5 BENEFITS OF RESTORATION

At this conceptual level of detail, benefits may be among the most difficult part of the project to define, or at least quantify. Those who originally fought to prevent the flooding of Hetch Hetchy Valley did not need detailed economic studies to decide that the valley was worth more as a natural wonder than as a reservoir. Others believed the value of developing water and power resources was worth more than preserving the valley. While future detailed benefit studies are unlikely to ever provide conclusive evidence for all parties, such studies could help people put the benefits of a restored valley in perspective with the existing benefits of the Hetch Hetchy water system.

AESTHETICS

While beauty is a subjective concept, perhaps the most aesthetically striking characteristics of a restored Hetch Hetchy Valley would be the monolithic size of the valley's sheer granite cliffs, the expansiveness of the open space from one side of the valley to the other, and the valley's waterfalls that cascade down from impressive heights.

Hetch Hetchy Valley is often compared to Yosemite Valley. To place the size of Hetch Hetchy Valley into perspective, Yosemite Valley and Hetch Hetchy Valley are roughly the same length at approximately seven miles long. According to NPS staff, the primary difference is width. The average width of Yosemite Valley is approximately one mile, while the average width of Hetch Hetchy Valley is just over a half-mile.

According to previous publications on the restoration of Hetch Hetchy Valley, the primary justification for removing the dam and restoring the valley is to reclaim a beautiful landscape that is owned by the American people.

Photographer unknown

Ansel Adams

Hetch Hetchy Valley (left) is often compared to Yosemite Valley (right).

ECONOMIC BENEFITS OF RESTORATION

Very little information is available from previous studies on the potential economic benefits of restoring Hetch Hetchy Valley. One form of benefits would accrue from people visiting or using the valley, called "use benefits." Another type of benefits would result for people that may never visit the valley, but would nonetheless place value on knowing that the valley exists. These benefits, called "non-use benefits," are similar to people valuing, for example, that Mono Lake is protected, though they may never visit it.

Use Benefits

Increased public use opportunity is one of the most obvious benefits of restoring the valley. California's population is increasing and the demand for additional recreational opportunities is growing as well. Restoring Hetch Hetchy Valley is one potential option to increase recreational opportunities.

The 2004 Rider report used a benefits transfer methodology to estimate use benefits as society's willingness to pay for those recreational opportunities. Rider's report uses development scenarios similar to those generated by the 1988 Assembly Office of Research (AOR) study, but provides more detail on the extent of facilities that could be placed in the valley. The estimates of total annual use benefits in excess of what the users pay are:

- Low Development: $14.68 million based on 400,000 visitor days per year
- Medium Development: $15.67 million based on 600,000 visitor days per year
- High Development: $26.12 million based on 1,000,000 visitor days per year

It should be noted that benefits transfer is not necessarily a straightforward exercise. For example, attention must be paid to the extent to which the resources being valued are similar; the scale, magnitude, and nature of the environmental changes valued are comparable; the group surveyed in the original study is comparable to the groups that the policy change under consideration would impact; and the extent to which the original studies were conducted using appropriate methodologies.

Fog descends upon Hetch Hetchy Reservoir.

Non-Use Benefits

There are many examples of studies that have estimated non-use values for a variety of resources. Two such examples are presented below for informational purposes only. We note that the values arising from these studies may not necessarily be representative of values that might arise from a focused study of the non-use values associated with restoring the Hetch Hetchy Valley.

U.S. Fish and Wildlife Service (USFWS 1998) reports a case study to estimate the benefits of dam removal on the Elwha River in Washington State to illustrate how the Contingent Valuation method can be used in benefits estimation. John Loomis of Colorado State University developed a contingent value study to measure the total economic value, both use and non-use, associated with removal of the dams. The analysis elicited estimated willingness to pay information from households in Washington and the rest of the U.S. Annual willingness to pay for dam removal and restoration ranged from $94 to $138 million from residents of Washington and from $3.376 to $6.137 billion from the rest of the U.S.

Loomis also conducted a contingent valuation study (1988) for benefits arising from Mono Lake. He found that the average value was $35.21 for a respondent who never expected to visit Mono Lake. Extrapolating this to 30 million inhabitants of California yields a value of $1.056 billion. The lake is a great distance from population centers and is largely inaccessible from Northern California during the winter months. It is likely that the non-use benefits from Hetch Hetchy would even be higher than the non-use benefits from Mono Lake.

Combined Use and Non-Use Benefits

If the Elwha study (USFWS 1998) is taken as representative of an upper bound of potential non-use benefits for Hetch Hetchy, the annual benefits of restoring Hetch Hetchy Valley range from $26 million (use benefit) to $6 billion (non-use benefit). The extreme range in the estimates of economic benefits that might result from restoring Hetch Hetchy Valley, in and of itself, casts doubt on their ability to provide useful information. Further detailed study is necessary to more accurately estimate both the use and non-use benefits that might accrue if the Hetch Hetchy Valley is restored.

An important point to consider is that estimation of the potential benefits from a project is only part of a benefit cost analysis. Other important considerations include a determination that no other project provides greater net benefits (benefits minus costs) and a determination that there are no other less costly means to obtain the same objective. A benefit cost analysis only determines whether a project is economically justifiable, not whether a project is financially feasible.

STATEWIDE IMPLICATIONS

There are only four glacially-carved valleys in California with features like Hetch Hetchy Valley: Yosemite, Hetch Hetchy, Kings Canyon, and Tehipite. Some of the features that make Hetch Hetchy Valley unique include the following:

- Accessible all year both by car and on foot.
- A flat valley floor with expanses of meadows and forest that provide easy walking.
- Tall waterfalls that vary from misty to thundering.
- Meandering river.
- Waterfalls and rivers are approachable.
- Vertical granite walls with heights in excess of 1,000 feet.

Restoring Hetch Hetchy Valley would return this unique valley to the use and enjoyment of the public.[7] In addition, Hetch Hetchy is at the transition from foothill to montane habitats and therefore provides habitat to a larger number of plant and wildlife species than does Yosemite Valley.

Restoring Hetch Hetchy Valley could also have significant statewide implication from lost water and power and from environmental impacts of replacing the water and power with other infrastructure.

[7] Appendix C provides more detail on public use in the valley.

6 COSTS OF RESTORATION

Without any defined project objectives, any cost estimate is conceptual at best. Different concepts of what the project should be lead to different estimates of cost. For example, an objective of draining the reservoir and leaving the dam in place would provide for a much lower cost than an objective to completely remove the dam. Therefore, the cost estimates provided in previous studies are not directly comparable due to the lack of defined and consistent objectives.

The state found that all previous estimates were incomplete since the studies focused on specific items and were not presented as complete projects. Figure 6-1 shows the cost information available from the previous studies, along with the estimates made by the state for this report.

Figure 6-1 Hetch Hetchy Valley Restoration Cost Estimate (millions of dollars)

Category	Restore Hetch Hetchy	Environmental Defense	STATE
Implement Water Replacement Components	626	174 to 652	1,144 to 4,305
Implement Power Replacement Components	217	340 to 693	560 to 820
Dam Modification or Removal	108	Not Included	250 to 915
Restore Valley	23	Not Included	32 to 53
Implement Public Use Plan for Valley	Not Included	Not Included	10 to 91
Subtotal	**974**	**514 to 1,345**	**1,996 to 6,184**
Contingencies	57	-11 to 228	Included in above values
Site-Specific Environmental Documentation, Permitting & Mitigation	Not Included	Included in above values	390 to 1,790
Engineering, Legal and Administration	65	6 to 76	610 to 1,850
GRAND TOTAL	**$1,096**	**$510 TO 1,649**	**$2,996 TO 9,824**

Note: Via memo to DWR dated July 20, 2005, SFPUC provided an estimate of $9 billion in total costs to restore Hetch Hetchy Valley. SFPUC did not respond to DWR requests to review documentation of this cost estimate; therefore, DWR was unable to examine SFPUC's claim in this report.

STATE COST ESTIMATING METHODOLOGY

Due to the incomplete nature of the cost estimates from the previous studies, the state found it necessary to make its own cost estimate based upon its extensive experience in planning, design, and construction of water projects. This provides one complete estimate that is based on consistent methodology throughout.

The cost estimate is patterned on the prior work by making broad assumptions on a mix of facilities (as proposed by others) that may be required for the restoration project. The facility mix used here is patterned on integrated resource management principles and is similar to the Environmental Defense and Restore Hetch Hetchy work. However, a range was created to cover the lack of fundamental objectives and anticipated environmental mitigation requirements. Since fundamental objectives have not been articulated at this time, there is huge variability in quantities and unit costs.

Total capital costs include water and power replacement components, complete dam removal, Hetch Hetchy Valley restoration, development of a visitor use plan for the valley, environmental protection, mitigation, and land acquisition costs.

Incidental Flood Control from Hetch Hetchy

While there is no requirement to maintain flood control space in Hetch Hetchy Reservoir, the reservoir provides some indirect flood control benefits on the Tuolumne and lower San Joaquin rivers. Reservoir operators normally keep some space during winter months for operational flexibility and to avoid losing power production if there is a winter storm that could force spills beyond the Kirkwood Powerhouse hydraulic capacity (about 1,400 cfs).

During a big snowpack year, the U.S. Army Corps of Engineers allows up to 50,000 af of snowmelt reservation at Don Pedro Reservoir to be transferred to Hetch Hetchy Reservoir if there is enough empty space in Hetch Hetchy and Lake Lloyd.

A 2005 report by MBK Engineers shows how Hetch Hetchy Reservoir has helped control past floods on the Tuolumne River. The report concluded that the maximum Don Pedro Dam release during 1997 would have been about 100,000 cfs without O'Shaughnessy compared to the actual 59,000 cfs recorded in the flood. The 41,000 cfs increase would probably raise the peak stage at La Grange nearly eight feet higher than actually occurred in 1997.

The incidental flood storage in Hetch Hetchy reservoir in a large flood is likely to be in the 60 to 70 thousand acre-feet (taf) range. There is about an equal amount in Lake Lloyd and Lake Eleanor. Combined with storage in Don Pedro Reservoir, the incidental storage help provide flood protection to about 1 in 50 year level. Removing Hetch Hetchy would lower flood protection on the Tuolumne River to about 1 in 40 year level.

Contingencies

The total direct cost for the facility component includes a 30 percent markup for contingencies to cover inaccuracies in quantity estimation, an allowance for unlisted items, and other unknowns at the time of this conceptual-level estimate. This is consistent with DWR's standard estimating practices at this phase of a conceptual project study. To account for site-specific environmental documentation, permitting, and mitigation expenses, the estimate includes an additional markup of 20 to 30 percent applied to the total direct costs. Further, the estimate includes another 30 percent markup to account for engineering, legal, and administration costs.

Some Issues that Could Significantly Change the Cost Estimate

Following are some critical issues that need to be resolved to narrow the cost range.

- How will assumed measures such as water transfers, conservation, recycling and desalination affect total customer water demand and will this demand stabilize or increase in the future?
- Will there be sufficient power replacement within the SFPUC system or will outside power sources be necessary to make up for the loss?
- Will hydrology and/or institutional constraints limit Bay-Delta supplies?
- What should be the level of water treatment?
- What is an acceptable level of environmental protection and mitigation?
- What is an acceptable level of water management risk?
- How and where would material be disposed of from removal of O'Shaughnessy Dam?
- Should O'Shaughnessy Dam be completely removed or left in place with an empty reservoir?

Priest Reservoir regulates flow into Moccasin Powerhouse.

Plan Formulation

If the decision is made to continue with planning, additional funding will be required for appraisal level and feasibility studies, site-specific engineering, environmental documentation, permitting, mitigation, and preparation of plans and specifications for project construction. The planning effort could take up to 10 years of normal planning, feasibility, and environmental studies, including programmatic documents. If there is continued interest in proceeding with all levels of study, the state estimates $65 million would be needed to complete these studies, exclusive of preparation of design plans and specifications.

CONCEPT-LEVEL COST ESTIMATE

Cost estimates at the concept level are often "back-of-envelope" in nature, made without having material quantity estimates. They are generally based on conceptual sketches, at best, and rely on extrapolation of cost information from other existing facilities. Construction cost escalation would generally only be considered at this level of study if there were reason to believe that a substantial disparity in the relative value of various inputs, such as labor, material and power costs, is expected at the time of construction. Without this foresight and without an idea of when the project(s) would be constructed, the state has not included escalation in this cost estimate.

A summary of the state cost estimate is given in Figure 6-2 and information on the specific basis for costs is presented in Appendix G.

Following are some highlights of the state's cost estimate:

- An average cost per unit of surface storage was developed from five surface storage programs currently under joint studies by DWR and U.S. Bureau of Reclamation as part of the CALFED Surface Storage Investigations Program.
- Groundwater storage and extraction costs are based on Proposition 13 projects funded by DWR over the last four years.
- Conveyance costs, such as interties to the SFPUC system, used typical costs developed by DWR's Division of Engineering for the SWP South Bay Aqueduct expansion.
- Intertie structures, such as reservoir intake towers, are based on the SWP's San Bernardino Intake Structure experience.
- Annual operations and maintenance (O&M) costs are assessed at two percent of total project costs based on economic analyses of the Coastal Branch Project, plus energy costs. Present worth of O&M costs are assessed at 6% discount rate over 30 years.
- Power replacement facility costs (including pumps, pipelines, tunnels, motors, valves and other mechanical work) were predicted using actual SWP cost experience with the Coastal Aqueduct, East Branch Extension pump stations, and Mojave Siphon Power Plant.
- Power transmission line costs are based on a quotation from Sacramento Municipal Utility District.
- Dam removal methods and costs were compared to other dam removal projects in the U.S.: Elwha and Glines Canyon Dams on the Elwha River in Olympia National Park, Washington; Matilija Dam on the Ventura River in

From the tailrace of Moccasin Powerhouse, Tuolumne River water is transported via tunnels and pipelines to the San Francisco Bay Area.

California; and San Clemente Dam on the Carmel River in California.

- Valley Restoration and Recreation Plan Development costs are provided by the National Park Service and the California Department of Parks and Recreation.
- In the last two years, DWR has experienced significant increases in construction costs. Based on its recent experience, DWR added 30% for engineering design, construction, and administration costs in its estimate.

Cost Perspective for California Resource Management Challenges

- **$10 billion to $16 billion for flood management**
- **$3 billion to $6 billion for Salton Sea**
- **$3 billion to $10 billion for CALFED**
- **$1 billion to $2 billion for Owens Valley**
- **$3 billion to $10 billion for Hetch Hetchy**

Figure 6-2 A Cost Estimate for Hetch Hetchy Restoration (millions of 2005 dollars) [1]

PLANNING COSTS		
Plan Formulation (site-specific engineering, environmental documentation, permitting, and mitigation are not included in this planning level work, see F and G below)		
Level 1 -	Complete concept level studies	7
Level 2 -	Appraisal-level studies	13
Level 3 -	Feasibility-level studies	32
Level 4 -	Detailed studies and programmatic documents (but not including final design, permits and other site-specific work in Items F and G below)	13
GRAND TOTAL OF PLANNING COSTS		**$65+**
IMPLEMENTATION COSTS		
A	**Implement Water Replacement Components** [2]	**$1,144 – $4,305**
1	Construct new water supply facilities	
a	250,000 to 450,000 af new surface storage [3]	163 - 1,460
b	200 to 300 cfs groundwater banking program [3]	150 - 230
c	Intertie (Don Pedro or SWP)	53 - 234
2	Acquire dry-year supply transfer water	22 - 86
3	Expand water treatment facilities	310 - 515
4	Increase water use efficiency (5,000 to 20,000 af) [3]	46 - 210
5	Present worth of increased annual O&M costs	400 – 1,570
B	**Implement Power Replacement Components** [2]	**$560 - $820**
1	Construct new facilities	
a	new 1,500 cfs Canyon Tunnel intake	70
b	modifications to Kirkwood for reduced "head"	30
c	730 cfs pumped connection from Holm to Mountain Tunnel	40
2	Purchase replacement capacity and energy	420 - 680
C	**Modify or Remove Dam**	**$250 - $915**
1	Mobilization and set-up (crusher, conveyor, roads, etc.)	39 - 65
2	Deconstruct dam	178 - 810
3	Demobilization and clean-up	33 - 40
D	**Restore Valley**	**$32 - $53**
1	Refill quarry excavations and recontour ground surface	1
2	Native species revegetation and stream restoration	30 - 50
3	Maintenance and monitoring (adaptive management)	1 - 2
E	**Implement Public Use Plan for Valley**	**$10 - $91**
Subtotal of Direct Costs		**$1,996 - $6,184**
F	**Site-Specific Environmental Docs, Permits, & Mitigation (20-30%)**	**$390 - $1,790**
G	**Engineering, Legal, and Administration (30%)**	**$610 - $1,850**
GRAND TOTAL OF IMPLEMENTATION COSTS		**$2,996 - $9,824**
TOTAL PROJECT COST		**$3,061 to $9,889**

Hetch Hetchy Reservoir

NOTES FOR FIGURE 6-2

[1] Estimates are based on similar project experience and include a 30% markup for uncertainty in estimating costs (see Appendix G for more detail).

[2] To develop cost estimates, the state used a resource mix based on the ED-modeled alternative — which includes an additional 323 taf storage in Calaveras Reservoir, a 200 cfs groundwater extraction program, a 407 cfs Don Pedro Intertie, 56 taf maximum annual dry year water transfers — to meet increased future demands.

Power replacement facilities were based on other existing Hetch Hetchy water and power replacement studies.

This combination of water supply and power replacement components was chosen for its potential to meet the broad objectives likely to be required for the restoration of Hetch Hetchy Valley. The range of costs was developed using the high and low cost estimates from water management components 1, 2, and 3, as discussed in Chapter 4.

[3] Given the uncertainty involved, a range was used in this cost estimate because the exact location, facility size, and operational parameters are unknown at this time. The facility mix selected and the cost range presented also account for possible additional environmental protection and risk mitigation for California water management that may be required to implement these projects.

7 NEXT STEPS – FUTURE WORK

This study presents initial conceptual information for review and to promote discussion. It does appear technically feasible to restore the Hetch Hetchy Valley. However, it is premature to evaluate its financial feasibility. Based upon the low level of detail of information compiled during this state review, this chapter provides some guidance for others that may have continued interest in the restoration of Hetch Hetchy Valley.

The information from prior reports is not nearly detailed enough to make a decision on the financial feasibility of valley restoration. If a decision is ever to be made, policy makers and the public will need significantly more detailed quantitative information about costs, benefits, and tradeoffs associated with a specific proposal.

ROLE OF THE STATE

Further investigations into Hetch Hetchy Valley restoration cannot be led by the State of California alone. Federal participation, specifically the active and direct participation of the U.S. Department of Interior, will be important to help shape future studies and to work with the San Francisco Public Utilities Commission, Native American tribes, and the public on any next steps in this process. Federal authorization may be needed to initiate this federal role. A public/private partnership might be one mechanism to proceed with further evaluations. The Resources Agency will participate in any future studies under its mission to manage California's natural resources with the goal of ensuring that future studies or plans adhere to principles of integrated regional water management, that they maximize public benefit, and that they protect the environment, as well as the public trust.

If more detailed information becomes available, the state will review it in light of potential impacts on California's natural resource management activities and responsibilities — including water, energy, environmental, and recreation — and how overall public benefits can be maximized. If the federal government continues the investigation of restoring Hetch Hetchy, the state will consider participating as an active member of a cooperative study.

MORE DIALOGUE IS NEEDED

More dialogue must occur among elected officials; federal, state, and local agencies; Native American tribes; environmental interest groups; and the public before a decision is made to continue with restoration studies. Together, these interests will need to grapple with questions such as:

- What specific processes and studies are needed to determine the feasibility of restoring Hetch Hetchy Valley and replacing its current water and power benefits?
- Are water and power replacement options acceptable to the public?
- Can an adequate package of actions and mechanisms assure that a restoration and replacement program will be implemented and operated as intended?
- Who is willing to pay for a comprehensive Hetch Hetchy solution?

Prior to making a decision on whether or not to proceed with investigating the financial feasibility of restoring the Hetch Hetchy Valley, future studies need to be committed to well-defined objectives and supported by a sound stakeholder process. Future studies should also be carried out to a consistent level of study.

MANAGEMENT STRUCTURE

The California Research Bureau (2005) discussed a number of major environmental restoration projects in California and around the country. The report identifies that these projects often utilize various management structures during different stages of their development. Described below are three general structures from the report:

- *Government-Run Study*. This approach relies on government expertise to direct and conduct the analysis. For a large, complex issue, this could be a multi-agency study like what is occurring in the Florida Everglades. These processes usually rely on public and stakeholder advisory bodies to provide advice and feedback.
- *Government-Appointed Task Force*. Projects around the country do not use the term "task force" in a consistent way. In some cases, it means a stakeholder group that will negotiate a result similarly satisfactory (or unsatisfactory) to all parties. In other cases it means a panel of experts or a distinguished leader that brings a neutral, unbiased approach to the problem. For the purposes of this report, the term is used in the spirit of a panel of experts or distinguished leaders. An example is the California's Marine Life Protection Act (MLPA) Blue Ribbon Task Force. Parties expect such a task force to conduct a transparent and unbiased study of the issues; listen to stakeholders, the public, and the experts; and then make recommendations to government. The credibility of the task force with stakeholders, government officials, and the public is key to its success.

- *Collaborative Stakeholder Process*. In the two models described above, stakeholders may be consulted or have a formal advisory role. In the third model, which we call a collaborative stakeholder process, they are directly involved in setting up and overseeing the investigation. Terms commonly used to describe this process are "collaborative analysis" and "joint fact-finding." The Sacramento Area Water Forum is such a process.

It should also be noted that the management structure may not be the same throughout the study period, which could last up to 10 years.

LEVEL OF STUDY DETAIL

The level of detail in the previous Hetch Hetchy restoration studies is generally at the conceptual level or less. A next step in the studies could be elevating all the information to the same level of conceptual detail. Four specific areas could use more study to bring all information to the conceptual level of detail:

- Public use
- Valley restoration
- Dam removal
- Benefits

It is not essential for all the studies to occur at the same time. In fact, an analysis on public use and restoration early in the process would fill in important gaps and enhance efforts to quantify benefits, study dam removal, or define water and power replacement objectives.

Visitors walk across O'Shaughnessy Dam to reach the hiking trail around Hetch Hetchy Reservoir.

Future studies of any subject areas related to Hetch Hetchy Valley restoration will likely examine the issues identified to date through the following activities either under conceptual or appraisal level of study:

- Development and analysis of alternatives
- Public outreach
- Alternatives assessment

More detailed feasibility studies should only be conducted if the proposal looks promising after these less detailed studies.

FORMAL STAKEHOLDER PROCESS

A formal stakeholder process engaging the city and county of San Francisco and the Department of Interior regarding objectives for water and power replacement is critical. As information becomes available, policy makers and the public will have the opportunity to continue, adjust, postpone, or stop the evaluation process.

PURPOSE AND NEED

None of the prior studies articulated project objectives for restoration, public use, and water and power replacement. The next step of study should be based on a well-defined purpose and need statement, accompanied by specific project objectives. This process should also establish performance measures for restoration, public use in Hetch Hetchy Valley, and water and power replacement.

DEVELOP AND EVALUATE ALTERNATIVES

Some of the studies looked at multiple concepts for their area of interest, but generally none evaluated alternatives for the entire project. The next step of studies needs to develop and evaluate a reasonable range of alternatives based on the purpose and needs and established objectives. The evaluation should identify benefits and costs for a range of public use and restoration alternatives, as well as the cost of replacing current water and power benefits.

IMPORTANT ISSUES TO BE ADDRESSED

Through the public workshop and agency contacts to date, the study team has heard the issues and potential impacts identified by the stakeholders that should be addressed in future phases of study. Some of these issues are briefly summarized below. In addition to the following issues, a preliminary list of potential project impacts can be found in Appendix D and public comments can be found in Appendix J.

Project Planning and Objectives

The acceptability of restoring Hetch Hetchy Valley to interested parties around Yosemite National Park and to regional and statewide stakeholders needs to be considered. The planning and implementation issues include:

- Project purpose and need
- Objectives
- Identification and development of a range of alternatives
- Identification of potential project partners and financing
- Required permits and agency consultation
- Interrelationships with other projects and studies
- Institutional arrangements
- Agency and public education and participation

Restoration and Public Use

The potential beneficial and adverse effects of restoring Hetch Hetchy Valley need evaluation. The alternatives evaluation should include analysis of the following factors:

- Ambient water quality
- Number, location, size, design, and impacts of new visitor use facilities
- Impacts of removal or modification of O'Shaughnessy Dam
- Disposal of material from dam demolition
- Disturbance of valley floor by original construction
- Restoration of valley walls
- Sensitive terrestrial species and habitat
- Natural recolonization by plants and animals
- Cultural and other historic resources, including Native American issues
- Third party and environmental justice impacts
- National Park policies

System Operations, Conveyance Pipelines, and Facilities

Replacement water and power supplies from new facilities must be considered, including potential water quality and water supply reliability benefits and the institutional and operational agreements among potential participants. A key issue will be quantifying potential benefits of new facilities and identifying other water users who might be interested in obtaining those benefits. The conveyance, operation, and delivery issues include the following:

- Delivered water quality
- Delivered water amounts, timing, and reliability
- Growth issues
- Operational and institutional agreements among project participants
- Location, size, and impacts of conveyance facilities
- Risk management, including dam safety
- Impacts to downstream users
- Environmental impacts
- Sensitive species and habitat
- Reservoir and water supply security
- Flood control
- Operations during construction and coordination of operations with other projects
- Statewide water management

Legal Issues

The legal issues raised by restoring Hetch Hetchy Valley must necessarily be considered in a general way. They can only be fully and accurately described once a specific proposal is made on how the restoration is to be accomplished, and will obviously turn in great part on what facilities and by what institutional arrangements are proposed. Virtually all the alternatives for water and power supply replacement involve the use of potentially controversial water transfers in the Tuolumne River watershed (including Don Pedro Reservoir), the lower San Joaquin River, and the Sacramento-San Joaquin Delta. The legal issues involved in restoration include:

- Reasonable use and public trust
- Water quality and instream impacts
- Environmental review, documentation, and mitigation
- Safety
- Flood control
- Public use
- Water transfers
- Water rights
- Organizational and contractual obligations
- Wilderness Act
- Wild and Scenic Rivers Act
- Raker Act, including dam removal authority

Cost, Financing, and Institutional Arrangements

The potential costs and financing for Hetch Hetchy Valley restoration and water and power replacement, including allocation of costs among purposes and beneficiaries, must be determined. A method for determining the value of potential benefits is necessary to assist decision makers in allocating costs. The cost and financing areas of investigation include:

- Methods for determining costs and benefits
- Allocation of costs among project purposes
- Funding and financing alternatives and associated institutional requirements
- Institutional and operational arrangements among partner agencies
- Operation and control of facilities
- Mechanism for assuring commitments

Reports on dam removal by the Aspen Institute and the H. John Heinz III Center for Science, Economics, and the Environment stressed several issues important to dam removal:

- Address the rights of dam owners and beneficiaries at the outset
- If new studies are necessary, take key steps up front
- Revise permitting requirements to accommodate dam removal
- Coordinate the applicable regulatory programs.
- Make dam removal activities eligible for funding from existing programs and seek private funds
- Consider creative regulatory approaches

The Pulgas Water Temple marks the terminus of the Hetch Hetchy Aqueduct near Woodside.

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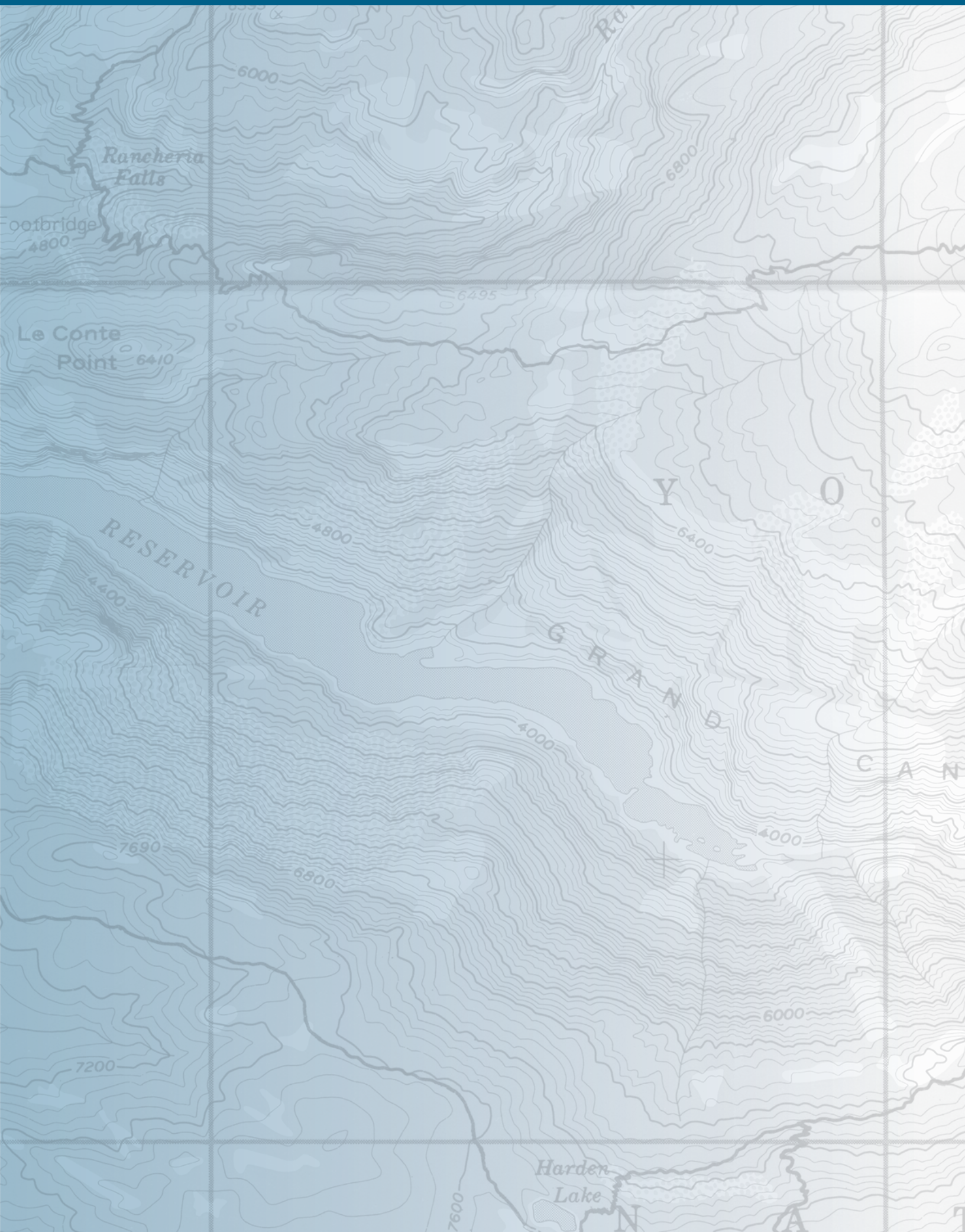
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