

2024 Plankton Monitoring & Community Outreach Final Report



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2024 Goals & Results

Stream Team partnered with Pacific Shellfish Institute (PSI) to perform its 13th year of the “What’s Blooming?” plankton monitoring and community outreach program! The goal of this program is to offer engaging activities that educate the public about local water quality issues and encourage environmental stewardship. Monitoring connects the community to their watershed and inspires participants to take evidence-based actions that reduce stormwater pollution, particularly related to nutrients, bacteria and litter. This year, PSI hosted 13 events – 5 “What’s Blooming in Budd?” plankton monitoring events and 8 community events spread between the Olympia (2), Lacey (2), Tumwater (2), and Thurston County (2) jurisdictions.



Nisqually Watershed Festival

PSI shared information about the “What’s Blooming?” and community events on [PSI’s website](#) (Appendix A), [Facebook](#) (Appendix B) and [Instagram](#) pages. The 2024 Task Summary includes the number of Contacts (in-person and social media) for the 13 events supported under this contract. PSI also hosted additional “What’s Blooming in Budd?” events weekly throughout the year using alternative funding sources. The entire year’s water quality and plankton summary data are also included in this report.

2024 Task Summary		
Task	Date	Contacts
Stormwater Field Day (Marshall MS)	4/11/24	400
Stormwater Field Day (Washington MS)	4/18/24	250
What's Blooming in Budd? #1	6/20/24	66
What's Blooming in Budd? #2	6/27/24	99
What's Blooming in Budd? #3	7/18/24	50
What's Blooming in Budd? #4	8/8/24	90
What's Blooming in Budd? #5	8/22/24	58
TOTAL OLYMPIA		1013
Lacey Fish-In	4/20/24	200
Lacey Children's Day	10/5/24	300
TOTAL LACEY		500
Tumwater Falls Festival	9/28/24	278
Tumwater TRL Discover Plankton Workshop	11/4/24	32
TOTAL TUMWATER		310
Nisqually Watershed Festival	9/28/24	250
McLane Creek Salmon & Cider Celebration	11/10/24	163
TOTAL THURSTON COUNTY		413
TOTAL (In-Person)	13 EVENTS	2236
TOTAL (Social Media - FB and IG)	16 POSTS	2198
GRAND TOTAL		4434

PSI completed a total of 5 “What’s Blooming in Budd?” monitoring events and 8 community outreach events reaching 4,434 individuals – 50% (or 2,198) of those being contacts via social media, and 50% (or 2,236) being in-person.

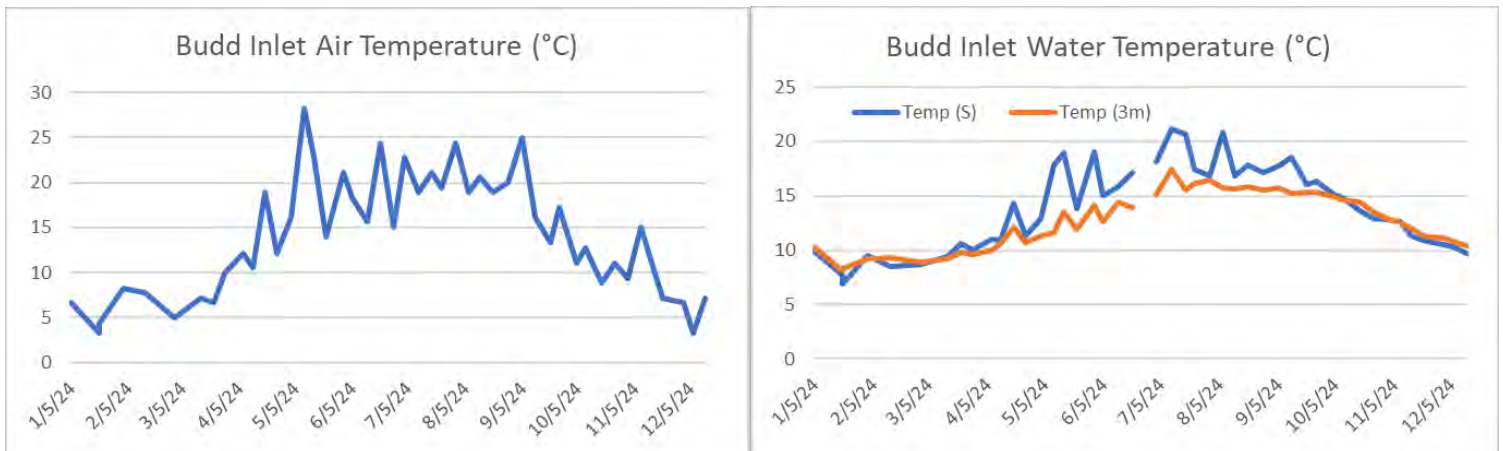
PSI partnered with Stream Team to host 2 Stormwater Field Days at Marshall and Washington Middle Schools and 1 Discover Plankton workshop at the Timberland Regional Library Tumwater branch. Other events supported under this contract included the Lacey Family Fish-In, Lacey Children’s Day,

Tumwater Falls Festival, Nisqually Watershed Festival, and McLane Creek Salmon & Cider Celebration.

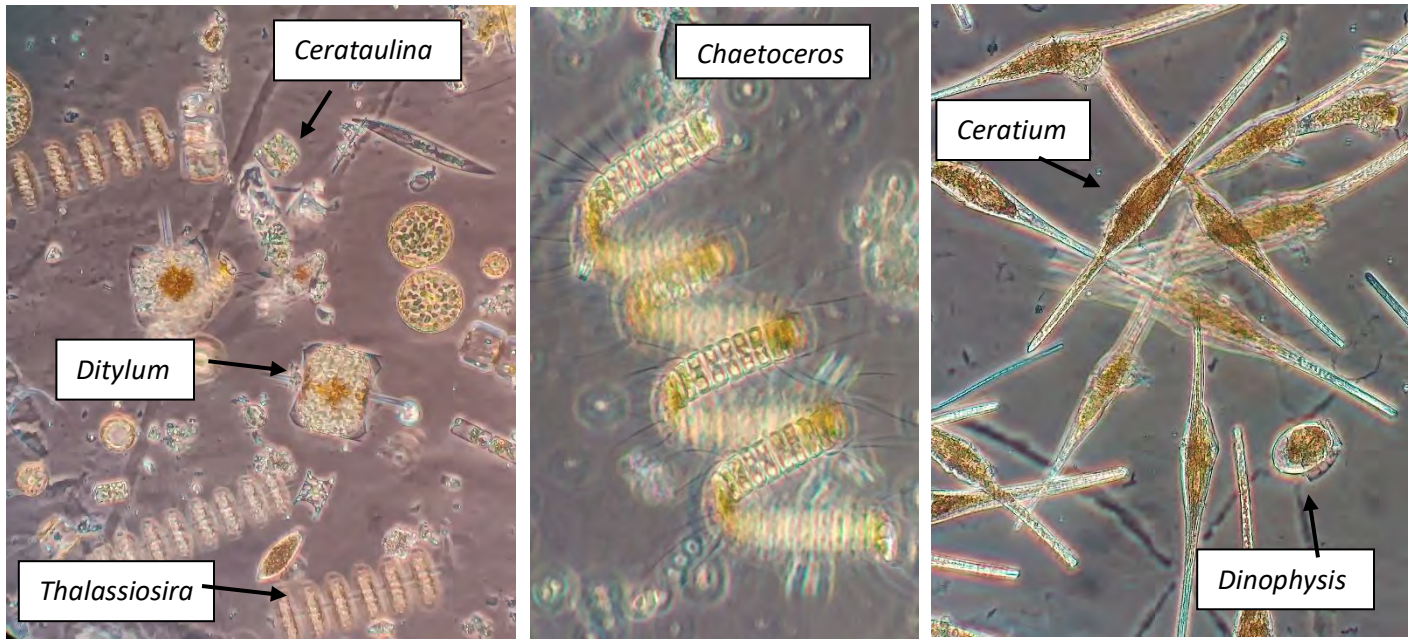
For the “What’s Blooming?” monitoring events, PSI collected water quality and phytoplankton data every Thursday (10-12 AM) between June 20th and September 5th. The public, in addition to Olympia Community Sailing campers, assisted with plankton and water quality data collection. The plankton were viewed under field microscopes and the results were displayed on an A-frame board left on-site until dusk. Plankton samples were further analyzed in the lab to determine species richness and harmful algal bloom (HAB) concentrations using SoundToxins protocols. SoundToxins is a phytoplankton monitoring program designed to provide early warning of HABs to minimize human health risk and losses to fisheries. Data was entered into NOAA’s [SoundToxins](#) phytoplankton monitoring database. The connection between stormwater pollution, downstream water quality, and stewardship was highlighted throughout all events.

Budd Inlet Water Quality Data

The “What’s Blooming?” program continues to contribute to a long-term data set for Budd Inlet. Air and water temperatures followed a similar and expected trend, but did not get as cold or hot as last year. Air temperatures ranged from 3.3°C (38°F) on 1/20 to an early-season peak of 28.3°C (83°F) on 5/10. Water temperatures ranged from 6.9°C (44°F) on 1/20 to 21.1°C (70°F) on 7/11. The difference in water temperature at the surface and 3-meters illustrates that thermal stratification was strong between mid-April and mid-September. Under stratified conditions, diatoms dissipate once they have depleted essential nutrients at the surface. At that time, dinoflagellates flourish since they can migrate to depth (thanks to their flagellas!) to obtain nutrients. In contrast, diatoms dominate the composition during early-spring and late-fall when mixing provides adequate nutrients.



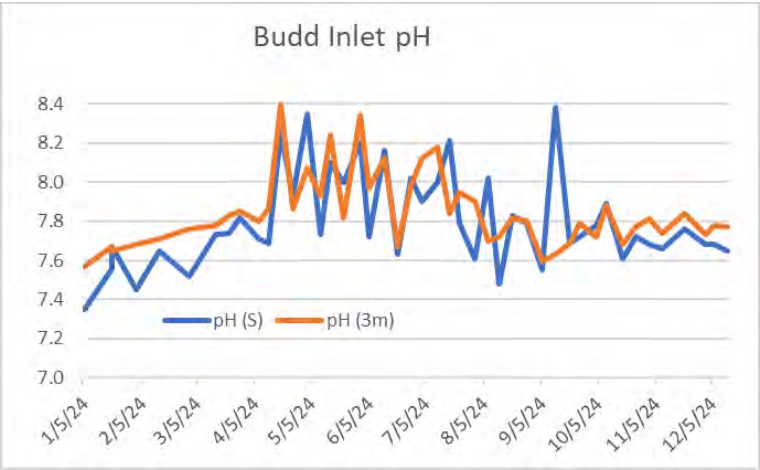
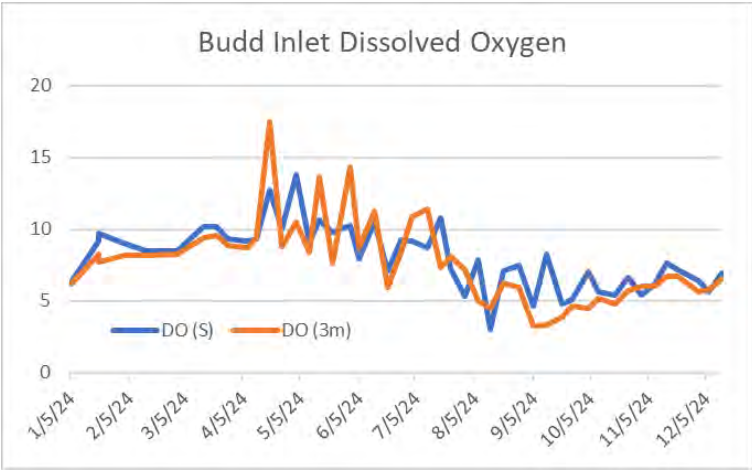
True to form, chain-forming diatoms dominated the phytoplankton in mid to late April. During this time, water clarity reached its lowest value of 1.5-meters as thick blooms of *Cerataulina*, *Chaetoceros* and *Thalassiosira* drove oxygen and pH levels to their peak of 17.45 mg/l and 8.4



An assortment of plankton images (diatoms on left, dinoflagellates on right) captured during the season. Photos: PSI.

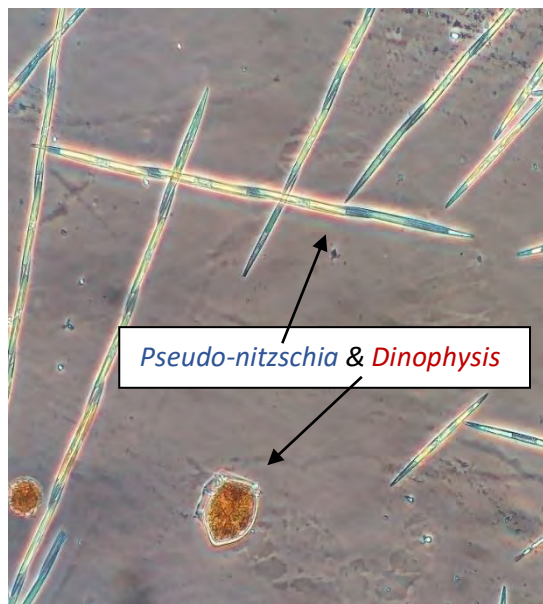
respectively! Amusingly, this diatom assemblage resulted in plankton samples that smelled strongly of melons. The dinoflagellate, *Noctiluca*, was common throughout May and June, followed by *Ceratium* (renamed *Tripes*) in July. With the onset of fall, stratification ceased as the water “turned over” initiating a bloom of the diatom, *Ditylum*.

Phytoplankton have a significant influence on dissolved oxygen (DO) and pH levels as they bloom and photosynthesize in the spring (increasing DO and pH) and are decomposed during late summer and early-fall (decreasing DO and pH, particularly at depth). This decrease in DO from spring to fall was clearly observed with oxygen values reaching their lowest on 8/13 at 3.05 mg/L (low of 2.9 mg/l in both 2022 and 2023). Levels below 4 mg/l are stressful to marine life; below 2 mg/l have been shown to cause mortality.



Budd Inlet has long suffered from low oxygen levels in late-summer due to excess nutrients that fuel rich phytoplankton blooms. Preventing nutrient sources such as animal waste and fertilizer – to name a few – from entering the Inlet is a key step in protecting water quality.

Harmful Algal Blooms (HABs)

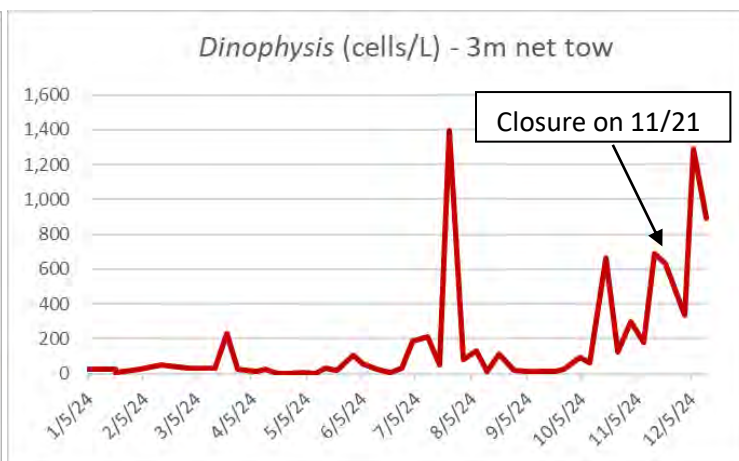
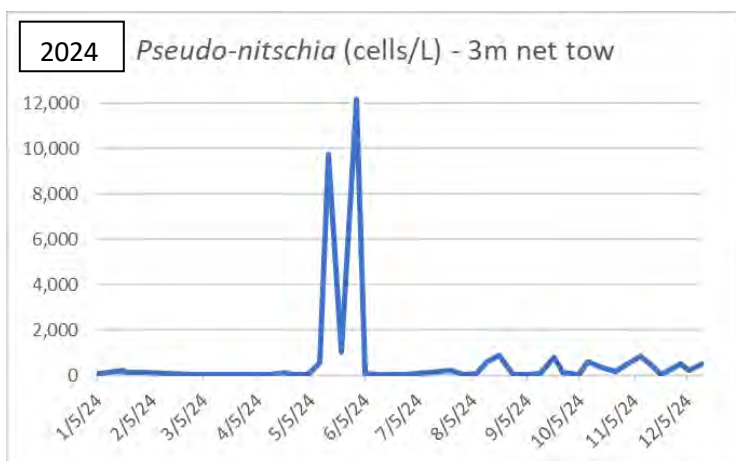


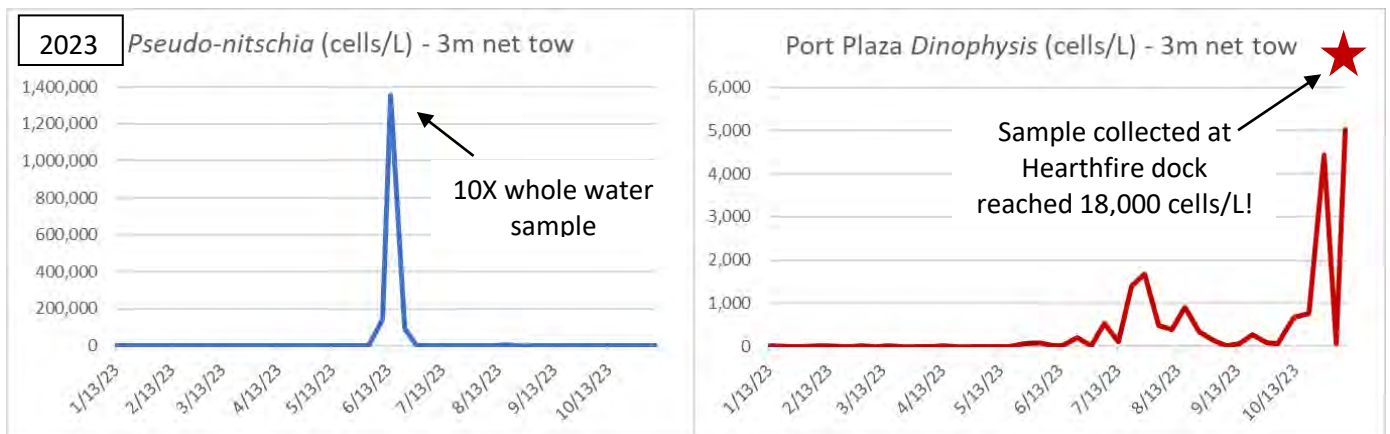
Plankton samples were screened for HAB species including *Dinophysis*, *Pseudo-nitzschia*, and *Alexandrium*. Additional species including *Akashiwo sanguinea*, *Protoceratium reticulatum*, *Noctiluca scintillans* and *Mesodinium rubrum* were also screened as “Species of Concern” or “Interest.” *Akashiwo* and *Protoceratium* have been associated with shellfish mortality events; *Noctiluca* is a voracious predator influencing community composition; and *Mesodinium* is an important food source for *Dinophysis*.

Pseudo-nitzschia, the species responsible for Amnesic Shellfish Poisoning (ASP) bloomed on May 15th and 31st reaching a maximum concentration of 12,155 cells/L. The bloom was slightly earlier and

much smaller than last year’s June bloom of 1,356,000 cells/L! While it is not uncommon for *Pseudo-nitzschia* to bloom in Budd Inlet, ASP closures are rare in South Sound. In fact, while cells are often present, or even common, they remain non-toxic in this region.

Dinophysis, the species responsible for Diarrhetic Shellfish Poisoning (DSP), followed a similar pattern to last year, but at much smaller concentrations. *Dinophysis* bloomed on July 23rd at a concentration of 1,399 cells/L. This bloom did not result in a shellfish bed closure. However,





2023 HAB graphs for comparison depicting similar bloom timing, however, at a much greater magnitude.

blooms of predominantly *D. acuminata* started on 10/18 extending through the end of December reaching 1,292 cells/L on 12/6. WDOH closed Budd Inlet to shellfish harvesting on 11/21 when cell counts were 690 cells/L and DST (Diarrhetic Shellfish Toxins) levels were 20 µg/100 g, exceeding the closure limit of 16. Since this time, mussel samples have been collected but are pending due to DST equipment repairs and Budd Inlet remains closed based, in part, on SoundToxins cell count data.

This long-term data set has proven to be extremely valuable in gaining a better understanding of HAB trends over time including bloom and closure timing, duration, and water quality factors (and species) associated with these blooms.

Please refer to Appendices A (What's Blooming?) and B (Social Media Posts) for photos and a detailed description of each week's sampling adventures.

Community Events

In 2024, PSI attended 8 Community events in partnership with Stream Team. Events included Stormwater Field Days at Marshall and Washington Middle Schools, a Discover Plankton workshop at Tumwater's Timberland Regional Library branch, Lacey Family Fish-In, Lacey Children's Day, Tumwater Falls Festival, Nisqually Watershed Festival, and McLane Creek Salmon & Cider Celebration.

At each of these events, PSI provided fun and education hands on activities related to local water quality, field monitoring, and environmental stewardship. Activities included a stormwater relay with stations focused on recycling, reuse, and proper pet waste disposal; mussel filtration and feeding demonstrations; live plankton viewing under microscopes; a "beach cleanup" reduce/reuse/recycle game, salmon stormwater stenciling, shellfish identification, and pet waste education. All events were well attended. PSI distributed bags-on-board, pet waste disposal fliers, updated local recycling rules, and collected pet waste pledges.

PSI also maintained the Discover Plankton Lendable Kits housed at the Lacey, Tumwater, and Olympia Timberland Library branches as part of the [Library of Things](#) collection. PSI partnered

with Stream Team to host 2 Discover Plankton workshops at the Tumwater and Olympia Timberland Library branches, 1 of which was funded under this contract.

The following photos were taken with permission at the following Steam Team events.

Stormwater Week Field Day



Marshall MS students participate in a relay race that focuses on actions individuals can take to keep pollutants off the ground and out of Puget Sound!

Lacey Family Fish-In



Participants feed mussels live plankton (left), discover what plankton are blooming in Budd Inlet and Long's Pond (center), and learn about the top 10 items found during cleanups and how we can keep them out of our waterways (right).

What's Blooming in Budd?



Guest visitors from Washington Department of Health share with Olympia Community Sailing campers and the public the importance of HAB monitoring for human health and safety (left). Visitors discovering What's Blooming in Budd (right).

Tumwater Falls Festival



Participants learn how to keep water clean and healthy for the returning Chinook salmon and all creatures that call Puget Sound their home.

Lacey Children's Day



A job well done! These girls cleaned up the beach and even recycled the bottles and cans. Thank you, young stewards!

McClane Creek Salmon & Cider Celebration



The salmon returning to McClane Creek were unbelievable and awe-inspiring! Folks enjoyed the spectacle while also enjoying donuts, hot apple cider, and a handful of fun, educational activities!

Nisqually Watershed Festival



Scoop it and trash it! Why use bags when there are grabbers?! Haha! Participants learning what's living in the water and why it's important to keep the water clean!



Tumwater Library “Discover Plankton!” Workshop



Families checking out the Discover Plankton lendable kits (left) while discovering “What's Blooming?” in Budd Inlet and Ward Lake (right).

Acknowledgements

PSI is incredibly grateful to Stream Team for their financial support over the past 13 years! The “What’s Blooming in Budd?” data set is now revealing its true colors and being used by researchers and students to better understand water quality and HABs in our local region and promote environmental stewardship. Thank you to the Port of Olympia for supporting research and education at Port Plaza and to Washington SeaGrant for managing the SoundToxins program. Thank you to our student intern, Mia, volunteers, Roberta & Jeanne, and all the plankton enthusiasts that join us on the dock each year. See you next spring!



PSI is so grateful for our wonderful volunteers and interns! Thank you, Jeanne, Mia, and Roberta for your help and enthusiasm!

Appendix A: 2024 Plankton Monitoring Weekly Reports

What's Blooming in Budd in 2024?

Location: Port Plaza Dock (near Farmers Market)

Date: Thursdays (June 20 – September 5)

Time: 10 AM – 12 PM

This summer, PSI will sample weekly at Port Plaza, Budd Inlet, thanks to generous funding from Stream Team and the Inspire Olympia Fund! Come join us! Everyone is welcome!

PSI will have water quality equipment, plankton nets, and microscopes available for plankton viewing and identifying harmful algal bloom (HAB) species for NOAA's [SoundToxins](#) program. As always, you may check here weekly to view data, photos, videos, and a commentary on our sampling experience.

Every week, plankton communities change. Every week, we see something new!

We would love to see you on the dock or hear from you! Contact us anytime with your burning plankton questions, or to arrange for group presentations.

Mary Elizabeth maryelizabeth@pacshell.org & Aimee Christy, aimee@pacshell.org



June 20, 2024 – Budd Inlet, Port Plaza

Secchi disk (water clarity): 3.2 meters

Blooming Phytoplankton Species: *No blooming species.*

Common Phytoplankton Species: *Pleurosigma/Gyrosigma*, *Noctiluca*

Zooplankton: bivalve larvae, copepods, larvaceans, polychaete larvae, rotifers, crustacean nauplii, tintinnids, barnacle larvae, ciliates

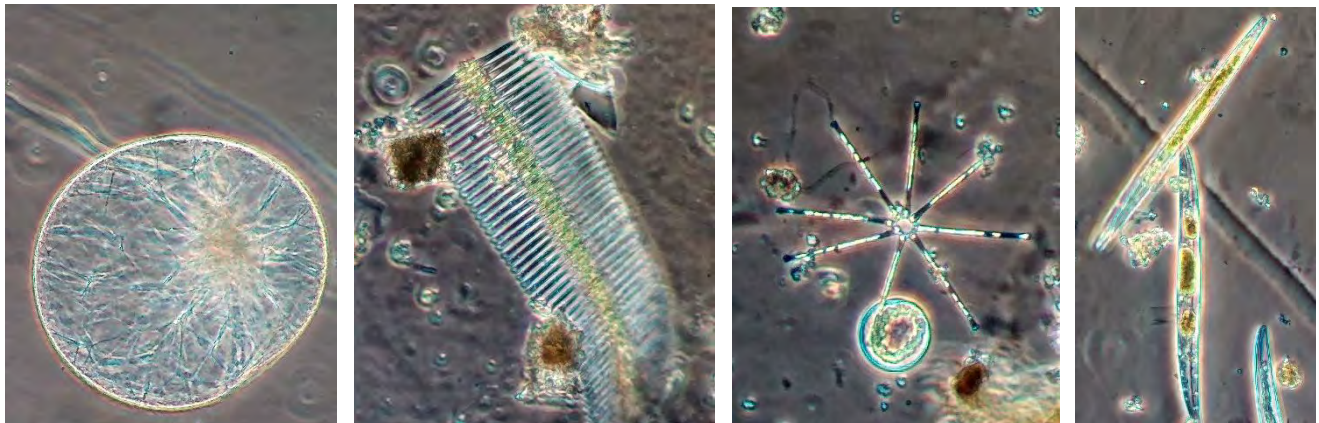
Harmful Algal Bloom (HAB) Species: *Pseudo-nitzschia* (6 cells/L), *Dinophysis sp* (6 cells/L), *Akashiwo sanguinea* (6 cells/L)



	Surface	1.5m	3.0m
Temp (°C)	17.1	15.7	13.9
Salinity (ppt)	14.92	27.49	28.4
Oxygen (mg/l)	7.06	6.92	5.92
pH	7.63	7.71	7.67

What an amazing kick-off to the What’s Blooming in Budd summer season. Thank you, Jeanne Koenings and Mia Widrow (Olympia HS intern), for volunteering to educate folks about plankton and Budd Inlet water quality! We had 66 visitors swing by the table to peek through the microscopes, including campers from Olympia Community Sailing and out-of-town guests from Colorado, Florida, and Humboldt County!

The zooplankton were the stars of the plankton today – plenty of action from the copepods, larvaceans, and rotifers. Our timing hit peak low tide (-2ft), dropping surface salinities and reflecting the lower dissolved oxygen and pH levels measured directly off-bottom a 10-foot depth. The tide was so low that you could see TONS of sea stars and plumose anemones! So amazing! Kids kept themselves very busy attempting to catch sticklebacks and ctenophores.



From left to right: *Noctiluca* (dinoflagellate), *Fragilaria*, *Asterionella*, *Pleurosigma/Gyrosigma*(diatoms)

June 27, 2024 – Budd Inlet, Port Plaza


Secchi disk (water clarity): 3.4 meters

Blooming Phytoplankton Species: *Small species of Chaetoceros.*

Common Phytoplankton Species: *Lauderia, Noctiluca, Ceratium fusus, Scrippsiella*

Zooplankton: copepods, polychaete larvae, rotifers, crustacean nauplii, tintinnids, ciliates

Harmful Algal Bloom (HAB) Species: *Pseudo-nitzschia* (12 cells/L), *Dinophysis sp* (30 cells/L), *Noctiluca* (429 cells/L)



	Surface	1.5m	3.0m
Temp (°C)	ND	ND	ND
Salinity (ppt)	27.77	28.55	28.72
Oxygen (mg/l)	9.22	8.23	8.37
pH	8.02	7.96	7.98



Today's "What's Blooming in Budd?" started off overcast & windy, but lucky for us, the wind helped our [#olympiacommunitysailing](#) campers make record time to the dock. The campers helped us gather our plankton sample and YSI data before heading to their land-based activities. Thank you, campers!

There are still plenty of Zooplankton dominating the sample with polychaetes, larvaceans, and rotifers. Thank you to our very hardy volunteers Jeanne & Roberta for sticking out the morning! The sun did come through and made 99 visitors very appreciative of a gorgeous day on the dock.

Thank you, Inspire Olympia, StreamTeam, and Rose Foundation for supporting these fun and educational events.



July 3, 2024 – Budd Inlet, Port Plaza

Secchi disk (water clarity): 4.5 meters

Blooming Phytoplankton Species: *Ceratium fusus*

Common Phytoplankton Species: *Lauderia*, *Noctiluca*, *Scrippsiella*, *Heterocapsa*

Zooplankton: copepods, polychaete larvae, rotifers, crustacean nauplii, tintinnids, ciliates, tiarina, larvaceans

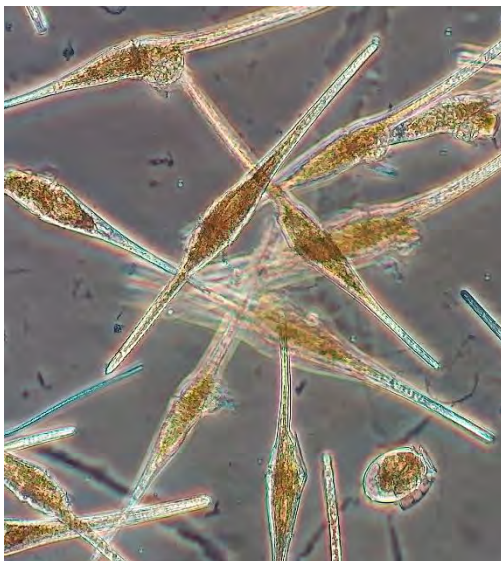
Harmful Algal Bloom (HAB) Species: *Pseudo-nitzschia* (83 cells/L), *Dinophysis sp* (185 cells/L), *Noctiluca* (482 cells/L), *Akashiwo sanguinea* (18 cells/L).



	Surface	1.5m	3.0m
Temp (°C)	18.10	16.10	15.10
Salinity (ppt)	26.32	27.98	28.43
Oxygen (mg/l)	9.14	10.95	10.89
pH	7.90	8.10	8.12

PSI staff are enjoying the July 4th holiday this week, so no official “What’s Blooming in Budd?” event took place at Port Plaza this week. Instead, I collected a quick sample on July 3rd.

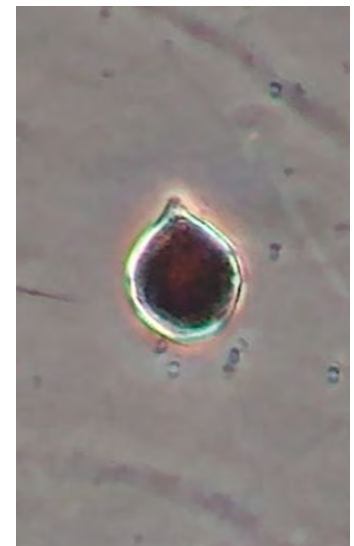
Ceratium fusus was certainly blooming and we observed the highest species richness of the season – a whopping 45 species (20 diatoms, 15 dinoflagellates, and 10 zooplankton species).



Ceratium fusus with a small *Dinophysis acuminata*



Noctiluca scintillans



Dinoflagellates like this *Scrippsiella* were common

July 11, 2024 – Budd Inlet, Port Plaza

Secchi disk (water clarity): 1.75 meters

Blooming Phytoplankton Species: *Ceratium fusus*

Common Phytoplankton Species: *Lauderia*, *Noctiluca*, *Scrippsiella*, *Heterocapsa*, *Akashiwo*

Zooplankton: copepods, rotifers, crustacean nauplii, tintinnids, ciliates, tiarina, larvaceans, barnacle nauplii, nematodes, eggs

Harmful Algal Bloom (HAB) Species: *Pseudo-nitzschia* (95 cells/L), *Dinophysis sp* (214 cells/L), *Noctiluca* (327 cells/L), *Akashiwo sanguinea* (482 cells/L), *Protoceratium reticulatum* (24 cells/L).



	Surface	1.5m	3.0m
Temp (°C)	21.10	17.40	15.50
Salinity (ppt)	20.20	28.78	28.30
Oxygen (mg/l)	8.74	10.24	11.38
pH	8.00	8.07	8.18



Today’s “What’s Blooming in Budd” was a welcomed relief from the heat we have been having this week! A cool breeze swept across as visitors explored the dock. When participants gathered a secchi disc reading the water clarity was only 1.75m! We grabbed our plankton sample and observed a *Ceratium fusus* bloom in progress, a harmless phytoplankton typical of this time of year. Other species shown in the accompanying photo include *Dinophysis fortii* and *Noctiluca*

scintillans. Larger zooplankton species such as moon jellies and egg yolk jellies were plentiful!

It's incredible to see the change in phytoplankton blooms week to week.

July 18, 2024 – Budd Inlet, Port Plaza

Secchi disk (water clarity): 2.1 meters

Blooming Phytoplankton Species: *Ceratium fusus*

Common Phytoplankton Species: *Noctiluca*, *Scrippsiella*, *Heterocapsa*, *Akashiwo*, *Cylindrotheca*, *Nitzschia acicularis*.

Zooplankton: copepods, rotifers, crustacean nauplii, tintinnids, ciliates, tiarina, larvaceans, barnacle nauplii, nematodes, eggs.

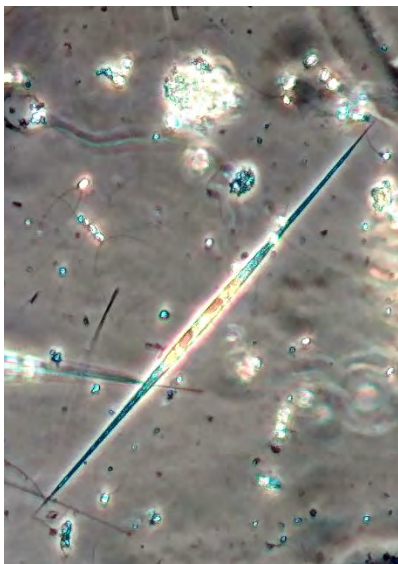
Harmful Algal Bloom (HAB) Species: *Pseudo-nitzschia* (179 cells/L), *Dinophysis sp* (48 cells/L), *Noctiluca* (476 cells/L), *Akashiwo sanguinea* (333 cells/L), *Protoceratium reticulatum* (24 cells/L), *Alexandrium sp.* (6 cells/L).



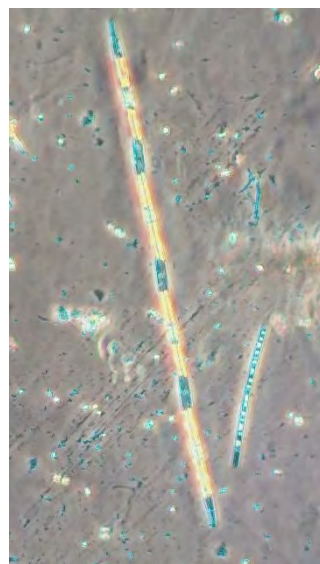
	Surface	1.5m	3.0m
Temp (°C)	20.60	18.60	15.50
Salinity (ppt)	26.75	28.07	28.50
Oxygen (mg/l)	10.77	11.14	7.31
pH	8.21	8.14	7.84

What a great day on the dock! There were lots of pulsing moon jellies and swimming nudibranchs at the surface. It was such a treat to have last year's Olympia HS intern, Shriya Prasanna, helping!

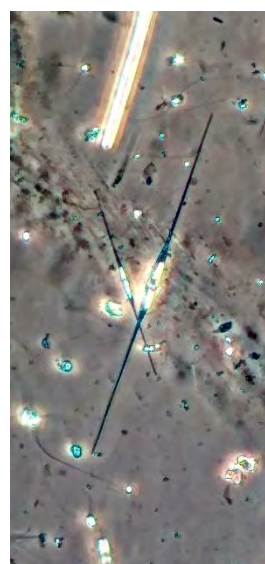
Similar to last week, species richness was very high. *Ceratium fusus* (which apparently underwent a recent name change to *Tripes fusus*) was blooming along with a sub-bloom of *Scrippsiella trochoidea*. *Noctiluca* was still common along with many slender diatom species including *Nitzschia acicularis* and *Cylindrotheca Closterium*. Zooplankton were zipping around all over the slides! So much life in Budd Inlet!! Here are some examples of a few long, skinny pennate diatoms from today's sample!



Nitzschia acicularis



Pseudo-nitzschia



Cylindrotheca closterium



Thalassionema nitzschioides

July 25, 2024 – Budd Inlet, Port Plaza


Secchi disk (water clarity): 3.8 meters

Blooming Phytoplankton Species: *Ceratium fusus*

Common Phytoplankton Species: *Akashiwo*, *Cylindrotheca*, *Nitzschia acicularis*, *Dinophysis*.

Zooplankton: copepods, rotifers, crustacean nauplii, tintinnids, tiarina, larvaceans, eggs.

Harmful Algal Bloom (HAB) Species: *Pseudo-nitzschia* (220 cells/L), *Dinophysis sp* (1,399 cells/L), *Noctiluca* (95 cells/L), *Akashiwo sanguinea* (1,595 cells/L), *Protoceratium reticulatum* (30 cells/L), *Alexandrium sp.* (12 cells/L).

	Surface	1.5m	3.0m
Temp (°C)	17.40	16.70	16.10
Salinity (ppt)	26.26	28.38	28.77
Oxygen (mg/l)	7.24	9.03	8.06
pH	7.79	8.02	7.95

Thursday's 'What's Blooming' had a special blast from the past as former PSI educator Mary



Official SoundToxins YSI and plankton data collected on July 23rd.

Middleton joined us on the dock! We are so thankful to have had her expertise and enthusiasm for the day. Thank you, Mary! There was a constant flow of visitors and plenty of moon jellies in the water. The Sound Toxins net tow sample showed a significant increase in two Harmful Algal Bloom species: both *Dinophysis* (1399 cells/L) and *Akashiwo* (1595 cells/L). PSI alerted SoundToxins to the change and will be sampling again this Thursday for anyone who's curious about what this recent rain might do to alter the plankton community and what else is blooming this week!

August 1, 2024 – Budd Inlet, Port Plaza

Secchi disk (water clarity): 5+ meters

Blooming Phytoplankton Species: *Ditylum brightwellii*

Common Phytoplankton Species: *Eucampia zodiacus*

Zooplankton: copepods, rotifers, crustacean nauplii, tintinnids, bivalve larvae, barnacle nauplii.

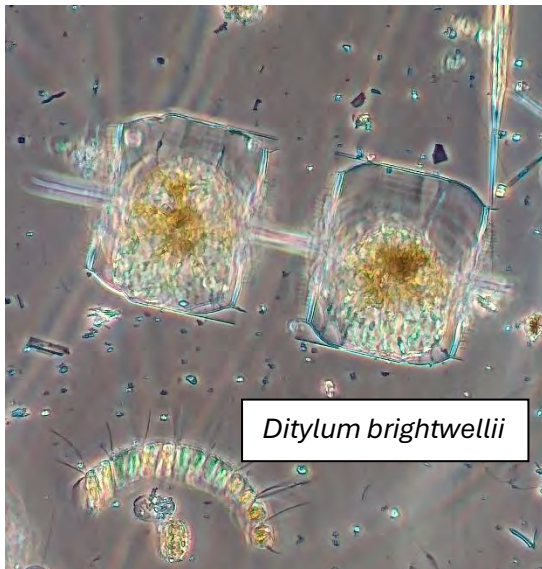
Harmful Algal Bloom (HAB) Species: *Dinophysis sp* (83 cells/L), *Noctiluca* (36 cells/L), *Akashiwo sanguinea* (6 cells/L).



	Surface	1.5m	3.0m
Temp (°C)	16.80	16.60	16.40
Salinity (ppt)	28.57	28.63	28.81
Oxygen (mg/l)	5.36	6.10	7.15
pH	7.61	7.75	7.90

Oh my gosh! So many enthusiastic campers today. We had 38 kids from Olympia Community Sailing camps alone visit the dock to learn about plankton and water quality. Thank you to Zoey, an Olympia HS student, and Jeanne for your help! The kiddos really kept us on our toes!

Last week’s rain and cooler temperatures completely changed the plankton community composition. Previously, the water was full of dinoflagellates with *Ceratium fusus* (now *Tripus fusus*) blooming and spikes of 2 HAB species: *Akashiwo* and *Dinophysis*. Today, most of those 3 species were gone and the diatom, *Ditylum brightwellii* was blooming. A complete plankton turnover! Who will dominate next week as temperatures crank up again? Stay tuned!



Official SoundToxins YSI data and plankton collected on July 31st.

August 8, 2024 – Budd Inlet, Port Plaza

Secchi disk (water clarity): 3.5 meters

Blooming Phytoplankton Species: *Ditylum brightwellii*, *Akashiwo sanguinea*

Common Phytoplankton Species: *Eucampia zodiacus*, *Heterocapsa*, *Scrippsiella*

Zooplankton: copepods, rotifers, crustacean nauplii, tintinnids, polychaetes, larvaceans.

Harmful Algal Bloom (HAB) Species: *Dinophysis sp* (131 cells/L), *Noctiluca* (65 cells/L), *Akashiwo sanguinea* (613 cells/L), *Pseudo-nitzschia* (83 cells/L), *Protoceratium reticulatum* (89 cells/L).



Official SoundToxins YSI and plankton collected on Aug. 7.



	Surface	1.5m	3.0m
Temp (°C)	20.80	18.50	15.70
Salinity (ppt)	22.04	27.73	29.20
Oxygen (mg/l)	7.85	8.93	5.02
pH	8.02	8.04	7.70

Man, did we have the dream team today! Jeanne Koenings and I were thrilled to welcome Max Wiecek and Malena Reyes, from WA Department

of Health’s shellfish program to "What's Blooming in Budd?"

Together, we shared with 90 visitors how SoundToxins phytoplankton monitoring and WDOH's routine shellfish biotoxin testing help us better understand harmful algal blooms and ensure that shellfish are safe to eat. Learn more at

<https://doh.wa.gov/.../recreational.../illnesses/biotoxins>

The plankton have been amazing after last week's rain/sun combo! A beautiful bouquet of diatoms, dinoflagellates, and zooplankton! Come join us next week to see what's blooming.



August 15, 2024 – Budd Inlet, Port Plaza

Secchi disk (water clarity): 3.2 meters

Blooming Phytoplankton Species: *Ditylum brightwellii*

Common Phytoplankton Species: *Eucampia zodiacus*, *Skeletonema*, *Heterocapsa*, *Scrippsiella*

Zooplankton: rotifers, crustacean nauplii, tintinnids, polychaetes (lots), larvaceans, tiarina.

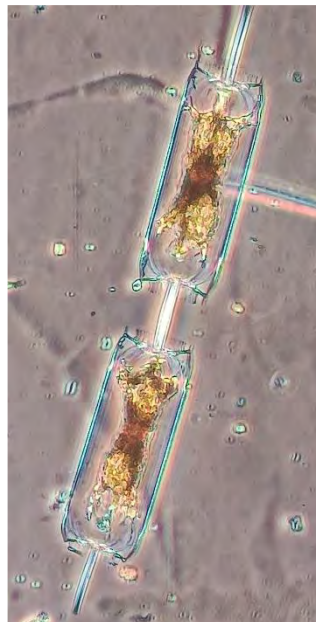
Harmful Algal Bloom (HAB) Species: *Dinophysis* sp (12 cells/L), *Noctiluca* (54 cells/L), *Pseudo-nitzschia* (613 cells/L), *Protoceratium reticulatum* (6 cells/L).



	Surface	1.5m	3.0m
Temp (°C)	16.80	15.90	15.60
Salinity (ppt)	25.72	29.00	29.09
Oxygen (mg/l)	3.05	4.09	4.45
pH	7.48	7.66	7.72

Thank you, Evie, Roberta and Jeanne for jumping in to host “What’s Blooming?” this week while the regular staffers were out on vacation and sick! We knew we were in great hands!!

This week, *Ditylum brightwellii* was blooming in robust concentrations. Many cells were actively dividing. This summer has been quite unusual in that the plankton composition is not dominated by the dinoflagellates, *Akashiwo* and *Ceratium*. Instead, the assemblages are rather diverse and water clarity has been very good around 3-meters. The oxygen/pH levels are surprisingly low this week suggesting that winds might be pushing up water from near the bottom of the inlet. Hopefully, this is temporary and values will increase next week. We’ll also keep an eye on the increasing *Pseudo-nitzschia* levels.



Thalassiosira & *Ditylum* (triangular when viewing straight down on the long, hollow tube (rimoportula) extending from each valve; *Ditylum* (rectangular from side/girdle view); polychaete larvae.

August 22, 2024 – Budd Inlet, Port Plaza

Secchi disk (water clarity): 3.3 meters

Blooming Phytoplankton Species: *Odontella mobiliensis*, *Ditylum brightwellii*

Common Phytoplankton Species: *Ditylum brightwellii*, *Skeletonema*, *Scrippsiella*

Zooplankton: rotifers, tiarina, crustacean nauplii, polychaetes, larvaceans, copepods.

Harmful Algal Bloom (HAB) Species: *Dinophysis sp* (113 cells/L), *Noctiluca* (71 cells/L), *Pseudo-nitzschia* (869 cells/L), *Akashiwo* (185 cells/L)



Official YSI and plankton data collected on Aug 20th.



	Surface	1.5m	3.0m
Temp (°C)	17.80	16.50	15.80
Salinity (ppt)	22.35	29.01	29.28
Oxygen (mg/l)	7.06	7.88	6.22
pH	7.83	7.96	7.82

The plankton assemblage was incredibly diverse this week! The combination of rain, nutrients and sunshine really resulted in a rich plankton community. The diatom, *Odontella mobiliensis*, was blooming with a sub-bloom of *Ditylum brightwellii*. Large centric *Coscinodiscus* were common as well as a mix of dinoflagellates including *Akashiwo*, *Heterocapsa*, *Scrippsiella*, *Protoperidinium*. The zooplankton were lively, especially the larvaceans, tiarina, tintinnids and polychaetes (so many!). My daughter took a picture of an adult polychaete worm while she was working at a local shellfish farm this week. The closeup of the head is unbelievable!!! So cute!!!



Photo credit: Samantha Christy

August 29, 2024 – Budd Inlet, Port Plaza

Secchi disk (water clarity): 3.5 meters

Blooming Phytoplankton Species: *Odontella mobiliensis*,
(*Akashiwo sanguinea* the following day)

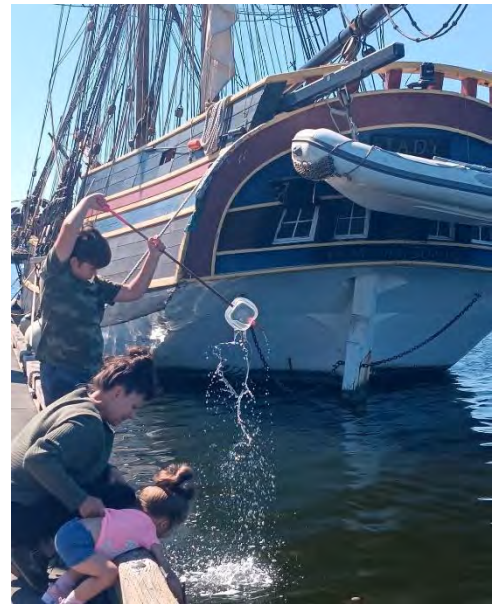
Common Phytoplankton Species: *Eucampia*, *Scrippsiella*.

Zooplankton: rotifers, tiarina, bivalve larvae, polychaetes, larvaceans, ctenophore larvae, tintinnids.

Harmful Algal Bloom (HAB) Species: *Dinophysis sp* (18 cells/L), *Noctiluca* (345 cells/L), *Pseudo-nitzschia* (18 cells/L), *Akashiwo* (310 cells/L).



	Surface	1.5m	3.0m
Temp (°C)	17.10	16.30	15.50
Salinity (ppt)	22.07	28.69	29.31
Oxygen (mg/l)	7.47	6.70	5.90
pH	7.79	7.80	7.80



Official SoundToxins YSI and plankton data collected August 28th.

What an incredible way to head into a beautiful long weekend-

Thursday’s “What’s Blooming in Budd?” was absolute perfection. Many visitors from across the nation and lots of Olympia locals were thrilled to spend some time on the dock leading up to Harbor Days. We were lucky enough to be stationed right next to the beautiful tall ship Lady Washington. The water was warm and clear!! One participant read 5-m visibility on the secchi disc. The plankton was sparse but had a lot of biodiversity.

Zooplankton: Rotifers, Larvaceans, Bivalve larvae, Crustacean nauplius, Ctenophores and Jellies.
Phytoplankton: *Coscinodiscus*, *Scrippsiella*, *Eucampia*, *Ditylum*, *Heterocapsa* and *Protoperidinium*.

HABs: No noted species of human health concern. We did have a surprising increase (from only one day prior) in the presence of *Akashiwo sanguinea*, a species associated with shellfish mortality events. We are looking forward to seeing how this bloom progresses.



September 5, 2024 – Budd Inlet, Port Plaza

Secchi disk (water clarity): 4.5 meters

Blooming Phytoplankton Species: *Skeletonema*, *Scrippsiella*

Common Phytoplankton Species: *Akashiwo*, *Polykrikos*

Zooplankton: rotifers, tiarina, bivalve larvae, polychaetes (so many larvae!), larvaceans, copepods, crustacean nauplii.

Harmful Algal Bloom (HAB) Species: *Dinophysis* sp (12 cells/L), *Noctiluca* (95 cells/L), *Akashiwo* (417 cells/L).



	Surface	1.5m	3.0m
Temp (°C)	17.70	16.30	15.90
Salinity (ppt)	24.87	29.11	29.25
Oxygen (mg/l)	4.63	3.57	3.23
pH	7.55	7.56	7.60

Today is “back to school day” for most students, but we still had almost 80 visitors peek into the microscopes to discover What’s Blooming. The plankton were sparse, but after dragging the net through the water repeatedly, we had plenty of interesting species to look at. Lots of polychaete larvae in various stages of development. Plenty of long *Skeletonema* chains, *Polykrikos*, and *Akashiwo*. And check out this interesting water beetle that our young scientist scooped out of the water. I thought it was terrestrial at first, but it’s quite comfortable gliding through the water. Anyone know what this is?


Harmful Algal Bloom species were minimal. Back in the lab we only detected a few *Dinophysis* in our counting chamber. *Akashiwo* cells have also dissipated since last week.

While today is officially the last scheduled “What’s Blooming in Budd?” event for the summer, we may continue hosting events every Thursday as long as they’re well attended. We truly enjoy spending time on the dock and engaging in fascinating conversations with everyone that stops by.

A special thank you to Jeanne Koenings and Roberta Woods for volunteering their time this summer to help folks with the sampling equipment and microscopes. You are so appreciated!



Appendix B: 2024 PSI Facebook & Instagram Posts

 **Pacific Shellfish Institute**
Published by Aimee Christy
April 20 · 🌐

Another successful Lacey Family Fish-In!! Folks started casting their lines into Longs Pond, Woodland Creek Community Park, at 8:00 AM sharp! A big thank you to City of Lacey, South Sound Puget Sound Anglers, Capital City Bass Club, and WA Department of Fish and Wildlife for organizing this fun and educational event.

PSI brought nets and microscopes so families could discover what other critters are living in Longs Pond (so many water fleas & rotifers!), and offered activities related to keeping our environment clean and healthy! Support for our time was generously provided by Stream Team and a Washington Department of Ecology grant. Thank you.





Pacific Shellfish Institute

Published by Mary Elizabeth Portwood

June 19

Calling all plankton enthusiasts! Tomorrow, June 20th is the summer kickoff to our "What's Blooming in Budd?" program. Join us at the Port Plaza dock every Thursday this summer from 10am-12pm to discover what's blooming!

We will also demo AND lend out one of PSI's Discover Plankton kits - first come first serve! But no worries if you can't make it. You can also check out Discover Plankton kits from the Olympia, Lacey and Tumwater Timberland Library branches for a 3-week period. Yes! Explore the summer plankton blooms with your very own microscope! Hope to see you on the dock!

These programs are generously supported by Stream Team of Thurston County, Inspire Olympia and Dawkins Foundation. Thank you !





Pacific Shellfish Institute

Published by Aimee Christy

June 21



What an amazing kick-off to the “What’s Blooming in Budd?” summer season! Thank you, Jeanne Koenings and Mia Widrow (Olympia HS intern), for helping out today! We had 66 visitors swing by the table to peek through the microscopes. Zooplankton were certainly the stars – plenty of action from copepods, polychaetes, larvaceans, and rotifers. The tide was so low that you could see TONS of sea stars and anemones along the bottom!

Join us every Thursday from 10-12 at the Port Plaza dock. We’d love to see you and discover what’s blooming! Thank you, Inspire Olympia, StreamTeam, and Rose Foundation for supporting these fun and educational events. Learn more at: www.pacshell.org/whats-blooming-in-budd.asp.





Pacific Shellfish Institute is at Port Plaza.

Published by Mary Elizabeth Portwood



June 27 · Olympia, WA · 🌍

Today's "What's Blooming in Budd?" started off overcast & windy, but lucky for us, the wind helped our [#olympiacomunitysailing](#) campers make record time to the dock. The campers helped us gather our plankton sample and YSI data before heading to their land based activities- Thank you campers! There are still plenty of Zooplankton dominating the sample with polychaetes, larvaceans, and rotifers. Thank you to our very hardy volunteers Jeanne & Roberta for sticking out the morning! The sun did come through and made 99 visitors very appreciative of a gorgeous day on the dock.

Join us every Thursday (except 4th of July) from 10am-12pm at the Port Plaza dock. We'd love to see you and discover what's blooming! Thank you, Inspire Olympia, StreamTeam, and Rose Foundation for supporting these fun and educational events. Learn more at:

www.pacshell.org/whats-blooming-in-budd.asp.





Pacific Shellfish Institute

Published by Aimee Christy

July 18

What's Blooming in Budd? So much!!

Budd Inlet was full of microscopic life this morning from pulsing moon jellies and "swimming" nudibranchs to blooms of dinoflagellates including *Ceratium fusus* (now *Tripos fusus*!) and *Akashiwo sanguinea*. Today's sample also included many harmful algal bloom (HAB) species and Species of Concern that are monitored as part of the SoundToxins program: *Akashiwo*, *Alexandrium*, *Pseudo-nitzschia*, *Dinophysis*, *Protoceratium*, and *Noctiluca*.

It was such a pleasure to have Shriya Prasanna, last year's Olympia HS intern, helping the very enthusiastic Olympia Community Sailing campers with their equipment and microscopes!

Be sure to check out PSI's homepage (www.pacshell.org) and click on the Pink Protoperidinium to learn more about "What's Blooming in Budd?"

A big thank you to Inspire Olympia and StreamTeam for supporting these free, fun, and educational opportunities! Join us at Port Plaza every Thursday from 10-12!





Pacific Shellfish Institute

Published by Mary Elizabeth Portwood

· August 9 ·

Man, did we have the dream team today! Jeanne Koenings and I were thrilled to welcome Max Wiecek and Malena Reyes, from WA Department of Health's shellfish program, to "What's Blooming in Budd?"

Together, we shared with 90 visitors how SoundToxins phytoplankton monitoring and WDOH's routine shellfish biotoxin testing help us better understand harmful algal blooms and ensure that shellfish are safe to eat. Learn more at <https://doh.wa.gov/.../recreational.../illnesses/biotoxins>

The plankton have been amazing after last week's rain/sun combo! A beautiful bouquet of diatoms, dinoflagellates, and zooplankton! Come join us next week to see what's blooming.

Thank you, [#InspireOlympia](#) and [Stream Team of Thurston County](#) for supporting our time on the dock!





Pacific Shellfish Institute

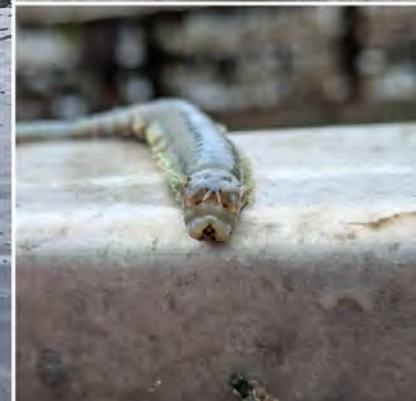
Published by Aimee Christy

- August 24 -

Fall was in the air at this week's "What's Blooming?" event with guests showing up with cozy, hot drinks from the Farmers Market. Late summer has been unusual in that the plankton composition has not been dominated by the dinoflagellates, *Akashiwo* and *Ceratium*. Instead, the assemblages have been diverse and water clarity has been good around 3-meters. The diatom, *Odontella mobiliensis*, was blooming along with a sub-bloom of *Ditylum brightwellii*.

The zooplankton were lively, especially the polychaetes (so many!). My daughter, Samantha Christy, took a picture of an adult polychaete worm while she was working at a local shellfish farm this week. The closeup of the head is unbelievable!!! I knew they were adorable, but really? Come join us next Thursday (10-12)! We'd love to see you.

A big thank you to [#InspireOlympia](#) and Stream Team of Thurston County for supporting these fun and educational opportunities for the community!





Pacific Shellfish Institute

Published by Mary Elizabeth Portwood



December 20 at 1:06 PM · 🌐

Here's a look back at a festive fall with our dear friends at [Stream Team of Thurston County](#) ! PSI had the great fortune to partner with Stream Team at several events all across Thurston County, promoting stewardship and discussing the importance of keeping our waters healthy. The best part of our job is engaging with our incredibly eco-minded community and fostering a love of the environment. We are truly grateful for our time at these events, engaging and having fun alongside Stream Team and you!

