Publication No. 11-03-078

DEPARTMENT OF ECOLOGY State of Washington

Eyes Over Puget Sound

Click to navigate

Surface Conditions Report
August 8, 2011

Up-to-date observations of visible water quality conditions in Puget Sound and the Strait of Juan de Fuca

At a glance

Conditions:

At a glance

Personal flight impression 8-8-2011

Mya and Laura in the field

A Kaleidoscope of Color

Wake of a boat in Budd Inlet

Marine Flight 4 (South)

The South Sound flight took place on an overcast August day, but we were thankful that the weather was at least warm.

The flight started off uneventful until we reached Commencement Bay in Tacoma. We can never predict what the Puyallup River plume will look like, and today it was striking!

The color of the water was a light, seafoam green color, and it formed streaks against the clear blue Sound water. The three of us in the plane were trying to describe this unique color, and were laughing about names. Our favorite was "glacial mint."

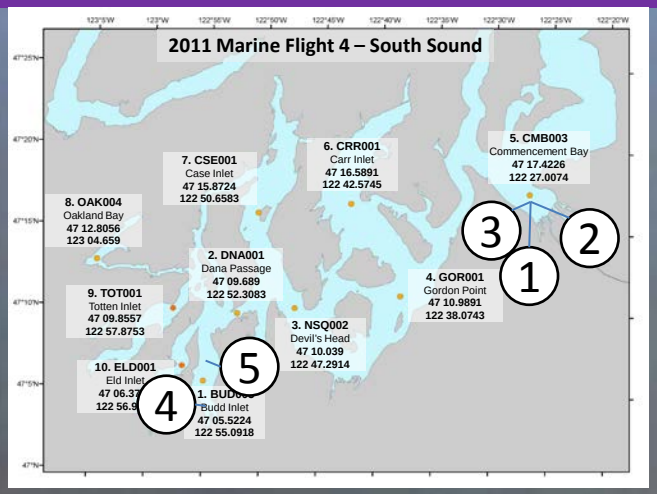
We caught red Lion's Mane jellyfish tentacles on our CTD which made for interesting sampling. On our way back to Olympia, Budd Inlet was very red and brown with algal blooms. We found ourselves wishing that we had a field microscope in order to look at a sample.

Overall, the flight was a success, and visually a kaleidoscope of colors.

At a glance

Personal flight impression 8-8-2011

River discharge in Commencement Bay



Station map in South Sound (Flight 4)

Unloading the plane in red-brown Budd Inlet

Totten Inlet - CTD in middle of jellyfish swarm & Glacial runoff in Commencement Bay

Lion's mane jellyfish tentacles on CTD

Boat moving through bloom in Budd Inlet

Aerial photography Summary 8-8-2011

Comment: Extensive red-brown blooms in South Sound and Quartermaster Harbor; Profuse, extensive, large mats and strands of macro-algae in Central and South Sound.

Red-brown blooms in Budd Inlet

Macro-algae aggregates in Central Basin

Front

Mixing and Fronts:

Dana Passage, Nisqually Reach, Commencement Bay, Central Basin near Port Madison.

Plume

Suspended sediment:

Nisqually Reach, Commencement Bay River plumes

Bloom

Visible blooms:

Brown-red: Budd Inlet, Henderson Inlet, Squaxin Passage, Quartermaster Harbor,

Green: Carr Inlets, Oro Bay (Anderson Island), Quartermaster Harbor.

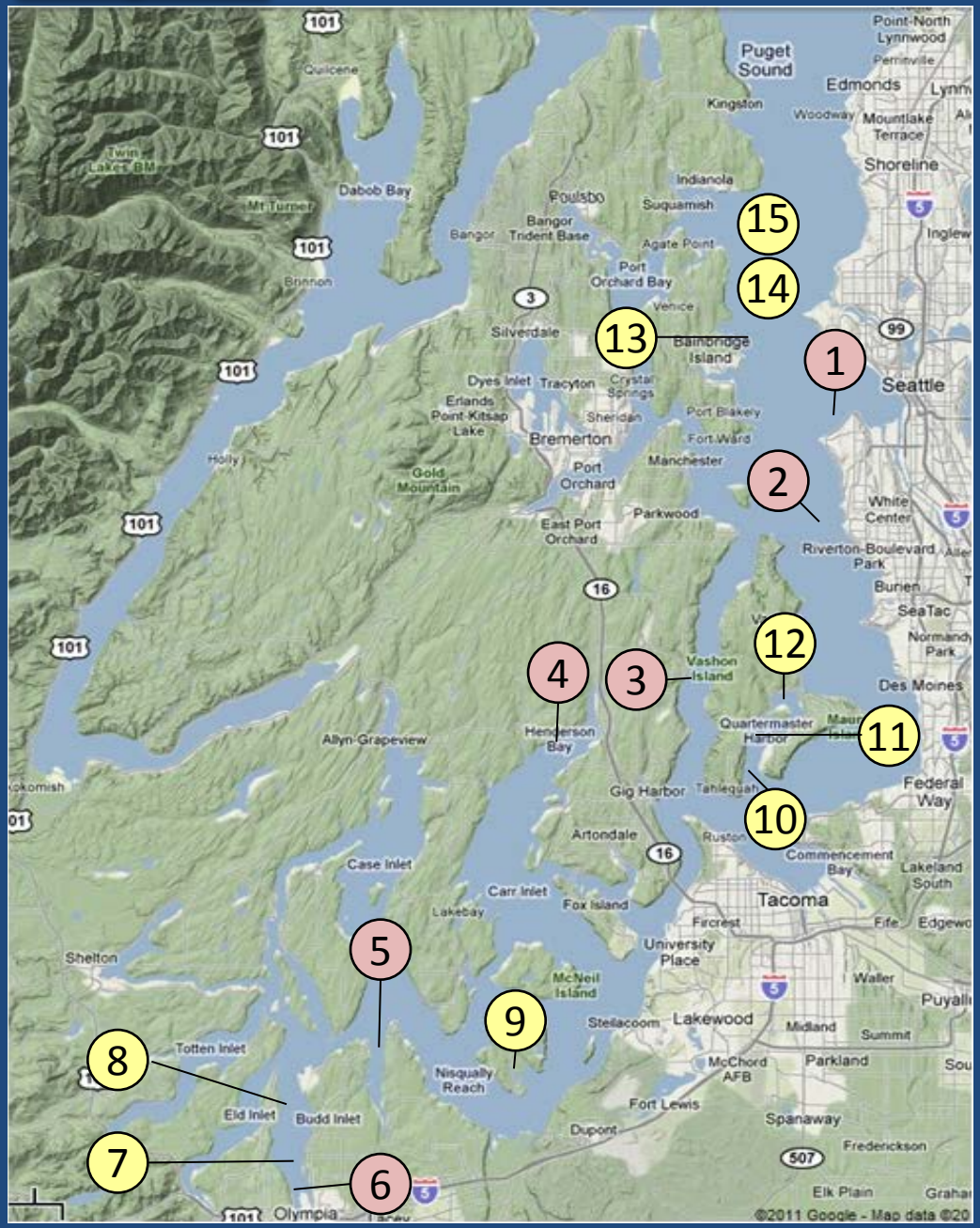
Turquoise : Budd Inlet and Squaxin Passage.

Debris

Debris *(mainly associated with macro-algae mats):*

Extensive filaments and multiple patches in South Sound – Budd- , Carr Inlet, Colvos Passage, and large areas of Central Sound

At a glance



Aerial Photography Image Guide

8-8-2011

Click on numbers

- Morning Flight
- Evening Flight

Flight Information:

Morning flight:
Low clouds, altitude 1500ft, no wind
(visibility limited, dark)

Evening flight:
Intermittent cloud cover
Visibility limited , altitude 2500ft

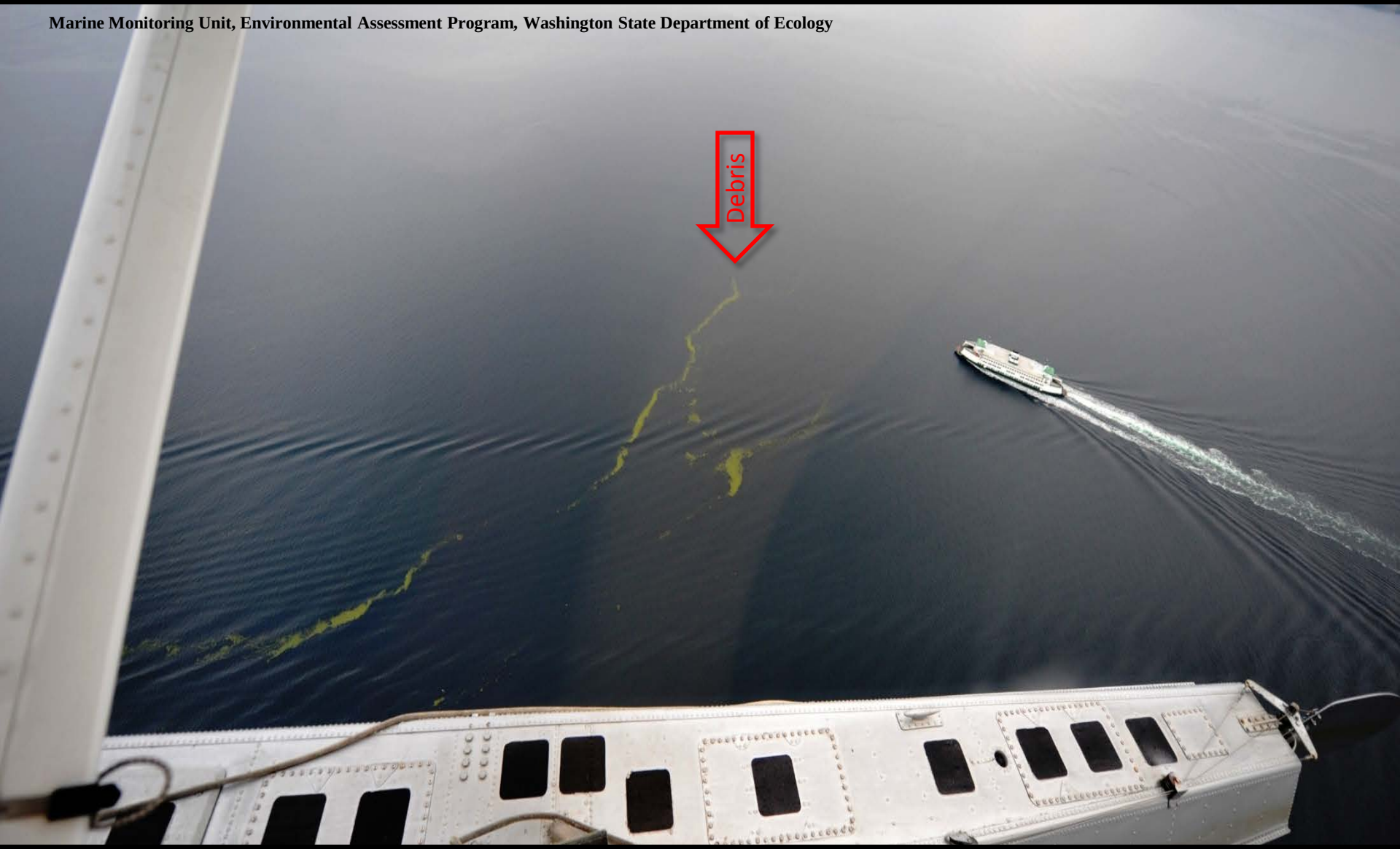
Observational maps Central Sound

Observational maps South Sound

Aerial photography

Back to map

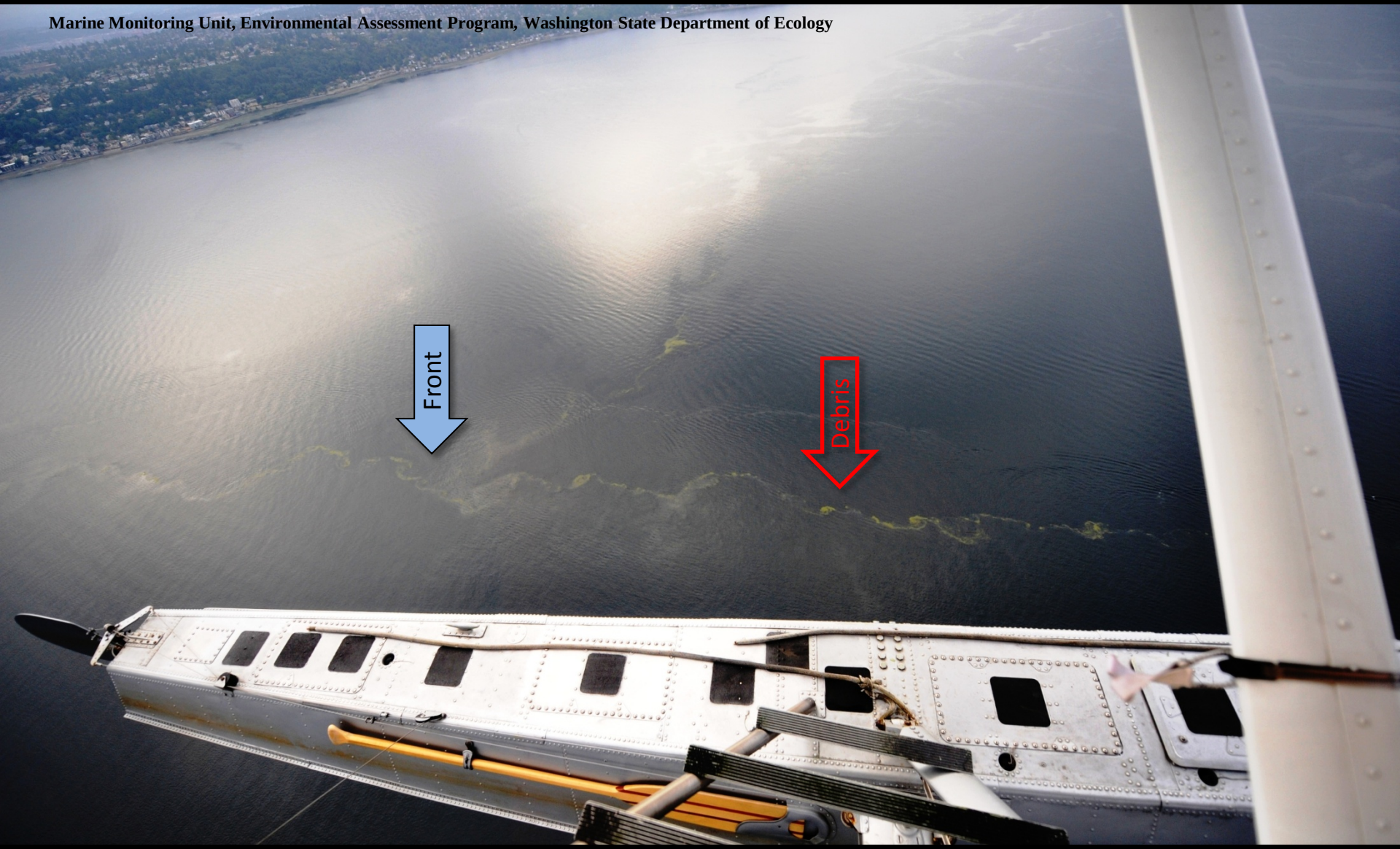
Marine Monitoring Unit, Environmental Assessment Program, Washington State Department of Ecology



Macro-algae patches. Location: Off Alki Point, Seattle (Central Basin), 8: 48 AM

Aerial photography

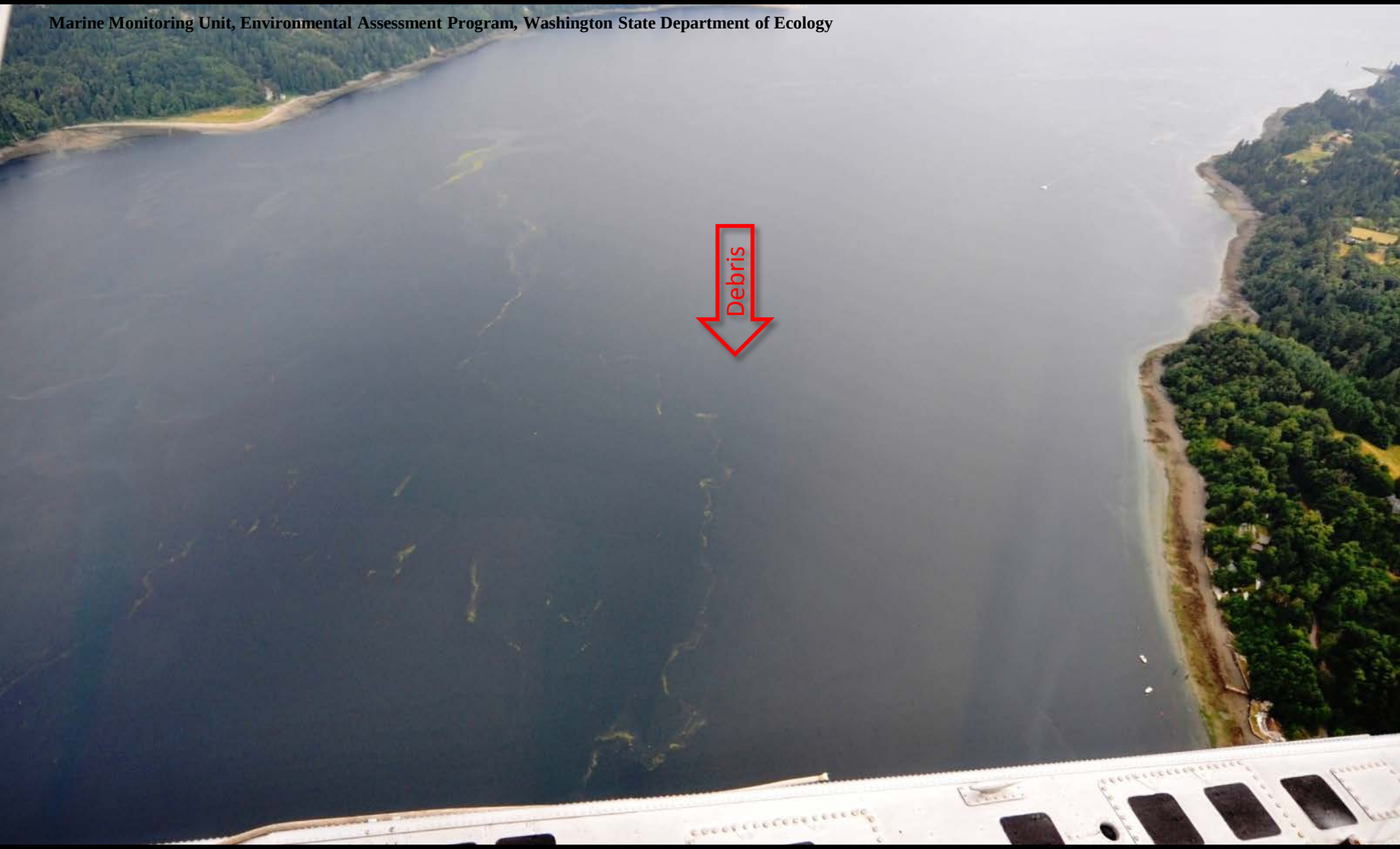
Back to map



Macro-algae patches. Location: North of Vashon Island (Central Basin), 7:45 AM

Aerial photography

Back to map



Macro-algae patches. Location: Colvos Passage (West of Vashon Island), 8:56 AM

Aerial photography

Back to map

Marine Monitoring Unit, Environmental Assessment Program, Washington State Department of Ecology

Macro-algae filaments. Location: Northern Carr Inlet (South Sound), 9:00 AM

Aerial photography

Back to map

Red-brown and turquoise bloom. Location: Henderson Inlet (South Sound), 9:11 AM

Aerial photography

Back to map

Red-brown and turquoise blooms. Location: Budd Inlet (South Sound), 9:19 AM

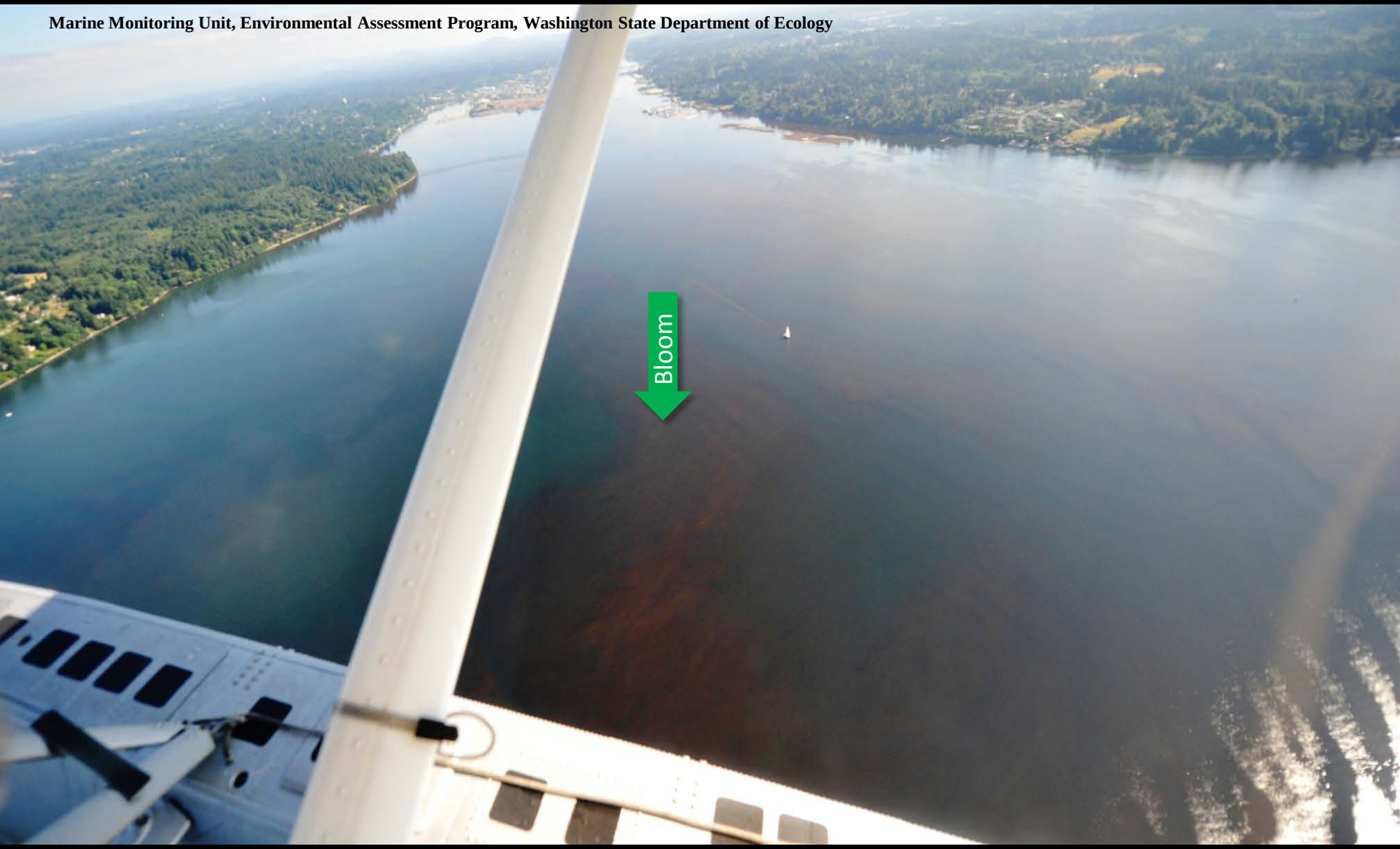
Aerial photography

Back to map

Red-brown bloom. Location: Budd Inlet, Olympia (South Sound) , 4:17 PM

Aerial photography

Back to map



Red-brown bloom. Location: Budd Inlet, Olympia (South Sound) , 4:18 PM

Aerial photography

Back to map

Turquoise-green bloom. Location: Oro Bay, Anderson Island (South Sound), 4:28 PM

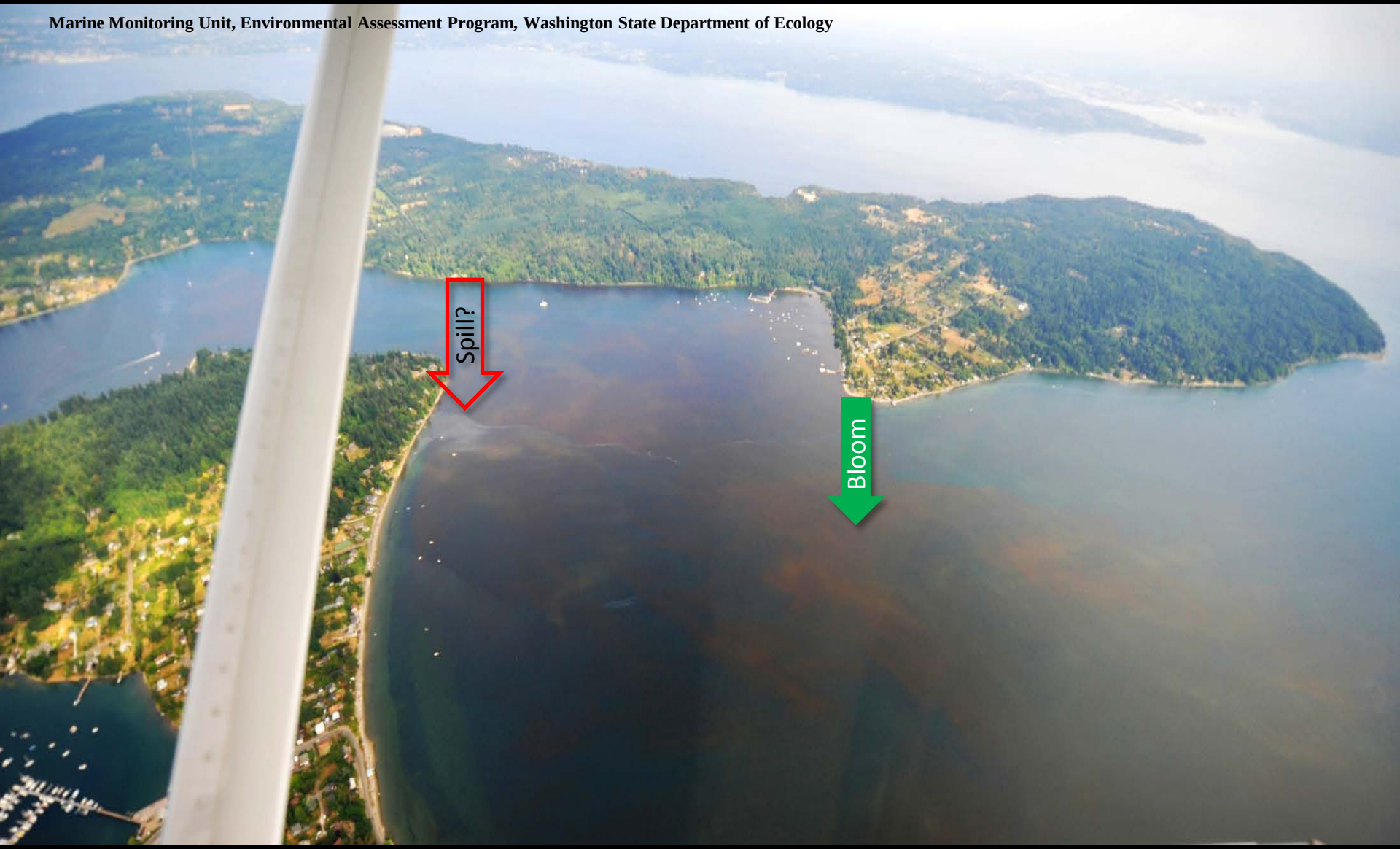
Aerial photography

Back to map

Red-brown bloom. Location: Quartermaster Harbor (Vashon Island), 4:32 PM

Aerial photography

Back to map



Red-brown bloom. Location: Quartermaster Harbor (Vashon Island), 4:32 PM

Aerial photography

Back to map

Red-brown and green blooms. Location: Quartermaster Harbor (Vashon Island), 4:32 PM

Aerial photography

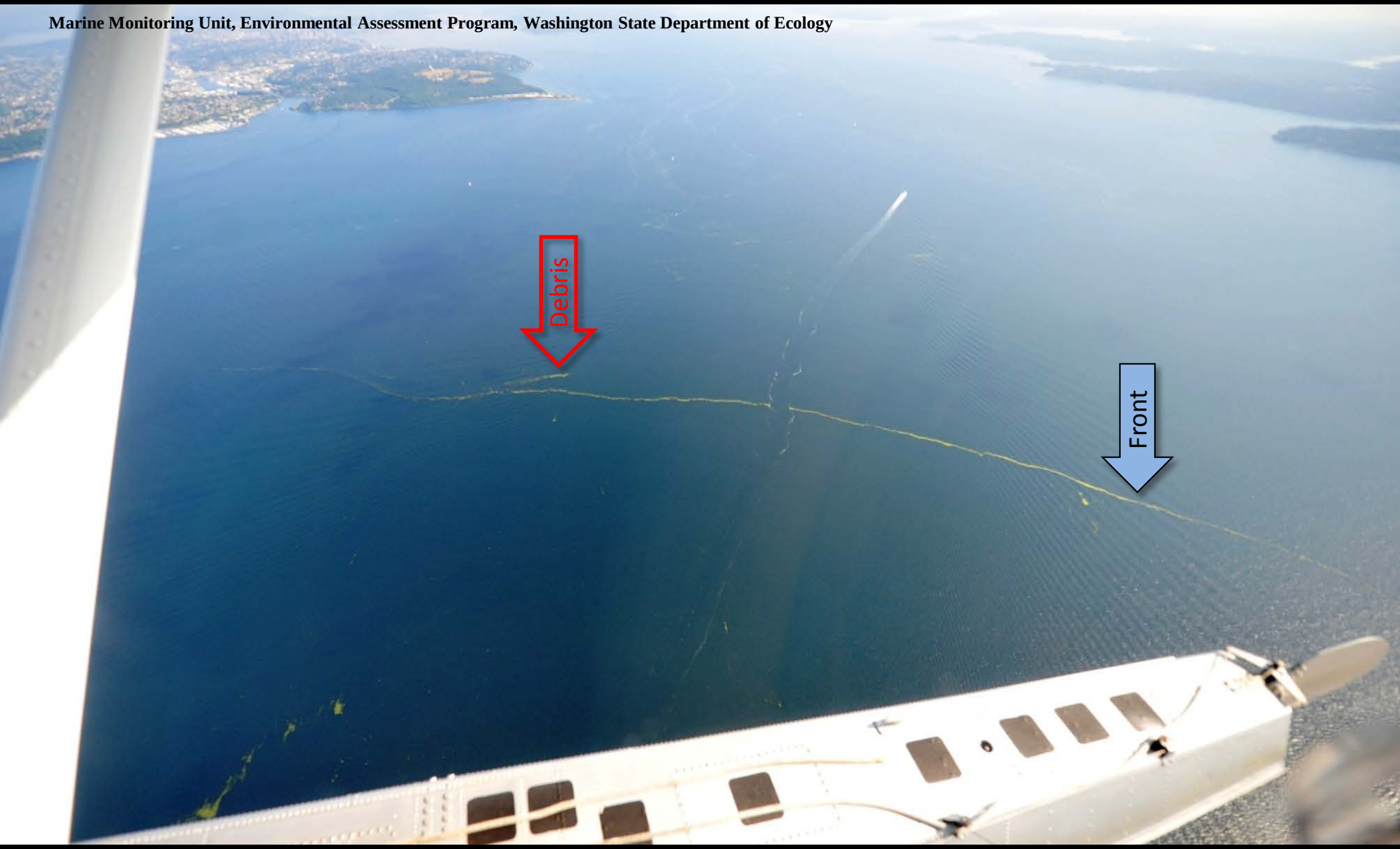
Back to map

Macro -algae aggregates. Location: East Bainbridge Island (Central Sound), 4:46 PM

Aerial photography

Back to map

Marine Monitoring Unit, Environmental Assessment Program, Washington State Department of Ecology



Macro -algae aggregates. Location: North of Shillshole, Seattle (Central Sound), 4:46 PM

Aerial photography

Back to map

Macro-algae aggregates. Location: Port Madison, Bainbridge Island (Central Sound), 4:47 PM

At a glance

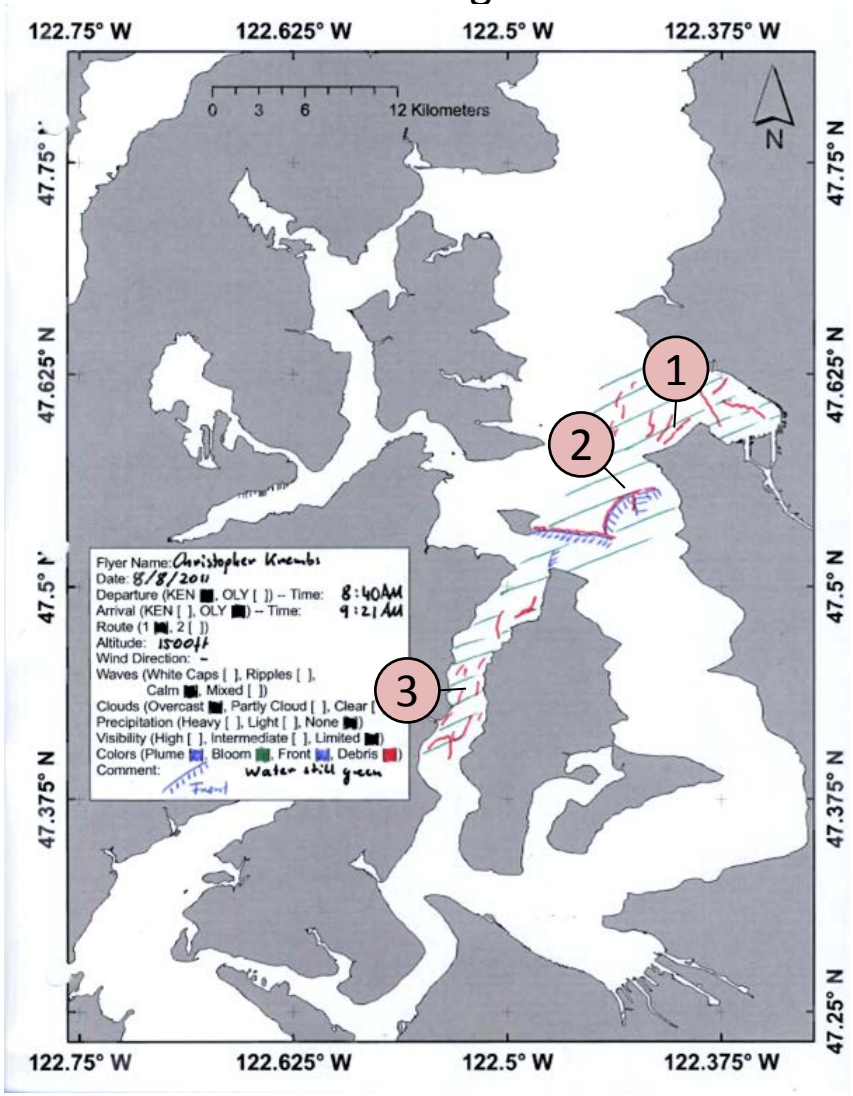
Aerial Photography

Observations in Central Sound: 8-8-2011

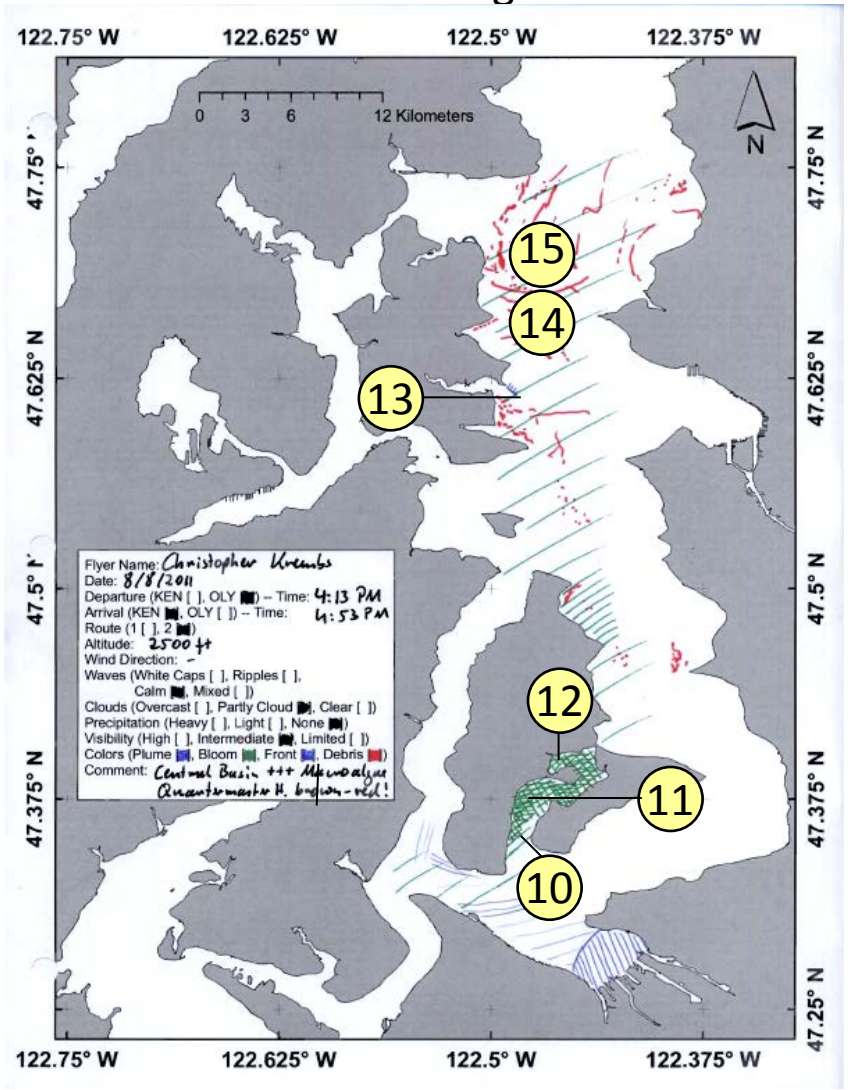
Back to map

Numbers on map refer to picture numbers for spatial reference

Morning



Evening



At a glance

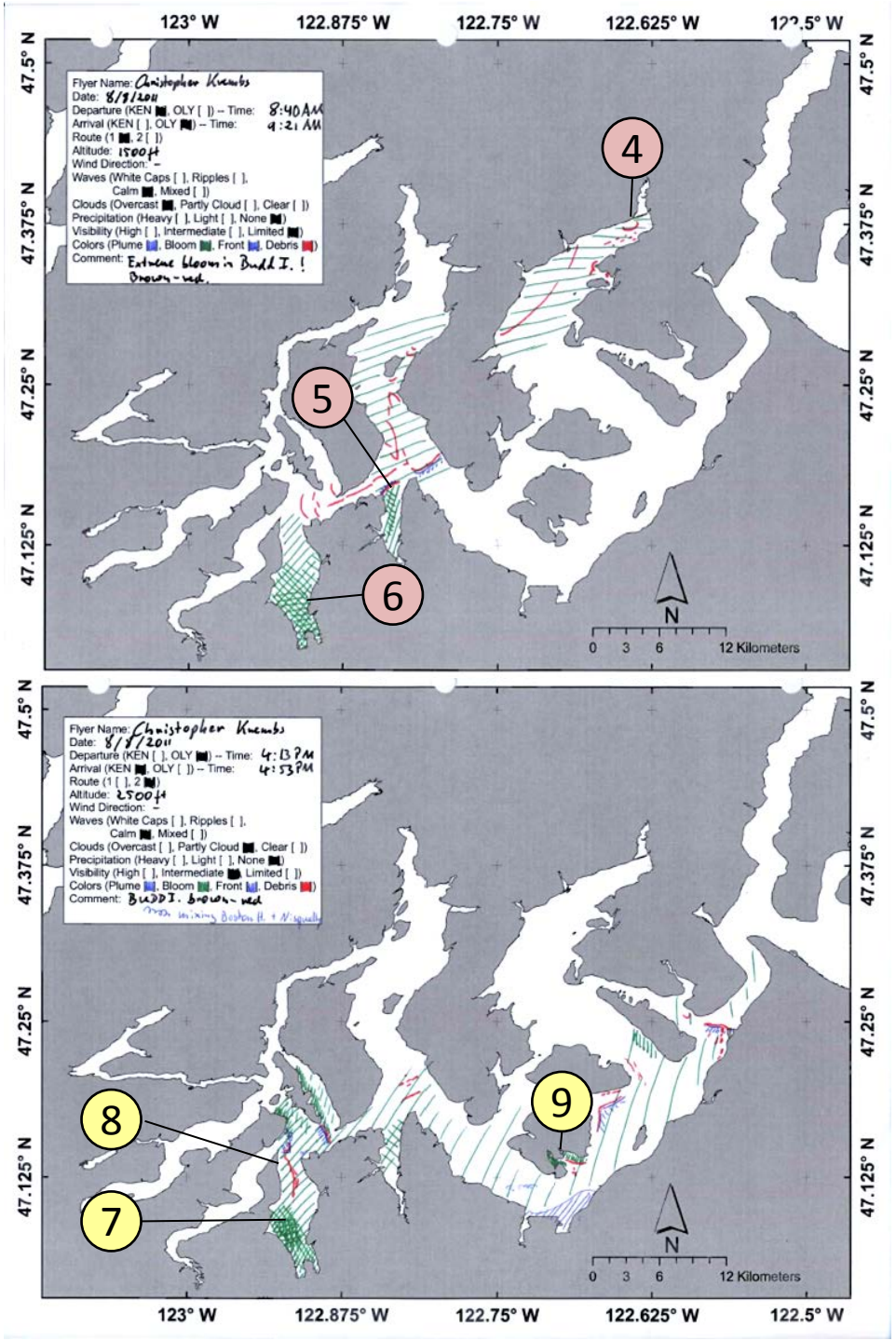
Back to map

Aerial Photography

Observations in South Sound: 8-8-2011

Morning

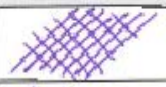
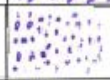
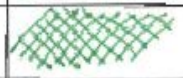
Evening



Numbers on map refer to picture numbers for spatial reference

At a glance

Legend to map annotations

Plumes	
• Freshwater with sediment **solid**	
• Freshwater with sediment **dispersed**	
• Coastal erosion with sediment	
Blooms	
• Dispersed	
• Solid	
Debris	
• Dispersed	
• Solid	
Front	
• Distinct water mass boundaries	
• Several scattered	

Comments:
Maps are produced by observers during and after flight and intended to give an approximate reconstruction of surface conditions on scales that connect to and overlap with satellite images in the following section.

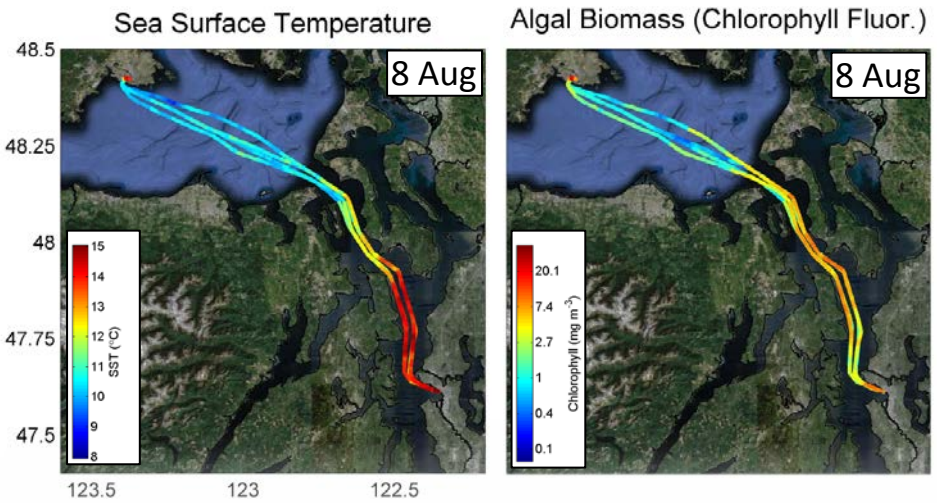
Daily Ferry and Satellite observations in Central Sound, 8-8-2011

At a glance

DEPARTMENT OF ECOLOGY State of Washington

Contact: brandon.sackmann@ecy.wa.gov

MERIS True Color image used for spatial context (19 February 2011). Image is not coincident with ferry data shown on right



Current Conditions: Latest bloom in Central Sound shows signs of fading as waters begin to clear; surface temperatures in Central Sound range from 14-15 °C and 10-11 °C in Strait of Juan de Fuca.

--- Daily 'Quick-Look' Products Available ---

(http://www.ecy.wa.gov/programs/eap/mar_wat/eops/clipper.html)

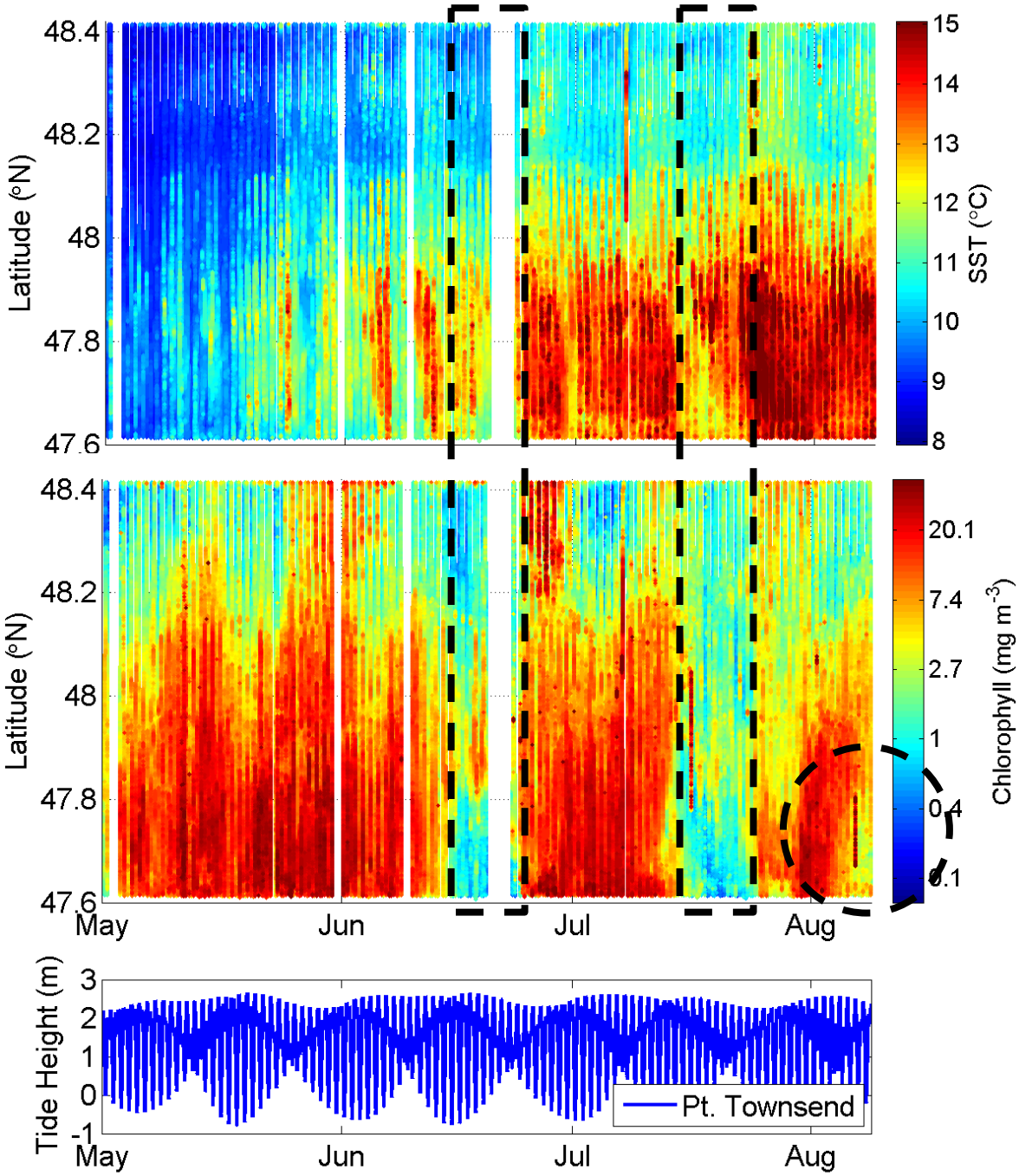
At a glance

Victoria Clipper

Latest algae bloom in Central Sound begins to fade…

Brief *clearing* of Central Sound waters in mid-June and mid-July (i.e., reduced fluorescence and turbidity); associated with cooler surface temperatures and lower percent oxygen saturation (next page).

Similar bloom pattern observed in summer 2010…



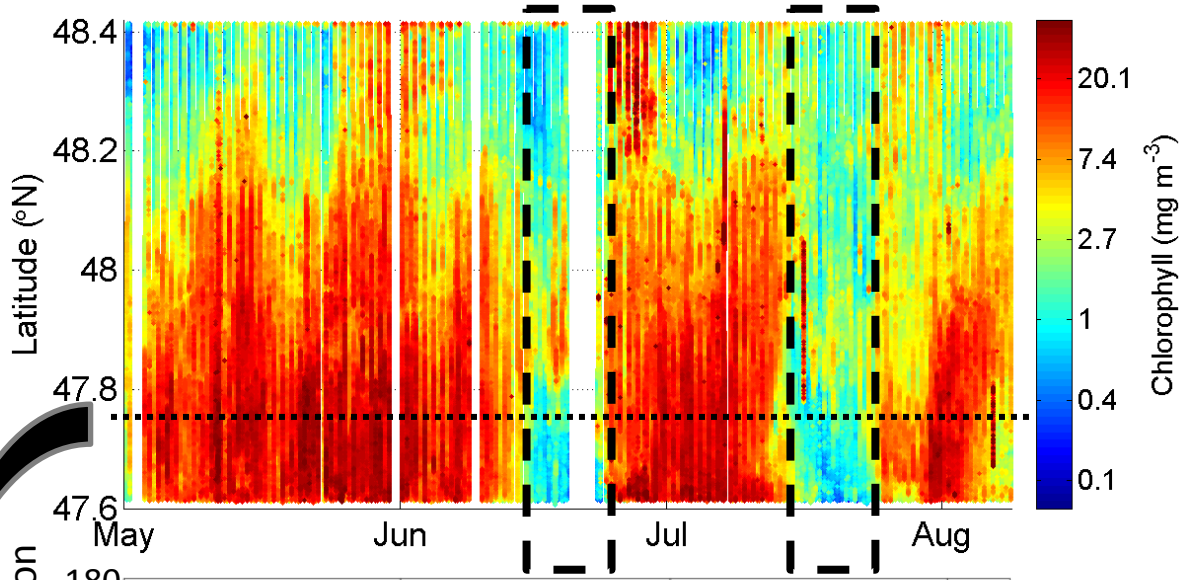
At a glance

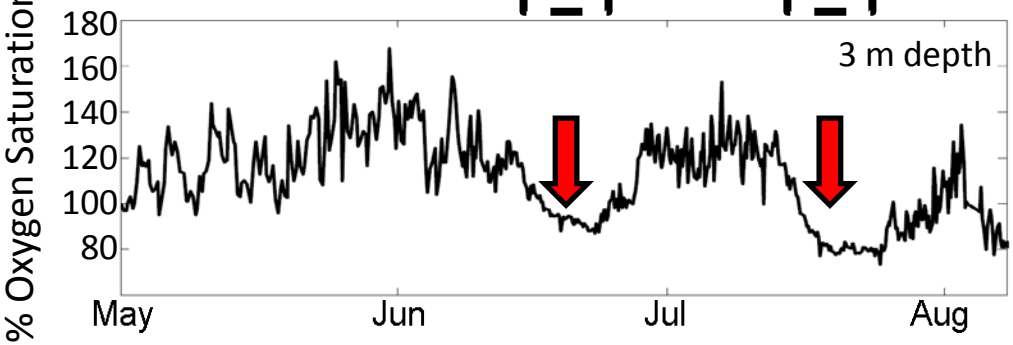
Victoria Clipper

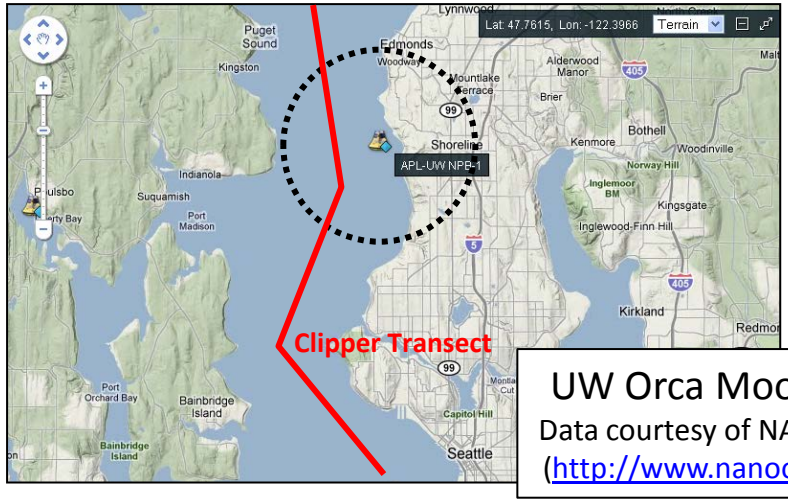
Latest algae bloom in Central Sound begins to fade…

Brief *clearing* of Central Sound waters in mid-June and mid-July (i.e., reduced fluorescence and turbidity); associated with cooler surface temperatures (prev. page) and lower percent oxygen saturation.

Chlorophyll fluorescence is a sensitive indicator of near-surface biological processes…







UW Orca Mooring
Data courtesy of NANOOS
(http://www.nanoos.org)

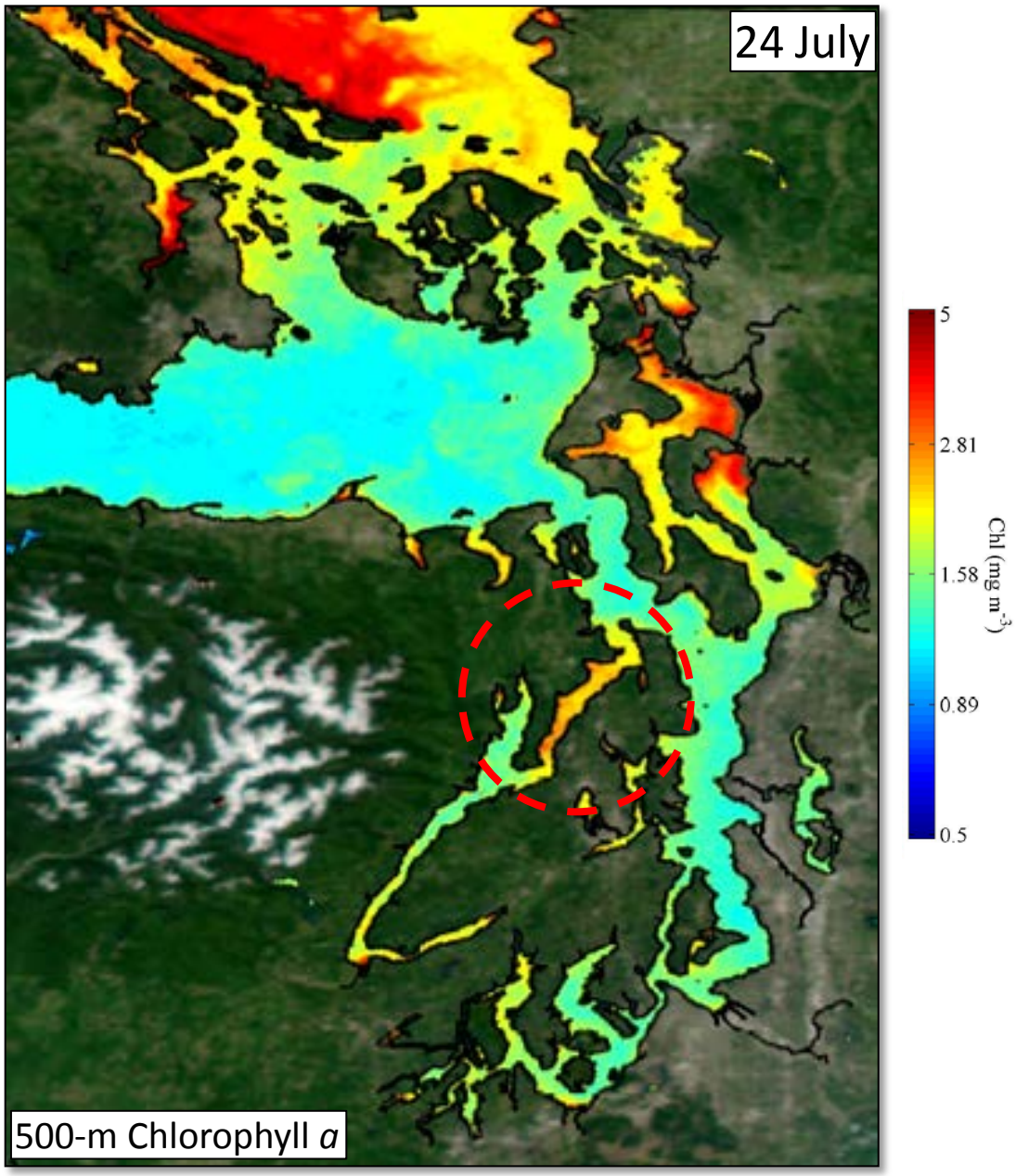
At a glance

High Resolution Products for MODIS-Aqua and MODIS-Terra

Products Under Evaluation:

Quasi-250-m True Color
500-m Chlorophyll *a*
250-m Turbidity Proxy
(remote sensing reflectance at 645 nm)

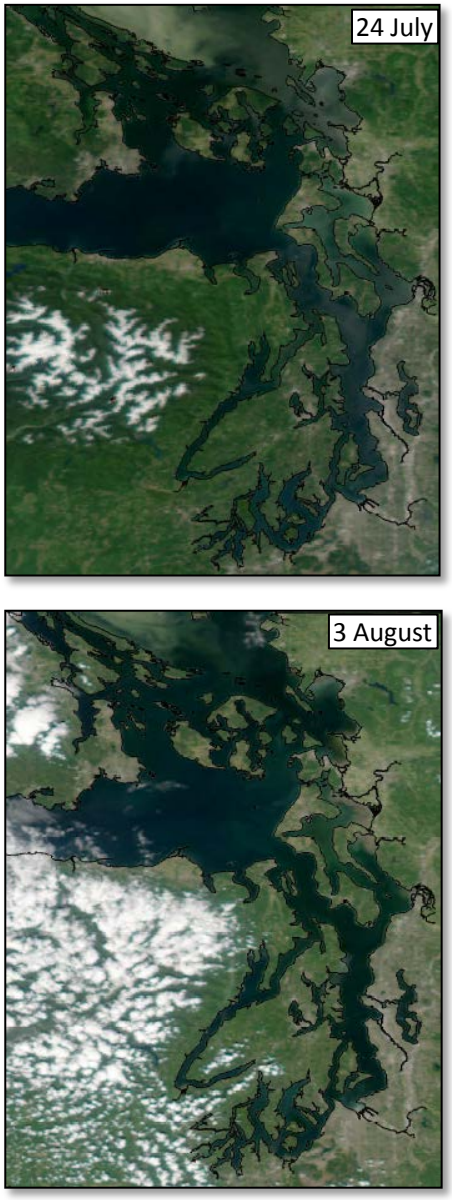
Multiple MODIS-Aqua and MODIS-Terra images showed a phytoplankton bloom in northern Hood Canal in late July…



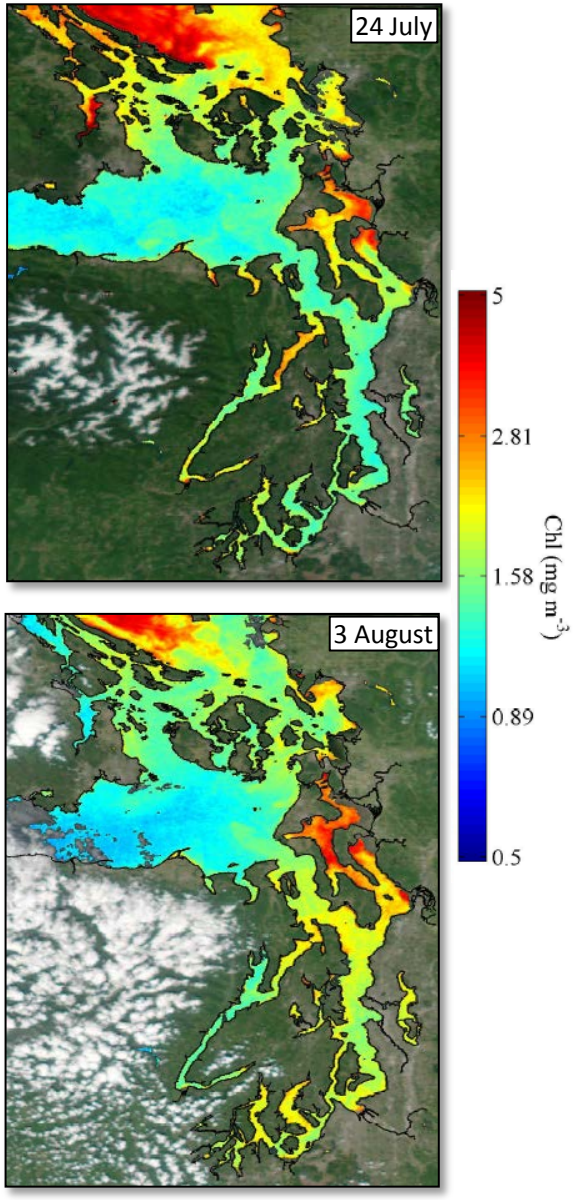
At a glance

High Resolution Products for MODIS-Aqua and MODIS-Terra

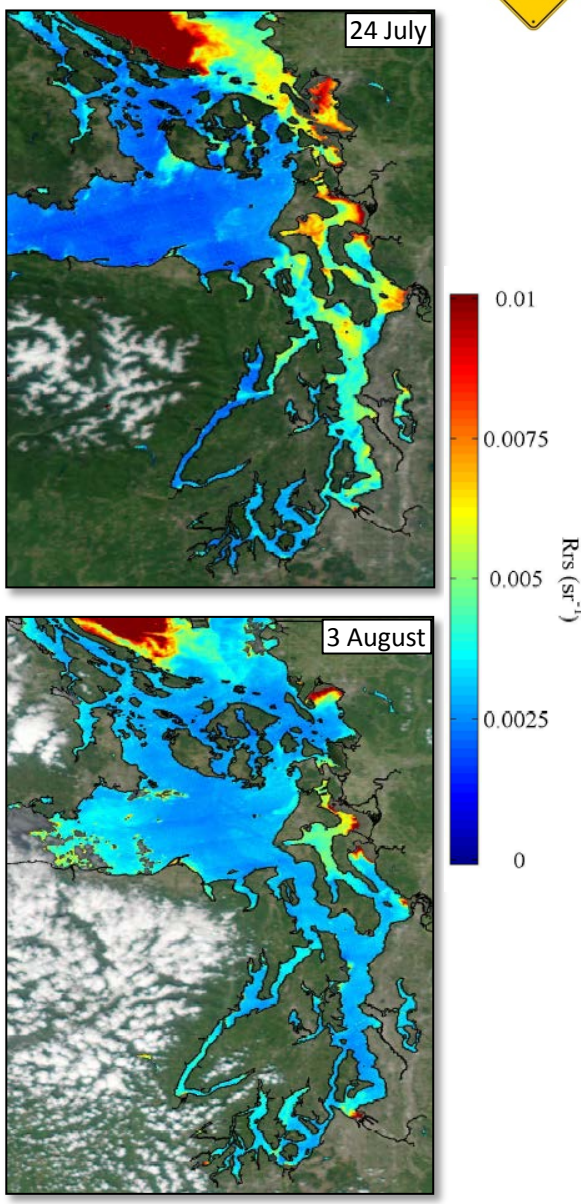
"Quasi-250-m True Color"



"500-m Chlorophyll *a*"



"250-m Turbidity Proxy"



At a glance

Landsat

(30m True Color)

Recreational boaters enjoy a beautiful Saturday afternoon near Tacoma; Puyallup river plume spreads into Puget Sound.

At a glance

Landsat

(120m Thermal Band)

Relative Temperatures:

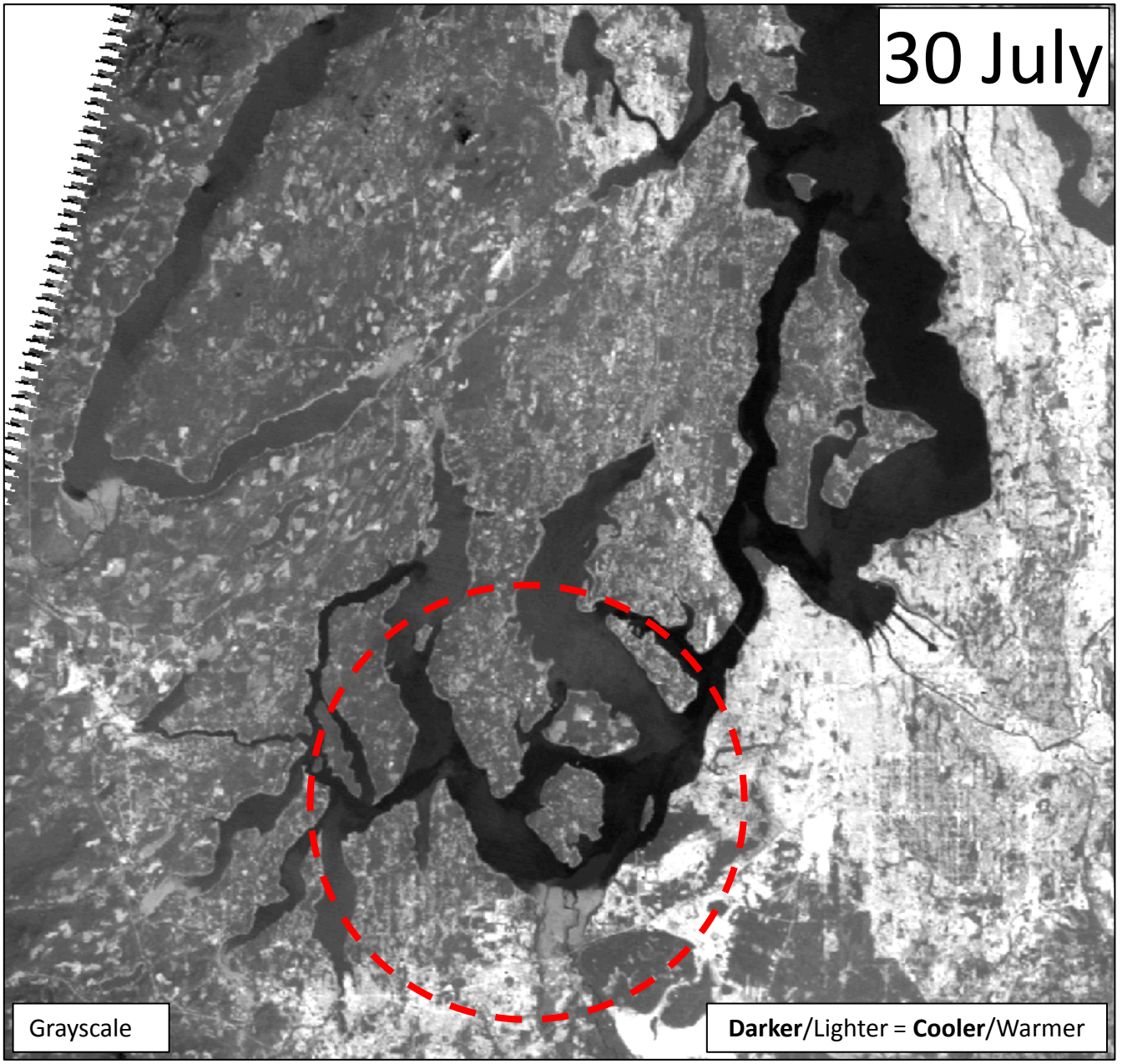
Central Sound ~14 °C

South Sound

- Carr Inlet ~16.5 °C
- Case Inlet ~17.5 °C
- Budd Inlet ~18 °C
- Lynch Cove ~18 °C

(Hood Canal)

Cooler near-surface temperatures help visualize dynamic mixing processes in South Puget Sound…



Mooring observation from 7/25/-8/7/2011

At a glance

DEPARTMENT OF ECOLOGY State of Washington

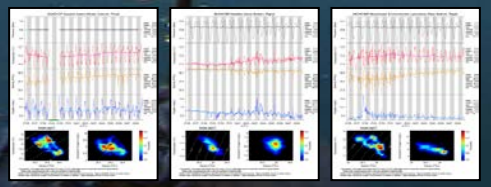
- http://www.ecy.wa.gov/programs/eap/mar_wat/moorings.html

Mukilteo, Whidbey Basin near Everett MUK01BR (14 m): DO mean value was 6.8 dropping 0.9 mg/L from previous two weeks. Salinity mean value was 28.9 PSU. Temperature increased by 0.8 °C with mean daily value of 11.3°C. MUK01SR (0 m): Mean daily salinity values were approximately 25.0 PSU (3.9 PSU less than MUK01BR). The temperature mean value was 13.4°C, increasing by 0.9 °C.

Manchester, Central Sound MCH01BR (11m): DO values mean daily values 8.1 mg/L with sharp peak on 7/28. Salinity mean value was 28.9 PSU, increasing over the last two weeks. Temperature increased slightly with a mean daily value of 12.5 °C. MCH01SR: Salinity mean value was 28.6, increasing by 0.9 PSU. Temperature mean value was 13.1°C, decreasing by 0.9°C.

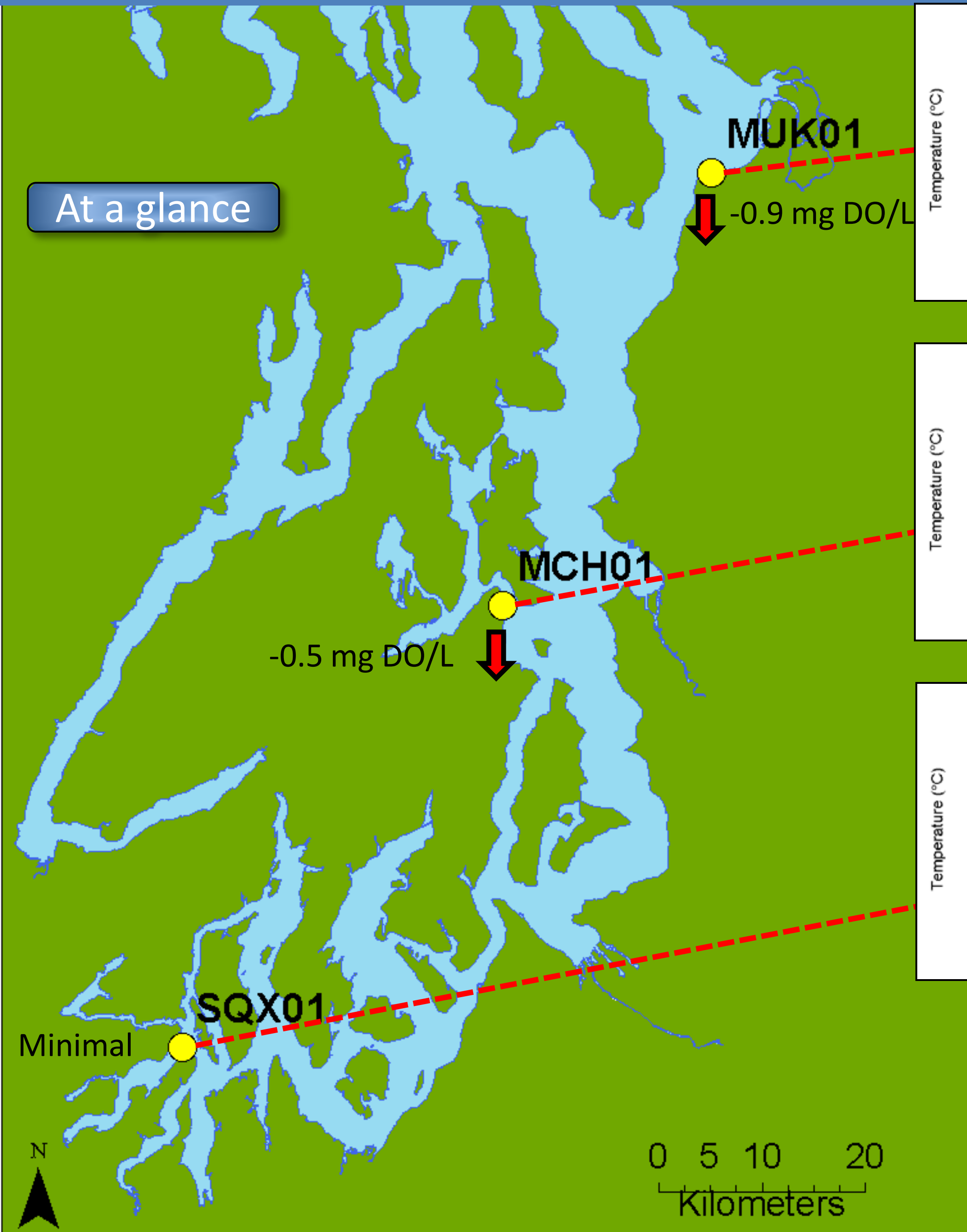
Squaxin Passage (South Sound) near Olympia SQX01CR: Dissolved oxygen mean value observed was 9.0 mg/L, with similar values from the previous two weeks. Salinity increased by 0.2 PSU with a mean daily value of 28.4 PSU. Temperature mean daily value was 15.0°C.

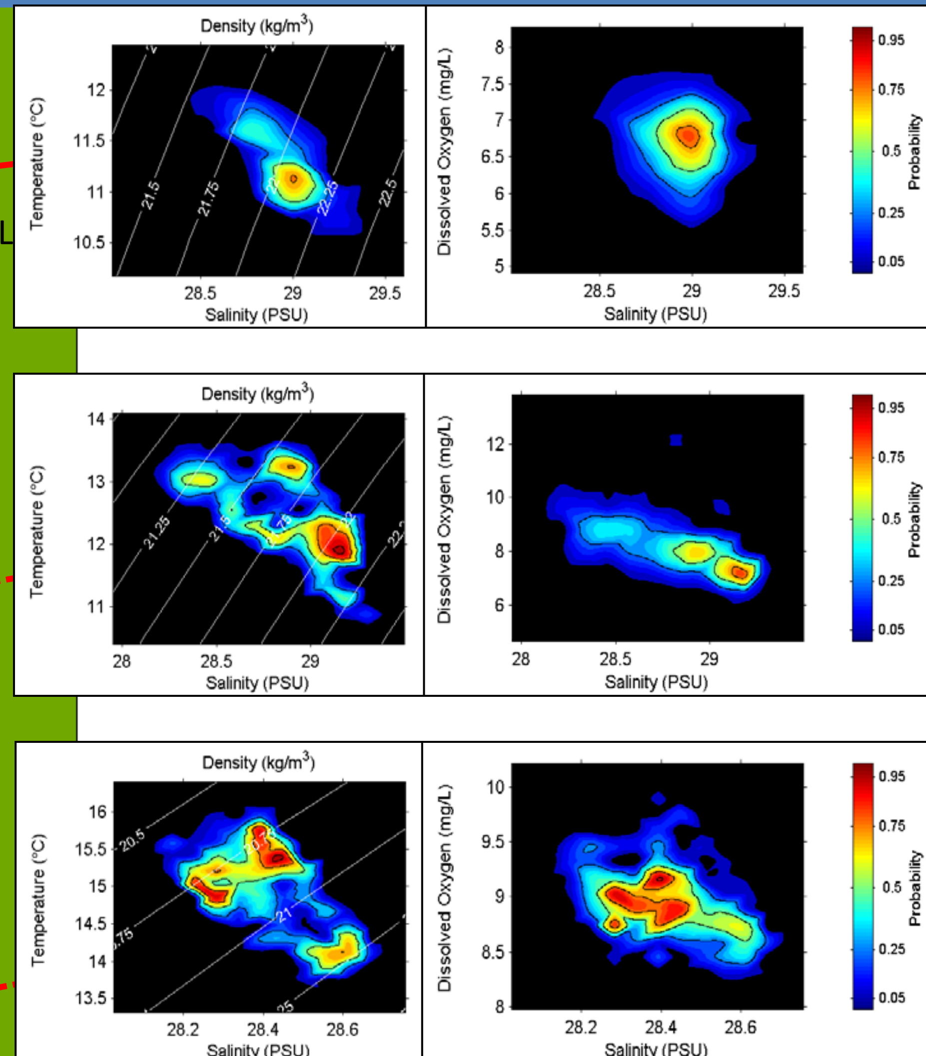
Real-time data now online



SQX01 MUK01 MCH01

Water Masses and DO from our Moorings: 7/25/-8/7/2011





Left Panel: Probability of finding a specific density over the past two-week period. High probability shown in warm colors.

Right Panel: Dissolved oxygen concentration in relation to salinity. High probability shown in warm colors.

At a glance

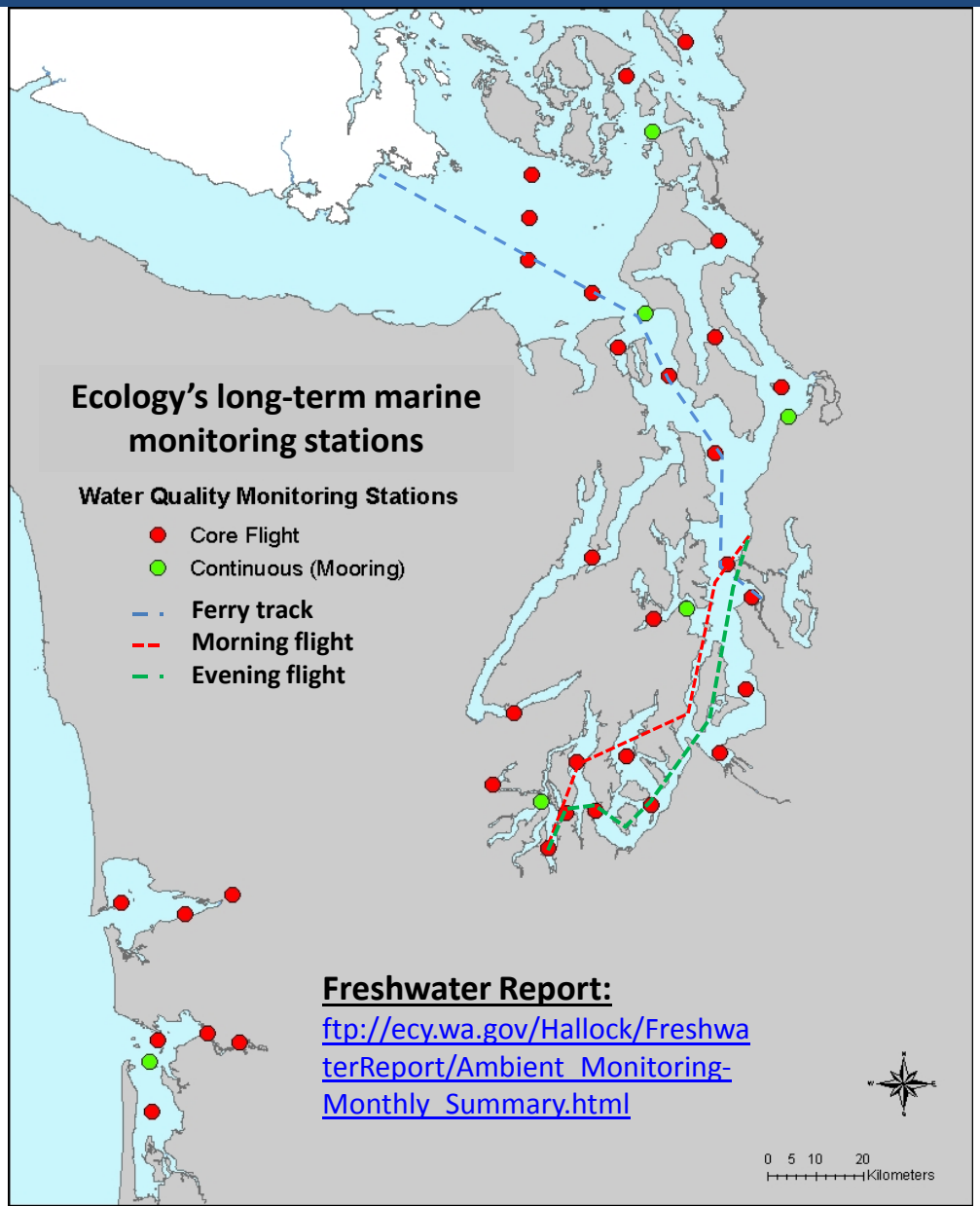
Get your data from Ecology's Environmental Assessment Program

Long – Term Monitoring Network

ftp://www.ecy.wa.gov/eap/Flight_Blog/

Access core monitoring data:

http://www.ecy.wa.gov/apps/eap/marinewq/mwdataset.asp



Freshwater Report:

ftp://ecy.wa.gov/Hallock/FreshwaterReport/Ambient_Monitoring-Monthly_Summary.html

Real – Time Sensor Network

brandon.sackmann@ecy.wa.gov

Access mooring data:

http://www.ecy.wa.gov/programs/eap/mar_wat/moorings.html

You may subscribe or unsubscribe to the Eyes Over Puget Sound email listserv by going to this link:
http://listserv.wa.gov/cgi-bin/wa?A0=ECOLOGY-EYES-OVER-PUGET-SOUND

At a glance

We are looking for feedback to improve our products.

Dr. Christopher Krembs
ckre461@ecy.wa.gov

Marine Monitoring Unit
Environmental Assessment Program
WA Department of Ecology

Many thanks to our business partners: Clipper Navigation, Swantown Marina and Kenmore Air.