Publication No. 20-03-073

DEPARTMENT OF ECOLOGY
State of Washington

Eyes Over Puget Sound

Surface Conditions Report: *October 26, 2020*

Critter of the month: the Jelly-dwelling anemone

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

LONG-TERM MARINE MONITORING UNIT

Dany Burgess

Tyler Burks
Skip Albertson

Dr. Christopher Krembs (Editor)

Thank you to many

The Jelly-dwelling anemone

p. 4

Concealing the beast within…

Climate & streams

p. 5-10

A relatively warm summer and fall, but with a La Niña forming in the tropics. Stream flows in the Puget Sound region are relative normal for the time of year.

Aerial photography

p. 11-31

Blooms have largely disappeared, kelp beds look strong in Northern Puget Sound, and the harvest of the annual chum salmon is in full swing. Jellyfish aggregations are visible in Budd and Sinclair Inlets and oils sheens from boats are numerous.

People send their observations

p. 32

More images from people on the water are reaching us helping us to document an algal rich summer in Puget Sound and a high amount of organic material in the water and on beaches.

Editorial assistance provided by: Elisa Rauschl, Julianne Ruffner, Valerie Partridge.

Personal Field Impression 10-26-2020

Meet our new Washington Conservation Corps intern

Grace working for Harbor WildWatch doing beach seining and Olympia oyster research in Gig Harbor, WA.

"Only 3 weeks in, I feel like I've only figuratively gotten my feet wet here at Ecology with lab work, but I soon hope to "dive" right into field work."

Peer into a microscope and one sees a whole different world of creatures. Peer into the life of Grace McKenney, and you'll probably find her staring into a microscope. Coming from the University of Washington Tacoma with a B.Sc. in Environmental Science, Grace brings both lab, and marine and freshwater field experience.

A *Nephtys* sp. Grace found in a sediment sample last week.

Grace is at home in waders taking water samples, on a boat, or looking into a microscope sorting invertebrates. As her term with Washington Conservation Corps continues on, Grace will be splitting her time between the Marine Waters, Sediment, and Toxics Teams here at the Dept. of Ecology.

Grace sorting through a sediment sample in the Benthic Lab.

Critter of the Month – The Jelly-dwelling anemone

Dany Burgess

Marine Sediment Monitoring

Peachia quinquecapitata

You would never know that the exterior of this innocent-looking little critter conceals a beast within. The jelly-dwelling anemone will stop at nothing to get a foothold in the mud of Puget Sound, even if it means taking others down along the way!

Fun Facts

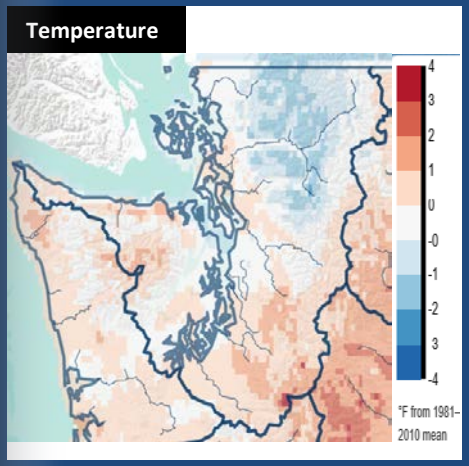
- They have tiny "hands" stuck to their mouths
- As babies, they get eaten by jellyfish – and they're fine with that
- They are parasitic, but only as larvae – the adults are model citizens

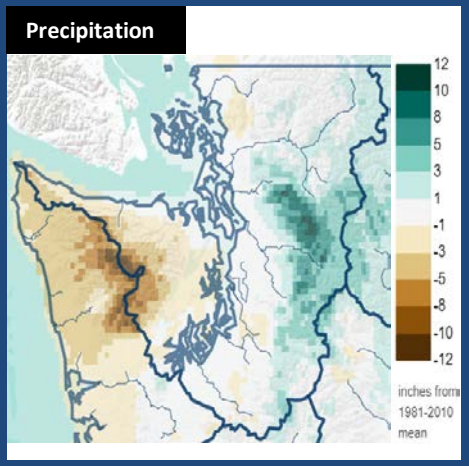
Learn more about the jelly-dwelling anemone and other critters on Ecology's EcoConnect blog here

How much water did we get and what can we expect?

During the previous 30 days, Puget Sound **air temperatures and precipitation were variable** depending on location (A). During the next 30 days, **temperature and precipitation forecasts are above normal** (B). Through the start of the year, precipitation has a higher probability to be above normal, while temperature may be affected by the onset of La Niña conditions.

A. Northwest Climate Toolbox (Previous 30 days)

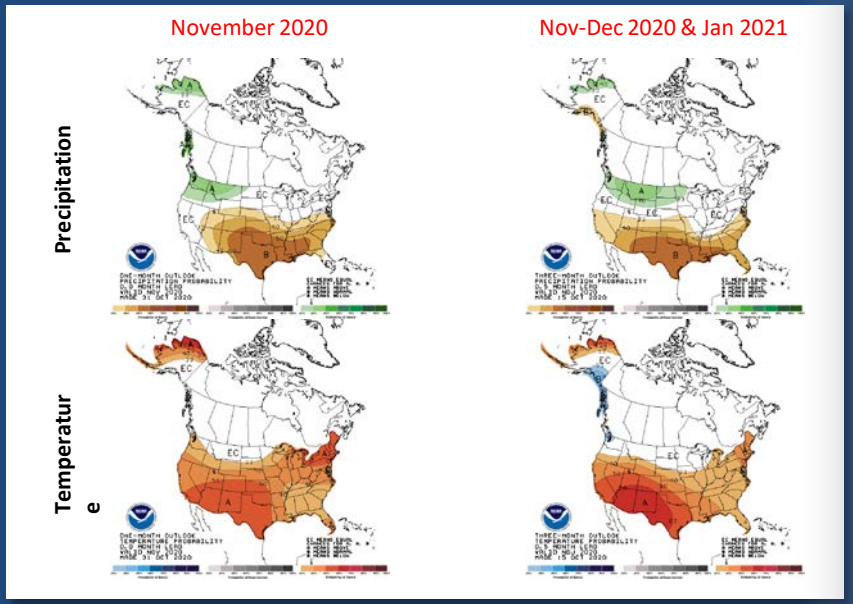




Temperature Anomaly from historical mean ranged from -3 to +4°F in the Puget Sound region during the past 30 days.

Precipitation Anomaly from historical mean ranged from -12 to +12 inches in the Puget Sound region during the past 30 days.

B. Climate Prediction Center, NOAA



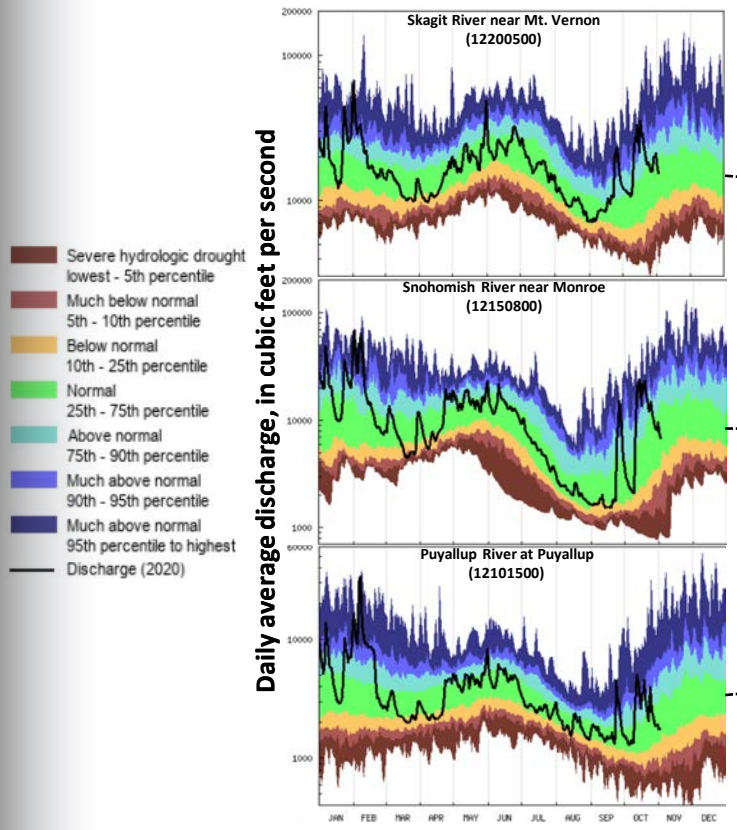
Forecasts show a higher probability of above normal precipitation in the NW. The three month (longer range) probability forecast for temperature is below normal, while the forecast for the month of November is above normal. click here.

How much water flows into Puget Sound?

Temporal: Following a series of notable precipitation events, a dry period has resulted in relatively normal freshwater inputs from major Puget Sound rivers to Puget Sound (trend charts, left).

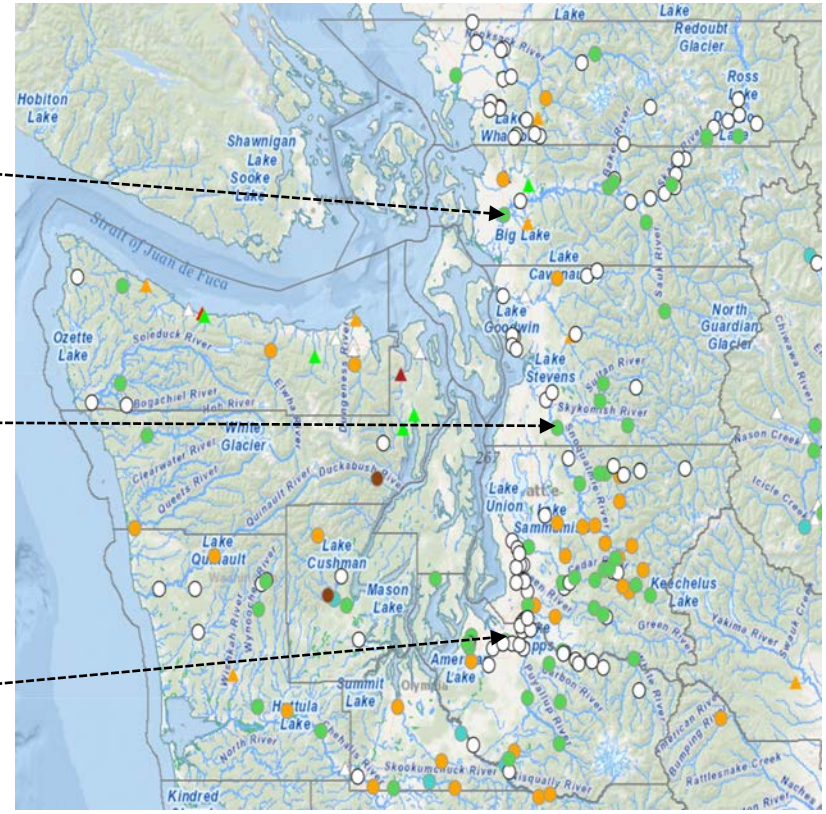
Spatial: Geographic variation in streamflow (map, right) dependent on precipitation distribution and intensity during preceding storms, and are normal to below normal.

Select Puget Sound Streamflow Trends



USGS WaterWatch: CLICK HERE!

Current Streamflow Conditions as of 11/3/2020



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

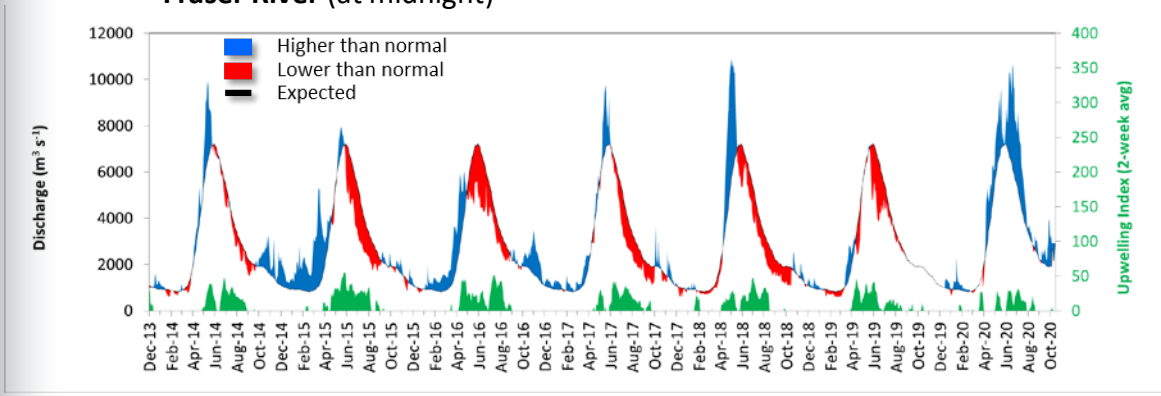
- Highest recorded
- Much above normal (>90%)
- Above normal (76-90%)
- Normal (25-75%)
- Below normal (10-24%)
- Much below normal (<10%)
- Lowest recorded
- Not ranked

Current conditions: CLICK HERE!

Climate : How well is the Salish Sea exchanging its water?

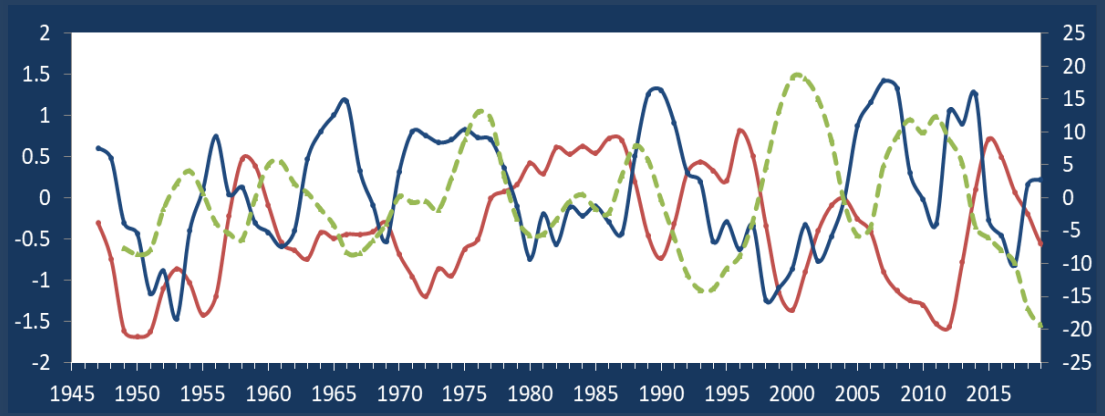
Historically, the peaks of coastal upwelling and the freshet are in sync. In early 2020 Fraser R. flows were at expected levels.

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 was flowing consistently high this year.

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



How do ocean boundary conditions affect the quality of water we exchange with the ocean?

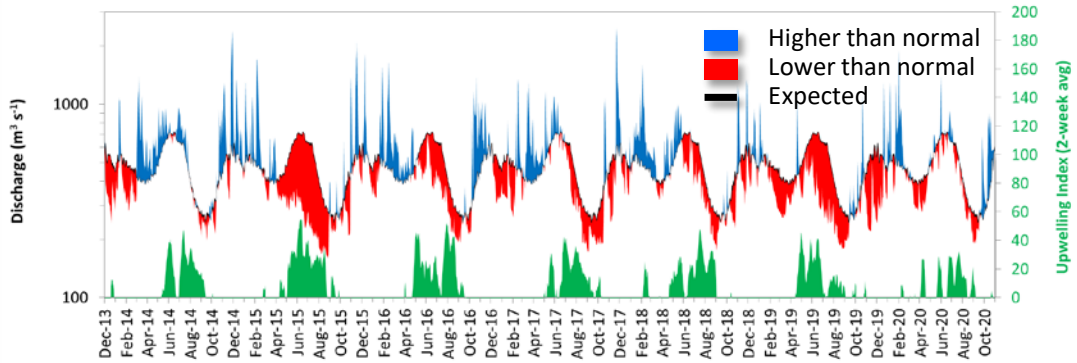
Recent years' warm water is mostly gone (PDO). Upwelling (Upwelling Index anomaly) is relatively expected. NPGO, which reflects the surface productivity along the coast, has fallen to one of its lowest numbers.

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

Climate: How well is Puget Sound exchanging its water?

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

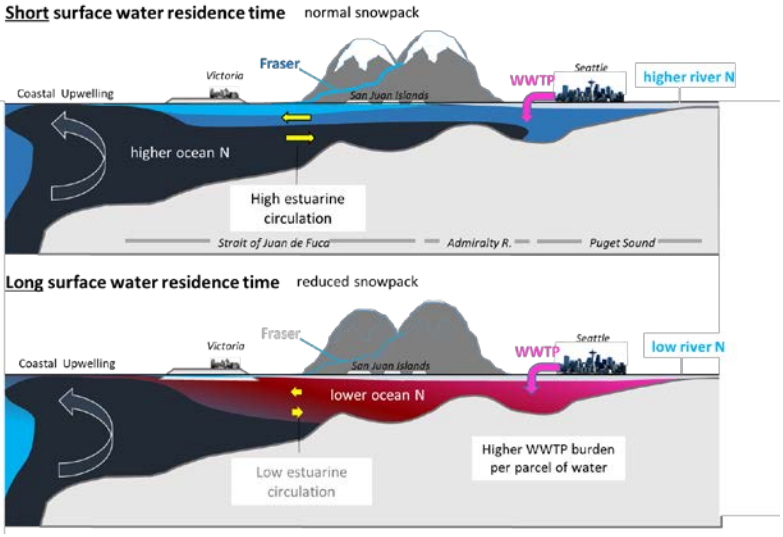
Skagit River (at midnight USGS)



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. This year, flows of the Skagit were close to normal.

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. The past year has generally been warmer and drier. For recent river and stream inflow, see page 5.

Conditions leading up to November:

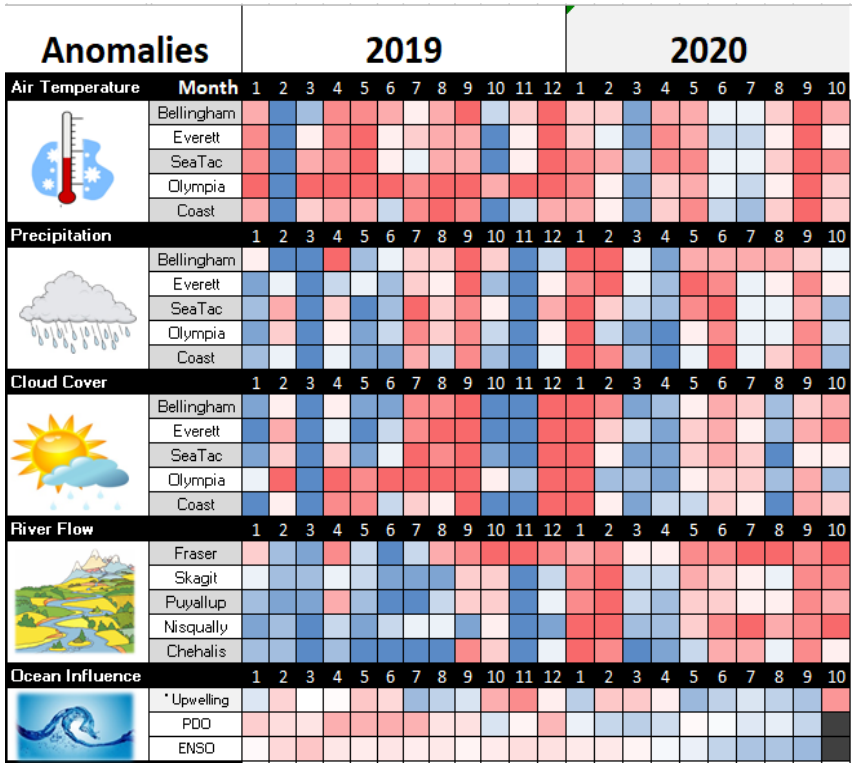
Air temperatures have generally been warmer this summer, except in June and July.

Precipitation was mostly below normal, except in May, June, and September.

Sunshine (opposite of cloud cover) levels were slightly below expected except during August.

River flows have been higher than normal, especially in the Nisqually and Fraser rivers.

Upwelling started in early spring during 2020, as in 2018 & 2019. La Nina is gaining strength.



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

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

Stay plumbed into the the information stream…

PSEMP
PUGET SOUND ECOSYSTEM MONITORING PROGRAM

The **Marine Waters Work Group** (PSEMP) releases a summary of its bimonthly

Marine Condition Update webinar covering the Puget Sound region, coastal waters and the North Pacific. To participate in the webinar, join our email list by emailing Iris (ikemp@lltk.org) or the Marine Waters Work Group (marinewaters@psemp.org).

What's the story so far?

Go to the webpage and read detailed discussion summaries.

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State of Washington

What were the conditions at the surface on 10-26-2020?

The productive season comes to an end the water is clear and blooms have largely disappeared. Kelp beds look strong this fall in Northern Puget Sound. The harvest of the annual chum salmon run is going on in Hood Canal. Jellyfish aggregations are visible in Budd and Sinclair Inlets. Oil sheens from boat activity are numerous.

Atmospheric waves over Blake Island

Big container ships waiting near Blake Island

Start here

Front

Mixing and fronts:
Strong tidal front accumulating surface debris in Admiralty Reach and northern Central Basin.

Jellyfish and fish:
Jellyfish abundant in Budd Inlet and potentially in Sinclair Inlet and Dyes Inlet. A fleet of fishing vessels harvests the annual chum salmon run in Hood Canal.

Plume

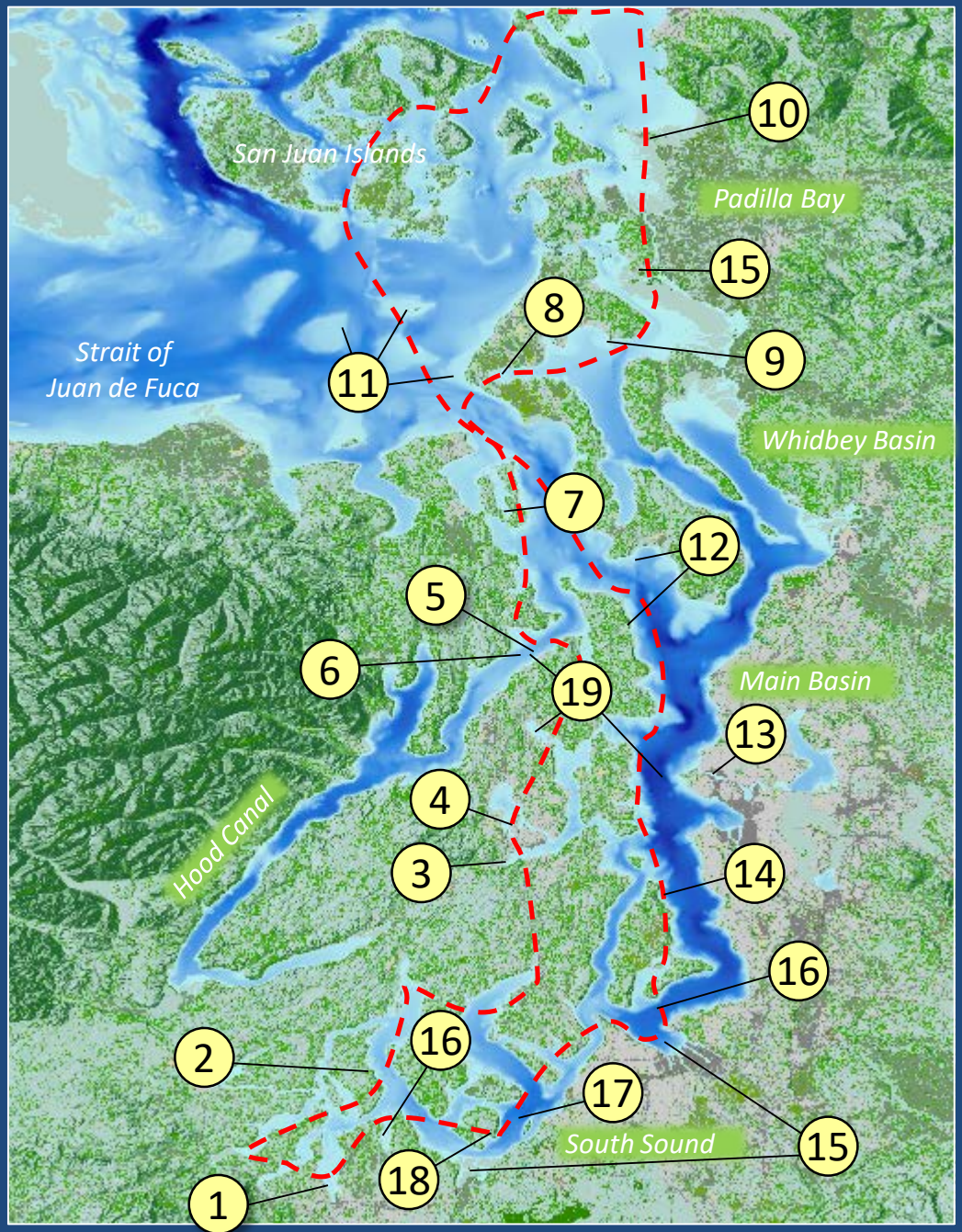
Suspended sediment:
Glacial flour in suspension from the Puyallup River covering portions of Commencement Bay and revealing interesting patterns and processes.

Bloom

Visible blooms:
Visible blooms have largely disappeared, yet kelp beds stand out this fall.

Debris

Debris:
Little organic debris in the water, except in Admiralty Reach where some debris accumulates at tidal fronts.



DEPARTMENT OF ECOLOGY
State of Washington

Aerial navigation guide

Date: 10/26/2020

Click on numbers

Flight Observations

Sunny, little waves and wind, good visibility

People observations

20

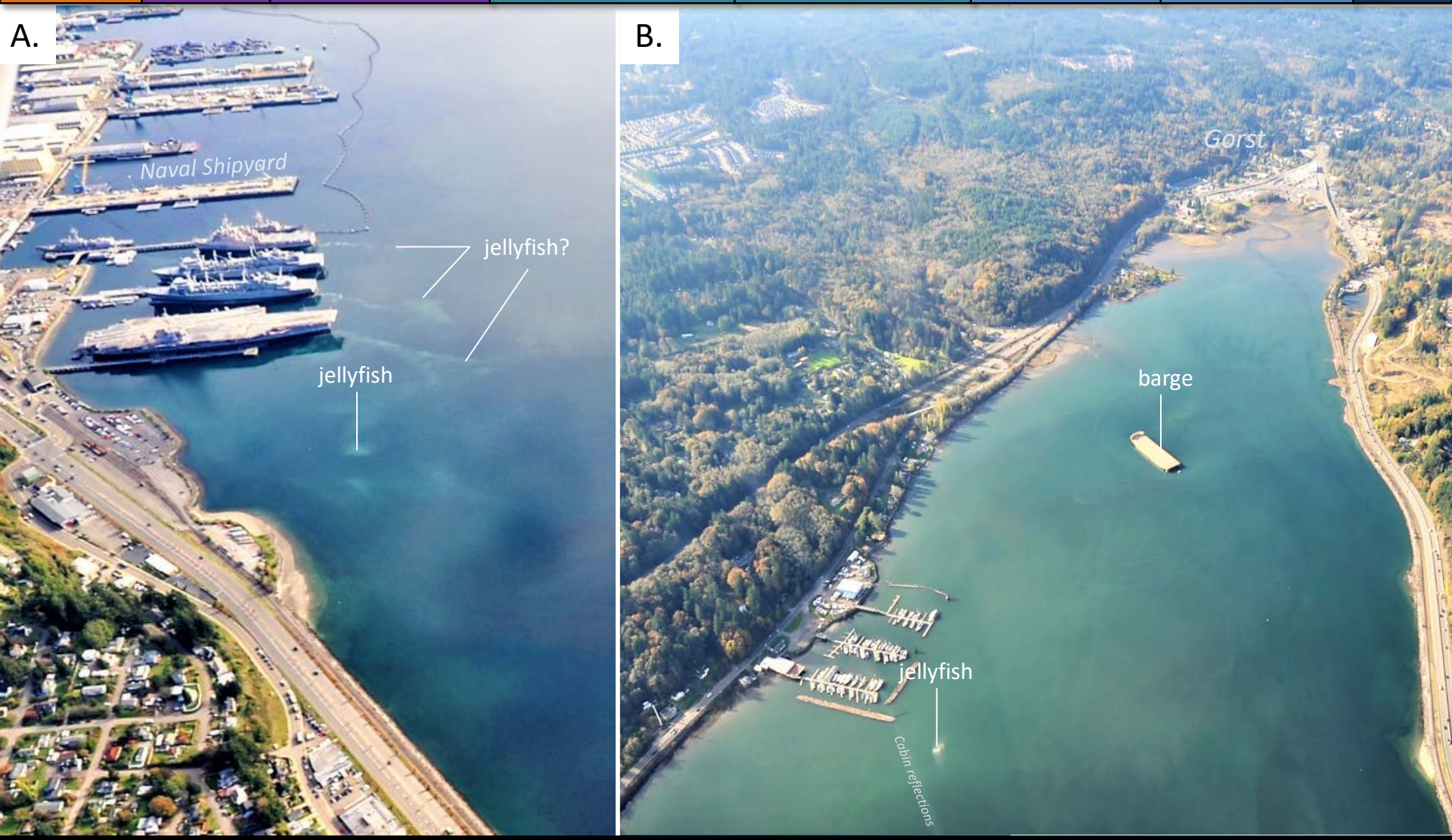
Tide data from 10/26/2020 (Seattle):

Time	Pred (ft)	High/Low
01:47 AM	8.03	H
07:52 AM	1.92	L
03:10 PM	11.25	H
09:39 PM	3.82	L

Aggregations of jellyfish. Location: Budd Inlet (South Sound), 10:47 AM

Shellfish harvest in the nearshore locally suspends sediments.
Location: Case Inlet (South Sound), 10:57 AM

Aerial photography 10-26-2020



Milky white patches that are likely jellyfish. A. looking eastward, B. looking westward.

Location: Sinclair Inlet (Central Sound), 11:21 AM

Milky white patches that are likely jellyfish.

Location: Oyster Bay, Dyes Inlet (Central Sound) 11:22 AM

A. A dozen fishing vessels harvest the annual chum salmon run south of the bridge B. while others are waiting north of the bridge. Location: Hood canal Bridge, (Hood Canal), 11:50 AM

A. Fishing vessel and large oil sheen south of the Hood Canal bridge. B. A close up

Location: Four Corners (Hood Canal) 11:50 AM

Aerial photography 10-26-2020

Turquoise-white nearshore region of unknown cause.

Location: Scow Bay, Marrowstone Island (Central Sound), 11:58 AM

Aerial photography 10-26-2020

Shellfish rafts seem to filter the water nearby.

Location: Penn Cove (Whidbey Basin), 12:05 PM

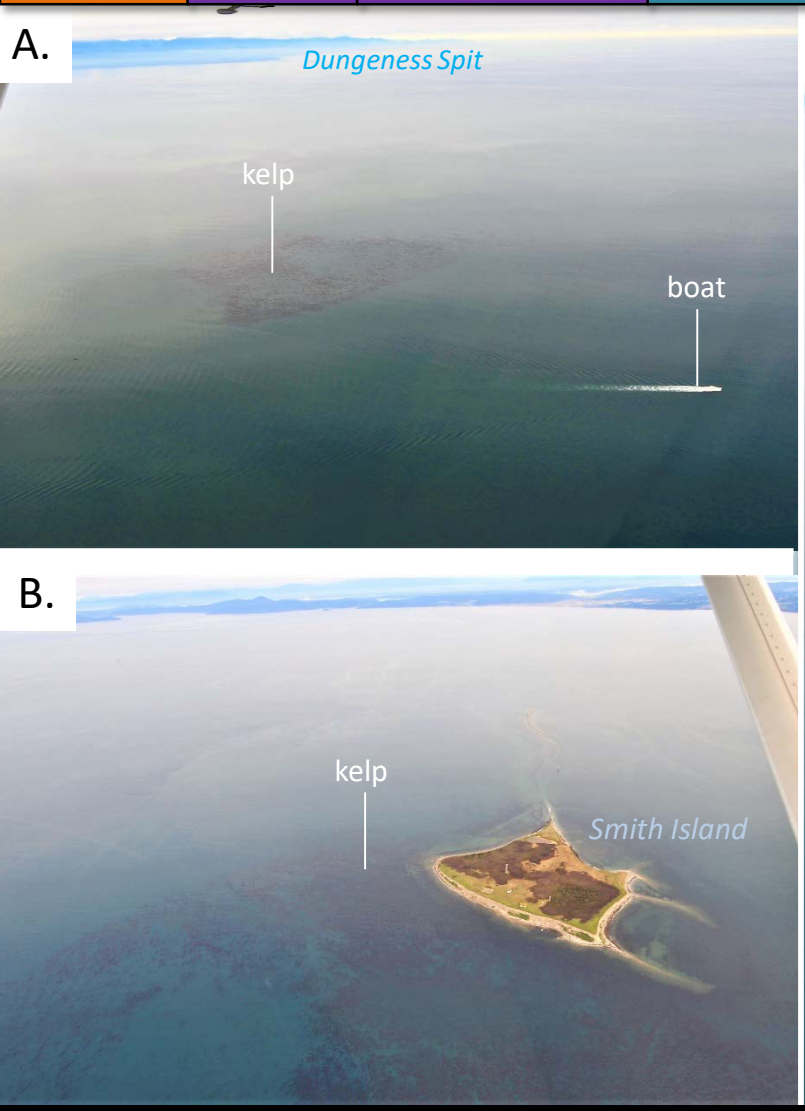
Kelp bed west of Polnell Point

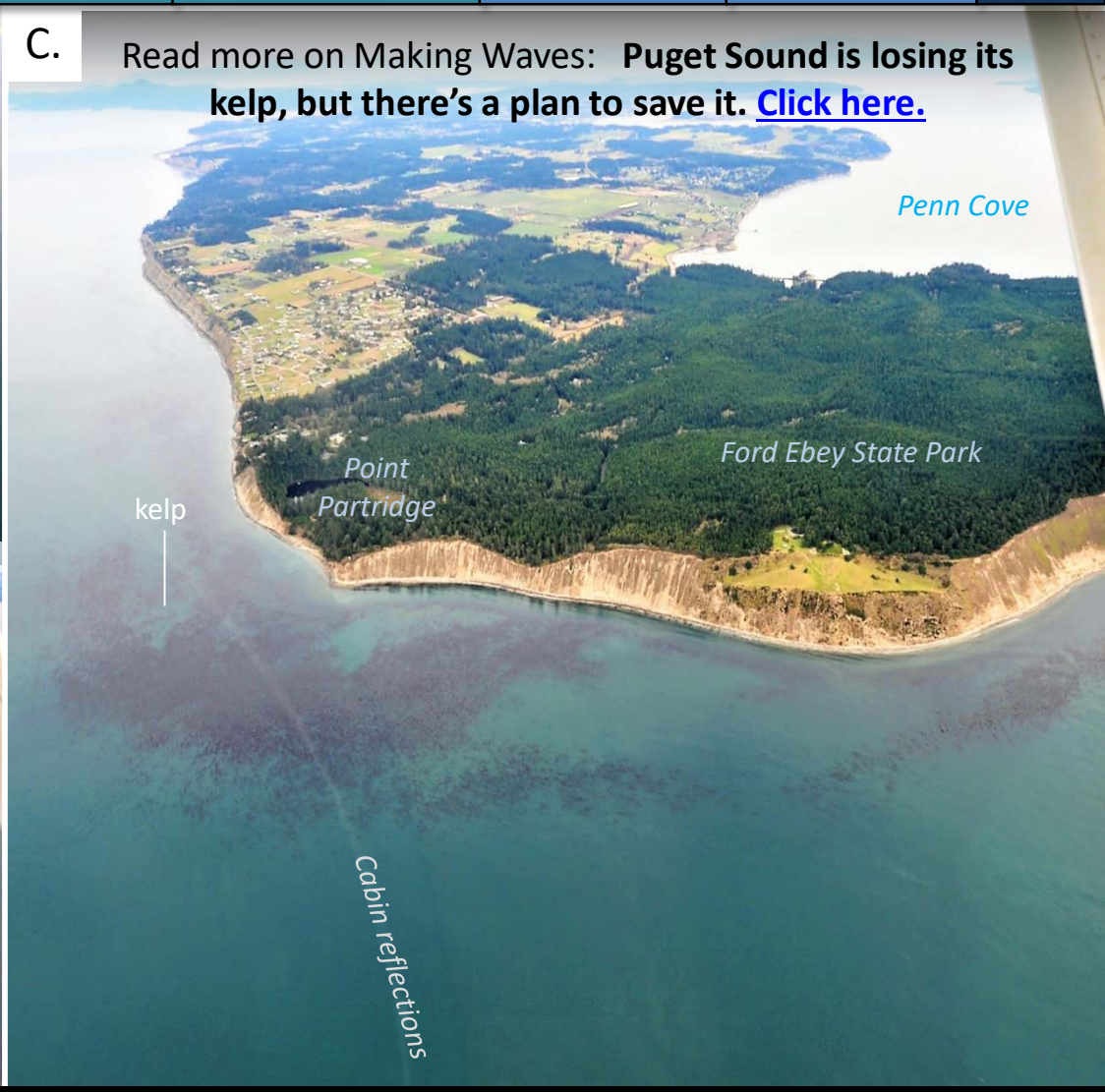
Location: *Crescent Harbor* (Whidbey Basin), 12:09 PM

Aerial photography 10-26-2020

Samish River plume containing suspended sediment hugging the northern shores of Samish Island.

Location: Samish Island (North Sound), 12:21 PM

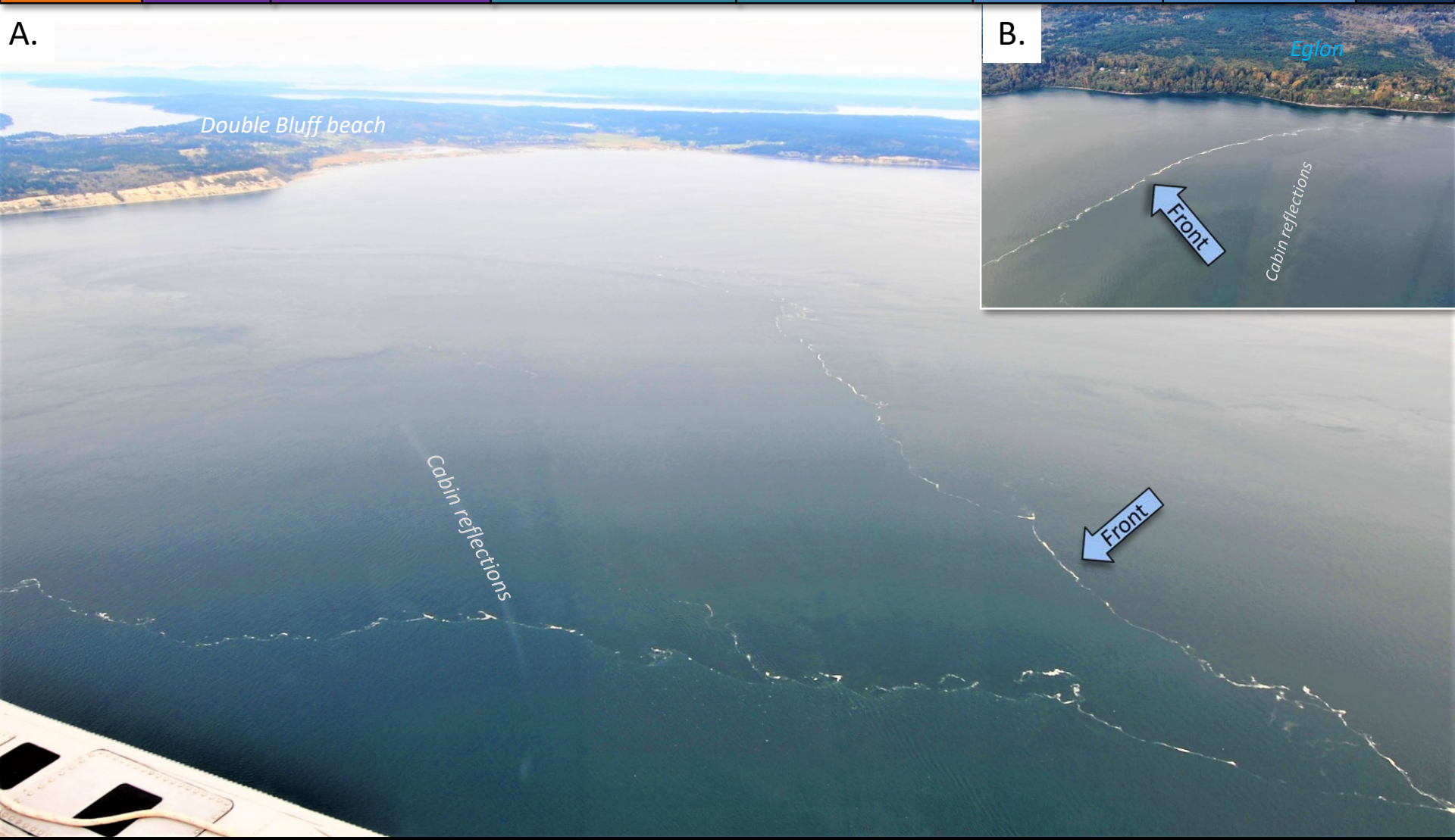




A. Visible kelp beds in open water (shallow). B. Kelp beds near Smith Island. C. Kelp beds off Point Partridge

Location: Strait of Juan de Fuca (North Sound), 12:50 PM

Aerial photography 10-26-2020



A. Looking east, surface debris accumulating along tidal fronts in northern Central Basin. B. looking West.
Location: Skagit Bay (Central Sound), 1:04 PM

Aerial photography 10-26-2020

Urban waterways, Salmon Bay is clear no oil sheen.

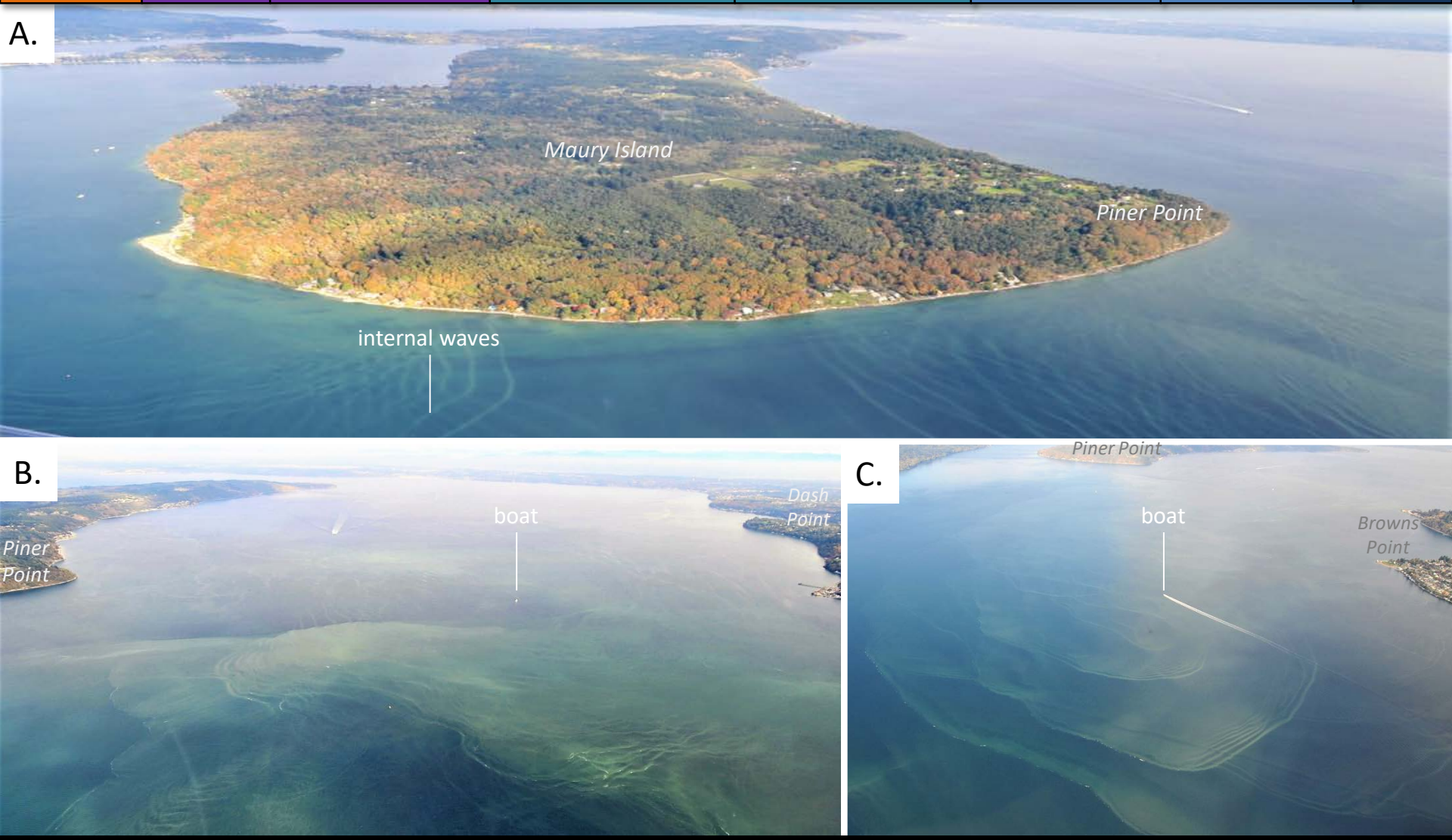
Location: Seattle (Central Sound), 1:17 PM

Aerial photography 10-26-2020

Large container ship creating huge breaking wake and traveling fast.
Location: Vashon island (Central Sound), 1:23 PM

Three different glacial-fed estuaries. A. The urbanized Puyallup river estuary. B. The north fork of the Skagit river. C. the Nisqually River and its national wildlife refuge. Location: A. Tacoma, B. La Conner, C. Lacey

Aerial photography 10-26-2020



Glacial flour and internal waves create interesting patterns and processes

Location: Henderson Inlet (Central Sound) 1:30 PM

Aerial photography 10-26-2020

Edge of the Nisqually River plume carrying glacial flour.
Location: Entrance to Carr Inlet (South Sound) 1:36 PM

Aerial photography 10-26-2020

Fading bloom in Oro Bay

Location: Anderson Island (South Sound) 1:39 PM

Aerial photography 10-26-2020

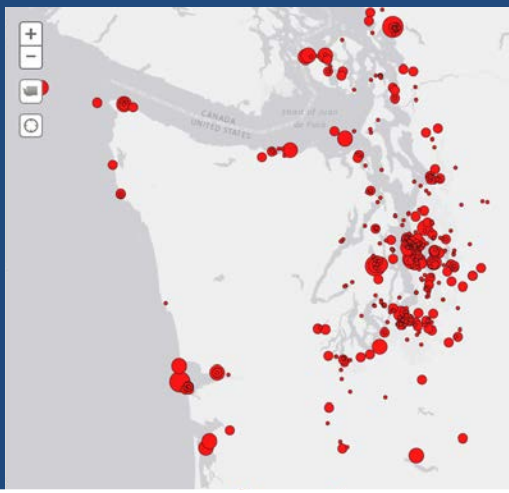
A. 11:50 AM

Reported spills from July 2015 –March 2020

Many small spills go unnoticed.
Help us fill the gap.

Explore Ecology's Spill Map to study spills in our region.

Click to go to page



B. 1:15 PM

C. 11:29 AM

Various oil sheens. A. Northern Hood Canal, B. Off West Point, Seattle, C. near Poulsbo Yacht Club, Liberty Bay

A.

Tramp Harbor with sulphur smell and dead clams in October (Karlista Rickerson)

B.

Tramp Harbor, *Protoceratium reticulatum* bloom in August (Karlista Rickerson)

C.

Noctiluca cells off Fairhaven in August, 2018 (Mark Konikoff)

D.

Chuckanut Bay, Bellingham Bay, 8/4/2020 (Steve Tuckerman)

E.

Chuckanut Bay, Bellingham Bay, 10/26/2020 (EOPS)

Contributions by observers on the water and beaches during summer 2020. E. Chuckanut Bay on 10/26/2020

We have published 88 editions!

Find all previous Eyes Over Puget Sound editions at the end of this document.

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.

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Marine monitoring Unit
Environmental Assessment Program
Washington State
Department of Ecology

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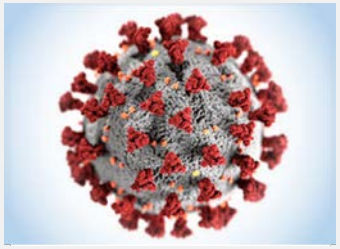

No coverage due to COVID-19 pandemic from April-September

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Jan_10_2020,
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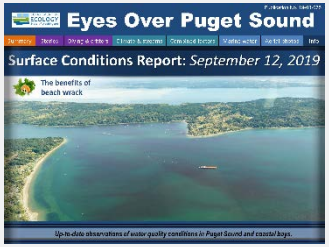
Publication No. 19-03-076



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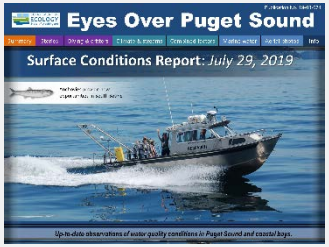

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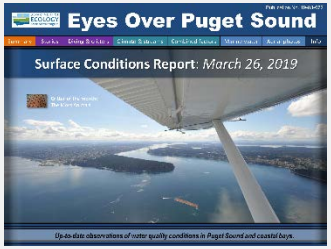

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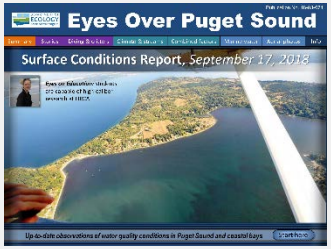

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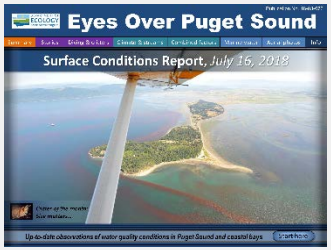

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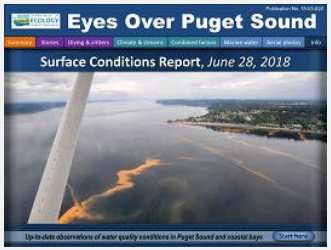

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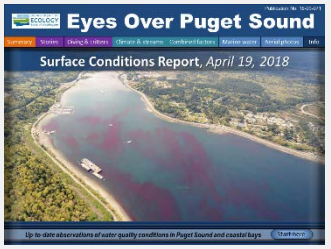

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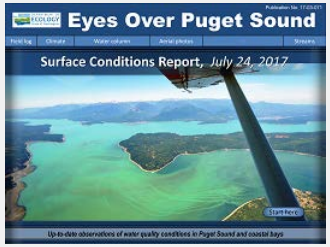

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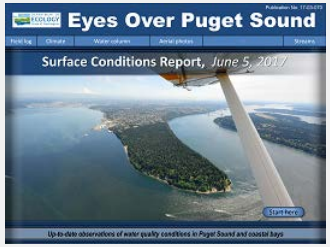

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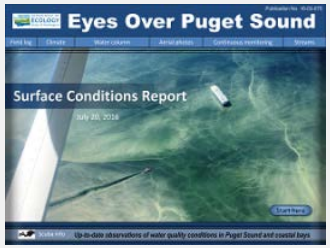

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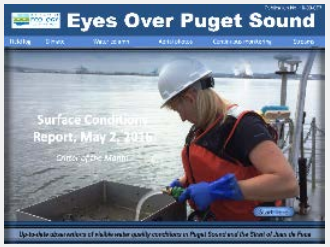

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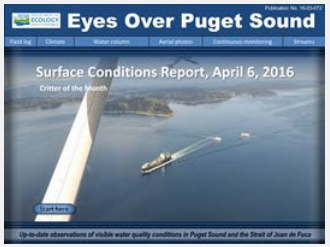

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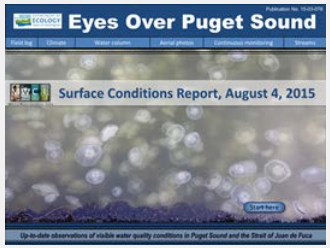

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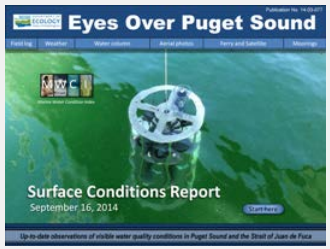

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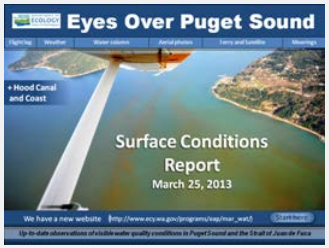

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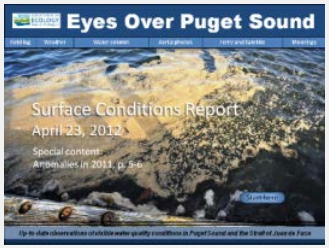

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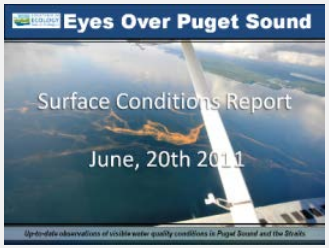

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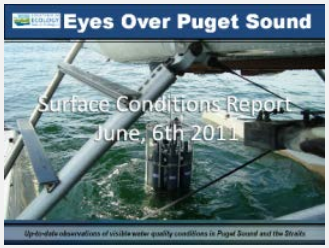

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