CHAPTER 13.0 TECHNICAL ANALYSIS

13.1 Introduction

In November 2014, the Upper Feather River Integrated Regional Water Management Plan (IRWMP) Project Team issued a call for studies at each of the Workgroup meetings and on the Upper Feather River (UFR) IRWM Plan website. At the same time, the Project Team began collecting data and developing a database that would be posted on the website indefinitely and updated as new information became available.

Data were collected on a wide range of watershed management-related topics including, but not limited to, the following:

- Surface and groundwater sources and management
- Water quality
- Agricultural lands management and restoration
- Ecosystem conditions and restoration
- Flood and floodplain management
- Watershed conditions and management
- Fire and vegetation management
- Forest ecosystem conditions and management
- Stormwater management
- Wetlands
- Water supply assessments
- Hydrology and hydrogeology studies
- Land use management
- Recreation resources and plans
- Municipal service reviews
- Water and wastewater infrastructure studies
- Community vulnerability assessments
- Socioeconomic studies

Data on these topics include technical studies and assessments, monitoring reports, websites, document collections, maps, and legislation.

The following sections summarize the mandatory plans and other technical studies found during this data call and search, and evaluate the information for data gaps and applicability to the UFR IRWM Plan. The final section assesses how information, study methods, and analyses will be used by the Upper Feather Regional Water Management Group (RWMG) and public to understand watershed management conditions and needs over the 20-year planning horizon.

Appendix 13-1 includes a complete list of baseline data found to date, organized by topic area. This data list will continue to grow with the IRWM Plan process. Many topic areas overlap, and thus many of the data studies may be used in different functions throughout the IRWM planning process. As noted above, baseline information is also available on the IRWM Plan website (http://featherriver.org/catalog/index.php). The database is fully searchable, and in many cases an active web link to the referenced document is also available.

13.2 Review of Mandatory Documents

This section provides an overview of federal, state, regional, or locally mandated documents. A synopsis of each document is provided, along with an analysis of how the data will be used by the RWMG and public in the IRWM planning process.

13.2.1 Federal Resources

13.2.1.1 Forest Land and Resource Management Plans

The U.S. Forest Service (USFS) planning documents provide guidelines and management direction for the upper watershed regions of the Upper Feather IRWM Plan Area. The 2004 Sierra Nevada Forest Plan Amendment lays out broad management goals and strategies for addressing five issue areas in the dozens of complex ecosystems within the Sierra Nevada: old forest ecosystems and associated species; aquatic, riparian, and meadow ecosystems and associated species; fire and fuels management; invasive weeds; and foothill oak woodland ecosystems. In addition, the 2012 Planning Rule for land management planning for the national forest system became effective on May 9, 2012. The USFS subsequently released proposed planning directives, which are the key set of agency guidance documents that direct implementation of the 2012 Planning Rule, for public review and comment. The directives are expected to be formally adopted in the near future.

The Upper Feather IRWM planning area includes all or portions of the Plumas, Lassen, and Tahoe National Forests and their respective land and resource management plans, all prepared by the USFS as follows:

- Plumas National Forest Land and Resource Management Plan (1988)
- Lassen National Forest Land and Resource Management Plan (2005)
- Tahoe National Forest Land and Resource Management Plan (2005)

These plans direct the management of their respective national forest lands. The purpose is to guide efficient use and protection of forest resources, fulfill legislative requirements, and balance local, regional, and national needs. The plans describe the current management direction, supply or production capability, existing and projected demands for forest goods and services, and the need or opportunity for changes in current management direction. Applicable resource areas include recreation, fish, wildlife, and sensitive plants, diversity, riparian areas, water, ownership, land uses, and the urban/wildland interface. The plans also present both forest-wide and area-specific management direction for national forest lands.

13.2.1.2 FERC Relicensing Documents

At least six hydropower projects in the Upper Feather watershed are undergoing, or will soon undergo, relicensing through the Federal Energy Regulatory Commission (FERC), including the following:

- Bucks Creek Project (FERC Project 619)
- Lake Oroville Project (FERC Project 2100)
- Poe Hydroelectric Project (FERC Project 2107)
- Rock Creek - Cresta Project (FERC Project No. 1962)
- South Feather Power Project (FERC Project 2088)
- Upper North Fork Feather River Project - Lake Almanor, Butt Valley Reservoir, and Butt Valley, Caribou 1&2, Belden, and Oak Flat powerhouses (Project 2105)

FERC relicensing often requires substantial supporting documentation in the form of biotic studies, flood risk assessments, recreational use studies, settlement agreements mandating in-stream flow requirements

and resource management strategies for fish and wildlife protection, and other documentation. These auxiliary documents are useful in the preparation of IRWM Plans. For hydropower projects currently undergoing relicensing, websites catalog the various supporting documents in some cases, such as the Poe Hydroelectric Project with the State Water Resources Control Board (SWRCB) and National Oceanic and Atmospheric Administration; more than one agency may provide website support. FERC relicensing information is also readily available on its online library (http://www.ferc.gov/docs-filing/elibrary.asp).

13.2.1.3 Climate Change Resources

Several federal agencies have been involved in climate change research and planning documents, including the USFS, the U.S. Environmental Protection Agency (EPA), and the U.S. Army Corps of Engineers (USACE). Federally prepared documents that will be useful in climate change vulnerability assessments and adaptation strategies include the following, which can be found on the IRWM website:

- "Chapter 3: Climate Change and the Relevance of Historical Forest Conditions" from Managing Sierra Nevada Forests (USDA Forest Service, March 2012) discusses the current and future patterns of climate change in Sierra Nevada forests, biotic responses to climate change, the value of various management practices in ecosystem restoration, and the value of historical ecology in developing management practices. These resources can be used to help define regional climate trends.
- Climate Change Handbook for Regional Water Planning (U.S. EPA and California Department of Water Resources, December 2011) was developed as a partnership of the EPA Region 9, the California DWR, the USACE South Pacific Division, and the Resources Legacy Fund, specifically for the Integrated Regional Water Management planning process. Quantitative tools and techniques for addressing both climate change adaptation and mitigation (greenhouse gas reduction) are introduced and discussed in order to facilitate preparation of comprehensive IRWM Plans. A guide to assess the vulnerability of a watershed or region to climate change impacts is presented in this handbook, and guidelines to prioritize vulnerabilities are introduced. These resources can be used to help define vulnerabilities/strategies consistent with DWR guidelines.
- The Emissions & Generation Resource Integrated Database (eGRID) for 2010 (U.S. EPA, December 2010) is a comprehensive inventory of environmental attributes of electric power. The preeminent source of emissions data for the electric power sector, eGRID is based on available facility-specific data for all U.S. electricity generating facilities that provide power to the electric grid and report data to the U.S. government. eGRID can be used to calculate construction-related electric energy emissions in the planning area.

13.2.2 State Resources

13.2.2.1 California Water Plan

The California Water Plan (CWP) Update 2013 was prepared by the California Department of Water Resources (DWR) to define the statewide approach to water management, set state priorities, and provide guidance to water planners throughout the state. The CWP is a master plan that guides the orderly and coordinated control, protection, conservation, development, management, and efficient use of the water resources of the state. The CWP promotes regional water planning to integrate multiple water and resource management activities to meet a wide range of local objectives and is intended to help water agencies, local governments, and the state legislature promote and support integrated regional water management (such as in the preparation of IRWM plans). The CWP does not make project-specific or site-specific recommendations but instead provides a framework to guide local agencies. The 2013 CWP Update has new features that include a strategic plan with vision, goals, recommendations, and an implementation plan. It was developed with a different analytical approach than prior state water plans,

and relies on extended information and tools, including use of water portfolios, regional reports, a protocol for future scenarios, and defined resource management strategies (RMS).

The CWP identified RMSs that should be used by the Upper Feather River RWMG and other stakeholders to develop the UFR IRWM Plan so that the Upper Feather RMSs are consistent with the state's priorities. Coordination of RMS with state priorities will also increase the competitiveness of IRWM Plan projects for future state funding.

A key objective of the CWP is to present a diverse set of RMSs to meet the needs of each region as well as statewide needs. The strategies can be adapted and combined within an IRWM plan region depending on climate, projected growth, existing water system, and environmental and social conditions. The proposed strategies should complement the operation of the existing water system within an IRWM plan region. The basic intent of the CWP is to help IRWM planning areas to prepare watershed management plans that satisfy regional and state needs, meet multiple objectives, include public input, address environmental justice, mitigate impacts, protect public trust assets, and are affordable.

Table 13-1. CWP 2013 Resource Management Strategies

Agricultural lands stewardship	Recharge area protection
Agricultural water use efficiency	Recycled municipal water
Conjunctive management and groundwater storage	Salt and salinity management
Conveyance–Delta	Sediment management
Conveyance–regional/local	Surface storage–CALFED
Desalination	Surface storage—regional/local
Drinking water treatment and distribution	System re-operation
Economic incentives (loans, grants, & water pricing)	Urban land use management
Ecosystem restoration	Urban runoff management
Forest management	System re-operation
Flood management	Urban land use management
Groundwater/Aquifer remediation	Urban stormwater runoff management
Land use planning and management	Urban water use efficiency
Matching water quality to use	Water and culture
Outreach and engagement	Water-dependent recreation
Pollution prevention	Watershed management
Precipitation enhancement	Water transfers

13.2.2.2 Sacramento River Basin Plan

The jurisdictional boundaries of the Central Valley RWQCB include the UFR IRWM planning area. As a tributary to the Sacramento River, the Upper Feather River is recognized in the Central Valley RWQCB's Sacramento River Basin Plan (2011) as a surface water body that requires monitoring and regulation. This basin plan identifies the beneficial uses of the Feather River, provides specific water quality objectives (including total dissolved solids, pesticides, and electrical conductivity), and lists illegal discharges into the Feather River.

Section 13240 of the Porter-Cologne Water Quality Control Act requires each Regional Water Quality Control Board (RWQCB) of the State Water Resources Control Board (SWRCB) to formulate and adopt water quality control plans, or basin plans, for all areas within the region. The Porter-Cologne Act also

requires each RWQCB to establish water quality objectives to ensure the reasonable protection of beneficial uses and a program of implementation for achieving water quality objectives within basin plans. Beneficial uses and water quality objectives are also included in the State's water quality standards.

13.2.2.3 The 20x2020 Water Conservation Plan

The 20x2020 Water Conservation Plan (2010) was developed by a number of public resource agencies, including DWR, SWRCB, California Bay-Delta Authority, California Energy Commission, California Department of Public Health, California Public Utilities Commission, and California Air Resources Control Board. In 2008, Governor Schwarzenegger directed state agencies to develop a plan to reduce statewide per capita water use by 20 percent by the year 2020. The 20x2020 Water Conservation Plan sets forth a statewide road map that includes a range of activities to maximize the state's urban water efficiency and conservation opportunities between 2009 and 2020, and beyond These activities include improving an understanding of the variation in water use across California, promoting legislative initiatives that incentivize water agencies to promote water conservation, and creating evaluation and enforcement mechanisms to assure regional and statewide goals are met.

Using ten hydrologic regions as defined by DWR for water resources planning purposes, regional baseline and target values were derived for daily per capita water use. The 2005 statewide baseline urban water use value, expressed in gallons per capita per day (gpcd), is 192 gpcd. The statewide target for 2020 is 154 gpcd. This represents a statewide savings of 1.59 million acre-feet (MAF) based on a population of 37 million people. The Upper Feather River is in DWR's Hydrologic Region 5 (Sacramento River), with a baseline water use of 253 gpcd and a 2020 target of 176 gpcd. Residential users are the highest water users (174 gpcd). The 20X2020 Water Conservation Plan can be used in the IRWMP to describe existing water use, water conservation targets, potential statewide savings, and water conservation strategies.

13.2.2.4 Disadvantaged Communities Mapping Tool

The DWR has developed a mapping tool to help determine which communities in an IRWM region meet the Disadvantaged Community (DAC) median household income (MHI) definition. The maps and geographic information system (GIS) files are derived from the U.S. Census Bureau's American Community Survey (ACS) and are compiled for the five-year period 2006-2010. DAC status is determined based on the DAC definition provided in DWR's Proposition 84 and 1E IRWM Guidelines, dated August 2010. An MHI of less than $48,706 is the DAC threshold (80 percent of the statewide MHI). The GIS files used to generate maps are provided for those with GIS capabilities.

13.2.2.5 Groundwater Resources

Groundwater Information Center

The Groundwater Information Center, a website maintained by DWR (http://www.water.ca.gov/groundwater/), can be used to describe the relationship between groundwater and surface water.

Bulletin 118 and Related Resources

Bulletin 118 presents the results of groundwater basin evaluations in California. The Upper Feather River watershed is located within the Sacramento Valley basin and there are a number of groundwater sub basins within the region. Resources include the 2003 Update of Bulletin 118, region-specific bulletin reports, and groundwater basin maps and descriptions.

13.2.2.6 Climate Change Resources

Similar to federal agency involvement in climate change planning, several California State agencies have also been involved in climate change research and planning documents, including the California Department of Water Resources, California Energy Commission, and California Air Resources Board. State-prepared documents that will be useful in climate change vulnerability assessments and adaptation strategies include the following:

- Managing an Uncertain Future: Climate change adaptation strategies for California's water (California Department of Water Resources, 2008) provides a profile of the observed climate phenomena at the state level that have bearing on the region and provides adaptation strategies for addressing these phenomena. This document can be used for describing the existing climate change setting and in developing climate change adaptation strategies.
- Cal-Adapt – Exploring California's Climate Change Research (California Energy Commission) provides modeled climate trend graphs, precipitation decadal averages, and wildfire risk, with GIS imaging of all parameters. This information can serve as a source of comparison with other modeling of the watershed for high and low greenhouse gas (GHG) emission scenarios.
- California Climate Adaptation Strategy (California Natural Resources Agency, 2009) proposes a set of recommendations for policy development to protect the state from the effects of climate change and generally focuses on GHG reduction strategies. This document can be used in the IRWM Plan process to help develop climate adaptation goals.
- The Climate Change Scoping Plan: A framework for change (California Air Resources Board, December 2008) calls for a reduction in California's carbon footprint by reducing GHGs to 1990 levels, or cutting approximately 30 percent from business-as-usual emission levels projected for 2020. Significant progress can be made toward the 2020 goal relying on existing technologies and improving the efficiency of energy use. A number of solutions are "off the shelf," and many –especially investments in energy conservation and efficiency – have proven economic benefits. Other solutions involve improving infrastructure, transitioning to cleaner and more secure sources of energy, and adopting 21st century land use planning and development practices. This scoping plan can assist in providing climate change adaptation strategies for the IRWM Plan.
- Proposition 84 & Proposition 1E Integrated Regional Water Management Guidelines (California Department of Water Resources, November 2012) provides IRWM Plan guidance on aspects of climate to be discussed, strategies to be considered, and assessment of GHG emissions to be included in IRWM Plans. It will be used for DWR compliance in the IRWM Plan process.

13.2.3 Local and Regional Plans

13.2.3.1 Urban Water Management Plans

The California Urban Water Management Planning Act of 1983 requires urban water suppliers that serve more than 3,000 customers, or that deliver more than 3,000 AF per year, must prepare and adopt an urban water management plan (UWMP). The act provides that urban water suppliers must prepare, adopt, and submit UWMPs to DWR in order to be eligible to receive funding for certain programs, including Proposition 50. An UWMP provides water management strategies for a service area as well as baseline data on water deliveries, supply and demand, supply reliability, and climate and precipitation statistics.

There are no applicable UWMPs within the UFR IRWM planning area. Just outside the UFR IRWM area to the west, the South Feather Water & Power Agency (SFWPA) has prepared an UWMP (2010) for its 31,000-acre service area, serving approximately 6,650 households in the Oroville area of Butte County. The SFWPA operates a hydropower project (South Feather Power Project, FERC License No. 2088) on the

South Fork of Feather River and Slate Creek. This project includes numerous reservoirs with a combined storage of 164,577 AF. Given that SFWPA operates water storage and hydropower projects within the UFR IRWM planning area, their UWMP will be a resource on the issue of exported water in the UFR IRWM Plan.

13.2.3.2 Agricultural Water Management Plans

The Agricultural Efficient Water Suppliers Efficient Management Practices Act of 1990 (AB 3616) defines state requirements for Agricultural Water Management Plans (AWMP), which are intended to document whether agricultural water is being used efficiently. The act also requires DWR to support and assist in implementing practices that increase statewide water use efficiencies. The DWR supports the Agricultural Water Management Council (Council), consisting of members of the agricultural and environmental communities and other interested parties.

An AWMP must be prepared as a requirement of the Central Valley Project Improvement Act (Central Valley Project contractors using water for agriculture are required to prepare AWMPs) or in accordance with the requirements of the Water Conservation Act of 2009 (SB X7-7) i.e., water purveyors who deliver water to more than 25,000 acres).

Although Plumas County alone had 162,000 acres of planted crops in 2010 per the 2035 Plumas County General Plan Update, there are no AWMPs in the UFR IRWM Plan Area. The region's water purveyors are not subject to either of the aforementioned state mandates for the preparation of an AWMP. It should be noted that Sierra Valley Resource Conservation District provides information on several agricultural water-related projects, including the Sierra Valley Agricultural Water Quality and Habitat Enhancement Project, and the Upper Long Valley Creek Agricultural Lands Improvement Project.

13.2.3.3 Groundwater Management Plans

Groundwater management is the planned and coordinated local effort to sustain the groundwater basin to meet future water supply needs. With the passage of Assembly Bill (AB) 3030 in 1992, local water agencies were provided a systematic way of formulating groundwater management plans (GWMP). AB 3030 also encouraged coordination between local entities through joint-power authorities or memoranda of understanding. Senate Bill (SB) 1938, passed in 2002, further emphasized the need for groundwater management in California. SB 1938 requires AB 3030 GWMPs to contain specific plan components to receive state funding for water projects.

In the UFR IRWM planning area, the largest groundwater basin is in Sierra Valley. The Sierra Valley groundwater basin experiences a wide range of water quality conditions, primarily associated with naturally occurring mineral constituents. The most affected portion of the basin is found in the central west side of the valley where fault-associated thermal waters and hot springs yield water with high concentrations of boron, fluoride, iron, and sodium. Although there are no GWMPs in the planning area, Sierra Valley has been the subject of many groundwater studies and management documents related to safe extraction quantities, water supply, groundwater level, and water quality, including the following:

- Sierra Valley Hydrogeologic Studies (2005)
- Results of the Fall 2005 Aquifer Tests in Sierra Valley (2006)
- Technical Report on 2005-2011 Hydrogeologic Evaluation for Sierra Valley (2012)

A number of studies on meadow restoration in the planning area, and the Feather River Watershed Management Strategy for Implementing the Monterey Settlement Agreement, which discussed groundwater recharge, are also useful in groundwater issues research.

As noted above, DWR's region-specific Bulletin 118 reports are also pertinent to local groundwater conditions.

13.2.3.4 City and County General Plans

California state law requires each city and county to adopt a general plan for its physical development, including any land outside its boundaries that bears relation to its planning. The California Supreme Court has called the general plan the "constitution for future development." The goals, policies and objectives contained in city or county general plans are intended to underlie most land use- and resource-related decisions, including those that affect water supplies and quality.

Of the seven mandatory elements that cities and counties must cover in their general plans, some degree of water management information is required in five of them:

- Land use
- Circulation
- Conservation
- Open-space
- Safety

In addition, many general plans include optional elements, such as public services, recreation, hydrology and water quality, agricultural resources, and climate change or GHG emissions. These optional elements also include water management data.

The City of Portola, one of only two incorporated cities within the IRWM Plan area, has adopted a Parks and Recreation Master Plan in addition to its general plan. Plumas County, the primary county within the plan area, is actively engaged in the IRWM planning process and RWMG, and has assumed the role of lead agency for the UFR IRWM Plan. Other jurisdictions with applicable general plans within the IRWM planning area include Butte County, Lassen County, and Sierra County. These plans and their applicable planning horizons are shown in Table 13-2 below:

Table 13-2. General Plans in Upper Feather IRWM Planning Area

General Plan	Year Adopted	Planning Horizon
City of Portola	2012	2020
Plumas County	2013	2035
Butte County	2012	2030
Lassen County	1999	2020
Sierra County	1996	2012

The Plumas County General Plan acknowledges that buildout of the general plan may deplete groundwater resources or interfere with groundwater recharge, and provides mitigation including the support of the IRWM Plan and groundwater recharge protection measures. It also indicates that implementing the general plan may result in development within dam failure inundation zones, a significant and unavoidable impact even with the preservation of floodplain areas and management of new development in hazardous areas.

General plans for the counties of Plumas, Sierra, and Butte include a "water resources element" that specifically addresses water sources, storm water management, water service providers, water storage facilities, the supply and demand of water, as well as each county's management efforts. Plumas County's

Agriculture and Forestry Element and Butte County's Agriculture Element will also be helpful in the preparation of the IRWM Plan. Both plans also contain discussions on GHGs in their Conservation and Open Space Elements.

It should also be noted that both the general plans and their corresponding EIRs are valuable resources in the IRWM planning process.

13.2.3.5 County Hazard Mitigation Plans/Emergency Operations Plans

The purpose of hazard mitigation plans (HMPs) is to better protect people and property from the effects of hazardous events or emergencies such as wildfire, flooding, and drought. Development of HMPs ensures a participating jurisdictions' continued eligibility for certain federal disaster assistance, specifically the FEMA Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and the Flood Mitigation Assistance Program (FMA). Completion also earns credits under the National Flood Insurance Program's Community Rating System (CRS) which provides for lower flood insurance premiums in CRS communities.

Hazard mitigation plans in the Upper Feather IRWM planning area include

- Butte County Hazard Mitigation Plan (May 2013)
- Lassen County, Susanville, Susanville Indian Reservation Hazard Mitigation Plan (March 2010)
- Plumas County Hazard Mitigation Plan (2016)

In the UFR Plan area, wildfire, flooding, drought, and infrastructure failures are the primary water-related hazards listed in the local HMPs.

13.2.3.6 Municipal Service Reviews

Under the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000 (Government Code §56000, et seq.), public agencies whose boundaries and governance are subject to Local Agency Formation Commission (LAFCo) must provide a review of public services--such as water, fire protection, and reclamation--every five years. An MSR provides comprehensive knowledge of available services, future needs for each service, and the efficiency and expansion capacity of service providers.

In the Upper Feather River IRWM planning area, the following MSRs are available as reference sources:

- Central Plumas Fire MSR (December 9, 2013)
- Eastern Plumas MSR (October 3, 2011)
- Lake Almanor MSR (October 15, 2012)
- City of Loyalton MSR (December 9, 2010)

The Lake Almanor MSR includes ten different providers of various services, while the Easter Plumas MSR includes 17 different service providers. In utilizing these sources, the determinations made for each service provider should be reviewed for information on adequate infrastructure, supply, and growth projections. Determinations on water, wastewater, fire, and recreation services should specifically be reviewed for water-related issues.

13.2.3.7 Water Supply Master Plans

There are no local mandated water supply master plans or water supply assessments under Senate Bills 610 and 221 in the Upper Feather River IRWM planning area.

However, the Plumas County Flood Control and Water Conservation District (Plumas County FCWCD) has co-sponsored at least two watershed management plans. The Plumas County FCWCD, a water district governed by the Plumas County Board of Supervisors, delivers municipal and irrigation water supplies from the State Water Project and promotes watershed restoration and management in the Upper Feather River Region It is also serves as the grantee for the current Upper Feather River IRWM Plan Update and for various Proposition 50 IRWM associated projects.

13.2.3.8 Watershed Management Plans

A number of local watershed management plans have been prepared within the UFR IRWM planning area, including the following:

- Feather River Watershed Management Strategy for Implementing the Monterey Settlement Agreement (2004)
- Feather River Coordinated Resource Management Group Annual Reports (2005-2013)
- Coordinated Resource Management Plan for the East Branch of the North Fork Feather River (1989)
- Lake Almanor Watershed Management Plan (2009)
- Coordinated Resource Management Plan for the Feather River (1996)
- The Delta Plan (2013)

These documents establish priorities for watershed management and restoration actions. The watershed plan goals include improving temporal retention of water, increasing base flows, reducing sedimentation, protecting streambanks, improving upland vegetation, improving groundwater recharge, and providing adaptive management solutions. These plans will be integrated into the UFR IRWM Plan in terms of watershed management strategies, adaptive management approaches, goals, and identified or perceived conflicts among water users.

13.3 Review of Other Data

A systematic search for information on watershed management and planning in the UFR IRWM planning area has uncovered approximately 200 data sources (a number that is growing as the IRWM Plan process unfolds) for use in the UFR IRWM Plan. Some of these sources are mandatory or legally required documents as specified in the scope of work for this Technical Study, but many are not.

Non-mandatory source material is also useful in the research and writing of watershed management topics covered in the IRWM Plan and are included in a brief discussion here. Most are primary sources of information such as scientific studies, non-profit organization (NPO) generated technical studies, document collections (such as the Climate Adaptation Knowledge Exchange, an NPO website that includes case studies, adaptation plans, and climate adaptation tools), legal documents, U.S. Census documents, and monitoring reports. These documents cover a range of topics that can be generally categorized as follows:

- Biotic studies and assessments
- Climate change case studies, adaptation plans, vulnerability assessments, and planning tools
- Demographic information/DACs
- Flood studies
- Forest and wildfire studies
- Planning laws
- Recreation-related documents
- Restoration studies

- Stream flow studies
- Water quality studies and monitoring reports
- Watershed assessments

Given the large number of non-mandatory data found, Appendix 13-1 contains a synopsis of these documents by category.

13.4 Analysis of Data Gaps

This technical document review identified several data gaps that should be addressed in the IRWM Plan as well as over the long-term, in planning for the Upper Feather watershed area:

- Conjunctive water use and conjunctive water management resources
- Recreation planning resources
- Water supply and management plans

These data gaps are discussed in further detail below.

13.4.1 Conjunctive Water Use & Management Resources

More data and studies are needed on conjunctive water use and conjunctive water management strategies in the planning area.

Conjunctive water use is an approach that recognizes the hydrologic connection between surface water and groundwater so as to manage the overall water supply more efficiently. Methods for conjunctive water use can consist of groundwater use by individuals to supplement limited surface water supplies, or it can consist of regional water management programs that store large volumes of surface water below ground during normal and high rainfall years in order to pump groundwater from storage during drought years. Both types use surface water and groundwater together to improve the overall availability and reliability of water supply. The IRWM planning process would benefit from a review of existing conjunctive water use practices in the Upper Feather IRWM planning area, as well as recommendations for potential new conjunctive water use practices that could ease water supply and reliability issues.

Conjunctive water management engages the principles of conjunctive water use, where surface water and groundwater are used in combination to improve water availability and reliability. However, conjunctive water management also includes important components of groundwater management such as monitoring, evaluation of monitoring data to develop local management objectives, and use of monitoring data to establish and enforce local management policies. Scientific studies are needed to support conjunctive water management. They provide important data to understand the geology of aquifer systems, how and where surface water replenishes the groundwater, and flow directions and gradients of groundwater. These types of studies would benefit the IRWM planning process and should lead to conjunctive management strategy recommendations in the IRWM Plan. To support this effort, a water balance study is being prepared by Plumas Geo-Hydrology as part of the work plan for the IRWM Plan Update.

13.4.2 Recreation Planning Resources

Recreation plans are significant in the context of IRWM planning when recreation relates to water consumption (e.g., irrigation for parks) and water use (e.g., rafting, boating, and fishing).A survey of recreation documents in the planning area uncovered one recreation use survey on Little Last Chance

Creek, a Parks and Recreation Master Plan for the City of Portola, and a database of recreation documents on an NPO site. The following additional agencies provide recreation services in the IRWM planning area:

- Eastern Plumas Recreation District
- Whitehawk Ranch Community Services District
- Almanor Recreation and Park District

No recreation plans for these districts were found. Given the lack of recreation use documents for primary water bodies in the planning area, the IRWM outreach process will need to include informational interviews on recreational use of water bodies in the plan area.

13.4.3 Water Supply and Management Plans

State-mandated water supply documents and legislation such as the 20X2020 Water Conservation Plan, Senate Bills 610 and 221, and the State Water Resources Control Board's "Notice of Surface Water Shortage and Potential for Curtailment of Water Right Diversions for 2015" will impact water supply discussions during the IRWM planning process. Other valuable resources related to water supply include groundwater management plans for some of the groundwater basins in the local valley areas, local general plans and general plan EIRs, and municipal service reviews. A data gap is identified, however, in terms of agricultural water management plans, drought action plans, and comprehensive water supply planning documents for the larger planning area that might match in scope the level of information provided in an urban water management plan.