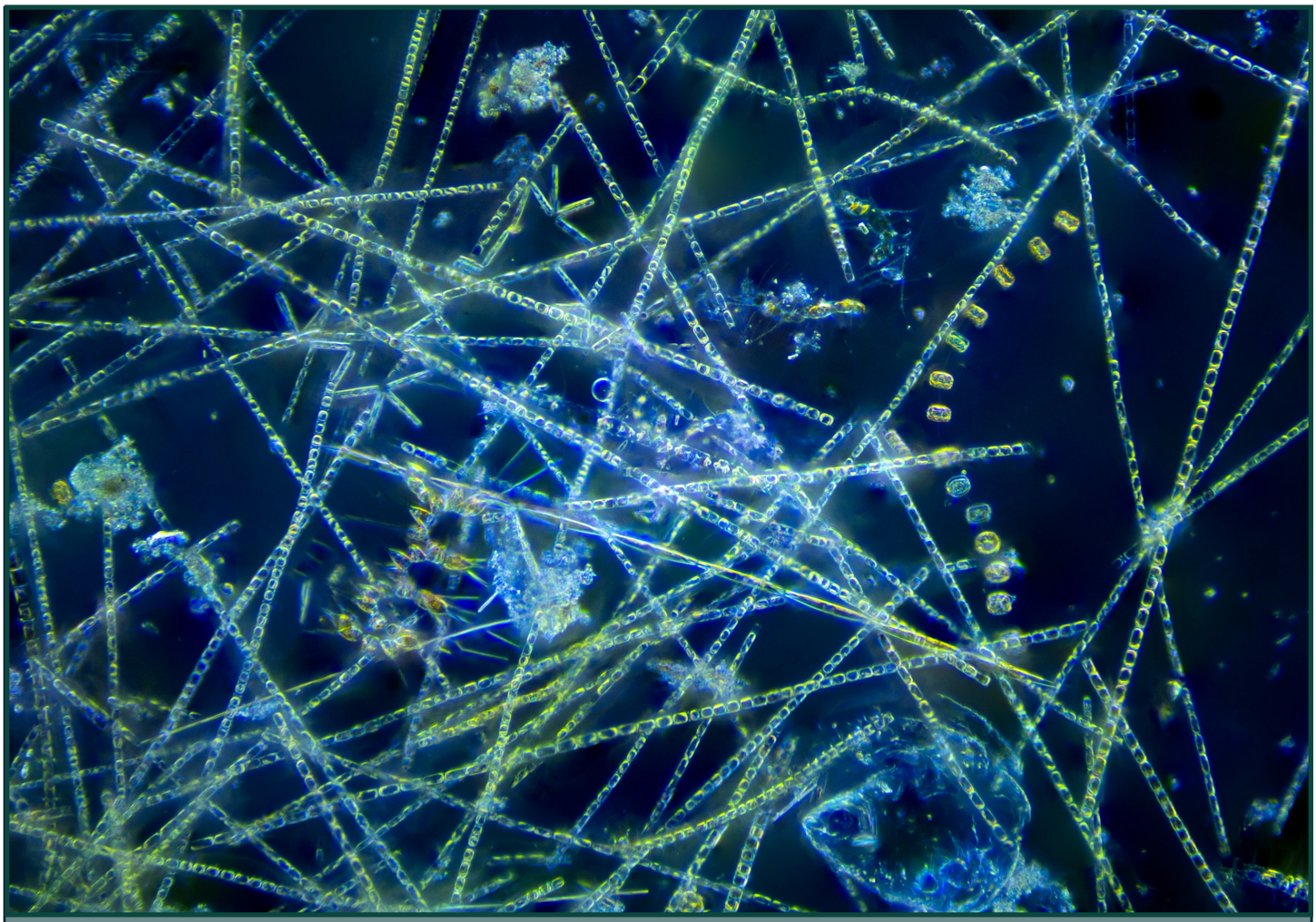


WHATCOM MARINE RESOURCES COMMITTEE (MRC) HARMFUL ALGAL BLOOM MONITORING FINAL REPORT

Prepared by: Dana Daniels, Whatcom MRC Staff
Whatcom County Public Works Natural Resources Division
Reporting Period: October 2025 - September 2026

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ABSTRACT

The SoundToxins monitoring network, managed by Washington Sea Grant, monitors over 3 dozen sites for harmful algal blooms (HABs) throughout the Salish Sea. Due to a lack of HAB data from the north region of Washington State, the Whatcom MRC added two HAB monitoring sites in Whatcom County including Birch Bay Village Marina and Drayton Harbor/ Semiahmoo Marina in October of 2023. The MRC monitors these two sites for harmful phytoplankton weekly from March through October and biweekly from November through February.

The monitoring and analysis protocols were developed by the SoundToxins monitoring network. The HAB data is uploaded to the SoundToxins database and the Washington State Department of Health (WA DOH) is notified when HAB action levels are reached. This data allows management agencies and scientists to more effectively manage shellfish closures for public safety. Adding regular monitoring at these sites in north Whatcom County fills data gaps in areas that have seen historically high levels of shellfish toxins. Drayton Harbor is also an important tribal, recreational, and commercial shellfish harvest area. The addition of these sites in the northern-most area of the Puget Sound also provides valuable data to better understand phytoplankton dynamics of the entire sound.

During the October 2025 through September 2026 reporting period, samples collected at Drayton Harbor/Semiahmoo Marina and Birch Bay Village Marina indicated relatively low HAB impacts compared to previous years. Paralytic shellfish toxin levels exceeded action levels at both sites intermittently from April through June 2026, resulting in temporary recreational shellfish harvest closures. Despite these short-term closures, recreational harvest remained open for most of the year. Overall, closures were less frequent and did not extend through the warmer summer and fall months as they had in 2023, 2024, and 2025.

The 2026 monitoring season marked the third year of HAB data collection by the Whatcom MRC. Monitoring results have demonstrated considerable year-to-year variability, reflecting the dynamic nature of phytoplankton bloom development. Given that blooms can occur unpredictably across both time and location, consistent monitoring at numerous geographically dispersed sites is critical for safeguarding public health. The Whatcom MRC's citizen science monitoring efforts provide valuable data that support this goal in Whatcom County.

PROJECT GOALS

This project was initiated by local citizen scientists to address a gap in HAB monitoring data in the northern Puget Sound. Monitoring in this region is especially important due to its proximity to tribal, recreational, and commercial shellfish growing and harvesting areas, the historically high abundance of HAB species in this area, and the influence of nutrient-rich inputs from the Fraser River that can contribute to bloom development. The goal of this data is to support management agencies and researchers in making more informed decisions regarding shellfish harvest closures to protect public health in Whatcom County, while also improving our understanding of phytoplankton dynamics throughout the Puget Sound. An additional objective of the project is to provide educational and hands-on learning opportunities for K–12 and higher education students.

PROJECT ENGAGEMENT

The MRC was responsible for project planning and coordination including sample collection, sample analysis, and data entry. The MRC recruited and trained community volunteers to assist with the project, and communicated findings to the project partners outlined on the next page.

The primary HAB sampling team included a dedicated group of community volunteers who consistently collected and analyzed samples. As the HAB team sampled, there was also frequent engagement with the public about the project. These brief interactions often yielded interest in the project, resulting in several folks joining the team for sampling or microscopic analysis throughout the year. Additionally, members of the HAB sampling team attended a SoundToxins training in Shoreline, WA in March of 2026, collaborating with other sampling teams throughout the Puget Sound and learning more about HABs in our region.

PARTNER ORGANIZATIONS

- **SoundToxins:** Provided sampling protocols, equipment, training, HAB communication, and database management for HAB data throughout the Puget Sound.

- **Washington State Department of Health (WA DOH):** Provided biotoxin testing for the mussels sampled by the HAB team. This information, along with the HAB team's data, was used to update the WA DOH Recreational Shellfish Safety Map.

- **Whatcom County Health and Community Services:** Coordinated supplies for mussel collection and shipping to WA DOH and announced Whatcom County shellfish closures as needed.

- **Garden of the Salish Sea Curriculum (GSSC)**: The HAB team provided educational content and hands-on training to K-12 students through GSSC. GSSC provided interns to assist the HAB team with sampling.



View of Semiahmoo/Drayton Harbor. Photo credit: Dana Daniels, MRC staff.

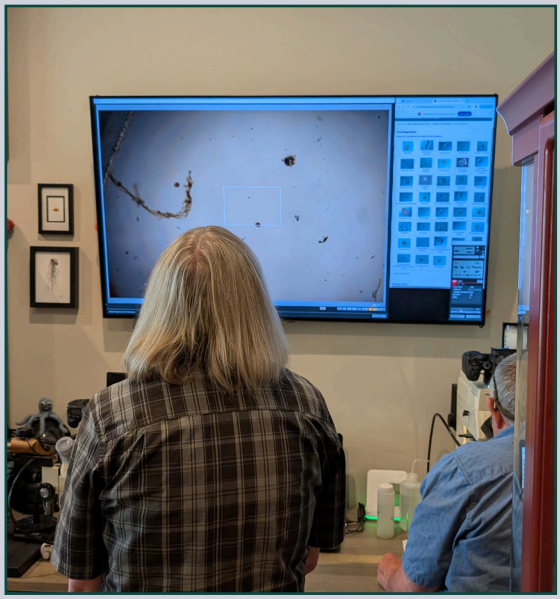
PARTICIPANTS

The primary HAB team that sampled throughout the year is shown in the top left photo below and included (from left to right): Rick Beauregard (MRC project lead), Dana Daniels (MRC staff), Pat Gilmer, Patricia Lulu, Lora Crawford, and Steve Wilson. A full volunteer list with corresponding hours is included in Appendix A. Throughout the reporting period, 15 volunteers participated, contributing over 400 hours of volunteer time to the project.









Volunteers assist with HAB sample collection and analysis. Photo credits: Top left: Semiahmoo resident. All other photo credits: Dana Daniels, MRC staff.

PROJECT METHODS

From October 2025 through September 2026, the Whatcom MRC sampled two sites for HABs using protocols developed by the SoundToxins monitoring network as outlined in Appendix B. These protocols are also used by other HAB monitoring groups to maintain consistency throughout the Puget Sound. The two sites, including Drayton Harbor/Semiahmoo Marina (DHSM) and Birch Bay Village Marina (BBVM) were monitored weekly from March through October and biweekly from November through February.

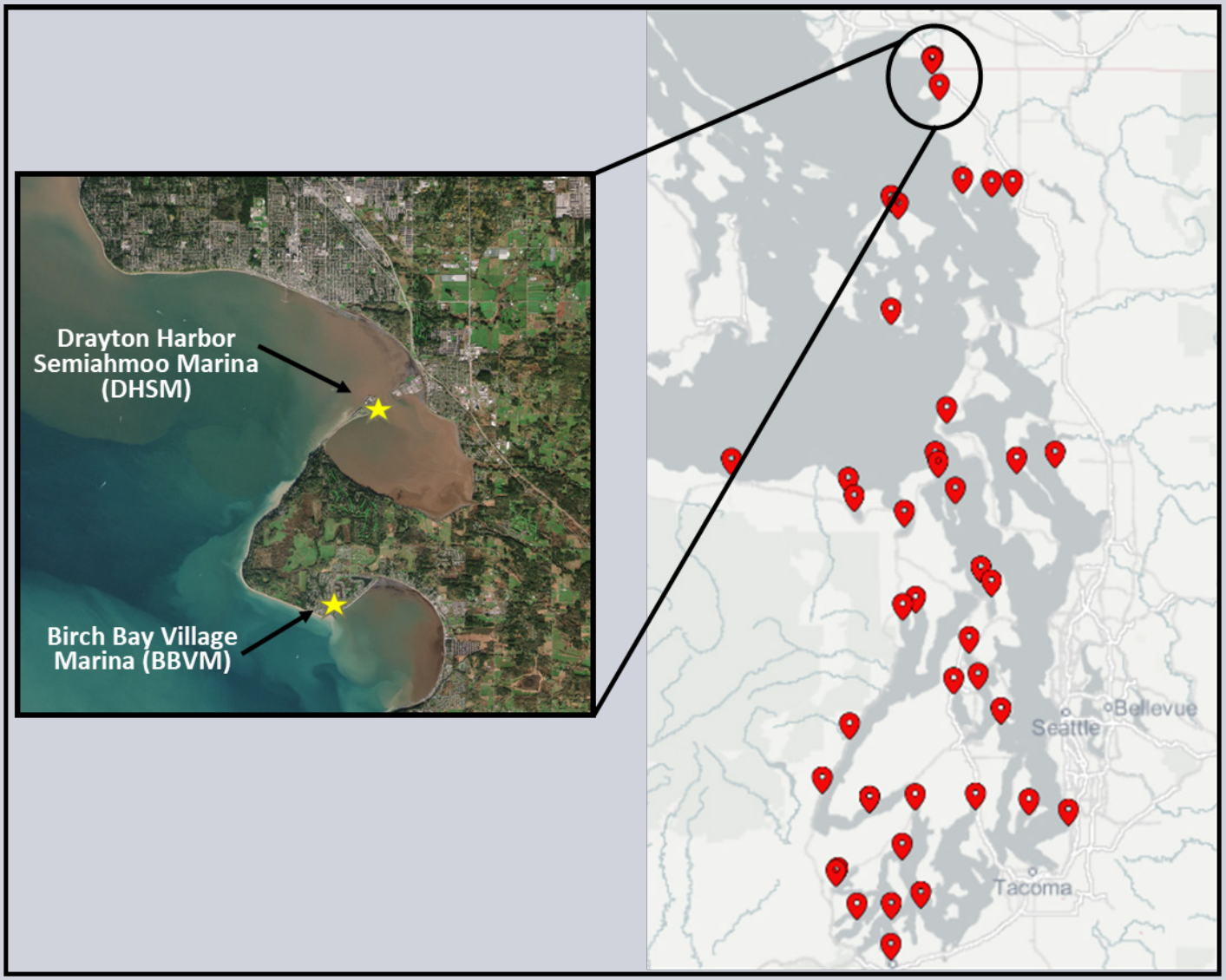


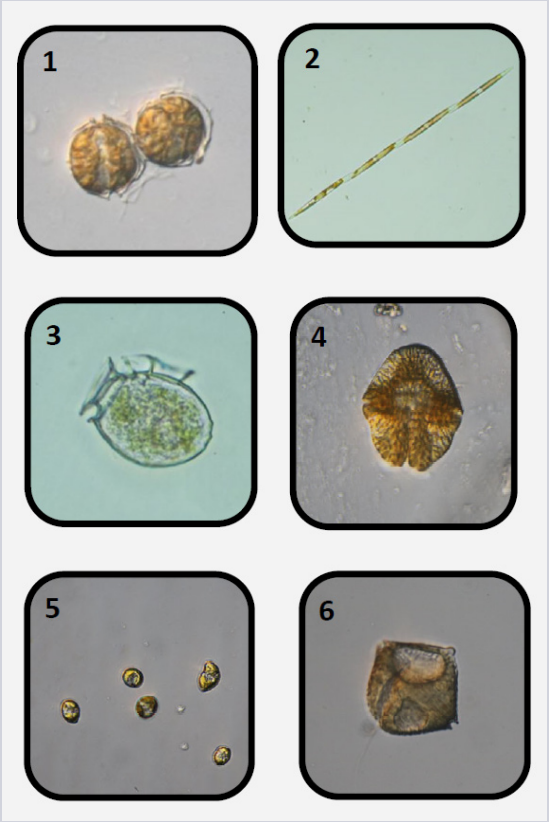
Figure 1: Map showing all of the SoundToxins HAB monitoring sites throughout the Puget Sound. The two northernmost sites, including Drayton Harbor/Semiahmoo Marina (DHSM) and Birch Bay Village Marina (BBVM), are sampled by the Whatcom MRC.

PROJECT METHODS

Sample Collection: Three types of plankton samples were taken per site: whole water samples, 10X concentrated whole water samples, and a vertical net tow of the water column (left photo). For the vertical net tow, the cod end of the net concentrated the plankton sample (right photo). Environmental conditions, including air and water temperature, salinity, wind speed, and tidal stage were also recorded. Photo credits: Dana Daniels, MRC staff.







Sample Analysis: Plankton samples were analyzed microscopically with a focus on HAB species as shown in the photos to the left including (1) *Alexandrium*, (2) *Pseudo-nitzschia*, (3) *Dinophysis*, (4) *Akashiwo sanguinea*, (5) *Heterosigma akashiwo*, and (6) *Protoceratium reticulatum*. HAB species and their corresponding action levels established by SoundToxins and the U.S Food and Drug Administration (US FDA), as well as toxicity information, are outlined on the next page. Photo credits: Steve Wilson and Rick Beauregard.

Reporting: Following sample analysis, results were uploaded to the SoundToxins monitoring database. When HAB species were present above their respective action levels, this information was directly reported to SoundToxins and WA DOH.

PROJECT METHODS

Plankton Species	Sample	SoundToxins Action Level*	Toxicology	Toxin	US FDA Action Level*
Diatoms					
Pseudo-nitzschia (Small complex)	10X, WW	1,000,000 cells/L	Amnesic Shellfish Poisoning (ASP)	Domoic Acid (DA)	20 ppm
Pseudo-nitzschia (Large complex)	10X, WW	50,000 cells/L	Amnesic Shellfish Poisoning (ASP)	Domoic Acid (DA)	20 ppm
Chaetoceros concavicornus	Net Tow	"Common", "Bloom" or > 5,000 cells/L	Fish mortality	NA; Causes physical irritation	NA
Dinoflagellates					
Alexandrium spp.	Net Tow	Initial sighting; Increase from previous sample	Paralytic Shellfish Poisoning (PSP)	Paralytic Shellfish Toxin	80 µg/100 g shellfish tissue
Dinophysis spp.	Net Tow	Initial sighting; Increase from previous sample	Diarrhetic Shellfish Poisoning (DSP)	Diarrhetic Shellfish Toxin	16 µg/100 g shellfish tissue
Akashiwo sanguinea	Net Tow	"Common" or "Bloom"	Bird, fish and shellfish mortality	Photosensitive Hemolytic Toxins	NA
Azadinium spp.	Net Tow	Initial sighting; Increase from previous sample	Human health impacts	Azaspiracids	NA
Karenia mikimotoi	Net Tow	Initial sighting; Increase from previous sample	Human and marine life health impacts	Gymnocin Polyether Toxins	NA
Protoceratium reticulatum	Net Tow	"Common" or "Bloom"	Shellfish mortality	Yessotoxin	NA
Other					
Phaeocystis globosa	Net Tow	"Common" or "Bloom"	Bird, fish and shellfish mortality	Hemolytic Toxins	NA
Heterosigma akashiwo	WW	"Common" or "Bloom"	Fish and shellfish mortality	Several	NA

Table 1: HAB species action levels and toxicity information. WW indicates the whole water sample is used for analysis. "Common" or "Bloom" conditions are relative to the abundances in the rest of the sample.

*While the US FDA sets mandatory, nationwide action levels that trigger commercial shellfish harvesting closures, SoundToxins uses lower, species-specific action levels to alert authorities of a potential threat before toxin levels become dangerous.

PROJECT METHODS

HAB Identification Training: To train volunteers on plankton identification, counting, and microscope procedures, the HAB team hosted several "scope school" sessions following sample collection, focusing on proper identification of HAB species.





Volunteers participate in microscope training to identify HABs species. Photo credits: Dana Daniels, MRC staff.

Mussel Sampling: While collecting plankton samples, volunteers also collected blue mussels to be tested for paralytic shellfish toxins (PST or biotoxins) by WA DOH. Mussel sampling was conducted as part of a separate WA DOH project and was therefore outside the scope of this MRC project. Biotoxin results, combined with phytoplankton monitoring data, were used to inform recreational shellfish harvest closures in these areas to best protect public health (right photo below).





HAB volunteers collect blue mussels from Birch Bay Village Marina. Photo credit: Dana Daniels, MRC staff.

RESULTS

From October 2025 through September 2026, volunteers conducted 42 sampling events, collecting a total of 252 samples for HAB analysis including whole water samples, 10X concentrated whole water samples, and net tow samples across the two sites. Volunteers contributed more than 400 hours to field sampling, microscopic analysis, and data management.

At both DHSM and BBVM, detections of biotoxins in mussel samples above the action level and the presence of HAB species in the water, particularly *Alexandrium*, resulted in intermittent recreational shellfish harvest closures from April through June of 2026. Despite these temporary closures, recreational shellfish harvesting remained open for most of the year.

Graphs summarizing the HAB monitoring data from October 2025 through September 2026 from both sampling sites are shown on the following pages. All raw data are included in Appendix C.

DATA SUMMARY: DHSM

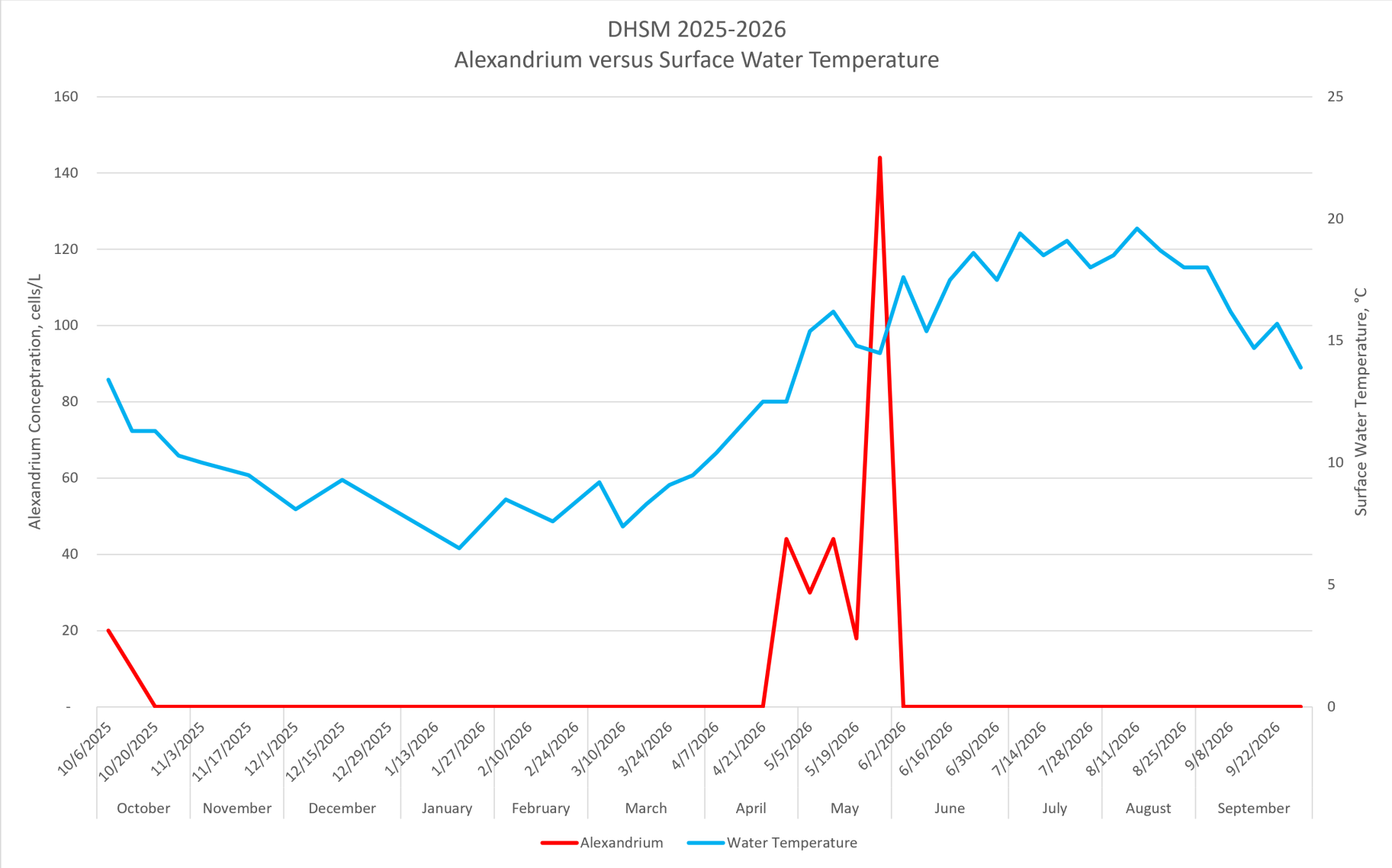


Figure 2: *Alexandrium* concentration (red line, left axis) from the net tow samples at DHSM and sea surface temperature (blue line, right axis) from October 2025–September 2026. *Alexandrium* was absent in most samples, but briefly increased with increasing sea surface temperature from April to June.

DATA SUMMARY: DHSM

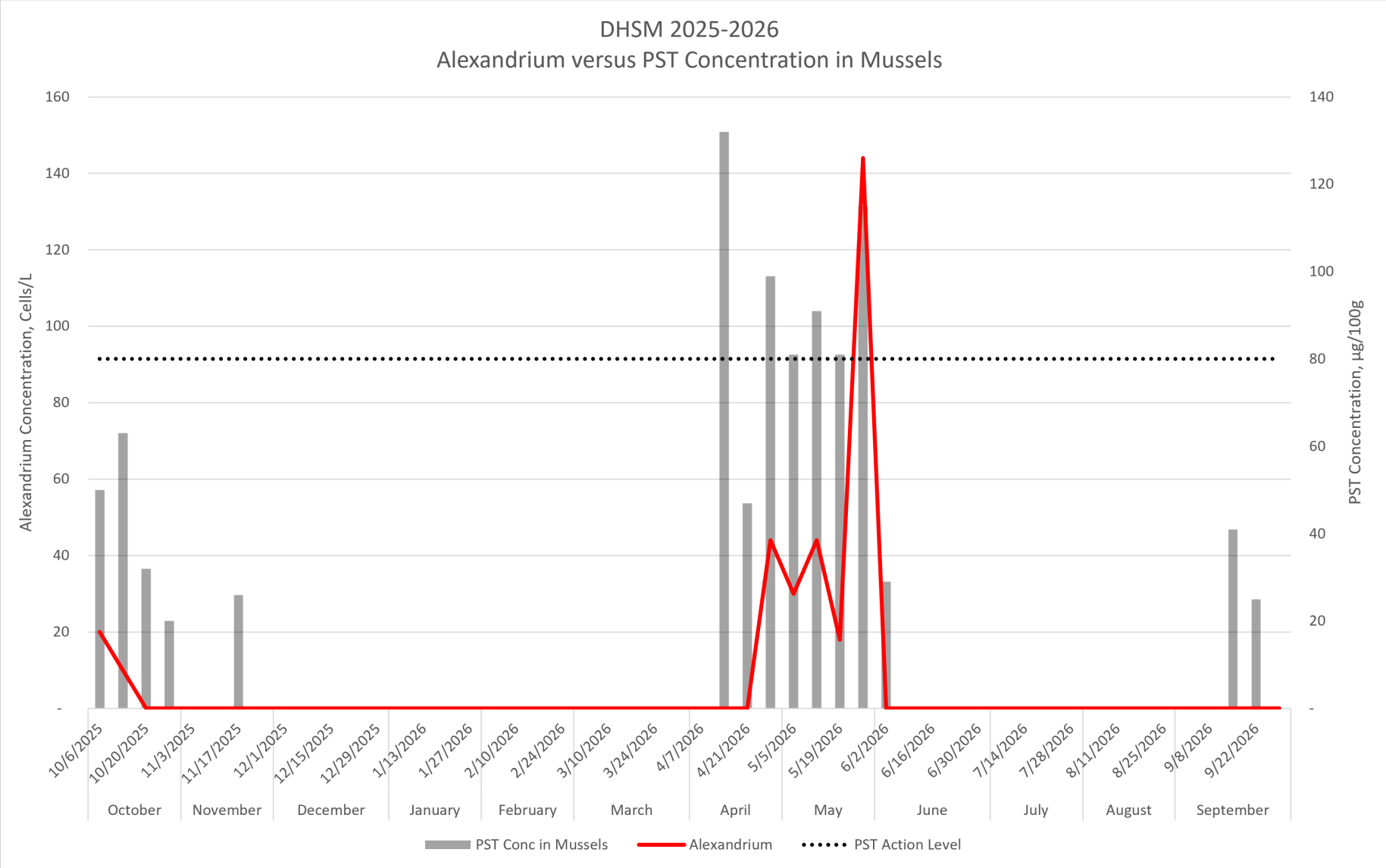


Figure 3: *Alexandrium* concentrations from net tow (red line, left axis) and WA DOH biotoxin/PST data from the blue mussels (gray bars, right axis) collected concurrently at DHSM from October 2025– September 2026. Biotoxins/PST detected in blue mussel tissues only exceeded the US FDA action level of 80 µg/100g tissue (dotted line) intermittently from mid April to early June. Recreational shellfish beds were closed intermittently during this period, but remained open for the majority of the year.

DATA SUMMARY: BBVM

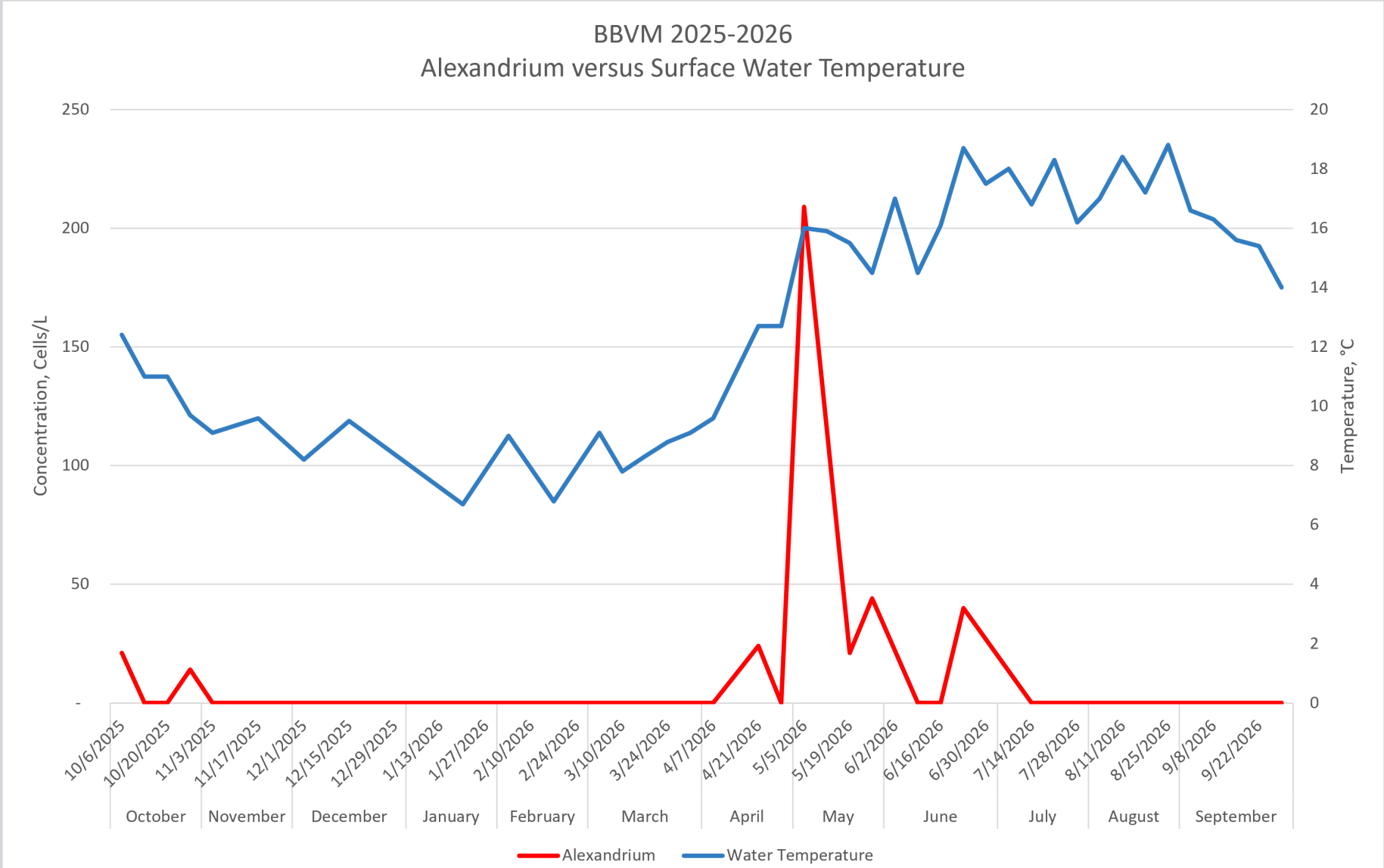


Figure 4: *Alexandrium* concentration (red line, left axis) from the net tow samples at BBVM and sea surface temperature (blue line, right axis) from October 2025–September 2026. *Alexandrium* was absent in most samples, but briefly increased with increasing sea surface temperature from April to June.

DATA SUMMARY: BBVM

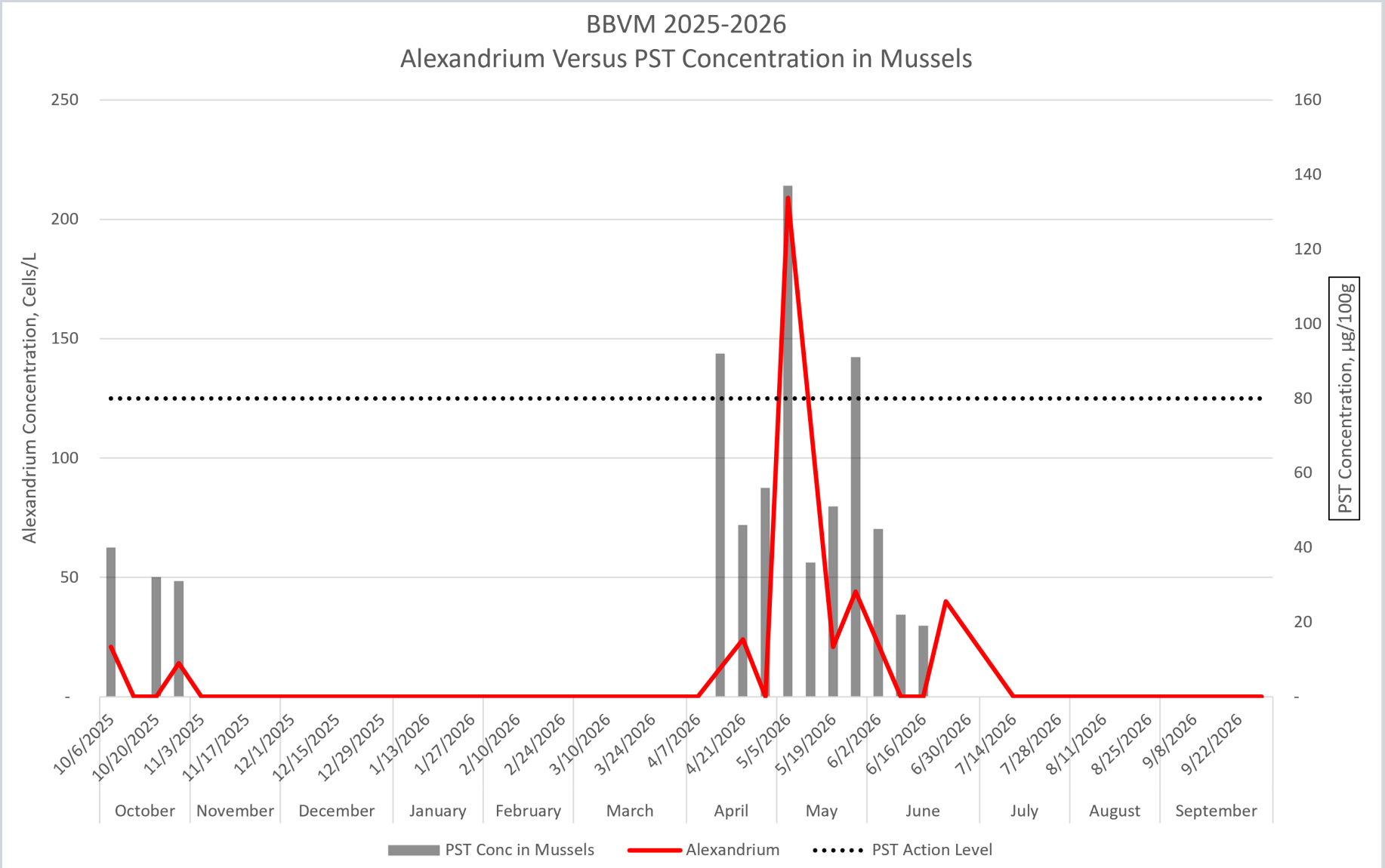


Figure 5: *Alexandrium* concentrations from net tow (red line, left axis) and WA DOH biotoxin/PST data from the blue mussels (gray bars, right axis) collected concurrently at BBVM from October 2025– September 2026. Biotoxins/PST detected in blue mussel tissues only exceeded the US FDA action level of 80 µg/100g tissue (dotted line) intermittently from mid April to early June. Recreational shellfish beds were closed intermittently during this period, but remained open for the majority of the year.

OUTCOMES

The HAB monitoring data from Drayton Harbor/Semiahmoo Marina and Birch Bay Village Marina achieved the goal of filling the HAB data gap for the north Puget Sound. Phytoplankton monitoring data, in addition to biotoxin analysis by WA DOH, allowed for the effective management of shellfish resources within Whatcom County to better protect public health and the shellfish economy. Based on the monitoring data gathered for this project, beaches in northern Whatcom County were closed for recreational shellfish harvest due to biotoxins intermittently from April to June 2026, and remained open during the rest of the reporting period.

OUTPUTS

From October 2025 through September 2026:

- **252 samples were collected** for HAB analysis over **42 sampling events** at 2 sites in Whatcom County
- **15 volunteers** participated
- Over **400 volunteer hours** were contributed
- **7 "scope school" training events** for phytoplankton identification and counting methods occurred





HAB sampling volunteers. Photo credits: Dana Daniels, MRC staff.

RESULTS IN CONTEXT

Samples collected during this reporting period exhibited relatively low *Alexandrium* abundance and biotoxin concentrations compared to previous years. In 2025, recreational shellfish harvest closures were implemented in north Whatcom County during July, August, and September. In 2024, closures remained in effect from May through September, while in 2023, closures began in May and continued intermittently through September. By comparison, 2026 experienced only a few short-term closures between April and June, followed by an unusually quiet summer and fall with no additional recreational shellfish harvest closures for biotoxins. Other recreational shellfish harvest closures occurred during this reporting period, but they were not due to the presence of PST or HAB events. The 2026 spring bloom was also notably less productive than in previous years, with little evidence of a significant spring bloom event.

The 2026 monitoring season marked the third year of HAB data collection by the MRC, and results continue to highlight substantial year-to-year variability in bloom dynamics. As average sea surface temperatures rise and the effects of climate change become more pronounced, ongoing monitoring of HAB species and biotoxin events will play an increasingly important role in protecting public health throughout the Salish Sea.



Employees from the Whatcom County Public Works Natural Resources Division learn about the MRC's HAB monitoring project. Photo credit: Dana Daniels, MRC staff.

PROJECT HIGHLIGHTS

During this project year, the HAB sampling team sampled two northern Whatcom County sites across 42 sampling events from October 2025 to September 2026. They also collected mussel samples for analysis by the WA DOH state lab for shellfish toxins. HAB samples were analyzed by 4 of our members trained in phytoplankton counting and identification methods. Other members of the team were also trained in microscopic techniques used to quantify the presence of HABs and other phytoplankton species through periodic "scope schools."

Over 400 hours of sampling, analysis, and data management time were invested by the volunteer team during the project year. Data from the HAB counts was entered into the SoundToxins database and biotoxin data from the mussel samples was reported by WA DOH and used to inform shellfish safety mapping.

The data from the project period again demonstrated the high variability of phytoplankton production from year to year. The spring bloom of 2026 showed lower total productivity compared to any previous year sampled, with hardly any bloom at all, and far lower than last year. There was no sign of the 2025 blooms of *Heterosigma* or *Rhizosolenia/Sundstromia* observed last year at DHSM or BBVM.

HAB concentrations were lower again this year than in many previous years. *Alexandrium* was detected in only 7 samples at DHSM and 7 at BBVM from October 2025 through September 2026. Concentrations of Paralytic Shellfish Toxin (PST) in mussels were correspondingly low, only exceeding regulatory limits for 6 weeks at DHSM and 3 weeks at BBVM. Water temperatures were higher during winter and early spring than many recent years since 2021, but maximum temperature in summer never reached above 20°C and remained lower than previous summers.

Phytoplankton blooms are highly variable in terms of where and when they can initiate and proliferate. A large geographically dispersed number of sites must be monitored to get a complete picture and best protect public health. Projects like the MRC citizen science monitoring of HABs in Whatcom County, and others that make up the SoundToxins program, are the most cost-effective way to achieve this sampling effort.

- Rick Beauregard
Whatcom MRC Project Lead

PROJECT HIGHLIGHTS

"In times of ever-increasing costs to provide important public health protection for consumers of shellfish, the information that citizen science-based volunteers provide by collecting and reporting phytoplankton data is critical for the WA Department of Health (WA DOH) in the decision process when closing/opening shellfish harvest. In Whatcom County, there have been several occasions when WA DOH was considering upgrading an area closed to shellfish harvest based on declining toxin levels in shellfish, but the early warning phytoplankton data suggested the toxic bloom was not over. In these cases, we kept the closure in place and the next shellfish sample was over the closure level once again. Opening and closing an area to shellfish harvest has a significant cost to the commercial shellfish companies, tribes, local health jurisdictions, and recreational shellfish harvesters. WA DOH relies on the early warning phytoplankton data that the Whatcom County phytoplankton samplers provide to make the most confident public health changes in shellfish harvesting opportunities and to minimize the economic burden to all shellfish harvesters."

-Jerry Borchert, Marine Biotoxin Lead
Washington State Department of Health

"The SoundToxins partnership relies on the dedicated participation of community scientists to collect early warning data on HABs in critical shellfish growing areas across the state's coastal waters. The MRC HAB team have been invaluable members of our network. In addition to filling important data gaps, they have increased education and outreach efforts in the community through collaborating with other monitors across the network, training new volunteers, engaging with local news outlets, and working with K-12 schools. The work of the MRC HAB team has been essential in providing early detection of HABs in Whatcom County's marine waters and helps improve shellfish safety and the resilience of the shellfish industry in Washington State."

-Michelle Lepori-Bui and Melissa Petrich
SoundToxins Program Managers

LESSONS LEARNED / NEXT STEPS

Through this project, the HAB monitoring team has developed the knowledge and expertise needed to successfully train, coordinate, and support a volunteer monitoring program. Team members have gained skills in microscopy, taxonomic identification, field sampling and data collection under a variety of weather conditions, data management, data analysis, and the interpretation and communication of results. As interest in HAB monitoring grows, the Whatcom MRC is well positioned to assist other MRCs in establishing similar programs within their counties. The MRC will continue monitoring HABs and collaborating with partner organizations to help protect public health and ensure shellfish safety in Whatcom County.



View from Semiahmoo Spit. Photo credit: Dana Daniels, MRC staff.

APPENDICES

- **Appendix A**: Volunteer Hours
- **Appendix B**: SoundToxins Monitoring Manual
- **Appendix C**: Raw Data