

# Eyes Over Puget Sound

[Summary](#)[Critters & divers](#)[Climate & streams](#)[Combined factors](#)[Marine water](#)[Aerial photos](#)[Data](#)

## Surface Conditions Report: June 17, 2021



*Critter of the month:  
The bamboo worm*



*Up-to-date observations of water quality conditions in Puget Sound and coastal bays*

Summary

Critters & divers

Climate & streams

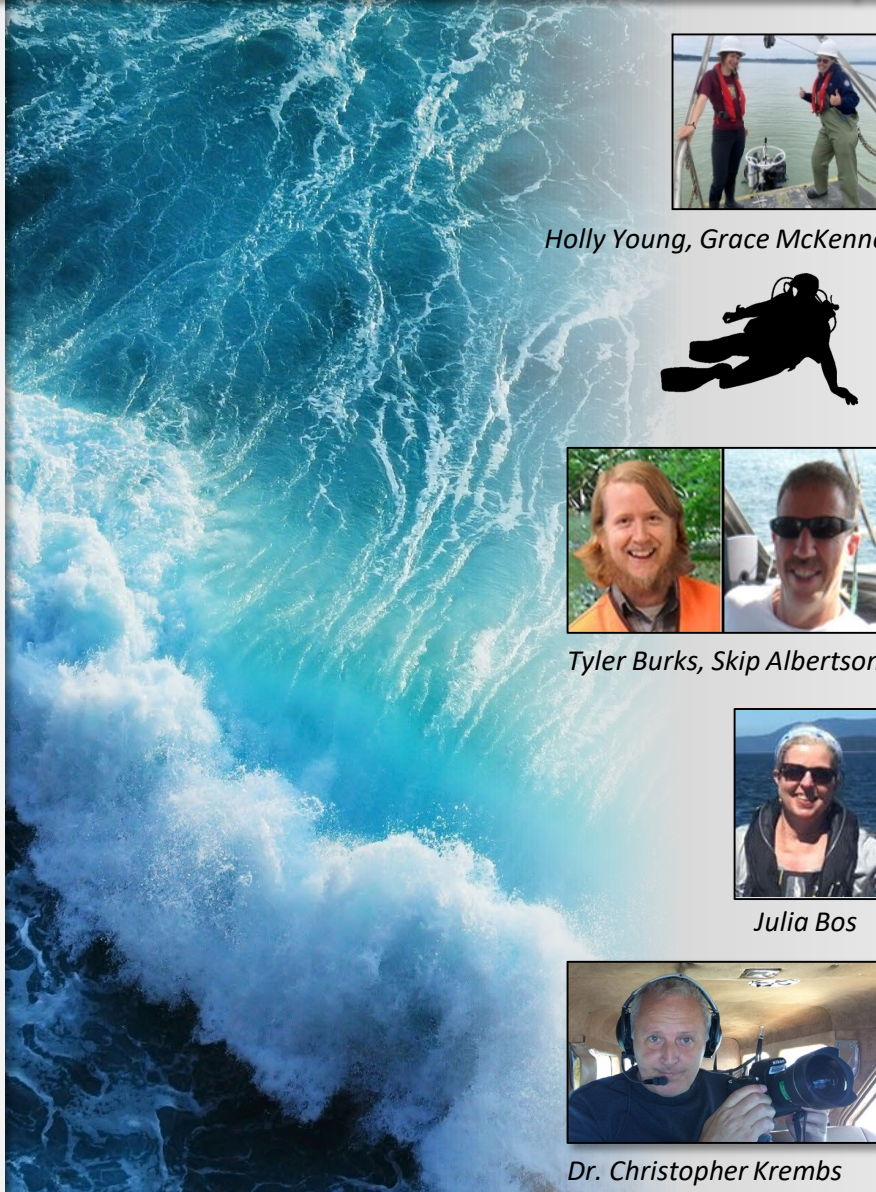
Combined factors

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Data

LONG-TERM MARINE MONITORING UNIT



*Holly Young, Grace McKenney*

## Field work, [p. 3](#)

Field work in 2021 is back, after adjusting to COVID.



## Divers help clean Puget Sound, [p. 6](#)

SCUBA divers in Puget Sound did some cleaning up at Redondo Beach.



*Tyler Burks, Skip Albertson*

## Climate & streams, [p. 8-12](#)

Despite a La Niña phase, precipitation and rain have been lower since March. Rivers responded differently whether they were snow- or rain-fed.



*Julia Bos*

## Water quality, [p. 13-14](#)

The moderate drought continues to impact salinity in Coastal Bays and Puget Sound, with most stations showing higher salinity.



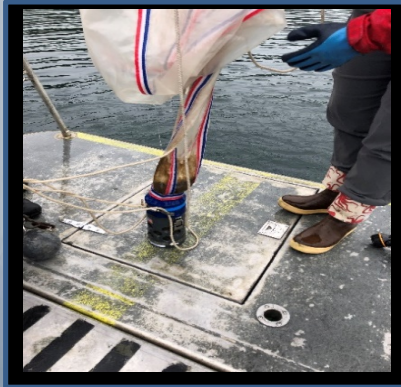
*Dr. Christopher Krembs*

## The aerial photography, [p. 15-56](#)

Strong blooms in Bellingham Bay and Central Sound, with large patches of organic material that are also very present in South Sound and Hood Canal. Blooms also in Holmes Harbor and Liberty Bay and smaller bays. IR images show heat islands on sun-exposed shores.



## Field work in 2021 is back, after we adjusted to COVID



Spring 2021 has been a such a change from last year! Our monthly monitoring machine is in full swing.

Thanks to the dedication and perseverance of our field staff, we had 100 percent station attainment for our 39 stations in March, April, May, and June — just in time for the spring bloom. That hasn't happened since 2012!



Tahuya, May 21, 2021

Gray whale, Grays Harbor, May 19.



Tahuya, April 19, 2021

The zooplankton tows in Hood Canal near Tahuya, supporting the Salish Sea Marine Survival Project, are always interesting.

Qualitatively, one can watch the change as the season progresses.



Tahuya, June 18, 2021



## Critter of the Month – The Bamboo Worms

### Family Maldanidae

These critters may look a bit like the widespread bamboo plant, but they're anything but garden-variety. Get ready to get your hands dirty, because this month we're digging into the muddy world of bamboo worms!

### Fun Bamboo Worm Facts

- They use their specialized heads to “hoe” food-rich mud.
- They are actually very fragile and make tubes for protection.
- They manage to keep their houses clean even when they are buried in mud.



Dany Burgess  
Marine Sediment  
Monitoring Team





## Beach Wrack: a Harbor for Fecal Bacteria



Loose algae and seagrass, or “wrack,” washes up onto beaches and sticks around. Wrack that lingers can harbor bacteria, posing a health risk for beachgoers.

Edmonds Underwater Park, Snohomish County. Photo by Hugh Matheson

Contact with fecal bacteria while swimming or beachcombing increases your risk of getting sick.

The BEACH program monitors fecal bacteria. We advise no contact with wrack, sand, or water when bacteria levels are high.



Bacteria can take advantage of increased water temperatures during summer.

[Check our advisory map](#) to decrease your risk of exposure!



Bacteria linger longer in wrack than in sand.



Photo by Danita Delimont

Wildlife forages in wrack and may also be pooping in it. Animal feces, not the wrack itself, is a source of fecal bacteria.





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*SCUBA divers in Puget Sound did some cleaning up at Redondo Beach, a popular site, not only for diving, but also for fishing, boating, and recreation. Unfortunately, this urban area shows evidence of its popularity — fishing gear, plastics, golf balls, and other trash have made their way into the sound. Well done, divers, and thank you!*



Nels, Scott, Eric, LeAnne, Tom, Jess, Daniel, and Valerie.  
Photos sent in by Jessica Alexanderson





## What was the water visibility like for divers?

Only best visibility shown for **May**, in form of a small diver



Good Visibility Poor



Best and worst horizontal visibility at corresponding vertical depth

Location	Best Visibility		Worst Visibility	
	Horizontal Distance (ft.)	Vertical Depth (ft.)	Horizontal Distance (ft.)	Vertical Depth (ft.)
1	41	61	8	5
2	7	5	3	23
3	16	7	14	74
4	45	59	8	3
5	17	69	12	5
6	41	90	5	15
7	26	89	8	3
8	40	69	26	3
9	42	92	18	5
10	13	33	7	5
11	38	98	6	21
12	43	87	7	7
13	26	82	9	26
14	47	90	9	5
15	9	5	9	15
16	21	98	16	87
17	31	98	23	5
18	14	26	9	59

## Find depths with high/low visibility



- **Best visibility** occurred in Commencement Bay near Dash Point of 47 ft at a depth of 90 ft (Location 14).
- **Poor visibility (no diver icon)** of 3 ft occurred in Bellingham Bay at around 23 ft (Location 2).



Picture by Eric Askilrud



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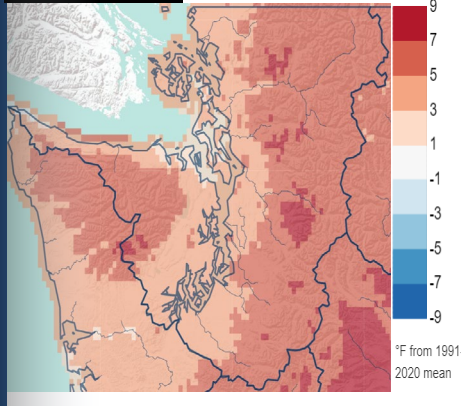


During the month of June, Puget Sound air temperatures were above normal, while precipitation varied from southwest (wet) to northeast (dry) (A). During the next 30 days, temperatures are expected to be above normal, and precipitation is expected to be below normal (B). Unprecedented air temperatures at the end of June also warmed river temperatures temporarily to levels not seen until later in the summer, particularly in rain-dominated watersheds.

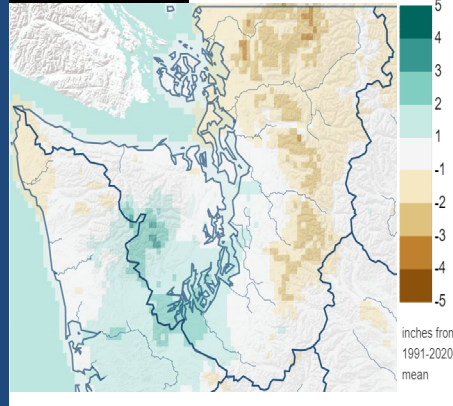
## A. Northwest Climate Toolbox (Previous 30 days)

## B. Northwest Climate Toolbox (Next 30 days)

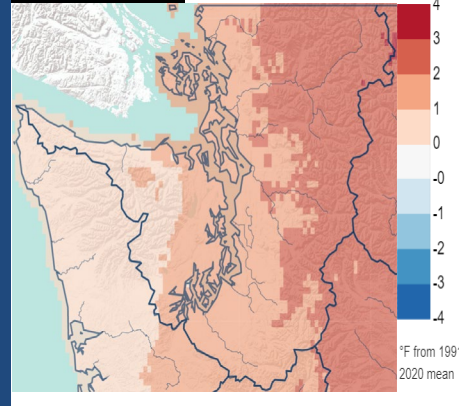
Temperature



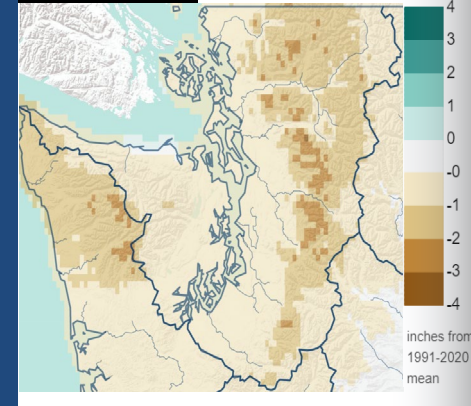
Precipitation



Temperature



Precipitation



### Temperature Anomaly

from historical mean ranged from +1 to +9°F in the Puget Sound region during the past 30 days.

### Precipitation Anomaly

from historical mean ranged from -4 to +3 inches in the Puget Sound region during the past 30 days.

### Temperature Anomaly

from historical mean is forecasted to be up to +3 °F in the Puget Sound region during the next 30 days.

### Precipitation Anomaly

from historical mean is forecasted to be below normal in the Puget Sound region during the next 30 days.





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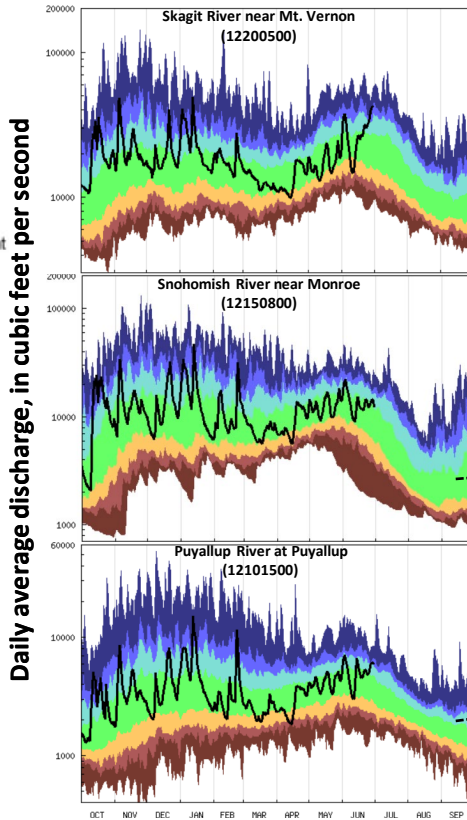
Data

**Temporal:** Following precipitation in the first half of June, streamflow dropped quickly, only to surge to above normal due to unprecedented heat, which melted high-elevation snowpack in snow-dominated Puget Sound watersheds (trend charts, left).

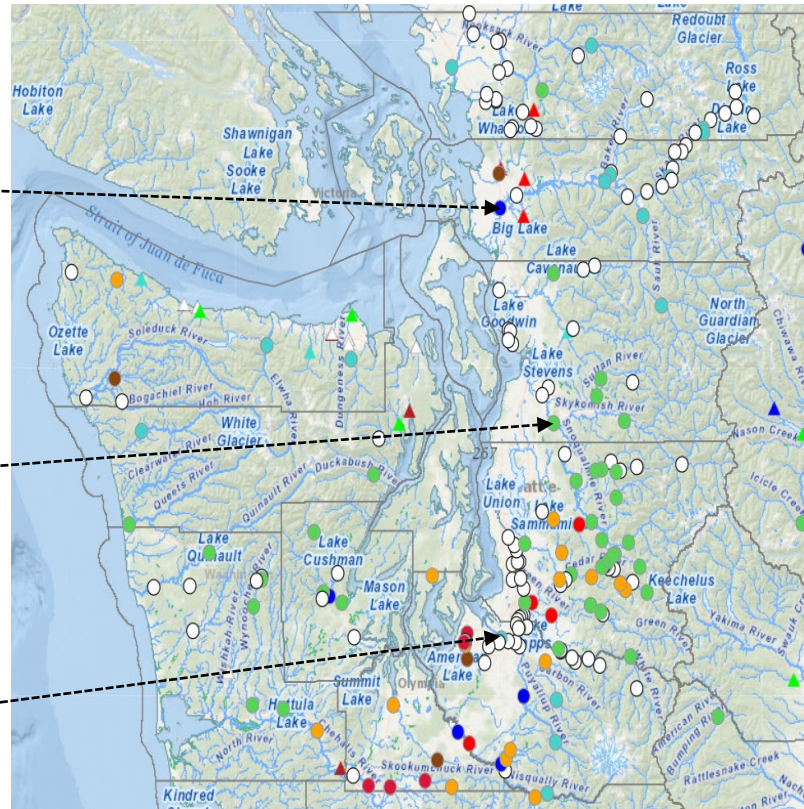
**Spatial:** Variation in streamflow (map, right) was dependent on the extent of remaining snowpack, and high temperatures. Snow-dominated watersheds were above normal, while rain-dominated lowlands were below normal.

## Select Puget Sound Streamflow Trends

## Current Streamflow Conditions as of 7/1/2021



USGS WaterWatch: [CLICK HERE!](#)



### USGS Real Time Streamflow Values

- Much above normal (>90%)
- Above normal (76-90%)
- Normal (25-75%)
- Below normal (10-24%)
- Much below normal (5-10%)
- Far below normal (>5%)
- Lowest recorded
- Not Ranked

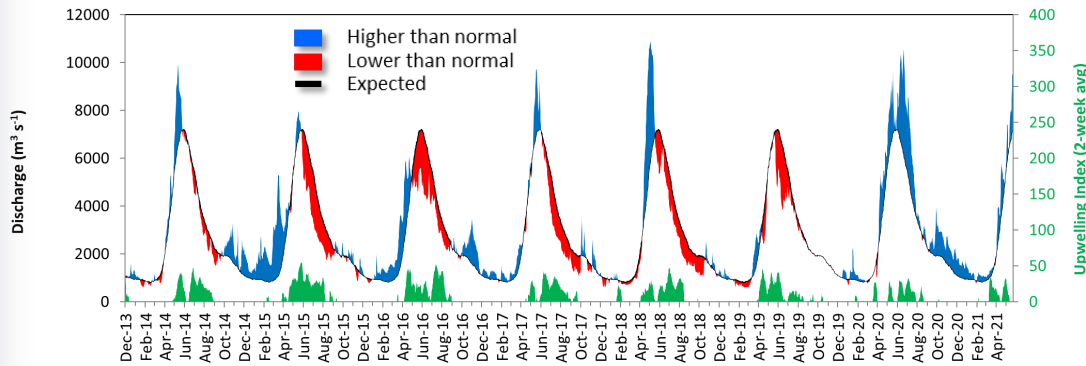
### Ecology Daily Streamflow

- Daily Streamflow
- ▲ Highest recorded
  - ▲ Much above normal (>90%)
  - ▲ Above normal (76-90%)
  - ▲ Normal (25-75%)
  - ▲ Below normal (10-24%)
  - ▲ Much below normal (<10%)
  - ▲ Lowest recorded
  - △ Not ranked

Current conditions: [CLICK HERE!](#)

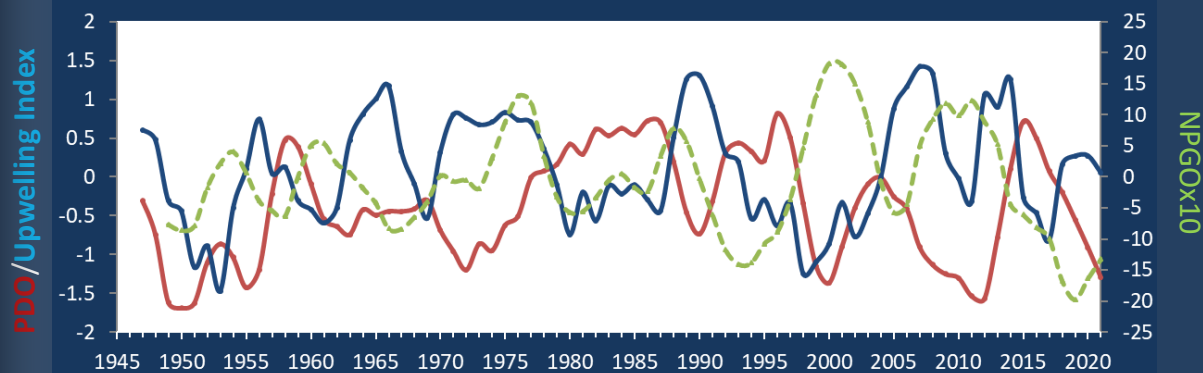
Historically, the peaks of coastal upwelling and the [freshet](#) are in sync.

## Fraser River (at midnight)



The Fraser River is the major driver of [estuarine circulation](#) and water exchange between the Salish Sea and the ocean. The Fraser River flows normalize after high flows in 2020 and winter 2021. Upwelling off the coast appears earlier and weaker.

## Three-year running average of PDO, Upwelling, and NPGO Indices



How do ocean boundary conditions affect the quality of water the Salish Sea exchanges with the ocean?

Water has gradually cooled (PDO). Upwelling (Upwelling Index [anomaly](#)) is at expected level. Productivity in the eastern Pacific is lower (NPGO).

Pacific Decadal Oscillation Index (PDO, [temperature](#), [explanation](#)). Upwelling Index (anomalies) ([Upwelling](#), [low oxygen](#), [explanation](#)). North Pacific Gyre Oscillation Index (NPGO, [productivity](#), [explanation](#)).





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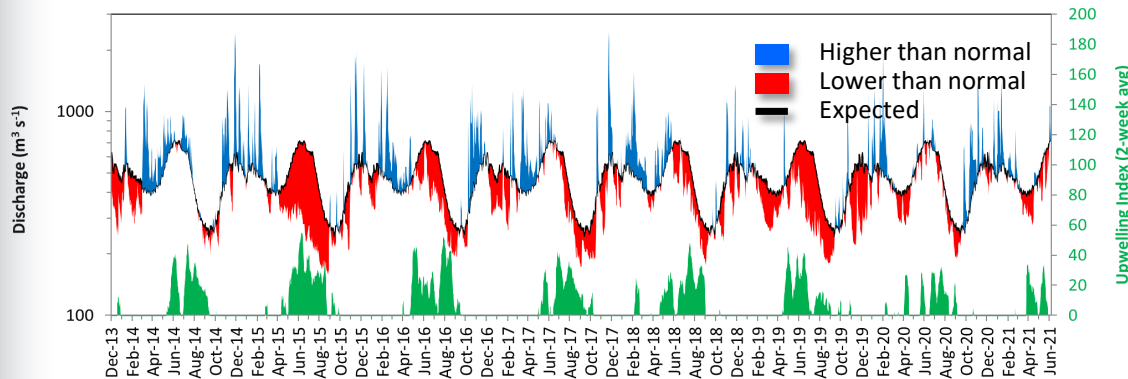
Marine water

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The Skagit River is the largest freshwater source for Puget Sound. It is a river that is regulated.

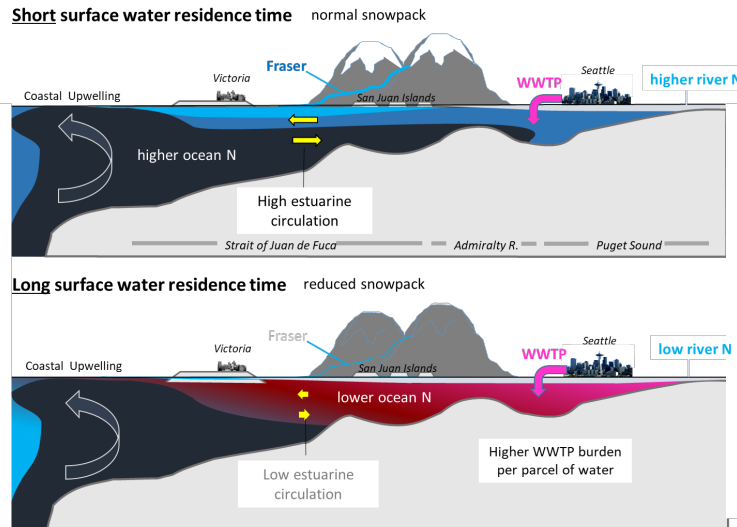
## Skagit River (at midnight USGS)



The Skagit River freshet is no longer clearly pronounced, because it is a regulated system for hydroelectric power generation. However, drought years and low flows can be seen in the river's discharge data. In the beginning of 2021, flows appear lower.

Normal river flows drive **"natural"** nutrient inputs and keep the **water cool**.

Low river flows change the **nutrient balance** and make **water warmer**.



River flows and upwelling in the summer influence our water quality.

Rivers strengthen estuarine circulation in the Salish Sea. This is important in the summer.

Upwelled ocean water provides cool, nutrient-rich water.

For that to happen, we need northerly winds and good river flows (a good snowpack) during periods of water exchange through Admiralty Reach (neap tides).



In the anomaly plot, we want to connect different factors influencing water quality in the context of space and time. We do this with a heat map and anomalies by month for selected regions from north to south. For recent river and stream inflow, [see page 9](#).

## Conditions leading up to June:

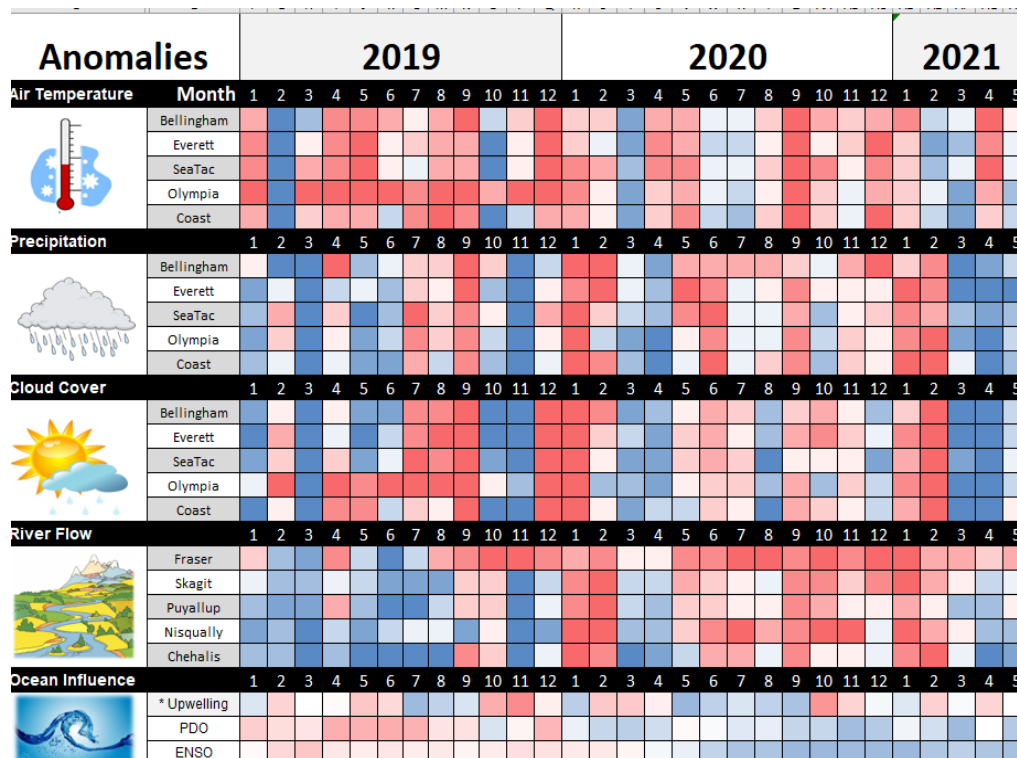
**Air temperatures** have been variable but averaging to expected levels before the heat wave at the end of the month.

**Precipitation** has been below normal since March, an abrupt change from January and February.

**Cloud cover** has been lower since March.

**River flows** since March have been higher in snow-fed rivers but lower in rain-fed systems.

**Downwelling** was weaker since February. PDO and ENSO are in cold phase (La Niña).



All data are from public sources: UW GRAYSKIES; river flows from USGS and Environment Canada; indices from NOAA & UW (PDO).

\*Upwelling/downwelling Anomalies (PFEL)

PDO = Pacific Decadal Oscillation

ENSO = El Niño Southern Oscillation

higher expected lower

No data



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## Marine Water Conditions: 2021 temperature, salinity, and dissolved oxygen

### Coastal Bays

T: Warmer  
S: **Max Salinity**  
DO: Lower

### Salish Sea

T: Expected temps  
S: **Saltier Sound-wide**  
DO: Variable. Lower to Expected

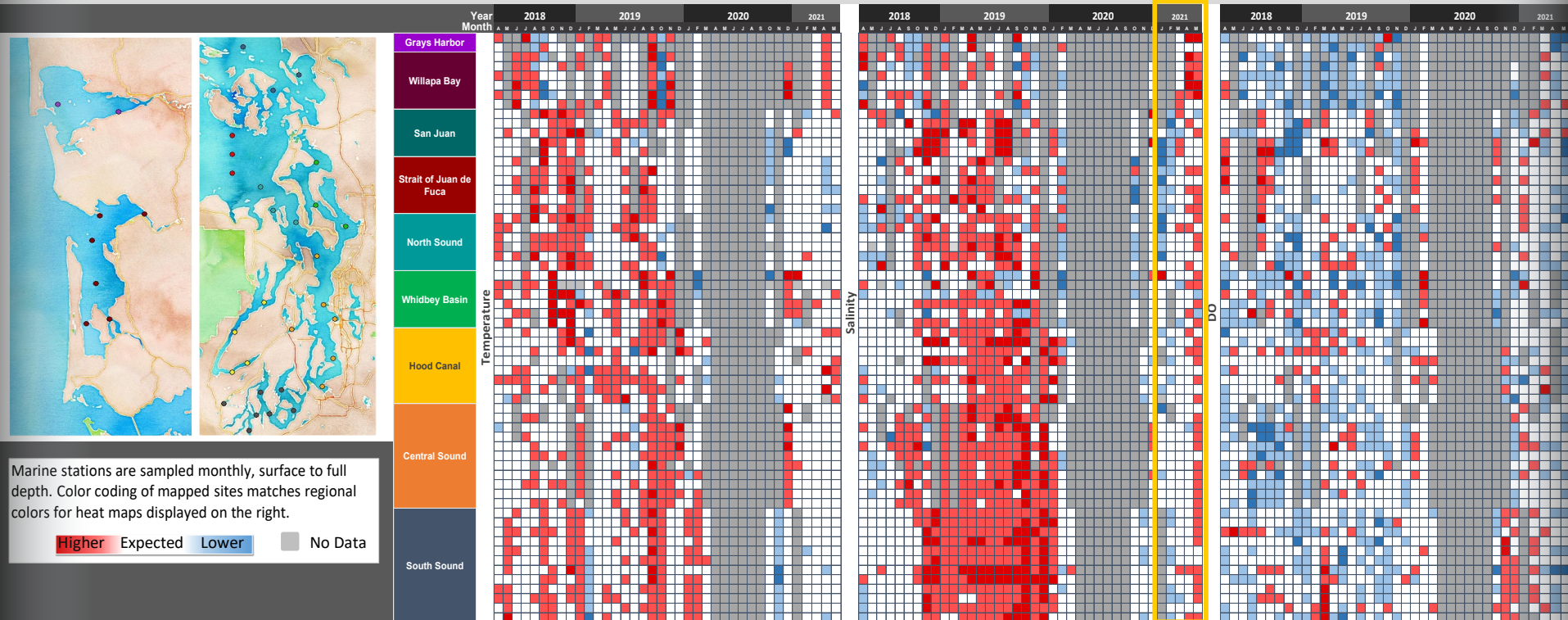
Record low precipitation and river discharge that started in March continue into May. The moderate drought continues to impact salinity in coastal bays and Puget Sound, with most stations showing higher salinity.

Baseline: 1999-2020 (expanding)

Temperature

Salinity

Dissolved Oxygen



Marine stations are sampled monthly, surface to full depth. Color coding of mapped sites matches regional colors for heat maps displayed on the right.



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## Stay up-to-date on unfolding stories relevant to our region



The **Marine Waters Work Group** (PSEMP) releases a summary of its bimonthly **Marine Condition Update**, covering the Puget Sound region, coastal waters, and the North Pacific.

To participate in the webinar every other month, join our email list by emailing Iris Kemp ([ikemp@ltk.org](mailto:ikemp@ltk.org)) or the Marine Waters Work Group ([marinewaters@psemp.org](mailto:marinewaters@psemp.org)).

Stay plumbed into the the information stream...

## What's the story so far?

Go to the [webpage](#) and read detailed discussion summaries.



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Large brownish blooms in Central Sound, Bellingham and Liberty Bays, and Eld Inlet. Green blooms in Holmes Harbor; Nelson, Mosquito, and Mats Mats Bays; and Jarrell Cove. Large organic debris islands in South and Central Sound, Northern Hood Canal, and Bellingham Bay. Glacial flour very pronounced in Commencement Bay. Fish and jellyfish aggregations numerous in Eld Inlet.

Start here

*Iconic places, Sucia Island, San Juan Islands*



*Dungeness Spit, Sequim, Olympic Peninsula*



### Mixing and fronts:

Very distinct fronts in southern Central Sound and Central Sound, Lummi Bay, Cherry Point, and Birch Bay.



### Jellyfish and fish:

Few patches of jellyfish in Budd and Sinclair Inlet, larger patches in Eld Inlet and potentially Quartermaster Harbor.



### Suspended sediment:

Large inputs of glacial flour from the Puyallup River. Suspended sediment from human activity in Eld and Totten Inlets.



### Visible blooms:

Large brownish blooms in Central Sound, Bellingham and Liberty Bays, and Eld Inlet. Green blooms in Holmes Harbor; Nelson, Mosquito, and Mats Mats Bays; and Jarrell Cove.



### Debris:

Large amounts and numerous islands of organic debris in South and Central Puget Sound and Bellingham Bay.



# Aerial navigation guide

Date: 6-17-2021

Click on numbers

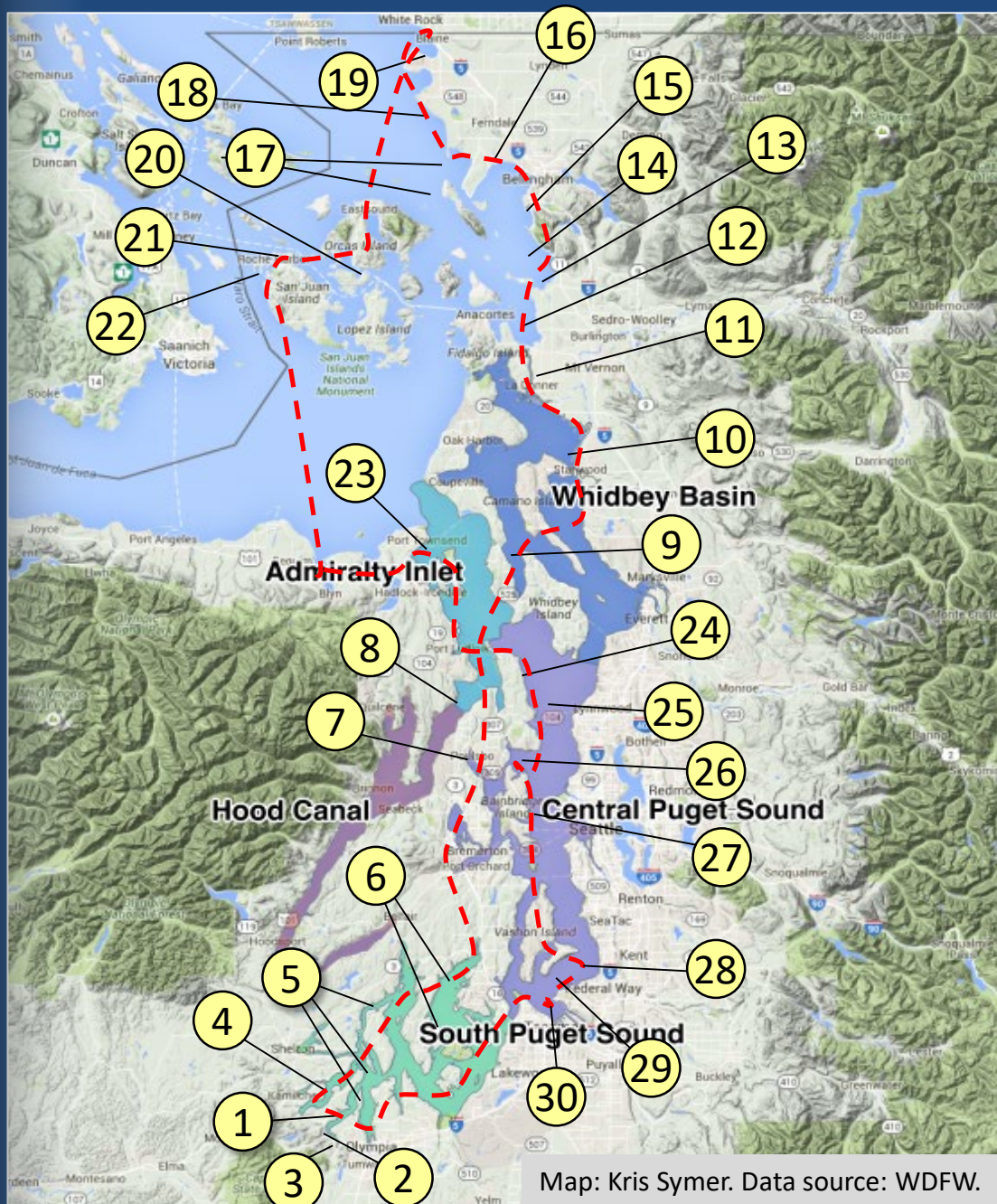
Flight Observations  
 Very high visibility, sunny

Contribute observations



Tide data from 6-17-2021 (Seattle):

Time		High/Low
05:33 AM	5.63	L
10:06 AM	7.62	H
04:34 PM	0.92	L
11:49 PM	11.71	H







## Connect aerial observation with data from ORCA moorings



Nick Michel-Hart,  
John Mickett, UW/APL.



[NANOOS NVS Data Explorer](#)



### View products by mooring

#### Puget Sound

- ① [Carr Inlet](#)
- ② [Dabob Bay](#)
- ③ [Hoodspport](#)
- ④ [Hansville](#)
- ⑤ [Point Wells](#)
- ⑥ [Twanoh](#)

#### Salish Sea

- ⑦ [Bellingham Bay](#)
- ⑧ [Friday Harbor](#)



Thayne Yazzie, NWIC,  
Robert Daniels, UW/APL



Summary

Critters & divers

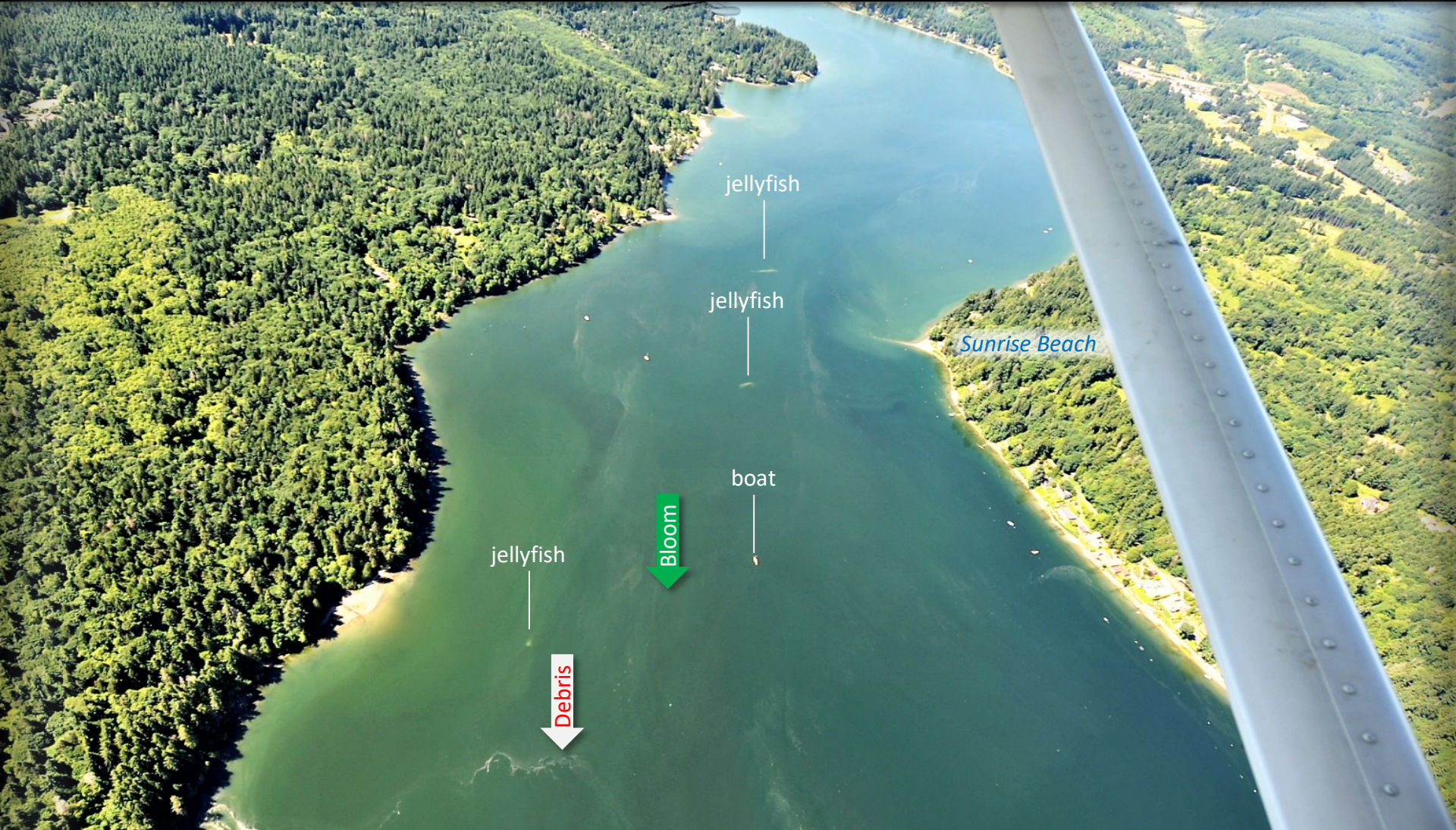
Climate & streams

Combined factors

Marine water

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Data



Patches of jellyfish , organic debris, and bloom. Location: Eld Inlet (South Sound), 11:21 AM





Summary

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*Schools of fish, a bloom, and suspended sediment.* Location: Eld Inlet (South Sound), 11:26 AM





Summary

Critters &amp; divers

Climate &amp; streams

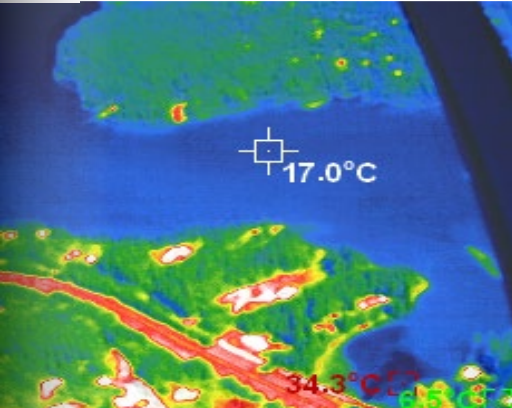
Combined factors

Marine water

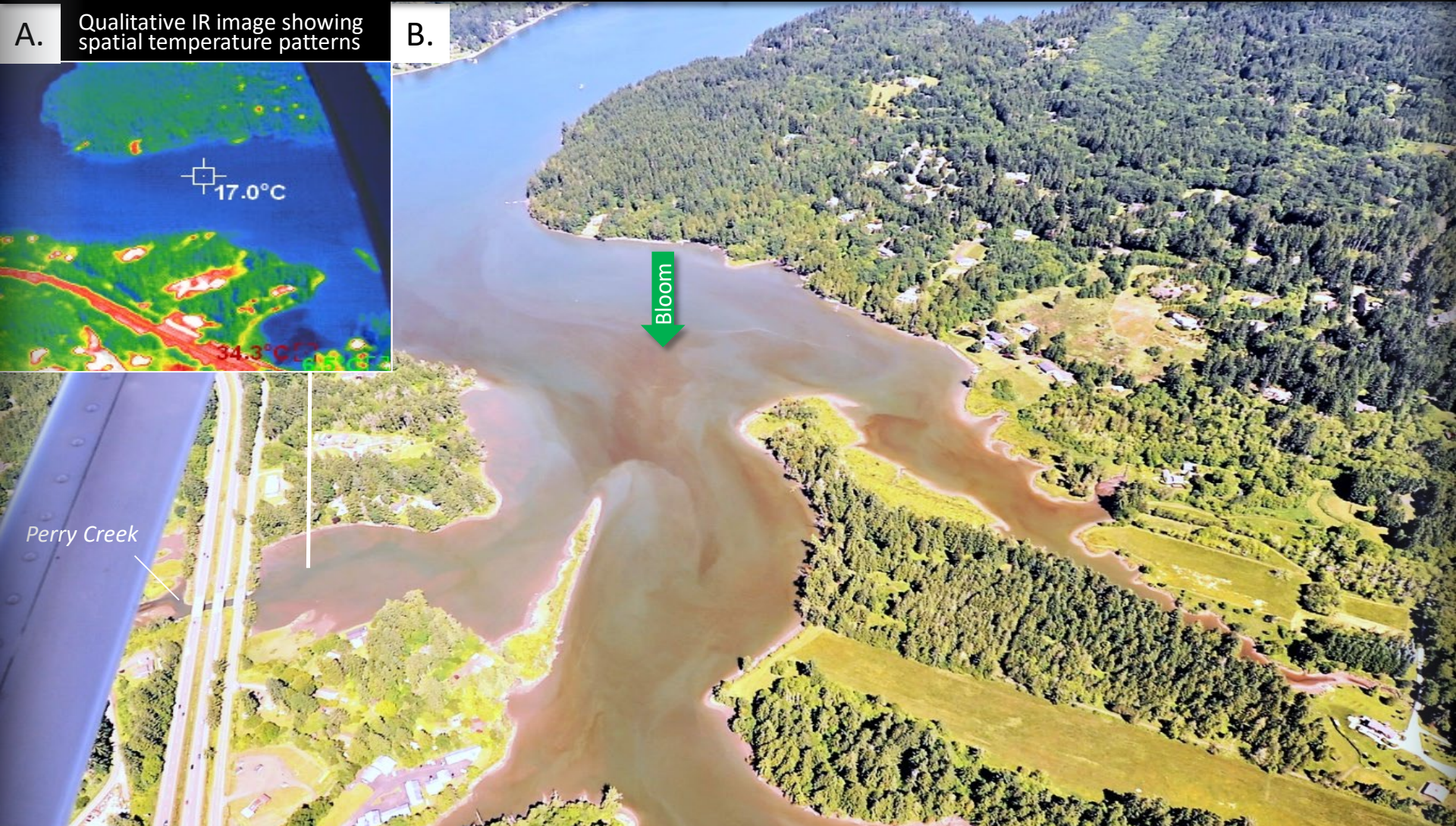
Aerial photos

Data

A. Qualitative IR image showing spatial temperature patterns



B.



A. Colder water entering from Perry Creek. B. Strong brown-orange bloom.

Location: Eld Inlet (South Sound), 11:24 AM





Summary

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*Boat and suspended sediment near shellfish pens. Location: Totten Inlet (South Sound ), 11:28 AM*





Summary

Critters &amp; divers

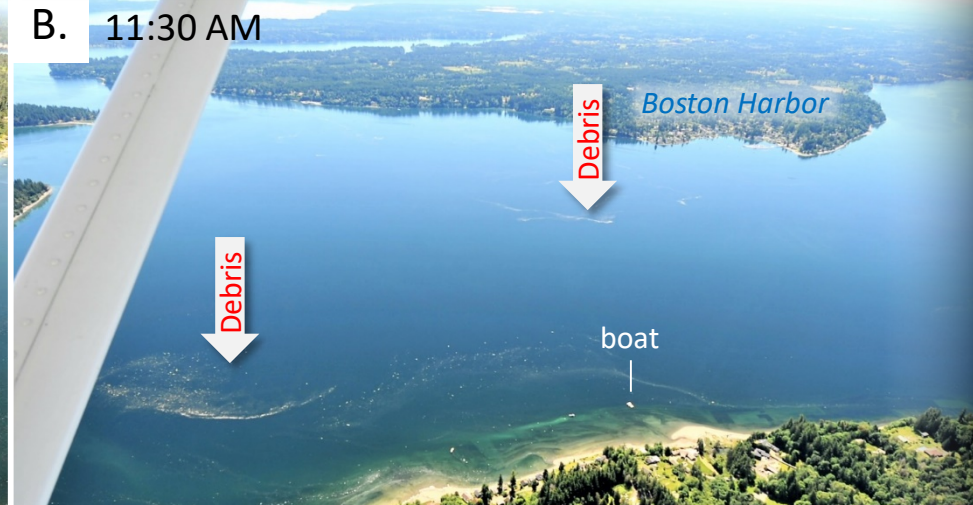
Climate &amp; streams

Combined factors

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*Large fields of organic debris drifting in many places of South Sound.*

Location: A. Budd Inlet, B. Dana Passage, C. Squaxin Passage, D. Pickering Passage (South Sound)





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*Large fields of organic debris drifting in many places of South Sound.  
 Location: Carr Inlet (South Sound)*





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Data

A.



Strong bloom near the surface (boats leave tracks). B. Local river with colder water entering a warmer nearshore water pocket. Location: Whidbey Island (Central Sound), 12:03 PM





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boat

Debris

Debris

Debris

*Large rafts of organic material collecting at Hood Canal Bridge.*  
Location: Hood Canal Bridge (Hood Canal), 12:09 PM



Summary

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A.



A. Container ships at entrance to Holmes Harbor. B. Green bloom stretching from Saratoga Passage into C. Holmes Harbor. Location: Whidbey Island (Whidbey Basin), 12:22 PM





Summary

Critters &amp; divers

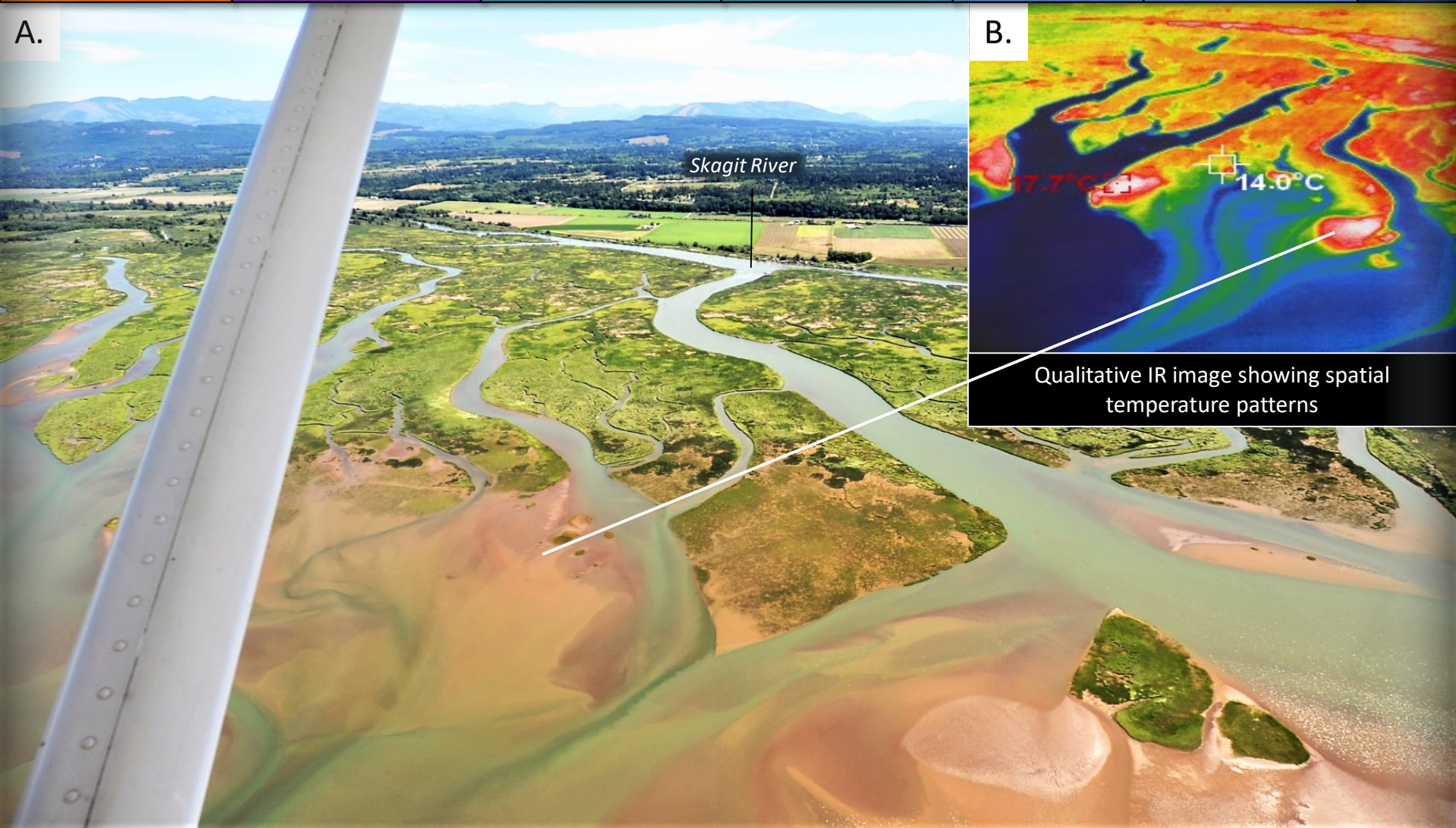
Climate &amp; streams

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A. South Fork of the Skagit River delta with B. variable temperatures and hotspots on sun-exposed tidal flats.  
Location: Skagit Bay (North Sound), 12:31 PM





Summary

Critters &amp; divers

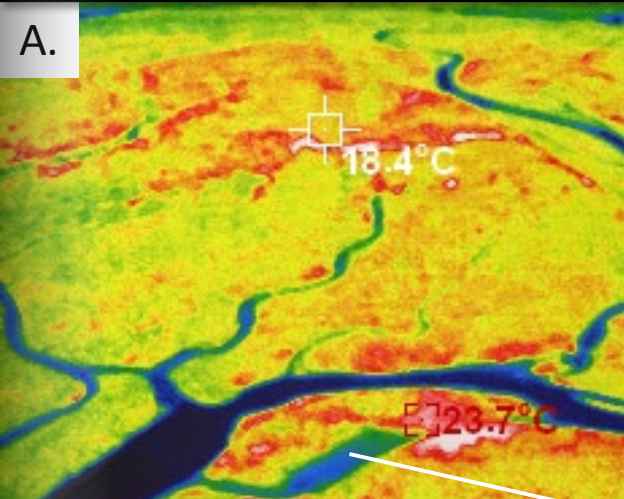
Climate &amp; streams

Combined factors

Marine water

Aerial photos

Data



Qualitative IR image showing spatial temperature patterns.



A. Thermal image revealing 100-square-foot-sized temperature anomaly in the North Fork of the Skagit River delta.  
 B. Photo of same area. C. Red circle on satellite view shows location. Location: Skagit Bay (North Sound), 12:35 PM





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*Organic material accumulating along sides of tidal gullies near seagrass beds.*

Location: Padilla Bay (North Sound), 12:39 PM





Summary

Crittters &amp; divers

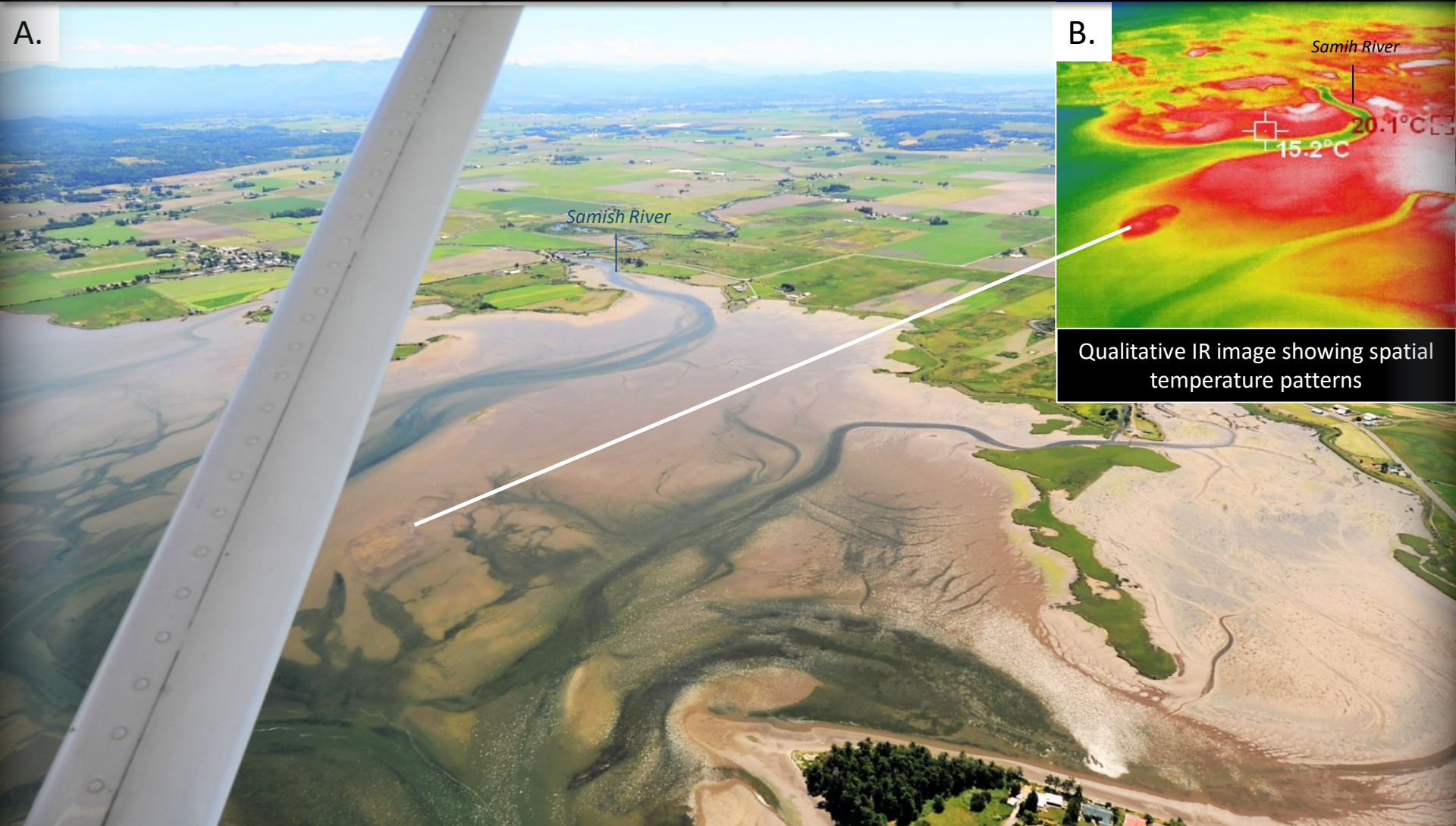
Climate &amp; streams

Combined factors

Marine water

Aerial photos

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A. Samish River estuary with B. pockets of warmer water in the shallows over the tidal flats.  
Location: Samish Bay (North Sound), 12:44 PM





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*Strong olive-golden bloom and organic material accumulating at front. Internal waves are also visible.*  
Location: Samish Bay (North Sound), 12:47 PM





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A.

B.

Qualitative IR image showing spatial temperature patterns

A. Internal waves in Bellingham Bay. B. IR image showing colder water of the Chuckanut River delta. Location: Bellingham Bay (North Sound), 12:49 PM





Summary

Critters &amp; divers

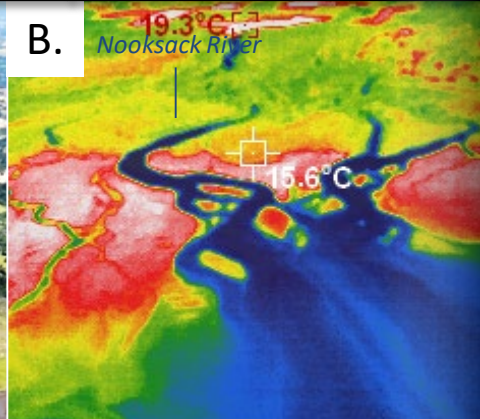
Climate &amp; streams

Combined factors

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Qualitative IR image showing spatial temperature patterns

A. Nooksack River delta. B. Large temperature gradients over mudflats compared to vegetated riparian corridor.  
Location: Bellingham Bay (North Sound), 12:52 PM

Summary

Critters & divers

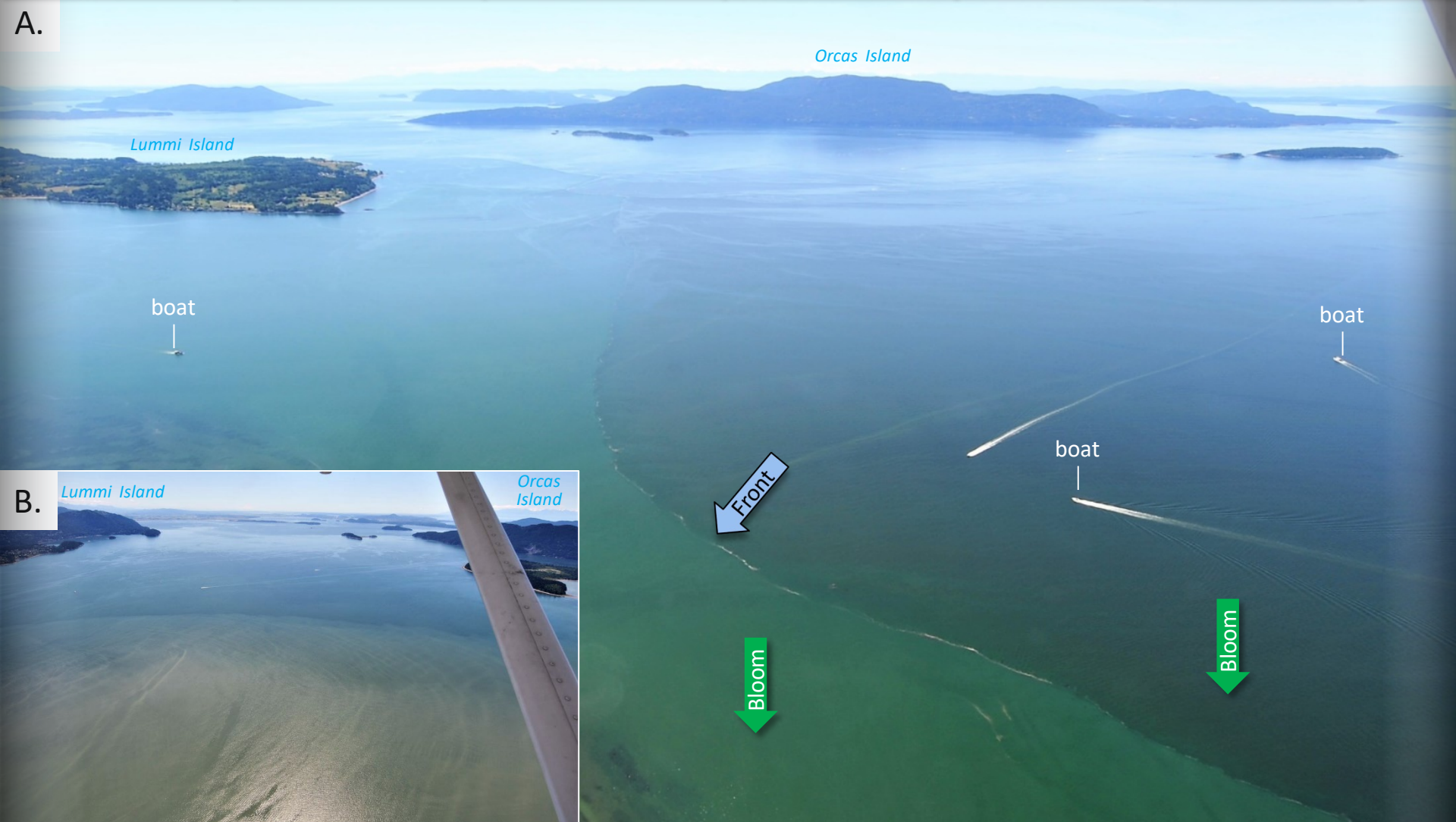
Climate & streams

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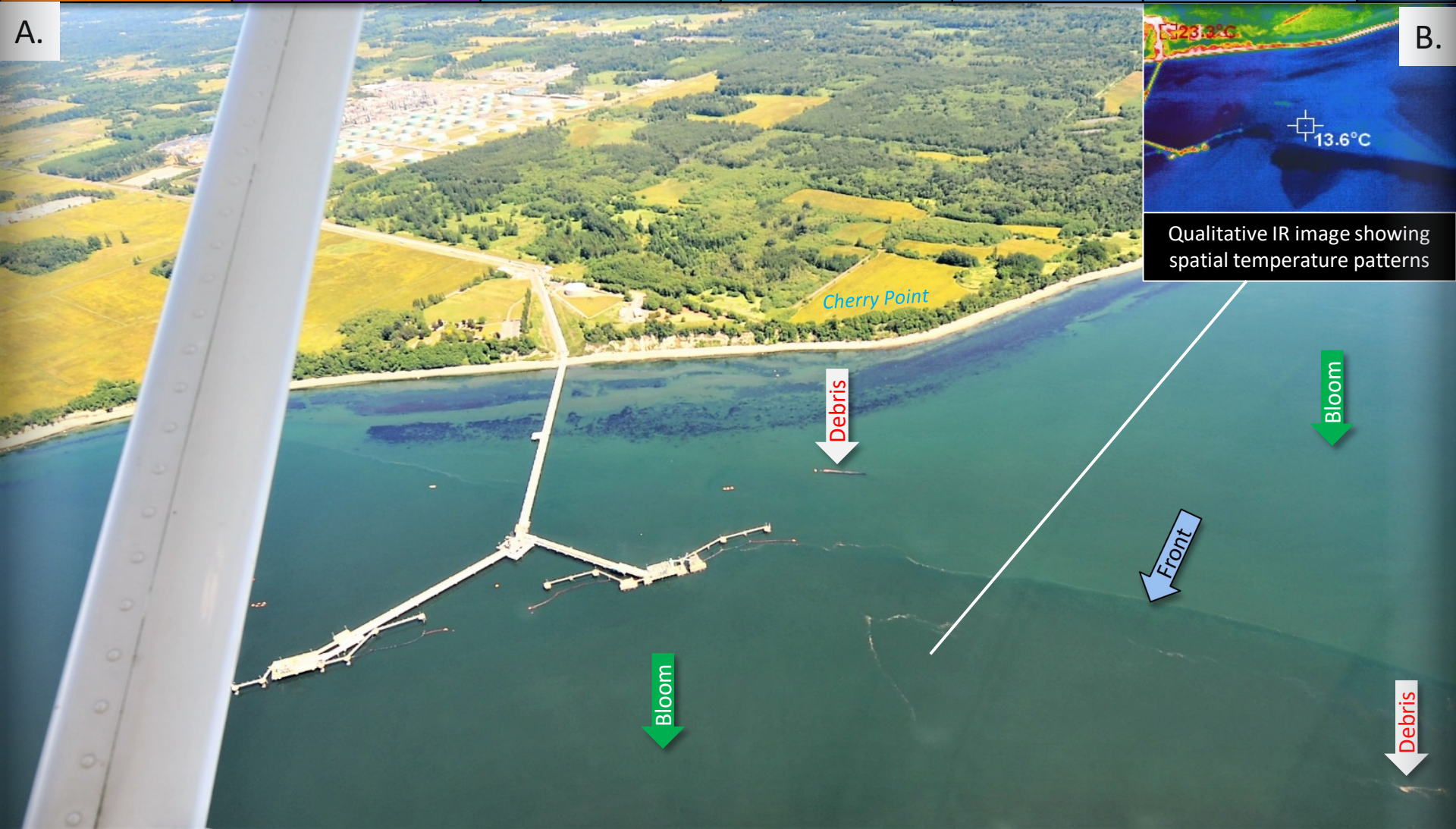


Large fronts of differently colored water in A. Lummi Bay, B. Rosario Strait looking south.  
Location: North and east of Lummi Island (North Sound), 12:56 PM





Summary	Critters & divers	Climate & streams	Combined factors	Marine water	Aerial photos	Data
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A. Front extending towards shore. B. Surface temperature anomalies near front.  
 Location: Cherry Point (North Sound), 12:59 PM





Summary

Critters &amp; divers

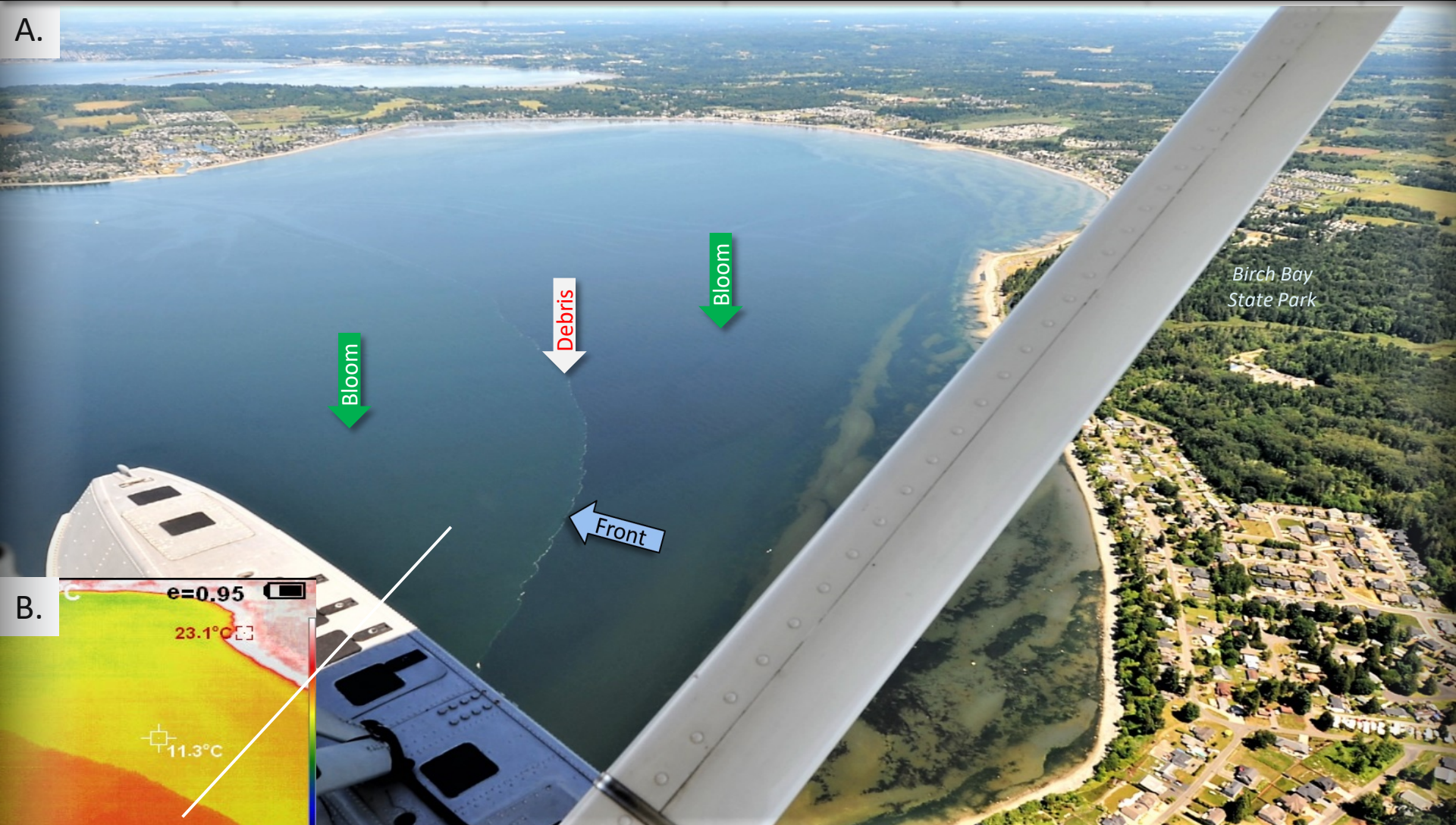
Climate &amp; streams

Combined factors

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A. Front with differently colored water and differing temperatures. B. Warmer (red) water outside and colder (yellow) water inside the bay. Location: Birch Bay (North Sound), 1:00 PM





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A. Front separating San Juan Island water from algal-rich water from B. West Sound.  
Location: San Juan Island (San Juan Islands), 1:18 PM





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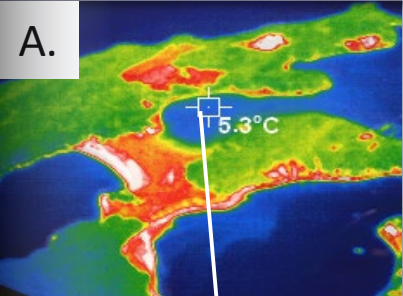
Marine water

Aerial photos

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B

Qualitative IR image showing spatial temperature patterns



A. Warmer water in Nelson Bay with B. green-yellow bloom and golden olive-brown bloom in Westcott Bay.

Location: San Juan Island (San Juan Islands), 1:23 PM





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*Bloom along front in Mosquito Bay originating in Horseshoe and Mitchell Bays.  
Location: San Juan Island (San Juan Islands), 1:24 PM*





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Critters & divers

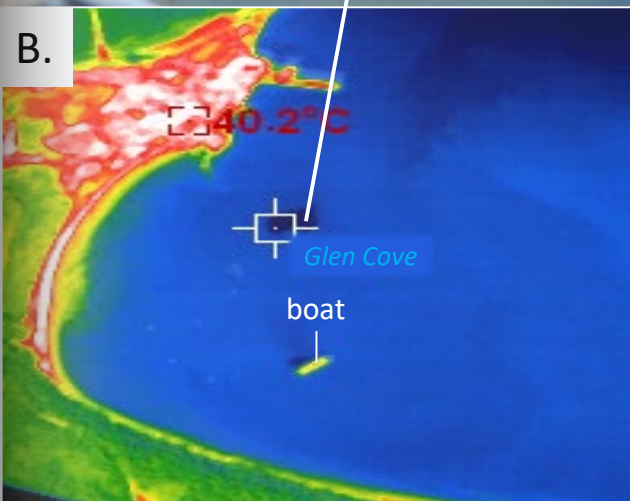
Climate & streams

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Data



Qualitative IR image showing spatial temperature patterns



A. Outfall in Glen Cove surfaces and has B. colder IR signature. C. Bloom and line of bubbles in Western Bay.  
Location: Port Townsend Bay (North Sound), 1:51 PM





Summary

Crittters &amp; divers

Climate &amp; streams

Combined factors

Marine water

Aerial photos

Data



*A. Strong bloom and B. internal waves.*

Location: A. Kingston, B. Eglon Beach near Rose Point (Central Sound), 2:03 PM





Summary

Critters & divers

Climate & streams

Combined factors

Marine water

Aerial photos

Data



A. Entrance to Port Madison. B. Thick bloom fronts and organic material.  
Location: Across from Point Wells (Central Sound), 2:06 PM





Summary

Critters &amp; divers

Climate &amp; streams

Combined factors

Marine water

Aerial photos

Data



A. Bloom intensifying in Port Madison. B. Tidal currents give contrast of bloom and other water at Agate Point.

Location: Port Madison (Central Sound), 2:09 PM





Summary

Critters &amp; divers

Climate &amp; streams

Combined factors

Marine water

Aerial photos

Data



*Thick bloom fronts and organic material off Murden Cove.*  
Location: East of Bainbridge Island (Central Sound), 2:11 PM





Summary

Critters &amp; divers

Climate &amp; streams

Combined factors

Marine water

Aerial photos

Data

Noctiluca reported on 7/2/2021 near Alki Point (ERTS #707751)



*Puyallup River plume with glacial flour, bloom, and orange organic debris (likely Noctiluca) accumulating at front.  
 Location: East of Maury Island (Central Sound), 2:22 PM*





Summary

Critters &amp; divers

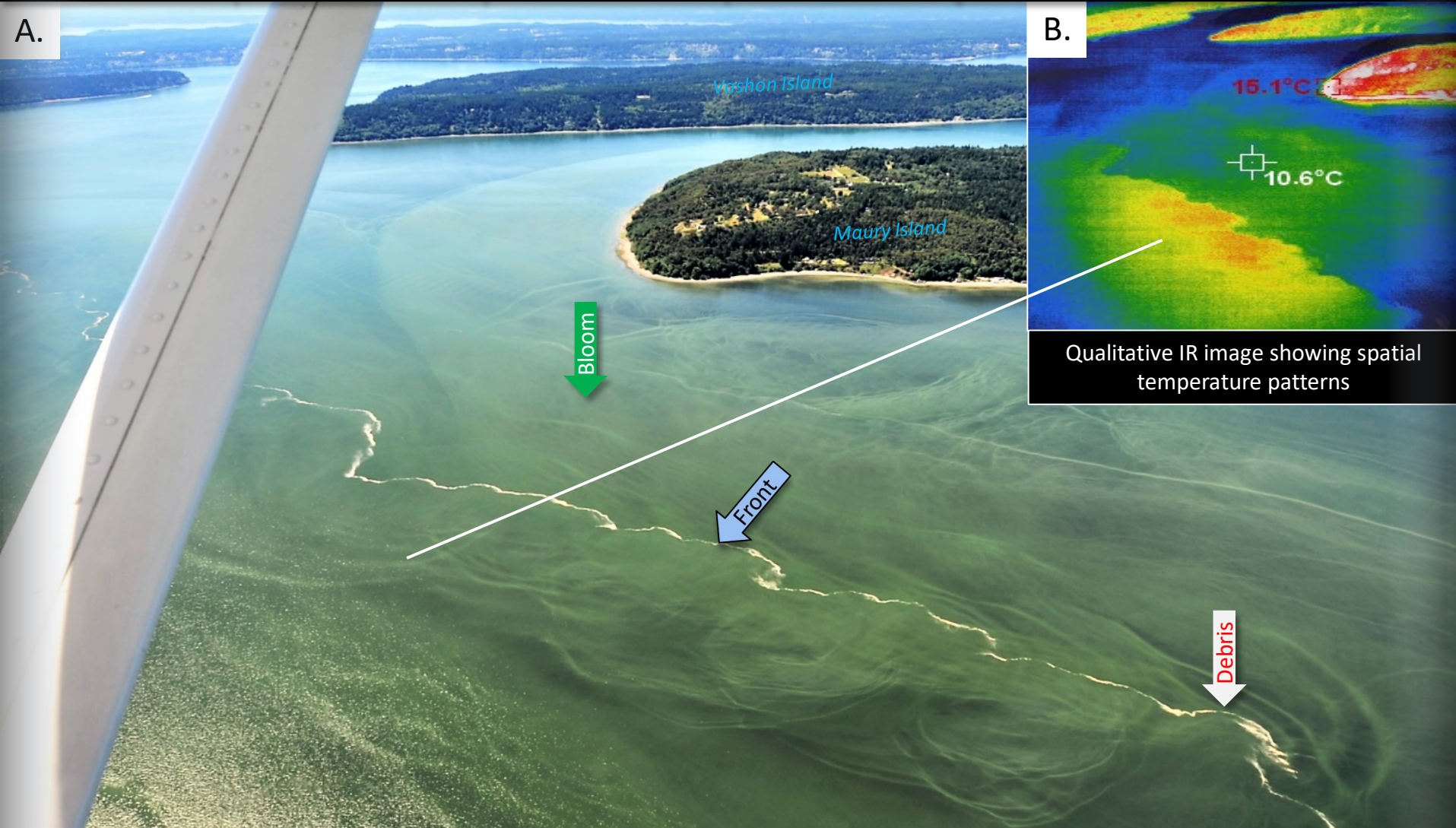
Climate &amp; streams

Combined factors

Marine water

Aerial photos

Data



A. Puyallup River plume with glacial flour, bloom, and organic debris accumulating at front.  
 B. East of front is warmer water. Location: East of Maury Island (Central Sound), 2:23 PM





Summary

Critters &amp; divers

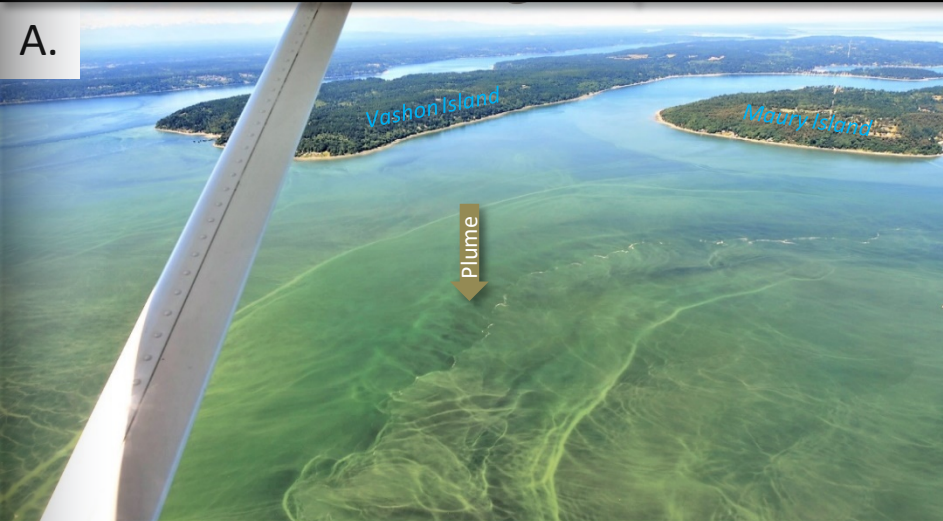
Climate &amp; streams

Combined factors

Marine water

Aerial photos

Data



A-B. Puyallup River plume with glacial flour. C. Wake of a container ship reveals thickness of surface layer. D. Tidal fronts in Dalco Passage. Location: Commencement Bay (Central Sound), 2:24 PM





Summary

Critters &amp; divers

Climate &amp; streams

Combined factors

Marine water

Aerial photos

Data



We add your observations to EOPS because we believe they matter.

- In the following pages you will find water quality issues that engaged and concerned citizens submitted to us.
- We feel that your observations should be shared side-by-side with aerial photo records.
- We encourage you to share your observations with us.





Summary

Critters &amp; divers

Climate &amp; streams

Combined factors

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Data



Maria Mason, 4/23/2021, filmed many large mats of organic material along eastern Bainbridge Island's shores, A. looking north, B. looking southeast.





Summary

Critters &amp; divers

Climate &amp; streams

Combined factors

Marine water

Aerial photos

Data

A.



B.



Adding bleach removed  
coloration



Tony Melchior, 4/20/2021, saw a *Noctiluca* bloom NE of shoreline between Belfair and Union, Hood Canal.





Summary

Critters &amp; divers

Climate &amp; streams

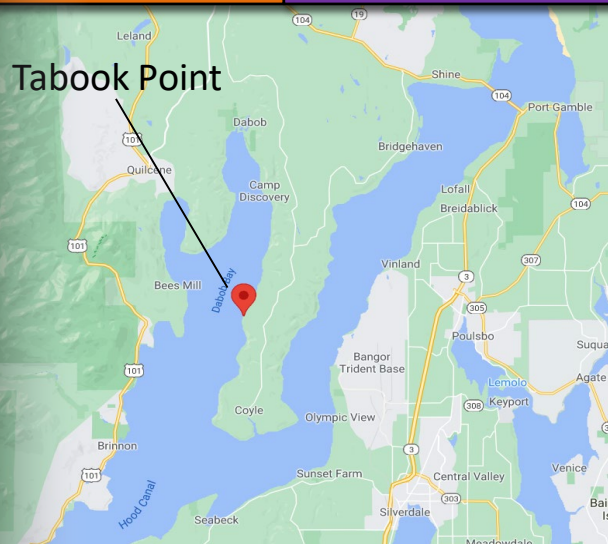
Combined factors

Marine water

Aerial photos

Data

Tabook Point



Mary Jean Ryan, 6/1/2021, documented a *Noctiluca* bloom in Dabob Bay near Tabook Point (Hood Canal).





Summary

Critters &amp; divers

Climate &amp; streams

Combined factors

Marine water

Aerial photos

Data



Catherine Drews, 5/25/2021, documented a *Noctiluca* bloom in Holmes Harbor (Whidbey Basin).





Summary

Critters &amp; divers

Climate &amp; streams

Combined factors

Marine water

Aerial photos

Data

A.



B.

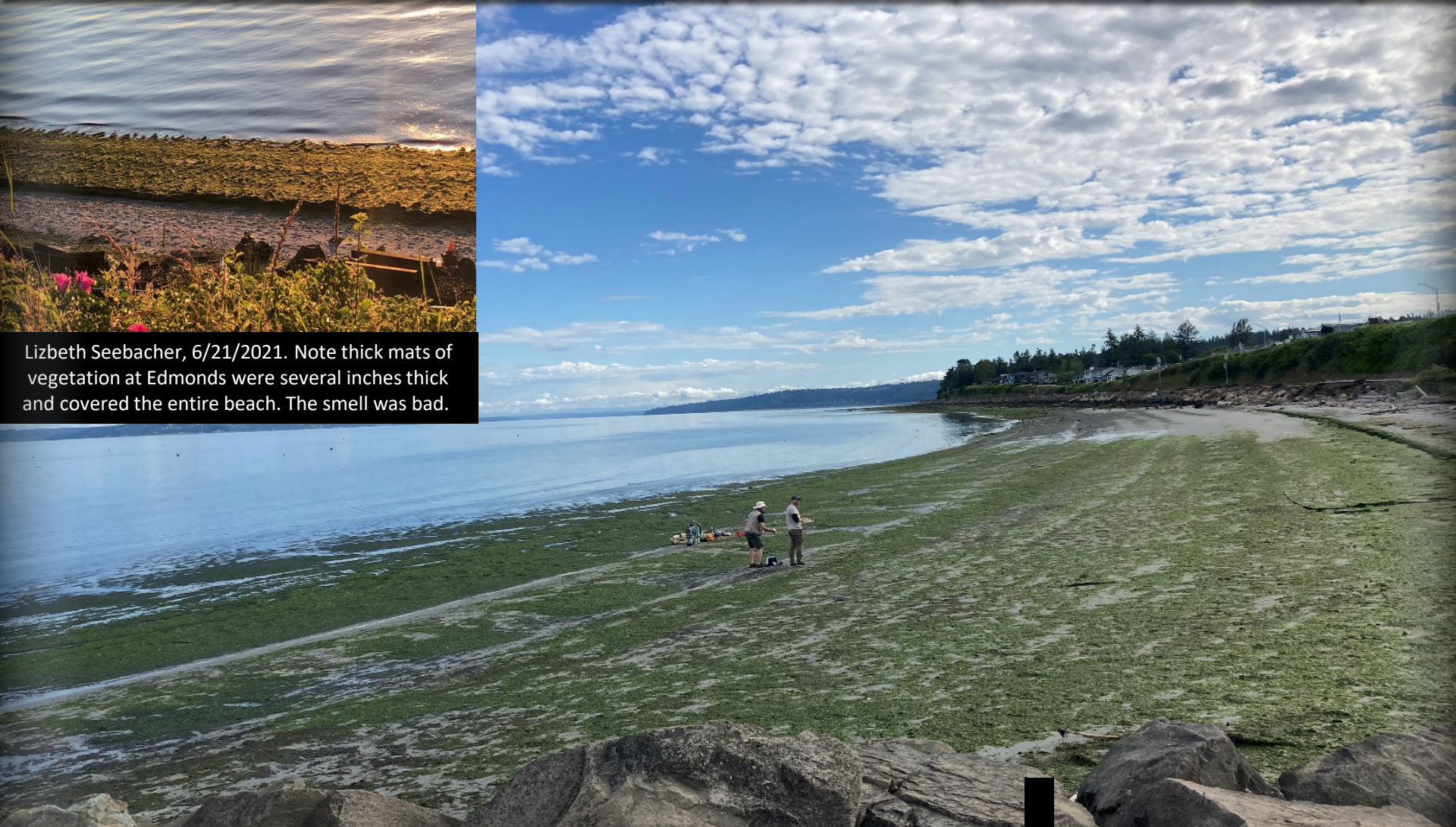


Glenn Briskin, 5/30/2021, wondered if there is A. more empty sand and sea lettuce, and B. less eel grass in Birch Bay than a few years ago. (EOPS has no image record from Birch Bay to help answer this question.)



[Summary](#)[Critters & divers](#)[Climate & streams](#)[Combined factors](#)[Marine water](#)[Aerial photos](#)[Data](#)

Lizbeth Seebacher, 6/21/2021. Note thick mats of vegetation at Edmonds were several inches thick and covered the entire beach. The smell was bad.



Elisa Dawson, Tim Ellis, and Alex Pittman, 6/8/2021, encountered lots of macro-algae north of the jetty at Edmonds Underwater Park.





Summary

Critters &amp; divers

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A.



B.



C.



6/17/2021, Jarrell Cove. A bright-green bloom lasting for several weeks: A. low tide, B. high tide. C. EOPS overflight view of the bloom.





Summary

Critters &amp; divers

Climate &amp; streams

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Data

Extreme temperatures brought biggest glacial melt in Washington in about 100 years  
 ([Komo News](#))



A. Reza Taheri, 6/29/2021, noted glacial flour-colored water in Commencement Bay.

B. Ecology crew sampling Commencement Bay station on 7/1/2021.





Summary

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## Stench from decaying oysters that were killed when the 100°F+ heat wave and a strong minus tide combined

7/1/2021, Hood Canal. Tony Melchiors

On Hood Canal, some oysters experienced long exposure to very high temperatures, and many died. For the past few days, when the tide is low enough to expose oyster beds, there is a nasty odor of “death” on the beach. Only when the tide is back in and water covers the oysters does the odor dissipate.

Tony's boot

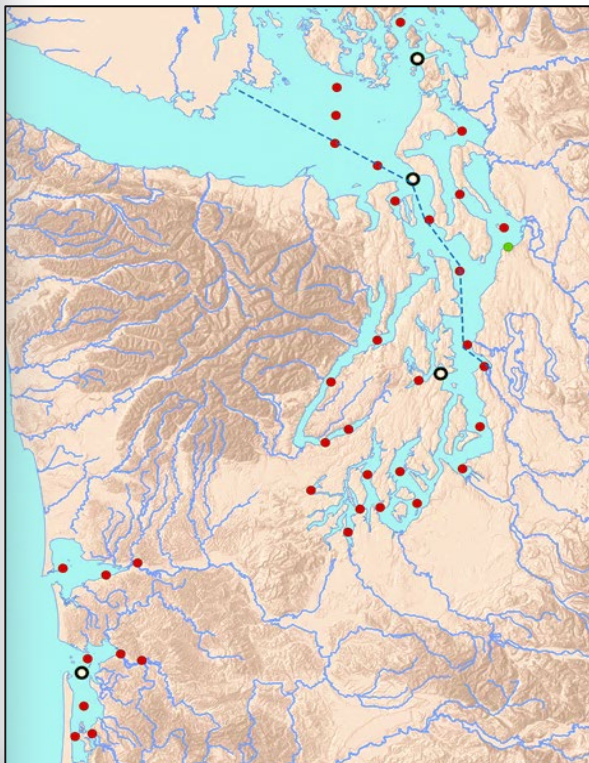
dead oysters

WA Dept. of Fish and Wildlife has developed a community science tool to report fish or shellfish die-offs related to low water levels, high temperatures, or other environmental conditions: <https://publicinput.com/X7060>.



## Long-term monitoring data from Puget Sound and coastal bays

- 39 stations sampled monthly
- 16 physical, chemical, biogeochemical parameters
- data from 1999-present







Summary Stories Critters & divers Climate & streams Combined factors Marine water Aerial photos Data

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**Recommended Citation (example for September 2018 edition):**

Washington State Department of Ecology. 2018. Eyes Over Puget Sound: Surface Conditions Report, September 17, 2018. Publication No. 18-03-075. Olympia, WA.  
<https://fortress.wa.gov/ecy/publications/documents/1803075.pdf>.



Many thanks to our business partners:  
Shannon Point Marine Lab (WWU), Swantown  
Marina, and Kenmore Air.

**Contact:**

Dr. Christopher Krembs  
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Marine Monitoring Unit  
Environmental Assessment Program  
Washington State  
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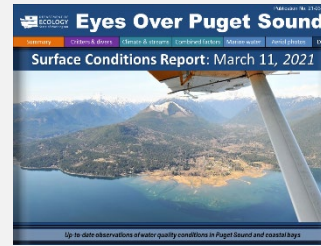
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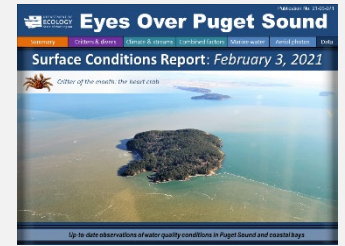
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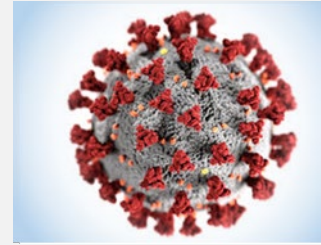
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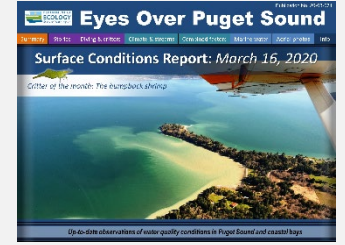
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[Publication No. 20-03-073](#)



September\_28\_2020,  
[Publication No. 20-03-072](#)



No coverage due to COVID-19  
pandemic from April-September



March\_16\_2020,  
[Publication No. 20-03-071](#)



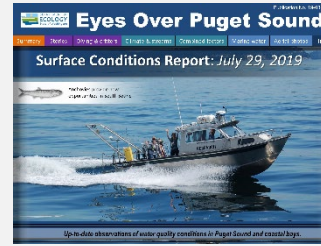
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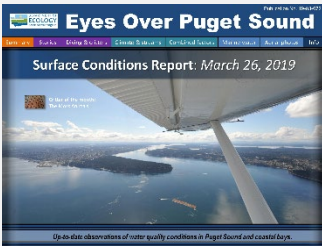
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June\_4\_2019  
[Publication No. 19-03-073](#)



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[Publication No. 19-03-072](#)



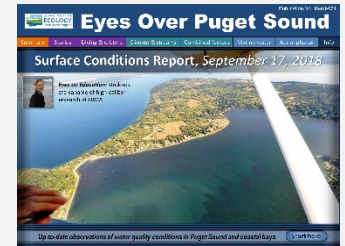
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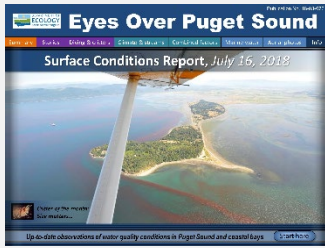


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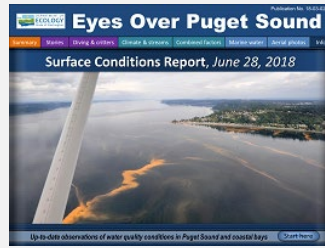


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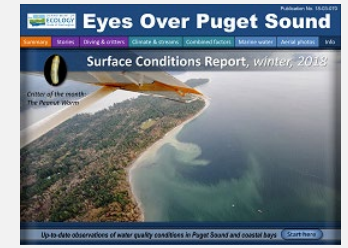
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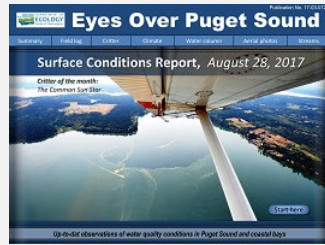
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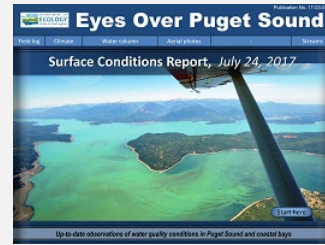
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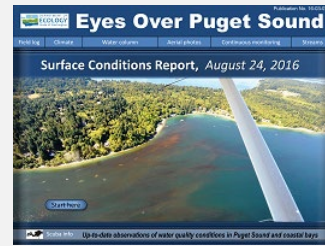
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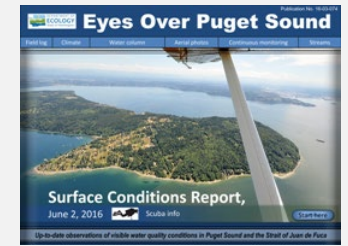
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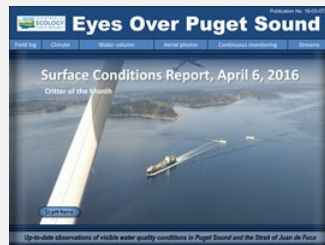
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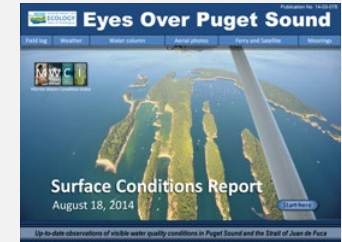
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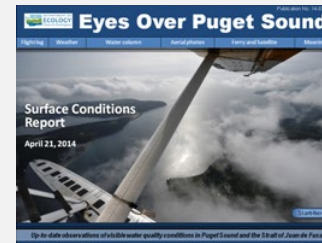
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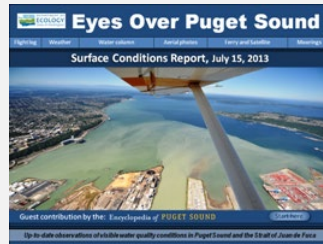
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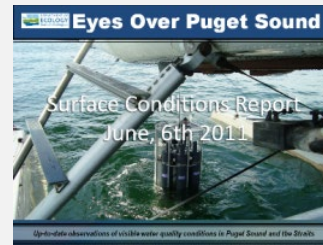
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