STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

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

CLOSING COMMENTS OF THE BAY INSTITUTE AND NATURAL RESOURCES DEFENSE COUNCIL

APRIL 14, 2010

The Bay Institute (TBI) and the Natural Resources Defense Council (NRDC) submit these closing comments regarding the informational proceeding before the State Water Resources Control Board (SWRCB) to develop flow criteria for the Delta ecosystem necessary to protect public trust resources. Our comments supplement and do not substitute for the testimony submitted by TBI *et al*, identified as ExhibitsTBI-1 through TBI-4, and the accompanying summary of the exhibits, contained in the record of these proceedings.

I. INTRODUCTORY REMARKS

Flow conditions are key to protecting public trust resources but are not currently adequate to do so.

The extensive record compiled by the SWRCB for this proceeding and augmented by the submissions of the invited expert panel, the federal and state resource agencies, our groups, and others demonstrates beyond any doubt that flows are a critical driver of ecosystem conditions in the Delta, and that existing flow conditions are inadequate to protect public trust resources. The panel of experts assembled by the SWRCB states unequivocally that "flow is a major determinant of habitat and transport," that "recent Delta environmental flows are insufficient to support native Delta fishes for today's habitats." and that "recent flow regimes … encourage non-native species" including those that have adverse impacts on public trust resources (Expert Panel, Intro_1, Intro_6). Similarly, the Department of Interior (DOI) finds that "flow in the Delta is one of the most important components of ecosystem function" (DOI testimony, p. 4) and presents a wealth of information on how flow affects public trust resources and how flow conditions for these resources have been impaired; the National Marine Fisheries Service states that "adequate flows are an essential component of habitat" (NMFS summary, p. 1); and the California Department of Fish and Game's Exhibits 1-4 describe in detail the important, well-documented relationships between flow and the viability of numerous public trust resources.

Although no universal threshold for reducing flows to estuaries without causing long-term loss of viability has been identified, the panel of invited experts noted that in the Everglades significant harm was defined as greater than 15% habitat alteration (Expert Panel, Intro_1). In contrast, Delta hydrology has been altered to a far greater degree than 15%, with outflows reduced three times as much, on average; inflows significantly reduced as well, practically flatlining the San Joaquin River hydrograph; and reverse flows in interior Delta channels occurring more than 90% of the time (more specific descriptions of the degree of hydrologic alteration can be found throughout the DOI testimony and TBI Exhibits 1-4). As DOI observes, "flow conditions more similar to natural flows will provide beneficial flow conditions and improved habitat for native species; while the further flow conditions are from what naturally occurs, the less adequate habitat conditions are for our native species" (p. 4, DOI testimony). As described in TBI Exhibits 1-4, Delta flow conditions that are more similar to natural flows would generally improve Delta inflows and outflows significantly in the middle range of hydrological conditions, i.e., in the range between extreme drought and flood events, and significantly constrain reverse flow conditions, especially when hydrological conditions are drier and public trust resources most vulnerable.

Flow criteria must address Delta inflows and in-Delta hydrodynamics in addition to Delta outflows.

Delta outflows are highly correlated to the abundance and other viability attributes of numerous public trust resources, and improving outflow conditions serves as the foundation for any set of protective Delta flow criteria. However, the extensive record submitted to the SWRCB demonstrates that criteria for inflows and in-Delta hydrodynamics are also necessary to protect public trust resources. For instance, the panel of experts invited by the SWRCB emphasizes the importance of flows related to floodplain activation and of net flows in in-Delta channels, in addition to Delta outflows (Expert Panel, Intro_6). The Department of Interior makes the same point, stating that "consideration of all aspects of Delta flow criteria, including timing, magnitude, and variability of outflow, reverse flows, floodplain inundation, inflow and hydrology are important for this Board process" (DOI testimony, p. 9). (Indeed, all three fishery agencies address inflows and Delta hydrodynamics in their testimony). No credible expert appears to be arguing to the contrary.

There is no basis in this proceeding for assessing tradeoffs between protections of different public trust resources.

It is well understood that the hydrology and physical habitat of the Delta and its watershed are highly altered. Given the constraints of such a highly altered system, such as the lack of access to salmonid spawning habitat areas upstream of major reservoirs in the Central Valley, some parties have suggested that implementing criteria to protect one set of public trust resources, such as outflow criteria for resident pelagic species, may conflict with implementing protections to protect another set of public trust resources, such as carryover storage requirements to maintain coldwater reserves for migratory anadromous fish species. The real conflict is more likely between making decisions to protect public trust resources in and upstream of the Delta versus making decisions to maximize deliveries for consumptive use and to exclude some parties from contributing to meeting public trust obligations. Without determining what set of water rights holders and permittees are contributing to meeting flow criteria, how water rights might be modified to protect the public trust, how storage facilities might be modified to allow increased access to spawning areas, and many other factors that are clearly outside the scope of these proceedings, it is impossible for the SWRCB to assess whether and to what degree such a conflict might exist,. In short, the SWRCB should identify the flows associated with fully protecting public trust resources in the Delta without attempting to assess or reconcile potential conflicts between the needs of these resources or between these resources and other uses of water.

The best way to address uncertainty and plan for long-term flow management in the Delta is to develop, and revise over time, flow criteria that are based on achieving specific desired outcomes for public trust resources.

The SWRCB is understandably concerned with the challenge of providing adequate flows and other conditions for public trust resources in a complex and highly stressed estuarine ecosystem subject to further alteration as a result of climate change and other emerging stressors. In our view, the absolute prerequisite for successfully managing a dynamic ecosystem like the Delta and designing a long-term adaptive management regime is the adoption of specific targets that define the desired outcomes for public trust resources. The definition of desired outcomes drives both the development of specific numeric flow criteria and the design and implementation of an adaptive management program. TBI Exhibits 1-4 describe in detail how specific viability criteria for public trust resources in the Delta can be used to define desired outcomes for these resources, and how information on relationships between flow and viability criteria can then be applied to develop the numeric flow criteria. This approach not only justifies the adoption of these criteria on the basis of achieving targets for public trust resource protection, but provides a framework for subsequently using ecological indicators and other performance assessment tools to measure the ability of the flow criteria to achieve desired outcomes and adjusting them as appropriate to improve the potential for success. Most scientific experts and resource managers would agree on the soundness of such a framework. For instance, DOI has proposed a similar approach, recommending that these proceedings address "defined ecosystem goals (using specific biological/physical indicators to track progress), Delta flow criteria that were developed to meet the defined ecosystem goals, considering watershed hydrology, and a process to adaptively manage flow criteria to meet the ecosystem goals" (DOI testimony, p. 2).

The Delta flow criteria proceeding represents the SWRCB's opportunity to establish a restoration and recovery planning process for the Delta.

It is important to be clear as to what this proceeding is and is not. It is clearly not intended to be a regulatory proceeding to review and amend existing permit terms and conditions under the authority of the SWRCB or other permitting entities. On the contrary, this proceeding was intentionally decoupled by the legislature to any specific permitting action precisely in order to allow the SWRCB to freely determine the flow criteria necessary to fully protect public resource species in the Delta without considering the impact of such criteria on any particular interest. As such, the criteria should be considered as the basis of a restoration and recovery plan for public trust resources. These criteria can and should be used to guide the development of future plans and permits, including pursuant to the SWRCB's own authority, that are intended to support restoration of the Delta ecosystem and full protection of its public trust resources. Whether subsequent management efforts will successfully achieve these outcomes is unknown. What is certain is that these outcomes are only possible if the SWRCB rises to the occasion and makes the most of this opportunity to promote a restoration and recovery vision for the Delta.

II. SUMMARY OF RECOMMENDED FLOW CRITERIA

Fully protecting public trust resources in the Delta requires maintaining or restoring appropriate levels of four characteristics that equate to the persistence of populations and estuarine ecosystems: (1) abundance; (2) distribution; (3) diversity; and (4) productivity for key species.

Abundance:

- More abundant populations are less vulnerable to disturbances and risk of extinction.
- The relationship between abundance and flow is one of the strongest and most persistent relationships observed in the San Francisco estuary.

Distribution:

- More widely distributed populations are less vulnerable to catastrophic events and risk of extinction.
- Flows positively affect spatial distribution by facilitating the movement of organisms and by making suitable habitat available through floodplain inundation, salinity gradient, and other mechanisms.

Diversity:

- Species and populations that are both more genetically diverse and more diverse in life history patterns are more resilient to environmental change and less at risk of extinction.
- Maintaining the high variability in flows that characterize estuaries helps preserve the genetic and life history diversity of public trust resources.

Productivity:

- The potential of a particular species to respond with positive population growth to changing conditions in a dynamic estuary is key to maintaining its viability.
- Large-scale flow impairment can cause chronic negative population growth.

The National Marine Fisheries Service, for example, considers restoration of these four viability criteria central to its efforts to recover endangered salmonids in the Central Valley. These viability criteria apply to other species as well (although the exact levels for each criteria will vary by species). Clearly, full protection of the public trust requires, at a minimum, recovery of fish populations that are endangered. The Delta flow criteria described in TBI Exhibits 1-4 are intended to meet objectives relating to one or more specific viability characteristics (e.g., increased population growth, abundance at levels specified in an ESA recovery plan) for one or more Delta species and were developed using an analysis of the flow conditions associated with maintaining or restoring these viability criteria for these species. Based on current knowledge, it is reasonable to conclude that our recommended criteria are sufficient to protect the public trust uses of numerous other Delta fish and wildlife species that were not analyzed (Figure 1). However, these criteria may need to be revised if new information becomes available demonstrating greater flow requirements for other species.

Viability Attribute	Flow Criteria: Delta outflows	San Joaquin River Delta Inflows	Sacramento River Delta Inflows	Delta Hydrodynamics
Abundance	**longfin smelt** **bay shrimp** **delta smelt** starry flounder Sacramento splittail striped bass American shad Eurytemora affinis (spring) *habitat abundance for estuarine species*	**fall run Chinook salmon** spring run Chinook salmon *Abundance of and transport to accessible cold-water riverine habitats and communities*		**SJR Chinook salmon** **Sacramento River Chinook salmon** **Delta smelt** *abundance of habitat for smelt species in the south Delta*
Spatial Extent	**longfin smelt** **Delta smelt** **striped bass YOY** starry flounder bay shrimp *transport both seaward and landward (e.g. gravitational circulation)*	**fall run Chinook salmon** **spring run Chinook salmon** steelhead white sturgeon green sturgeon Sacramento splittail longfin smelt Delta smelt *Distribution of productive cold-water riverine habitats and communities*	**fall run Chinook salmon** **Sacramento splittail** **spring run Chinook salmon** **winter run Chinook salmon** **late-fall run Chinook salmon** white sturgeon green sturgeon American Shad striped bass *Increased distribution of floodplain habitats*	longfin smelt Delta smelt fall run Chinook salmon (SJR) spring run Chinook salmon (SJR) *Spatial distribution of spawning and rearing habitats in the South Delta*
Diversity	*Increased occurrence of juveniles seaward for freshwater spawners and landwards for marine spawners*	**fall run Chinook salmon** spring run Chinook salmon white sturgeon steelhead *Diversity of riverine hydrographs and habitats in the Central Valley*	fall run Chinook salmon spring run Chinook salmon winter run Chinook salmon late fall run Chinook salmon *Increased availability of floodplain habitats*	**Delta smelt**
Productivity/ Stability	**longfin smelt** **bay shrimp**	**fall run Chinook salmon**	**fall run Chinook salmon** **Sacramento splittail** spring run Chinook salmon winter run Chinook salmon late-fall run Chinook salmon white sturgeon green sturgeon American Shad striped bass *Increased production and transport of materials off of floodplains to river and tidal habitats*	**longfin smelt** **Delta smelt** **SJR Chinook salmon**

Figure 1 (also Fig. 9 in TBI/NRDC Exhibit I): Public trust resources (species and ecosystem attributes) protected by flow recommendations in this submission. Bold text indicates that analysis of a species' catch, distribution, and life history data contributed directly to formulation of the flow recommendation. Research studies and or life history similarities indicate that other species (plain text) and ecosystem attributes (italics) will benefit from the recommended flows. The list is not exhaustive; absence of species names indicates absence of research that we are aware of, not absence of a mechanistic relationship (e.g., all species native to the lower Sacramento River are expected to benefit from a restoration of higher magnitude flows during the appropriate season).

Ultimately, the relationship between flows and viability of public trust species is probably the strongest biological signal in the estuary. There is no compelling evidence that anything other than restoration of adequate flows can fuel restoration of public trust resources. Such flow restoration may not be sufficient in and of itself to fully protect public trust resources, because of the effect of other stressors, which must be mitigated; but without it, protection of public trust resources will not be possible

Winter – spring Delta outflows

For winter – spring Delta outflows, we analyzed the statistical relationships between outflow and the abundance and productivity of three public trust resource species (longfin smelt, *Crangon* shrimp species, and starry flounder). These and numerous other species use the Delta, Suisun Bay, and Suisun Marsh during the winter and spring for spawning, migration, and/or rearing and are heavily impacted by outflows during this period. Strong, significant, longstanding, well-documented statistical relationships between abundance and winter-spring Delta outflow have been found and currently exist for most of the species that are affected by Delta outflows for all or part of their life cycle even though they have varying life history requirements. In short, higher winter-spring outflows produce higher abundance levels for many estuarine organisms. Over the last few decades, outflows have been reduced by almost one half on average. The historic record was analyzed to determine the level of winter and spring outflows necessary to support achievement of recovery-level abundance targets and/or more frequently allow for a positive biological response (population growth) by the three species selected. Recommended outflow criteria for different seasonal periods during the January-June period are presented in Table 1 and Figure 2. The outflows necessary to support longfin smelt abundance will benefit all other flow-dependent species and are also consistent with those necessary to support the population's spatial distribution.

In Figure 2, these findings are presented as continuous relationships between Delta outflow and the prevailing hydrology; these continuous relationships provide for a more natural pattern in Delta outflow (one that matches actual hydrology) and reduces the need for "acrobatic" flow management that sometimes occurs with discrete, stepwise flow prescriptions. In Table 1, these findings are also presented by water-year type for comparative purposes. Our winter-spring Delta outflow criteria approximate the frequency distribution of outflow levels, i.e., the relationship between outflow and the 8 River Index, for the 1956-1987 period.

Table 1: Recommended winter and spring Delta outflows to benefit public trust uses of pelagic species (as represented by abundance and productivity of longfin smelt, *Crangon* shrimp, and starry flounder and spatial distribution of longfin smelt).
TBI/NRDC's recommendation is that spring outflow should be a continuous function of hydrological conditions as measured by the 8 River Index in any given year. As a result, numbers in the cells reflect the approximate range of average outflows recommended in each season across the range of hydrologies in a water year type. The actual relationships are depicted in figures within Exhibit 2 of the TBI/NRDC proposal -- figure numbers appear in parentheses.
The different seasons depicted here stem from statistical relationships between outflow and abundance several species. Specifying separate winter and spring seasonal flows and combined winter-spring flow is necessary in order to prevent erratic flow conditions in some months to make up for unnaturally low outflows (those not reflecting the prevailing hydrology) in other months.

				Delta Outflow						
				WINTER AVERAGE			**SPRING AVERAGES**			**JUNE AVERAGE**
TBI/NRDC Exhibit	**Measured as:**	**Page**	**Month**	**Jan**	**Feb**	**Mar**	**Mar**	**Apr**	**May**	**Jun**
			Hydrology*							
2	Outflows in cfs *(Parentheses indicate figures that describe these recommendations)*	21-25	0-20% exceedence (Wettest years)	140,000 to 87,500 (18a and 19a)			110,000 to 62,500 (18b and 19b)			50,000 to 25,000 (18c and 19c)
			21-40% exceedence	87,500 to 55,000 (18a and 19a)			62,500 to 42,500 (18b and 19b)			25,000 to 8,500 (18c and 19c)
			41-60% exceedence	55,000 to 35,200 (18a and 19a)			42,500 to 29,000 (18b and 19b)			8,500 to 5,000 (18c and 19c)
			61-80% exceedence	35,000 to 21,000 (18a and 19a)			29,000 to 17,500 (18b and 19b)			5,000 to 4,200 (18c and 19c)
			81-100% exceedence (Driest years)	21,000 to 14,000 (18a and 19a)			17,500 to 10,000 (18b and 19b)			4,200 to 3,000 (18c and 19c)

* For Delta outflow recommendations, water year categories represent exceedence frequencies for the 8-river index. They are not equivalent to DWR "water year types" (which account for storage and other conditions). Months without outflow recommendations

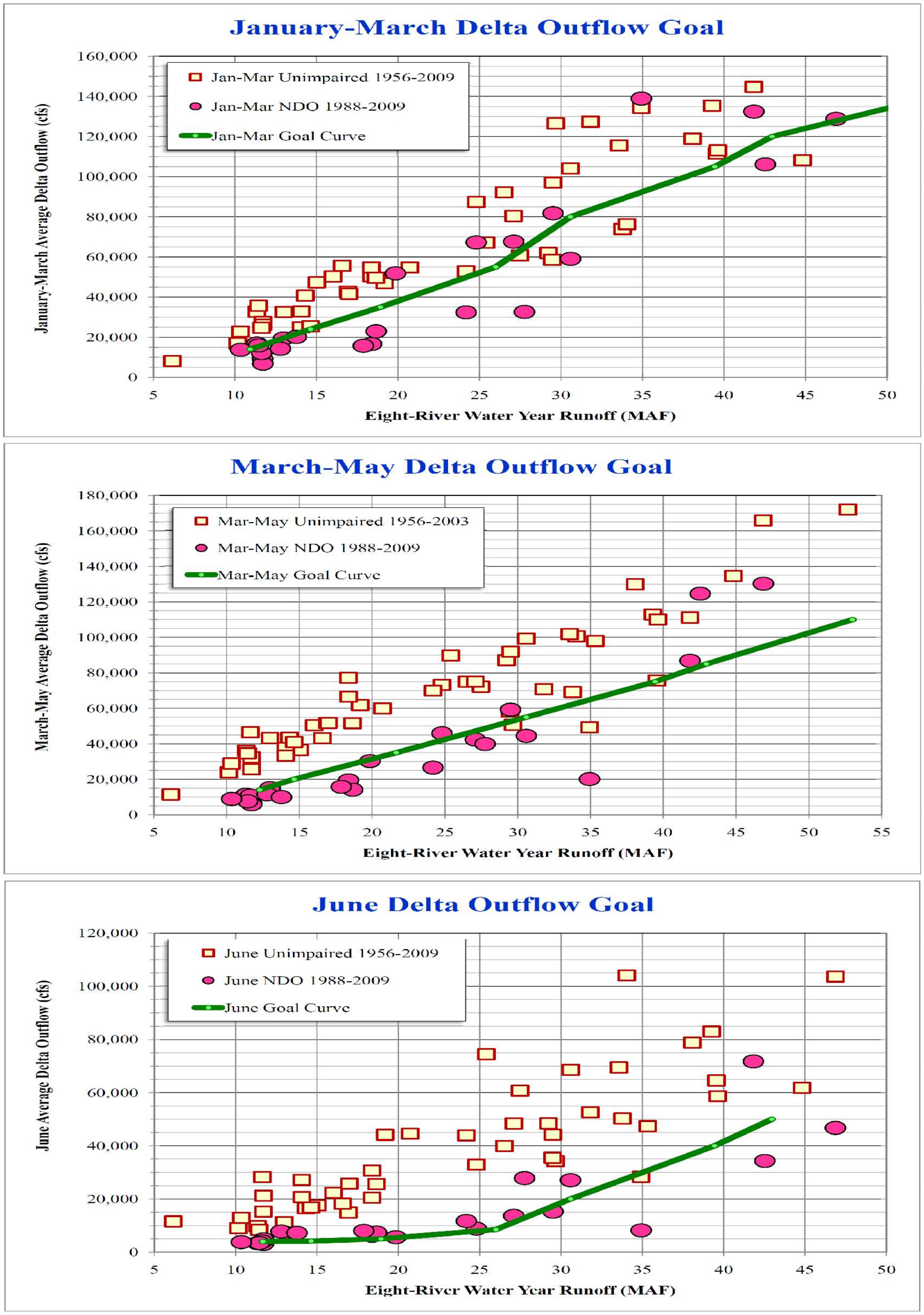

Figure 2 (also Figures 19a-c, TBI Exhibit 2): Relationship of annual hydrology (runoff, MAF), 1988-2009 actual outflow and recommended Delta outflow criteria for January-March (top), March-May (middle) and June (bottom). Seasonal periods are limited to biologically relevant periods for public trust resources.

Fall Delta outflows

For fall Delta outflows, we analyzed emerging statistical evidence of a relationship between outflow and the abundance and distribution of delta smelt and striped bass in order to develop fall outflow recommendations (Table 2). While fall outflows are naturally much lower than outflows in the winter –spring period, the relative change in fall outflow levels over the last few decades has been dramatic, harming public trust resource values and promoting the spread of invasive species. Unlike any of our other recommendations, the fall outflow criteria occasionally exceed unimpaired outflow in limited cases; that is, they require reservoir releases in the fall independent of antecedent conditions. The amount of water involved is relatively small and is tied to prevailing hydrological conditions (like all of our criteria) – when there is more water available, more water is allocated to public trust resource protection. The justification for these supplemental flows is the need to expand the areal extent and quality of habitat available to support delta smelt and reverse the degradation of historic habitat areas in the central Delta. Additional fall outflows should also help control the occurrence, distribution and abundance of harmful invasive species such as the overbite clam and blue-green algae.

Table 2: Recommended fall Delta outflows to benefit public trust uses of pelagic species (as represented by abundance and spatial distribution of Delta smelt). Increased fall flow is also believed to increase striped bass habitat and improve population productivity for that species.

				Fall Delta Outflow		
				FALL AVERAGE		
TBI/NRDC Exhibit	**Measured as:**	**Page**	**Month**	**Sept**	**Oct**	**Nov**
			Hydrology*			
2 (Table 1 & Figure 27)	Outflows in cfs	35	0-20% exceedence (Wettest years)	19,00 to 16,100		
			21-40% exceedence	16,100 to 12,400		
			41-60% exceedence	12,400 to 9,700		
			61-80% exceedence	9,000 to 7,500		
			81-100% exceedence (Driest years)	7,500 to 5,750		

* For Delta outflow recommendations, water year categories represent exceedence frequencies for the 8-river index. They are not equivalent to DWR "water year types" (which account for storage and other conditions). Months without outflow recommendations

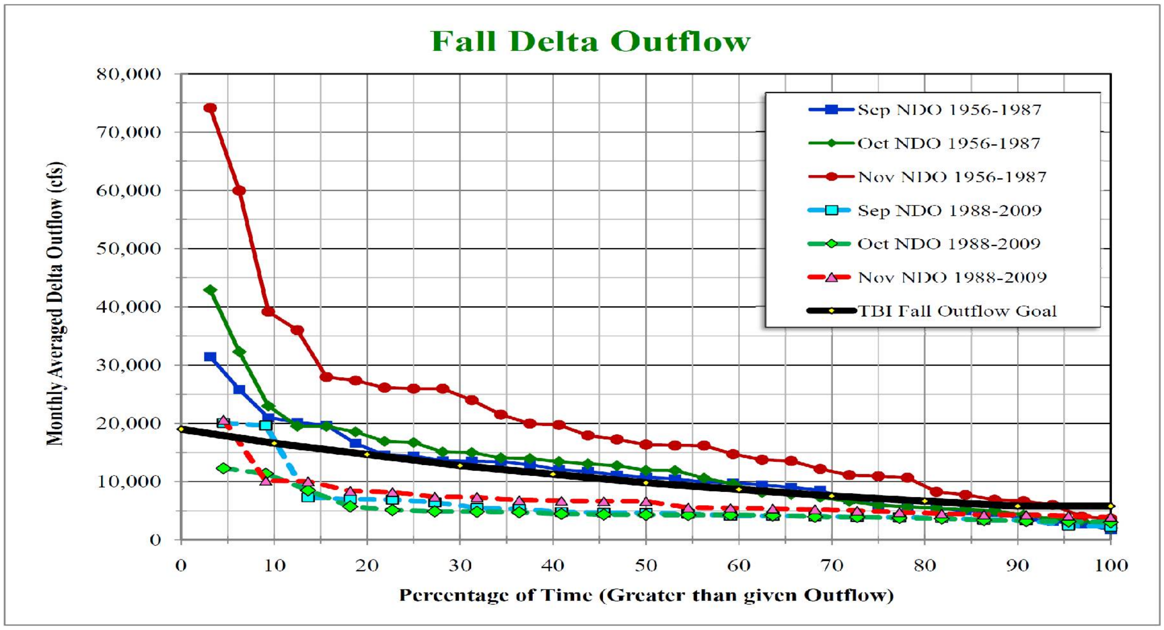

Figure 3 (also Figure 27, TBI Exhibit 2): Frequency of distribution of Delta outflow for three months (September, October, November) in two periods (1956-1987 and 1988-2009). Black line shows proposed fall Delta outflow criteria, which is the same for each of the three months. Note that the proposed criteria call for fall outflows that are higher than actual flows in the recent period (1988-2009) in order to improve delta smelt abundance and spatial distribution. In most years, the proposed criteria require less Delta outflow than occurred in the 1956-1987 period.

Winter – spring Sacramento River inflows

For winter – spring Sacramento River inflows, we analyzed the known mechanistic relationships among river flows, the frequency, duration, and magnitude of appropriately-timed floodplain inundation, and the abundance, spatial distribution, productivity, and life history diversity of Sacramento splittail and the various races of Chinook salmon in the Sacramento River basin. Splittail use floodplains such as the Yolo and Sutter Bypass for spawning and early rearing, whereas juvenile Chinook salmon experience greater growth and survival on inundated floodplains. Several thresholds in magnitude and duration of flooding were related to hydrological conditions so that in wetter years the floodplain would be inundated for longer than in drier years (Table 3a).

Spring and year-round San Joaquin River inflows

For spring San Joaquin River inflows, we analyzed the relationship between spring San Joaquin flows and the abundance, productivity, and life history diversity of San Joaquin fall run Chinook salmon. San Joaquin River inflows to the Delta have been dramatically reduced, removing the natural variability under most conditions. Spring inflows above certain thresholds that no longer occur frequently under current regimes are correlated with higher salmon survival and recruitment. Year-round flows to maintain hydrologic connectivity and adequate water quality conditions were also developed. The inflow criteria are presented in Table 3b. These criteria should also help support restoration of spring run Chinook salmon to the San Joaquin basin. Maintenance of fall run Chinook salmon and restoration of spring run Chinook salmon in the San Joaquin Basin is critical to support the spatial distribution viability criterion for these two important fish populations; without adequate flows in the lower river, migration of both adults and juveniles is severely impaired and their ability to persist in the San Joaquin River and its tributaries is jeopardized.

Table 3: Recommended Delta inflows from (a) Sacramento River and (b) San Joaquin River to benefit public trust uses. Blank cells reflect lack of data relating specific public trust uses to inflows during those months; other values and sources of information should be used to construct flows during those months. Flows on the Sacramento River assume structural modifications to allow inundation at lower flow rates than is currently possible.

a) Sacramento River inflows

TBI/NRDC Exhibit	Measured as:	Page	Month/ Public Trust Benefit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
			Hydrology	Sacramento Salmonids Sacramento splittail	Sacramento Salmonids Sacramento splittail	Sacramento Salmonids Sacramento splittail	Sacramento Salmonids Sacramento splittail	Sacramento Salmonids Sacramento splittail							Sacramento Salmonids Sacramento splittail
3 Table 3	CFS at Verona	36	Wet	35,000 cfs for 120 continuous days during this period											see Jan-May
			Above Normal		32,500 for 90 continuous days										
			Below Normal		30,000 cfs for 60 continuous days										
			Dry			27,500 for 30 continous days									
			Critical			27,500 for 15 continuous days									

b) San Joaquin River inflows

TBI/NRDC Exhibit	Measured as:	Page	Month/ Public Trust Benefit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
			Hydrology	San Joaquin River Salmonids											
3 Table 1	CFS at Vernalis	28	Wet	2,000	2,000	1st half: 2,000 2nd half: 5,000	1st half: 20,000 2nd half: 20,000	1st half: 20,000 2nd half: 7,000	1st half: 7,000 2nd half: 2,000	2,000	2,000	2,000	2,000	2,000	2,000
			Above Normal	2,000	2,000	1st half: 2,000 2nd half: 5,000	2nd half: 20,000 2nd half: 20,000	1st half: 7,000 2nd half: 7,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
			Below Normal	2,000	2,000	1st half: 2,000 2nd half: 2,000	1st half: 20,000 2nd half: 10,000	1st half: 7,000 2nd half: 5,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
			Dry	2,000	2,000	1st half: 2,000 2nd half: 2,000	1st half: 5,000 2nd half: 10,000	1st half: 7,000 2nd half: 5,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
			Critical	2,000	2,000	1st half: 2,000 2nd half: 2,000	1st half: 5,000 2nd half: 5,000	1st half: 5,000 2nd half: 5,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000

Delta hydrodynamics

For Delta hydrodynamics, we analyzed the relationships between successful migration (and/or entrainment) of key fish species and various aspects of Delta hydrodynamics (export:inflow, inflow:outflow ratios, Old and Middle River flows). Whether species use the Delta for spawning and rearing, or simply as a migration corridor, they are heavily impacted by the unusual hydrodynamics of the Delta that arise from export pumping, reservoir releases, and the altered channel geometry and bathymetry of this area. Dramatic increases in export pumping from the South Delta, in conjunction with reduced flows and Delta channelization, have shifted the dominant patterns of water flow from east – west to north – south and created negative (reverse) flows in the lower San Joaquin River and southern in-Delta channels more than 90% of the time, resulting in delayed migration, migration through unproductive or lethal habitats, and entrainment in the south Delta export facilities. The data on the relationships between migration and/or entrainment and hydrodynamics was used to determine the timing and thresholds associated with protecting abundance, productivity, life history diversity, and spatial distribution of a variety of fish species, including Sacramento and San Joaquin Basin salmonids, delta smelt, and longfin smelt. These recommendations were converted into Old and Middle River (OMR) flows are presented in Table 4. (Note that our recommended OMR flows assume San Joaquin River in flows recommended in TBI Exhibit 3 and Table 3b above are also implemented.)

Table 4: Recommended Delta hydrodynamic conditions, expressed as OMR flows. Blank cells reflect lack of data relating specific public trust uses to Delta hydrodynamics in those months; other values and sources of information should be used to construct recommendations in those months. Hydrodynamic recommendations expressed as Vernalis flow and/or export to inflow ratios in the original testimony have been converted to OMR flows (using the San Joaquin flow recommendations as described in TBI Exhibit 3).

				Delta Hydrodynamics											
TBI Exhibit	**Measured**	**Page**	**Month/ Public Trust Benefit**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
			Hydrology	**Sacramento Salmonids Delta smelt Longfin smelt***	**Sacramento Salmonids Delta smelt Longfin smelt***	**Sac and SJR Salmonids Delta smelt Longfin Smelt***	**Sac and SJR Salmonids Delta smelt Longfin Smelt** (crit and dry years)	**Sac and SJR Salmonids Delta smelt Longfin Smelt** (crit and dry years)	**Sac and SJR Salmonids Delta smelt**				**Sacramento Basin Salmon**	**Sacramento Basin Salmon**	**Sacramento Basin Salmon Delta smelt**
4	OMR Flows (cfs)	30	Wet	-1,500 OR >0*	-1,500 OR >0*	>0	>0	>0	-1,500				-2,000	-2,000	-1,500
			Above Normal	-1,500 OR >0*	-1,500 OR >0*	>0	>0	>0	-1,500				-2,000	-2,000	-1,500
			Below Normal	-1,500 OR >0*	-1,500 OR >0*	>0	>0	>0	-1,500				-2,000	-2,000	-1,500
			Dry	-1,500 OR >0*	-1,500 OR >0*	>0	>0	>0	-1,500				-2,000	-2,000	-1,500
			Critical	-1,500 OR >0*	-1,500 OR >0*	-1,500 OR >0*	>0	>0	-1,500				-2,000	-2,000	-1,500

* When the previous longfin smelt FMWT index <500, OMR flows in Jan-Mar are >0. This corrects a typographical error in the table on page 30 of the original submission