given location and flows vary substantially on an annual basis depending on whether a water year is wet, AN, BN, Dry, or CD. Recreational values on the Mokelumne River are much more tied to specific flows on the Mokelumne River and maintenance of flows consistent with FERC license requirements. Nonetheless, many types of water projects could be developed upstream without adversely affecting the free-flowing condition, natural character, and extraordinary scenic and recreational values of designated segments.

The estimated impacts to potential future water project types by river classification are characterized in **Table 5.1**, but are speculative because feasibility studies are not completed and proposed projects are presently only at a conceptual level. Greater detail on the specifics of actual impacts are not possible without additional, detailed information that would be available in feasibility studies and related environmental impact assessments associated with specific projects. In general, potential water use impacts from “wild” designated segments could be slightly greater than from “scenic” or “recreational” designated segments because the free-flowing conditions and natural characteristics of designated river segments vary and are embodied in their classification levels. **Table 5-2** summarizes potential Wild and Scenic River designation on land and water uses. Potential impacts are based on no special provisions included with designation of the five segments. Special provisions, as documented for past river segments in Section 2.5.5, “Legal Effects of Inclusion in California System,” under “Special Provisions,” could be included with river designation to minimize potential impacts from river designation and classification, although classification has little impact on any future water development.

Wild and Scenic River designation of the Mokelumne River would foreclose any future dams, reservoirs, diversions, or other water impoundment facilities on the designated segments, as well as foreclose any future Pardee Dam raises that would impound the lower reach of Segment E. None of these projects have been determined to be feasible. Nor are there other similar water facilities proposed for the study segments. Therefore, Wild and Scenic River designation would not foreclose any future projects known at this time, and there would be no effect on regional and local economies from project foreclosure. Any potential curtailments would depend on project characteristics and other factors.

Table 5-1. Summary of Potential Impacts from Wild and Scenic River Designation and Classification on Future Water Project Types

Future Water Project Type	River Classification		
	Wild	Scenic	Recreational
Upstream Storage	Curtailed – Moderate ^a	Curtailed - Moderate ^a	Curtailed - Low ^a
Reservoir Improvement	Curtailed - Moderate ^a	Curtailed - Moderate ^a	Curtailed - Low ^a
Reservoir Reoperation	Curtailed - Moderate ^a	Curtailed - Moderate ^a	Curtailed - Low ^a
Off-Stream Storage	Curtailed - Moderate ^a	Curtailed - Low	Unaffected
Water Rights Changes	Curtailed - Moderate ^a	Curtailed - Moderate ^a	Curtailed - Low ^a
Water Conservation	Unaffected	Unaffected	Unaffected
Domestic Water Supply	Unaffected	Unaffected	Unaffected
Agriculture Water Supply	Curtailed - Moderate ^a	Curtailed - Moderate ^a	Curtailed - Low ^a
Flow Diversion	Curtailed - Moderate ^a	Curtailed - Moderate ^a	Curtailed - Low ^a
New Storage Inundating any Designated Segment	Foreclosed	Foreclosed	Foreclosed

Notes:

^a Potential impacts rated as “Low” or “Moderate” are meant to show differences in potential impacts between river classification (wild, scenic, or recreational); the actual differences between river classifications are much smaller. Actual potential impacts from any specific future water project type and use would be heavily dependent primarily upon the specific project proposed, and whether any “special provisions” are included with river segment designation.

Table 5-2. Summary of Potential Impacts from Wild and Scenic River Designation on Land and Water Uses

Type of Use	Current Use Level	Reasonably Foreseeable Use Level	Potential Impact
Grazing	Low	Low	Unaffected
Mining	Moderate	Moderate	Unaffected
Timber harvest	Moderate	Moderate	Curtailed ^a
Agricultural uses	Low	Low	Unaffected
Recreation	High	High	Enhanced
Fish and wildlife habitat maintenance	High	High	Enhanced
Private land access	Low	Low	Unaffected
Water supply (existing)	Moderate	Moderate	Unaffected
Water supply (future)	Moderate	Moderate	Variable ^b
Hydroelectric power	High	High	Unaffected
Flood control	Low	Low	Unaffected
Water quality maintenance	Moderate	Moderate	Unaffected

Notes:

^a Potential impact to timber management within the special treatment area (within 200 feet of designated river segments) is determined by a registered professional forester. Special treatment area management plans for designated segments, if needed, may include minor or nonexistent additional impacts.

^b Potential impact depends on specific project design and operation; whether a project is an existing or future project; the specific extraordinary values for which a river segment is included in the State System; whether the project could be designed and operated to avoid adverse impacts on the free-flowing condition, natural character, immediate environment, and the extraordinary values for which a river segment is designated; whether special provisions are included with designation that address water supply or water rights; and the Secretary for Natural Resources' determination of whether a proposed project on a designated segment provides for local domestic use.

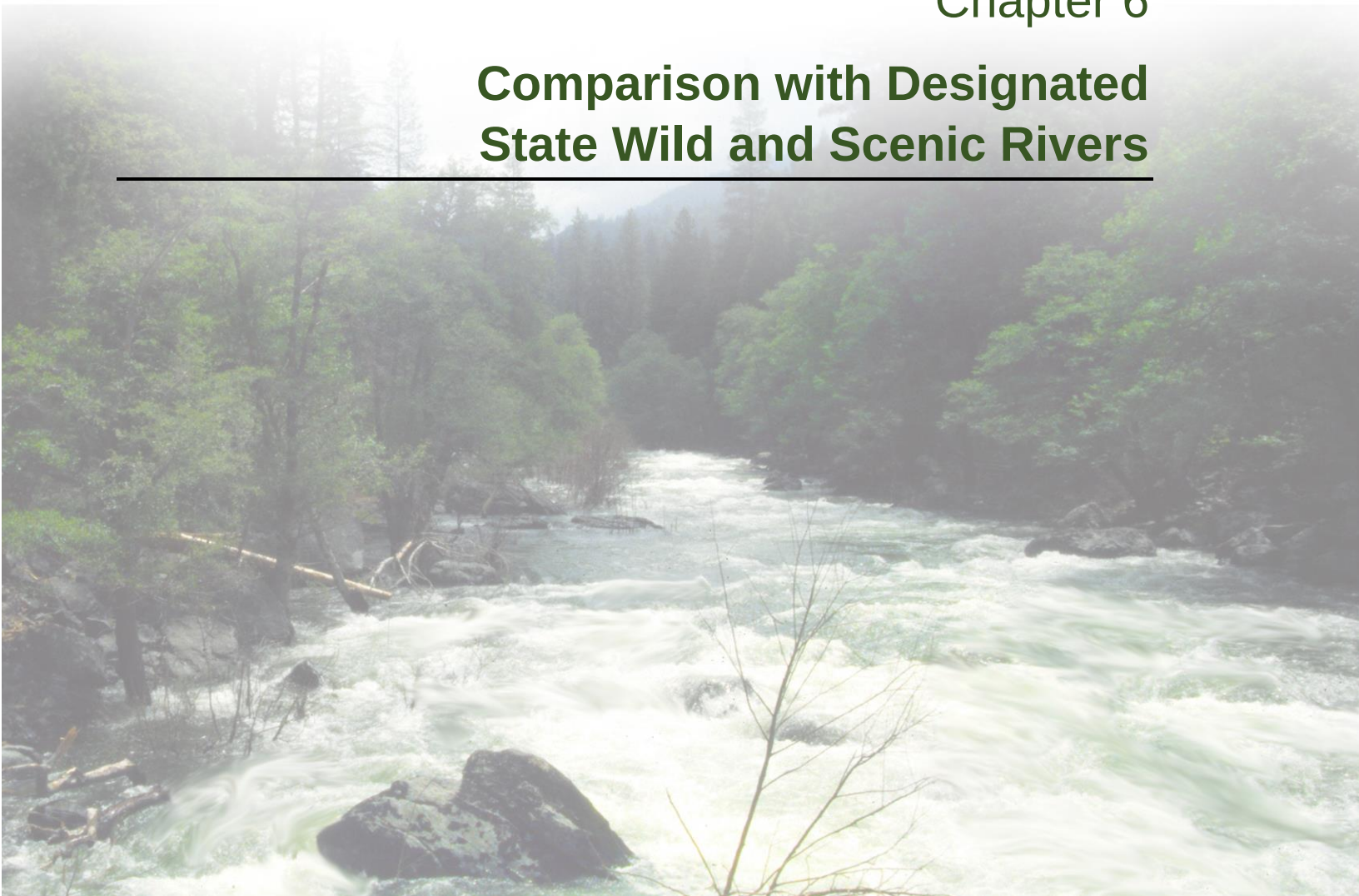
5.3 Regional and Local Economic Impacts

Designating Mokelumne River segments as components of the California System would not be expected to significantly affect production of timber, livestock, minerals, or any other commodities within lands adjacent to the river or in the watershed. Consequently, no or negligible impacts on the regional or local economies would be expected within these sectors. The prestige of the area's recreation sites might be enhanced slightly to a limited number of people, resulting in some increase in demand for participation in hiking, fishing, camping, kayaking, rafting, and related activities. Increased recreational use of the river would be minor and have negligible effects on the regional and local economies.

Impacts on land and water use and economic activity could occur if State Wild and Scenic River designation precluded or restricted diversions of water for future offstream beneficial uses or water impoundment upstream of designated river segments. The Mokelumne River has been declared fully appropriated by SWRCB, but water rights are pending that could be available for diversion regardless of whether the river is included in the State System. Because the feasibility of proposed water projects is unknown, and it is speculative to know specific water demands far into the future, it is too speculative to assess the regional and local economic impacts if any future potential local water projects are curtailed or foreclosed.

Chapter 6

Comparison with Designated State Wild and Scenic Rivers



Chapter 6. Comparison with Designated State Wild and Scenic Rivers

Charter members of the California Wild and Scenic Rivers System in 1972 were rivers located within the Klamath, Trinity, Smith, Eel, and American River systems. Formal eligibility and suitability studies were not prepared and extraordinary resource values were never specifically identified on a segment-by-segment basis for any of these rivers. The main stem rivers in these systems are all components of the National System, and all the river segments except the North Fork American River qualified for inclusion on the basis of outstandingly remarkable anadromous fishery values. The lower American River was found to possess outstandingly remarkable recreational values, and the Middle Fork Eel River possesses outstandingly remarkable white-water boating (recreational) values. The North Fork American River contains outstandingly remarkable scenic, recreational, cultural, and water quality values.

6.1 Eligibility and Classification

Formal State wild and scenic eligibility and suitability studies were completed for the West Walker, East Fork Carson, and McCloud Rivers in 1988 (The Resources Agency 1988a, 1988b, 1988c). The West Walker River possesses extraordinary water; fisheries; recreational; scenic; and scientific, ecological, and educational resource values. The East Fork Carson River possesses extraordinary water, recreational, and scenic resource values. These two rivers, located in the eastern Sierra Nevada and on the western edge of the Great Basin, represent unique components of the California System because of the very different resource attributes in this geographic area than in the rest of California.

The only western Sierra Nevada rivers in the California Wild and Scenic Rivers System are the North Fork American River and lower American River, which were charter members in 1972. Based on the Federal studies, the North Fork American River has similar outstandingly remarkable scenic and recreational values to the Mokelumne River. The lower American River's outstandingly remarkable recreation values are unique in California for such a large diverse array of recreational opportunities so close to a large metropolitan area (i.e., Sacramento).

Mill and Deer Creeks, also both western Sierra Nevada streams, were not included in the System but were afforded special protection under the Act in 1994. Both Mill and Deer Creeks have extraordinary fishery (unique salmon populations), recreational (hiking, backpacking, camping, fishing, boating, and nature observation in a deep canyon and geologically unique landscape), and scenic (creeks flow through deep and fairly remote canyons with dense conifer forests and unique geologic formations and diverse vegetation) resource values. Contributing to the extraordinary recreational values, Deer Creek also has opportunities for expert white-water boating for approximately a 2-month period during high spring flows in the lower canyon; the creek is rated as Class 4 to 5 for boating and requires expert boating skills to negotiate successfully. Both creeks have segments designated as wild, scenic, and recreational.

The five Mokelumne River study segments are comparable to the North Fork American River, Mill Creek, and Deer Creek in terms of the quality and extent of their extraordinary scenic and recreational values. In particular, all offer a diverse array of recreational experiences in wild, scenic, and recreational

classifications. The North Fork American River is similar to the five Mokelumne River study segments in that these river segments are all located upstream of major water impoundments. The Mokelumne River study segments collectively, however, offer a more diverse array of boating opportunities and greater public access relatively close to the large metropolitan areas of both Sacramento and Stockton for access to these resource values and scenic and recreational opportunities.

With only one western Sierra Nevada river included in the California Wild and Scenic Rivers System (i.e., North Fork American River), inclusion of the five contiguous study segments of the Mokelumne River into the State System would meet the Act's legislative declaration to preserve certain rivers which possess extraordinary scenic, recreational, fishery, or wildlife values in their free-flowing state, together with their immediate environments, for the benefit and enjoyment of the people of the State (PRC Sec. 5093.50).

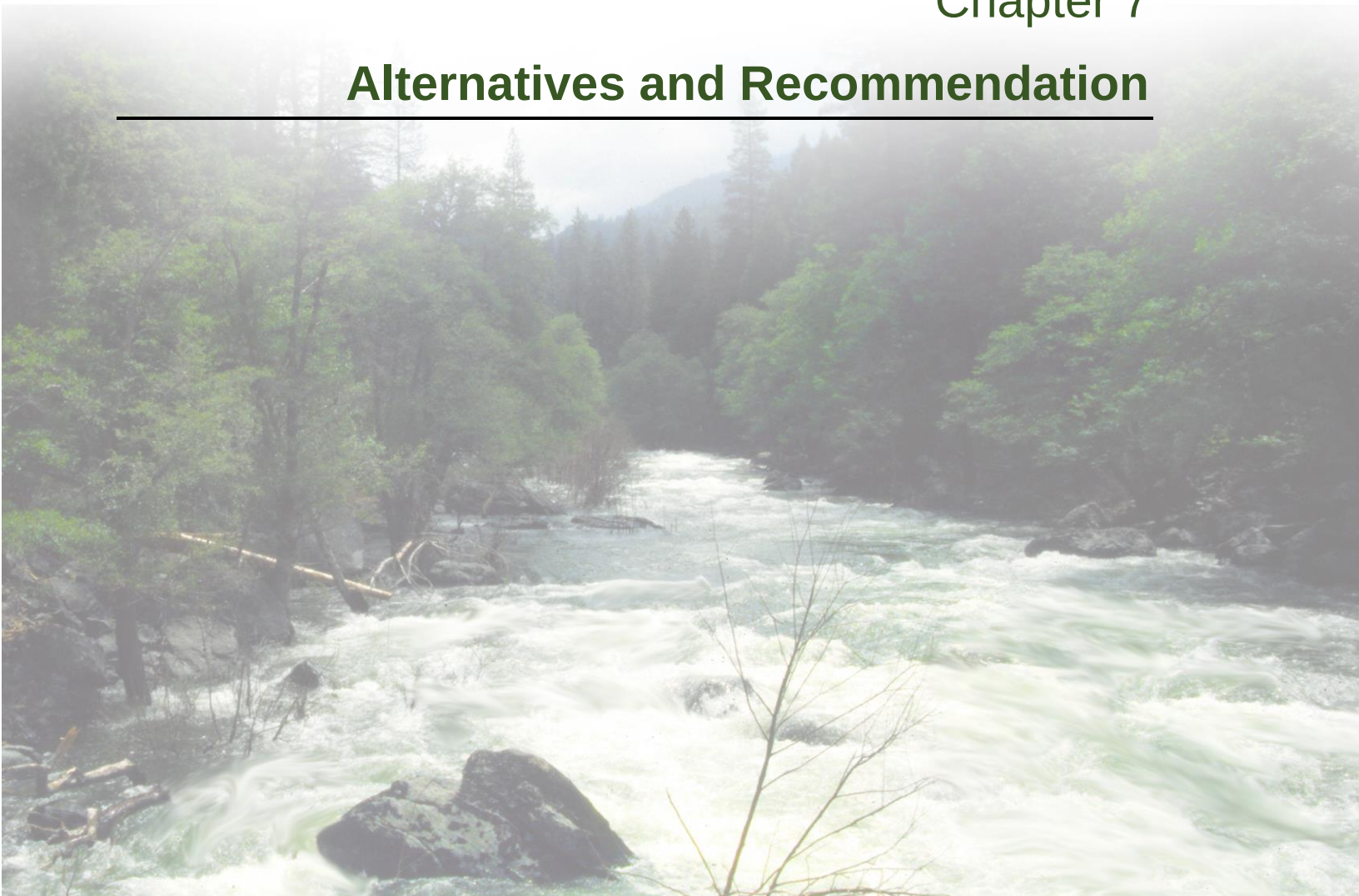
6.2 Suitability

Most rivers added to the California Wild and Scenic Rivers System or receiving special protections under the Act (McCloud River and Mill and Deer Creeks) have had special provisions incorporated regarding future water rights and domestic water development.

Including the five Mokelumne River segments into the State System with special provisions regarding future water rights and domestic water development is not precedent setting and allows domestic water development when such projects can be carried out without adversely affecting the free-flowing condition and natural character of these five river segments, particularly their extraordinary scenic and recreational values. As with other such river segments included in the California Wild and Scenic Rivers System with special provisions, the five study segments of the Mokelumne River can be similarly included in the System; meet the fundamental purpose of the Act; and allow feasible future domestic water projects that are planned, designed, and implemented without adversely affecting the free-flowing condition and natural character of designated river segments, particularly their extraordinary scenic and recreational values.

Chapter 7

Alternatives and Recommendation



Chapter 7. Alternatives and Recommendation

Several alternatives are available for recommendation by the Secretary to the Legislature and Governor as discussed below.

Alternative 1 is to recommend that none of the five study segments of the North Fork Mokelumne River and Mokelumne River under consideration for designation be included in the California Wild and Scenic Rivers System. Available data, however, support justification to include all five study segments as part of the System. All segments under consideration were found to be eligible for inclusion. While the river system has existing infrastructure developments, there are no significant structures within the eligible segments. In addition, operations of existing infrastructure are managed under a stream ecology program which ensures that patterns of flow through the eligible segments mimic the annual flow cycle and interannual variability of the natural flow of the river but with flow volumes reduced.

Nondesignation would potentially allow future water impoundments and diversions which could upset the balance between water uses and instream flows which support the river's relatively free-flowing status, immediate environments, natural character, and extraordinary scenic and recreational values for the benefit and enjoyment of the people of the State. The free-flowing status, immediate environments, natural character, and extraordinary scenic and recreational values would remain at risk to future water impoundments and diversions with this alternative.

Alternative 2 is to include only a subset of the five eligible segments of the North Fork Mokelumne River and Mokelumne River under consideration for designation be included in the California Wild and Scenic Rivers System. The number of subsets is large and it is unnecessary to evaluate any or all of these subsets because all segments are eligible and the impacts of designating a few segments versus all five segments is small. The eligible segments traverse several Sierra Nevada ecological communities as the stream descends from approximately 3,600 feet to approximately 580 feet over a distance of nearly 40 river miles through a diversity of high scenic values, in a viewshed that is generally intact and harmonious. The combination and unique integrity of the geologic, hydrologic, vegetation, recreation, and cultural resources provide recreational values along the five river segments that give a continuum of diverse and at times unique recreational opportunities which are extraordinary when considered as a whole. The free-flowing conditions, immediate environments, natural character, and extraordinary scenic and recreational values of any eligible but non-designated segments would remain at risk to future water impoundments and diversions with this alternative.

Alternative 3 is to include all eligible segments of the North Fork Mokelumne River and Mokelumne River in the California Wild and Scenic Rivers System. Each of the segments considered for designation has been found to be eligible either individually (Segments A, B, C1, and E) or when considered as a whole (Segments A, B, C1 and C2, D, and E). Wild and Scenic River designation of all eligible segments would preserve the free-flowing conditions; immediate environments; natural character; and continuum, diversity, and unique integrity of extraordinary scenic and recreational values. The certainty that would be desired by local water stakeholders to access potential future water rights with new or modified facilities, could be potentially compromised with this alternative, although existing water rights and facilities would be unaffected.

The existing balance between agricultural water and domestic water use for communities within the Counties of Alpine, Amador, and Calaveras where the water originates, and continued management of instream flows that support the free-flowing condition, natural character, and extraordinary values of the eligible river segments, could be preserved if special provisions are included to ensure water users can continue to access their existing water rights using existing or comparable infrastructure with designation of all eligible river segments, and potential future water rights and water projects are not foreclosed with inclusion of the five river segments into the State System.

Alternative 4 (Recommended Approach) is to include all five eligible river segments in the California Wild and Scenic Rivers System, similar to Alternative 3, but with special provisions that ensure the suitability of the designation. The five segments contain extraordinary scenic and/or recreational values and would represent unique additions to the California System. Preservation of these segments in their existing free-flowing condition, natural character, and with their extraordinary scenic and/or recreational values is considered to be the highest and most beneficial use of the water for the people of the State. Local land and water uses generally would be maintained, particularly if special provisions are included as part of the designation to ensure water users can continue to use existing or comparable infrastructure to access water available under existing water rights, and potentially develop future water rights and projects that do not adversely affect the free-flowing condition, natural character, and extraordinary scenic and/or recreational values for which the river segments are designated. It is therefore recommended that the following segments of the Mokelumne River be classified and added to the California Wild and Scenic Rivers System as follows:

- **Segment A1:** North Fork Mokelumne River from 0.50 mile downstream of the Salt Springs Dam to Bear Creek confluence (**Recreational**); **Segment A2:** Bear Creek confluence to 0.50 mile upstream of the Tiger Creek Powerhouse (**Wild**).
- **Segment B:** North Fork Mokelumne River from 1,000 feet downstream of the Tiger Creek Afterbay Dam to State Highway Route 26 (SR-26) (**Wild**).
- **Segment C1:** North Fork Mokelumne River from 400 feet downstream of the small reregulating dam at the outlet of the West Point Powerhouse to the southern boundary of Section 12, T6N R12E (**Wild**); **Segment C2:** Section 12 boundary to confluence of the North and Middle Forks Mokelumne River (**Recreational**).
- **Segment D:** Mokelumne River from the confluence of the North and Middle Forks to 300 feet upstream of the Electra Powerhouse (**Scenic**).
- **Segment E:** Mokelumne River from 300 feet downstream of the small reregulating dam downstream of the Electra Powerhouse to the Pardee Reservoir flood surcharge pool at 580 feet elevation above mean sea level (**Recreational**).

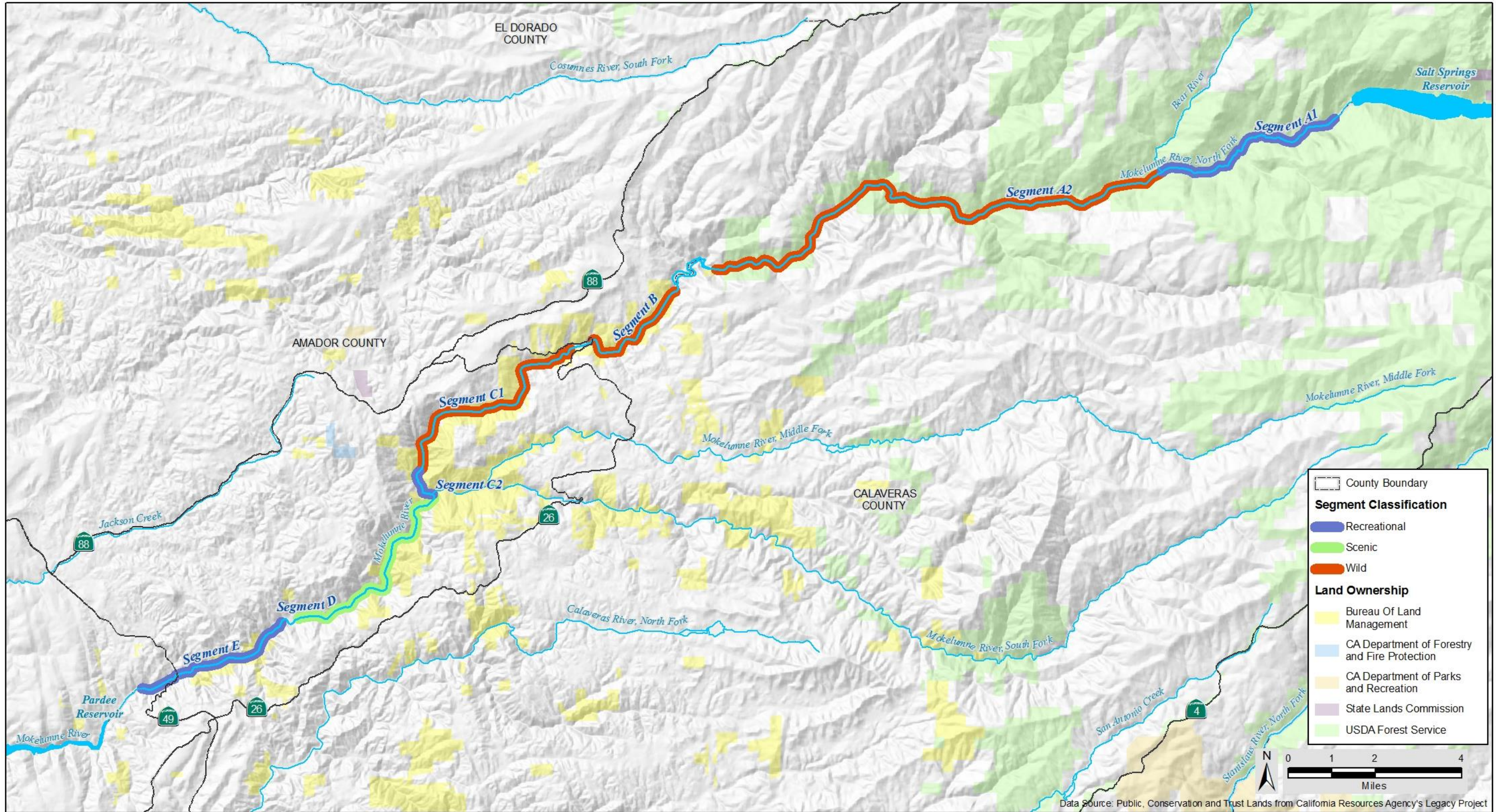
Classifications of eligible river segments for this recommended alternative are shown in **Figure 7-1**.

This study recommends including the segments listed above into the System, and describes special provisions that address concerns regarding potential effects of the proposed designation on existing water rights application 5647X03 and future local water development projects designed to avoid adverse effects on the free-flowing condition and natural character of designated segments, as well as on the extraordinary scenic and recreational values for which the segments would be designated.

- **Special Provision No. 1.** The designation of the identified segments of the Mokelumne River into the System shall not prejudice, alter, delay, interfere with, or affect in any way, the existing water rights of the Pacific Gas and Electric Company or public water agencies within the Mokelumne River watershed (hereafter defined as upstream of Pardee Reservoir), including the range of operations permitted under these existing water rights; any historic water use practices within existing water rights; or the replacement, maintenance, repair, operation, or future expansion within existing water rights of existing diversion, storage, powerhouse, or conveyance facilities or other works by the Pacific Gas and Electric Company, or public water agencies within the Mokelumne River watershed; nor shall anything in this subdivision preclude the issuance of any governmental authorization or financial assistance needed for utilization of those rights, except that no changes shall cause an adverse effect, if any of the preexisting facilities or places or the purposes of use, upon the free-flowing condition, natural character, or extraordinary scenic or recreational values of the river segments designated herein. Any such change or application shall be subject to all applicable constitutional, statutory, and judicial requirements, including the public trust doctrine. For the purposes of this designation, an adverse effect will be considered to be significant impairment to flows that would otherwise exist independent of this designation.
- **Special Provision No. 2.** The designation of the identified segments of the Mokelumne River into the System shall not prejudice, alter, delay, interfere with, or affect any changes to the existing water rights of the Pacific Gas and Electric Company, or public water agencies within the Mokelumne River watershed, including changes in the purposes of use, places of use, points of diversion, quantities of water diverted, or ownership, or applications by these agencies for new water rights, including reservations of rights for County-of-Origin uses; provided, that the changes or applications do not involve the construction of a dam, reservoir, diversion, or other water impoundment facility within the designated segments; or cause an adverse effect, if any of the preexisting water rights or facilities or places or the purposes of use, upon the free-flowing condition, natural character, or extraordinary scenic and/or recreational values of the river segments designated herein. Any such change, application, or future project shall be subject to all applicable constitutional, statutory, and judicial requirements, including the public trust doctrine and a determination that the new or expanded or rehabilitated facilities will not cause an adverse effect upon the free-flowing condition, natural character, or extraordinary scenic or recreational values of the river segments designated herein. For the purposes of this designation, an adverse effect will be considered to be significant impairment to flows that would otherwise exist independent of this designation.
- **Special Provision No. 3.** The designation of the identified segments of the Mokelumne River into the System shall not prejudice, alter, affect in any way, or interfere with the maintenance, repair, or operation by the Pacific Gas and Electric Company of the Mokelumne River Project (FERC No. 137) currently under the 2001 Federal Energy Regulatory Commission license for the project, the incorporated settlement agreement, any license amendments made with the agreement of the parties to the incorporated settlement agreement, and any adjustment of flows permitted to occur pursuant to the license for enhancement of ecological and recreational resources.

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Figure 7-1. Mokelumne River Segment Classification

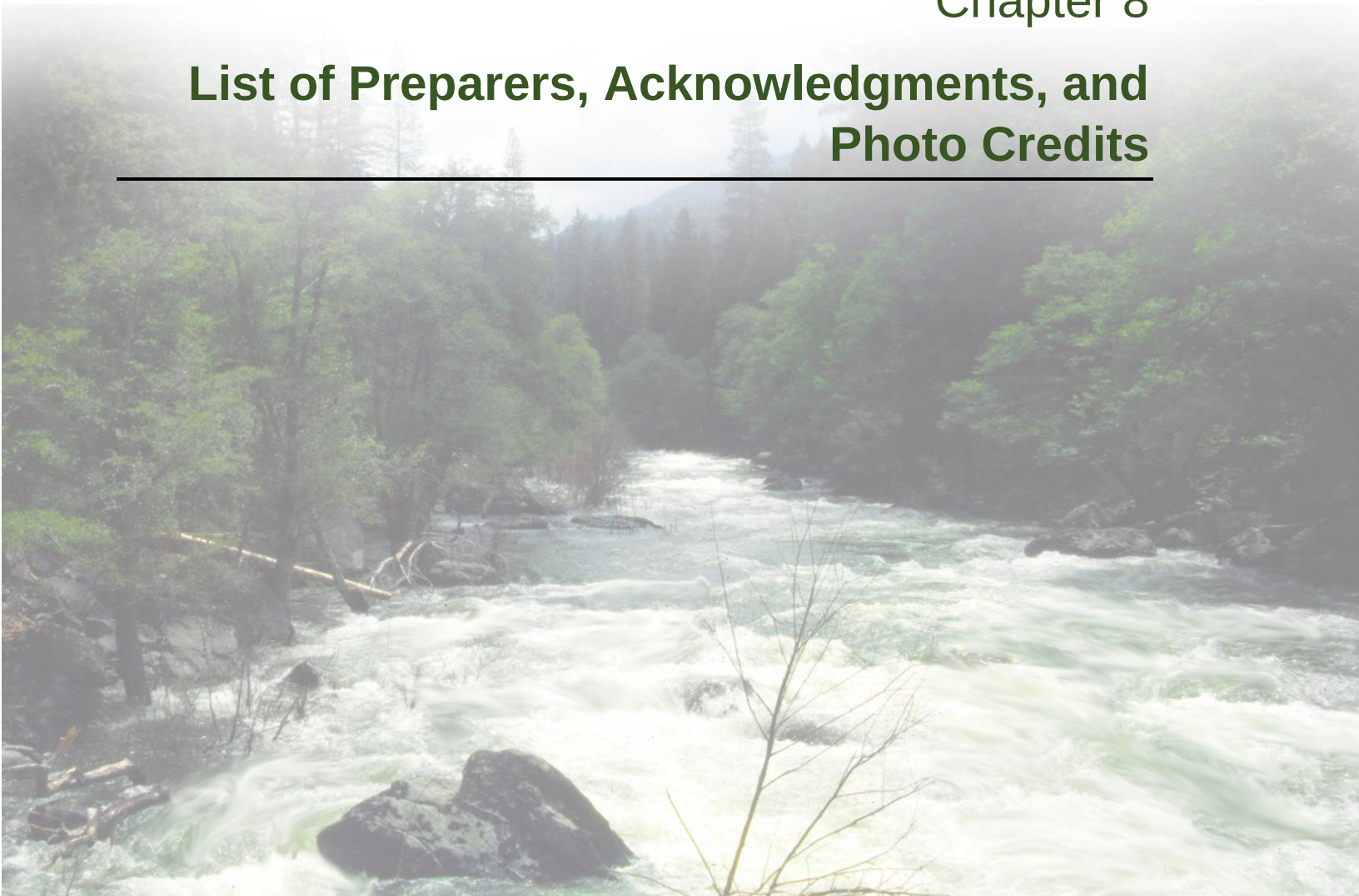


Source: GEI Consultants, Inc., 2017

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Chapter 8

List of Preparers, Acknowledgments, and Photo Credits



Chapter 8. List of Preparers, Acknowledgments, and Photo Credits

8.1 List of Preparers

The following is a list of the individuals who directed, managed, prepared, and/or reviewed sections of this report.

California Natural Resources Agency

Name	Qualifications and Experience	Participation
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GEI Consultants, Inc.

Name	Qualifications and Experience	Participation
Phil Dunn	B.S. Zoology, M.S. Fisheries Biology; 36 years' experience	Contractor Project Director/Project Manager, Document QA/QC; Eligibility Analysis; Classification; Suitability Analysis; Recommendations
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Hannah Dunn	B.S. Environmental Studies; 2 years' experience	List of Preparers; References; Appendices
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Maria Pascoal	B.F.A. Graphic Design, Technical Writing and Communication Certificate; 15 years' experience	Graphics Production
Charisse Case	Certificate of Completion, Business Administration; 29 years' experience	Report Production; Word Processing

8.2 Acknowledgments

The information and data used in this report could not have been compiled without the cooperation of various governmental agencies, organizations, and individuals. Appreciation is expressed to all who contributed time and energy to the study effort. The individuals named below were particularly helpful in developing this study:

- Gene Mancebo, Amador Water Agency
- Peter Martin, Calaveras County Water District
- Rick Hopson, Eldorado National Forest
- Katherine Evatt, Foothill Conservancy
- Steve Evans, Friends of the River

8.3 Photo Credits

Photographs taken by GEI staff are not presented below, including all photographs presented in Section 4.3, “Scenic Values.” All photographs taken by others are credited below.

Cover (top right and lower right photos)

Photo Credit: Katherine Evatt, Date Unknown

Chapter Dividers Photo

Photo Credit: Foothill Conservancy, Date Unknown

A-2 Wading near Mokelumne River Campground

Photo Credit: Dave Tearpak, Date Unknown

A-6 Rock climbing occurs at Calaveras Dome

Photo Credit: Foothill Conservancy, 2000-2017

A-7 Angler at Bruce Crossing

Photo Credit: Foothill Conservancy, 2000-2017

A-9a Kayakers on Devil’s Nose Run – running the “Cascade But Bigger” Rapid and scouting Mokelumne Falls

Photo Credit: Daniel Brasuell, courtesy Foothill Conservancy, 2000-2017

A-9b Kayakers on Devil’s Nose Run – running the “Cascade But Bigger” Rapid and scouting Mokelumne Falls

Photo Credit: Daniel Brasuell, Courtesy Foothill Conservancy, 2000-2017

A-10 Angler at lower end of Segment A above Tiger Creek

Photo Credit: Denise Schank, courtesy Foothill Conservancy, 2006

B-1 Angler at Tiger Creek Run

Photo Credit: Foothill Conservancy, 2000-2017

B-2a and b Swimmers and kayakers at pools near Highway 26 Bridge

Photo Credit: Foothill Conservancy, 2000-2017

B-4 Rafting guide training trip on Tiger Creek Run
Photo Credit: Foothill Conservancy, 2000-2017

B-5 Family fishing and kayakers at take-out near Highway 26 Bridge
Photo Credit: Foothill Conservancy 2015

B-6 Family picnicking and rafters using dedicated take-out for Tiger Creek Run
Photo Credit: Foothill Conservancy, 2000-2017

B-7 Kayakers on Tiger Creek Run
Photo Credit: Foothill Conservancy, 2000-2017

B-8 Signage for boaters at designated Tiger Creek Run take-out
Photo Credit: Foothill Conservancy, 2000-2017

C-1a and b Riverside picnic areas at Roaring Camp
Photo Credit: Roaring Camp website 2017

C-2 Riverside camping at Roaring Camp
Photo Credit: Roaring Camp website 2017

C-3 Riverside gold mining at Roaring Camp
Photo Credit: Roaring Camp website 2017

C-4b Rock diving and swimming at Roaring Camp
Photo Credit: Roaring Camp website 2017

C-5 Angling at Roaring Camp
Photo Credit: Roaring Camp website 2017

C-6 Floating at Roaring Camp
Photo Credit: Roaring Camp website 2017

C-7a Backcountry hiking/rock scrambling
Photo Credit: Reuben Childress 2017

C-7b Backcountry hiking/rock scrambling
Photo credit: Reuben Childress 2017

D-1a Scrambling and Swimming to Access the River Downstream of Roaring Camp
Photo Credit: Foothill Conservancy 2017

D-1b Scrambling to access River downstream of Roaring Camp
Photo Credit: Foothill Conservancy 2017

D-2 Old Ponderosa Way Bridge and swimming, day use, and kayak put-in for Ponderosa Run
Photo Credit: Mario Blackwell 2016

D-3 Dropping into Chute Rapid #3 on Ponderosa Run
Photo Credit: Mario Blackwell 2016

D-4a Inflatable kayaks on Ponderosa Run
Photo Credit: Foothill Conservancy 2017

D-4b Inflatable kayaks on Ponderosa Run
Photo Credit: Foothill Conservancy 2017

D-4c Inflatable kayaks on Ponderosa Run
Photo Credit: Foothill Conservancy 2017

E-1a Drop-in to Devil's Toilet Bowl Rapid
Photo Credit: Foothill Conservancy, 2000-2017

E-1b Chute Rapid
Photo Credit: Foothill Conservancy, 2000-2017

E-2 Youth inner city outings trip on Electra Run
Photo Credit: Foothill Conservancy, 2000-2017

E-3 Floater on Electra Run
Photo Credit: Buzz Eggleston, Date Unknown

E-4 Kayakers departing for Electra Run
Photo Credit: Katherine Evatt 2009

E-5 Canoer participating in Annual Mokelumne River Race – slalom event
Photo Credit: Martin Beebee 2017

E-6 Standup paddleboarder participating in Annual Mokelumne River Race – slalom event
Photo Credit: Martin Beebee 2017

E-7 Tandem kayak participating in Annual Mokelumne River Race – slalom event
Photo Credit: Menka Belgal 2017

E-8a Day users along Electra Run
Photo Credit: Foothill Conservancy, 2000-2017

E-8b Day users along Electra Run
Photo Credit: Foothill Conservancy 2014

E-9 Swimmers in Electra Day Use Area
Photo Credit: Foothill Conservancy, 2010

E-10a Fly fishing for kokanee salmon at Electra Day Use Area
Photo Credit: Foothill Conservancy, 2007-2017

E-10b Fly fishing at Electra Day Use Area
Photo Credit: Foothill Conservancy, 2000-2017

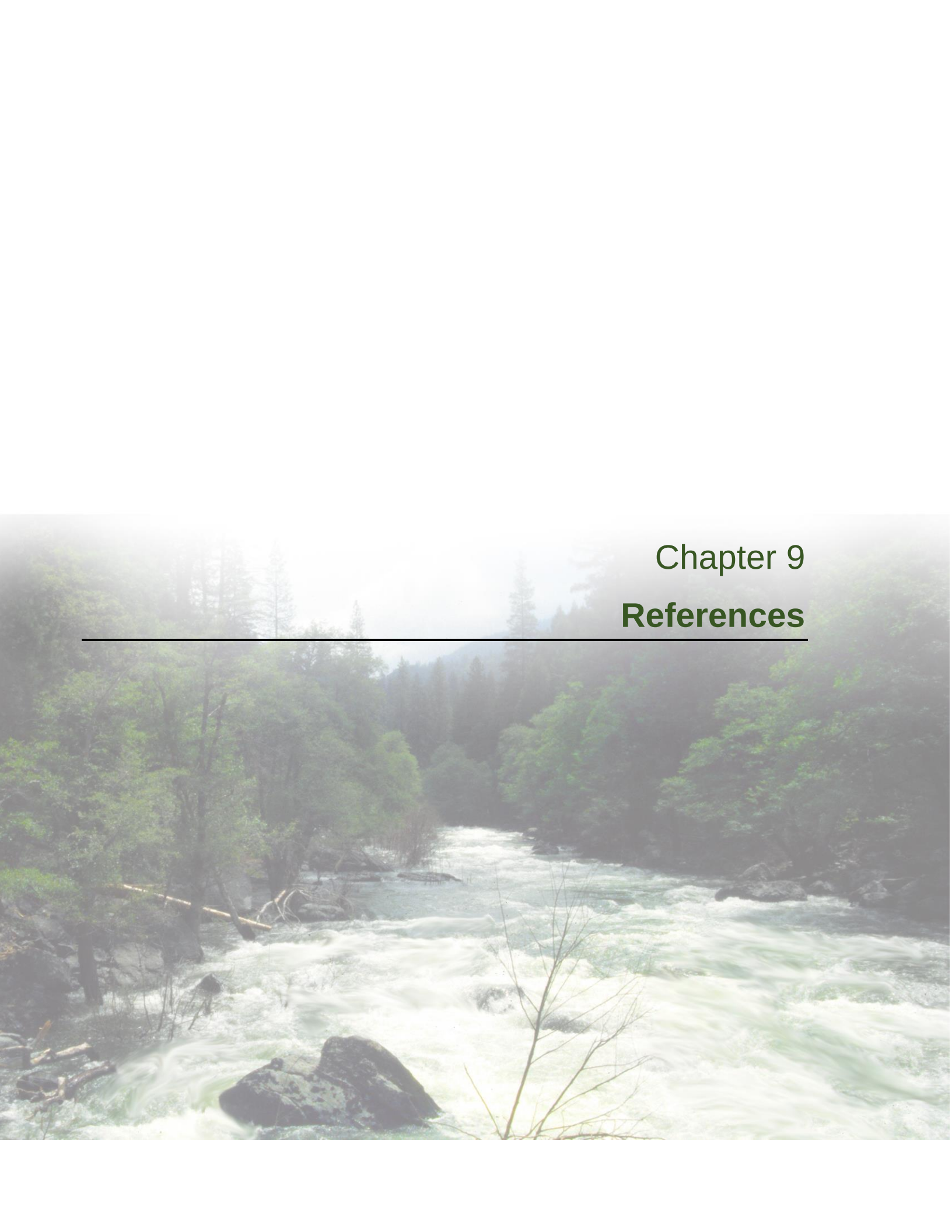
E-11 Spin Fishing at Electra Day Use Area
Photo Credit: Katherine Evatt 2007

E-14 Bikers on Electra Road next to river
Photo Credit: Foothill Conservancy, 2000-2017

E-15a Spring wildflowers along Electra Road and river
Photo Credit: Tearpak Digital, 2009

E-15b Spring wildflowers along Electra Road and river
Photo Credit: Foothill Conservancy, 2009

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Chapter 9

References

Chapter 9. References

1. Introduction

Amador Water Agency (AWA). 2017. *Long-Term Needs and Water Supply Study*. Sutter Creek, CA.

Calaveras County Water District (CCWD) and Calaveras Public Utility District (CPUD). 2017. *Calaveras County Mokelumne River Long-Term Water Needs Study*. San Andreas, CA.

California Research Bureau (CRB). 2018. Regulatory Impact of Wild & Scenic Rivers Designation (Update to 2005 Wolk Memo). Memorandum from Ben Tang to Joseph Wall, CNRA. California State Library. Sacramento, CA.

2. Study Area and Methods

Amador Water Agency (AWA). 2016. *2015 Urban Water Management Plan*. Sutter Creek, CA.

_____. 2017a. *Long-Term Needs and Water Supply Study*. Sutter Creek, CA.

_____. 2017b. *Central Amador Water Project (CAWP) Water Right Application Environmental Impact Report*. Sutter Creek, CA.

Calaveras County Water District (CCWD). 2016. *2015 Urban Water Management Plan Update*. San Andreas, CA.

Calaveras County Water District and Calaveras Public Utility District (CPUD). 2017. *Calaveras County Mokelumne River Long-Term Water Needs Study*. San Andreas, CA.

California Research Bureau (CRB). 2018. Regulatory Impact of Wild & Scenic Rivers Designation (Update to 2005 Wolk Memo). Memorandum from Ben Tang to Joseph Wall, CNRA. California State Library. Sacramento, CA.

California Water Code (CWC). 2016. Technical reference for Water Storage Investment Program.

Federal Energy Regulatory Commission (FERC). 2001. *Order Approving Settlement Agreement and Issuing New License*. Pacific Gas and Electric Company Project Nos. 137-002 and 027. Washington, D.C.

Mokelumne River Water and Power Authority (MRWPA). 2004. *Mokelumne River Regional Water Storage and Conjunctive Use Project – More Water, Feasibility Analysis/Environmental Documentation Phase 1 – Reconnaissance Study Summary Report*. Lodi, CA.

Pacific Gas and Electric Company (PG&E). 2000. *Mokelumne Relicensing Settlement Agreement*. Mokelumne River Project (FERC Project No. 137). San Ramon, CA.

_____. 2010. 2009 Stream Ecology Monitoring Program Annual Report & Five-Year Summary. Mokelumne River Project (FERC Project No. 137). San Ramon, CA.

- _____. 2017. *2016 Stream Ecology Monitoring Program Annual Report & Ten-Year Summary*. Mokelumne River Project (FERC Project No. 137). San Ramon, CA.
- Pacific Institute. 2017. *Review of Amador Water Agency's Long-Term Needs and Water Supply Study*. Oakland, CA.
- San Joaquin County. 2011. *Freeport Element of the American River Use Strategy, Phase I: Draft Feasibility Study*. Stockton, CA.
- The Resources Agency. 1994a. *Deer Creek Wild and Scenic River Suitability Report*. Prepared by Jones & Stokes Associates. Sacramento, CA.
- _____. 1994b. *Mill Creek Wild and Scenic River Suitability Report*. Prepared by Jones & Stokes Associates. Sacramento, CA.
- _____. 1988a. *West Walker River Wild and Scenic River Suitability Report*. Prepared by Jones & Stokes Associates. Sacramento, CA.
- _____. 1988b. *East Fork Carson Wild and Scenic River Suitability Report*. Prepared by Jones & Stokes Associates. Sacramento, CA.
- _____. 1988c. *McCloud River Wild and Scenic River Suitability Report*. Prepared by Jones & Stokes Associates. Sacramento, CA.
- Upper Mokelumne River Watershed Authority (UMRWA). 2007. *Upper Mokelumne River Watershed Assessment and Planning Project*.
- _____. 2013. *Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan Update*.
- Upper Mokelumne River Watershed Authority (UMRWA) and Eastern San Joaquin County Groundwater Basin Authority (ESJGBA). 2015. *Mokelumne Watershed Interregional Sustainability Evaluation (MokeWISE) Program Final Report*.
- U.S. Bureau of Land Management (BLM). 2007. *Sierra Proposed Resource Management Plan and Final Environmental Impact Statement, Appendix E: Wild and Scenic River Eligibility and Suitability*. Folsom, CA. Available at: <https://archive.org/details/sierraproposedre00unit>.
- U.S. Forest Service (USFS). 1990. *Wild and Scenic River Study Report/Environmental Impact Statement on the North Fork of the Mokelumne River*. Eldorado and Stanislaus National Forests. Placerville, CA.

3. River Water Development and Issues Summary

- Amador Water Agency (AWA). 2017. *Long-Term Needs and Water Supply Study*. Sutter Creek, CA.
- Calaveras County Water District (CCWD) and Calaveras Public Utility District (CPUD). 2017. *Calaveras County Mokelumne River Long-Term Water Needs Study*. San Andreas, CA.
- California Water Commission. 2016. *Technical Reference for Water Storage Investment Program*. Sacramento, CA.

- Federal Energy Regulatory Commission (FERC). 2001. *Order Approving Settlement Agreement and Issuing New License*. Pacific Gas and Electric Company Project Nos. 137-002 and 027. Washington, D.C.
- Pacific Institute. 2017. *Review of Amador Water Agency's Long-Term Needs and Water Supply Study*. Oakland, CA.
- Pacific Gas and Electric Company (PG&E). 2000. *Mokelumne Relicensing Settlement Agreement*. Mokelumne River Project (FERC Project No. 137). San Ramon, CA.
- Upper Mokelumne River Watershed Authority (UMRWA). 2013. *Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan Update*.
- Upper Mokelumne River Watershed Authority (UMRWA) and Eastern San Joaquin County Groundwater Basin Authority (ESJGBA). 2015. *Mokelumne Watershed Interregional Sustainability Evaluation (MoKEWISE) Program Final Report*.
- U.S. Bureau of Land Management (BLM). 2007. *Sierra Proposed Resource Management Plan and Final Environmental Impact Statement, Appendix E: Wild and Scenic River Eligibility and Suitability*. Folsom, CA. Available at: <https://archive.org/details/sierraproposedre00unit>.
- U.S. Forest Service (USFS). 1990. *Wild and Scenic River Study Report/Environmental Impact Statement on the North Fork of the Mokelumne River*. Eldorado and Stanislaus National Forests. Placerville, CA.
- U.S. Global Change Research Program (USGCRP). 2017. *Climate Science Special Report: Fourth National Climate Assessment*. U.S. Global Change Research Program.

4.1 Wildlife Values

- Amador Calaveras Consensus Group (ACCG). 2017 (October). *Amador-Calaveras Consensus Group Monitoring and Science Symposium Highlights*.
- California Department of Fish and Wildlife (CDFW). 2017a. Biogeographic Data Branch. Available at: <https://map.dfg.ca.gov/rarefind/Login.aspx?ReturnUrl=%2frarefind%2fview%2fRareFind.aspx>.
- _____. 2017b. Mule Deer Range, Region 2. Available at: <https://map.dfg.ca.gov/metadata/ds0796.html>. Accessed January 19, 2018.
- California Natural Diversity Database (CNDDB). 2017. Available at: <https://www.wildlife.ca.gov/data/cnddb/maps-and-data>.
- Fogg, A.M., Z.L. Steel, and R.D. Burnett. *Avian Monitoring in Feds and Power fires: Final Report*. Point Blue Conservation Science, Petaluma, CA. Point Blue Contribution No. 2138.
- Mayer, K.E. and W.F. Laudenslayer, Jr. 1988. *A Guide to Wildlife Habitats of California*. California Department of Fish and Game. Sacramento, CA.
- Federal Energy Regulatory Commission (FERC). 1996. *Draft Environmental Assessment for Hydropower License*. Mokelumne River Project (FERC Project No. 137). Washington, D.C.

- Pacific Gas and Electric Company (PG&E). 2017a. *10-Year Summary Report, Stream Ecology Monitoring Program (SEMP) Riparian Vegetation Monitoring*. Mokelumne River Project (FERC Project No. 137). San Ramon, CA.
- _____. 2017b. *2016 Annual and 10-Year Summary, Stream Ecology Monitoring Program (SEMP)*. Mokelumne River Project (FERC Project No. 137). San Ramon, CA.
- U.S. Forest Service (USFS). 2005. *Final Environmental Impact Statement, Power Fire Restoration*. Eldorado National Forest. Placerville, CA.
- _____. 2017a. *CavIVeg geospatial data*. Available at:
<https://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/?cid=stelprdb5347192>.
- _____. 2017b. *Draft Environmental Impact Statement, Power Fire Restoration Project*. Eldorado National Forest. Placerville, CA.
- U.S. Fish and Wildlife Service (USFWS). 2017a. *List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project*. Sacramento Fish and Wildlife Office. Sacramento, CA.
- _____. 2017b. *Critical Habitat for Threatened and Endangered Species*. Available at:
<https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77>.
- _____. 2017c. *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus)*. Sacramento Fish and Wildlife Office. Sacramento, CA.

4.2 Fishery Values

- Amador County. 1987. *Application for license before FERC, Major Unconstructed Project*. Devil's Nose/Cross County, FERC No. 8759 and No 8144, Water-Power Project. Sutter Creek, CA.
- Boyd, S. 2014. *Verifying Reported Historical Natural Barriers to the Upstream Migration of Chinook Salmon (Oncorhynchus tshawytscha) and Steelhead (Oncorhynchus mykiss) in the Mokelumne River Watershed*.
- California Department of Fish and Wildlife (CDFW). 2017. *Mokelumne River, Amador and Calaveras Counties, 2013-2016 Angler Survey Box Analysis*. Sacramento, CA.
- Childress, R., and M. Workman. 2017. *A Collaborative Effort to Develop a Pilot Project and Assess the Feasibility of Reintroducing Chinook Salmon above Pardee Reservoir on the Mokelumne River, CA*. Session at the 35th Annual Salmonid Restoration Conference. Davis, CA. Available at:
https://www.calsalmon.org/sites/default/files/2017_Reintroduction_Morning_Session_part1.pdf.
- Federal Energy Regulatory Commission (FERC). 1996. *Draft Environmental Assessment for Hydropower License*. Mokelumne River Project (FERC Project No. 137). Washington, D.C.
- Knapp, R. 1996. *Non-native Trout in Natural Lakes of the Sierra Nevada: An Analysis of their Distribution and Impacts on Native Aquatic Biota*. Sierra Nevada Aquatic Research Laboratory. Available at: http://www.highsierrahikers.org/issue_fish_main.html.

- Knight, C., and R. Lusardi. 2017. *Reintroduction of Salmon into their Historic Habitats (Two-Part Session)*. Concurrent Session at the 35th Annual Salmonid Restoration Conference. Davis, CA. Available at:
https://www.calsalmon.org/sites/default/files/2017_Reintroduction_Morning_Session_part1.pdf.
- Merz, J.E. and M.S. Saldate. 2005. *Lower Mokelumne River Fish Community Survey*. Mimeo Report. East Bay Municipal Utility District. Lodi, CA.
- Moyle, P.B. 2002. *Inland Fishes of California*. University of California Press. Berkeley, CA.
- Pacific Gas and Electric Company (PG&E). 2016. 2015 Fish Population Monitoring Report. Mokelumne River Project (FERC Project No 137). San Ramon, CA.
- _____. 2017. 10-Year Summary Report Stream Ecology Monitoring Program (SEMP) Fish Population Monitoring. Mokelumne River Project (FERC Project No. 137). San Ramon, CA.
- Upper Mokelumne River Watershed Authority (UMRWA) and Eastern San Joaquin County Groundwater Basin Authority (ESJGBA). 2015. *Scope of Work: Project 1a: Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir*. MokeWISE Program.
- U.S. Bureau of Land Management (BLM). 2007. *Sierra Proposed Resource Management Plan and Final Environmental Impact Statement, Appendix E: Wild and Scenic River Eligibility and Suitability*. Available at: <https://archive.org/details/sierraproposedre00unit>. Accessed September 2017.
- U.S. Forest Service (USFS). 1990. *Wild and Scenic River Study Report/Environmental Impact Statement on the North Fork of the Mokelumne River*. Eldorado and Stanislaus National Forests. Placerville, CA.

4.3 Scenic Values

- California Department of Transportation. 2017. *State Scenic Highways*. Available at:
<http://www.dot.ca.gov/design/lap/livability/scenic-highways/>.
- U.S. Bureau of Land Management (BLM). 1986. *Visual Resource Inventory*. Manual H-8410-1.
- _____. 2007. *Sierra Proposed Resource Management Plan and Final Environmental Impact Statement*. Available at:
<https://www.fs.usda.gov/detail/eldorado/landmanagement/planning/?cid=fseprd528612>.
- U.S. Forest Service (USFS). 1989. *Eldorado National Forest Land and Resource Management Plan*. Pacific Southwest Region. Available at:
<https://www.fs.usda.gov/detail/eldorado/landmanagement/planning/?cid=fseprd528612>.
- _____. 1990. *Wild and Scenic River Study Report/Environmental Impact Statement on the North Fork of the Mokelumne River*. Eldorado and Stanislaus National Forests. Placerville, CA.
- _____. 1995. *Landscape Aesthetics, A Handbook for Scenery Management*. Agriculture Handbook Number 701.

4.4 Recreational Values

- American Whitewater. 2013. *Mokelumne River, North Fork, Below Salt Springs Reservoir to Tiger Creek Afterbay (Devil's Nose)*. Cullowhee, NC. Available at: <https://www.americanwhitewater.org/content/River/detail/id/254/>.
- _____. 2014. *Mokelumne River Statement of Outstandingly Remarkable Recreational Values for State Senate Bill 1199*.
- _____. 2017. *Mokelumne River Information*. Cullowhee, NC. Available at: <https://www.americanwhitewater.org/content/River/detail/id/254/>.
- A Wet State. 2007. *North Fork of the Mokelumne (Below Tiger Creek Dam)*. Available at: <http://www.awetstate.com/NMokTC.html>.
- _____. 2008. *Mokelumne River (Electra)*. Available at: <http://www.awetstate.com/MokelumneE.html>.
- _____. 2009. *North Fork of the Mokelumne (Devil's Nose)*. Available at: <http://www.awetstate.com/NMokDN.html>.
- California Creeks. 2007. *Mokelumne North Fork to Tiger Creek*. Available at: <http://www.cacreeks.com/mok-nf.htm>.
- _____. 2009. *Mokelumne South Fork*. Available at: <http://cacreeks.com/mystery.htm>.
- _____. 2010. *Mokelumne North Fork below Tiger Creek*. Available at: <http://cacreeks.com/mok-tig.htm>.
- _____. 2012. *Mokelumne below Electra Powerhouse*. Available at: <http://www.cacreeks.com/mok-elec.htm>.
- California Department of Fish and Wildlife (CDFW). 2010. *Maps of State Game Refuges in California*. Sacramento, CA.
- _____. 2017b. California's Deer Population Estimates. Available at: <https://www.wildlife.ca.gov/Conservation/Mammals/Deer/Population#32712445-population-by-hunt-zone>. Accessed January 19, 2018.
- _____. 2017b. *2017 California Deer Hunt Zones*. Deer Management Programs. Sacramento, CA.
- California Department of Motor Vehicles. 2017. Available at: <https://www.dmv.ca.gov/portal/dmv>.
- Calaveras Enterprise. 2014. *Protecting the Mokelumne River is Good for the Economy*. Available at: http://www.calaverasenterprise.com/opinion/columns/guest_opinion/article_ea8ed13a-9a82-11e3-babb-0019bb2963f4.html.
- East Bay Municipal Utility District (EBMUD). 2016. *Trails of the Pardee & Camanche Watersheds*. Oakland, CA.

- Ecoangler. 2008. *North Fork of the Mokelumne River*. Available at: http://www.ecoangler.com/habitat/North_Fork_Mokelumne_River.html.
- Federal Energy Regulatory Commission (FERC). 1996. *Draft Environmental Assessment for Hydropower License*. Mokelumne River Project (FERC Project No. 137). Washington, D.C.
- _____. 2001. *Order Approving Settlement Agreement and Issuing New License*. Pacific Gas and Electric Company Project Nos. 137-002 and 027. Washington, D.C.
- Foothill Conservancy. 2017. Available at: <http://www.foothillconservancy.org/pages/wshome2.cgi>.
- Holbek, L. and C. Stanley. 1988. *A Guide to the Best Whitewater in the State of California*.
- Maniery, J., and Dutschke, D. 1989. *Northern Miwok at Big Bar: A Glimpse into the Lives of Pedro and Lily O'Connor*. American Indian Quarterly 13(4): 481-495.
- Martin, Charles. 1974. *Sierra Whitewater*. Sunnyvale: Fiddleneck.
- Mokelumne Coast to Crest Trail (MC2CT). 2017. *Trail Map and Planning Documents*. Available at: <https://mc2ct.org/>.
- Mokelumne River Races. 2017. Available at: <http://www.mokeraces.com/>.
- Mountain Project. 2017. *Deer Bridge Dome Climbing*. Adventure Projects, Inc. Available at: <https://www.mountainproject.com/area/111886311/deer-bridge-dome>.
- Pacific Gas and Electric Company (PG&E). 2005. *Mokelumne River Project (FERC Project No. 137) Discussion Topics and Initial Recommendations for Future Studies Related to Recreation Streamflows and Pulse Flows in Dry and Critically Dry Water Years*. San Ramon, CA.
- _____. 2017. *Recreational Facilities*. Available at: www.pge.com/recreation.
- Perfectfly. 2017. *Fly Fishing the Mokelumne River California*. Available at: <http://www.perfectflystore.com/wmokelumner.html>.
- Roaring Camp. 2017. Available at: <https://www.roaringcamp.com/>.
- Rock Climbing. 2017. *Hammer Dome*. Available at: http://www.rockclimbing.com/routes/North_America/United_States/California/Western_Sierra/Calaveras_Dome/Hammer_Dome/.
- Sierra Club. 2012. Available at: <https://www.sierraclub.org/>.
- The Crag. 2017. *Sergeant Rock*. Available at: <https://www.thecrag.com/climbing/united-states/calaveras-dome/area/770076639>.
- U.S. Bureau of Land Management (BLM). 1986. *Visual Resource Inventory*. Manual H-8410-1.
- _____. 2007. *Sierra Proposed Resource Management Plan and Final Environmental Impact Statement*,

Appendix E: Wild and Scenic River Eligibility and Suitability. Folsom, CA. Available at: <https://archive.org/details/sierraproposedre00unit>.

U.S. Forest Service (USFS). 1988. *Eldorado National Forest Land and Resource Management Plan*. Pacific Southwest Region. Placerville, CA.

_____. 1990. *Wild and Scenic River Study Report/Environmental Impact Statement on the North Fork of the Mokelumne River*. Eldorado and Stanislaus National Forests. Placerville, CA.

_____. 2017a. *Eldorado National Forest Campground Information*. Placerville, CA.

_____. 2017b. *Eldorado National Forest Off-Highway Vehicle Information*. Placerville, CA.

Wirth Environmental Services. 1985. *Mokelumne River Project, Cultural Resources Evaluation Program*. San Francisco, CA.

4.5 Immediate Environments

California Department of Fish and Wildlife (CDFW). 2017. *Mokelumne River, Amador and Calaveras Counties, 2013-2016 Angler Survey Box Analysis*. Sacramento, CA.

Cooper, J. F. 2002. *Garnet Hill Field Trip, Bay Area Mineralogists*. Available at: <http://www.baymin.org/Field/GarnetHill.html>.

Pacific Gas and Electric Company (PG&E). 2017. *10-Year Summary Report Stream Ecology Monitoring Program (SEMP) Fish Population Monitoring*. Mokelumne River Project (FERC Project No. 137). San Ramon, CA.

RMC Water and Environment. 2017. *Long-Term Needs and Water Supply Study for the Amador Water Agency*. Prepared for Amador Water Agency, Sutter Creek, CA.

University of California Division of Agriculture and Natural Resources. 2017. *California Weather Database, Tiger Creek Pumping House Daily Averages Report*. Available at: <http://ipm.ucanr.edu/calludt.cgi/WXDATAREPORT>.

Upper Mokelumne River Watershed Council. Undated. *Hydrology and Water Quality in the Upper Mokelumne River Hydrologic Unit*. Available at: <http://www.co.amador.ca.us/home/showdocument?id=771>.

U.S. Bureau of Land Management. 2007. *Sierra Proposed Resource Management Plan and Final Environmental Impact Statement, Appendix E: Wild and Scenic River Eligibility and Suitability*. Folsom, CA. Available at: <https://archive.org/details/sierraproposedre00unit>.

U.S. Forest Service. 1990. *Wild and Scenic River Study Report/Environmental Impact Statement on the North Fork of the Mokelumne River*. Eldorado and Stanislaus National Forests. Placerville, CA.

Wagner, D.L., C.W. Jennings, T.L. Bedrossian, and E.J. Bortugno. 1981. *Geologic Map of the Sacramento Quadrangle*. California Geological Survey, Regional Geologic Map No. 1A. Available at: <http://www.quake.ca.gov/gmaps/rgm/sacramento/sacramento.html>.

4.6 Eligibility and Classification

State Water Resources Control Board. 2015. *Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List*. Adopted September 30, 2004, amended February 3, 2015. Sacramento, CA.

5. Suitability Evaluation

Amador County. 2016a. *2016 Agricultural Crop and Livestock Report*. Sutter Creek, CA.

_____. 2016b. *Amador County General Plan, Land Use and Economic Development Elements*. Available at: <http://www.co.amador.ca.us/departments/planning/current-general-plan-document-1110>.

Amador Water Agency (AWA). 2016. *2015 Urban Water Management Plan Update*. Sutter Creek, CA.

_____. 2017. *Long-Term Needs and Water Supply Study*. Sutter Creek, CA.

Calaveras County Water District (CCWD). 2016. *2015 Urban Water Management Plan Update*. San Andreas, CA.

Calaveras County Water District and Calaveras Public Utility District (CPUD). 2017. *Calaveras County Mokelumne River Long-Term Water Needs Study*. San Andreas, CA.

California Research Bureau (CRB). 2005. California Wild and Scenic Rivers Act Designation. Memorandum from Daniel Pollak to Lois Wolk, Assembly Water, Parks and Wildlife Committee. California State Library. Sacramento, CA.

_____. 2018. Regulatory Impact of Wild & Scenic Rivers Designation (Update to 2005 Wolk Memo). Memorandum from Ben Tang to Joseph Wall, CNRA. California State Library. Sacramento, CA.

Northern California Water Association. 2007. *Land Use/Water Supply Analysis Guidebook, An addendum to the Sacramento Valley Integrated Regional Water Management Plan*. Sacramento, CA.

Pacific Gas and Electric Company (PG&E). 2000. *Mokelumne Relicensing Settlement Agreement*. Mokelumne River Project (FERC Project No. 137). San Ramon, CA.

U.S. Bureau of Land Management (BLM). 1986. *Visual Resource Inventory*. Manual H-8410-1.

_____. 2007. *Sierra Proposed Resource Management Plan and Final Environmental Impact Statement*. Folsom, CA. Available at: https://eplanning.blm.gov/epl-front-office/projects/lup/72554/96712/116818/Sierra_PRMP_FEIS.pdf.

_____. 2008. *Sierra Proposed Resource Management Plan and Final EIS*. Folsom, CA.

U.S. Forest Service (USFS). 1986. *Land and Resource Management Plan for the Stanislaus National Forest*. Placerville, CA.

- _____. 1989. *Eldorado National Forest Land and Resource Management Plan*. Pacific Southwest Region. Placerville, CA. Available at:
<https://www.fs.usda.gov/detail/eldorado/landmanagement/planning/?cid=fseprd528612>.
- _____. 2000. *Mokelumne Wilderness Management Guidelines: Land and Resource Management Plan Amendment*. Placerville, CA.
- _____. 2004. *Sierra Nevada Forest Plan Amendment, Final Supplemental Environmental Impact Statement*. Placerville, CA.

6. Comparison with Designated State Wild and Scenic Rivers

No references

7. Alternatives and Recommendation

No references

8. List of Preparers, Acknowledgements, and Photo Credits

No references