

## **A Look Back Into 2024: How Did Flow Impact HABs in the Sacramento-San Joaquin Bay-Delta Region?**

The California Data Exchange Center (CDEC) provides publicly available data for water flow from monitoring gauges within the Delta, which is the source for the flow charts in this document, and Restore the Delta uses this data consistently when available. Flow is one of the few things that water agencies can control when managing our Delta; it is imperative for the health of the Delta and its ecosystem, from reducing harmful algal bloom (HAB) activity to restoring fish populations. This blog post will highlight different locations around the Delta with available flow data to stress the importance of flow for mitigating HABs in the Delta.

The charts below measure flow from May 1st to October 1 in 2023 and 2024 for various Delta locations that experienced HAB activity in 2024. The measurement for flow is cubic feet per second (CFS), labeled on the left of each chart. The positive values indicate downstream flow, and the negative values indicate upstream flow resulting from tidal movement or pumping stations pulling water back upstream. The color of the markings on the charts indicates the advisory levels based on the Freshwater Harmful Algal Bloom Program's (FHAB) Trigger Levels below. The shaded areas on the charts indicate how long the bloom advisories were in place. The advisory-level data came from HAB reports from the FHAB program.

*Figure 1: Cyanobacterial harmful algal bloom advisory levels from:*  
<https://mywaterquality.ca.gov/habs/resources/response-guidance.html>

### **Dutch Slough at Jersey Island:**

Dutch slough flows into the Big Break Regional Park, where a harmful algal bloom shut down swimming and a ramp for launching kayaks, a recurring problem at the Regional Park over the past few years. Looking at the flow levels for Big Break Shoreline, Dutch Slough is the closest flow monitor on CDEC for inflow.

Trigger Levels For Human and Animal Health				
Criteria*	No Advisory <sup>a</sup>	Caution (TIER 1)	Warning (TIER 2)	Danger (TIER 3)
Total Microcystins <sup>b</sup>	< 0.8 µg/L	0.8 µg/L	6 µg/L	20 µg/L
Anatoxin-a	Non-detect <sup>c</sup>	Detected <sup>c</sup>	20 µg/L	90 µg/L
Cylindrospermopsin	< 1 µg/L	1 µg/L	4 µg/L	17 µg/L
Cell Density of potential toxin producers	< 4,000 cells/mL	4,000 cells/mL	_____	_____
Site-specific indicator(s)	No site-specific indicators present	Discoloration, scum, algal mats, soupy or paint-like appearance.  Suspected illness	_____	_____

\* Action levels are met when one or more criteria are met.

<sup>a</sup> For de-posting, all criteria for no advisory must be met for a minimum of 2 weeks. General awareness sign may remain posted and healthy water habits are still recommended.

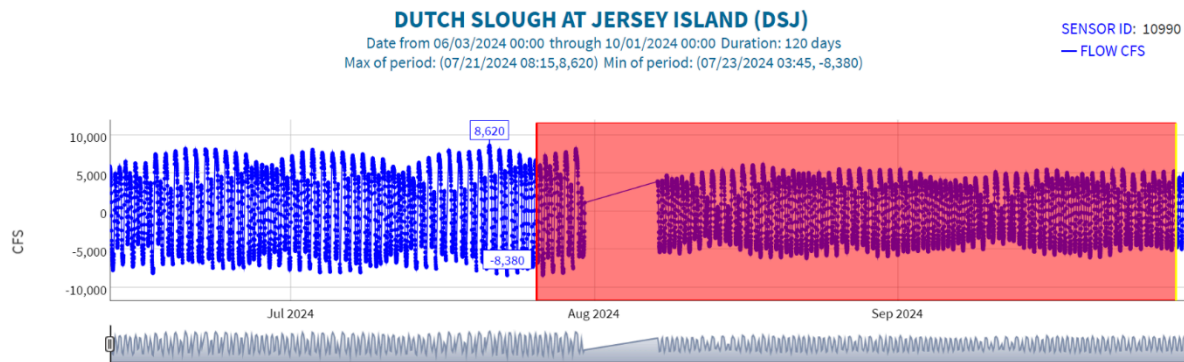
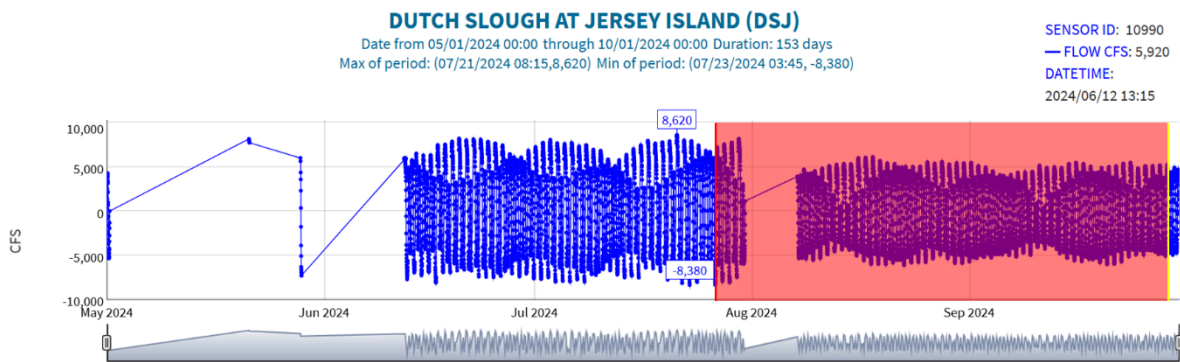
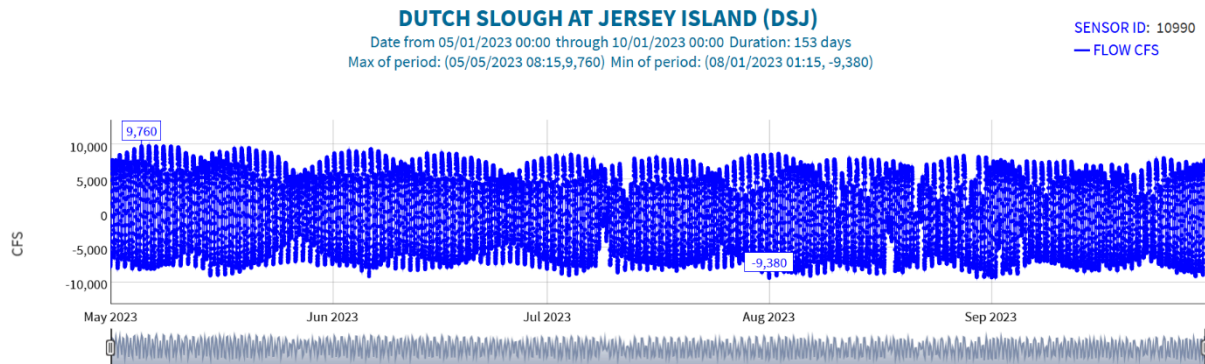
<sup>b</sup> Microcystins refers to the sum of all measured Microcystin congeners.

<sup>c</sup> Must use an analytical method that detects ≤ 1µg/L Anatoxin-a.

There are three flowcharts for Dutch Slough: one that keeps consistency with the rest of the flow charts on this document, one that cleans up the timeframe for which the flow monitor was offline in 2024, and a flow chart from 2023.

From July 26, 2024, until September 27, 2024, Big Break Shoreline fell under Danger levels for toxins from a harmful algal bloom outbreak by the shoreline, based on data collected for the FHAB Program through the State Water Board. On September 27, the trigger level improved to Warning levels, highlighted in yellow at the end of the flow chart. The bloom occurred after the extended downtime of the monitor, which fell from May to mid-June. It's worth noting that the flow monitor was down for a time between August and September, but the flow levels appear consistent. The bloom advisory started during a fluctuating flow between 8600 and -8400 cubic feet per second, showing the flow fluctuation upstream and downstream due to daily tidal cycles. However, once the bloom occurred, the flow monitor went offline, and when it returned online, the flow fluctuation fell between 6000 and -6000 cfs for the remainder of the bloom at a Danger level.

There were no HABs advisories in 2023 for Big Break Shoreline, which coincided with higher flow, displayed in the 2023 data, fluctuating between 9800 and -9400 cfs for the same period as the data for 2024. The lower flow in 2024, followed by a drop during the bloom, appears to correlate with the bloom advisories at Big Break Shoreline.



## Old River at Highway 4:

This monitoring station highlights a need for a flow monitor along the Indian Slough that flows into Discovery Bay because of the distance away the Old River monitor is from

Discovery Bay. In the picture below, the nearest flow monitors to Discovery Bay are the Old River (OH4) and the Victoria Canal (VCU), which both monitor the flow that gets pulled away towards the Clifton Court Forebay (Figure 2). Discovery Bay has a water circulation problem, and without a close enough flow monitor, it's a guessing game about how much flow is getting into Discovery Bay. However, the Danger advisory for the blooms that occurred in 2024 around Discovery Bay coincided with when the monitor showed the most diversion of water towards the Clifton Court Forebay, ranging from 2000 to -9000 cfs in that period (the red shading on the flowchart for Old River). The caution trigger level for HABs in Discovery Bay occurred from June 7, 2024, until July 8, 2024, which is when the danger trigger level occurred until September 9, 2024.

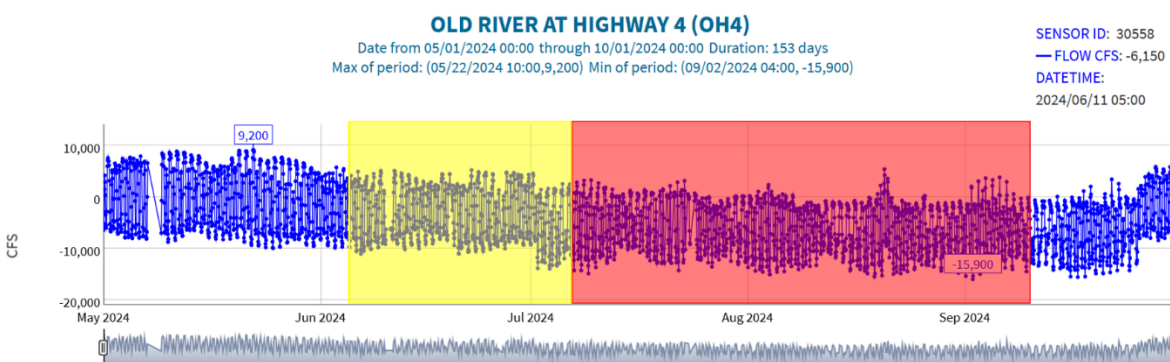
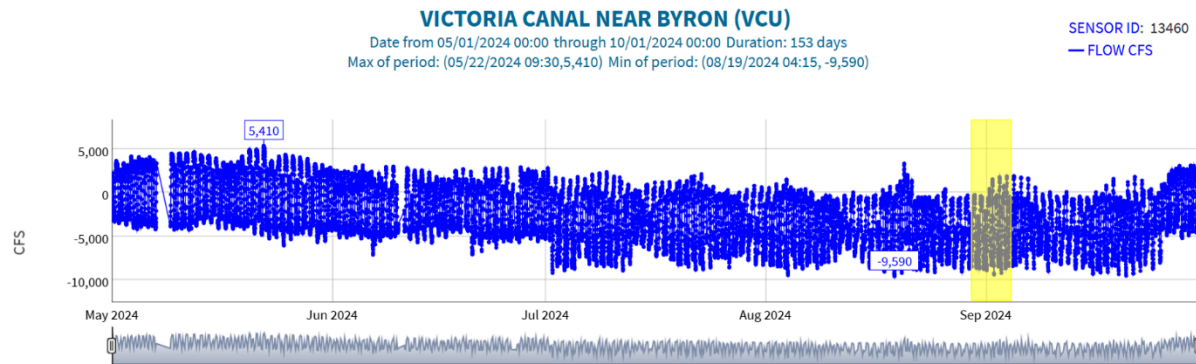
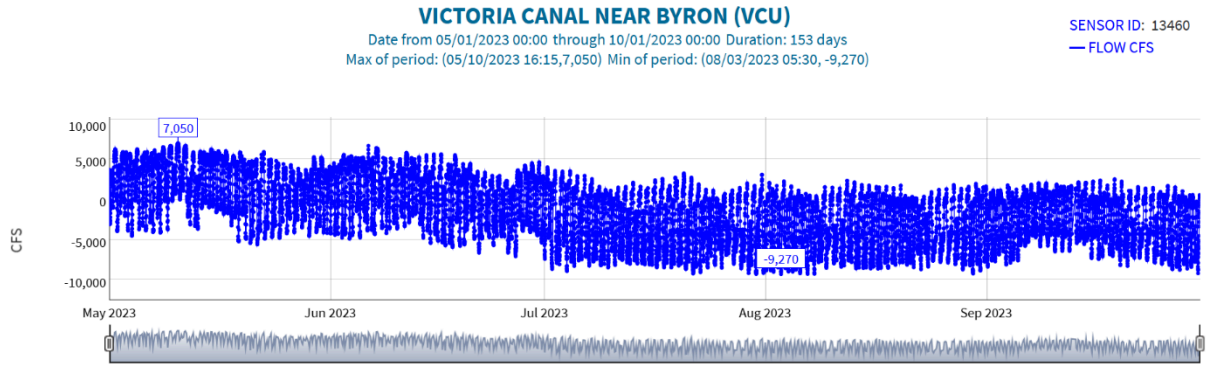




Figure 2: Screenshot of the map of CDEC monitoring stations: <https://cdec.water.ca.gov/webgis/?appid=cdecstation>

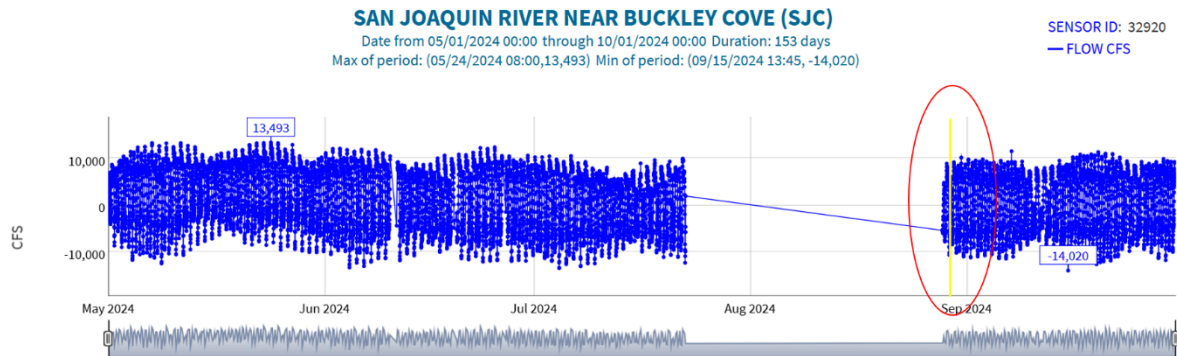
### **Victoria Canal near Byron:**

Victoria Canal is an interesting case because there were cautionary advisories for HABs in 2024, but the deviation between flow from 2023 to 2024 wasn't significant. However, this one is worth pointing out because the Victoria Canal is similar to Old River in that it flows into Clifton Court Forebay. If toxins are flowing into the pumping stations to divert water, the transport of toxins could be a danger to water supplies throughout California, highlighting the need to manage the HABs concerns in the Delta to secure the water source. The caution level trigger occurred from August 28, 2024, until September 13, 2024.



### San Joaquin River near Buckley Cove:

From the testing performed by Restore the Delta around the Stockton area, we found one single result for HABs: near the San Joaquin River downstream exit out of Stockton along the levees near Windmill Cove. The caution trigger level also coincided with a period when the monitor went offline, likely for maintenance, but the flow fluctuation appeared to have been between 10000 and -10000 cfs. There was no observation of a visual bloom, which could mean that the toxins detected may have been from benthic HABs, the colonies of HABs that can attach to the bottom of the water column, or from an unreported upstream bloom along the San Joaquin River. The caution level trigger occurred on August 23, 2024.



## The Reservoirs:

The Contra Loma and San Luis Reservoirs experienced Danger advisory levels of bloom activity throughout the summer of 2024. However, there is no flow data to reference because no such monitors exist. However, the HAB activity is unsurprising because these reservoirs have steady, stagnant water that fills the reservoir from pumping facilities around the Delta. Combine that steady water with other factors like sunlight, hot temperatures, and nutrients, and you have the perfect cocktail for HABs to form. The reservoirs that provide water for many people are sitting still and experiencing HABs at Danger trigger levels, raising public health concerns by removing flows from the Delta and storing still water in these reservoirs.

## The Importance of Flow in Water Quality Management:

The flow data shown highlights a need for flow throughout the Delta system. The Delta ecosystem requires multiple protections for downstream flow for recovery. When there is adequate flow through the system, the data from the past few years show that bloom reports falter with the amount of flow we've experienced in the past few wet years. The locations that experienced bloom activity in 2024 are notable because they are areas where lack of water circulation is a concern, specifically Discovery Bay, the Big Break Shoreline, and the reservoirs where water sits still. Increasing circulation in areas of the Delta that lack flow should be a priority for the water agencies in California. The Delta-wide decrease in bloom activity over the last two years is notable for general flow releases from reservoirs during drought years.

## Conclusion:



The need for a human health HAB standard is well past due, and having one set in place would allow for another means of managing flow through the Delta during periods of drought through requirements for maintaining water quality. In the past two years, an above-average snowpack has allowed colder freshwater to flow down the Sacramento and San Joaquin Rivers during the spring and summer months. However, California's fluctuating hydrology shows flow as the foundation of any strategy to address HABs, water quality, species protection, and public health. Lack of flow during drought stresses the need for a human health standard for HABs, which connects to the more significant collective needs for instream flows in the water management system. We need the State Water Board and other water agencies to take the lead and proactively incorporate protective standards in the Delta as we go into an uncertain future in environmental conditions around the management of our ecosystem.