

March 14, 2016

CALIFORNIA WATER COMMISSION
Attention: Jennifer Marr, Supervising Engineer
901 P Street, Room 314
P.O. Box 924836
Sacramento, CA 94236-0001

**SUBJECT: Comments on Water Storage Investment Program (WSIP)
Draft Regulations**

Dear Chairman Byrne and Members of the Commission:

Thank you for the opportunity to comment on the WSIP draft regulations concerning quantification. We at Montgomery & Associates laud the State of California's commitment to increasing water supply reliability for its residents, while also striving for ecological improvements. The following comments are respectfully submitted based on our belief that incorporating them into revised regulations and associated materials will benefit those preparing WSIP applications, as well as the Commission in judging applicants' quantification estimates.

Our comments relate to three linked quantifications: (1) quantifying changes in water stored (and by extension water available for environmental purposes); (2) quantifying physical ecological changes besides water quantity and timing; and (3) quantifying ecological benefits and costs. We note that uncertainties compound as an applicant steps through these three processes. For example, consider a potential project that proposes to improve conditions for salmon. The uncertainty bounds around the monetized ecological benefits of increased salmon depend in part on the uncertainty bounds of salmon response to hydrologic changes, which in turn depends on the estimate of how a given project will actually modify baseline hydrology. Thus, to the extent the Commission can further guide best practices for applicants, the ultimate range of quantified benefits and costs could be significantly tightened. This would facilitate comparison across applicants based more on differences in what is proposed and less on the various quantification and valuation approaches chosen by applicants. Specific suggestions follow.

1. Offer more guidance on quantifying hydrologic changes, including recharge facilities

Water storage facilities will be part of many proposals, and the Commission will need criteria to evaluate and compare them. The regulations are relatively void of guidance on

what would make a better recharge facility. Desired recharge capacity is a fundamental factor in determining the feasibility of any given site; a given site may be a poor option for a large-scale facility but could be acceptable for a small-scale facility.

Recharge can be achieved via several different methods, including: surface infiltration basins; vadose zone or saturated zone injection wells; in-channel recharge; infiltration galleries; and spreading water on fallow agricultural fields. The recharge method may in part dictate the site chosen, or conversely, conditions at the chosen site may favor a particular recharge method.

Based on our experience in implementing dozens of groundwater storage and recovery projects, we suggest the Commission develop evaluation criteria based on suitability of recharge at a given site and its hydrogeologic factors, impacts on others, water resource benefits, non-hydrogeologic factors, and recovery considerations.

1.A. Hydrogeologic factors and impacts to others

A key factor in assessing recharge projects is the physical capacity of subsurface geologic materials (typically basin-fill sediments) to transmit water to and within the aquifer. This may be the most important factor for a large-scale project, but it often is not for smaller projects, and needs to be evaluated in relation to recharge goals. Hydrogeologic factors include:

- lithologic/stratigraphic conditions: how conducive for or limiting to infiltration or injection
- depth to groundwater level and proximity to groundwater flow barriers (storage capacity of the subsurface materials)
- aquifer physical parameters and groundwater movement: how rapidly a developing recharge mound would dissipate, allowing sustained recharge without water levels approaching land surface
- groundwater quality: could recharge degrade water quality sufficiently to adversely affect future uses and/or mobilize contaminants, perhaps requiring mitigation?

Impacts to others include adverse impacts to nearby land and water uses from long-term recharge operations, such as proximity to:

- “sensitive” wells such as public or private potable supply wells
- existing “sensitive” land uses such as existing recharge facilities, sand and gravel pits, and landfills (this could also be a regulatory constraint)
- potential contaminant sources and/or existing contaminant plumes or poor-quality groundwater that could migrate due to recharge-induced hydraulic gradients

1.B. Non-hydrogeologic factors

These factors are often more important or limiting for development of a recharge

facility than hydrogeologic factors, and include consideration of:

- current land uses: compatibility of recharge with adjacent/nearby land uses and prevention of “unreasonable harm”
- land ownership: public versus private land, and land value (acquisition cost)
- proximity to water source and associated infrastructure/costs to deliver water
- access to power if pump stations are required

1.C. Water resource benefits and recovery considerations

Greater physical benefits may be realized if recharge occurs in proximity to areas of historic groundwater level decline or areas where current or future recovery of stored water may occur. This reduces excessive drawdown and associated risk of subsidence, and reduces pumping lift and energy cost. In the case of WSIP applications, consideration may be given to whether recharge will restore or preserve surface flows.

Feasibility of recovering stored water at or near the recharge site is an important factor for recharge facility siting if stored water is to be recovered and used seasonally or banked and recovered when needed in the future. Considerations include:

- depth to water and associated pumping lift
- ambient groundwater quality
- wellfield design and associated cost for recovering water more uniformly (avoiding localized areas of excessive water level drawdown)
- infrastructure requirements and costs to convey water to the areas of demand

2. Offer more guidance on estimating physical ecological changes besides hydrologic changes

We believe the draft regulations rightly focus on quantifying physical changes as a precursor to benefit and cost quantification. However, modeling impacts on fish or other organisms from hydrologic changes is highly uncertain. If the Commission could endorse or otherwise note and compare “trusted” software or models (preferably those in the public domain) used for purposes such as estimating fish response to hydrologic changes, the burden on applicants would be eased, possibly facilitating a greater diversity of applicants overall.

Although the regulations include numerous guidelines on types of ecological changes important to consider, a key issue is capacity to actually model those changes. With numerous California state agencies involved in activities such as fish recovery, it may make sense to offer or note any available tools to WSIP applicants. Otherwise, multiple parties may end up with varied approaches of estimating more or less the same sorts of ecological changes. Despite the difficult issues involved with economic valuation of physical changes, most of the uncertainty underlying public benefits and costs may actually be due to uncertainty in the ecological models. We respect the Commission’s position of not dictating

methodologies, but perhaps more technical guidance could be offered, in the form of recommended but not required tools and approaches.

3. Points on calculating ecological benefits and costs

3.A. Clarify important economic concepts

The largest compartment of Proposition 1 funding is for WSIP, and the largest compartment for state-matched funding is ecological benefits. This makes ecological benefit estimation a very important category, yet this is where guidance in the economics portion of the regulations is particularly lacking. However, ecological benefits have been extensively treated in other seminal works, and the regulations could adopt key concepts and guidelines from these ready sources. We believe the regulations could be improved through explicit mention of the well-known concepts of use value vs. nonuse value, and market value vs. nonmarket value. Such terminology assists in organizing different types of economic values, and the terms are described in numerous sources, such as the National Research Council (2004, e.g., Table 2-1) and US Environmental Protection Agency (2014).

We believe a key issue in particular for WSIP is explicit recognition of nonuse value. This is a type of nonmarket value infrequently cited in lay publications, but a critical component of calculating the full impact of environmental change. Nonuse values appear to be the same as ecological values as the Commission defines them, since ecological values are distinct from recreational values. However, in Article 1, Section 6000, definition 81, the Commission includes “intrinsic value” as part of recreational value. Intrinsic value sometimes refers to nonuse value, thus translation of value terminology used by the Commission to economics references is unclear. Nonuse values are well-established in the environmental economics literature (e.g., Johnston et al., 2003, US Environmental Protection Agency, 2014, especially chapter 7). However, since the nonuse value term is not cited, this literature, which includes extensive treatment of monetization and associated uncertainty, is obscured for WSIP applicants. Furthermore, it could later be argued that the Commission did not intend to include nonuse values, and ecological values could be left open to interpretation. We note that the draft regulations contain no specific definition of ecological values.

A related issue is the potential for applicants to conflate recreation benefits as measured by economic expenditures, versus an estimate of consumer’s surplus. Consumer’s surplus specifically accounts for the net welfare of improved or additional recreation sites, whereas economic expenditure estimates are thought to mainly capture displacement of economic activity from one site or region to another. However, as with nonuse values, the important concept of consumer’s surplus is not mentioned in the draft regulations. Thus, applicants may waste resources focusing on expenditures rather than net welfare changes.

3.B. Offer more guidance on estimating nonmarket values

Our consultancy has extensive experience monetizing public benefits (including nonuse values) related to changes in surface waters. For any given project, we could likely envision a range of approaches for estimating changes in public benefits, with the more expensive approaches offering lower levels of uncertainty. The regulations do not offer many tips regarding the types of analyses that would be considered sufficient for a WSIP proposal. Guidance on acceptable analyses could greatly reduce the applicant burden and potentially facilitate a broader array of project proposals overall. This could be as simple as providing an initial reference list of applicable case studies for applicants to consider.

A key difference between different modes of estimating nonmarket values is original research (new research tailored to a project proposal) vs. benefit-transfer (values derived from a similar scenario). The timeline of the WSIP funding process is long enough that original research is feasible, albeit at additional cost. However, these additional costs could be well worth the expense, as a means of controlling the high uncertainty inherent in estimating public benefits for environmental projects. That is, spending on original economic research could easily turn out to be in the overall public interest, in assisting selection of projects most likely to yield the highest return on state funding.

Also consider that many projects could overlap in terms of the physical changes that would result, and thus could potentially utilize similar benefit functions. For example, multiple separate projects could all improve conditions for endangered salmon in similar ways. If the Commission developed or endorsed a benefit function that related changes in salmon abundance to changes in total economic value for Californians, this could both greatly ease applicant burden and facilitate Commission comparisons across projects, as opposed to each applicant independently estimating such benefits.

3.C. Clarify benefit-cost issues

When undertaking benefit-cost analysis, applicants will have to utilize a broad accounting stance (defining whose benefits and costs matter), since both private and public benefits are included. Some clarification would be useful on non-public benefits that will not accrue to the applicant. For example, if an irrigation district applied for funding, in addition to benefits to that District and to “the public”, there might also be benefits to a nearby irrigation district or town. Oddly, accounting for these additional benefits might harm the applicant because it would make reaching the 50% threshold for public benefits more difficult. Some clarification on how these benefits should be characterized would be helpful.

The value of enhanced conservation efforts seems unclear. Article 3, Section 6004.7.b lists water quality priorities. Item (8) is “reduce current or future water demand on the Delta watershed by developing local water supplies and improving regional water self-reliance”. Would enhanced water conservation be recognized as a way of reducing future demand on the delta through improving self-reliance?

An issue of present value is raised by Article 3, Section 6005. The list of relative environmental values includes “(5) immediacy of ecosystem improvement actions and realization of benefits” and (6) speaks to the duration of benefits. The regulations dictate that all benefits must be presented in 2015 dollars, but these “immediacy” and “duration” criteria appear to imply a different, potentially higher discount rate for environmental values. Some guidance on discount rates might be useful, unless the Commission intends to both use a standard discount rate to reduce all future benefits and costs to 2015 dollar values, and in addition, give some sort of qualitative advantage to proposed projects whose environmental benefits are realized sooner and/or last longer.

Montgomery & Associates hopes you find these comments valuable as you finalize the WSIP application regulations and move ahead to improve both groundwater sustainability and ecological conditions. Please feel free to contact us at 520-881-4912 if you have questions or require clarification on our comments.

References:

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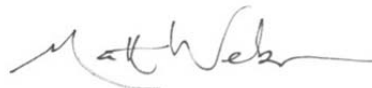
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Sincerely,

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