

DSC – 3
Delta Flow Criteria
Written Summary

The Delta Science Center at Big Break appreciates the opportunity to present findings and recommendation for setting flow criteria from the Delta. Our organization is a non-profit 501c3 Corporation located in Oakley, CA, in the very heart of the Delta. The objectives of the Delta Science Center are to provide education and research about our water ecosystem to residents of our surrounding communities.

The following summary is organized according to the five questions in the Delta Flow Criteria Notice dated December 15, 2009. Our recommendations deal primarily with observed changes in Delta water chemistry and their potential impacts on both pelagic and anadromous fish species and well other aquatic organisms in the food chain. We believe that if the observations we have made are widespread in the Delta, they may represent a major stressor, one that has been inadequately studied to date. The issue arises around increasing concentrations of nitrates in Delta waters that cause hyper-eutrophic conditions, very damaging to fish and insect life. Our work is admittedly incomplete in both geographic scope and duration. The Delta Science Center intends to continue the described work through the current year to improve these inadequacies. It may be wise for others to join in these efforts, considering the extreme plight of threatened and endangered species in the Delta waters.

1. Key Information Key information for our recommendations is contained in the attached testimony. The major issue is the relation between eutrophic effects of high nitrate concentrations during summer months (say June – September) and the health of both the food chain and pelagic and anadromous species. This is obviously not simply a flow issue but at quality issue, related both to flow for dilution and mass loading of nutrients from all sources. We believe the information provided in the attached documents to be reasonably accurate but in need of expansion and peer review in the coming months. Nonetheless, we feel it important enough to become part of the flow criteria setting process.

2. Methodology.... We believe that the State Water Board should look to strategies that, among other variables, will limit nitrate (NO_3^-) ion concentrations in Delta waters including all tributary streams to approximately 4 mg/l to at the most 10 mg/l as (NO_3^-). While this concentration level is less than the current EPA standard for drinking water, our observations indicate that as nitrate concentrations pass approximately 5 mg/l, abrupt changes to water chemistry happen in the late summer, changes so severe as to be acutely damaging to fish and insect life. These recommended nitrate levels are consistent with maximum concentrations specified for Canadian waters of 4 mg/l.

The lower concentration restriction should be applied during summer months when the combination of longer days, higher temperature, tidal mixing and long retention time due to lower flows can lead to near-fatal daily swings in dissolved oxygen and pH in the shallow waters which provide shelter for insects and small fish.

The higher concentration maximum levels (10 mg/l) may be appropriate for times other than summer, if it can be shown that other stressors related to flow do not continue to prevent recovery of endangered fish species.

All this being said, it may not be possible to achieve the recommended reductions of nitrates from the averages we observed in Big Break (20mg/l – 30 mg/l) with flow changes alone. In order to achieve the recommended goals, additional strategies should be considered along with flow. These can include:

- Limiting or prohibiting discharges of nutrient laden water from agricultural activities during the most sensitive times of the year. This might be accomplished by reducing the amounts of inorganic fertilizer used and/or the amount of excess water applied to a field. For some crops, the use of drip irrigation may be a cost effective remedy.

- Reducing the average concentration of nitrate from municipal sewage effluent to 10 mg/l as has been the case in several WDR permits issued by the Regional Water Quality Control Boards. (WDR No. R5-2007, WDR No. R5-2008). This may result in the need to add treatment facilities for nitrification-denitrification, using stabilization lagoons, and/or land discharge.
- Working with homebuilders, home owners, and landscape contractors to use much less fertilizer when installing new lawns and maintaining existing lawns. This last strategy need not involve any cost but will require widespread education along with periodic monitoring, possibly through regional storm-water programs.

3. Sources of Flows ... With respect to the concerns we have raised, sources of flow having high nitrate concentrations should be given special scrutiny and, if appropriate, be the subject of remedial action. These sources are really inflow to the Delta, not outflow.

4. Uncertainty... As we have already stated, uncertainty with respect to our findings rests largely with the limited geographic scope investigated to date. This uncertainty can be diminished by the following:

- Add nitrate analysis to all ongoing water quality-monitoring activities currently underwritten by DWR. In larger studies where water anions are being monitored using ion chromatography, little or no additional cost should be involved.
- Add continuous monitoring for dissolved oxygen, nitrates, pH and turbidity at key Delta and tributary locations.
- Encourage and/or fund additional studies focusing on the relation between nitrates/eutrophication, and harm to aquatic species. Thus far, the observations show a temporal match between nitrate increases and drop in the numbers of threatened and endangered species.
- Where strategically possible, begin programs that will reduce nitrate discharge, monitoring the health in the affected water bodies.

5. Anticipated accomplishments... In the next six months, at least part or even all of the steps mentioned immediately above can be started. This will provide the opportunity to verify the mechanism and severity of eutrophication reported in our attachments, along with at least beginning to evaluate its aerial extent. Using mostly field monitoring techniques, interim reports can be available by the end of July.

The beginning of 2010 has been wetter than in previous years. As such, we may even see a natural reduction in the eutrophication we have observed, and if we are really lucky, possible observation of species starting to rebound.

Closing Statement

Again, on behalf of the Delta Science Center at Big Break, we sincerely appreciate the opportunity to provide our findings and recommendations towards setting flow criteria for the Sacramento-San Joaquin Delta. As appropriate, we wish to stay involved with this process and offer to provide any assistance that we can.