Delta Hazardous Algal Blooms (HABs)
Project Impacts

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Current Conditions

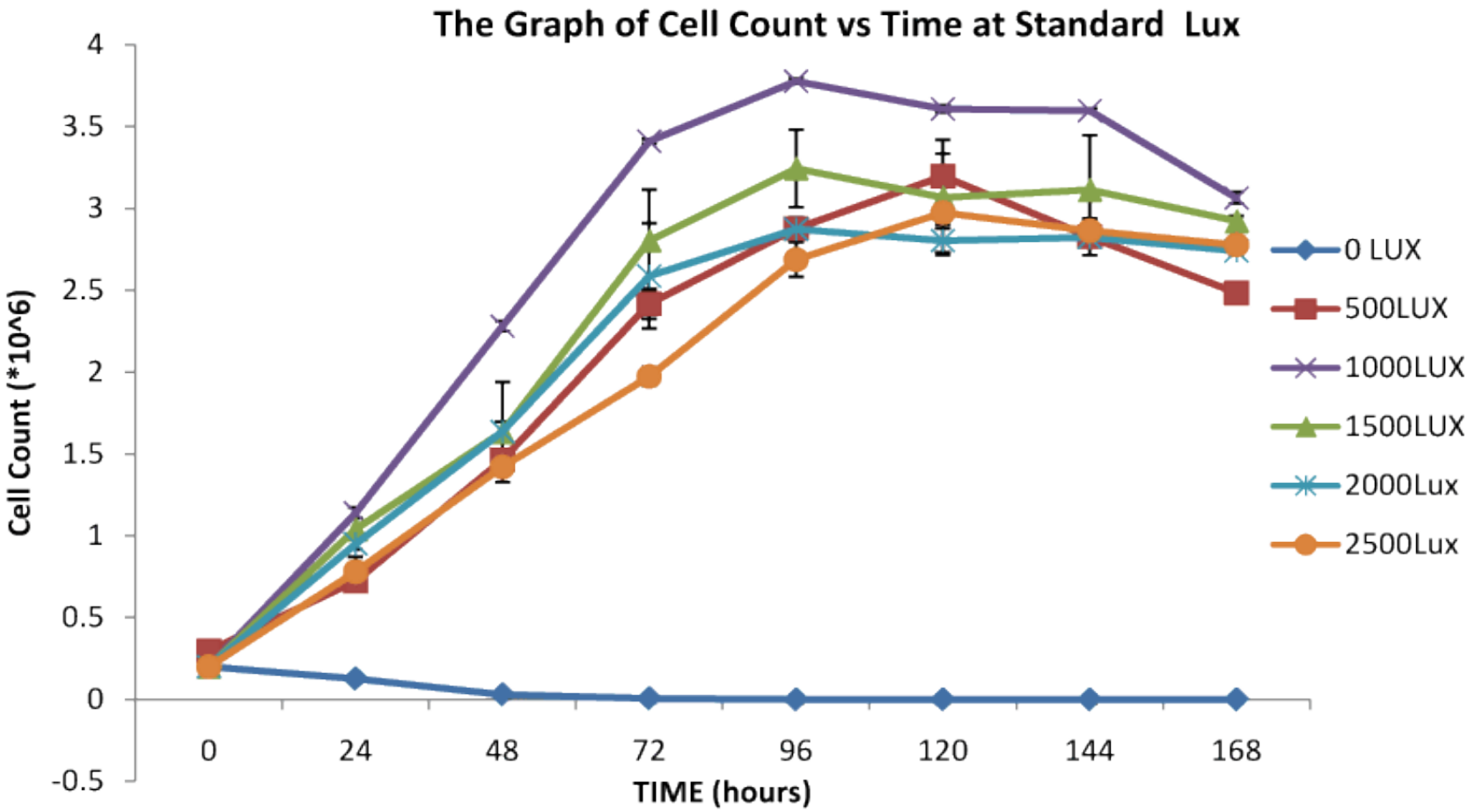
Region dominated by Sacramento River Flows, existing project diversion can use both Sacramento River flows and San Joaquin.

Tidally controlled-twice a day tidal signal from the Pacific, through San Francisco Bay, Suisun, and up the rivers and sloughs. Varies from river to more lake- at Sacramento and Verona.

Relatively high energy tidal flow upriver can dominate Sacramento River outflow and lead to retention and slower flushing.

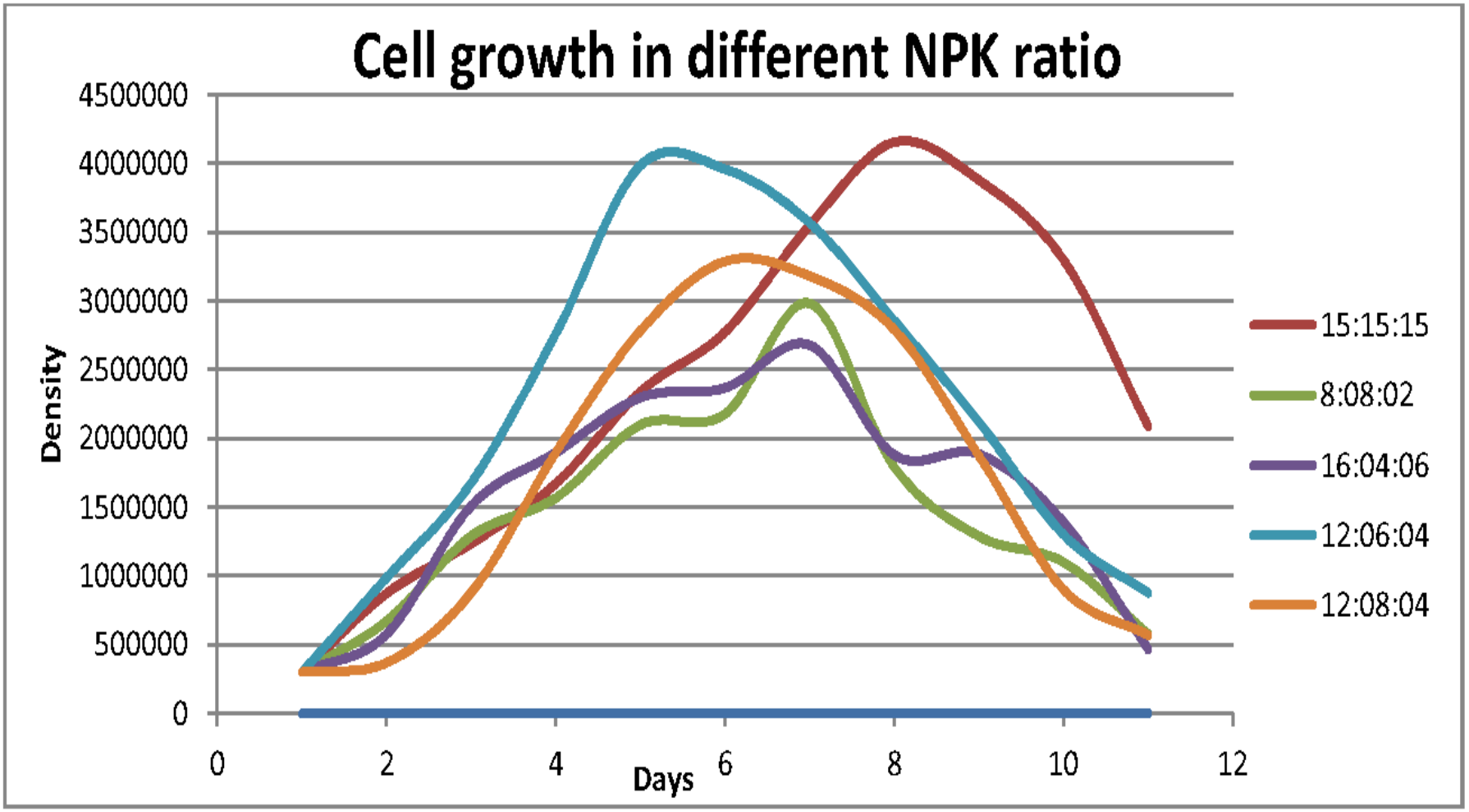
Existing conditions allow ‘freshening’ of entire northern and central Delta parts of the system before export pumps.

Algal Ecology



SJC- Pal S. W., N. K. Singh and K. Azam. 2013. Evaluation of Relationship between Light Intensity (Lux) and Growth of Chaetoceros muelleri. School of Marine Studies, Faculty of Science, Technology and Environment, University of the South Pacific, Fiji. (Figure Microalgae response to light.)

Algal Ecology



SJC- Kassim, Z., Akbar J., Lim K. C., Nur F. Z. and Nur H. A. 2014. SustainableTechnique for Selected Live Feed Culture in: "Sustainable Aquaculture Techniques", Hernandez- Vergara and Carlos Ivan Perez-Rostro eds,

Algal Ecology

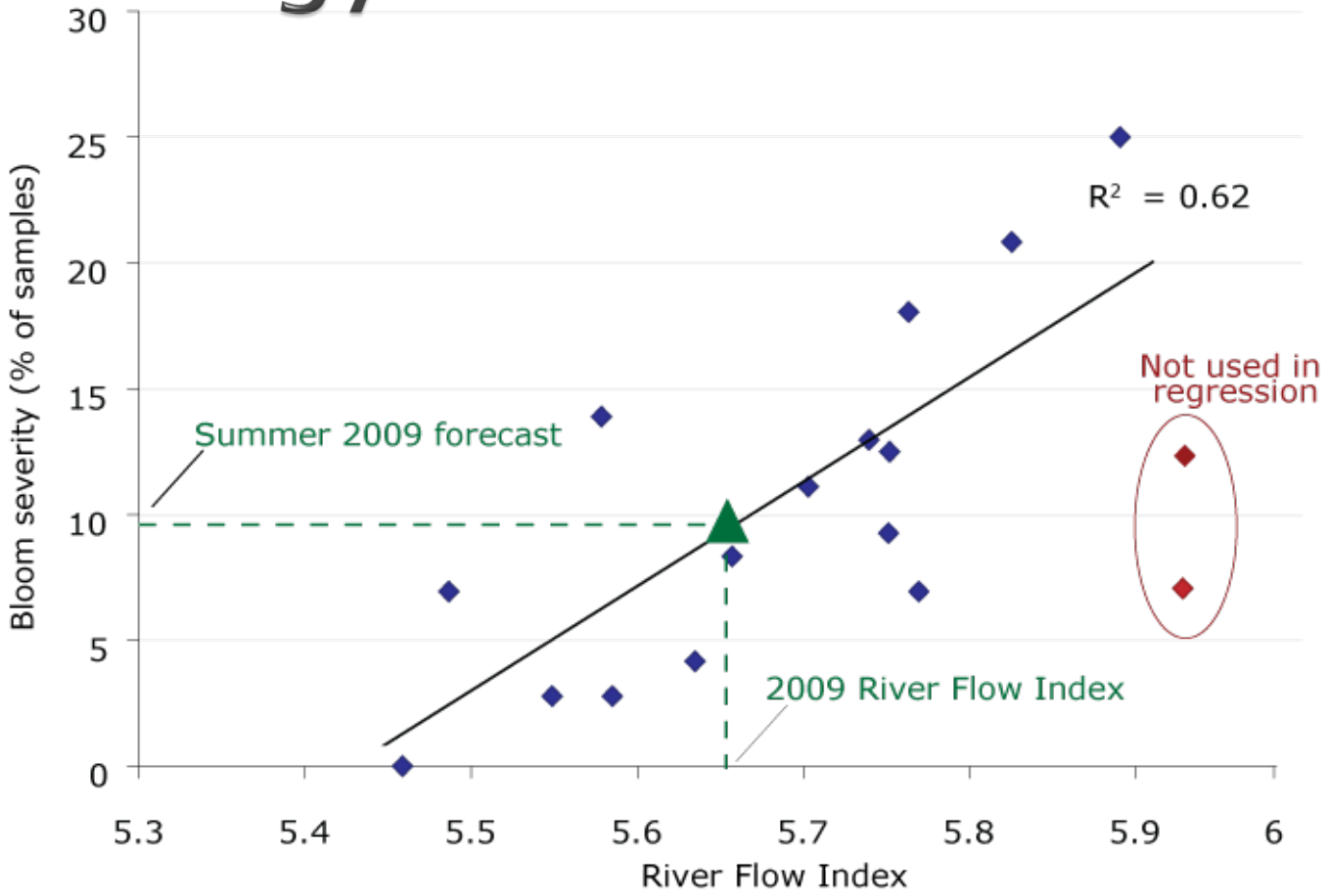


Figure 1. Regression relationship between river flow index at Point of Rocks, Potomac River, MD and Bloom Severity Index as % of samples in a summer season where bloom levels of *Microcystis* were detected. 2008 Summer Forecast is shown here.

X-axis: River Flow Index = Log_{10}(Cumulative 17 month flow in cubic feet/(1* 10^{-6}))
Y-axis: Bloom Severity Index = % Summer Potomac samples at bloom level

SJC- Tango, P. 2009. USGS. (Microcystis) Growth Model, Potomac Algal Bloom

Recent Conditions

The existing Project is clearly not responsible for drought conditions. It does however influence flows, temperatures and the resulting river water quantity and quality during droughts.

It influences those conditions through holding water back in the rim dams, the timing of releases for fisheries (itself already mitigation for Project impacts), and, the variation in releases from individual rim dams.

Recent Conditions

The proposed Project modification of the point of diversion adds significant complexity to those influences on the water quality. By removing the high water quality from the Sacramento River much higher in the watershed, it changes the relative influence of the other sources and reduces its dilution effect and thus the assimilative capacity of the Sacramento River downstream of the intakes.

It also changes the residence time of the remaining flows, by increasing the time it takes for these flows to reach San Francisco Bay.

Petition

New diversions intended to take off higher quality water (EC/TDS/Br/Cl) much further upstream.

Proposed project rules and likely operations mirror drought conditions on the Sacramento River.

- 6,000 cfs, 300 cfs would be diverted, leaving 5,700 cfs in the river.
- 15,000 cfs, 3,000 cfs would be diverted, leaving 12,000 cfs in the river.
- 22,000 cfs, 9,000 cfs would be diverted, leaving 13,000 cfs in the river.

These flows are directly equivalent to the range of flows at Freeport during critically dry year (mean 9,345 cfs 1922) to a dry year (mean 16,003 cfs 1989). (II-28, ICF 2016, Pg. 2-3).

Petition

Water quality is maintained or modified by the operations of the Project's rim dams and at the proposed new point of diversion.

The relative proportion of flow from each of these sources and the operations of the Delta Cross-Channel (DCC) provide the mixing and dilution of these source waters and agricultural and urban water returns. Each of these factors influence water quality and the associated circulation of water within the Delta and have direct and indirect effects on water quality, and that water quality's influence of the formation and maintenance of HABs.

Project Influences on HABs

The Project identifies the potential for HAB influence, but claims that it is unlikely. This conclusion is unsupported by both the weight of scientific evidence and even media reports.

- Project rejects the availability of algal models, despite their common use in US and Canada for similar systems, and the existence of Delta models.

- Models could and should have been developed for the Project, but still have failed to do so. Critical to begin that process immediately and as a result of this process if nothing else.

- The Project could simply integrate existing algal models to initiate the more formal regional monitoring and modeling before the project's completion and after project operations. It is critical that the SWRCB require operational limits that the Project should follow, before the project is built.

Conclusions

- The project has failed to adequately identify the potential of Northern Delta intakes and their operation to influence HAB formation.

- The project has a high likelihood to injure beneficial uses as a result.

- Under the operational rules provided by the project, there are conditions by which similar flows and reduced dilution potential as have happened in drought would be matched or exacerbated. The Project thus bears the responsibility for monitoring the conditions it creates and mitigating its impacts.

- If the Petition, granted, must be conditioned to support and expand the existing USGS/Delta RMP HAB monitoring network, and establish operational rules for the project that minimize or mitigate for its effects.