STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

INFORMATIONAL PROCEEDING TO DEVELOP FLOW CRITERIA FOR THE DELTA ECOSYSTEM NECESSARY TO PROTECT PUBLIC TRUST RESOURCES

SUMMARY OF TESTIMONY
AMERICAN RIVERS AND NATURAL HERITAGE INSTITUTE

American Rivers (AR) and Natural Heritage Institute provide this summary of the testimony that we have today submitted in this proceeding. That testimony is AR-1 and TBI-1 through TBI-4. As directed in the Dec. 15, 2009 Notice and the Jan. 29, 2010 Revised Notice, this summary consists of two parts: answers to the Key Issues stated in the Notice (p. 7), and our recommendations organized by panel topic stated in the Revised Notice (pp. 4-5).

I.
KEY ISSUES

1. **What key information, in particular scientific information or portions of scientific information, should the State Water Board rely upon when determining the volume, quantity, and timing of water needed for the Delta ecosystem pursuant to the board's public trust obligations? For large reports or documents, what pages or chapters should be considered? What does this scientific information indicate regarding the minimum and maximum volume, quality, and timing of flows needed under the existing physical conditions, various hydrologic conditions, and biological conditions? With respect to biological conditions, what does the scientific information indicate regarding appropriateness of flow to control non-native species? What is the level of scientific certainty regarding the foregoing information?**

Our testimony cites the specific documents which we consider to be most reliable for the purpose of developing flow criteria in this proceeding. We address scientific uncertainty in Key Issue #4.

Scientific information should be used to establish the minimum volume, quality, and distribution of impaired flows to protect public trust resources. It should not be used here to establish maximum flow volume. Continuously unimpaired flows, which would provide the maximum benefits for native fishes and other public trust resources, would be a social, economic, and legal impossibility.

The flow criteria should be based on existing capital infrastructure for storage, conveyance, or other forms of control. The Board may address potential modifications in subsequent proceedings for individual diversions.

Flow is effective to reduce predation by exotic species and manage many other stressors for public trust resources, including elevated water temperature, contaminants, and the distribution of invasive aquatic vegetation. Our answer to Key Issue #5 makes specific recommendations for subsequent proceedings to address modification of capital infrastructure and other stressors.

2. **What methodology should the State Water Board use to develop flow criteria for the Delta? What does that methodology indicate the needed minimum and maximum volume, quality, and timing of flows are for different hydrologic conditions under the current physical conditions of the Delta?**

All aquatic species in the Delta are within the scope of the public trust doctrine. Given the wide range of life histories and needs, the Board should use native indicator species to establish criteria. An indicator species: (i) has substantial economic value, such as anadromous fish; (ii) has special legal protection, such as pelagic fish listed under the Endangered Species Acts; or (iii) is a "canary in the coal mine" whose condition tracks the condition of the ecosystem as a whole. The Board's panel topics #2 and 3, as described in the Revised Notice, are consistent with this approach.

The Board should use the following methods to establish flow criteria for protection of indicator species: (i) known relationship between flow and a mechanism (such as the availability of habitat critical for a life stage) which benefits the species; (ii) statistically reliable correlations between flow and population or other viability attributes; and (iii) historical volume, quality, and timing of flow at a time when the species was in good condition.

The flow criteria should be sufficient to achieve four elements of viability for a given species: (i) abundance, (ii) productivity (e.g., rate of population growth), (iii) geographic distribution, and (iv) genetic diversity.

3. **When determining Delta outflows necessary to protect public trust resources, how important is the source of those flows? How should the State Water Board address this issue when developing Delta outflow criteria?**

The source of flows is vitally important to restore public trust resources, including pelagic and anadromous fish species, which migrate through and out of the Delta. Inflows transport fish during migration. Tributary rivers, creeks, and wetlands in the Sacramento and San Joaquin Basins provide quantity, diversity, and redundancy of habitat. Such habitat

contributes to the viability of such species, and specifically, capacity to withstand unfavorable drought or other environmental conditions. Outflows should consist of inflows roughly proportionate to each tributary basin's historic contribution.

4. How should the State Water Board address scientific uncertainty when developing the Delta outflow criteria? Specifically, what kind of adaptive management, monitoring, and special studies programs should the State Water Board consider as part of the Delta outflow criteria, if any?

The existing record, as supplemented by the testimonies and other exhibits submitted today, is ample for this purpose. After more than forty years of scientific monitoring by federal and state agencies, universities, and other entities, the Delta is the most studied aquatic ecosystem in the world. And while causal mechanisms in the relation between the physical environment of the Delta and any indicator species are complex, dynamic, and not certain, that is true in any aquatic ecosystem. A controlled experiment cannot occur to test biological response to any one variable. Even so, the Board has established flow requirements to protect public trust resources in water rights proceedings, such as the Mono Lake Cases, and in water quality standards, such as the X_2 standard in Decision 1641 and the *Bay-Delta Water Control Plan* (2006). The ultimate test is whether a flow requirement, or here a criteria, is supported by substantial evidence in the record, not whether the evidence is certain as to the biological response of a given species.

In addressing uncertainty here, the Board should bear in mind that the flow criteria will not have any direct legal consequence for individual diversions. Before flow requirements are imposed, each diverter and other stakeholders must and will be heard again in a subsequent water right proceeding, and the Board will hold a hearing and conduct an environmental review under the California Environmental Quality Act.

The Final Report should provide guidance for adaptive management of flow requirements. The guidance should address: measurable objectives for species condition and habitat, testable hypotheses for the impacts of a flow measure, monitoring, and procedures to adjust the flow requirement or objectives. Thereafter, as recommended in Key Issue #5, the Board should amend the *Bay-Delta Water Quality Control Plan* and individual water rights and other permits to require such adaptive management of diversions and other facilities.

5. What can the State Water Board reasonably be expected to accomplish with respect to flow criteria within the nine months following enactment of SB 1? What issues should the State Water Board focus on in order to develop meaningful criteria during this short period of time?

The Board should adopt these flow criteria on time. As discussed under Key Issue #4, the Board will have a sufficient basis for this decision, by relying on the best available evidence to understand how flow probably affects the condition of each trust resource.

The Board effectively asks: what is the value of this proceeding, mindful that the flow criteria will be non-binding and informational? This proceeding should provide directional guidance for subsequent resolution of flow issues in water rights proceedings or amendment of the water quality standards related to water diversions that affect the Delta. By specifying flow "volume, quality, timing" as required by Water Code section 85086, the criteria will describe a strategy how to use flow to fix the broken Delta ecosystem. That will serve as the starting point for the Board's continuing efforts to apply the strategy to individual diversions and other activities, and specifically, to establish the right balance of flow measures and physical solutions to achieve water supply, other developmental uses, and ecosystem sustainability. The public trust doctrine, like the Water Code and other applicable law, requires that the Board consider costs, benefits, and the comparative effectiveness of alternative mitigation measures when it establishes flow requirements for an individual diversion.

We recommend that the Board's Final Report here identify the subsequent proceedings, including estimated schedules, to apply the flow criteria to individual diversions and other facilities. These include:

- proceeding to amend the water rights of the California Department of Water Resources and U.S. Bureau of Reclamation to implement the Bay Delta Conservation Plan (expected to be adopted in 2011) for the federal and state water supply systems. This proceeding will consider any proposed modification to the conveyance and storage facilities for those systems.

- other water rights proceedings for the two-thirds of tributary diversions not controlled by those systems. Under the physical solution doctrine, these proceedings should consider appropriate modifications to diversion facilities.

- triennial review of the *Bay-Delta Water Quality Control Plan* (2006). This review should include strategies to manage invasive fish and plant species.

In addition, the California Department of Fish and Game (DFG) should promptly establish procedures and schedule to assure that all diversions tributary to the Delta comply with the requirements of Fish and Game Code sections 5900-6100.[1] These statutes require measures to prevent entrainment, require fish passage, and provide other protections.

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[1] See Richard Roos-Collins and Brian Johnson, "Administrative Orders der California Fish and Game Code sections 5900 – 6100" (July 21, 2009), on file with DFG.

II.
TESTIMONY BY PANEL TOPIC

1. Hydrology

Due to storage and diversion since 1945, peak inflows from the Sacramento River Basin have shifted from the winter-spring period to summer. Inflows from the San Joaquin Basin have been substantially diminished in the summer. Cumulative outflows and hydrologic variability, including the volume and frequency of pulse flows, have been substantially diminished. These flow alterations correlate with declines and poor conditions of pelagic and anadromous fish species in the Delta. Flows pursuant to these criteria should support: food web and production; critical habitat for each species, including complex channel form and seasonal access to floodplains; suitable temperature, turbidity, and other water quality conditions; and velocity and other migratory cues.

2. Pelagic Fish

Flow criteria should specify winter-spring flows which (i) historically correlated with positive population growth at least 50% of the time and (ii) provide for seasonal floodplain inundation. The criteria should specify fall flows that result in X_2 location less than 83 km.

3. Anadromous Fish

Flow criteria show specify flows (varying by applicable season, mostly winter-spring) to provide sufficient depth, temperature, and continuity of flows for upstream migration passage for spawners, rearing habitat in seasonally inundated floodplains and channel margins, and outmigration passage for juveniles.

4. Other Stressors

Flow criteria should specify flows which address other stressors, including loss of floodplain habitat, predation by non-native fish, impairment of shallow-water habitat by exotic aquatic vegetation, and toxic contaminants. As stated under Key Issue #5, any actionable strategy to address these or other stressors will include non-flow measures.

5. Hydrodynamics

The flow criteria should address reverse flows in Old and Middle Rivers and other hydrodynamic conditions that contribute to substantial entrainment of fish within the Delta.