October 1, 2007

Mr. Paul Maltzer, Environmental Review Officer
San Francisco Planning Department
1650 Mission St., Suite 400
San Francisco, CA 94103

Re: Comments regarding the Draft Program Environmental Impact Report (DPEIR) for the San Francisco Public Utilities Commission's Water System Improvement Program (WSIP)

Dear Mr. Maltzer:

The Tuolumne River Trust, Clean Water Action and Sierra Club appreciate the opportunity to comment on the Draft Program Environmental Impact Report (DPEIR) for the San Francisco Public Utilities Commission's (SFPUC) Water System Improvement Program (WSIP). Our groups wholeheartedly support the timely completion of projects needed to repair aging and seismically-vulnerable infrastructure in order to protect the SFPUC's water supply system from earthquakes and other disasters.

The WSIP also includes a proposal to divert more water from the Tuolumne River to meet an anticipated increase in demand among the SFPUC's wholesale customers. Our review of the water supply aspects of the WSIP, and the DPEIR, uncovered several technical flaws and pitfalls. The attached comments provide greater detail on these shortcomings that we hope the San Francisco Planning Department will find useful in completing an adequate environmental review.

Creating a water plan for 2030 presents a unique opportunity for San Francisco, and the SFPUC's wholesale customers, to become a leader in water use efficiency, conservation and recycling. By pursuing a sustainable path, the Bay Area can increase water supply reliability and become a better steward of the Tuolumne and Bay Area Watersheds. As we work to pursue collaborative approaches through the planning and environmental review process, we welcome the opportunity to discuss our comments with you in greater detail.

Sincerely,

Peter Drekmeier
Tuolumne River Trust

Jennifer Clary
Clean Water Action

John Rizzo
Sierra Club, SF Bay Chapter

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EXECUTIVE SUMMARY

Comments on the WSIP DPEIR from Tuolumne River Trust,
Sierra Club and Clean Water Action
October 1, 2007

The Tuolumne River Trust, Sierra Club and Clean Water Action have reviewed the Draft Program Environmental Impact Report (DPEIR) for the proposed Water System Improvement Program (WSIP). Our combined comments focus on inadequacies in the DPEIR regarding the proposal to divert additional water from the Tuolumne River.

There are a number of areas in which the DPEIR fails to produce adequate baseline data, relies on flawed modeling, or reaches erroneous conclusions. It is difficult, if not impossible, to predict the impacts of diverting additional water from the Tuolumne River without adequate information, modeling and analysis.

The DPEIR attempts to assess the impacts to biological resources of WSIP-related flow changes with little or no reference to current biological conditions. This lack of information regarding current biological conditions creates two problems: (1) there is no biological baseline against which to compare conditions under the WSIP, and (2) there is no indication that current conditions are satisfactory with respect to a desired condition or legal requirements. As a result, there is no way to interpret the meaning of the DPEIR's claims that biological conditions under WSIP would be acceptable because WSIP would produce "small," "infrequent" or "rare" changes from current conditions. 01

Following is a summary of our primary concerns:

- Some studies referenced in the DPEIR were incomplete drafts. For example, a 1992 instream flow study conducted by the United States Department of Fish and Wildlife never moved beyond its draft stage, and the data is now 15 years old. The study concluded that minimum flow releases below O'Shaughnessy Dam needed to be increased; however, this recommendation was never adopted.

- The DPEIR lacks data on the health of Chinook salmon (a species of special concern) and steelhead trout (listed as "threatened"). The Chinook salmon population has declined from a high of approximately 130,000 in 1944 to just a few hundred individuals in recent years. The DPEIR presents no analysis of current population size for steelhead.

- Studies referred to in the DPEIR are old, outdated and may no longer be accurate. For example, there has not been a comprehensive study of the upper Tuolumne River in over fifteen years. Without information on baseline conditions, the DPEIR fails to assess the impacts of the proposed diversion in this part of the watershed.

- The DPEIR concludes, without any critical analysis, that hydrological and meteorological conditions in the next 82 years will be identical to those in the preceding 82 years. The analysis dismisses the potential impact of climate change on precipitation and river hydrology, and failed to identify or consider trends over the 82-year period.

- According to the DPEIR, per-capita demand for wholesale customers is projected to increase over current demand, despite numerous studies that show that substantial cost-effective reductions are possible using available technologies and policies. More specifically:
  - The analysis of future water demand does not include price-driven efficiency improvements, despite an estimated quadrupling of the price of water from the SFPUC by 2015.
  - Per-capita outdoor water use is projected to increase, indicating that the proposed conservation does not adequately address this issue.
  - The forecasting method for future water demand assumes that the current composition of commercial and industrial businesses will not change, and it ignores the variability in water use in the non-residential sector.
  - The wholesale demand study may overestimate future employment, thereby inflating 2030 non-residential demand.
  - The DPEIR did not adequately analyze the full potential for water conservation and recycling. It ignores a 2006 SFPUC study that identified measures that would reduce the need for more diversion by 74%.

- The DPEIR fails to define thresholds of significance in measurable, quantifiable terms. It consistently confuses the frequency of an event with the severity of its impact. A severe impact (*e.g.*, a seismic incident) could be significant even if it is unlikely to occur frequently. By the same token, a frequent impact (*e.g.*, a modest level of soil erosion each time it rains) could be cumulatively significant even if a single occurrence would have only a small impact.

- The DPEIR obscures analysis of potential impacts related to flow fluctuations by aggregating data into monthly averages. However, many biological, hydrological, and geomorphological processes respond to changes in flow on a daily or hourly basis.

- It is unclear whether the SFPUC has the right to divert more water from the Tuolumne. The SFPUC's pre-1914 appropriative right was for storage of water for hydroelectric power generation. Hydropower generation is considered a non-consumptive use right because the water is returned to the stream system.

- A proposal to enter into water transfer agreements with the Modesto and Turlock Irrigation Districts (MID/TID) is uncertain because the Districts have not expressed interest in the plan.

- Two proposed fishery habitat restoration projects are problematic because they mitigate for different problems than what would be created by reduced flows.

- In some cases, the SFPUC would rely on other agencies to meet flow objectives. However, the California Environmental Quality Act (CEQA) requires that mitigation measures "must be fully enforceable through permit conditions, agreements, or other legally binding instruments."

- The DPEIR fails to address the impact of recent Delta pump rulings on releases from Don Pedro Reservoir.

In conclusion, the Tuolumne River Trust, Sierra Club and Clean Water Action have identified numerous inadequacies in the WSIP DPEIR. Please see our complete comments for a thorough evaluation.

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COMMENTS ON THE WSIP DPEIR

From the Tuolumne River Trust, Sierra Club and Clean Water Action
October 1, 2007

The Tuolumne River Trust, Sierra Club and Clean Water Action have reviewed the Draft Program Environmental Impact Report (DPEIR) for the proposed Water System Improvement Program (WSIP). Our combined comments focus on inadequacies in the DPEIR regarding the proposal to divert additional water from the Tuolumne River.

Our comments are organized under three main categories:

1. Inadequate Studies/Lack of Baseline Data
2. Flawed Modeling/Analysis
3. Faulty Assumptions

In addition to the various comments made in this letter, we offer a number of additional specific comments in Attachment A.

We also include the following Attachments:

Attachment A: Matrix of additional comments.
Attachment B: Tables 1 and VI from *Instream Flow Requirements for Rainbow and Brown Trout in the Tuolumne River Between O'Shaughnessy Dam and Early Intake*, Michael Aceituno for the U.S. Fish and Wildlife Service, 1992.
Attachment C: Graph of decline of Chinook salmon.
Attachment D: *Central Valley Steelhead*, Dennis R. McEwan, 2001.
Attachment E: *In Hot Water: Water Management Strategies to Weather the Effects of Global Warming*, Natural Resources Defense Council, 2007.
Attachment F: Reports on Climate Change and the Sierra Snowpack.
Attachment G: *Leaders talk climate change at Hetch Hetchy*, Union Democrat, September 24, 2007.
Attachment H: *A Review of the San Francisco Public Utilities Commission's Retail and Wholesale Customer Water Demand Projections*, Pacific Institute for Studies in Development, Environment and Security, 2007.
Attachment I: Studies on Water Conservation.
Attachment J: Selected presentations from "Sustainable Water Supply Briefing," September 28, 2006.

General: Water Enterprise Environmental Stewardship Policy

"It is the policy of the SFPUC to operate the SFPUC water system in a manner that protects and restores native fish and wildlife downstream of SFPUC dams and water diversions, within SFPUC reservoirs, and on SFPUC watershed lands." So states the SFPUC's Water Enterprise Environmental Stewardship Policy (WEESP) adopted in 2006.

02

The Policy establishes environmental stewardship as a fundamental component of the Water Enterprise mission, and was adopted with the explicit intent that implementation of the policy would occur through: "Integration of the policy into the Water System Improvement Program and individual infrastructure projects (i.e., repair and replacement programs)," and by ensuring "that the policy guides development of project descriptions, alternatives and mitigation for all SFPUC projects during the environmental review process under CEQA and/or NEPA."

The WEESP is a foundational policy for the WSIP, but is missing from Table 2.3 (DPEIR, Vol. 1, p. 2-46). Because the proposed program would have significant impacts on downstream native fish and wildlife populations, the SFPUC has failed to "integrate" the Environmental Stewardship Policy into the WSIP.

02 cont.

I. INADEQUATE STUDIES / LACK OF BASELINE DATA

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There are a number of areas in which the DPEIR fails to produce adequate baseline data. It is difficult, if not impossible, to predict the impacts of diverting additional water from the Tuolumne River without adequate information.

04

The DPEIR attempts to assess the impacts to biological resources of WSIP-related flow changes with little or no reference to current biological conditions. This lack of knowledge regarding current biological conditions creates two problems: (1) there is no biological baseline against which to compare conditions under the WSIP, and (2) there is no indication that current conditions are satisfactory with respect to a desired condition or legal requirements. As a result, there is no way to interpret the meaning of the DPEIR's claims that biological conditions under WSIP will be acceptable because WSIP will produce "small" or "infrequent" or "rare" changes from current conditions.

05

This section of our comments addresses the lack of baseline data in the following areas:

a) A 1992 Instream Flow Study Was Never Completed
b) Lack of Data on the Decline of Chinook Salmon
c) Lack of Data on Steelhead Trout
d) Lack of Baseline Data for the Upper Tuolumne
e) Lack of Data on Impacts to Streamside Meadows
f) Lack of Data on the Potential Impacts of Climate Change
g) Lack of Data on Groundwater Resources

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a) <u>A 1992 Instream Flow Study Was Never Completed</u>

Pursuant to California State Fish and Game Code § 5937[1], the SFPUC is obligated to maintain healthy populations of fish below its dams. Before assuming that

[1] Fish & Game C. § 5937 states, in pertinent part: "The owner of any **dam** shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over,

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meeting minimum flow standards is adequate to maintain healthy fish and wildlife populations in the future, the SFPUC must show that its minimum flow standards are currently maintaining healthy fish and wildlife populations. The baseline documentation, particularly for the reach below O'Shaughnessy Dam, fails to demonstrate this due to the lack of recent studies.

The DPEIR references the rough draft of a report entitled "Instream Flow Requirements for Rainbow and Brown Trout in the Tuolumne River Between O'Shaughnessy Dam and Early Intake." This report was never completed, and the draft is more than 15 years old, however, it states:

> "In 1988, the U.S. Fish and Wildlife Service's Instream Flow Incremental Methodology (IFIM) was applied to the Tuolumne River below Hetch Hetchy Reservoir...An annual fishery allocation of between 59,207 acre-feet and 75,363 acre-feet is recommended, based on the findings of the instream flow study."[2]

06 cont.

The study concluded that minimum flow releases below O'Shaughnessy needed to be increased (see "Attachment B"), however, this recommendation was never adopted.

In a letter submitted during the scoping phase for the DPEIR, the State Water Resources Control Board stated, "it appears that the DEIR should include sufficient information for the State Water Board to use the document for water right permitting purposes. However, the document still fails to evaluate the availability of unappropriated water after taking into consideration prior rights and the water required to maintain public trust resources. Division staff recommends that any evaluation utilize a cumulative flow impairment methodology, such as the assessment method described in the *Guidelines for Maintaining Instream Flows to Protect Fisheries Resources Downstream of Water Diversions in Mid-California Coastal Streams (Draft)* prepared by NOAA Fisheries Service and the Department of Fish and Game and dated June 17, 2002."

07

The impact evaluation in the DPEIR does not employ a cumulative flow impairment methodology and falls short of answering the question of whether there is sufficient water available to maintain public trust resources.

If recent fish population surveys are lacking for the upper watershed, how was the SFPUC able to determine if public trust resources are being maintained currently, let alone with the WSIP?

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around or through the **dam**, to keep in good condition any **fish** that may be planted or exist below the **dam**."

[2] Michael Aceituno for the U.S. Fish and Wildlife Service. 1992. "Instream Flow Requirements for Rainbow and Brown Trout in the Tuolumne River Between O'Shaughnessy Dam and Early Intake"

b) Lack of Data on the Decline of Chinook Salmon

Historically, the Tuolumne River supported at least two distinct runs of Chinook salmon – spring and fall, and populations in this river were believed to be "very large" (Yoshiyama et al. 2001).[3] By the early 1950s, the Tuolumne's spring-run Chinook were extirpated. The fall-run Chinook salmon population has declined from a high of approximately 130,000 in 1944 to just a few hundred individuals in recent years (see "Attachment C").

The 1996 Federal Energy Regulatory Commission (FERC) Order Amending the License for the New Don Pedro Project, which was based on the 1995 Settlement Agreement, to which the San Francisco Public Utilities Commission was a signatory, required a restoration program for Chinook salmon and 10-years of monitoring. Despite the implementation of four of the ten required restoration projects, the salmon population continues to decline. Additionally, monitoring has shown that flows do have a strong influence on the number of adult salmon that return to spawn. Additional withdrawals of water from the Tuolumne will only compound the problem and further harm a population of fish that is already on the verge of extirpation. The DPEIR must explain the reasons for the decline in Chinook salmon. 09

As best we can tell, TID and MID routinely divert less than the total amount of water guaranteed under their water rights. In approximately 72% of years TID/MID combined diversions are less than their water rights as reported in the DPEIR. Average diversions (861,451 afy) are approximately 44% of the computed maximum annual allotment (1,940,000 afy). Apparently, TID and MID do not routinely divert their total annual entitlement. This suggests that these two entities may have latitude to increase their usage if they feel the need to do so. As a result, the DPEIR's assumption that annual TID/MID diversions would remain constant at 867,000 afy seems unrealistic. An adequate analysis of the proposed SFPUC diversion must include an estimate of future water use by these agencies and an analysis of the cumulative impact of all future increases in diversions from the Tuolumne River. 10

c) Lack of Data on Steelhead Trout

Steelhead trout (*Oncorhynchus mykiss*) were listed as a "threatened" species under the federal Endangered Species Act in 1998, and retain that protected status today. Yet, the DPEIR presents no analysis of current population size for steelhead (or the alternate life-history form, commonly called "rainbow trout"). Instead, the DPEIR relies on a FERC report from 1995 that concludes that steelhead do not occur in the Tuolumne or occur there only rarely. In fact, more recent reports have concluded that steelhead spawning does occur on the 11

[3] R.M. Yoshiyama, E.R. Gerstung, F.W. Fisher, and P.B. Moyle. 2001. "Historical and Present Distribution of Chinook Salmon in the Central Valley Drainage of California" *in* "Contributions to the biology of Central Valley Salmonids," Volume 1, *ed.* Randall Brown. California Dept. of Fish and Game. Fish Bulletin 179.

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Tuolumne River; for example, McEwan (2001)[4] (see "Attachment D") provides a detailed account of reports of this species on the Tuolumne in recent years. An adequate draft PEIR must include current information about steelhead presence and population. (*See* CEQA Guidelines § 15125(a))[5] 11 cont.

Because the DPEIR references no monitoring program that would accurately assess the status of *O. mykiss* in the Tuolumne River, there is no way to evaluate the numerical response of this species to proposed flow changes. Perhaps more importantly, because SFPUC and other users of the Tuolumne hydrosystem have not yet established a monitoring program for *O. mykiss*, there is no way to tell whether *current* operating practices for the Tuolumne River hydrosystem produce acceptable conditions for this or other important fish species. The DPEIR does mention that the SFPUC is about to implement a monitoring program, but results do not exist today. It is quite possible that current operations lead to unacceptable conditions for Central Valley steelhead and that these operations violate requirements of the Endangered Species Act and other laws and regulations, such as Fish and Game Code § 5937. 12

The fact that steelhead were historically abundant in the Tuolumne (Yoshiyama et al., 2001; Lindley et al., 2006[6]) and are "rare" today emphasizes the need to operate the Tuolumne hydrosystem in ways that encourage steelhead population growth.

An adequate review and mitigation proposal for impacts to anadromous species, including *O. mykiss*, requires that the SFPUC implement a comprehensive monitoring system on the Tuolumne River below La Grange Dam for several years. Results from this monitoring are needed before impacts can be adequately assessed or mitigated, and should be in hand before flow reductions on the Tuolumne are proposed and analyzed, let alone approved or implemented. *See Sundstrom v. County of Mendocino* (1988) 202 Cal. App. 3d 296, 306-08 (studies essential to adequate CEQA review must precede project approval). 13

d) Lack of Baseline Data for the Upper Tuolumne

There has not been a comprehensive study of the upper Tuolumne River in over fifteen years. Without information on baseline conditions, the DPEIR does not adequately assess the impacts of the proposed diversion in this part of the watershed. 14

In 2006, the SFPUC initiated the first comprehensive study of the upper Tuolumne River in over 15 years. Initial findings from the first year of study

[4] Dennis R. McEwan. 2001. "Central Valley Steelhead."

[5] (Draft EIR "must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published....")

[6] Lindley, ST, RS Schick, A Agrawal, M Goslin, TE Pearson, E Mora, JJ Anderson, B May, S Greene, C Hanson, A Low, D McEwan, RB MacFarlane, C Swanson, and JG Williams. 2006. Historical population structure of Central Valley steelhead and its alteration by dams. San Francisco Estuary and Watershed Science 4(1) Art. 3.

show significant alteration of the natural hydrology, especially in dry years and "recovery" years following dry years, when the SFPUC restores reservoir levels.

The National Park Service initiated its "Tuolumne Wild and Scenic River Comprehensive Management Plan" in 2006. This plan will cover the 54 miles of designated Wild and Scenic River within Yosemite National Park, including the six-mile reach of the Tuolumne River, downstream of the Hetch Hetchy Reservoir, that passes through the Poopenaut Valley. The intended purpose of the plan is to establish the overall goals and vision for the river corridor. It will provide broad, conceptual-level management objectives that may amend the *General Management Plan for Yosemite National Park* (1980) for the river corridor. The draft environmental impact statement is scheduled for release in 2008, with the final report expected in 2009 (NPS, 2006b, 2007). (DPEIR Vol. 3, 5.2-16)

As with the DPEIR's failure to provide current information regarding the presence of steelhead, its lack of current baseline data regarding the upper Tuolumne River provides no rational basis for conclusions regarding the potential impacts of increased water diversions on the upper Tuolumne and associated resources. *See* CEQA Guidelines § 15125(a) (quoted above). With no immediate need for additional water supply or the proposed diversion, any proposal to divert additional water from the Tuolumne must be tabled until these two studies have been completed.

14 cont.

e) Lack of Data on Impacts to Streamside Meadows

The DPEIR acknowledges that it does not provide baseline data as to the "extent, species composition and condition of the existing meadow vegetation within the Poopenaut Valley." (p. 6-50.). It speculates that some (but not all) of this data may be available in the study mentioned above, but the DPEIR does not provide it. The DPEIR states in footnote 5 (page 6-50) that this ongoing study will "examine sediment transport and deposition relationships with flow." It does not mention the collection of data regarding the extent of rare or endangered plant species or impacts to wildlife.

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For these other impacts, the DPEIR states that baseline data collection surveys will be conducted in future years, with the implication that this would be well after the Final PEIR is approved. This is inadequate under CEQA. There are no assurances or approval stages to guarantee that this data collection will actually occur. CEQA requires the project agency preparing the DPEIR to provide the data that describe the existing environmental setting. Without baseline data as to the current condition of the meadows and other features of the Poopenaut Valley, it is impossible to perform an adequate analysis of the impacts of the WSIP project on native meadow vegetation, the animals that depends on the vegetation, other natural resources, and access by recreational users.

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Measure 5.3.7-2, "Controlled releases to recharge groundwater in streamside meadows and other alluvial deposits," requires the SFPUC to manage releases from O'Shaughnessy Dam during the spring to recharge groundwater in the riverside meadows in the Poopenaut Valley. It does not specify the time or

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magnitude of these releases. This measure appears to assume that flows would not need to be increased, just released in a different manner.

17 cont.

The DPEIR does not provide any supporting studies that detail how current SFPUC operations interact with the downstream meadows. In fact, the most recent ecological study of the Upper Tuolumne Watershed could only hypothesize about the relationship between flows and meadows in the riparian corridor and recommends future monitoring in order to understand this relationship.

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Without completed studies that illuminate the meadow/groundwater dynamics, the SFPUC cannot know whether substantial flow increases will be necessary in order to protect the sensitive habitats and special-status species. Without the proper studies, it is speculative to assume that any flow release pattern adjustments will mitigate the impacts on these sensitive habitats.

There are no mitigations proposed or discussed for Recreational and Visual Resources for the Poopenaut Valley. This section simply states, "none required" without explanation. As a popular destination for recreational hikers within Yosemite National Park, the DPEIR should identify possible impacts to access for recreational users due to changes in dam releases.

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f) Lack of Data on the Potential Impacts of Climate Change

The longstanding consensus in the scientific community about the reality and potential large-scale impacts of global climate change has recently been accepted as a matter of public policy. Indeed, in Section 5.7.6, the DPEIR provides a sampling of recent studies and analyses that address this potential problem. Unfortunately, the DPEIR dismisses the potential impact of climate change on WSIP impacts. The report states, "There is no clear scientific consensus on exactly how global warming will quantitatively affect California water supplies..." (DPEIR Vol. 3, 5.7.-92). But exact quantification of the effects of climate change is not a prerequisite to having to examine these effects in an environmental analysis. *See, e.g., NRDC v. Kempthorne* (U.S. Dist. Court, E.D. Cal., 5/30/07) 2007 WL 1577896 at *38 - *41 (despite uncertainties, impacts of climate change must be analyzed in evaluating impacts of water project operations on protected fish species).

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Each of the general trends listed in this section, for which the DPEIR recognizes a scientific consensus, indicate that the SFPUC's reliance on the 82-year hydrological record for this system will overestimate water availability and underestimate water demands. In other words, an analysis built solely around the historic hydrological patterns in the Tuolumne basin underestimates the potential impacts of removing more water from the Tuolumne system. The DPEIR's "thumbnail" analysis of a 1.5°C increase in temperature between 2000 and 2025 is weak. It minimally addresses only one of the likely patterns resulting from global climate change identified in the DPEIR itself:

"Reduction in the average annual snowpack due to a rise in the snowline and a shallower snowpack in the low- and medium-elevation zones such as in the Tuolumne River basin, and a shift in snowmelt runoff to earlier in the year" (DPEIR Vol. 3, 5.7.-92)

This "back of the envelope" analysis concludes that, because the shift in seasonal snowpack and snowmelt over the next 20 some odd years will be "within the current range of interannual variation in runoff..." there will be no significant impact of global warming. This conclusion ignores the fact that, during the last several decades, changes in hydrological conditions have been the primary culprit in declines of one species in the Tuolumne (steelhead) and several species in the larger Sacramento-San Joaquin system (Chinook salmon, Delta smelt, green sturgeon) that necessitated protection under the Endangered Species Act. The report should not equate "change within the historical range" with "no impact."

Other changes resulting from existing climatological trends that will persist over the next 20 years (such as decreased vegetative growth, decreasing water quality in the Delta, increased need for irrigation water, etc.) are not analyzed at all in the DPEIR. Even a simple translation of air temperature changes into water temperature changes in stretches of the Tuolumne and San Joaquin Rivers where fish species may be impacted was not attempted.

20 cont.

The DPEIR must do a much more complete analysis of global climate change impacts. Modeling an increase in temperature should encompass the following parameters:

- Increase in evaporation and transpiration from all system reservoirs.
- Increase in in-stream water temperature.
- Potential water quality impacts from increase in algae formation and other organic matter due to increased runoff and higher temperatures.
- Increase in water demand for agriculture.
- Impacts to riparian resources.
- Impacts of dwindling snowpack:
    - Smaller snowpack due to later onset of winter snow season.
    - Earlier snowmelt and peak runoff.
    - Reduction in water content of snow.
    - Increase in precipitation falling as rain rather than snow will change the operation of reservoirs, particularly Eleanor and Cherry, whose watersheds lie at lower elevations than Hetch Hetchy. This will require a change in reservoir operation which, when combined with the change in reservoir operations based on 300mgd demand, will result in a greater cumulative impact than that studied in the DPEIR.
- Reduction in hydropower generation.

Further, the increase is water usage assumed in this program is in conflict with California statute (AB 32, 2006), which mandates a 25% decrease in greenhouse gas (GHG) emissions by 2020. This statute should be cited in Chapter 4.2 (Vol. 2) and the impacts analyzed. The projected increase in gross per capita water use

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assumed in the 2030 demand figure will increase the per capita GHG emissions due to increases in energy used for water treatment, use and disposal. The impacts should be analyzed for each of the alternatives, and mitigation proposed to ensure that each is in compliance with state law.

21 cont.

The argument that "there is no consensus" regarding the magnitude of changes over the next 20+ years is specious – mathematical models are specifically designed to assess the impact of changed assumptions on system outcomes. The hydrological and temperature models utilized by the DPEIR can be run with a range of different inputs predicted by the variety of climate change studies cited in the DPEIR.

In July of 2007, the Natural Resources Defense Council published *In Hot Water: Water Management Strategies to Weather the Effects of Global Warming* (see Attachment E). This paper outlines specific measurable impacts that have been identified with temperature increase. For instance:

- Snow levels are predicted to rise 500 feet for every degree Celsius of temperature rise. (This differs from the results of the modeling included in the DPEIR.)
- The increase in evaporation and transpiration due to a 2 degree Celsius increase in temperature would reduce mean annual runoff by 4-12%. (This has not been included in the modeling in the DPEIR.)
- The risk of a 100-year flood event will grow larger in the 21st century, rising from a 1 percent chance in any given year to as high as a 6 percent chance. This means occasional extreme events will become much more common.

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Numerous studies exist that explore how climate change might affect the Sierra snowpack (see Attachment F). At a meeting of water industry leaders in September 2007, SFPUC spokesman Tony Winnicker said, "Water utilities, in many ways, are the first responders to the effects and consequences of global climate change," (see Attachment G). His acknowledgement emphasizes the need to consider the impacts of climate change in the WSIP DPEIR.

g) Lack of Data on Groundwater Resources

The document contends that impacts limited to shallow groundwater aquifers would be less than significant, since municipal and irrigation wells typically access deep aquifers. However, domestic wells typically access shallow groundwater, and a significant number of Central Valley residents rely on domestic wells for their drinking water supply. The DPEIR must review information at the county level and estimate the number of domestic wells in the vicinity of the Tuolumne River in order to make a rational determination on the significance of the impact. Because these residents have fewer alternatives than municipal water users, the impact of a loss of supply would be greater for them. This is a potentially significant, although mitigable, impact.

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While it is appropriate to use conservative values for water system planning and for CEQA analysis, the combination of a lack of historic data and the failure to consider the potential of using local stormwater supply to enhance natural

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aquifer recharge has led to an underestimate of the yield of the Westside Groundwater Basin. This, in turn, increases the impact on the Tuolumne River, as shortfalls in local supply are expected to be met by increased withdrawals from the Tuolumne. 24 cont.

The DPEIR should confirm at the beginning of Section 5.6 that both local and regional groundwater projects are subject to project-level CEQA review. 25

Figures 5.6-3 and 5.6-4 give some idea of historic pumping levels from municipal users of the aquifer, but contain only one data point (from 1965) for total withdrawals. Figure 5.6-4 is particularly baffling, as it shows only municipal usage for the period since 2000, a period when the aquifer has been closely monitored. In order to better understand past and current usage (and thus future sustainable yield) of the aquifer, it would be helpful to have these figures reflect total pumping volumes. The narrative in this section is confusing as it contains many individual pieces of data that would be more easily understood if contained in a table. 26

The DPEIR states that the amount of groundwater used for irrigation of the Golden Gate National Cemetery in San Bruno is undetermined (page 5.6-8)? Why is this so? Is this an unmetered use, and if so, what is the plan to measure this use? 27

The conjunctive use program outlined in the WSIP for the South Westside Groundwater Basin (p. 5.6-25) relies on passive recharge of the groundwater supplies and withdrawals based upon historic pumping levels. However, the available capacity of this aquifer exceeds the capacity of Crystal Springs Reservoir. The DPEIR should evaluate the potential of a proactive recharge program that uses local stormwater (for example, the same stormwater that Daly City is planning to dispose of in the ocean as part of its Vista Grande project) as a resource to increase the yield of the aquifer, reduce flooding, and meet increasingly rigorous NPDES stormwater regulations. 28

Impact 5.6-5 addresses contamination of drinking water due to groundwater pumping in the Westside Groundwater Basin. According to the analysis, current wells in this basin already exceed the drinking water standard for nitrates, an acute contaminant. Furthermore, sites for production wells have been identified as part of the basin management plan, and groundwater testing at these locations has shown similar contamination. Given this fact, a Source Water Assessment should be part of the DPEIR, and potential actions to address the contamination identified. 29

II. FLAWED MODELING/ANALYSIS

There are a number of areas in which the DPEIR uses flawed modeling or improper analysis of data to achieve its conclusions. It is difficult, if not impossible, to predict the impacts of diverting additional water from the Tuolumne River without adequate modeling and analysis. 30

12.4-95

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This section of our comments addresses problems with flawed modeling or improper analysis of data in the following areas: 30 cont.

a) The DPEIR Uses Inflated Water Demand Projections
b) Underestimated Potential for Conservation and Recycling
c) Impacts of Reduced Flows on Hydrology and Geomorphology
d) Failure to Define Thresholds of Significance
e) Aggregation of Data into Time-Steps that Lack Relevance to Biological, Hydrological, or Geomorphological Processes
f) Lack of Significance Criteria for Groundwater Impacts
g) HH/LSM Modeling Methodology
h) HH/LSM Modeling Conclusions
i) Tables Are Inconsistent with Narrative

a) The DPEIR Uses Inflated Water Demand Projections

In *A Review of the San Francisco Public Utilities Commission's Retail and Wholesale Customer Water Demand Projections* (Attachment H), the Pacific Institute states:

> "Our analysis, however, reveals that the wholesale and retail demand studies may significantly overestimate future regional demand for water and underestimate the potential for cost-effective demand management and recycled water and therefore are inadequate."

Specifically, the study found: 31

- Per-capita demand for wholesale customers is projected to increase over current (2001) per-capita demand, despite numerous studies that show that substantial cost-effective reductions in per-capita demand are possible with available technologies and policies.
- The analysis of SFPUC retail and wholesale demand does not include price-driven efficiency improvements, despite an estimated quadrupling of the price of water from the SFPUC by 2015.
- Increases in residential demand are largely due to outdoor water use. For the wholesale and retail customers, per-capita outdoor use is projected to increase, indicating that the proposed conservation does not adequately address this issue.
- Future demand for the wholesale customers is not adequately evaluated. The forecasting method is flawed in that it assumes that the current composition of commercial and industrial businesses within the non-residential sector will not change over time, and it ignores the variability in water use in both quantity and purpose among users in the non-residential sector.
- The wholesale demand study may overestimate future employment, thereby inflating 2030 non-residential demand. Recent data indicates that economic recovery in the San Francisco Bay Area has been slower than expected, and consequently, the job outlook for the region has been adjusted downward. A slower economy would reduce projected water

demand for the non-residential sector. The demand forecast should be adjusted according to the most current information available. 31 cont.

By inflating demand projections, the DPEIR attempts to justify increased water diversion from the Tuolumne River. However, the water supply may then induce growth beyond ABAG and General Plan projections. The DPEIR states, *"SFPUC Projections (Section 7.2).* Accurate demand projections are important in ensuring that future water supplies will be adequate while not surpassing the needs of planned growth." (Vol. 4, 7-5). The DPEIR goes on to state, "In some jurisdictions (Foster City, Half Moon Bay, and Burlingame), the WSIP could support more population growth than is forecasted in adopted general plans. In other jurisdictions (East Palo Alto, Foster City, San Bruno, Fremont, Newark, and Union City), the WSIP could support more employment growth than is forecasted in the adopted general plans of the respective jurisdictions." (Vol. 1, p. S-62)

The expanded water supply would accommodate a 28.8% increase in employment and a 16.8% increase in population between 2005 and 2030 in its service area. This is about 5% more jobs and 5% less population than what the EIR estimates the general plans would allow. The DPEIR cites the environmental analysis done for the general plans in its service area. None of these plans has a time horizon that extends to 2030, so it is speculative to make conclusions about consistency. It is also speculative to assume that the local jurisdictions would plan for a continuing rate of growth beyond their horizon years, as assumed in the DPEIR. So it cannot be concluded that the EIRs done for the general plans adequately cover the growth allowed by the increased water supply. The DPEIR acknowledges this fact on p. 7-35 and p. 7-69. The DPEIR finds that the water supply growth is generally consistent with ABAG projections to the year 2025, but ABAG projections are not subject to environmental review. 32

Furthermore, the DPEIR looks at the indirect effects of the growth it would accommodate on air quality, traffic, and water quality, but not on the other factors mandated by CEQA: Land Use, Population and Housing; Noise, Biological Resources, Geology, Agriculture, Public Services, Cultural Resources, and Visual Resources. 33

The DPEIR acknowledges (p. 7-70) that the environmental analysis done for the general plans, on which it relies, did not address impacts on greenhouse gas emissions and global warming. This is an issue on which the Attorney General has sued San Bernardino County for inadequacies in its general plan EIR. The DPEIR fails to address this vital issue. 34

The project-level impacts on growth also depend on the mitigation measures identified in the general plan EIRs, as noted on page 7-71 and Appendix E, Section E.6. Thus, there is insufficient mitigation for the impacts for the projects up to the year 2030. 35

12.4-96

SI_TRT-CWA-SierraC

The DPEIR also must address how infrastructure redundancy measures, such as building a second New Irvington Tunnel, would increases system capacity and growth potential. 36

b) Underestimated Potential for Conservation and Recycling

The Master Water Sales Agreement requires that wholesale customers employ best efforts to use all sources of water owned or controlled by them, including groundwater (San Francisco Public Utilities Commission (SFPUC) and Bay Area Water Users Association (BAWUA), Water Supply Master Plan, April 2000).

The SFPUC's report entitled *Investigation of Regional Water Supply Option 4* (March 2006) identified numerous conservation, recycling, and groundwater possibilities available to the wholesale customers. However, the DPEIR did not adequately analyze this alternative – it just used some information from the report with no additional analysis. The report identifies existing conservation potential to eliminate the need for 74% of the proposed diversion.

Although industry trends show a decrease in gross per capita water demand, the wholesale agencies are predicting an *increase* in gross per capita water consumption. The DPEIR should investigate this discrepancy and determine whether the 2030 demand forecast accurately reflects industry trends. 37

According to the Pacific Institute the conservation measures included by the wholesale customers of the SFPUC have several critical flaws:

- The 4% average conservation savings identified by the wholesale agencies is a significant understatement of potential savings.
- Planned conservation efforts focus almost wholly on indoor water use, even though 60% of the planned increase in demand is projected to come from outdoor water use.
- The demand estimate fails to take into account foreseeable changes in conservation standards.

The same report finds shortfalls in the analysis of the recycled water potential for the wholesale agencies, which is projected at 3% of 2030 demand. This falls well short of the recycling goals for the state of California of 1.5 million acre feet per year by 2030, or those of local agencies – 6% of total demand for the East Bay Municipal Utility District and 10% for the Santa Clara Valley Water District. Again, this document should investigate this discrepancy and determine whether the 2030 demand forecast accurately reflects industry trends. 38

While the SFPUC and the BAWSCA agencies have committed to implementing additional conservation measures and recycled water and groundwater projects as part of WSIP, the SFPUC further studied the potential and identified additional conservation, recycling, and renewable groundwater projects that could yield 28.5 mgd. The SFPUC has proposed to pursue 10 mgd of that potential; however, the remaining 18.5 mgd is not currently being considered as part of the WSIP. 39

The wholesale conservation study also identified an additional 6 mgd of savings that could be achieved through cost-effective conservation programs. However, the wholesale customers did not factor those savings into their purchase request to the SFPUC. As a result, the DPEIR is based on flawed demand and supply projections despite the availability of additional analyses. 39 cont.

The actual demand and supply projections, including the water conservation potential studies that were used in developing the demand projections evaluated in the WSIP, also were flawed. The SFPUC conducted studies to determine the water conservation potential for their retail and wholesale customers. The studies estimated how much water would be saved by 2030 through the natural replacement of fixtures due to implementation of the existing plumbing code, as well as through active conservation measures. For the study of conservation potential in the retail area of San Francisco, the SFPUC considered 48 different conservation measures and selected 38 for implementation as part of its plan. The wholesale conservation study initially considered a set of 75 measures, but, on average, selected fewer than 10 to include in their conservation plan. 40

All of the conservation measures selected by the wholesale agencies were deemed cost-effective based on the estimated future cost of water at $1,100/acre-foot. The wholesale customer study identified an additional 6 mgd of *cost-effective* conservation savings that could be achieved by 2030; however, the wholesale customers have chosen not to pursue those savings without providing sufficient justification or explanation. The wholesale conservation study also failed to determine the *total cost-effective* conservation potential of the region.

(Please see and comment on Attachments I and J regarding the potential for water conservation and recycling..) 41

c) Impacts of Reduced Flows on Hydrology and Geomorphology

Changes in freshwater flow stored and released from behind dams on the Tuolumne will impact local hydrology, fish resources, and geomorphic characteristics of the Tuolumne; hydrological and biotic resources affected by the WSIP may extend downstream through the San Joaquin River and, potentially, into the Sacramento-San Joaquin Delta. Changing (and in most cases, reducing) freshwater releases in the Tuolumne system may affect changes in fish populations (including, in particular, federally protected steelhead (*O. mykiss*)) by altering the volume of available spawning, incubation, rearing, and emigration habitat and by altering water quality (e.g., temperature and chemical concentrations), and geomorphological characteristics (e.g., the abundance and quality of spawning substrate or rearing habitat). The timing and magnitude of freshwater releases have an obvious impact in hydrological characteristics of the river, including water quality characteristics such as flow rate, temperature, and chemical concentrations. In addition, flow reductions (as proposed under the WSIP) may lead to changes in local and regional groundwater tables as recharge rates are altered and groundwater pumping rates increase (a potential outcome of the WSIP that receives little attention). Furthermore, changes in the magnitude and inter-annual distribution of peak flows in the Tuolumne (and 42

12.4-97

specifically, truncation of the high-magnitude end of the hydrograph) may impact geomorphic attributes of the river continuum (such as channel depth and breadth, bank and bed armoring, particle size distribution) which may, in turn, affect biological resources in the river. 42 cont.

The DPEIR incorrectly dismisses the potential for hydrological and geomorphological impacts by arguing that changes in flow will be "within the current range" of flow fluctuations. This casual dismissal does not suffice for analysis.

d) Failure to Define Thresholds of Significance

The DPEIR persistently fails to define significant impacts in measurable, quantifiable terms. Thus, it is not possible to evaluate when truly significant impacts will occur. Impact thresholds should be (a) quantifiable (b) measurable (c) defensible and (d) account for **both** the severity and frequency of an impact. A severe impact (*e.g.*, a seismic risk connected to a project) could be significant even if it is unlikely to occur frequently. By the same token, a frequent impact (*e.g.*, a modest level of soil erosion each time it rains) could be cumulatively significant even if a single occurrence would have only a small impact. 43

The DPEIR consistently confuses the frequency of an event (also poorly defined in the report) with the severity of the impact. Thus, there is a proliferation of words like "occasional," "rare," "uncommon," and "sometimes" that are intended to alleviate concern that impacts will be significant. However, if an impact is severe, it really does not matter how frequent it is. Thus, when the report concludes (on page 5.3.6-33) that the impact of flow reduction and temperature increases on emigrating salmonid juveniles is "infrequent" and thus, not significant, this assessment is incomplete because it does not incorporate the severity of the potential impact (nor does it define "infrequent"). 44

Another indication of the poorly defined impact thresholds is that the DPEIR routinely assumes that changes that are not "substantially out of the range experienced under current conditions" are insignificant. Under this logic, if mean conditions (of temperature, or flow, or sediment transport) under the WSIP approximate the low (or high) range of current variation, there has not been an impact of the WSIP. This kind of logic leads, step-by-step, to serious cumulative impacts. For example, if the WSIP is adopted, could a *subsequent* plan also claim "no significant impact" if the changes *it* produced still fit just inside the extreme end of the "range" produced by the WSIP? 45

e) Aggregation of Data into Time-Steps that Lack Relevance to Biological, Hydrological, or Geomorphological Processes

The DPEIR obscures analysis of potential impacts related to flow fluctuations on the Tuolumne River by aggregating data over coarse time-steps. For example, the hydrological modeling used throughout the report produces output on a monthly time-step. This level of resolution may be valuable for water balance equations and estimates of "average" changes in monthly flow, but it does not 46

allow insight into variations that are the components of that "average" – the weekly, daily, and even hourly conditions that actually affect biological, hydrological, and geomorphological conditions on the Tuolumne River. So, for example, on page 5.3.6-31 the DPEIR states that, under some conditions, average monthly flows will be reduced by 25% (the conditions are documented elsewhere). This means that sometimes flow reductions will be greater than 25% -- that is the nature of an average. Whereas the report "analyzes" the impact of a 25% habitat reduction, the reality is that about _ of the time under these conditions, habitat reductions will be worse than 25%. Even in months with these conditions when habitat is actually reduced exactly 25% on average, the flow reduction during any particular day or week can be greater than 25% (again, that is the nature of an average). 46 cont.

Similarly, in some places the DPEIR aggregates historic flow patterns across different "water-year types" (e.g. wet years, above normal years, etc.) and then analyzes changes anticipated under WSIP from these average, within "water-year type," conditions. As a result, the DPEIR tends to understate potential impacts to biological, hydrological, and geomorphological features of the Tuolumne River due to implementation of the WSIP. First, it should be noted that some of the average changes in flow are themselves potentially significant (see Tables 5.3.1-5 and 5.3.1-6, for examples). But, the report fails to note or discuss that this kind of change is only the "average" change expected for a given month in this "water-year type" under the WSIP. Changes in any particular year (of a given water-year type) may be greater than or less than this average. Because the DPEIR **never** reports the variance or the range around the means it presents, the reader has no way of assessing what kind of faith to place in the averages. 47

The problem with the DPEIR's reliance on monthly (or even more coarse "Water-year-type") averages is that many biological, hydrological, and geomorphological processes respond to changes in flow at a much finer time step. Fish and other organisms experience actual habitat reductions, as these occur on an hourly, daily, or weekly basis, not the average monthly habitat reductions The DPEIR presents no assessment (even a very general assessment) regarding the appropriate hydrological time-step needed to analyze different impacts. For example, biological resources may respond to flow-related temperature changes on the scale of one or a few days. On the other extreme, river geomorphology may not change at all as a result of reduced flows in one year; however, a persistent reduction in peak flows can cause significant changes in river geomorphology on broad spatial scales (e.g., channel downcutting and meander patterns), or on fine spatial scales (e.g., bank and bed armoring) that are biologically significant (*see* TNC 2006 for a review). 48

Another example of this tendency to underestimate impacts is provided on pages 5.3.4-6 of the report. The DPEIR concludes that most impacts to Tuolumne River flows below La Grange Dam will occur in relatively wet years. This is true; however, a review of table 5.3.4-4 indicates that flow reductions would have occurred in 20% (5 of 25) of dry and below normal years and in more than 10% (16 of 125) of months between October and April during those years under WSIP. 49

The DPEIR tends to ignore flow impacts during years of "below normal" and lower runoff because it finds that such impacts will be "rare" or "infrequent". But given that biological resources may already be stressed during these periods, the failure to analyze flow reductions during these periods is unacceptable. Again, we wish to emphasize that biological resources are not living in the "average" low flow condition, they are experiencing the conditions that actually occur for variable lengths of time; thus, the average "below normal" year condition is not a relevant metric for assessing impacts. 49 cont.

The meaning and proper application of averages should also be included in a discussion of model resolution, as the two are intrinsically linked. Monthly averages represent the peak of a normal distribution (and many hydrologic variables are not normally distributed) and do not incorporate information about the true distribution or its range (i.e., the tails of a distribution). As a result, variability seen in daily and or weekly flows cannot be directly assessed using monthly averages. Therefore, any conclusion about the potential effects of the WSIP on daily and weekly flows is only an assumption based upon somewhat subjective measures. 50

f) Lack of Significance Criteria for Groundwater Impacts

The City and County of San Francisco has not formally adopted significance criteria for impacts related to groundwater, but generally considers that implementation of the WSIP would have a significant groundwater impact if it were to:

- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted).
- Substantially impair a water body's ability to support beneficial uses designated by the State Water Resources Control Board or Regional Water Quality Control Board.
- Otherwise substantially degrade water quality. 51

This document should set measurable criteria for groundwater impacts. As written, this is a subjective rather than scientific assessment.

g) HH/LSM Modeling Methodology

The HH/LSM is, in essence, a reservoir and system routing model that uses an 82-year historical period of record for analysis of the effects of the WSIP. Several issues regarding model development and error estimation persist. Modeling scenarios developed with the HH/LSM consist of two types: a base-line scenario meant to simulate hydrologic conditions of the system over the period of record using 2005 (base-line year) conditions, and alternative scenarios including the WSIP scenario and Variants 1, 2, and 3. Results from both the base-line model

and each variant including the WSIP are then compared. Several issues about the modeling approach are apparent:

- *Modeling Error:* Models of any sort inherently contain error. The amount of model error depends on the accuracy of the data inputs, potential error in the underlying model calculations, and the factors that are incorporated or not incorporated into the model. Model error can potentially be significant. Most error is reduced through model calibration (comparing outputs with actual values and altering the model logic or assumptions until differences are minimized). Although this is standard practice, no mention of calibration and error reduction efforts and final error rates for the HH/LSM were discussed in the DPEIR. The accuracy of projections generated by the HH/LSM under the WSIP scenario is impossible to evaluate because there is no indication of how closely model projections reflect actual outcomes. Furthermore, because the base-line model contains inherent, unknown error and the scenarios contain inherent, unquantified error, any comparison of the scenarios with the baseline (or among scenarios) contains inherent, unquantified error. We found no discussion of analytical or model error in the DPEIR.

  Model error produces uncertainty around model outputs (estimates). For example, if model error is ±5% for a given output, then the model output (which represents the "mean expected" output given the inputs) is only accurate to within ±5%. For instance, during some extremely dry periods in some years, the HH/LSM model predicts that flows below O'Shaughnessy Dam may be reduced up to 90% of average flow. However, if the error rate is 5%, then the model is really saying that average flows reductions expected in this area are between 85% and 95%.

  Another potential difficulty with conducting a comparative analysis between modeled scenarios is possible compounding of model error. For example, if both the base-line model and the Variant model (in this case the WSIP scenario) have an inherent error of 5% (for illustration purposes), then the potential error of any analytical comparison could be up to 10%.

  Model error (uncertainty regarding the mean estimate) increases as one uses inputs that are at the extremes of the range of data used to create relationships in the model. For analysis of the WSIP (and other variants), the HH/LSM model was applied to conditions that are towards the extremes of those that were used to construct the fundamental relations in the model. In other words, the mathematical relationships used to construct the model become more tenuous as the input conditions deviate further from the norm. Further complications with model errors arise when attempting to translate averaged monthly-modeled results to finer time scales, as these typically have a much greater variance.

  We could not find a discussion of model error rates anywhere in the DPEIR; certainly, they were not incorporated into the analysis conducted

52

12.4-99

in and conclusions reached by the report. This could have significant implications for possible impacts of the WSIP, yet these implications are not mentioned in the DPEIR. This is particularly important because some conditions modeled under the WSIP scenario represent extremes that are not seen in current conditions and are thus not reflected in the 82-year record.

52 cont.

h) HH/LSM Modeling Conclusions

Conclusions presented in the DPEIR about the possible effects of WSIP implementation based upon the assumptions put forth in the HH/LSM and within the context of the report reflect monthly means; they are limited when evaluating effects at shorter time-scales and they do not incorporate deviations from mean projections (i.e. error). Potential effects resulting from changes in the distribution of daily, weekly, and peak flows are given only minor consideration. Of these, peak flows are the most difficult to predict, and the analysis of WSIP impacts on the occurrence, magnitude, and duration of peak flows is simplistic. Since peak flows are critical for channel geomorphology and stream ecology, this is a significant issue. In short, because of the limitations of the HH/LSM model, the DPEIR does not fully describe the effect of WSIP implementation on peak, daily, or weekly flows; this limits the actual analytical usefulness of the HH/LSM outputs for analysis in the DPEIR.

53

i) Tables Are Inconsistent with Narrative

On numerous occasions, the tables presenting data are inconsistent with the narratives that refer to them. For instance, on page 9-88, Section 9.3.1, the Comparison of Alternatives (subsection Tuolumne River Watershed) says, "Table 9-7 summarizes the potentially significant impacts on the Tuolumne River…from each of the alternatives." Then on page 89 the DPEIR states, "Four alternatives…would **avoid** this significant impact associated with the delay in spring releases." Yet, Table 9-7 does not agree with this narrative. It states that the alternatives will have "similar impact" to the proposed project, or the "same as proposed project."

54

III. FAULTY ASSUMPTIONS

There are a number of areas in which the DPEIR bases its conclusions on faulty assumptions. This section of our comments identifies erroneous conclusions in the following areas:

a) Questions about SFPUC Water Rights
b) MID/TID Transfer Agreements Are Not Certain
c) The 1997 FERC Settlement Agreement Will Affect Future Transfers
d) Effects on Flow along the San Joaquin River and the Sacramento-San Joaquin Delta
e) HH/LSM Primary Assumptions
f) The Historic Record of Calculated Runoff that Supplies the Hetch Hetchy System Does Not Accurately Reflect Future Conditions

55

g) Alternatives Analysis Improperly Quantifies the Demand, Yield and Drought Impact of All Alternatives

55 cont.

a) Questions about SFPUC Water Rights

The discussion of Tuolumne River water rights in the DPEIR fails to address the issues raised by the State Water Resources Control Board in its letter of October 3, 2005, which states:

> "For the City and County of San Francisco, the water rights were quantified in *Meridian Limited v. City and County of San Francisco et al.* It appears that the pre-1914 appropriative right was solely for storage of water. The project listed in the NOP is a direct diversion project. Any new diversions must be accomplished pursuant to an appropriative right obtained from the State Water Resources Control Board. . . In reviewing the Meridian case, Division staff notes that most of the water appropriated from the Tuolumne River for the Hetch Hetchy project was used for hydroelectric power generation. Hydropower generation is considered a non-consumptive use right because the water is returned to the stream system. In general, a non-consumptive water right cannot be used as the basis for new, consumptive uses of water."

56

The Raker Act clearly limits the amount of water that San Francisco can divert from the Tuolumne River. In addition to requiring San Francisco to release water to meet the senior water rights of Turlock Irrigation District and Modesto Irrigation District, the Act further limits Tuolumne diversions because San Francisco may not divert more water than is "necessary" from the Tuolumne.

Raker Act Section 9(h) provides:

> "That the said grantee shall not divert beyond the limits of the San Joaquin Valley any more of the waters from the Tuolumne watershed than, together with the waters which it now has or may hereafter acquire, shall be necessary for its beneficial use for domestic and other municipal purposes."

Since San Francisco must fulfill its "beneficial use" water needs with "waters which it now has or may hereafter acquire," Tuolumne River water must be a source of last resort for San Francisco. San Francisco has interpreted this section of the Raker Act as follows: "section 9(h) of the Raker Act requires San Francisco to make full use of its local sources of water."

The Notice of Preparation interpreted this requirement in the Raker Act in an overly narrow way:

> "under the WSIP, the regional water system would continue to comply with the conditions of all applicable institutional and planning requirements, including: . . . maximizing use of water from local watersheds."

57

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The Raker Act does not define the "water which it now has" as "water from local watersheds." It is true that San Francisco "now has" water rights to water from Bay Area creeks including Alameda, Arroyo Hondo, Calaveras, San Antonio, San Mateo, Pilarcitos, and San Andreas. However, it also is true that San Francisco "now has" waters that it is discharging from waste water treatment plants that could be recycled, and waters recoverable through water use efficiency and water conservation measures.

The Raker Act requires San Francisco to use the "waters which it now has" (normally described by the SFPUC as its "local sources of water") to the full extent possible. Then, and only then, may San Francisco divert water from the Tuolumne River. "Local sources of water" should include local creeks, groundwater, conservation, recycling, and desalination. San Francisco must maximize water from these sources before it proposes to increase the amount of water it diverts from the Tuolumne River.

57

b) MID/TID Transfer Agreements Are Not Certain

As stated in the DPEIR, the proposed MID/TID water transfer "involves some uncertainty because its implementation depends on the SFPUC negotiating and reaching agreement with MID/TID and possible other water agencies." (p. 6-48) The measure would require that MID/TID conserve water or meet their needs with an alternative water source so that releases from Don Pedro Reservoir remain unchanged.

The DPEIR does not present any evidence that the Districts are interested in pursuing any such agreement with the SFPUC nor that the SFPUC and the Districts are even in discussions regarding such an arrangement. In fact, in scoping comments submitted to the Planning Department in October 2005, the Turlock Irrigation District indicated that the SFPUC has not approached the District regarding any water transfer arrangements. It stated:

> "As a long-time partner on the river with the City and County of San Francisco, the District is disappointed that CCSF staff did not discuss with the District the proposed water transfers from the District before the proposal was publicly announced...It is imperative that the WSIP define the characteristics of 'additional water supply via district transfers.' As the District has seen no official proposal and as such, has neither discussed nor accepted any terms for a transfer, the EIR must address this issue."

58

The DPEIR states that if the SFPUC is unable to secure a water transfer arrangement with MID and TID, then it will conduct one of two fishery habitat restoration projects (5.3.6-4b, Fishery Habitat Enhancement): spawning gravel enhancement or removal of a former gravel quarry pit from the river corridor. These proposed mitigation measures are problematic for several reasons.

First, the gravel augmentation project proposed in 5.3.6-4b would enhance the spawning phase of the salmon life-cycle, while changes in flow would primarily

59

harm out-migration and rearing of juveniles. In other words, the proposed mitigation measure is mitigating for a different problem that what is created by reduced flows. Although gravel augmentation is probably needed as a result of spawning gravel degradation due to dam operations, the impact and the mitigation are poorly matched in this case. 59 cont.

Secondly, the alternative mitigation proposed in 5.3.6-4b (removal of a former gravel quarry) is of dubious benefit. The Turlock Irrigation District, as part of its obligation under the 1996 FERC Order, has completed a pond removal project at the "SRP-9" site. The project was intended to reduce predator habitat, however, the results do not show any success in achieving this goal. In fact, the District's assessment was that the project "was not successful in reducing largemouth bass linear density during the low flow years that have occurred since project construction" and "the project appears to have increased smallmouth bass abundance at the site relative to pre-project conditions at other SRP sites" (2005 Summary Report, p 3-48). 60

Thirdly, these projects do not consider impacts specifically to steelhead trout. Steelhead have a different life cycle and different habitat requirements than Chinook salmon. Steelhead are listed as "Threatened" under the Endangered Species Act, and as such, it is illegal to harm these fish in anyway.

In the Tuolumne, steelhead typically up-migrate in the winter and spring and summer-over in the river. As such, these fish require cool waters, below 65°F, preferably below 60°F. Further withdrawals would only serve to exacerbate the high temperatures already experienced in the river, particularly in the summer when air temperatures along the river frequently climb above 100°F. None of the projects proposed by the SFPUC would mitigate the impacts to steelhead. 61

There is no evidence that implementation of one of these fishery habitat enhancement projects would be an effective measure for mitigating the impacts of reducing flows in the Tuolumne River below La Grange Dam. 62

Finally, the DPEIR fails to identify the impacts on the Tuolumne River between the Hetch Hetchy Reservoir and the Don Pedro Reservoir if the MID/TID transfers were approved. 63

c) <u>The 1996 FERC Settlement Agreement Will Affect Future Transfers</u>

"TID and MID own and operate Don Pedro Reservoir (built under the New Don Pedro Project) and are solely responsible as project licensees for meeting the Federal Energy Regulatory Commission (FERC) requirements for fishery releases. Nevertheless, under the Fourth Agreement with TID and MID (see Chapter 2, Section 2.5.3), the SFPUC may be required to provide water for these FERC-imposed fishery releases from Don Pedro Reservoir if TID and MID demonstrate that their water entitlements are being adversely affected by providing the flows. 64

The SFPUC, TID, and MID entered into two funding agreements to implement

the FERC Settlement Agreement; the SFPUC now pays TID and MID to provide all of the additional water required under the 1996 FERC order amending the requirements for fishery releases from Don Pedro Reservoir. The current FERC license expires in 2016, at which time TID and MID will be required to apply for a new license for hydroelectric operations on Don Pedro Reservoir. As part of the license renewal, FERC may modify the fishery release requirements. Although the fishery release requirements that FERC may impose in 2016 cannot be anticipated at this time, the SFPUC assumes, for purposes of the WSIP, that it will be able to continue its current agreement with TID and MID to pay them to provide all of the additional water, if any, required for the fishery releases." (Vol. 1, 3-43) 64 cont.

The SFPUC cannot assume future FERC flows will stay constant. In fact, they are likely to increase due to dwindling salmon numbers and the listing of steelhead. As noted, the SFPUC/CCSF may be responsible for increasing fishery releases as part of re-licensing in 2016. However, the CCSF also make the false assumption that the funding agreement with MID and TID will continue. The funding agreements between MID, TID and the CCSF do not guarantee that MID and TID will cover all fishery releases under the FERC Settlement of 1995.

d) <u>Effects on Flow along the San Joaquin River and the Sacramento-San Joaquin Delta</u>

Under Impact 5.3.1-5, the DPEIR acknowledges that "following protracted droughts, reductions in San Joaquin River flow attributable to the WSIP would be sufficient to cause flow in the river at Vernalis to fall below the objective. Under these circumstances the USBR would be expected to increase releases from New Melones on the Stanislaus River to meet the flow objectives at Vernalis."

It goes on to read, "following protracted droughts, reductions in Delta inflow attributable to the WSIP would be sufficient to cause Delta outflow to fall below the objective. Under these circumstances the USBR and DWR (operators of CVP and SWP) would be expected to decrease diversions from the Delta so that Delta outflow objectives are met." 65

The conclusion of a less than significant impact is based on San Joaquin and Delta flow objectives being met by other agencies, which is outside of the control of the SFPUC. Under CEQA, any mitigation measures relied upon to reduce otherwise significant impacts to a level of insignificance "must be fully enforceable through permit conditions, agreements, or other legally binding instruments." (CEQA Guidelines § 15126.4(a)(2)). The DPEIR's assumption that USBR and DWR will make up for flows lost to increased Tuolumne River diversions is not a mitigation measure enforceable at all by SFPUC, let alone "fully enforceable." Moreover, in light of the frequent failure of USBR and DWR to provide sufficient flows for fish and water quality protection in the Delta in the past, this assumption is not well-founded.

In 1958 the CCSF applied to the Department of Interior for a change of location for their aqueduct right-of-way as provided under Section 2 of the Raker Act. In approving the change, DOI also required a revised schedule and study for minimum water releases from O'Shaughnessy Dam. In March 1987 the CCSF and DOI signed an agreement stating that the CCSF would fund **four-year** fish and habitat studies that would determine if flows in the upper Tuolumne should be increased. The CCSF further agreed to adjust minimum releases as set forth in said Agreement and a previous 1985 Flow Agreement. The CCSF contracted with the United States Fish and Wildlife Service (USFWS) to conduct the study.

On July 20, 1992 the USFWS completed a draft of this study and called for increased flows. However, a revised and increased flow schedule was never adopted or implemented by the SFPUC or the CCSF, and the USFWS study was never completed. Given these contractual agreements, the CCSF is legally obligated to complete the study and augment flows from O'Shaughnessy Dam. Complying with these agreements may be compatible with increasing diversions by 25 mgd at the same time. However, the DPEIR makes no effort to analyze the impact that these required flow increases would have on the CCSF's plan to increase diversions from the Tuolumne by 25 mgd, and seems to assume these agreements would have no impact. 66

Additionally, the recent ruling by Judge Wanger to protect the endangered Delta smelt will impact both inflows and pumping from the Delta. That means that loss of Tuolumne River inflows will have a significant impact, and that additional releases from south of the Delta storage in the Central Valley Project (CVP) and State Water Project (SWP) will be not be available for this purpose. The DPEIR must also address the impacts of the Delta pumps rulings on water releases from La Grange and New Melones Dams. 67

e) HH/LSM Primary Assumptions

The conclusions presented in the DPEIR regarding the potential impact of WSIP implementation on all components of the regional water supply system, especially the Tuolumne River, rely upon some of the assumptions maintained in the HH/LSM model and application of these assumptions to analysis of HH/LSM modeling results. Of the assumptions presented in the HH/LSM model, several are conditional and dependent upon the resolution of ongoing negotiations; other assumptions suppose unchanging conditions between 2005 base-line conditions and the target 2030 WSIP conditions. Among the questionable assumptions are: 68

- *The SFPUC will execute a water transfer agreement with both TID and MID that makes available to the SFPUC an additional 23 million gallons/day from Hetch Hetchy Reservoir (5.1-5, 5.3.6-33, Appendix H1-5).* This condition is contingent upon an agreement with TID and MID to allow the SFPUC to withdraw more water from its water bank account in Don Pedro Reservoir than is currently being withdrawn. The specifics of how the SFPUC proposes to repay this water to TID and MID have not been discussed, most likely because negotiations are ongoing and an

agreement has not been reached. However, since inflow into Don Pedro Reservoir will be reduced during most years, as determined by the HH/LSM and reported in the DPEIR, TID and MID will be required to capture more inflow in order to make up for this deficit. 68 cont.

- *TID and MID diversions from La Grange will be the same as those that were diverted during the base year (2005) (Appendix H2-1 Page 5).* The basis for this assumption is not discussed in the DPEIR. It is highly unlikely that TID and MID water requirements in the 2030 target year will be the same as they are now. The DPEIR assumes that current TID/MID combined diversions are ~ 867,000 acre-feet/year (App H, Tables on pages 48 and 49). However, in Vol. 1 section 2.3 (p. 37), the DPEIR implies that TID/MID's total water rights exceed 1.9 million acre-feet (when natural river flows at La Grange can support that volume of diversion). Thus, based on information in the DPEIR, it appears that TID/MID sometime divert less than their water right would allow. The assumption that they will not increase water diversions over the project period is questionable at best. MID's 2005 Urban Water Management Plan estimates an increase in demand of 70% by the year 2030. Additionally, the DPEIR's section on global climate change (Vol. 3, 5.7.6) acknowledges that with regional increases in temperature, agricultural water needs are anticipated to increase as well. 69

f) The Historic Record of Calculated Runoff that Supplies the Hetch Hetchy System Does Not Accurately Reflect Future Conditions

The DPEIR assumes, without any critical analysis, that hydrological and meteorological conditions in the next 82 years will be identical to those in the preceding 82 years. The DPEIR includes no analysis of the probability or return period of meteorological events. The only discussion of the probability of an event is that a 30% chance exists that the region will experience a drought greater than or equal to the 1987 – 1993 drought within the next 82 years (Appendix H, section 1.3.1, p. 13). This statement refers to studies that are not cited. Although this assessment may reflect the historic record, trends in hydrological and meteorological conditions that are already being observed (*see above* "Inadequacy or Lack of Monitoring Baseline") are not accounted for in the hydrological analysis, despite the fact that the DPEIR acknowledges the scientific consensus that global climate change has already occurred and will continue to impact this region in the immediate future. 70

The blind reliance on the 82-year hydrological record is a serious flaw in the DPEIR as global climate change can affect nearly every input into and assumption of the HH/LSM model and, thus, the outputs that define the impacts of the WSIP scenario (and other alternatives). An increase in the frequency of droughts of any magnitude has the potential to significantly impact system operation. If the return period for such conditions decreases (i.e., droughts occur with greater frequency), then several droughts may be experienced sequentially. According to the HH/LSM analysis, the hydrosystem is most vulnerable during less-than-normal and dry years (during extremely dry years

alternate sources and rationing are maximized) and wet years following a drought period. This will increase the magnitude and duration of stress on the entire system. For further discussion, see the section on climate change and global warming above.

The failure to incorporate observed or predicted meteorological trends into the hydrological projections is particularly significant because error estimates (model error) are already missing from the results presented in the DPEIR and the report does not indicate that the models were run under alternative input assumptions that would reflect potential variability in environmental conditions. 70 cont.

g) Alternatives Analysis Improperly Quantifies the Demand, Yield and Drought Impact of All Alternatives

Table 9-4 offers a description of the CEQA alternatives. Although each alternative includes a different estimate for conservation and recycling, the same 300 mgd figure for 2030 system demand is used in all except the "No Increased Purchase Request" alternative. Since water conservation and recycling *reduce* that demand figure, it should be changed to reflect the revised demand for each of the alternatives. For example, the no supplemental water alternative identifies 29 mgd in conservation/recycling/groundwater. The yield of the conservation and recycling projects should be subtracted from the 300 mgd 2030 demand figure to determine the actual demand under that scenario. 71

While it is appropriate to maintain a number that reflects conserved water in the service area, including that number in the calculation of actual water use improperly inflates customer demand and skews modeling of drought year shortages. Similarly, it is unclear how the drought model is changed to reflect the varying supply alternatives. The "Level of Service" discussion in Chapter 8 for the program variants provides an analysis of the impact of a change in demand on the design drought.

The discussion of "demand hardening" on page 9-54 is vague and unquantified, and is not accompanied by a discussion of the reduced number of dry years due to the reduction in demand, or by a discussion of the modeling results. The fact that 60% of the increased 2030 water demand is for outdoor use would seem to "soften" the drought shortage figure, as outdoor conservation is the most easily enforced and has fewer economic impacts. 72

The no additional diversions alternative assumes that there will be no conjunctive use program for the Westside Basin aquifer. While the scope of the program may be reduced due to limitations on Tuolumne River withdrawal, aquifer replenishment will still occur due to replacement of groundwater with reclaimed water for irrigation, potential for stormwater recharge, and reduced pumping due to conservation. 73

IV. ADDITIONAL COMMENTS

a) Does the WSIP Comply with NEPA?

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Chapter 5 of the DPEIR acknowledges that changes in the water releases from the Hetch Hetchy reservoir due to the WSIP will impact the Poopenaut Valley, a popular hiking destination and fragile wetlands ecosystem inside of Yosemite National Park. The DPEIR acknowledges impacts to the physical landscape of the Valley, including streamside alluvial deposits and meadow resources. Given that the WSIP will have an impact on a national park, is any federal approval necessary, and if so, what NEPA compliance is the relevant agency undertaking? 74

b) Inadequate Public Noticing of the San Francisco Hearing

The public was not adequately notified of the DPEIR hearing held on September 20, 2007 in front of the San Francisco Planning Commission, which is the body tasked with determining the adequacy of the document. We believe at least one additional hearing before the San Francisco Planning Commission must be held before the DPEIR is approved.

The meeting was noticed in the San Francisco Examiner on September 10, only 10 days before the hearing. Given the size of the DPEIR (more than 3,000-pages), this was not a reasonable amount of time to expect the general public to review the document and prepare informed comments.

Public notice was not given as to the time of the meeting until September 17, just three days before the meeting. The start time was not published in a newspaper, and the WSIP DPEIR item was not taken up until more than five hours after the meeting began.

The meeting began at 1:30 pm. The starting time for the WSIP item was identified as 5 pm, again, only three days before the hearing. The actual time the item was taken up was 7pm. Several dozen members of the public arrived at the hearing at 1:30 pm. It is not reasonable to expect the public to wait for five hours to testify. 75

At the hearing, the San Francisco Planning Commission was not given a presentation or briefing on the WSIP, and several Commissioners complained about the lack of information.

Planning Commissioner Christina Olague chided the SFPUC, saying it was "irresponsible" for the commission to not have been given a presentation on the project. The Commissioner requested that one or two additional public hearings be held for the WSIP DPEIR.

The result was that members of the public were giving comments to the DPEIR decision-making body without the benefit of having the governing body being properly prepared, thus giving comments in a vacuum.

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Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

3	5.1.4	12	Table 5.1-1 Modeling Assumptions Used In The CEQA Analysis Displays a list of modeling assumptions made in the development of the HH/LSM model run for the CEQA analysis.	This table includes some of the primary assumptions used in the CEQA analysis. Not included in this list are the assumption that TID/MID diversions and entitlements will remain static (as indicated in Appendix H), and that the SFPUC will be able to negotiate an agreement with TID and MID for the transfer of 27,000 acre-feet per year. These are rather large assumptions and must be identified as the entire analysis rests on their validity.	76
3	5.1.4	12	Table 5.1-1 Modeling Assumptions Used In The CEQA Analysis Displays a list of modeling assumptions made in the development of the HH/LSM model run for the CEQA analysis.	An even larger assumption, that the entire hydrological modelling process relies on, is that means, variances, and patterns in the 82-year hydrological record for this system (a) were constant (i.e. temporal trends were not directional) and (b) will be representative of the project period (2007-2030). Neither of these assumptions is accurate as patterns in regional climate (e.g. temperatures, drought frequency, etc.) appear to have been directional through the 82-year hydrological record and that directional change is predicted to continue through the project period (*see, for example, DPEIR Sect 5.7.6 "Climate change and gobal warming"*). As a result, the 82-year hydrological record, upon which these analyses are based, may offer only a weak approximation of conditions anticipated through the project period. Specifically, the hydrological record of the past 82 years is likely to overestimate the supply of water and underestimate the demand for that water (particularly by agricultural users under business-as-usual assumptions).	77
			Table 5.1-1 Modeling Assumptions Used In The CEQA Analysis Displays a list of modeling assumptions made in the development of the HH/LSM model run for the CEQA analysis.	The temporal availability of that water is likely to change. As a result, analyses of the WSIP based on this record are likely to underestimate the potential hydrological impacts of the program and the biotic and geomorphological impacts that are related to hydrological conditions.	78

1

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Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

3	5.1.4	14	Paragraph two under the heading Model Limitations describes model limitations as they apply to the Pilarcitos Reservoir	What are the specific limitations/deficiencies in the HH/LSM model that preclude its application to the Pilarcitos watershed? How do these model limitations impact analyses of other hydrosystem components and/or the hydrosystem overall? Again, very little metadata regarding the accuracy and limitations of the HH/LSM models is provided in the text. As a result, it is impossible for the reader to evaluate whether the model is being applied appropriately or whether model outputs are being interpreted with enough caution.	79
3	5.1.4	15	Table 5.1-2 describes model features and their respective outflow parameters.	Model outputs are reported in acre-feet while corresponding charts shown in previous chapters and sections report these values in either elevation or cubic-feet per second. Units of measure should be consistent throughout the report to improve readability and ease of analysis.	80
3	5.1.4	15	Table 5.1-2 describes model features and their respective outflow parameters.	Some system outputs are presented in "acre-feet" whereas others are presented in "million gallons". This makes analysis and comparisons difficult. Units of measure should be consistent throughout the report to improve readability and ease of analysis.	81
3	5.1.4	17	Paragraphs one and two describe the possible implications of the monthly time interval used in the DPEIR analysis. "…in some cases, the modeling limitation of only providing information at a monthly time interval required additional considerations … when simulating intermittent phenomena such as infrequent spills or releases from reservoirs that may last only a few days"	We agree that the modelling river flows at a monthly time-step is a "limitation" of the WSIP analyses because it does not account for "short-term variations" in flow volume or quality below dams in this hydrosystem. As noted above, the impact of these "short-term variations" (i.e. those on a daily or weekly time scale) may be significant and are worthy of consideration and documentation. Unfortunately, although this passage indicates that "operator knowledge" was used to "refine" analysis of the WSIP, these "refinements" are not available to the reader and thus the true impact of the WSIP on hydrological, biological, and geomorphological features cannot be determined.	82
3	5.1.4	17	Paragraph four describes the possible implications of the monthly time interval used in the PEIR analysis. "HH/LSM results were refined or teired to provide additional insight into the effects of the WSIP on stream flow for time periods of less than a month"	How were monthly results for Hetch-Hetchy releases "refined or tiered to provide additional insight into the effects of WSIP on stream flow for time periods of less than a month" ? As noted elsewhere, the inability of model results produced at a monthly time-step to capture the ecological, hydrological, and geomorphological implications of WSIP is a major concern. Thus, methods used to produce this finer grained resolution of WSIP impacts, and insights gained from it, are of great interest. Without documentation of the methods used to produce, and the insights gained from, this "refinement", the reader cannot evaluate the true impacts of the flow changes produced by the WSIP.	83
3	5.2	3	Table 5.2-1 Applicable federal, state, and local statutes and agreements	There is no mention of California State Fish and Game Code § 5937 that requires: "The owner of any dam shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around or through the dam, to keep in good condition any fish that may be planted or exist below the dam."	84

2

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Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

			What the DPEIR says (* indicates direct quote, otherwise paraphrase)	Our Comment	
3	5.3.1	12	Paragraph 2 refers to an agreement between USDOI and SFPUC requiring minimum stream flow from Hetch Hetchy reservoir. "...the agreement provides for an additional supplemental release, depending on hydrologic year type, subject to the completion of a fish habitat study and the determination of appropriate timing for the release..."	The Hetch Hetchy Fishery Investigation was initiated but never completed or adopted by the SFPUC. To our knowledge the several studies required under this agreement were never completed or adopted by the SFPUC. The failure of SFPUC to have completed and adopted the studies it agreed to indicates that the PUC does not know the condition of fish populations below O'Shaugnessy Dam or the impacts that its hydrosystem operation has had on fish populations or habitat resources. As a result, statements made about the current condition of fish populations in this stretch of river and the impacts of WSIP on fish resources in this stretch of river are highly speculative. Also, this failure to document fish populations and habitat conditions below O'Shaugnessy Dam calls in to question whether the PUC can claim to be in adherence with California Fish and Game Code § 5937 that requires maintenance of healthy fish populations below dams.	85
3	5.3.1	13	Table 5.3.1-2 "Schedule of Daily Minimum Required Releases to Support Fisheries Below O'Shaughnessy Dam"	A 1992 draft of the USFWS report "*Instream flow requirements for rainbow trout in the Tuolumne River between O'Shaugnessy Dam and Early Intake*" documented a "detailed instream flow analysis using the Service's ... IFIM" technique. This was the first of four studies agreed to by the SFPUC to document and mitigate the impacts of new facilities on and diversions from the Tuolumne, although, to our knowledge, this study has never been finalized or adopted by the PUC. Table VI on page 26 of that draft document (attached) called for substantial impacts in releases from O'Shaughnessy for the protection of fish populations over what is reported in Table 5.3.1-2 of the DPEIR. Specifically, flows during Year Type C (dry years) were 43-100% higher in the USFWS draft report than those reported under the DPEIR.	86
3	5.3.1	13	Table 5.3.1-2 "Schedule of Daily Minimum Required Releases to Support Fisheries Below O'Shaughnessy Dam"	Throughout this DPEIR, the SFPUC maintains that maintenance of mandatory minimum flows are sufficient to maintain fish populations below dams in the Tuolumne hydrosystem. No evidence is presented to support that assertion. The PUC could have monitored fish populations and fish habitat availability in the Tuolumne to assess whether hydrosystem operations impact fish populations. Indeed, one might argue that they are required to do so under State Fish and Game Code § 5937 and under agreements with USFWS and non-profit organizations such as the Tuolumne RIver Trust. Yet, there is no indication that the trout populations or important habitat variables (spawning and rearing habitat availability) have been measured in this reach since the draft USFWS report was completed in 1992. As a result, there is no way to determine the impact on fish populations of actual flows in this reach of the Tuolumne.	87

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

			What the DPEIR says (* indicates direct quote, otherwise paraphrase)	Our Comment	
3	5.3.1	22	Figure 5.3.1-8 presents the modelled average changes in reservoir releases from Hetch Hetchy with corresponding changes in the range of potential storage at Hetch Hetchy.	This figure compares monthly average ranges of storage, not the actual statistical range. As a result, this presentation could lead the reader to conclude that reservoir storage will not be significantly impacted in any month of any years; indeed, the DPEIR makes this claim on page 24 of this section. However, actual changes in the range of storage at Hetch Hetchy are, in some months, far greater than the **average** changes depicted here. Analysis of the data used to create this Figure (HH/LSM Result Viewer v. 1.0) indicate that, in some months, the range of resevoir storage under WSIP may change as much as 69%.	88
3	5.3.1	24	Sentence 6 of paragraph two states: "The WSIP would not alter water levels in Hetch Hetchy Reservoir such that they would substantially be outside the range experienced under the existing condition."	What constitutes being "outside of the existing range" is not explicitly defined. Figure 5.3.1-8 shows the **range** in modelled average reservoir storage increases approximately 25% to 30% (all of this additional **range** translates into potential **reductions** in actual reservoir storage) over the current condition during June, with an increased range (**potential reduction in storage**) of approximately 10% to 20% persisting through October. These potential changes in reservoir storage, at least during peak demand, seem to constitute a significant deviation from current conditions.	89

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

			Sentence 6 of paragraph two states: "The WSIP would not alter water levels in Hetch Hetchy Reservoir such that they would substantially be outside the range experienced under the existing condition."	Our analysis of the percent difference between the modeled storage for Hetch Hetchy compared with that during the period of record reveals that, in some instances, the range in reservoir storage changed up to 69% (this analysis was conducted using data from the HH/LSM Result Viewer Version 1.0). Although the frequencies of these effects are limited over the entire extent of the period of record, this difference shows that the range in modeled reservoir values could increase well beyond what is implied (i.e., significant change).	90
3	5.3.1	18	Discussing water quality objectives for the Sacramento-San Joaquin Delta. "These objectives have been the subject of much controversy and have frequently been revised. Some issues remain unresolved, including the degree to which parties that divert water upstream of the Delta are responsible for meeting Delta objectives."	This passage and the discussion that precedes it indicate three things: 1) Flow objectives for the Delta (and lower San Joaquin) are changing and increasing over time 2) SFPUC diversions affect San Joaquin flow in the Delta, and 3) The SFPUC's responsibility for maintaining San Joaquin flow and water quality standards are unresolved. Nowhere else in this DPEIR does the SFPUC address these facts and uncertainties or the question that stems from them: How will the WSIP affect the SFPUC's ability to respond to future demands for increased flows downstream to protect water quality? Given the tremendous uncertainties surrounding the future water needs in the Delta and the SFPUC's legal responsibilities to maintain that water quality, how can the SFPUC consider additional constraints on their ability to provide water by allocating it to customers outside of San Francisco?	91

5

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

3	5.3.1	19	Paragraphs covering the "Vernalis Adaptive Management Program"	Here again, the DPEIR makes clear that downstream requirements for Tuolumne River water may increase in the future, in this case, to protect fishery resources as agreed to under the "San Joaquin River Agreement". It's very name implies that the VAMP may determine that additional flows are needed to protect fish in the lower San Joaquin River and/or Delta (that is the meaning of "adaptive management"). Yet, the WSIP would appear to foreclose opportunities for increasing flows downstream (and it may jeopardie the ability to provide for existing flow requirements). The DPEIR fails to adequately address the impacts (legal, political, or biological) or foreclosing options related to increasing flows in the San Joaquin as necessary to protect fish populations.	92
3	5.3.1	20	Section titled "Significance Criteria" "The proposed program would have a significant impact if it were to: Substantially alter stream flows such that they were outside of the range of pre-project conditions and result in adverse hydrological effects."	What does "pre-project" mean in this context? If it means pre-Tuolumne River hydrosystem (prior to construction of La Grange, Don Pedro, or O'Shaughnessy Dams), then it is hard to believe that the WSIP would not lead to conditions that violate this significance criteria. If it means pre-WSIP conditions, then the impact threshold implicitly assumes that "adverse" hydrological impacts cannot occur unless flows are "outside of the **range" experienced under current conditions. Given the deterioration of conditions on the Tuolumne and San Joaquin River during the past several decades (e.g. the listing of steelhead as federally "threatened"),** it is not clear that current operations are an acceptable baseline for comparison. Continued deviations (e.g. WSIP) from an impacted state (current conditions) may lead to cumulative impacts. The report fails to consider whether flows may need to be *increased* on the Tuolumne to restore fish populations, water quality, and geomorphic processes.	93

6

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

Volume	Section	Page Number	What the DPEIR says ("" indicates direct quote, otherwise paraphrase)	Our Comment	
3	5.3.1	23	Figure 5.3.1-9 Presents modelling of Hetch Hetchy storage and releases to the Tuolumne River under historical conditions.	There are too many panels to this figure and too much information in each one to present them all on one page. As a result of packing each of these panels into such a small space, their ability to convey information is lost. For example, real changes in storage and flow are obscured because the range on the y-axis is so large and the space allocated to the image is so small. For example, whereas most changes in storage and flow "look" very small because of the format of these graphs, that obscures significant changes in the percentage of water released from Hetch Hetchey that occur in 2001 and 2002. Also the change in storage expected to occur under WSIP in the winter 1987, 1988, and 1989 looks minor but actually amounts to reductions between 10-25% of what they were without WSIP.	94
3	5.3.1	25	Impacts of flow along the Tuolumne River below O'Shaughnessy Dam. Fourth full paragraph states "... the greatest reduction in stream flow would occur in normal, below normal, and dry years ..."	Basically, this statement says that flow will be affected in most years; which contradicts an earlier statement that flows will not be affected or affected minimally in most years.	95
3	5.3.1	25	Impacts of flow along the Tuolumne River below O'Shaughnessy Dam. Paragraph three discusses the possible changes to release schedules to the Tuolumne with implementation of the WSIP.	What would happen to the stated pattern if inflows were consistently reduced during a dry period? Would flow releases to the Tuolumne be delayed indefinitely until the reservoir is filled to capacity? There is no discussion of alternate release schedules or operational practices and their affect on the Tuolumne if the reservoir does not fill to capacity.	96
3	5.3.1	25	Impacts of flow along the Tuolumne River below O'Shaughnessy Dam. Paragraph three discusses the possible changes to release schedules to the Tuolumne with implementation of the WSIP.	Flows may follow the same pattern in normal and above normal years, but presumably, the magnitude of releases will be less even though the pattern of releases will be the same. This in turn translates to a reduction in peak and sustained flows in this reach as a result of the WSIP during dry periods.	97
3	5.3.1	26	Table 5.3.1-5 Estimated Average Monthly Flows For The Tuolumne River Below O'Shaugnessy Dam Under Various Conditions Provides a column by-column comparison between flows in the Tuolumne during all water year types for both the modeled current condition and conditions under WSIP.	The table illustrates the differences between the averaged indexed (over the period of record) Tuolumne flows below Hetch Hetchy and modeled flows under WSIP conditions. The "Difference and Percent Change" panel of this table shows only an **average** of all modelled percent differences in flows expected to result from the WSIP. This incorrectly suggests that the maximum percent decrease that can be expected under WSIP for all hydrologic year types is 30%. As stated in the DPEIR, Tuolumne flows below O'Shaugnessy Dam (reflective of releases from Hetch Hecthy) will be reduced up to to 90% in certain years.	98
			Table 5.3.1-5 Estimated Average Monthly Flows For The Tuolumne River Below O'Shaugnessy Dam Under Various Conditions Provides a column by-column comparison between flows in the Tuolumne during all water year types for both the modeled current condition and conditions under WSIP.	Biotic and geomorphological resources will not experience the average flow reduction; they will experience the actual flow reduction in a given month, which, in some cases, may be up to 90%. Thus, this table limits the reader's ability to assess the true potential impacts of WSIP implementation on stream flows in the Tuolumne below O'Shaugnessy Dam. These impacts are likely to be far greater than implied by the average impacts presented in the table.	99

7

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Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
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Volume	Section	Page Number	What the DPEIR says ("" indicates direct quote, otherwise paraphrase)	Our Comment	
3	5.3.1	26	Table 5.3.1-6 Estimated Average Monthly Flows For The Tuolumne River Below La Grange Dam Under Various Conditions Presents deviations under WSIP from the average of monthly average flows under various "water-year types".	How were the "existing condition" and "Future with WSIP" values calculated? Presumably the former were based on the hydrologic record and the latter estimate is based on model runs which use the historical data as input? How many model runs were conducted? What is the variance in these estimates (i.e., how much estimation "error" exists)? A formal analysis of environmental variability and model error is required here (and throughout the hydrological sections of this report) in order to understand the level of certainty that we have regarding estimates of mean conditions). As presented, there is no way to evaluate the potential accuracy of modelling projections in the DPEIR because the reader does not know whether projections are accurate to within ±1%, ±10%, or ±100%.	100
3	5.3.1	26	Table 5.3.1-6 Estimated Average Monthly Flows For The Tuolumne River Below La Grange Dam Under Various Conditions Presents deviations under WSIP from the average of monthly average flows under various "water-year types".	Regardless of the exact method of calculation, aggregating (averaging) by month across many years (within the different water-year type categories) obscures the potential impact of changes under WSIP. There will be variance from the mean in these estimated changes in stream flow under WSIP because there is variance in flows under existing conditions and there is error (variance) in the model used to estimate flows under WSIP conditions. Impacts are caused by **extremes** in flow (high or low) more than by estimates of **average** flow. Since variances are not presented (*see above*) we cannot know the true extremes of flow to which the Tuolumne will be subjected. As a result, these **average** estimates are meaningless for purposes of understanding risks to biological, hydrological, and geomorphic features of the Tuolumne.	101

8

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

			Table 5.3.1-6 Estimated Average Monthly Flows For The Tuolumne River Below La Grange Dam Under Various Conditions Presents deviations under WSIP from the average of monthly average flows under various "water-year types".	As mentioned elsewhere in these comments, hydrologic flow regimes often have response periods (usually weekly and daily) that are shorter than the monthly scale at which the DPEIR presents results. Thus, on a daily or weekly basis, actual flows will be lower than those indicated in this table approximately 50% of the time (that is the nature of an average). Therefore, where flow declines are anticipated under the WSIP, the true impact of those decreases in flow are underestimated by the averages presented in these tables. Rather than presenting simple "average" estimated deviations from "average" flow conditions that existed in previous years, the DPEIR should include some estimate of maximum daily (or at least weekly) deviations from current conditions.	102
3	5.3.1	28	The first sentence under the heading "Impact Conclusions" states: "The WSIP would not alter flow in the Tuolumne River below O'Shaughnessy Dam such that it would be outside the range experienced under the existing condition, nor would the flow alterations result in adverse hydrologic effects or be sufficient to change the character of the river."	The statement does not summarize the preceeding discussion of the effects of WSIP implementation on flows at smaller time-steps. That discussion indicates that the HH/LSM model cannot assess the effect of WSIP on flows with time steps of less than one month. Because the potential effects of the WSIP on these types of flows cannot be determined or modeled, the claim regarding the impact of the WSIP on Tuolumne flows below O'Shaughnessy Dam is incomplete. The claim that flows will not be outside of the range experienced under the current condition is also misleading. Table 5.3.1-5 shows a percent difference of average monthly flows up to 30% during dry years, with a potential percent difference of up to 90% in some months of some years during extremely dry years.	103
			The first sentence under the heading "Impact Conclusions" states: "The WSIP would not alter flow in the Tuolumne River below O'Shaughnessy Dam such that it would be outside the range experienced under the existing condition, nor would the flow alterations result in adverse hydrologic effects or be sufficient to change the character of the river."	The data presented here clearly show the potential for a significant deviation from the modeled range under normal conditions, and as such, the referenced statement is not supported. The DPEIR minimizes the possible impacts of the WSIP on Tuolumne flows, and limits the reader's ability to assess this claim. Furthermore, the fact that what constitutes a significant deviation from normal is not quantified (or clarified) elsewhere in the PEIR makes assessing changes in stream flow between modeled scenarios difficult.	104

9

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

3	5.3.1	28	Impacts Conclusions re: Flow along the Tuolumne River below O'Shaughnessy Dam First full paragraph states: "The WSIP will not alter stream flow in the Tuolumne River below O'Shaughnessy Dam such that it would be substantially outside the range experienced under existing conditions, nor would the flow alterations result in adverse hydrological effects or be sufficient to change the character of the river."	This statement is based on many incompletely stated assumptions; it is little more than an assertion. The report acknowledges that daily and weekly sustained and peak flows could very well be affected by a delay in releases and a reduction in the volume of releases. Such volume reductions are anticipated in about 20 years (during the spring) in the 82 year simulation. The DPEIR admits that analysis of the effect of the WSIP on peak flows cannot be conducted because the model uses a monthly time-step, and peak flows usually last only a few hours or days. Yet, it is these peak flows that will determine "the character" of the River below O'Shaugnessy Dam.	105
3	5.3.1	28	Impacts of Flow along the Tuolumne River below O'Shaughnessy Dam First (partial paragraph) states: "Peak flows in years when runoff is less (dry years) might be reduced by the WSIP, depending on decisions made by reservoir operators."	This statement is vague. When Hetch Hetchy does not fill to capacity (as has occurred almost 25% of the time over the period of record), what exactly will happen to the magnitude, frequency, and duration of peak flows in this reach? The answer to this question can have broad implications for fish and wildlife habitat and changes in geomorphology.	106
3	5.3.1	28	Impacts of Flow along the Tuolumne River below O'Shaughnessy Dam First full paragraph states: "…the effects of the WSIP on flow along the Tuolumne River below O'Shaughnessy Dam would be less than significant…"	This claim should be amended to state that monthly affects *may be* less than significant and that daily and weekly affects cannot be assessed. Mitigation measures may be required if changes in daily and weekly flow regimes affect habitat and adversely affect stream morphology.	107
3	5.3.1	29	Section: Impact 5.3.1-2 Effects on Flow along Cherry Creek below Cherry Dam	A comparable graphical summary as the one provided for Hetch Hetchy Reservoir Volumes (Figure 5.3.1-8) is not provided. This creates the impression that such data are not available (which, most likely, is not the case). A similar chart should be included to supplement the discussion of reservoir storage under the heading Water Storage and Water Levels in Lake Loyd, and so that changes in the range in storage between the current condition and conditions under WSIP can be evaluated. This is especially important since these changes are not summarized elsewhere, and that, as stated, operation of Lake Loyd may change after periods of drought to satisfy TID and MID flow requirements and compensate for reductions in Don Perdro Reservoir storage due to reductions in Hetch Hetchy releases. Because Lake Loyd will most likely experience a change in water elevation, the actual magnitude and frequency of such changes should be analyzed and documented.	108

10

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

			[illegible]	Our Comment	
3	5.3.1	35	Table 5.3.1-6 Estimated Average Monthly Flows for the Tuolumne River Below La Grange Dam Under Various Conditions Presents deviations under WSIP from the average of monthly average flows under various "water-year types."	The table illustrates the differences between the averaged indexed (over the period of record) modeled Tuolumne flows below La Grange Dam and modeled flows under WSIP conditions. The Difference and Percent Change section of the table shows only an **average** of the range of possible percent differences in flows anticipated under the WSIP. This presentation incorrectly suggests that the maximum percent decrease that can be expected under WSIP for all hydrologic year types is 25%. Yet, as stated in the DPEIR, Tuolumne flows at La Grange Dam will be reduced up to 92% during some months in some years.	109
			Table 5.3.1-6 Estimated Average Monthly Flows for the Tuolumne River Below La Grange Dam Under Various Conditions Presents deviations under WSIP from the average of monthly average flows under various "water-year types."	Biotic and geomorphological resources will not experience the average flow reduction; they will experience the actual flow reduction in a given month, which, in some cases, may be up to 92% Thus, as presented, this table impedes assessment of the true potential impacts of WSIP implementation on stream flows in the Tuolumne below La Grange Dam. These impacts are likely to be far greater than implied by the (already substantial) average impacts presented in the table.	110
3	5.3.1	35	Table 5.3.1-6 Estimated Average Monthly Flows for the Tuolumne River Below La Grange Dam Under Various Conditions	Even as presented, this table indicates that there will be substantial reductions of flow in the Tuolumne River under most conditions. Of the 60 Month-by-"year type" combinations presented, more than 1/3 are expected to show average flow reductions of greater than 5%. This reduction in flow can have serious impacts on hydrological, biological, and geomorphological features of the Tuolumne River that are not analyzed by the DPEIR.	111

11

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

			[illegible]	Our Comment	
3	5.3.1	37	Paragraph two continues a discussion of the WSIP on the operation of Don Pedro Reservoir and Tuolumne releases below La Grange: "Although the WSIP would commonly reduce winter and spring flow in the river below La Grange Dam, it would not affect very infrequent large peak flows produced primarily by rainstorms."	The model used for this analysis is based on a monthly time-step while peak flow usually occurs over a much shorter period. Thus, this statement cannot be derived from model output (as output is in a monthly time-step) and must rely on some undocumented source of information. It is not clear whether release operations change as a result of these infrequent storm events or whether this refers only to flows that enter the River below La Grange dam. This should be clarified. In either case, the hydrological model cannot inform us about the impact of weekly and daily peak flows, even though these are probably important in determining impacts to aquatic habitat and river geomorphology.	112
3	5.3.1	38	The first sentence under the heading "Impact Conclusions" states: "The WSIP would not alter flow in the Tuolumne River below La Grange Dam such that it would be substantially outside the range experienced under the existing condition, nor would flow alterations result in adverse hydrologic effects or be sufficient to change the character of the river."	The statement does not summarize the preceeding discussion of the effects of WSIP implementation on flows at smaller time-steps. This discussion indicates that the HH/LSM model cannot assess the effect of WSIP on flows with time steps of less than one month. For example, in a month with **average** flows that are 25% below current conditions (such as June of "Above Normal" years), flows on any given day, or during any given week may be above or below the 25% average reduction. Flow reductions in excess of the average should occur about half the time, but the extent, duration, and frequency of these reductions in daily or weekly flow are unknown because the model does not produce output on that fine a scale. Because the potential effects of the WSIP on these types of flows cannot be determined or modeled, the claim regarding the impact of the WSIP on Tuolumne flows below La Grange Dam is unsupported.	113
3	5.3.1	38	The first sentence under the heading "Impact Conclusions" states: "The WSIP would not alter flow in the Tuolumne River below La Grange Dam such that it would be substantially outside the range experienced under the existing condition, nor would flow alterations result in adverse hydrologic effects or be sufficient to change the character of the river."	Once again, the significance threshhold for significant impacts is not adequate to protect biological populations, hydrological characteristics, and geomorphological processes of the Tuolumne River. Under the DPEIR's formulation, flows that do not lie **substantially outside the range experienced under existing conditions** do not consititute a significant impact. From this perspective, even if the WSIP consistently reduced average monthly flows to the low end of their current "range", there would be no impact. There is simply no analysis in the DPEIR (or anywhere else) that would support such a finding. Similarly, there is no analysis that demonstrates that *current* operating practices and diversion schedules adequately protect aquatic resources in th Tuolumne River.	114
3	5.3.1	38	The first sentence under the heading "Impact Conclusions" states: "The WSIP would not alter flow in the Tuolumne River below La Grange Dam such that it would be substantially outside the range experienced under the existing condition, nor would flow alterations result in adverse hydrologic effects or be sufficient to change the character of the river."	The data presented here clearly show the potential for a significant deviation from the modelled range under normal conditions; so, the referenced statement is not supported. This presentation minimizes the apparent impact of the WSIP on Tuolumne flows, and limits the reader's ability to assess this claim. Furthermore, because there is no quantification or definition of a ""substantial" deviation from the range experienced under existing conditions, assessing the significance of changes in stream flow between modeled scenarios is difficult. Similarly, it is difficult to determine what kind of changes would affect the "character of the river" because no measures or definition of that character are provided nor are thresholds proposed that would indicate when a "substantial" change in river character has occurred.	115

12

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

3	5.3.1	38	The last sentence of the first paragraph under the heading Impact 5.3.1-5 "Effects on Flow Along the San Joaquin River and the Sacramento-San Joaquin Delta" states: "Flow reductions of these magnitudes would be rare events ocurring four or five times in the 82-year period of hydrologic record."	"Rare" is a subjective term. There is no *apriori* definition of what "rare" means or whether "rare" events are those whose imapcts can be ignored. This substitution of frequency with severity of impact recurs throughout the document. It is unjustified and cannot subsitute for specific definitions of changes in frequency (rare, occassional, infrequent) or actual analyses of the severity of impact.	116
3	5.3.1	38	The last sentence of the first paragraph under the heading Impact 5.3.1-5 Effects on flow along the San Joaquin River and the Sacramento-San Joaquin Delta states: "Flow reductions of these magnitudes would be rare events ocurring four or five times in the 82-year period of hydrologic record."	Although the frequency of these events is <10% in the period of record, no information is provided about the distribution of these events. If they occur in sequential years or sequential months, such a prolonged reduction in flows could have deleterious effects on fisheries and ecosystems downstream. Even if they do not occur sequentially, such major changes in flow would likely have an impact on salinity intrusion and water quality (e.g., dissolved oxygen) in Sacramento-San Joaquin Delta.	117
3	5.3.1	38	The paragraph under the heading "Impact Conclusions" summarizes impacts to the Tuolumne below Don Pedro after implementation of the WSIP "Overall, the effects of the WSIP on flow along the Tuolumne River below La Grange Dam would be *less than significant,* and no mitigation measures would be required ."	This conclusion is based on a finding that monthly average flows under WSIP will not exceed current flows and that mimimum flows are governed by an agreement that will be maintained. However, this ignores the fact that the distribution of river flows (within those extremes) may change dramatically. The change in distribution of flow rates (principally, a truncation of the upper part of the hydrograph) could "be sufficient to change the character of the river". This statement refers to an analysis of monthly flows (the time-step at which the model was run), but not weekly and daily flows. In fact, as stated in the DPEIR, some releases could be delayed by several days or up to a week under some hydrologic conditions. Therefore, the monthly resolution of analysis obscures the potential impact of WSIP implementation on daily and weekly flows.	118
3	5.3.2	5	Geomorphological impacts -- approach to analysis "No modeling or field measurements have been performed to estimate program-generated changes in sediment transport in the Tuolumne River"	The analysis of sediment transport and gravel bed conditions in the Tuolumne is purely qualitative and largely speculative. Because there are no studies of baseline (historic) or current substrate conditions for much of the Tuolumne, it is impossible to know (a) how substrate conditions have changed over time, (b) the response of substrate to operational changes in the Tuolumne, or (c) the current state of Tuolumne River substrate.	119
3	5.3.2	5	Geomorphological impacts -- approach to analysis. "No modeling or field measurements have been performed to estimate program-generated changes in sediment transport in the Tuolumne River"	Steelhead, rainbow trout, and introduced trout species use gravel as a substrate for spawning and incubation. Steelhead juveniles also use pores in the streambed to hide (Williams 2006). The quality of this substrate (e.g. sediment size distribution) can have substantial impacts on a river's ability to support spawning salmonids (Kondolf 1997, 2000). Gravel degradation (bed armoring via slow sedimentation) is a major force driving the loss of salmonid spawning habitat in the Central Valley (Kondolf 1997, TNC 2006). The lack of information about current spawning gravel availability or how it is changing over time (and in response to hydrosystem operations, is a major flaw in this DPEIR. There is no way to evaluate the impact of WSIP to spawning habitat for salmonids without this information.	120

13

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

3	5.3.2	6	The first paragraph attempts to characterize the frequency of geomorphically significant peak flows in the Tuolumne River by comparing them to the periodicity seen in the Clavey River	It is not at all clear that the rate and frequency of geomorphic processes on the Clavey and Tuolumne River are comparable. Where is the evidence for this comparison?	121
3	5.3.2	7	The second sentence of the first (partial paragraph) under section 5.3.2.1 discusses the potential effect of WSIP implementation on sediment transport below O'Shaugnessy Dam, and states: "However, because the changes in peak flow would occur infrequently, they would not expect to result in a substantial change in erosion or siltation rates."	The duration and magnitude of peak flows will be uniformally reduced under WSIP between O'Shaugnessy Dam and Don Pedro Reservoir. Thus, a reduction in stream power available to move sediment must be expected. Simply stating that alterations to peak flows would be "infrequent" does not characterize the extent of the potential impact to geomorphic processes in the river. [This is another example of the DPEIR's practice of substituting frequency for magnitude of impact]. In some months, peak flows will be diminished in frequency, duration, and magnitude. These variables are the primary components in determining potential stream sediment transport. Thus, sediment movement will be undeniably altered, although the magnitude of the impact cannot be determined with the information provided here.	122
			The second sentence of the first (partial paragraph) under section 5.3.2.1 discusses the potential effect of WSIP implementation on sediment transport below O'Shaugnessy Dam, and states: "However, because the changes in peak flow would occur infrequently, they would not expect to result in a substantial change in erosion or siltation rates."	The reduction in Tuolumne sediment transport can be expected to increase armoring of gravel beds which would reduce available salmonid spawning habitat. Also, the persistent reduction in peak flows can be expected to gradually reduce the availability of interstitial spaces where juvenile rainbow trout overwinter.	123
3	5.3.2	7	The second sentence of the first (partial paragraph) under section 5.3.2.1 discusses the potential effect of WSIP implementation on sediment transport below O'Shaugnessy Dam, and states: "However, because the changes in peak flow would occur infrequently, they would not expect to result in a substantial change in erosion or siltation rates."	Curiously and unfortunately, the DPEIR makes no reference to the USFWS' draft IFIM report from 1992 wherein the Service assessed the abundance and distribution of available spawning and rearing habitat for native and introduced trout species in this stretch of river. Undoubtedly, this information is now out-of-date, however, it would serve as a basis for comparison if measures of gravel quality and abundance were made to day. That comparison would allow an assesmenet of how reservoir operations impact sediment transport in the Tuolumne between Hetch-Hetchy and Don Pedro dam.	124
3	5.3.2	7	The second to the last sentence of the final paragraph of section 5.3.2 discusses the potential effect of WSIP implementation on sediment transport below La Grange Dam, and states: "However, because WSIP-induced changes in peak flow would occur infrequently, they would not expect to result in a substantial change in erosion rates, siltation rates, or channel form."	Peak flows will be uniformally reduced under WSIP below La Grange Dam, as will the duration and magnitude of such events. Thus, a reduction in available stream power to move sediment is expected, whether this occurs on a regular basis or an irregular basis. Considering that the HH/LSM does not consider potential impacts on a daily or weekly scale, little can be said about the weekly and daily hydrology of this reach, other than that in some months over some years, peak flows will be diminished in frequency, duration, and magnitude, and as these variables are primary components in determining potential stream sediment transport, sediment movement will be undeniably altered, although the extent of alteration cannot be determined. Additionally, as previously mentioned in Section 5.3.1-4 page 37, implementation of the WSIP will likely reduce the magnitude and number of pulse flows from Don Pedro Reservoir in years where releases are above the minimum required. This will reduce the frequency and magnitude of sediment-moving flows.	125

14

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

			[illegible]	
3	5.3.2	7	The second to the last sentence of the final paragraph of section 5.3.2 discusses the potential effect of WSIP implementation on sediment transport below La Grange Dam, and states: "However, because WSIP-induced changes in peak flow would occur infrequently, they would not expect to result in a substantial change in erosion rates, siltation rates, or channel form."	The use of the term "infrequently" is misleading because "infrequent" high flows perform the majority of the geomorphic work in streams like the Tuolumne. The DPEIR presents no information regarding the abundance and distribution of spawning gravel below La Grange Dam. This is a major data gap given that both fall-run Chinook salmon and the federally threatened Central Valley steelhead use this stretch of river for spawning. Both species depend on the presence of high quality spawning gravel for egg deposition and incubation. Gravel quality deteriorates inexorably below dams that severely regulate peak flows (e.g. Kondolf 1997). The persistent slow armoring of spawning gravels is believed to be a major cause of the decline in available spawning habitat below dams in the Central Valley (e.g., Lindley et al, 2006; TNC 2006, Williams 2006).
			The second to the last sentence of the final paragraph of section 5.3.2 discusses the potential effect of WSIP implementation on sediment transport below La Grange Dam, and states: "However, because WSIP-induced changes in peak flow would occur infrequently, they would not expect to result in a substantial change in erosion rates, siltation rates, or channel form."	Given that the abundance of both fall-run Chinook salmon and steelhead has declined severely on the Tuolumne (McEwan 2001; Lindley et al, 2006; Williams 2006), it is surprising that the DPEIR did not analyze spawning gravel conditions (and the effect of current and proposed water system operations on those conditions) more thoroughly.

126

127

15

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

			[illegible]	
3	5.3.3	3	Table 5.3.3-2 "Maximum summer-fall water temperatures in the Tuolumne River from La Grange Dam to Modesto 1996-2004. This table provides information on maximum temperatures along the longitudinal profile of the Tuolumne River.	There is useful information in this table but it is far from comprehensive or well-explained. These are maximum river temperatures, but are they "instantaneous" maxima, maximum daily average, or was some other time scale employed? Organisms are capable of withstanding short term exposure to certain temperatures even if they cannot tolerate those temperatures for a full day or week. Therefore, the temporal scale of these data is a very important consideration. Temperatures are categorized as < or > 20 °C. There is no explanation of why this temperature cut-off was used. Nine years of data are presented but none of them reflect "critically dry" conditions, so the overall distribution of temperatures may by skewed towards lower water temperatures.
3	5.3.3	3	Table 5.3.3-2 "Maximum summer-fall water temperatures in the Tuolumne River from La Grange Dam to Modesto 1996-2004. This table provides information on maximum temperatures along the longitudinal profile of the Tuolumne River.	Temperatures presented are summer maxima. Maximum temperatures are useful for evaluating lethal effects to fish and other biota; however, other important temperature thresholds are not addressed by these data and are not reported or discussed elsewhere in the text. For example, metamorphosis of salmonid juveniles (smoltification) into seagoing fish may be impeded by high temperatures in the spring. Whereas reservoirs allow for release of artificially cold waters during the summer, the same thermal intertia can cause them to release artificially warm water during fall, winter, and spring when smoltification occurs. For steelhead, temperatures above 11-12°C inhibit smoltification whereas for fall-run Chinook, the temperature threshold may be closer to 17°C (Richter and Kolmes 2005). Artificially high winter and spring temperatures below dams (i.e. those that inhibit smoltification) may be an important force in the decline of Central Valley steelhead (McEwan 2001).
			Table 5.3.3-2 "Maximum summer-fall water temperatures in the Tuolumne River from La Grange Dam to Modesto 1996-2004. This table provides information on maximum temperatures along the longitudinal profile of the Tuolumne River.	The DPEIR should present information regarding current spring and winter temperature impacts resulting from hydrosystem operations and those anticipated under the WSIP and global warming scenarios and relate these to potential impacts on fish populations in the Tuolumne and San Joaquin Rivers.
3	5.3.3	16	Last paragraph, last sentence states: "…the impact of the WSIP on water quality in Hetch Hetchey Reservoir in the Tuolumne River would be less than significant…" And 5.3.6 page 3 second (full) paragraph states: "Water temperatures within [this same stretch of river] have been observed to exceed the maximum daily temperatures of 21°C."	These statmentes are internally inconsistent. **Any** increase in the frequency, duration, and magnitude of water temperatures in this stretch above 21 degrees C may constitute a significant impact to resident rainbow trout in this stretch of river.

128

129

130

131

16

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

3	5.3.3	16	Last paragraph, last sentence states: "...the impact of the WSIP on water quality in Hetch Hetchy Reservoir in the Tuolumne River would be less than significant..." And earlier: "On very rare occassions under existing conditions ... the water quality objective that limits increases in water temperature to 5 degrees Fahrenheit to protect coldwater fish would likely be exceeded. ... In the future, with the WSIP, very infrequent exceedences of the water quality standard would continue to occur, but could last longer by several days or weeks than under the existing conditions."	These statements are internally inconsistent and generally not well supported. Because no quantifiable, measureable significance thresholds were employed for evaluating this impact, its "significance" is difficult to determine. Once again, the DPEIR confounds frequency with severity of impact. The water quality objective mentioned is in place because exceeding it is expected to cause significant impacts to coldwater fish populations (e.g., salmon and trout). The fact that such exceedences have occurred in the past does not justify their occurence under the WSIP and certainly does not allow for increasing the duration of the violation. The DPEIR does not present any analysis of the **severity** of this impact to coldwater fish resources. If the impact is severe, then its frequency is not very relevant. Indeed, the fact that violations occur currently suggests that current operations are inadequate to protect the Tuolumne's coldwater fish resources.	132
			Last paragraph, last sentence states: "...the impact of the WSIP on water quality in Hetch Hetchy Reservoir in the Tuolumne River would be less than significant..." And earlier: "On very rare occassions under existing conditions ... the water quality objective that limits increases in water temperature to 5 degrees Fahrenheit to protect coldwater fish would likely be exceeded. ... In the future, with the WSIP, very infrequent exceedences of the water quality standard would continue to occur, but could last longer by several days or weeks than under the existing conditions."	This impact is of particular concern if water temperatures and water demands increase, as is expected under global climate change. Under global climate change scenarios, the frequency, duration, and magnitude of such violations of water quality objectives may all increase., The DPEIR's reliance on the 82-year hydrological record prevents any analysis of this possibility.	133

17

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

3	5.3.3	18 & 1	Figures 5.3.3-3 and 5.3.3-4 depict modeled temperature changes along the longitudinal profile of the river under two different reference environmental scenarios under current operating practices and under WSIP.	No indication of optimal or threshold temperatures is provided, so, for illustration purposes, we will use 20oC as a threshold temperature for impacts; steelhead experience sublethal negative consequences of elevated temperatures above this threshold (Reese and Harvey 2002, Richter and Komes 2005). Under existing operational rules and June 1993 environmental conditions, temperatures in the Tuolumne (as depicted in the DPEIR) do not exceed 20oC but they would exceed the threshold after ~25mi under WSIP operations. Under current operating conditions and June 1999 environmental conditions, steelhead may have experienced negative impacts more than 37mi downstream of La Grange dam, but under WSIP they would be expected to experience unsuitable temperatures beyond ~22miles below La Grange. Thus WSIP is expected to increase temperatures above a critical biological repsonse threshold over a large and measureable stretch of the Tuolumne River. The impacts of such changes in temperature under WSIP should be fully evaluated. Other biologically meaningful thresholds should be evaluated as well.	134
			Figures 5.3.3-3 and 5.3.3-4 depict modeled temperature changes along the longitudinal profile of the river under two different reference environmental scenarios under current operating practices and under WSIP.	Again, the potential impact of global warming has not been evaluated. Simply adding a given annual temperature increase to river temperatures is simplistic, but would give some sense of the potential loss of salmonid rearing habitat in the Tuolumne.	135

18

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
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October 1, 2007

			[illegible]		
3	5.3.3	19	Second full paragraph states: "...[temperature increases below La Grange dam] would be less than significant..." And "Water quality objectives for the Tuolumne require that water temperatures not be increased by more than 5oF. The WSIP would comply with this objective almost all the time. On rare occassions ... there would be exceedences of the objective, but these rare exceedence would not impair the river's ability to support ... designated beneficial uses ... including coldwater fisheries."	These statements are internally inconsistent and generally not well supported. Because no quantifiable, measureable significance thresholds were employed for evaluating this impact, its "significance" is difficult to determine. However, the water quality objective mentioned was instituted to protect resources dependent on cold water. The DPEIR's insistence that violations would be "rare" is subjective and not relevant. The **severity** of the impact is not evaluated at all. The basis for the DPEIR's claim that temperature impacts would not impair benificial uses is not provided.	136
3	5.3.3	20	First (partial) paragraph states: "....most of the reductions in flow would occur from February through June in wet or above -normal years when flow in the San Joaquin River is at its seasonal maximum. As a consequence, most of the time, WSIP induced changes in flow would have little effect on water quality in the San Joaquin River." Second paragraph states: "Almost all of the time, reductions in San Joaquin RIver flow attributable to the WSIP would not be sufficient to cause salinity ... at Vernalis to rise above the objective." This paragraph then expresses that water quality problems in the lower San Joaquin River are the responsiblity of the USBR and that that agency would take corrective actions..	Another way of saying this is: The WSIP ***will*** cause water quality violations in the lower San Joaquin River and Delta occassionally and the USBR will have to mitigate that impact. Again the DPEIR confounds frequency with severity of impact. The terms used to describe frequency of impacts are vague and subjective. The **severity** of the impact is not evaluated; however, the DPEIR plans actions that anticipate violations of environmental regulations that would appear to be significant. Also, the DPEIR's assumption that the USBR will have to mitigate any water quality impacts caused by implementation of the WSIP is not supported.	137
3	5.3.3	10 & 11	Table 5.3.3-6 identifies water quality objectives in the project area. Dissolved oxygen objectives are identified for the San Joaquin River, Tuolumne River, and other Delta waters. The lower San Joaquin River DO threshold is identified as 6.0 mg/L between September 1 and November 30.	The table does not display the 5.0mg/L standard that exists between December 1 and August 31. More importantly, the subsequent analysis of water quality impacts does not address impacts to dissolved oxygen in the lower San Joaquin River (specifically the Stockton Deepwater Ship Channel - SDWSC) that may result from WSIP operations. Part of the reason for frequent water quality violations in the SDWSC are low flow rates in the Lower SJR (Physcial Process Model; http://www.sirdotmdl.org/concept_model/about.htm).	138
			Table 5.3.3-6 identifies water quality objectives in the project area. Dissolved oxygen objectives are identified for the San Joaquin River, Tuolumne River, and other Delta waters. The lower San Joaquin River DO threshold is identified as 6.0 mg/L between September 1 and November 30.	These low flows may be exacerbated and prolonged due to flow reductions from the Tuolumne under WSIP. The impact of flow rate reductions on DO concentrations in the lower SJR must be evaluated. This analysis should account for the fact that violations of the DO standard in the SDWSC are already frequent (Stevens et al. 2006); thus, it could be argued that status quo releases from the Tuolumne hydrosystem are lower than those required to maintain water quality standards. Any increase in the frequency, duration and magnitude of low DO events in the lower SJR or Delta may represent a significant impact of the WSIP.	139

19

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

3	5.3.4	5	Paragraph 3 provides a summary discussion of the potential impacts on winter and spring Tuolumne River flows below La Grange Dam during dry years. "The WSIP would have no effect on flow in the Tuolumne River below La Grange Dam or the San Joaquin River under [below normal and drier years]"	In general, the analysis of flow during drier years is not given much attention. This may occur because the report erroneously concludes that flow changes will not occur during drier years. As stated multiple times through the DPEIR, drought year conditions have the potential to adversely affect river flows due to reductions in reservoir volume and increased municipal demand. Changes in irrigation demands are likely to be correlated (negatively) with the availability of freshwater (i.e., water year type) but these are not discussed. It is true that, under "critical year" types, the report indicates no change from current conditions as a result of the WSIP (*See table 5.3.4-4).* However, under "Below Normal" conditions, flows are reduced under the WSIP in several months of 3 of the 12 years (25%) considered in the record. Similarly, flow reductions occur in 2 of 13 (15%) of "Dry" years in the record. Thus, it is an overstatement to say the WSIP would have "no effect" on Tuolumne River flows below La Grange Dam.	140
3	5.3.4	6	Paragraph 2 provides a summary discussion of the changes in modeled releases from La Grange Dam. "Occassionally, changes are in the range of 1,000 cfs to a little over 3,000 cfs."	The use of the word "occassionally" is misleading. This is another example of the DPEIR's persistent substitution of frequency for severity of impact. This statement of potential flow reductions is not meaningful out of context. A meaningful context is provided by Table 5.3.1-1 on p. 5.3.1-12. This table shows mean monthly flows below La Grange Dam from 1974-2004 do not exceed 1,884 cfs (mean flow during February). Reducing flows 1,000 to 3,000 cfs represents a major reduction in flow when compared to average monthly flows of 1,884 cfs.	141
			Paragraph 2 provides a summary discussion of the changes in modeled releases from La Grange Dam. "Occassionally, changes are in the range of 1,000 cfs to a little over 3,000 cfs."	Another specific example of the potential flow reductions is in Table 5.3.4-4 which reveals that flows during a water year like 1964 would be reduced in several months. During Novembers of years like 1964 (a "Dry year"), flows would be reduced by 832 cfs. Table 5.3.1-1 reveals that average flows (i.e. higher than those expected in "dry" years) below La Grange Dam for November are 368 cfs. This reveals that reductions in flow under WSIP are as much as 225% of the average flow. That is a rather large impact.	142
3	5.3.4	7	Table 5.3.4-4 Average Monthly Changes In Tuolumne River Flow Below La Grange Dam Attributable To the WSIP Provides a summary of average monthly changes in river flow below La Grange Dam.	The table provided is virtually unreadable, and does not lend itself to an analysis of changes in flows beneath La Grange Dam attributable to the WSIP.	143

20

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
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			What the DPEIR says ("" indicate direct quote, otherwise paraphrase)	Our Comment	
3	5.3.4	10	Paragraph 2 provides a summary discussion of the potential impacts on Tuolumne River flows below La Grange Dam and the San Joaquin River during dry years . "Occassionally, changes [in river flow] are in the range of 1,000 cfs to a little over 3,000 cfs."	This statement of potential flow reductions is not meaningful out of context. A meaningful context is provided by Table 5.3.1-1 on p. 5.3.1-12 as it shows that mean monthly flows below La Grange Dam from 1974-2004 do not exceed 1,884 cfs (mean flow during February). This average includes all years and, clearly, flows may be higher in wet years; but the fact remains that reducing flows 1,000 to 3,000 cfs represents a major reduction in flow.	144
			Paragraph 2 provides a summary discussion of the potential impacts on Tuolumne River flows below La Grange Dam and the San Joaquin River during dry years . "Occassionally, changes [in river flow] are in the range of 1,000 cfs to a little over 3,000 cfs."	Additional context for this flow reduction can be found in Table 5.3.4-1 on page 5.3.4-3) which provides flow and water quality objectives for the SJR at Vernalis. The Tuolumne provides a significant fraction of these flows (see DPEIR, p. 5.3.1-16). The table reveals that, during wet and above normal years (the years when we might expect Don Pedro refilling to occur following a prolonged drought), minimum required flows at Vernalis are between 5,730 and 8,620 cfs. Reduction in Tuolumne flow of between 1,000 and 3,000 cfs represent a significant impediment to maintaining flow and water quality objectives in the SJR and downstream in the Delta (part of the rationale for these flows is maintenance of salinity standards in the Delta).	145
3	5.3.6	2	First (partial) paragraph states: "the SFPUC has initated a fishery monitoring program within the river to assess potential effects of project operations on habitat quality and availability for resident trout and other fish species that over time will provide additional site-specific information on the effects of seasonal and interannual variation in stream flows on fishery populations..."	Details of this monitoring program are unavailable. It is not clear that the monitoring program has begun. **Results** from this kind of monitoring program are required to determine the potential impacts of WSIP operations. Without this monitoring, there is no baseline with which to compare impacts to fisheries that result from WSIP. A monitoring program that begins after the adoption of the WSIP cannot be used to evaluate the potential impacts of the WSIP.	146

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
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			What the DPEIR says ("" indicate direct quote, otherwise paraphrase)	Our Comment	
4	5.3.7	2	Second (full) paragraph lists two studies of fish populations in the Tuolumne below Hetch Hetchy and an unspecified number of observations of rainbow and brown trout spawning in this reach.	All of these observations and studies are over 15 years old (the most recent is from 1992). The estimate of 7,000 total adult rainbow trout and brown trout in the stretch below O'Shawughnessy Damand Early Intake is outdated.	147
4	5.3.7	2 & 3	Third (full) paragraph refers to a USFWS 1992 study of available habitat in the Tuolumne River below O'Shaughnessy Dam. And On page 5.3.6-3, (first partial paragraph) "the stream flow study did not identify physical habitat as a major limiting factor, although seasonal water temperatures were identified as a factor affecting both brown and rainbow trout within the river."	The reference to this study is curious given that the study is a "rough draft" and has never been adopted by the SFPUC, despite the fact that it is 15 years old. This study called for substantially higher minimum flows in this stretch of the Tuolumne than the minimum flows identified by the DPEIR (see Table VI of USFWS 1992). If the SFPUC accepts the validity of this study (as implied by its citation here), then why has it not cited this study's recommendations regarding minimum instream flows in this stretch of the Tuolumne? The study is now over 15 years old; thus, the fact that physical habitat was not believed to be limiting at the time the study was written, does not mean that it is not limiting today. Operation of dams tends to degrade downstream physical rearing habitat conditions inexorably and gradually (Williams 2006; TNC 2006).	148
3	5.3.6	15	Table 5.3.6.2 Tuolumne River Spawning Survey Summary	These results are in some cases different from those presented in AFRP data; the difference is inexplicable. We present our Figure 1 (from the AFRP website: http://www.delta.dfg.ca.gov/afrp/documents/Doubling_goal_graphs_032807.ppt#281,35,Slide 35) to review Chinook salmon populations on the Tuolumne. Clearly, populations since 2000 and from 1988 through 1999, were well below the AFRP recovery goal of 38,000 fall run Chinook salmon. Indeed, only 500 fish returned in each of the last two years of record (2005 and 2006). The 1992-2006 average (8,941 fall-run) is <50% of the 1967-1991 average which the AFRP uses as its "baseline condition". The DPEIR's tepid insinuation that Chinook salmon populations are in better condition than they were prior to the FERC settlement agreement (page 15) is not supported.	149

SI_TRT-CWA-SierraC

Review of the Draft Program Environmental Impact Report (DPEIR) for the Water System Improvement Program (WSIP)
Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
Prepared by the Tuolumne River Trust
October 1, 2007

3	5.3.6	18	First paragraph states: "Water temperatures in the lower Tuolumne River are in the 25-30 °C range for an extended period of time during the summer in many locations… and are unsuitable for steelhead." And FERC concluded that no significant populations of steelhead/rainbow trout are present in the lowe Tuolumne system.	McEwan (2001) concludes that there is "substantial evidence" that a self-sustaining population of steelhead exists in the San Joaquin River. His report documents very large *O. mykiss* with all the morphological characteristics of anadromous steelhead as recently as January 2001. Certainly, steelhead populations were known to exist in the Tuolumne historically (McEwan 2001; Lindley et al. 2006). Thus, this paragraph serves as an indictment of the steelhead spawning and rearing conditions created by dams in the Tuolumne River. Maintenance of these "unsuitable" conditions (not to mention further degredation of conditions required by spawning steelehad) may constitute a violation of California Dept. of Fish and Game Code and/or the Federal Endangered Species Act. This is another example demonstrating that the baseline against which the WSIP is compared may itself represent unacceptable conditions.	150
			First paragraph states: "Water temperatures in the lower Tuolumne River are in the 25-30 oC range for an extended period of time during the summer in many locations… and are unsuitable for steelhead." And FERC concluded that no significant populations of steelhead/rainbow trout are present in the lowe Tuolumne system.	The 1996 FERC report that the DPEIR references is out-of-date and was conducted before the species was listed under the ESA. This may account for the lack of documented sightings of steelhead in the FERC report. As McEwan (2001:15) notes: "Until very recently, steelhead were considered by some to have been exterpated from the San Joaquin River system ..). However, this conclusion was based on little information and no field studies."	151
3	5.3.6	18	Second paragraph states: "…only 10 of the fish in this extended period of snorkel survey were in excess of 400 millimeters in length, suggesting that large anadromous steelhead probably occur in the system very infrequently"	The logical foundation for this statement is seriously flawed. *O. mykiss* come in two forms, resident (called "rainbow trout") and migratory (called "steelhead"). These two forms are indistinguishable until migration occurs. All *O. mykiss*, whether they become resident "rainbow trout" or anadromous "steelhead" pass through a stage where they are smaller than 400mm. Also, steelhead juveniles are expected to emigrate to marine waters (as "smolt") at lengths below ~200mm (CDFG 1996). Thus, any of the fish observed by the snorkel survey may have become anadromous steelhead.	152

23

SI_TRT-CWA-SierraC

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3	5.3.6	18	Steelhead/Rainbow Trout -- in general	"Steelhead" and "rainbow trout" are two life history forms of the same species. Some populations of this species are "polymorphic," meaning that resident "rainbow trout" can produce anadromous "steelehad" offspring and vice-versa. The extent and distibution of "polymorphic" populations in the Central Valley is undocumented. The mere fact that *o. mykiss* are observed in the Tuolumne indicates a strong possibility that the stream produces "steelhead" during at least some years. These steelhead are legally protected under the ESA.	153
3	5.3.6	18	Largemouth and smallmouth bass. Section states: "Non-native largemouth and smallmouth bass have colonized the lower Tuolumne River, taking advantage of the low-velocity, and pond-like habitats of the river…below RM 25….Both the low flow and high water temperatures in this reach stress juvenile salmon and enhance predation by bass".	These statements are correct. They indicate (a) that curent conditions created in the River by hydrosystem operations support non-native species impacts on native species of concern (particularly fall-run Chinook salmon and threatened steelhead) and (b) that operations that further reduce flow and increase temperatures in the Tuolumne will increase the spatial extent and magnitude of impacts of these non-native species. Changes anticipated by the WSIP will increase temperatures and reduce flows in the lower Tuolumen and thus increase impacts to species-of-concern by non-native predators.	154
3	5.3.6	20	First full paragraph: "Bass density could thus be reduced by recontouring the channel to enhance riffle and run habitats, combined with manipulation of flow to increase velocities….[this] would be expected to benfit out-migrating juvenile salmon."	No reference to literature, studies, or magnitudes of change are provided to support or parameterize this statement. Also, the paragraph ignores a more obvious solution to invasive bass problems in the Tuolumne: increase flows and storage in the Tuolumne hydrosystem decrease temperatures and decrease suitable habitat for these bass species. Changes anticipated by the WSIP would have the opposite impact.	155
3	5.3.6	24	Significance criteria: "The CCSF has not formally adopted significance standards for impacts related to fisheries, but generally considers that implementation of the proposed program would have fisheries impact if it were to: Have substantial adverse effect ... on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFG, NMFS, or USFWS….[or] Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels ... substantially reduce the number or restrict the range of an endangered, rare, or threatened species"	Failure to adopt a formal, quantifiable, measureable threshold for determining significant impacts is a persistent and major flaw of the DPEIR. Ther is no way to evaluate the magnitude of changes caused by the proposed plan because the significance thresholds lack a rigorous definition. For example "substantial" impacts are not defined. On the other hand, the Andromous Fish Restoration Program (AFRP) defines the goal of doubling anadromous fish populations above their baseline averages. Also, the Federal Endangered Species Act prohibits "Take" of endangered species; this is a much more rigorous, quantifiable, and measurable standard than "substantial reduction."	156
3	5.3.6	26	Effects on fishery resources along the Tuolumne River between Hetch Hetchy Reservoir and Don Pedro Reservoir. Indicates that minimum flow requirements below Hetch Hetchy (as described in Table 5.3.1-2) are met.	The USFWS draft instream flow report (1992) recommended that the minimum flows in the referenced table be revised upward substantially (see Table VI of the draft report). The failure of the SFPUC to adopt these recommendations may already have impacted fish populations in this area. The DPEIR's adherence to the older standards suggests that the WSIP will continue to impact rainbow trout populations. In general, because the SFPUC lacks a recent evaluation of rainbow trout populations in this area or habitat conditions in this area, it is hard to see how the imapcts of WSIP can be evaluated for this resource.	157

24

SI_TRT-CWA-SierraC

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3	5.3.6	26	Final paragraph states: "In spring months…operations under…WSIP would reduce average monthly flows between 4 and 30 percent…the greatest percentage reduction would occur in normal, below-normal, and dry years …[and] the modeling tool used for this analysis reports information in a monthly time step; it cannot provide weekly or daily information about flow releases...the flow reduction would not occur evenly over a month..."	The effect of presenting results in a monthly time-step is accurately portrayed here. If **monthly average** flows are reduced up to 30 percent, daily and weekly flows will sometime decrease **more than** 30% because the flow reduction will "not occur evenly over the month". Given their magnitude and timing (i.e., in drier years), these flow reductions may have serious impacts on rainbow trout populations in this reach.	158
3	5.3.6	27	Final two paragraphs discuss temperature impacts on rainbow trout populations in this reach. "This potential temeprature increase [under certain drought conditions water released from HH could be 10 to 12 °C warmer than under non-WSIP operations] would result in a less-than-significant impact on the fisheries in this reach [because] it would occur infrequently [and this temperature increase would not occur during the spawning period for rainbow trout."	First, the anticipated temperature increase violates the Central Valley RWQCB objective of limiting temperature changes in rivers to < 5°C (objective referenced on page 28 of this section); the frequency of this violation is not relevant -- it is still a violation that can be avoided by operating the hydrosystem correctly. A sudden 10-12oC temperature increase during the fall would likely have deleterious effects on trout as they prepare to overwinter. The DPEIR's dismissal of any impact is simply not supported by any literature reference. The temperature analysis does not account for the impact of regional climate change. Section 5.7.6 allows that there may be a 1.5 oC increase throughout the watershed over the project period. How would this direct temperature impact affect water temperatures and fish populations? Also, the increased temperatures, decreased water supplies, and increased demand for water created by regional climate change would all be expected to cause an increase in the frequency of conditions that produce the extreme temperature increases envisioned in this section of the DPEIR.	159
3	5.3.6	28	First full paragraph: "Potential impacts to resident fish population inhabiting the river are less than significant…"	Actual quantifiable analysis of this impact is not presented in the DPEIR, which simply dismisses the impact. A quantifiable impact assesment is made more difficult by the SFPUC's lack of a current baseline for this population or river conditions in this area. The draft studies from 1992 are too old and preliminary to provide a current baseline.	160

25

SI_TRT-CWA-SierraC

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Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
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			What the DPEIR says ("" indicate direct quote, otherwise paraphrase)	Our Comment	
3	5.3.6	28	Impact 5.3.6-4 states: "Changes in [hydrological conditions] have the potential to affect the quality and availability of habitat for resident and anadromous fish species. Chinook salmon is the species of most concern in this reach of the River. …Steelhead, which is a federally listed threatened species, may inhabit the river in low abundance."	We agree that hydrological changes anticipated under the WSIP are likely to impact Chinook salmon populations and steelhead populations on the Tuolumne below La Grange Dam. It is not clear why the DPEIR focusses on Chinook salmon, given that steelhead are an ESA listed species, their numbers are lower, and they are exposed to conditions on the Tuolumne year-round (because they rear in freshwater for two years before emigrating to the ocean). The fact that Steelhead may inhabit the River in "low numbers" cannot serve as a justification to ignore their requirements. Indeed, their lower numbers and more protected status indicate that *current* Tuolumne hydrosystem operations are inadequate to protect this species and that any additional impacts created by the WSIP are particularly significant.	161
			Impact 5.3.6-4 states: "Changes in [hydrological conditions] have the potential to affect the quality and availability of habitat for resident and anadromous fish species. Chinook salmon is the species of most concern in this reach of the River. …Steelhead, which is a federally listed threatened species, may inhabit the river in low abundance."	The extemely low populations of fall-run Chinook salmon observed in the Tuolumne in recent years (figure 1) also indicate that Tuolumne hydrosystem operations provide inadequate protection for this species-of-concern. Even slight, marginal habitat impairment caused by WSIP operations may be interpreted as significant impacts against this highly impacted baseline condition.	162

26

SI_TRT-CWA-SierraC

			What the DPEIR says	Our Comment	
3	5.3.6	29	Bulleted list at the top of the page presents potential mechanisms for adverse effects on fishery habitat.	An important impact mechanism missing from this list is: Reduction in salmonid spawning gravel quality and quantity as a result of reduced frequency, duration and magnitude of peak flows. Hydrosystem operations tend to impact salmonid spawning gravel inexorably over time. This occurs as a result of reduced spawning gravel recruitment (via erosion) and sedimentation and armoring of available spawning gravel (Kondolf 1997, TNC 2006, Williams 2006) This impact is believed to be a major cause of salmonid decline in the Central Valley of California (TNC 2006). Reductions in peak flow magnitude, duration, and frequency are a critical impact of the WSIP and the DPEIR has not analyzed the impacts of reduced sediment transport on spawning/rearing habitat availability.	163
3	5.3.6	29	Final paragraph discusses projected changes in flow over a variety of water year types and references Table 5.3.6-1.	See numerous earlier comments regarding the effect of aggregating flow reductions across water year types as in Table 5.3.6-1. Despite the DPEIR's efforts to characterize flow changes as "infrequent," the anticipated flow reductions in the Tuolumne River under WSIP will undoubtedly reduce sediment transport rates in the River. This reduction in sediment transport may translate into accelerated degradation of spawning substrate for salmonids and rearing habitat for numerous fish species. The fact that most of these reductions occur only during the highest flow periods actually *increases* the impact on sediment transport since most sediment transport occurs during high-flow events. As a result of the truncation of the upper end of the natural hydrograph, WSIP can be expected to reduce recruitment of spawning gravel to the river and increase gradual armoring of spawning substrate, making it unsuitable for salmonid spawning.	164
3	5.3.6	31	First (partial paragraph): "...in some years, when the flow reductions are more substantial, the WSIP changes would adversely affect juvenile fall-run Chinook salmon rearing habitat." And First (full) paragrap: "Based on the magnitude of the stream flow changes, it is not expected that flow reductions under the WSIP would result in significant adverse impacts on juvenile fall-run Chinook salmon migration."	The DPEIR correctly identifies that there will likely be impacts to fall-run Chinook salmon from implementation of the WSIP. Its assesment of which DPEIR flow reduction would cause an impact, the frequency of those events, and the life stages that would be impacted are unsupported -- they represent a guess. Actual impacts could be far more frequent and affect more parts of the life-cycle than the report admits. For example, the relationship between flow and juvenile outmigration success and rate are poorly understood (Williams 2006).	165
3	5.3.6	31	Second full paragraph states: "...Flow reductions in June would likely result in seasonally elevated water temperatures and a corresponding reduction in the linear extent of suitable habitat for steelhead/rainbow trout rearing..." And "Changes in flow in June of average wet years ... would have a minor effect on steelhead/rainbow trout...a reduction in average monthly flow in June of approximately 102 cfs would cause a moderate change in habitat conditions, potentially affecting oversummering steelhead/rainbow trout as well as reducing physical habitat within the river for other aquatic species."	We quantify the modeled linear reduction in habitat for two different June model scenarios (see comments re: Figures 5.3.3-3 and 5.3.3-4). The DPEIR could have done a similar (or more comprehensive) quantifiable analysis to back up this assertion. What is the defintion of a "minor" effect" How does it differ from a "moderate change in habitat conditions"? As stated elsewhere in these comments, the **average** monthly reduction of flows by 25% (under some conditions) means that sometimes flow reductions will be greater than 25%. Reducing habitat space by 1/4 for periods of a month or more would be expected to have a large impact on populations. The population discussed here is a federally-threatened population; the DPEIR acknowledges that steelhead are "rare" in this stretch of the river. Reducing their habitat by 25% or more from time to time seems inadvisable.	166

SI_TRT-CWA-SierraC

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			What the DPEIR says	Our Comment	
3	5.3.6	31	Third full paragraph states: "Almost all the time, WSIP-induced flow reductions ...would have no effect on temperature [below La Grange Dam]." And "On very rare occassions, WSIP-induced flow reduction would cause mean daily temperature increases of 10oC downstream near the San Joaquin River..."	It is difficult to understand how the DPEIR calculated daily temperature increases when their hydrological model does not produce daily flow estimates. The volume of flow has a huge impact on the temperature gain of water as it flows through the Tuolumne. Without knowing the flow on a given day, calculation of temperatures for that flow are problematic. The DPEIR should provide a more detailed description of how it conducted that modelling. The DPEIR again confuses frequency with severity of impact. Without changing their meaning, these two sentences could be rewritten to say: Sometimes WSIP induced-flow reductions would impact temperatures in the river in ways that would have determinetal effects on rearing salmonids.	167
			Third full paragraph states: "Almost all the time, WSIP-induced flow reductions ...would have no effect on temperature [below La Grange Dam]." And "On very rare occassions, WSIP-induced flow reduction would cause mean daily temperature increases of 10oC downstream near the San Joaquin River..."	The severity and frequency of these temperature-related impacts would be expected to increase because of expected increases in regional temperature (see DPEIR Sect 5.7.6 "Climate change and gobal warming"). These temperature-related impacts must be reanalyzed to account for the effect of regional air temperatures and related impacts on flow volume and timing. Even seemingly small increases in temperature can have dramatic effects on salmonid survival and reproductive success (Richter and Kolmes 2005).	168

SI_TRT-CWA-SierraC

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October 1, 2007

	3	5.3.6	32	First (partial) paragraph: The flow reduction would reduce available habitat in the entire reach of the river used by juvenile salmonids below La Grange Dam. The elevated temperatures, although infrequent, would truncate the length of the river reach suitable for juvenile salmonids. These adverse effects on flows and temperature in the river under the WSIP would not substantially alter or degrade fishery habitat or jeopardize the continuation of the fishery populations in the lower Tuolumne River in most years. And The WSIP's small but incremental contribution to adverse effects on the lower river would make planned restoration of habitat and fishery resources more difficult.	What does it mean that WSIP-induced flow alterations will only jeopardize the continued existence of fish populations *some of the time*? This is nonsensical. Again the frequency of the impact is not nearly as important as the severity of the impact when the severity is potentially catastrophic. We agree that the WSIP's significant contribution to adverse effects on the lower river would make planned restoration of fish species in this area more difficult.	169
	3	5.3.6	32	First (partial) paragraph: Proposes implemetation of Measure 5.3.6-4a, "Avoidance of Flow Changes by reducing demand for Don Pedro Reservoir Water." And/or Proposed implemetation of Measure 5.3.6-4b "Fishery Habitat Enhancement," if 5.3.6-4a is not possible.	The ability to implement (mitigation) measure 5.3.6-4a is completely speculative as it involves procuring water from TID and MID. The prospects for this seem unlikely but, until an agreement is in place, it is doubtful that this proposal can serve as a mitigation measure because it is outside of the SFPUC's control. The alternative mitigation measure 5.3.6-4b does not respond to the anticipated impact. The impact is related to loss of habitat due to decreased flows and associated increased temperature. Physcial habitat restoration may be necessary in this area but it will not change the impact of substantial flow reductions and temperature increases.	170
	3	5.3.6	32	Last paragraph (p32) states: "Increased water temperatures, particularly during the late spring juvenile salmonid migration period… would also be expected to adversely affect juvenile salmon survival."	Agreed	171

29

SI_TRT-CWA-SierraC

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Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
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October 1, 2007

	3	5.3.6	33	Inflow to the lower San Joaquin River from the Tuolumne River would not be less than the minimum stream flow specified in the FERC license of the Don Pedro Project. As a result of this minimum flow requirement, the WSIP would not have a significant impact on flows...	Maintenance of minimum flows specifed by FERC does not equate to protection of the San Joaquin or Lower Tuolumne's fish resources. Indeed, that minimum requirement was established before steelhead were listed as threatened and before their presence was confirmed in the Tuolumne River. Quoting from Calfed (2000): *It is important to note that all of the agreed upon or proposed flows (AFRP, Tuolumne River Settlement Agreement, FERC, VAMP, Davis-Grunsky, and DFG recommended flows) in the Stanislaus, Tuolumne, and Merced Rivers were designed to facilitate Chinook salmon recovery, and little or no consideration was given to steelhead recovery in the design of these flow strategies. Flow and temperature requirements of steelhead will need to be evaluated and integrated into the proposed flow regimes.*	172
	3	5.3.6	33	Last Paragraph states: "To the extent that infrequent reduction in flow and corresponding increases in water temperature occur during the spring… WSIP operations would contribute to adverse impacts on habitat conditions for downstream migrating Chinook salmon and steelhead. However, this potential impact would occur so infrequently that it does not represent a significant impact to fishery resources."	Once again, the significance threshhold for significant impacts is not adequately defined. If severe impacts occur only "infrequently" does that mean they are not significant? What is the threshold of severity frequency that defines a significant impact? These threshods must be laid out and justified in advance, otherwise the assesment of impacts amounts to no more than wishful thinking. Steelhead are listed as a threatened species. Fall-run Chinook salmon are a species of special concern. Numbers of both species are severely reduced on the Tuolumne from historic norms. As a result, any negative impact to these species that results from a discretionary action (like WSIP) must be regarded with extreme caution. Also, given the historic decline in these populations, it is highly likely that current operations of the Tuolumne hydrosystem provide inadequate protection for these species -- thus, marginal decreases in habitat quality from this already highly impacted state cannot be regarded as insignificant.	173
		H1.3.1	13	Paragraph 4 provides a description of drought planning inputs to the HH/LSM model and states: "Studies suggest that there is a 30 percent chance that the SFPUC system will experience a drought in the next 75 years equal to or more severe than the 1987-1992 drought."	No citation of these "studies" is provided.	174

30

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Appendix H	H1.3.1	15	Paragraph three describes the possible implications of the monthly time interval used in the DPEIR analysis, and states: "In additional instances such as the analyses of flow effects below Hetch Hetchy Reservoir and Alameda Creek Diversion Dam, HH/LSM results have been refined or tiered to provide additional insight to the effects of the WSIP upon stream flow for periods less than a month."	What methods were used to "tier" monthly results to analyze effects of the WSIP on stream flows below Hetch Hetchy Reservoir and Alameda Creek Diversion Dam for periods less than a month? Using a monthly interval for analysis limits the feasibility of conducting analyses of the effects of the WSIP on daily and weekly flow regimes. Considering that the monthly time-step constitutes a serious limitation for analysis of the proposed changes to daily and weekly hydrologic flow regimes, data resulting from the "tiering" process, analysis of these data, and the methods used to produce that data and analysis should be provided.	175
Appendix H	H1.3.1	16	Table 5.1-2 describes model features and their respective outflow parameters.	Only accumulated precipitation is presented as a model input for Hetch Hetchy Reservoir. Why were Lakes Eleanor and Lloyd excluded as inputs?	176
Appendix H	H2-1	49	Table 1-2 Summary of Modeling Results (Part 1/2) Provides a summary list of setting characteristics and modeling assumptions for the HH/LSM model.	Under the item Study Average Production & Disposition (1921-02) and the sub-items TID Diversion and MID Diversion assumes that both TID and MID diversions will remain static. What is the basis for this assumption? On page 5.7-92 of Volume 3, the DPEIR identified that the studies of global climate change summaried in Table 5.7-21, indicate that "changes in urban and agricultural water demand" and increases in evaporation and concomitant increased irrigation need" are likely outcomes of climate changes in the Central Valley and southern Sierra Nevada. Thus, the assumption that TID and MID agricultural water demands in 2030 will remain the same is unsupported.	177
Appendix H	H2-1	49	Table 1-2 Summary of Modeling Results (Part 1/2) Provides a summary list of setting characteristics and modeling assumptions for the HH/LSM model.	Under the item Study Average Production & Disposition (1921-02) and the sub-item Water Bank Account water transfers from TID and MID supplies are presumed to be 27,000 acre-feet. Has the SFPUC reached an agreement with TID and MID on this proposed transfer? If so, where is the documentation of that agreement? If not, because this assumption has a high degree of uncertainty, modelling results based on this assumption also have a high degree of uncertainty.	178
Appendix H	H2-1	55	Table 2.1-1 Provides a list of differences in total modeled system-wide delivery with implementation of WSIP	The data contained is difficult to review in this format. These types of data should be displayed as a single hydrograph or a set of hydrographs. Presenting extensive datasets as long table without corresponding graphs makes it very difficult to compare between the two scenarios. Without entering the data into a statistical or graphical software package, the reader cannot accomplish the required comparisons.	179
Appendix H	H2-1	61	Table 2.3-3 provides a list of differences in total modeled system-wide delivery with implementation of WSIP.	The data contained is difficult to review in this format. These types of data should be displayed as a single hydrograph or a set of hydrographs. Presenting extensive datasets as long tables without corresponding graphs makes it very difficult to compare between the two scenarios. Without entering the data into a statistical or graphical software package, the reader cannot accomplish the required comparisons.	180

31

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Appendix H	H2-1	62	Table 2.3-3 provides a list of differences in total modeled system-wide delivery with implementation of WSIP.	The data contained is difficult to review in this format. These types of data should be displayed as a single hydrograph or a set of hydrographs. Presenting extensive datasets as long tables without corresponding graphs makes it very difficult to compare between the two scenarios. Without entering the data into a statistical or graphical software package, the reader cannot accomplish the required comparisons.	181
Appendix H	H2-1	63	Table 2.3-3 provides a list of differences in total modeled system-wide delivery with implementation of WSIP.	The data contained is difficult to review in this format. These types of data should be displayed as a single hydrograph or a set of hydrographs. Presenting extensive datasets as long tables without corresponding graphs makes it very difficult to compare between the two scenarios. Without entering the data into a statistical or graphical software package, the reader cannot accomplish the required comparisons.	182
Appendix H	H2-1	65	Table 2.3-4 provides a list of differences in total modeled Hetch Hetchy delivery with implementation of WSIP.	The data contained is difficult to review in this format. These types of data should be displayed as a single hydrograph or a set of hydrographs. Presenting extensive datasets as long tables without corresponding graphs makes it very difficult to compare between the two scenarios. Without entering the data into a statistical or graphical software package, the reader cannot accomplish the required comparisons.	183
Appendix H	H2-1	66	Table 2.3-5 provides a list of differences in total modeled Hetch Hetchy delivery with implementation of WSIP.	The data contained is difficult to review in this format. These types of data should be displayed as a single hydrograph or a set of hydrographs. Presenting extensive datasets as long tables without corresponding graphs makes it very difficult to compare between the two scenarios. Without entering the data into a statistical or graphical software package, the reader cannot accomplish the required comparisons.	184
Appendix H	H2-1	67	Table 2.3-6 provides a list of differences in total modeled Hetch Hetchy delivery with implementation of WSIP.	The data contained is difficult to review in this format. These types of data should be displayed as a single hydrograph or a set of hydrographs. Presenting extensive datasets as long tables without corresponding graphs makes it very difficult to compare between the two scenarios. Without entering the data into a statistical or graphical software package, the reader cannot accomplish the required comparisons.	185
Appendix H	H2-1	71	Table 2.4-1 provides a list of differences in total modeled Lake Lloyd releases to Cherry Creek.	The data contained is difficult to review in this format. These types of data should be displayed as a single hydrograph or a set of hydrographs. Presenting extensive datasets as long tables without corresponding graphs makes it very difficult to compare between the two scenarios. Without entering the data into a statistical or graphical software package, the reader cannot accomplish the required comparisons.	186
Appendix H	H2-1	75	Tables 2.6-1 through 2.6-8 provide lists of differences in total modeled Don Pedro Reservoir storage.	These data are difficult to review in this format. These types of data should be displayed as a single hydrograph or a set of hydrographs. Presenting extensive datasets as long tables without corresponding graphs makes it very difficult to compare between the two scenarios. Without entering the data into a statistical or graphical software package, the reader cannot accomplish the required comparisons.	187

32

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October 1, 2007

			What the DPEIR says (* indicates direct quote, otherwise paraphrase)	Our Comment	
4	6.4.2	48	Measure 5.3.6-4a states: "The SFPUC will pursue a water transfer arrangment with MID/TID and/or other water agencies such that the water acquired is developed through actions that result in reduction of demand on Don Pedro Reservoir as a result of conservation, improved delivery efficiency, inter-agency water transfer or use of an alternative supply such as groundwater....The counsequent increase in water storage in Don Pedro Reservoir would offset the reduction in inflow ... attributable to WSIP [and thus] the release pattern from La Grange Dam would be the same or similar to the existing condition ..."	None of these potential sources of "new" water for Don Pedro Reservoir are confirmed. SFPUC cannot guarantee that these new water sources will become available or that their size or the timing of their availability will be sufficient to completely mitigate impacts 5.3.6-4 and 5.3.7-6. Given that (a) MID and TID currently divert less than their water right allows and there is every reason to believe that their needs for water will increase (especially given the trends expected to continue from global warming); reaching an agreement in which TID/MID divert less water than under current conditions seems hopelessly optimistic.	188
4	6.4.2	48	Measure 5.3.6-4b states: "If Measure 5.3.6-4a is not implemented, then the SFPUC will mitigate potential fishery effects on the lower Tuolumne River by implementing one of the following two habitat enhancement actions....gravel augmentation or isolating or filling a captured former gravel quarry pit along the river."	The first alternative (gravel augmentation) has nothing to do with the impact identified. Impacts 5.3.6-4 and 5.3.7-6 have to do with reductions in juvenile salmonid rearing and migration habitat. Gravel augmentation will increase spawning habitat for these species. Spawning habitat may indeed be limiting to these species; however, because the SFPUC has not monitored spawning habitat availability or use in this stretch of the river, we cannot assess the effect of current hydrosystem operations on spawning habitat availability. Restoring spawning gravel will not mitigate for impacts to the later life stage; indeed it may exacerbate that impact by increasing densities of juveniles competing for limited rearing habitat.	189

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Specific comments on the hydrologic, geomorphic, and fishery impacts of the WSIP
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October 1, 2007

			What the DPEIR says (* indicates direct quote, otherwise paraphrase)	Our Comment	
			Measure 5.3.6-4b states: "If Measure 5.3.6-4a is not implemented, then the SFPUC will mitigate potential fishery effects on the lower Tuolumne River by implementing one of the following two habitat enhancement actions....gravel augmentation or isolating or filling a captured former gravel quarry pit along the river."	The second alternative (isolating a former quarry) would be expected to benefit rearing salmonids because it would reduce habitat for their predators. There is no analysis of the current impact of predators in this quarry on Chinook salmon or steelehad (the magnitude of these impacts are bound to be somewhat different); therefore the mitigative effect of isolating this captured quarry cannot be evaluated. Impact 5.3.7-6 deals with likely impacts to terrestrial species that rely on riparian habitat; neither of the proposed alternatives under Measure 5.3.6-4b would have any beneficial effect on these species/habitats.	190
			Measure 5.3.6-4b states: "If Measure 5.3.6-4a is not implemented, then the SFPUC will mitigate potential fishery effects on the lower Tuolumne River by implementing one of the following two habitat enhancement actions....gravel augmentation or isolating or filling a captured former gravel quarry pit along the river."	By suggesting the need to restore spawning gravel in the Tuolumne River, the SFPUC indicates that it believes spawning gravel quality and/or availability are insufficient in this area. Because current hydrosystem operations in this area are almost certain to have had some impact on spawning substrate quantity and quality in this area, the SFPUC should be required to monitor both salmonid spawning habitat and salmonid rearing habitat to determine which of these habitat types is limiting in this stretch of river.	191

Attachment B

(From *Instream Flow Requirements for Rainbow and Brown Trout in the Tuolumne River Between O'Shaughnessy Dam and Early Intake,* Michael Aceituno for the U.S. Fish and Wildlife Service, Draft, 1992.)

Table I. The minimum amounts of water to be released from Hetch Hetchy Reservoir to the Tuolumne River at O'Shaughnessy Dam by water year schedule along with additional "mitigation" water provided under agreement in 1985.

Month	Minimum Monthly Release Schedule (CFS) A	B	C	Cumm. Precip.(In.) or runoff (AF) A >	B >	C
January	50	40	35	8.8	6.1	
February	60	50	35	14.0	9.5	
March	60	50	35	18.6	14.2	
April	75	65	35	23.0	18.0	
May	100	80	50	26.6	19.5	
June	125	110	75	26.6	21.3	
July	125	110	75	575,000	390,000	
August	125	110	75	640,000	400,000	
September 1-15	100	80	75	---	---	
September 16-30	80	65	50	---	---	
October	60	50	35	---	---	
November	60	50	35	---	---	
December	50	40	35	---	---	
MINIMUM RELEASE (AF)	56,207	49,994	35,197			
Added "mitigation" release for water year (AF)	18,000	6,500	4,400			
TOTAL ANNUAL FISHERY ALLOCATION (AF)	74,207	56,494	39,597			

(See reverse for recommended instream flow schedule.)

193

12.4-121

Commenter	Section	Page	Text	Comment
	4.6.4.2	48	Measure 5.3.6-4b states: "If Measure 5.3.6-4a is not implemented, then the SFPUC will mitigate potential fishery effects on the lower Tuolumne River by implementing one of the following two habitat enhancement actions…gravel augmentation or isolating or filling a captured former gravel quarry pit along the river."	In 1992, the USFWS conducted an evaluation of salmonid spawning habitat upstream of Don Pedro Dam; it is not clear why the SFPUC has not conducted a similar (or more comprehensive) analysis of spawning and rearing habitat availability under different flow regimes in the lower Tuolumne. Given that Tuolumne hydrosystem operations impact spawning and rearing conditions for native salmonids in the lower Tuolumne, it seems that the SFPUC should be required to conduct such monitoring to ensure that its operations do not impact the threatened Central Valley steelhead population or the ESA-candidate fall-run Chinook salmon population.

192

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193 cont.

07/17/92
10:00am

ROUGH DRAFT

BEECH HOLLOW FARM

Table VI. Annual instream flow schedule recommended for the maintenance of rainbow and brown trout within the Tuolumne River between O'Shaughnessy Dam and Early Intake.

		Minimum Instream Flow Schedules							
		A		B		C			
Month	Days	cfs	Ac-Ft.	cfs	Ac-Ft	cfs	Ac-Ft
January	31	85	5,227	70	4,304	50	3,074
February	28	95	4,721	70	3,888	50	2,772
March	31	85	5,227	70	4,304	60	3,689
April	30	100	5,951	70	4,165	75	4,463
May	31	100	6,148	70	4,304	100	6,149
June	30	125	7,438	125	7,438	125	7,438
July	31	150	9,223	135	8,301	125	7,686
August	31	150	9,223	125	8,301	125	7,686
September 1-15	15	125	3,719	100	2,975	100	2,975
September 16-30	15	100	2,975	70	2,083	80	2,380
October	31	85	5,227	70	4,304	60	3,689
November	30	85	5,056	70	4,165	60	3,570
December	31	85	5,227	70	4,304	60	3,074

Attachment C

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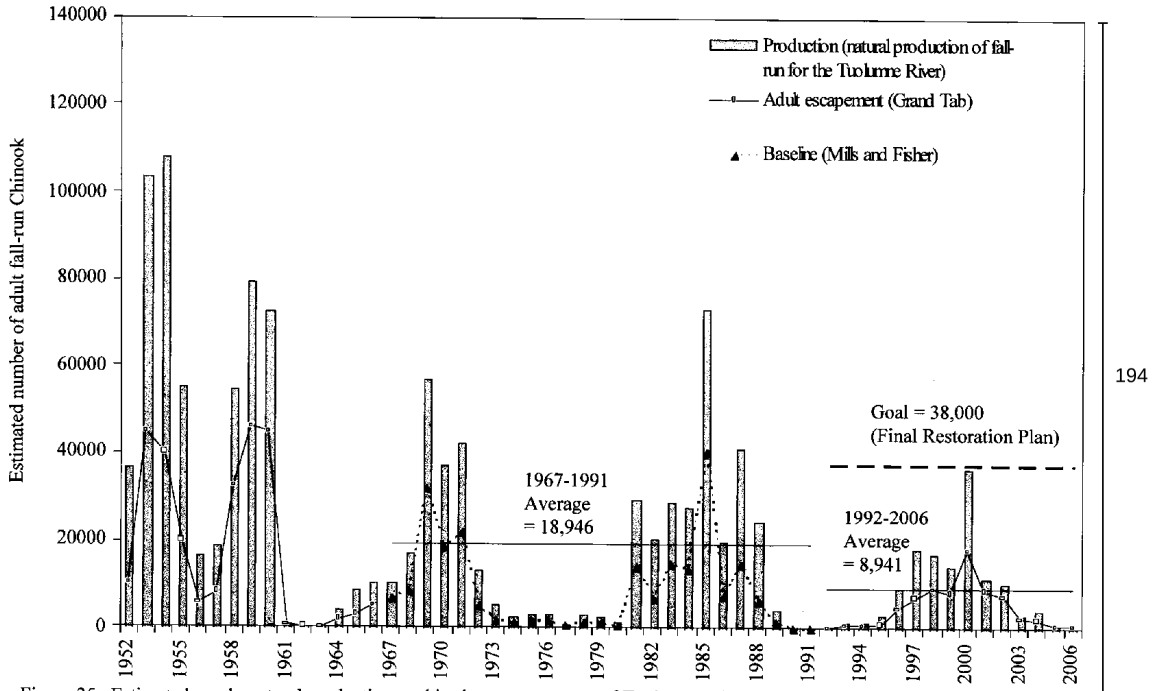
DRAFT 3-28-07



194

Figure 35. Estimated yearly natural production, and in river escapements of Tuolumne River adult fall-run Chinook salmon. 1952 - 1966, and 1992 - 2006 numbers are from CDFG Grand Tab (January 31, 2006). Baseline numbers (1967 - 1991) are from Mills and Fisher (CDFG, 1994).

COMMENT SI_TRT-CWA-SierraC-195:

This comment is comprised of the attachment indicated below, which is an exact duplicate of Comment Letter SI_PacInst.

Attachment H: Pacific Institute for Studies in Development, Environment and Security, *A Review of the San Francisco Utility Commission's Retail and Wholesale Customer Water Demand Projections*. July 2007.

195

Studies on Water Conservation

1. **EPA Case Studies**

"Cases in Water Conservation; how efficiency programs help water utilities save water and avoid costs." July 2002. Report on case studies of regional areas and their success in water conservation; including Irvine Ranch, Seattle and the Metropolitan Water District of Southern California.
http://www.epa.gov/watersense/docs/utilityconservation_508.pdf

2. **Seattle**

"Water Conservation Potential Assessment; Executive Summary." May 1998. Document about Seattle and its water program.
http://www.seattle.gov/util/stellent/groups/public/@spu/@csb/documents/webcontent/spu01_002152.pdf

"Potential Benefits of Water Supply Regionalization: A Case Study of the Seattle and Everett Water Systems"
http://www.tag.washington.edu/papers/papers/Reese-etal.2000.ASCE-Conf-Proc.0-7844-0517-4.pdf

3. **Metropolitan Water District of Southern California**

"Investing for the Future: Achievements in Conservation, Recycling and Groundwater Recharge" (annual progress report to the California State Legislature from the Metropolitan Water District of Southern California). February 2007.
http://www.mwdh2o.com/mwdh2o/pages/yourwater/sb60_06/SB60_2007_web.pdf

4. **Water Rates used in "Tuolumne to the Tap"**

Seattle
http://www.seattle.gov/util/Services/Water/Rates/WHOLESALE_2003120209103210.asp

Metropolitan Water District of Southern California:
http://www.mwdh2o.com/mwdh2o/pages/finance/finance_03.html

5. **"The Impacts of High Efficiency Plumbing Fixture Retrofits in Single-Family Homes." Prepared by Aquacraft, Inc. Water Engineering and Management.**

Seattle
http://www.cuwcc.org/enduse_studies/Seattle_Final_Report_Dec-2000.pdf

Tampa, FL.
http://www.tomthetoiletman.com/tampa_report.pdf

196

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A Review of the SFPUC Retail and Wholesale Customer Demand Projections

Sustainable Water Supply Briefing
September 28, 2006

Heather Cooley
Peter Gleick
Pacific Institute, Oakland, CA

PACIFIC INSTITUTE

Summary

- We reviewed current and projected water demand and conservation programs for SFPUC wholesale and retail customers.
- Demand increases are projected to vary dramatically from user to user.
- Demand increases are driven by non-residential and outdoor uses.
- Projected conservation programs inadequately address projected demand.
- Better efficiency studies are needed.

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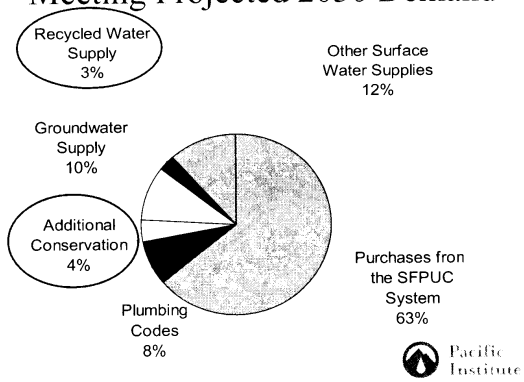
197

Meeting Projected 2030 Demand



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SFPUC Assumed Conservation Programs

- Wholesale Customers (Program B)
  - Fewer than 10 measures
  - Estimated savings: 13.4 mgd
- Retail Customers (Package C)
  - 38 measures
  - Estimated savings: 4.5 mgd

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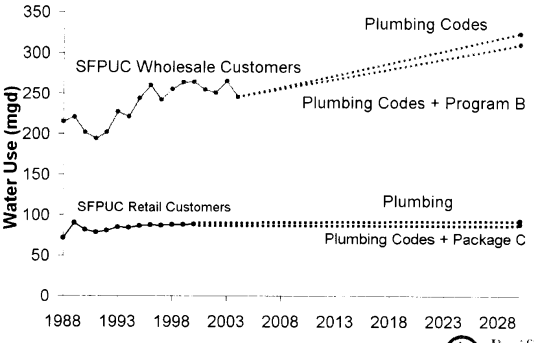
Historic and Projected Water Demand



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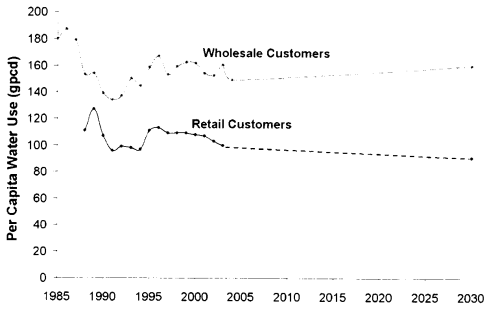
Historic and Projected Gross Per-Capita Demand



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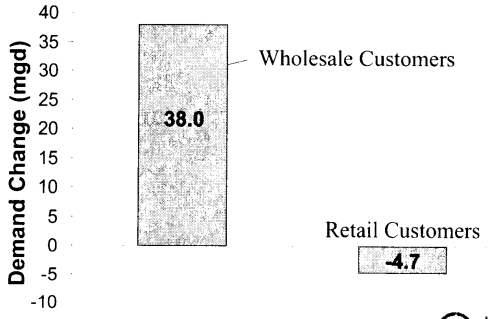
197 cont.

Demand Change (Current - 2030)



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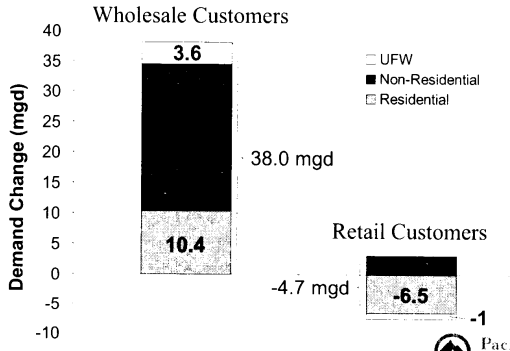
Demand Change (Current - 2030)



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Residential Per-Capita Demand (gpcd)

		Current		2030	
Customer	Sector	Indoor	Outdoor	Indoor	Outdoor
Wholesale	Single-family	69	**39**	58	**40**
Retail	Single-family	56	4	47	5

Efficient Indoor Water Use

AWWA: 45 gpcd

Seattle Study: 40 gpcd

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Non-Residential Demand

- Accounts for over **80%** of demand increase
- Employment projections too high
- Forecast method for wholesale customers is inadequate.
- Conservation measures fail to reduce demand to levels achieved elsewhere.

197 cont.

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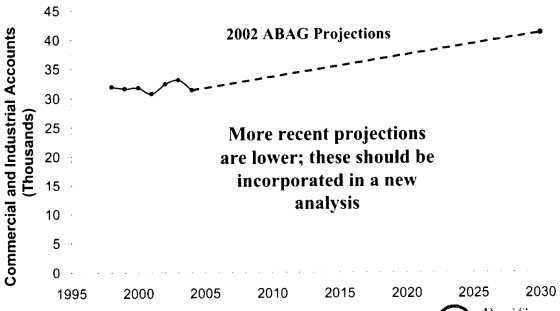
Employment Projections



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Forecast Method (Wholesale, Non-Residential Customers)

- Assumes that all non-residential users grow at the same rate (31.3% in accounts by 2030)
- Assumes water use among these non-residential users is the same
- This approach appears to overestimate 2030 demand.

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Non-Residential Conservation

- Proposed conservation reduces non-residential demand by 4%.
- Santa Clara Valley Water District study: 38%
- Pacific Institute study: 39% (minimum cost-effective savings of 26%)

Price-Driven Efficiency

- Price-driven efficiency improvements are **not** considered separately.
- But we know that water demand **IS** elastic.
- Water prices projected to quadruple by 2015 (in real dollars).

197 cont.

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Conclusions

- Demand increases are driven by non-residential and outdoor uses.
- Proposed conservation programs do not address these projected demands.
- Non-residential demand and conservation potential are inadequately evaluated.
- Price-driven conservation is not included.
- Projected recycled water use is small.

Recommendations

- More emphasis needs to be placed on reducing outdoor water use.
- Non-residential demand and conservation potential must be reassessed using industry-specific data on economic growth, water use, and conservation potential.
- Price-driven conservation must be included.
- Recycled water use must be expanded.

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Review of SFPUC Wholesale Demand Projections for 2030

Edward R. Osann
Potomac Resources, Inc.
September 28, 2006

Documents Reviewed

- Sustainable Water Supply Briefing Background Information Package 2006
- Wholesale Customer Demand Projections Technical Report (URS 2004)
- 2030 Purchase Estimates Technical Memorandum (URS 2004)
- Settlement Agreement and Master Water Sales Contract 1984

198

Key findings of the SFPUC Analysis

- Increased demand for water
  - +52 mgd suburban (+19%)
  - SF retail decrease
- Anticipated increases in SFPUC purchases
  - +35 mgd suburban (+19%)
  - SFPUC retail decrease
- 2030 Purchases *above* Supply Assurance
  - +24 mgd (+13%)
- Increased diversions from Tuolumne & Delta
  - ???

Has the Case Been Made for Increasing the Assured Supply?

- Are there shortcomings in the regional demand forecast?
- How sensitive is the projected demand to unmodeled factors, new technologies?
- Are there shortcomings in the conservation practices of individual wholesale customers?
- Are the demand increases contained in the forecast truly compelling?

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Are there shortcomings in the regional demand forecast?

- Pricing and elasticity
  - Missing analysis of the effects of rising costs for water and wastewater service on future demand;
  - Lack of consideration of pricing as a conservation strategy.
- 'Unaccounted for' water (e.g., leaks, unauthorized uses)
  - Crude projection of increased losses in lockstep with increased demand;
  - Lack of consideration of loss reduction as a conservation measure.

How sensitive is projected demand to new developments?

- New plumbing standards now on the Governor's desk (AB 2496)
  - Effective 2011, all new toilets must be 1.3 gpf, approx. 18 % more efficient
- New clothes washer standards pending before the Secretary of Energy
  - Effective 2010, all new washers in CA must have max WF of 6.0, approx. 30% more efficient
- 'Smart' Irrigation controllers -- weather based, moisture sensing
  - Performance still being verified, but 10% improvement should be obtainable

198 cont.

Are there gaps in the conservation practices of individual wholesale customers?

Considerations --

- Efficiency comes in small increments, no one 'silver bullet'
- Demand management is not static, but a continuous process of seeking out cost-effective opportunities to save water
- Areas of highest demand growth may present best opportunities for leadership and new savings

Where is the Growth in Demand?

6 Systems Comprise 70% of Demand Growth

Hayward	9.4 mgd	+49%
Alameda County	8.2 mgd	+16%
Santa Clara	8.1 mgd	+31%
Milpitas	5.7 mgd	+48%
Stanford	2.9 mgd	+76%
East Palo Alto	2.3 mgd	+92%
total	36.6 mgd	+32%

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Weak Price Signals for Water

	rate type	relative to average of all BAWSCA agencies ($2.55/ccf)
Hayward	3-tier	below av
Alameda County	uniform	below av
Santa Clara	uniform	below av
Milpitas	2-tier*	above av
Stanford	NA	
East Palo Alto	uniform	below av

*second tier starts 50% above average use

No Price Signal for Wastewater

BMP 11 calls for all signatories that provide both water and sewer service to employ volumetric rates for both.

	rate type	type of service
Hayward	flat	collection & treatment
Alameda County	NA	
Santa Clara	flat	collection
Milpitas	flat	collection
Stanford	NA	
East Palo Alto	flat	collection

198 cont.

Are the demand increases contained in the forecast truly compelling?

Hayward	*existing* SFR outdoor use projected to nearly double; 'nicer' landscaping
Alameda Cty	residential growth is all outdoors
Santa Clara	2/3 of projected increase in SFPUC purchase is growth on UAF (leaks/unauthorized uses)
Milpitas	new SFR and commercial use is over 50% outdoor use
Stanford	lake system use is nearly doubled
East Palo Alto	60% of new demand is new commercial development

Not 'bad' uses, but all present opportunities for intervention

Are the demand increases contained in the forecast uncontrollable?

Overall wholesale demand growth in outdoor use (20 mgd) and leaks and unauthorized uses (3.5 mgd) is comparable to the inferred increase in the Assured Supply (24 mgd)

Targeted strategies will dampen these demands:

Outdoor: A combination of pricing strategies, site plan review, and technology deployment (incentives, requirements)

Water losses: reject basing 'sufficiency' on fixed percentages; water accounting as per new AWWA M-36 manual, component analysis to determine cost-effective interventions

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Review of the Role of Price in SFPUC Water Demand Forecasts

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September 28, 2006

Outline

Summary
Construct Validity—Which Water Demand?
Questions—How was Price Handled?
Some Answers—what could water price be integrated into water demand?

199

Overall Assessment of Water Demand Forecasts

A consistent application of a consistent model
A transparent modeling effort
A monumental amount of work
A programmatic focus on conservation programs
A great improvement over that which preceded

Opportunities for Improvement

Determinants of Demand—
- better explanation of demand drivers improve long run prediction: human choice is involved

Seasonality—Not all gallons are created equal
More measurement, fewer assumptions
Focus on customer demand
- willingness to pay for safe reliable water service

Need for the Utility to use WUE to
- Communicate the value of water service

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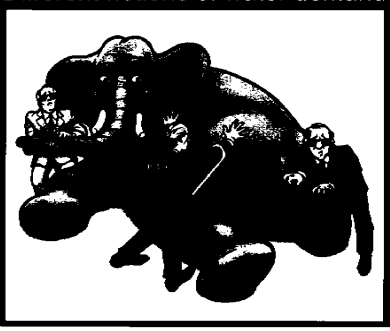
What is Water Demand?

If we are going to forecast it,
We should know what it is.

See Merritt, 2004,

Different notions of water demand



Different notions of water demand

Engineer – may view demand in terms of "demand load" – a production requirement, need

Water Planner – water demand as supply provided, use

Wastewater Planner – concerned with water use not consumed, but disposed

Financial Planner -- demand as revenue-producing consumption;

Economist – demand as a choice-based relationship between quantity and price, sometimes conditional on quality and reliability

Three Types of "Demand" Models

Water Requirements Model
Water Use Model
Water Demand Model

199 cont.

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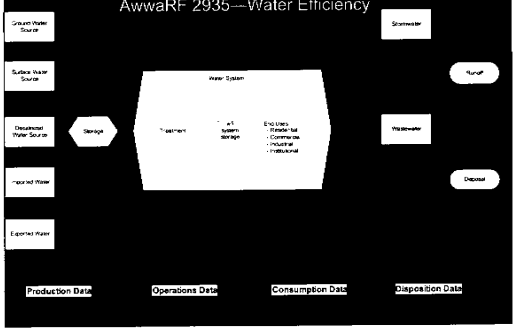
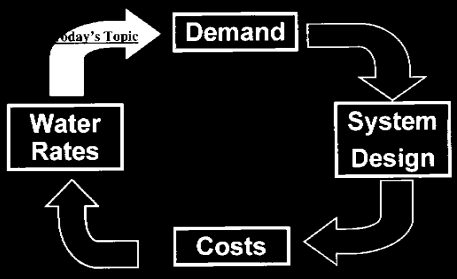
Flow of Water

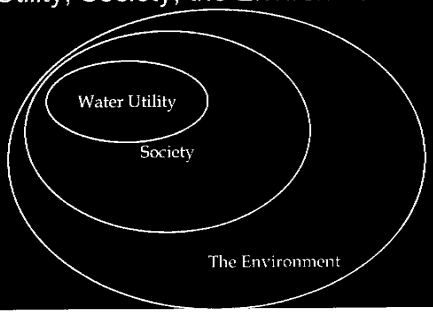
AwwaRF 2935—Water Efficiency



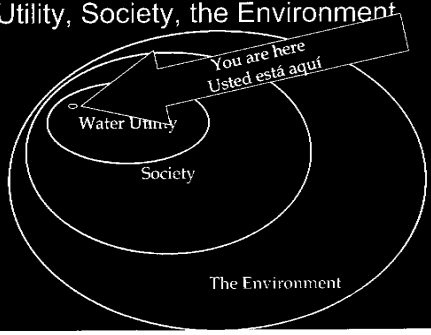
Flow of Dollars



Utility, Society, the Environment



Utility, Society, the Environment



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Flow of Water – Environmental View

Water Uses

Environmental
- >forest/brush-used (ET)
- >fishery flows
- >stream morphology
- >aquatic habitat (E&T)
- >riparian habitat (ET)
- >terrestrial habitat (ET)
- >ecosystem restoration

Urban
- >private sanitation
- >public sanitation
- >private landscape (ET)
- >public landscape (ET)
- >industrial cooling (E)
- >industrial processing
- >leakage and spillage

Agricultural
- >range (ET)
- >crop (ET)
- >system (E&T)
- >leaching
- >seepage and spillage
- >wetland

Recreational
- >water sports
- >game habitat (E&T)
- >fishing habitat

Water Flowpaths

Sub-Basin Inflows
A precipitation on area
B surface inflows
C subsurface inflows
D imported water
E desalination

Sub-Basin Outflows
A crop ET
B landscape ET
C natural vegetation ET
D riparian habitat ET
E aquatic habitat E&T
F direct evaporation E
G surface
H subsurface

Internal Flows
A reservoir releases
B river & stream
C river diversion
D canal & pipeline
E deliveries to users
F seepage
G deep percolation
H GW extractions
I surface runoff or spill
J surface return
K subsurface return
L flows to salt sinks
M recycling

Source Jack Keller

Questions Posed to Me

1. Was the future price of water appropriately considered when developing the 2030 water demand projections and conservation potential projections?
2. How could pricing issues have been more appropriately considered in these projections?
3. What are the risks of not appropriately considering the impact of water pricing?
4. What mechanisms (i.e. rate structures, stewardship fees) could the SFPUC and/or BAWSCA employ in order to finance regional conservation programs?
5. Given that the SFPUC and their wholesale customers will sign a new water sales agreement in 2009, are there any contractual elements you would recommend they consider that would enhance regional water conservation efforts?

199 cont.

Questions and Answers

Q1. Was the future price of water appropriately considered when developing the 2030 water demand projections and conservation potential projections?

A1. Price does not directly affect water demand forecasts. This is a shortcoming.

Why worry about Price?

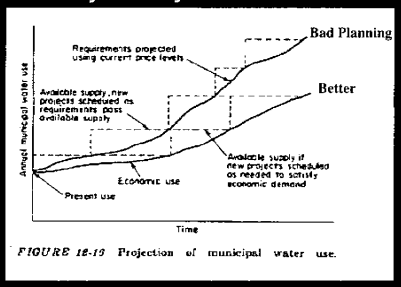

FIGURE 18-13 Projection of municipal water use.

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Understanding Water Demand

Lesson 1: **Price influences demand.**

Lesson 2: **"Price elasticity" is the percentage change in demand induced by a one percent change in price, all other factors being constant.**

Lesson 3: **Demand can be thought of as the sum of demands for different end uses of water.**

Lesson 4: **Demand for outdoor uses are more price-elastic than demand for indoor uses.**

A summary from Phase I report of the CUWCC Urban Retail Water Rates Project:
October 1994.

Understanding Water Demand, cont.

Lesson 5: **Demand for water during peak (summer) periods is greater than demand during off-peak (winter) periods.**

Lesson 6: **Residential water demand is inelastic--The response of residential demand to rate changes, though not zero, is small.**

Lesson 7: **Demand is more elastic in the long run than in the short run.**

Lesson 8: **Demand is influenced by forces other than price—including population growth, the economic cycle, weather, and income growth.**

Lesson 9: **The response of demand is more difficult to predict for large changes in price.**

199 cont.

Demand Analysis

Ingredients needed for planning

- **a forecast of the of future water demand**
- **a forecast of the of future water demand**
- **quantification of the surrounding future water demand**
- **quantification of the of water demand to changes in rates**
- **an accounting of the achieved by demand-side management**
- **an estimate of the potential achievable through demand-side management**

Questions and Answers

Q2. How could pricing issues have been more appropriately considered in these projections?

A2. The logical next steps for water demand forecasting include developing a better depiction of the long-run determinants of water demand.

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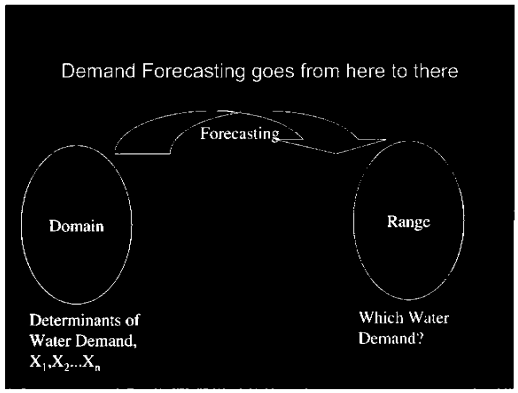

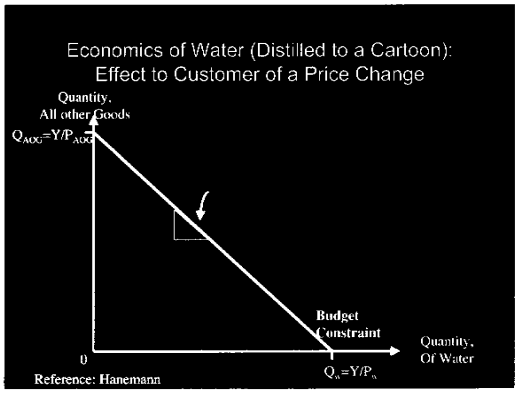

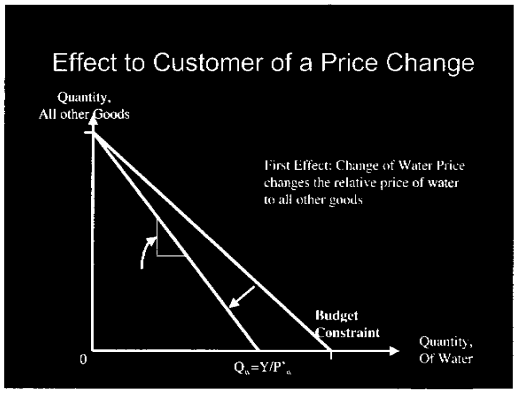

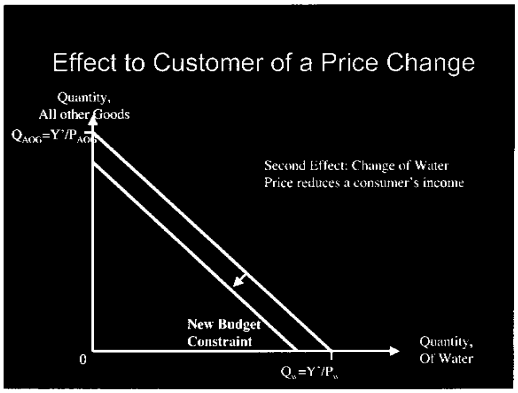

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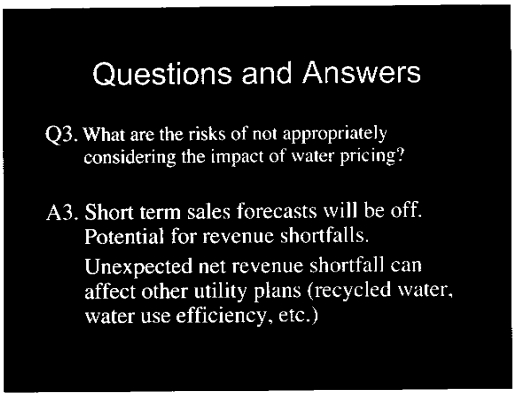

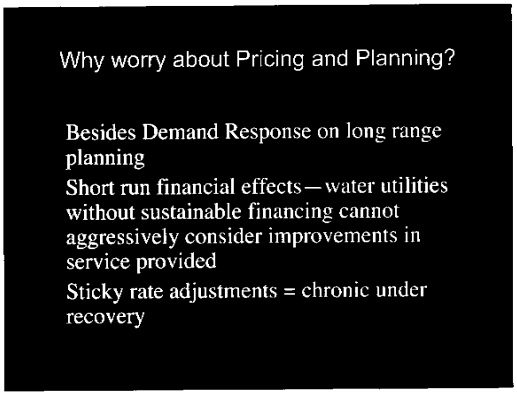

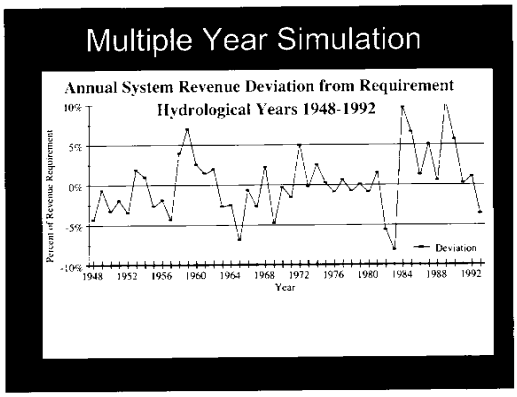

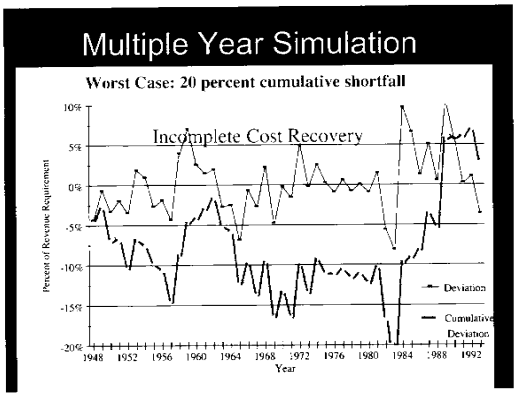

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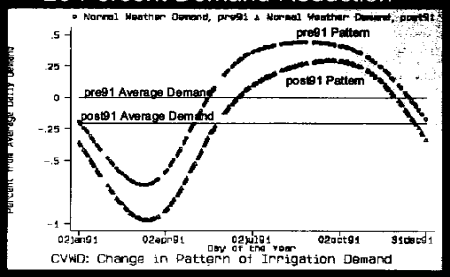
One response to price—23 Percent Demand Reduction



Example of an aggressive tiered rate tied to account level water budget with customer outreach—Capistrano Valley WD.

Questions and Answers

Q4. What mechanisms could the SFPUC and/or BAWSCA employ in order to finance regional conservation programs?

A4. Alternatives include:

- Volumetric charge for regional conservation funding
- Regional WUE implementation (one stop shopping)
- Dedicated funding from tiered pricing

199 cont.

In a Situation of Resource Scarcity…

- Water Use Efficiency (WUE) programs can provide customers with the information needed to balance new costs with their benefits.
- There are economies of scale in the provision of information on WUE measures.

Questions and Answers

Q5. Given that the SFPUC and their wholesale customers will sign a new water sales agreement in 2009, are there any contractual elements you would recommend they consider that would enhance regional water conservation efforts?

A5. Regional Implementation of Conservation

- Sustainable Financing for Conservation
- Water Rate Reform—get your signals straight
- Research and Measurement of Demand