Summary

This Plan Formulation Report (PFR) is an interim product of the Upper San Joaquin River Basin Storage Investigation (Investigation), a feasibility study by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and the California Department of Water Resources (DWR). The purpose of the Investigation is to determine the type and extent of Federal, State, and regional interests in a potential project(s) in the upper San Joaquin River watershed to expand water storage capacity; improve water supply reliability and flexibility of the water management system for agricultural, urban, and environmental uses; and enhance San Joaquin River water temperature and flow conditions to support anadromous fish restoration efforts. The primary purposes of this PFR are to describe the formulation, evaluation, and comparison of alternative plans that address Investigation planning objectives, and to define a set of alternative plans to be considered in detail in the Feasibility Report and Environmental Impact Statement/Environmental Impact Report (EIS/EIR). This PFR is not a decision document; it is a report based on available information at this stage of the feasibility study process. Additional studies and documentation will follow this PFR during the Investigation, with continued opportunities for public review and participation.

Background

The Investigation is one of five surface water storage studies recommended in the CALFED Bay-Delta Program (CALFED) Programmatic Environmental Impact Statement/Report (PEIS/EIR) Record of Decision (ROD) of August 2000. Reclamation and DWR are coordinating the Investigation with the California Bay-Delta Public Advisory Committee, which provides advice to the Secretary of the Interior regarding implementation of CALFED, and the California Bay-Delta Authority, which provides general oversight and coordination of all CALFED activities.

Federal authorization for the Investigation was initially provided in Public Law 108-7, Division D, Title II, Section 215, the omnibus appropriations legislation for fiscal year 2003. Subsequent authorization was provided in Public Law 108-361, Title I, Section 103, Subsection (d)(1)(A)(ii), the Water Supply, Reliability, and Environmental Improvement Act of 2004, which authorized feasibility studies of new water storage for three potential projects identified in the CALFED ROD. Reclamation is the responsible Federal agency for preparing the Feasibility Report and EIS. Section 227 of California Water Code authorizes DWR to participate in water resources investigations. DWR is the State lead agency for the Investigation and preparation of the EIR.

Existing and Future Conditions

The primary study area, shown in Figure S-1, encompasses the San Joaquin River watershed upstream from Friant Dam to Kerckhoff Dam, including Millerton Lake, and areas that would be directly affected by construction-related activities. The extended study area, shown in Figure S-2, encompasses locations of potential project features and areas potentially affected by alternatives implementation and/or operations. These include the upper San Joaquin River watershed, the San Joaquin River downstream from Friant Dam, the Sacramento-San Joaquin Delta (Delta), lands with San Joaquin River water rights, and water service areas in the Friant Division, south-of-Delta (SOD) Central Valley Project (CVP), and State Water Project (SWP).

This PFR describes existing and likely future without-project conditions in the primary and extended study areas. The description of these conditions includes information available at this stage of the planning process on physical, biological, cultural, and socioeconomic resources. Additional information will be documented in the pending Feasibility Report and EIS/EIR.

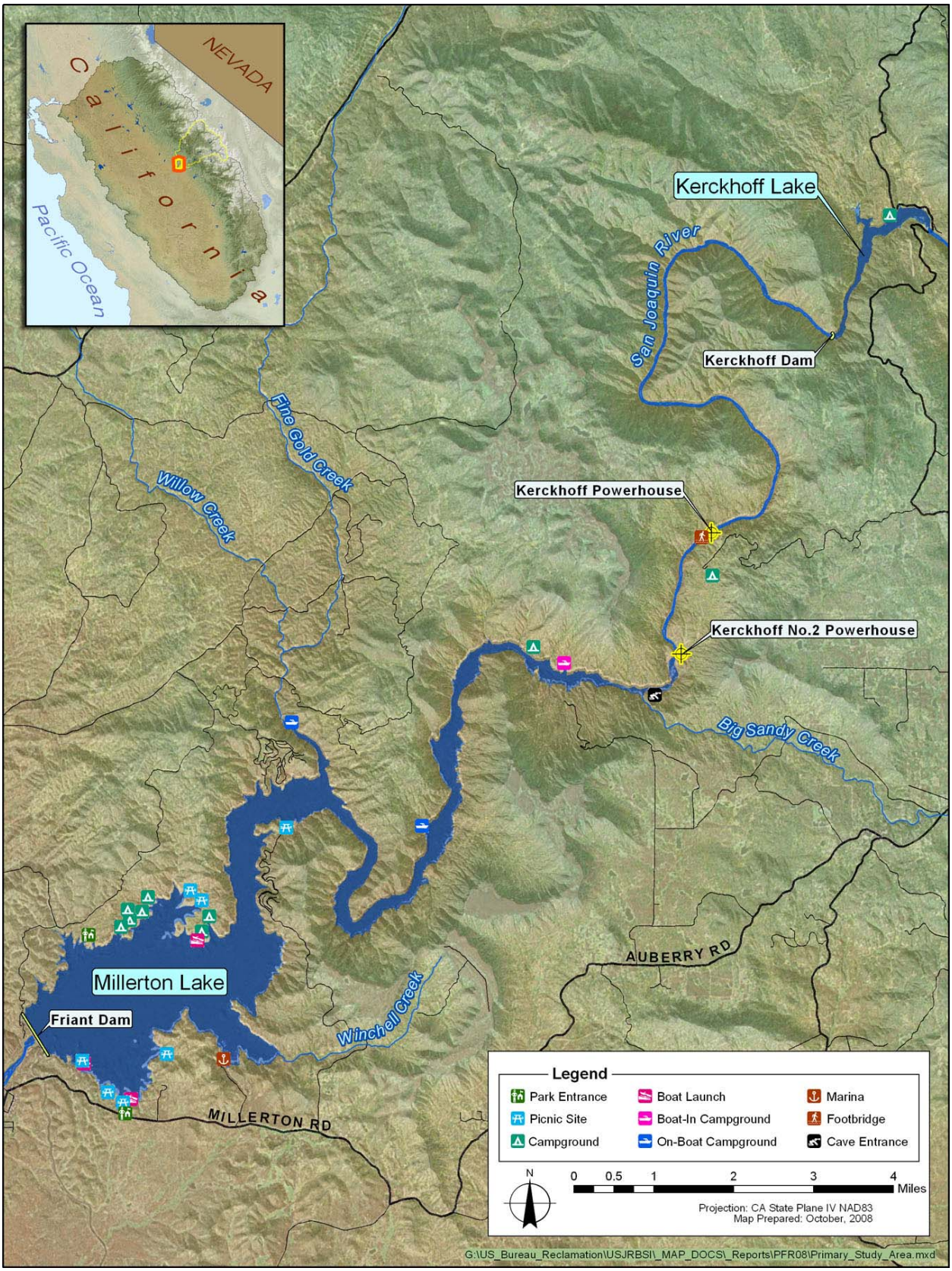

Figure S-1. Primary Study Area

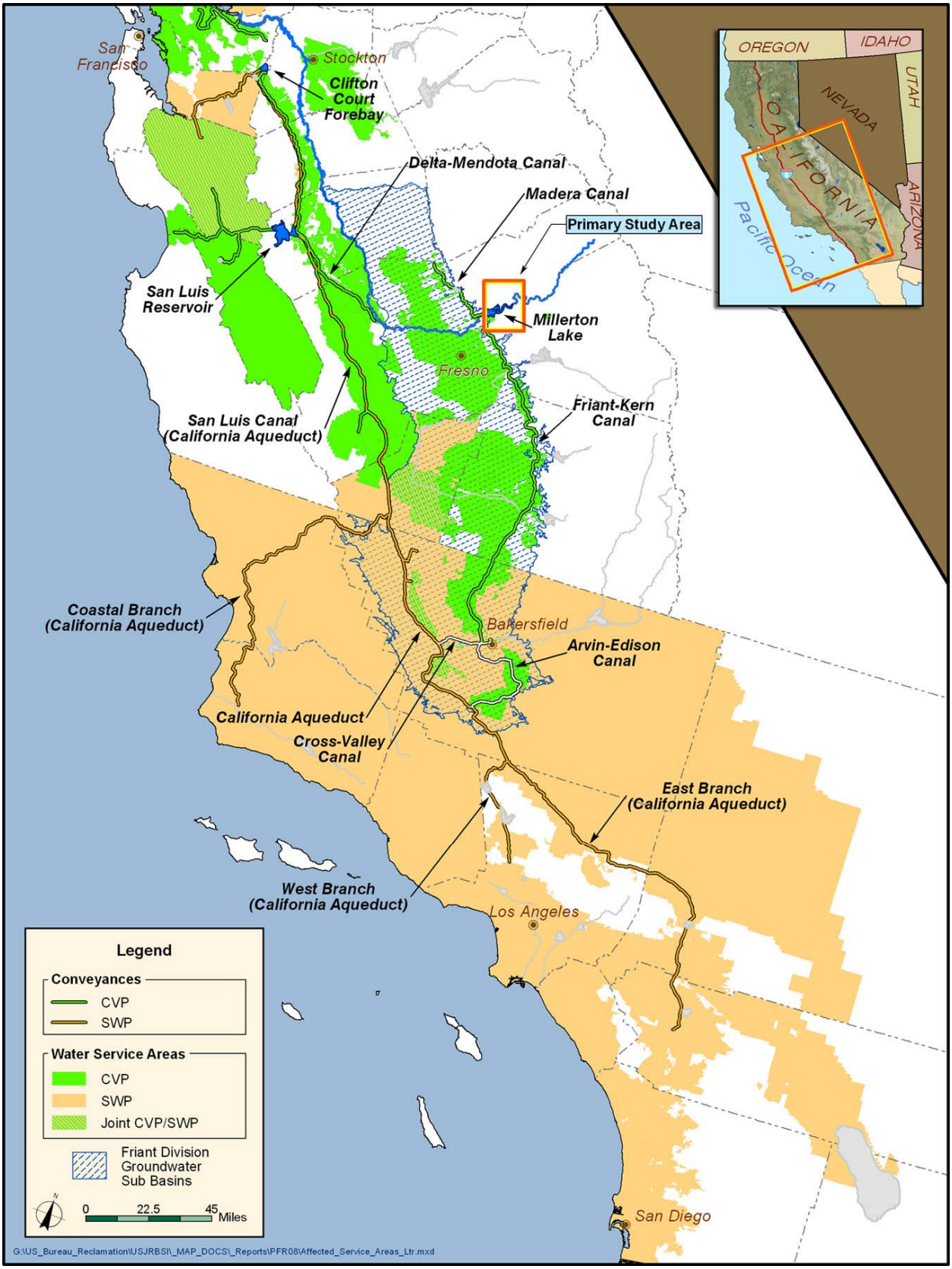

Figure S-2. Extended Study Area

Problems, Needs, and Opportunities

Major water and related resources problems and needs for the Investigation pertain to the San Joaquin River ecosystem and water supply reliability. Opportunities have been identified during the Investigation relative to flood damage reduction, hydropower, recreation, and water quality.

Water Supply Reliability Problems and Needs

Major factors affecting California's future water supplies include rapid population growth; agricultural-to-urban land use conversion; and climate change and related uncertainties, including Delta infrastructure, operations criteria, and ecosystem conditions. The California Water Plan Update 2005 states that California must invest in reliable, high-quality, sustainable and affordable water conservation; efficient water management; and development of water supplies.

The Friant Division of the CVP provides surface water supplies to many areas that also rely on groundwater, and was designed and is operated to support conjunctive water management to reduce groundwater overdraft in the eastern San Joaquin Valley. Although surface water deliveries from Friant Dam help reduce groundwater pumping and contribute to groundwater recharge, the groundwater basins in the eastern San Joaquin Valley remain in a state of overdraft in most years, which may ultimately reduce water use and irrigated acreage in the San Joaquin Valley.

In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit challenging the renewal of long-term water service contracts between the United States and CVP Friant Division contractors. After more than 18 years of litigation of this lawsuit, known as *NRDC et al. v. Kirk Rodgers et al.*, a Stipulation of Settlement (Settlement) was reached. Through implementation of the Settlement, average total system water deliveries from Friant Dam are expected to be reduced by about 208 thousand acre-feet (TAF) per year, or approximately 15 to 19 percent of deliveries under existing conditions.

San Joaquin River Ecosystem Problems and Needs

Generally unhealthy ecosystem conditions in the San Joaquin River from Friant Dam to the Merced River have resulted from lack of reliable flows and poor water quality. The Settlement led to the inclusion of Settlement-stipulated releases from Friant Dam for river restoration as a without-project condition for the Investigation. The Restoration Goal of the Settlement is to provide continuous flows in the San Joaquin River at Friant Dam to sustain naturally reproducing Chinook salmon and other fish populations in the river. The ability to manage volumes of cold water and to release water from Friant Dam at suitable temperatures, and provide for Settlement flows during critical-low years, may be challenges to fully meeting the Restoration Goal of the Settlement.

Opportunities

Identified opportunities include potential improvement in the reduction of flood damages; additional hydropower generation capacity; recreation site development and water level management; and water quality improvements in the San Joaquin River and in water supplies delivered to urban areas.

Planning Objectives

On the basis of the identified water and related resources problems, needs, and opportunities, study authorizations, and other pertinent direction, including information contained in the August 2000 CALFED ROD, the following planning objectives were developed:

- Increase water supply reliability and system operational flexibility for agricultural, municipal and industrial (M&I), and environmental purposes in the Friant Division, other San Joaquin Valley areas, and other regions.

- Enhance water temperature and flow conditions in the San Joaquin River from Friant Dam to the Merced River in support of restoring and maintaining naturally reproducing and self-sustaining anadromous fish (i.e., Settlement reintroduced fall- and/or spring-run Chinook salmon).

Alternatives were formulated specifically to accomplish the planning objectives. To the extent possible, through pursuit of the planning objectives, alternatives also include features to help address the following opportunities:

- Improve management of flood flows at Friant Dam.
- Preserve and increase energy generation, and improve energy management in the study area.
- Preserve and increase recreation opportunities in the study area.
- Improve San Joaquin River water quality.
- Improve the quality of water supplies delivered to urban areas.

Specific planning constraints, considerations, and criteria were also established to help guide the Investigation planning process.

Formulation and Evaluation of Alternative Plans

Once water resources problems, needs, and opportunities have been identified, and planning objectives, constraints, considerations, and criteria have been developed, the next major elements of the plan formulation process are identifying management measures, and formulating alternative plans to meet the planning objectives.

Management Measures

A management measure is any structural or nonstructural action or feature that could address the planning objectives and satisfy the other planning constraints, considerations, and criteria. Alternative plans are formulated by combining the most applicable measures that address the planning objectives, and adding measures that address opportunities. Numerous management measures were identified to address the Investigation planning objectives and opportunities. Of the management measures identified, nine measures were retained specifically to address the planning objective of enhancing water temperature and flow conditions in the San Joaquin River, seven measures were retained specifically to address improving water supply reliability, and six measures were retained specifically to address the identified opportunities. Tables S-1 and S-2 summarize the management measures carried forward to address the planning objectives and opportunities, respectively.

Additionally, measures to increase groundwater storage that were retained in concept only are listed in Table S-1. Other measures retained in concept only are not discussed because they are either under evaluation in another study or have unspecified operations.

Table S-1. Management Measures Addressing Planning Objectives

MANAGEMENT MEASURES
Planning Objective: ***Enhance water temperature and flow conditions in the San Joaquin River***
Perform Reservoir Operations and Water Management
Balance water storage in Millerton Lake and new upstream reservoirs
Modify storage and release operations at Friant Dam
Increase Surface Water Storage in the Upper San Joaquin River Basin
Enlarge Millerton Lake by raising Friant Dam
Construct Temperance Flat RM 274 Reservoir
Construct Temperance Flat RM 279 Reservoir
Construct Fine Gold Reservoir
Construct Water Temperature Management Devices
Construct temperature control devices on Friant Dam canal outlets
Construct temperature control device on Friant Dam river outlet
Construct selective level intake structures on new upstream dams
Increase Groundwater Storage
Increase conjunctive management of water in the Friant Division *(retained in concept only)*
Construct and operate groundwater banks in the Friant Division *(retained in concept only)*
Planning Objective: ***Increase water supply reliability and system operational flexibility***
Perform Reservoir Operations and Water Management
Modify storage and release operations at Friant Dam
Integrate Friant Dam operations with SWP and/or CVP outside Friant Division
Increase Surface Water Storage in the Upper San Joaquin River Basin
Enlarge Millerton Lake by raising Friant Dam
Construct Temperance Flat RM 274 Reservoir
Construct Temperance Flat RM 279 Reservoir
Construct Fine Gold Reservoir
Increase Groundwater Storage
Increase conjunctive management of water in the Friant Division *(retained in concept only)*
Construct and operate groundwater banks in the Friant Division *(retained in concept only)*
Increase Transvalley Conveyance Capacity
Construct Trans Valley Canal

Key:
CVP = Central Valley Project RM = river mile SWP = State Water Project

Table S-2. Management Measures Addressing Opportunities

MANAGEMENT MEASURES
Opportunity: Improve management of flood flows at Friant Dam
Increase flood storage space in or upstream from Millerton Lake
Opportunity: Preserve and increase energy generation and improve energy generation management
Modify existing or construct new generation facilities at Friant Dam canal outlets
Construct new hydropower generation facilities on retained new surface water storage measures
Extend Kerckhoff No. 2 tunnel around new surface water storage measures
Opportunity: Preserve and increase recreation opportunities in the study area
Replace or upgrade recreation facilities
Opportunity: Improve quality of water supplies delivered to urban areas
Integrate Friant Dam operations with SWP and/or CVP outside Friant Division

Key:
CVP = Central Valley Project No. = number SWP = State Water Project

Refinement of Initial Alternatives

Combinations of retained measures formed various initial alternatives that were developed to address the planning objectives. Many measures that either were not well defined or were under study by others were retained in concept only and, therefore, were not explicitly defined for inclusion in alternative plans.

Further evaluation and comparison of initial alternatives was performed early during the plan formulation phase. Initial plan formulation efforts concluded that combining an enlargement of Millerton Lake with one of the other storage sites (Temperance Flat River Mile (RM) 274, Temperance Flat RM 279, or Fine Gold reservoirs) would not be effective because very limited additional water supply would be provided, and because of the effects to private property and recreation facilities. Thus, the Enlarge Millerton Lake management measure was not considered further in this PFR or the Investigation. On the basis of these evaluations, the following five refined initial alternatives were retained for further evaluation during plan formulation:

- Fine Gold Reservoir up to 380 TAF of new storage capacity (380 TAF) with pump-generating facility
- Fine Gold Reservoir up to 780 TAF of new storage capacity (780 TAF) with pump-generating facility
- Temperance Flat RM 279 Reservoir up to 430 TAF of new storage capacity (430 TAF) with extended Kerckhoff No. 2 tunnel
- Temperance Flat RM 279 Reservoir up to 690 TAF of new storage capacity (690 TAF) with extended Kerckhoff No. 2 tunnel
- Temperance Flat RM 274 Reservoir up to 1,260 TAF of new storage capacity (1,260 TAF) with extended Kerckhoff No. 2 tunnel

For each initial alternative, several configurations were formulated to assess the incremental costs and benefits that would result from additional storage, reservoir operations, multiple reservoir elevations, and water temperature management, where relevant.

The five surface water storage measures in the refined initial alternatives were evaluated in a two-step process and two were retained for development into alternative plans (when combined with other retained measures) to be further evaluated in the PFR. In the first step, three of the five measures, Temperance Flat RM 274 Reservoir (1,260 TAF), Temperance Flat RM 279 Reservoir (690 TAF), and Fine Gold Reservoir (780 TAF) were retained for further evaluation in the Investigation. The first step evaluation was based on technical evaluations performed during initial plan formulation for incremental cost effectiveness at a range of potential sizes. At a lesser incremental cost, the larger size storage measures provide more operational flexibility, greater increases in water supply reliability, and greater ability to manage cold water supplies for release to the San Joaquin River.

The three remaining surface water storage measures retained through the first step were comparatively evaluated across sites in the second step. The second step evaluations were based on the relative ability of the three remaining surface water storage measures to meet each of the four criteria from the 1983 U.S Water Resources Council *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (P&G), including (1) effectiveness, (2) efficiency, (3) acceptability, and (4) completeness.

Based on this second step evaluation, as seen in Table S-3, the Fine Gold Reservoir (780 TAF) surface water storage measure was considered inferior to the Temperance Flat RM 274 and RM 279 surface water storage measures. This surface water storage measure provides fewer water supply and cold water management benefits (the primary purposes), and results in more reservoir area environmental consequences. Temperance Flat RM 274 Reservoir (1,260 TAF) and Temperance Flat RM 279 Reservoir (690 TAF) rank consistently higher than Fine Gold Reservoir (780 TAF), as shown in Table S-3.

The Temperance Flat RM 274 Reservoir (1,260 TAF) and Temperance Flat RM 279 Reservoir (690 TAF) surface water storage measures were retained for alternative plans. Further evaluations of Temperance Flat RM 279 Reservoir (690 TAF) and Temperance Flat RM 274 Reservoir (1,260 TAF) were performed and are described in this PFR.

Table S-3. Surface Water Storage Measures Comparison and Selection Summary

Criteria	Temperance Flat RM 279 Reservoir (690 TAF)	Fine Gold Reservoir (780 TAF)	Temperance Flat RM 274 Reservoir (1,260 TAF)
Effectiveness	Medium to High	Low to Medium	High
Efficiency	Medium	Low to Medium	Medium
Acceptability	Medium	Low to Medium	Low to Medium
Completeness	Medium to High	Medium	Medium to High
COMBINED RANKING[1]	Medium	Low to Medium (LOWEST)	Medium to High (HIGHEST)
STATUS	RETAINED FOR FURTHER CONSIDERATION	NOT RETAINED FOR FURTHER CONSIDERATION[2]	RETAINED FOR FURTHER CONSIDERATION

Notes:
[1] In developing a combined ranking, the effectiveness criterion was given twice the weight compared to each of the efficiency, acceptability, and completeness criteria.
[2] The Fine Gold Reservoir (780 TAF) surface water storage measure was not retained for further consideration because it is considered inferior to the Temperance Flat RM 279 and RM 274 surface water storage measures. This surface water storage measure would provide less water supply and cold water management benefits, and result in more reservoir area environmental consequences.

Key:
RM = river mile
TAF = thousand acre-feet

Features and Potential Effects of Alternative Plans

In addition to surface water storage measures, the alternative plans consist of other retained management measures discussed previously, such as operations, conveyance features, temperature management features, energy features, etc. Many of these measures are included in all action alternative plans described in this PFR. Measures to increase transvalley conveyance capacity are included in some alternative plans. In addition to the No-Action/No-Project Alternative, four groupings of alternative plans are addressed in this PFR:

- Temperance Flat RM 274 Reservoir
- Temperance Flat RM 274 Reservoir and Trans Valley Canal
- Temperance Flat RM 279 Reservoir
- Temperance Flat RM 279 Reservoir and Trans Valley Canal

The effects of the four groupings of alternative plans are determined in comparison to the No-Action/No-Project Alternative. For each alternative plan grouping, several operational scenarios were formulated and evaluated to assess the sensitivity of accomplishments for the alternatives to varying operational strategies and assumptions reflecting various management measures.

For all operations scenarios, the primary focus is increasing water supply reliability and enhancing water temperature conditions in the San Joaquin River. To the extent possible, without impacting the ability to meet the planning objectives, the alternative plans also would be managed to improve opportunities for hydropower generation and recreation. Potential flood damage reduction benefits would be achieved through the incidental effect of additional available storage space. Major components, accomplishments, potential benefits, and estimated costs of the four groupings of alternative plans and the No-Action/No-Project Alternative are summarized in Table S-4.

Operations scenarios vary, in part, on the degree to which Friant Dam would be operated in a coordinated manner with SWP facilities and other CVP facilities (operations integration). The level of integration, in combination with additional storage, has the potential to affect the geographic extent, type, and magnitude of potential water supply benefits that could be achieved with alternative plans for each reservoir site. Operations integration with the SWP and/or CVP would include coordinated management of water supplies in Millerton Lake and new storage with project operations of SOD facilities. This would involve delivery of water supplies to the Friant Division in combination with water exchanges between the Friant Division and SWP and/or other CVP service areas. Some Delta water supplies diverted to San Luis Reservoir would be delivered to water users in the Friant Division, while San Joaquin water would be stored in the new reservoir. Additional available storage space would accrue in San Luis Reservoir during wet periods, allowing export of additional Delta supplies. Accumulated San Joaquin supplies would be provided to SWP and/or CVP SOD water users through exchange at a later time.

Table S-4. Summary of Potential Alternative Plan Accomplishments, Potential Benefits, and Estimated Costs

Item	No-Action/ No-Project Alternative	Temperance Flat RM 274 Reservoir		Temperance Flat RM 274 Reservoir with Trans Valley Canal		Temperance Flat RM 279 Reservoir		Temperance Flat RM 279 Reservoir with Trans Valley Canal	
		Operations Integration							
		SWP/CVP/ Friant	SWP/ Friant	SWP/CVP/ Friant	SWP/ Friant	SWP/CVP/ Friant	SWP/ Friant	SWP/CVP/ Friant	SWP/ Friant
Physical Characteristics									
Additional Storage Capacity (TAF)	0	1,260				690			
Additional Conveyance Capacity (cfs)	0	N/A		1,000		N/A		1,000	
Accomplishments									
Dry and Critical Year Increase in Delivery (TAF)[1]	0	168	171	254	230	120	103	137	126
Long-Term Avg. Increase in Delivery (TAF)[1]	0	180	158	240	177	132	107	158	120
Increase in Cold-Water Volume in All Year-Types	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Replacement of Impacted Hydropower Generation (%)	N/A	97%	98%	94%	NE	100%	100%	NE	NE
Available Flood Space at 90% Exceedence (TAF)	170	301	285	210	257	191	191	172	180
Potential Annual Benefits and Estimated Costs ($ million)[2]									
Agricultural Water Supply Reliability	$0	$55.2	$50.4	$59.1	$50.4	$44.4	$40.0	$45.0	$40.0
M&I Water Supply Reliability	$0	$57.3	$74.2	$81.9	$93.2	$36.5	$46.3	$41.2	$57.1
M&I Water Quality	$0	$8.2	$7.4	$16.4	$15.2	$7.5	$7.4	$15.7	$13.0
Flood Damage Reduction	$0	$2.3	$2.1	$1.4	$1.9	$0.7	$0.7	$0.1	$0.3
Net Hydropower Generation[3]	$0	-$0.4	-$0.3	-$1.2	-$0.3	$0.3	$0.3	$0.3	$0.3
Recreation	$0	$7.3	$7.3	$7.3	$7.3	$4.0	$4.0	$4.0	$4.0
Emergency Water Supply	$0	$14.6	$14.5	$23.8	$22.0	$11.5	$11.1	$15.8	$15.0
Ecosystem	$0	$24.5	$24.5	$24.5	$24.5	$24.5	$24.5	$24.5	$24.5
Total Potential Monetary Benefits ($million)	**$0**	**$169.0**	**$180.1**	**$213.2**	**$214.2**	**$129.5**	**$134.4**	**$146.6**	**$154.2**
Total Estimated Capital Cost ($million)	**$0**	**$3,358**		**$4,045**		**$2,962**		**$3,662**	
Total Estimated Annual Cost ($million)[4]	**$0**	**$169.1**		**$204.1**		**$149.7**		**$185.2**	
Potential Net Benefits ($million)	**N/A**	**-$0.2**	**$11.0**	**$9.1**	**$10.2**	**-$20.2**	**-$15.3**	**-$38.6**	**-$31.0**
Preliminary Benefit-Cost Ratio	**N/A**	**1.00**	**1.06**	**1.04**	**1.05**	**0.87**	**0.90**	**0.79**	**0.83**

Notes:
General: All alternative plans listed in this table assume available transvalley conveyance capacity in Shafter-Wasco Pipeline, Cross Valley Canal, and Arvin-Edison Canal.
General: Potential benefits for alternative plans listed in this table are based on the Millerton Baseline reservoir balancing option.
General: All costs and benefits are preliminary and subject to revision in the Feasibility Report.
[1] Increase) in water supply deliveries compared to the No-Action/No-Project Alternative. Dry and critical years as defined by the Sacramento River hydrologic index.
[2] Based on October 2006 price levels.
[3] Net hydropower generation benefits include hydropower generation in the primary study area and minor effects to hydropower generation in the CVP/SWP system.
[4] Based on 4-7/8 discount rate and 100-year period of analysis.
Key:
Avg. = average
cfs = cubic feet per second
CVP = Central Valley Project
M&I = municipal and industrial
N/A = not applicable
NE = not estimated
RM = river mile
SWP = State Water Project
TAF = thousand acre-feet

No-Action/No-Project

Under the No-Action/No-Project Alternative, the Federal Government and the State would take no additional action toward implementing a specific plan to enhance water temperature and flow conditions in the San Joaquin River; address growing water supply reliability issues in California; or address threats of flooding along the San Joaquin River, California's demand for electricity, growing demands for water-oriented recreation, or improving water quality.

Temperance Flat RM 274 Reservoir

Temperance Flat RM 274 Reservoir would be formed by a dam in the upstream portion of Millerton Lake at RM 274. At the top of active storage elevation of 985 feet above mean sea level (elevation 985), the reservoir would provide about 1,260 TAF of additional storage. Water temperature management measures include a selective level intake structure on the main dam and temperature control devices on Friant Dam. The alternative plans also include features to mitigate the loss of generation from the Kerckhoff Project powerhouses. Temperance Flat RM 274 Reservoir alternative plans were evaluated under several distinct operations scenarios, which vary according to the extent of operations integration, available transvalley conveyance, and reservoir balancing. The primary operational focus is increasing water supply reliability and enhancing water temperature conditions in the San Joaquin River. Figure S-3 shows the extent of Temperance Flat RM 274 Reservoir and power features, and affected features in the reservoir area.

Temperance Flat RM 274 Reservoir with Trans Valley Canal

This grouping of alternative plans is the same as described for the Temperance Flat RM 274 Reservoir alternative plans, with an increased transvalley conveyance capacity through construction of a Trans Valley Canal. The Trans Valley Canal would have a conveyance capacity of 1,000 cubic feet per second (cfs), and could have several potential alternative configurations.

Temperance Flat RM 279 Reservoir Alternative Plans

Temperance Flat RM 279 Reservoir would be formed by a dam in the upstream portion of Millerton Lake at RM 279. At the top of active storage elevation of 985, the reservoir would provide about 690 TAF of additional storage. Potential water temperature management measures and features to mitigate the loss of generation from the Kerckhoff Project powerhouses are also included, and a variety of operations scenarios were considered (similar to the Temperance Flat RM 274 Reservoir alternative plans). Figure S-4 shows the extent of Temperance Flat RM 279 Reservoir and power features, and affected features in the reservoir area.

Temperance Flat RM 279 Reservoir with Trans Valley Canal

This grouping of alternative plans is the same as described for the Temperance Flat RM 279 Reservoir alternative plans, with an increased transvalley conveyance capacity via a Trans Valley Canal, with the same capacity and alignment assumptions as described previously.

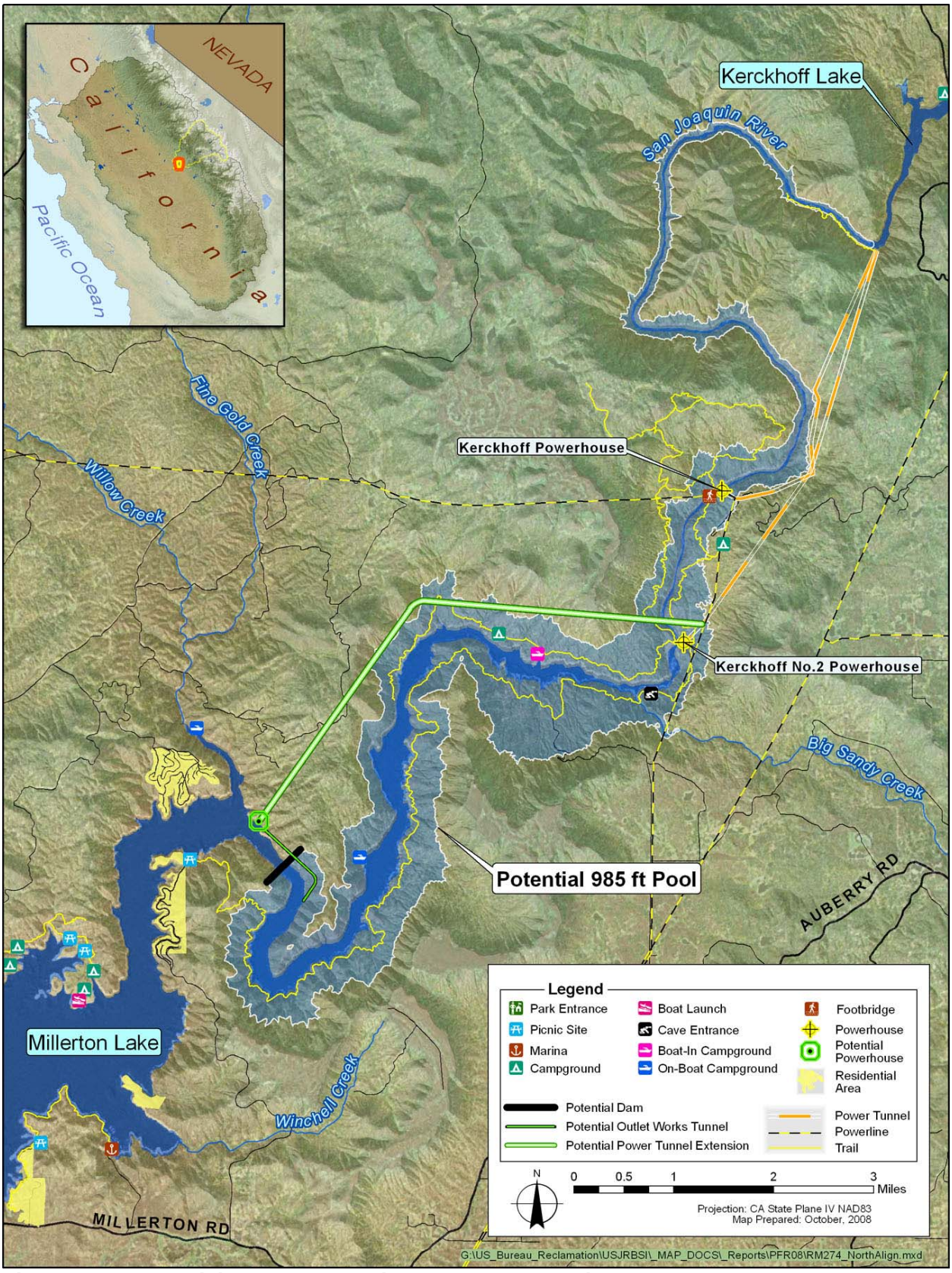

Figure S-3. Potential Temperance Flat RM 274 Reservoir

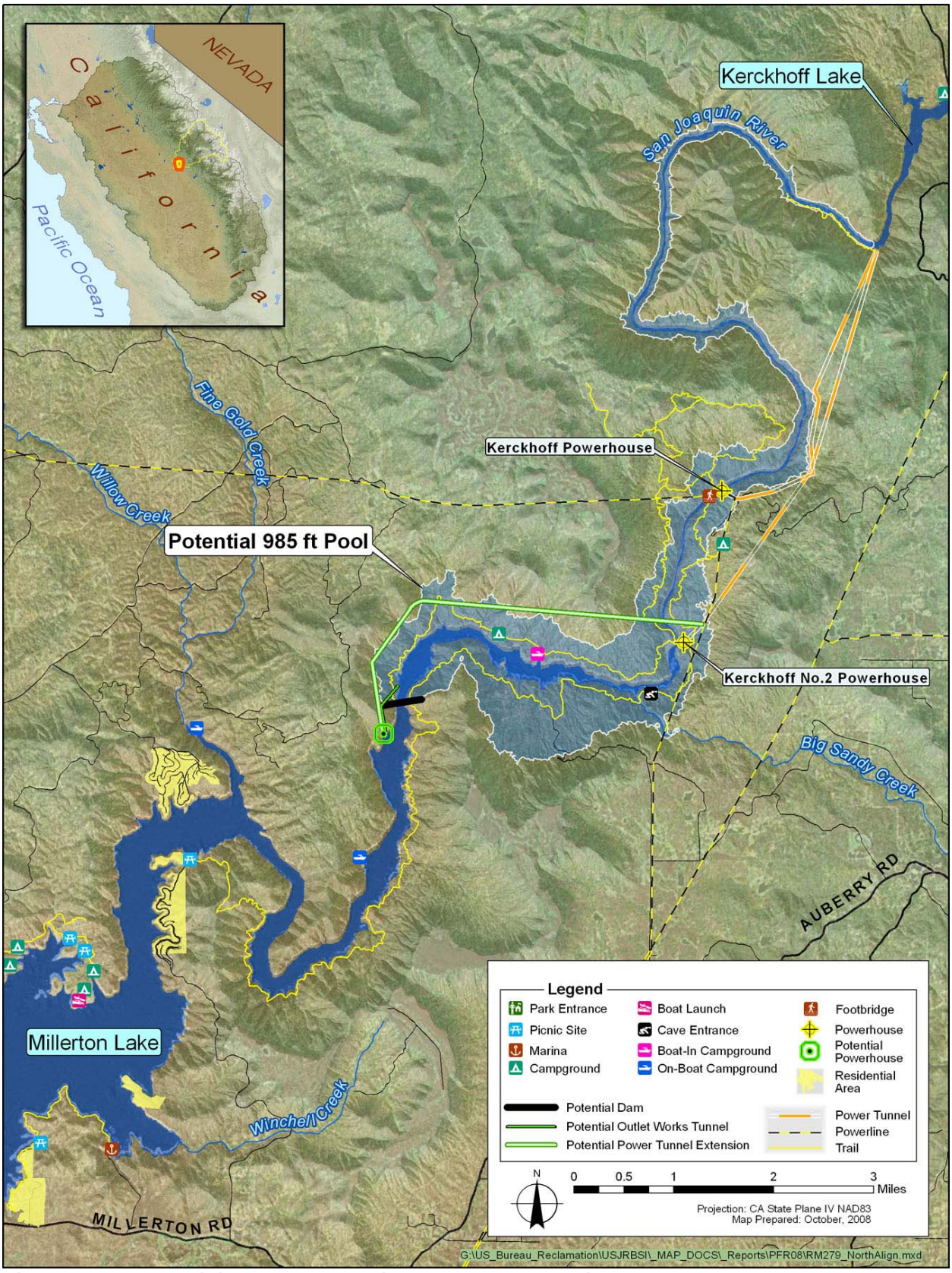

Figure S-4. Potential Temperance Flat RM 279 Reservoir

Comparison of Alternative Plans

Table S-4, shown previously, summarizes accomplishments, potential benefits, and estimated costs for the alternative plans that had the highest potential monetary benefits within each grouping. Estimates of potential net benefits and benefit-cost ratios are preliminary and subject to further refinement, but are useful for comparison purposes. Temperance Flat RM 274 Reservoir operated for SWP and Friant integration has the greatest preliminary potential net benefits and highest preliminary benefit cost-ratio.

Table S-5 compares the groupings of alternative plans for the four P&G planning criteria. Alternatives that include Temperance Flat RM 274 Reservoir rank highest in meeting the planning criteria.

Table S-5. Summary of Alternative Plan Comparison Related to Planning Criteria

CRITERION	No-Action/ No-Project Alternative	Temperance Flat RM 274 Reservoir	Temperance Flat RM 274 Reservoir with Trans Valley Canal	Temperance Flat RM 279 Reservoir	Temperance Flat RM 279 Reservoir with Trans Valley Canal
Effectiveness	N/A	High	High	Medium	Medium
Enhance water temperature and flow conditions in the San Joaquin River	N/A	High	High	Medium	Medium
Increase water supply reliability and system operational flexibility	N/A	High	High	Medium	Medium
Efficiency	N/A	High	High	Medium	Medium
Acceptability	N/A	Medium	Medium	High	High
Completeness	N/A	High	Medium	High	Medium
COMBINED RANKING[1]	**N/A**	**HIGH**	**HIGH**	**MEDIUM**	**MEDIUM**

Note:
[1] In developing a combined ranking, the effectiveness criterion was given twice the weight compared to each of the efficiency, acceptability, and completeness criteria.
Key:
N/A = not applicable
RM = river mile

Table S-6 summarizes how well alternative plans address planning objectives and opportunities, and meet planning constraints and considerations. All alternative plans (except the No-Action/No-Project Alternative) are formulated to address the planning objectives for the Investigation, and provide benefits associated with the opportunities to varying degrees (see Table S-4). At this stage in the planning process, all alternative plans meet planning constraints and considerations identified for the Investigation. Alternatives that include Temperance Flat RM 274 Reservoir rank highest in addressing the planning objectives and meeting planning constraints and criteria.

Table S-6. Summary Comparison of Alternative Plans Related to Planning Objectives, Opportunities, Constraints, and Considerations

Planning Objectives, Constraints, and Considerations	No-Action/ No-Project Alternative	Temperance Flat RM 274 Reservoir		Temperance Flat RM 274 Reservoir with Trans Valley Canal		Temperance Flat RM 279 Reservoir		Temperance Flat RM 279 Reservoir with Trans Valley Canal	
		Operations Integration Option							
		SWP/CVP/ Friant	SWP/ Friant	SWP/CVP/ Friant	SWP/ Friant	SWP/CVP/ Friant	SWP/ Friant	SWP/CVP/ Friant	SWP/ Friant
OBJECTIVES									
Enhance water temperature and flow conditions in the San Joaquin River									
Dry Year Increase in Cold-Water Volume Below 52°F (September to December) (TAF)	0	119	119	134	NE	61	63	NE	NE
Dry Year Increase in Cold-Water Volume Below 60°F (September to December) (TAF)	0	184	184	205	NE	123	116	NE	NE
Long-Term Avg. Increase in Cold-Water Volume Below 52°F (September to December) (TAF)	0	365	359	396	NE	183	178	NE	NE
Long-Term Avg. Increase in Cold-Water Volume Below 60°F (September to December) (TAF)	0	553	543	596	NE	313	305	NE	NE
Ability to Provide Restoration Flows to the San Joaquin River Below Friant Dam During Critical Years	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Increase Water Supply Reliability and System Operational Flexibility									
Dry and Critical Year Change in Delivery (TAF)	0	168	171	254	230	120	103	137	126
Long-Term Avg. Change in Delivery (TAF)	0	180	158	240	177	132	107	158	120
Operational Flexibility	Very Low	High	High	High	High	Medium	Medium	Medium	Medium
ADDRESSES PLANNING OPPORTUNITIES	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MEETS PLANNING CONSTRAINTS	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MEETS PLANNING CONSIDERATIONS	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
COMBINED RANKING FOR ADDRESSING OBJECTIVES, AND MEETING PLANNING CONSTRAINTS AND CRITERIA	**VERY LOW**	**HIGH**	**HIGH**	**HIGH**	**HIGH**	**MEDIUM**	**MEDIUM**	**MEDIUM**	**MEDIUM**

Key:
ºF = degrees Fahrenheit
Avg. = average
cfs = cubic feet per second
CVP = Central Valley Project
M&I = municipal and industrial
N/A = not applicable
NE = not estimated
RM = river mile
SWP = State Water Project
TAF = thousand acre-feet

Storage Site Selection

The Temperance Flat RM 274 Reservoir grouping of alternative plans is retained for further evaluation in the feasibility phase of the Investigation, and the Temperance Flat RM 279 Reservoir grouping of alternative plans will not be retained for further evaluation for the following major reasons:

- Temperance Flat RM 274 Reservoir alternative plans have greater benefits, greater net benefits, and a higher benefit-cost ratio compared to the Temperance Flat RM 279 Reservoir alternative plans.
- Most of the Temperance Flat RM 274 Reservoir alternative plans provide positive net benefits, but Temperance Flat RM 279 Reservoir alternative plans do not provide positive net benefits.
- Temperance Flat RM 274 Reservoir alternative plans address the planning objectives of enhancing water temperature and flow conditions in the San Joaquin River, and increasing water supply reliability and operational flexibility to a greater degree than Temperance Flat RM 279 Reservoir alternative plans.
- Based on comparing the alternative plans according to the four P&G criteria, Temperance Flat RM 274 Reservoir alternative plans ranked higher than Temperance Flat RM 279 Reservoir alternative plans.

The Trans Valley Canal will also not be retained for further evaluation in the feasibility phase of the Investigation. The ranking of alternative plans and benefit-cost ratios are not substantially affected by including the Trans Valley Canal with the Temperance Flat reservoirs, and the canal is not needed to achieve a positive benefit-cost ratio. The Trans Valley Canal is a potentially beneficial increment that could be added to an alternative at a later time.

Implementation Considerations

Potential project purposes include agricultural water supply, M&I water supply and water quality, ecosystem enhancement, hydropower, recreation, and flood damage reduction. A non-Federal sponsor has not been officially identified at this stage of the Investigation, but potential non-Federal sponsors include DWR and/or the Friant Water Users Authority. Through operations integration, benefits could also accrue to a larger geographic region, including the CVP and SWP SOD service areas. Construction of a new reservoir in the upper San Joaquin River basin would be subject to the requirements of numerous Federal, State, and local laws, policies, and regulations. Reclamation would need to obtain various permits and meet regulatory requirements before beginning any project construction, and comply with a number of environmental regulatory requirements as part of the NEPA and CEQA compliance process.

Preliminary Cost Allocation

A preliminary cost allocation was developed for Temperance Flat RM 274 Reservoir. A cost allocation for the recommended plan will be included in the Feasibility Report. Cost allocations are made for Federal water resources projects to derive an equitable distribution of project costs among authorized project purposes, or those purposes proposed for authorization, in accordance with existing law. The three basic steps associated with cost allocation are (1) identifying costs to be allocated, (2) allocating costs to project purposes; and (3) determining reimbursability.

At this stage of the Investigation, single-purpose alternative projects have not been developed and alternative costs have not been determined. As such, a full Separable Cost - Remaining Benefits (SCRB) analysis cannot be presented and the Alternative Justifiable Expenditure (AJE) approach is used for this preliminary cost allocation. The AJE method is a modified SCRB method used in situations when derivation of the separable costs is not feasible.

For the preliminary cost allocation, the benefit categories are grouped into five purposes supported by existing legislation. The two primary project purposes for cost allocation are water supply and fish and wildlife enhancement. Flood damage reduction, recreation, and hydropower generation are considered secondary purposes. Once costs are allocated to appropriate purposes, they can be apportioned to the Federal government and non-Federal sponsor(s) based on specific project authorization and/or established Federal cost-sharing laws and regulations. Federal costs are designated as either reimbursable or non-reimbursable. Non-reimbursable costs are those that can be borne by the Federal government. Costs allocated to agricultural and M&I water supply and hydropower purposes are fully reimbursable based on existing legislation.

Specific costs have been identified only for the fish and wildlife enhancement purpose associated with temperature management features on Friant Dam and Temperance Flat RM 274 Dam. All other costs are considered joint costs. The hydropower feature costs are not considered specific costs because the features are necessary for replacement of affected generation due to inundation of the Kerckhoff Project powerhouses within the alternative footprint. The recreation feature costs are not considered specific costs because the features are associated with replacement of the existing recreation facilities that would be inundated by the alternative.

Table S-7 provides the results of the cost allocation procedure based on the AJE approach. The annualized capital costs, annual O&M, and annual net decrease in hydropower generation value total $169.4 million. Based upon this procedure, the largest share of total annual costs of $169.4 million is allocated to M&I water supply reliability, followed by agricultural water supply reliability. A large portion of annual project costs is anticipated to be Federal reimbursable.

Table S-7. Preliminary Cost Allocation for Temperance Flat RM 274 Reservoir Alternative Based on an Alternative Justifiable Expenditure Approach

Purpose	Annual Benefits	Specific Costs	Remaining Benefits[1]	% Distribution of Remaining Benefits	Allocated Joint Costs[2]	Total Allocated Costs[3]	Overall % Cost Allocation
Water Supply	$146.5	$0	$146.5	88.0%	$136.8	$136.8	80.8%
Agricultural Water Supply Reliability	$50.4	$0	$50.4	30.3%	$47.1	$47.1	27.8%
M&I Water Supply Reliability	$74.2	$0	$74.2	44.6%	$69.3	$69.3	40.9%
Emergency Water Supply	$14.5	$0	$14.5	8.7%	$13.5	$13.5	8.0%
M&I Water Quality	$7.4	$0	$7.4	4.4%	$6.9	$6.9	4.1%
Fish and Wildlife Enhancement	$24.5	$13.9	$10.6	6.4%	$9.9	$23.8	14.0%
Ecosystem (Water Temperature)	$24.5	$13.9	$10.6	6.4%	$9.9	$23.8	14.0%
Flood Damage Reduction	$2.1	$0	$2.1	1.3%	$2.0	$2.0	1.2%
Recreation	$7.3	$0	$7.3	4.4%	$6.8	$6.8	4.0%
Hydropower Generation	$0	$0	$0	0.0%	$0	$0	0.0%
Total	$180.4	$13.9	$166.5	100.0%	$155.5	$169.4	100.0%

Notes:
General. Cost and benefit information presented is based on annual values.
General. Values may not sum to total due to rounding.
[1] Remaining benefits = Benefits less specific costs, but must be greater than $0.
[2] Total project costs less sum of specific costs, times share of remaining benefits.
[3] Sum of specific costs and allocated joint costs.

Key:
% = percent
M&I = municipal and industrial

Study Management, Public Involvement, and Outreach

The Study Management Team (SMT) consists of Project Managers from Reclamation, DWR, the consultant team, and members of technical teams, including water operations, environmental resources, economics, engineering, hydropower, and temperature. The SMT directs work performed by the technical teams, coordinates results into the overall study, and directs public involvement activities.

A public involvement plan was initiated at the beginning of the Investigation that is designed to provide meaningful opportunities for stakeholder participation and to inform the public. Information dissemination methods include Investigation newsletters, Websites, and media relations. Since the beginning of the study, Investigation team members have provided periodic updates through the following outreach activities:

- Structured series of interactive public meetings and workshops
- Briefings for governmental and nongovernmental agencies and coalitions, and briefings for tribal representatives
- Coordination with local water resources management groups
- Coordination with agencies
- Tours of Millerton Lake and portions of the upper San Joaquin River
- Distribution of informative brochures, fact sheets, and documents that provided background and updates on the Investigation's progress and distribution of Investigation documents via a Website

Continued public and stakeholder involvement will be a critical component during the final phase of the Investigation, which will culminate with release of the Final Feasibility Report and its accompanying EIS/EIR.

Findings and Future Actions

Findings regarding storage site selection, Federal and State interest, and uncertainties and refinements, and future actions are summarized below.

Storage Site Selection

The Temperance Flat RM 274 Reservoir grouping of alternative plans is retained for further evaluation in the feasibility phase of the Investigation, and the Temperance Flat RM 279 Reservoir grouping of alternative plans will not be retained for further evaluation. The Trans Valley Canal will also not be retained for further evaluation in the feasibility phase of the Investigation.

Federal and State Interest

This PFR concludes there is a Federal and State interest in continuing the Investigation to determine the feasibility of a project in the Upper San Joaquin River Basin to meet the objectives associated with M&I, agricultural, and environmental water supply reliability; anadromous fish survival; power; incremental flood damage reduction; and recreation. The degree and magnitude of the Federal and State interest in a potential project will be refined and quantified in the Feasibility Report, EIS/EIR, and supporting documentation. Alternative plans have been identified that result in positive net National Economic Development (NED) benefits and significant positive regional economic effects. To date, there has been strong local, regional, State, and Federal interest in a potential project to address the identified planning objectives and opportunities.

Uncertainties and Refinements

Various uncertainties associated with the Investigation include hydrology and climate change, system operations facilities and constraints, cost estimates, and alternative refinements. Some key areas of uncertainty potentially affecting operational analyses for the Investigation include implementation of the San Joaquin River Restoration Program (SJRRP) on the operations of Friant Dam and the San Joaquin River, and changes in Delta export regulations or policies resulting from the pending Operations Criteria and Plan (OCAP) biological opinions, new Endangered Species Act (ESA) listings, or recommendations from various planning processes for the Delta. As uncertainties regarding some of these plans and policies are resolved during the next phase of study, assumptions will be refined, which may change the basis of comparison for or magnitude of the accomplishments of the alternative plans.

As the Investigation progresses, Temperance Flat RM 274 Reservoir alternative plans will likely evolve as technical studies are refined and additional information related to potential benefits, effects, and estimated costs is obtained, developed, and evaluated. Further, additional environmental analyses will be completed, which will inform the nature of potential mitigation and/or enhancement measures. Additional comparisons will be conducted for the alternative plans during the feasibility study and included in the Final Feasibility Report and accompanying EIS/EIR. The comparisons in the next phase of the Investigation will provide the basis for selection of a Recommended Plan. At that time, implementation responsibilities and an updated cost allocation will be developed and identified for that plan.

Future Actions

The Draft Feasibility Report and EIS/EIR are scheduled for 2009. It is estimated that the Final Feasibility Report and EIS/EIR would be completed in 2010. Major future actions required to complete the Investigation include:

- Completing environmental studies, including a detailed comparison of the environmental impacts of the alternative plans with the No-Action/No-Project Alternative for National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), process documentation, agency coordination, and consultation.
- Completing identification of potential effects (adverse and beneficial) and mitigation features of the alternative plans.
- Developing detailed designs, cost estimates, potential benefits, and cost allocation, and defining the rationale for, and selection of, a Recommended Plan.
- Identifying a non-Federal cost share partner.
- Determining financial feasibility through ability-to-pay analyses of Federal and non-Federal project partners.
- Preparing a Federal decision document that will incorporate the NEPA and CEQA compliance documentation by reference.