Publication No. 12-03-070

DEPARTMENT OF ECOLOGY State of Washington

# Eyes Over Puget Sound



## Surface Conditions Report

### January 30, 2012

Start here

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

# Marine Conditions from Jan. 30, 2012 at a Glance



LONG-TERM MARINE MONITORING UNIT

*Mya Keyzers*
*Laura Friedenberg*

*Skip Albertson*

*Dr. Christopher Krembs*

*Dr. Brandon Sackmann*

*David Mora*

**Personal flight impression** p. 3-4

January weather remains challenging but new flight plan was successful.

Weather conditions p. 6

Cloudy, slightly warmer-than-average air temperatures, and higher-than normal river flows.

Aerial photography p. 7-26

Freshwater plumes extend far into the waterways. Jellyfish in Budd Inlet persist.

Ferry and satellite p. 27-29

Chilly surface temperatures and pulses of high CDOM waters in Central Sound.

*In-situ* mooring data

Due to pressing technical maintenance work no report is available

Previous Eyes Over Puget Sound reports: www.ecy.wa.gov/programs/eap/mar_wat/eops/

# Personal flight impression 1-30-2012



Joe (pilot) unloading the winch frame.

CTD being deployed in the water

## Marine Flight 4 (South Sound)

*This month we were able to try out our new 2012 flight routes. The South Sound flight includes four Hood Canal stations. Flying in January is a challenge because of the weather. This month has been especially challenging due to the intense snowstorm.*

*Image: Mya working with the CTD in the back of the floatplane.*

*Since water quality sampling from a floatplane is unusual, we wanted to focus on the sampling setup. We have a custom made winch frame that fits in the back of the plane once the rear seats are removed. The frame holds a power winch, with 250 meters of crystal fiber Vectran® line. This line is stronger than steel and won't damage the plane. The CTD is attached to this line and is positioned above the hatch in the belly of the plane. We can lower the CTD to depth anywhere in Puget Sound with the press of a button. I can't imagine hand deploying the CTD to that depth the way they did in the "good ol' days." The frame with the winch and CTD are heavy pieces transported in and out of the plane each trip, but they are worth it!*

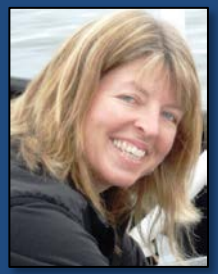
# Personal flight impression 1-30-2012



Seattle Aquarium and Skyline

Patches of sun in Commencement Bay

## NEW Flight and Station Maps



For 2012 we have shifted emphasis of our rotational monitoring effort to stations of the Kitsap Peninsula and Bainbridge Island.

*Julia Bos*

We will be visiting these stations:

- Port Gamble (PGA001)
- Port Madison (PMA001)
- Eagle Harbor (EAG001)

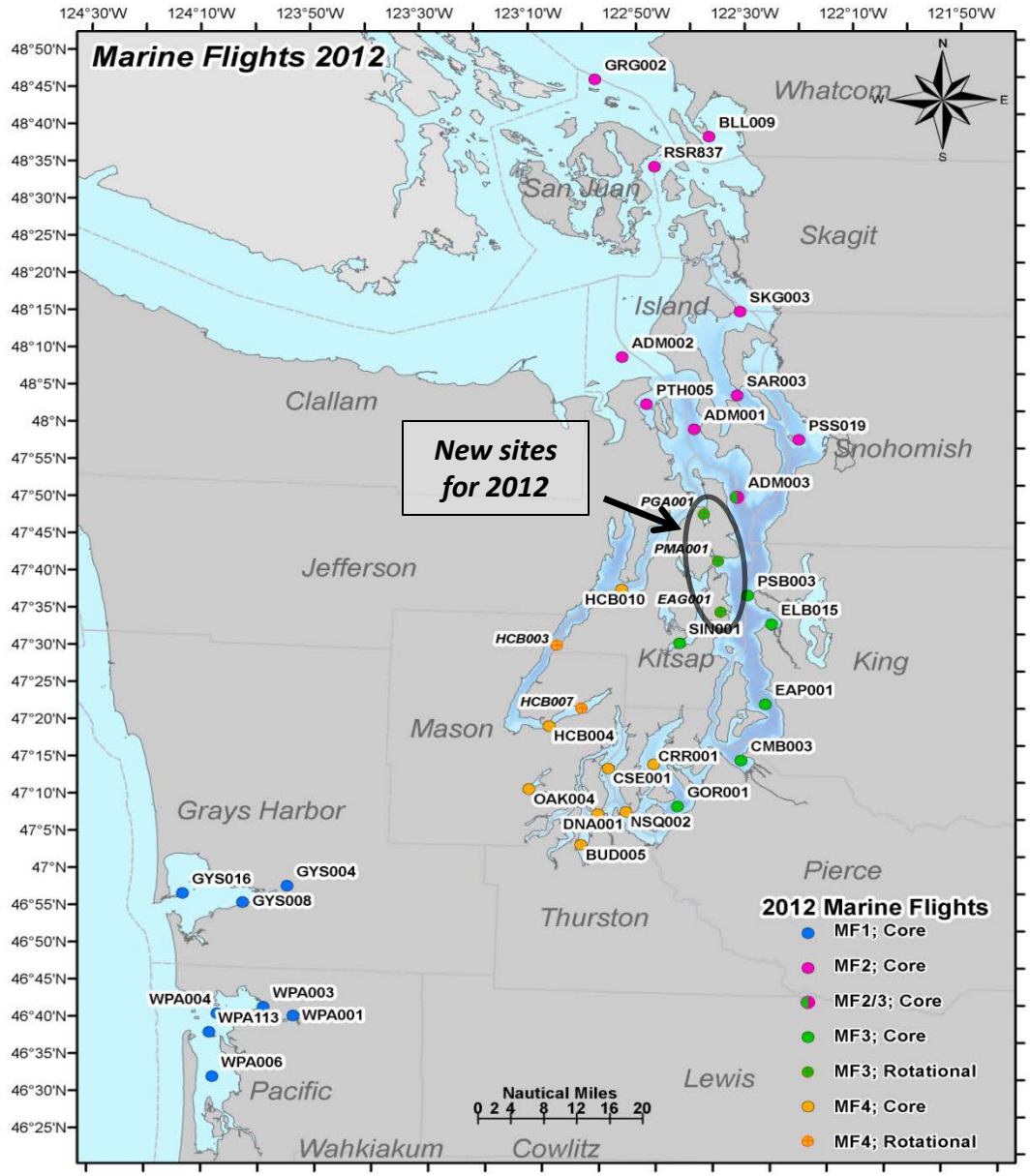
Click here for more Info and station maps

The data will allow us to determine if significant long-term trends in marine water quality occurred in this focus region.

Each of 4 regional flight routes are shown on the map, and will be conducted monthly.

# New Flight and Stations for the year 2012






## NEW Flight and Station Maps

**Port Gamble (PGA001)** - This site was last visited in 2001. It was considered impaired for DO and bacteria in previous water quality assessments and has undergone sediment remediation activities.

**Port Madison (PMA001)** - Sampled most recently in 1995, this location has had several improvements & shellfish harvest has recently been restored in this bay.

**Eagle Harbor (EAG001)** - A super-fund site, this location has been part of clean-up efforts conducted by EPA and WSDOT at a ferry maintenance site.

# Weather of the last two weeks of Jan., 2012



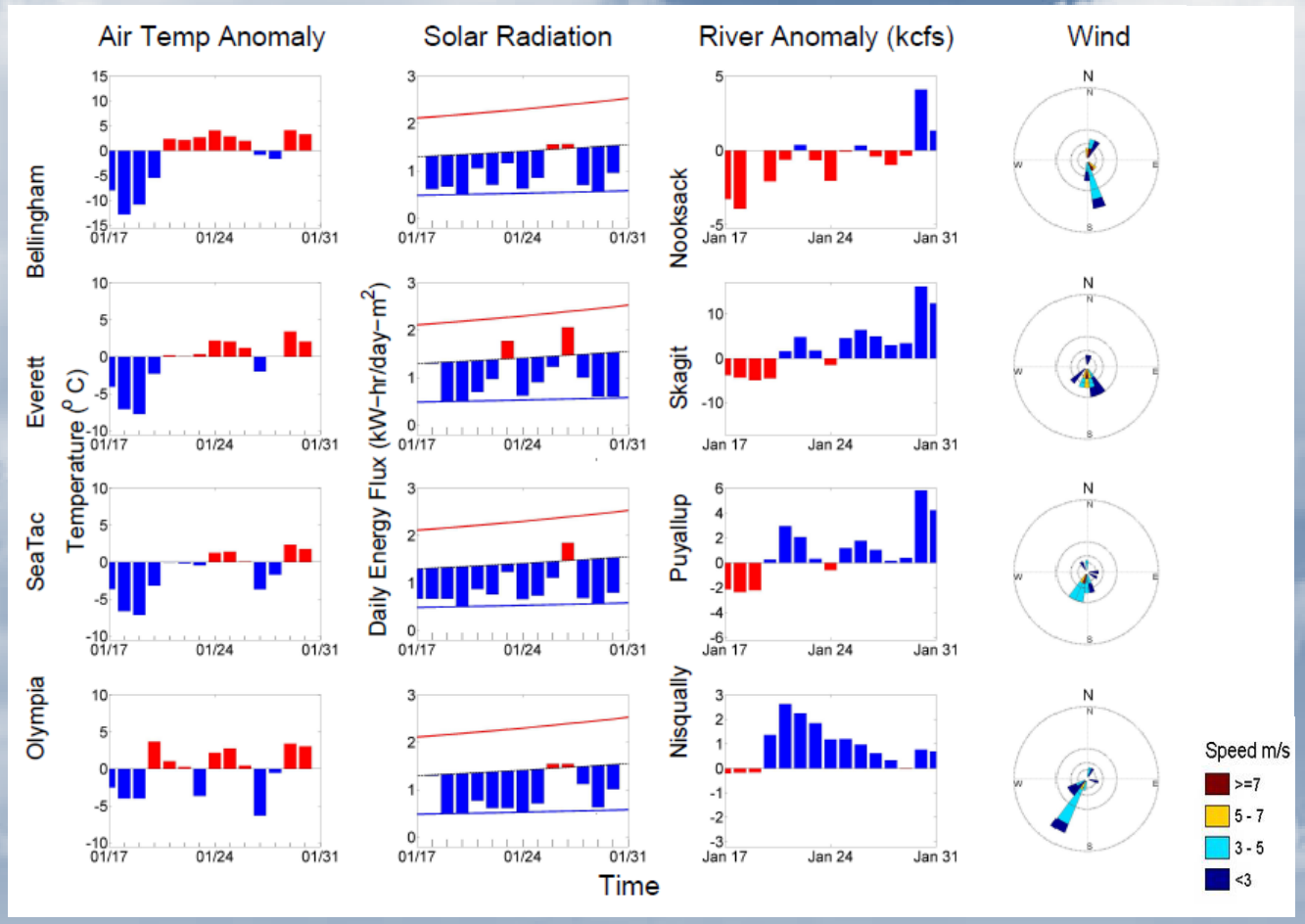
**Meteorological conditions typically explain up to half of the variance in observed marine variables** (Moore et al. 2008), particularly in shallower waters like those of South Puget Sound. I summarized the specific conditions prevalent during the past two weeks, from north to south. Source: http://www-k12.atmos.washington.edu/k12/grayskies/nw_weather.html

## Summary (1-17 to 1-31)

**Air temperatures** during the past few days have been warmer than normal following a cold spell 11 days ago.

**Rivers** have been running above normal for the past several days, and are stronger in the south and on the coast.

**Winds** have been predominantly from the SE in the north and the SW in the south.




Moore et al. 2008. Local and large-scale climate forcing of Puget Sound oceanographic properties on seasonal to interdecadal timescales. Limnol. Oceanogr., 53(5), 1746–1758

# Summary: Aerial Photography 1-30-2012

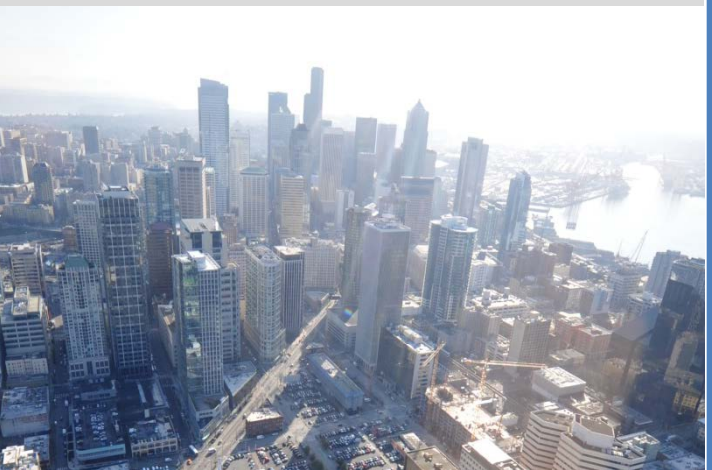


River plumes extend into Central Basin and fill many smaller bays. Jellyfish aggregations persist in Budd Inlet through the winter.

Start here

Jellyfish still abundant in Budd Inlet 4:20


Seattle gets a break in the rain 1/27/2011



Front

**Mixing and Fronts:** 3 4 5 7 8 10 11 12

Budd Inlet, Dana Passage, Case and Carr Inlet, Commencement Bay, Elliott Bay and Central Basin

Plume

**Suspended sediment:** 2 7 8 9 14

Most river plumes, beach erosion in Quartermaster Harbor, Carr Inlet, Vashon Island and West Point (Seattle).

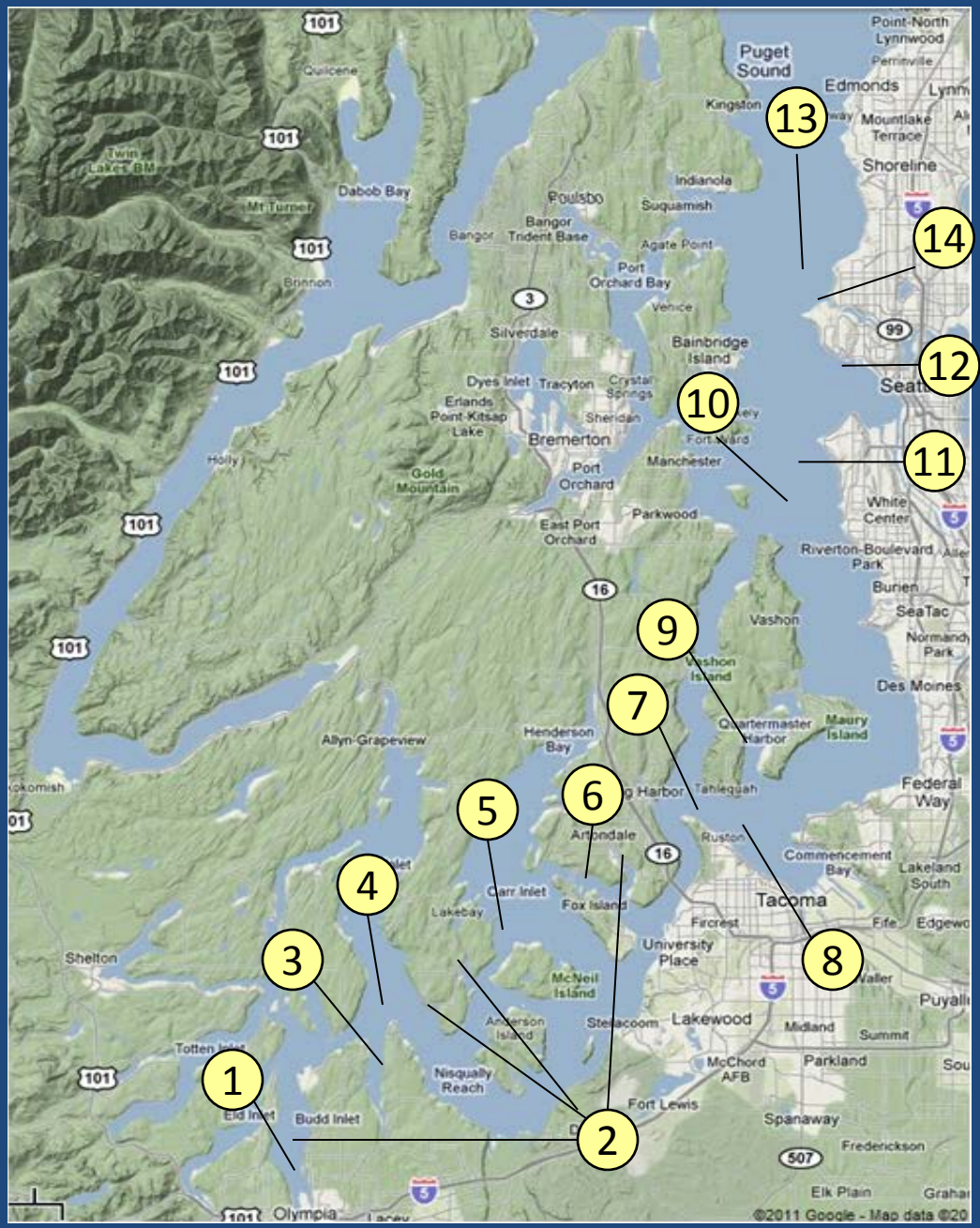
Bloom

**Visible blooms:** -

Debris

**Debris** 1 2 3 4 7 8 11

South Sound: Budd Inlet, Carr and Case Inlet Henderson Inlet and many small bays.
Central Basin: Near Point Defiance (Tacoma), otherwise absent.




# Aerial Photography Image guide 1-30-2012

## Click on numbers

- Morning Flight
- Evening Flight

## Flight Information:

Morning flight:
none

Evening flight:
Cloud banks affected flight route
Visibility limited, altitude 2500ft

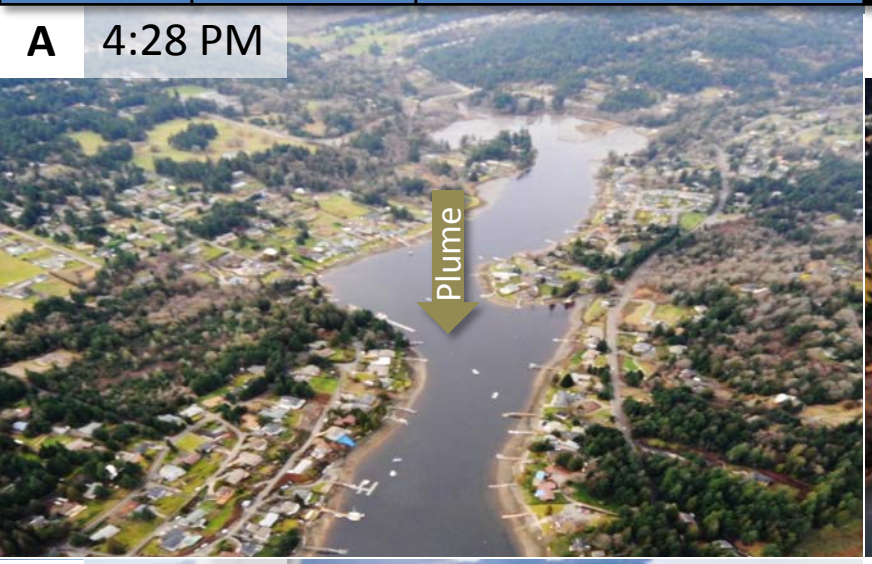
Observational maps

# Aerial photography




Surface slick and foam lines.

Location: Southern Budd Inlet, Gull Harbor 4:21 PM







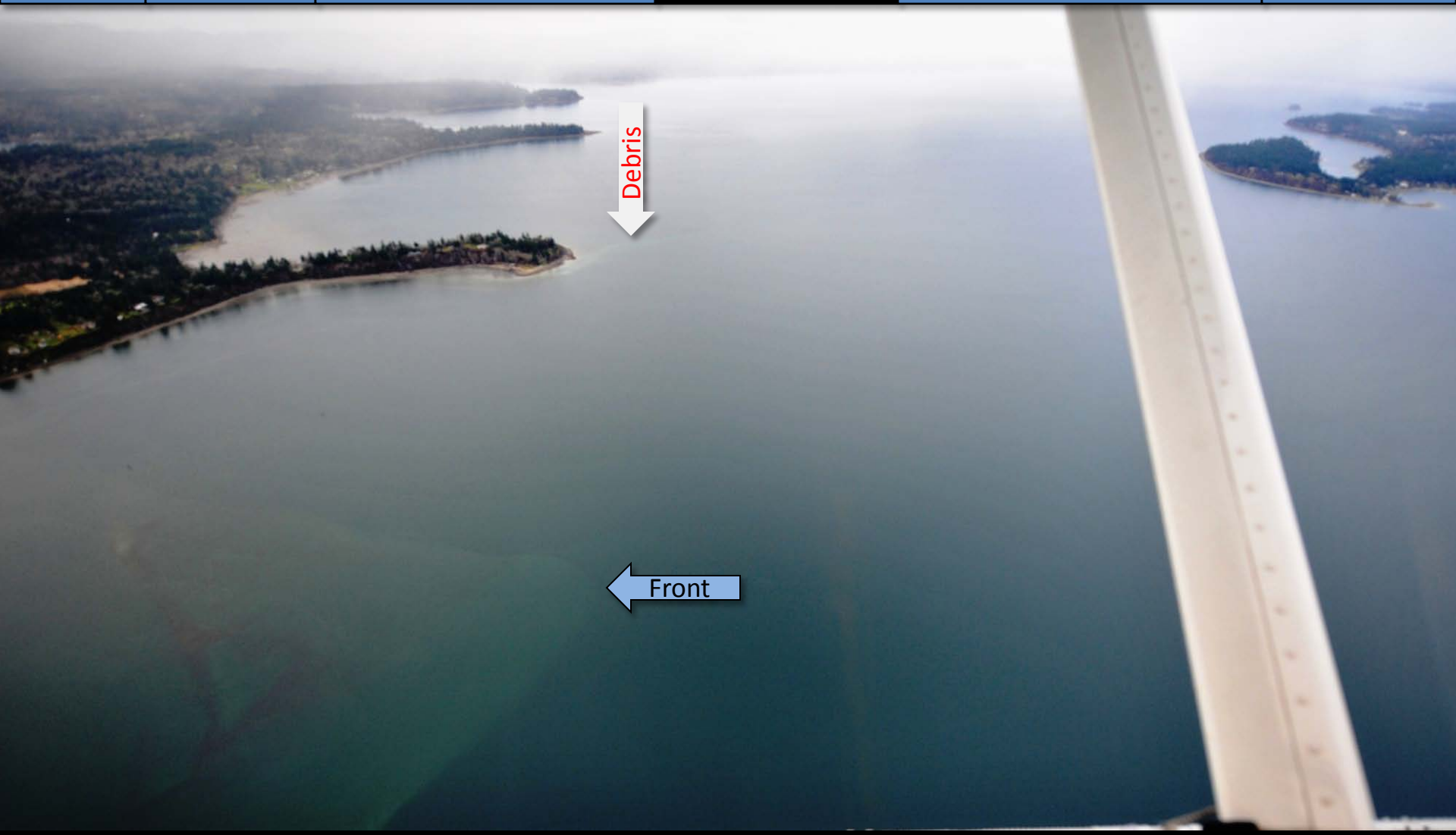
River plumes and sediment. Location: A-Gig Harbor, B-Gull Harbor, C-Taylor Bay, D-Filucy Bay


Debris and front along shore. Location: Henderson Inlet, 4:23 PM

# Aerial photography




Debris line.  Location: Dana Passage connecting with Case Inlet, 4:25 PM




Front over shallow water? Location: Carr Inlet near McNeil Island (South Sound), 4:27 PM

# Aerial photography




Oil sheen. Location: Fox Island (South Sound), 4:28 PM


Plume, front and debris line. Location: Point Defiance (Central Sound), 4:30 PM

# Aerial photography



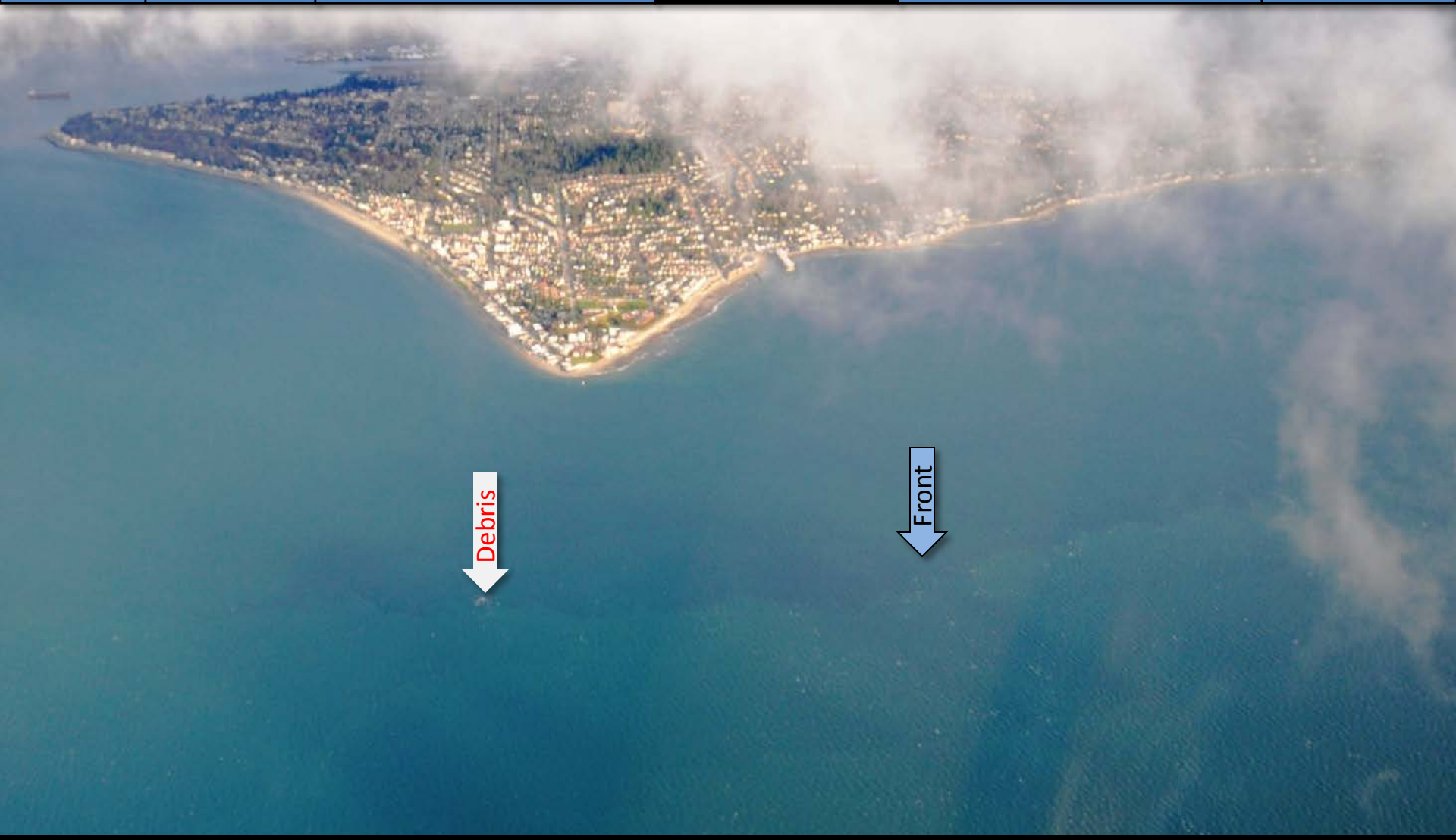

Plume, front and debris line. Location: Commencement Bay (Central Sound), 4:31 PM


Beach erosion or river? Location: Quartermaster Harbor (Central Sound), 4:32 PM

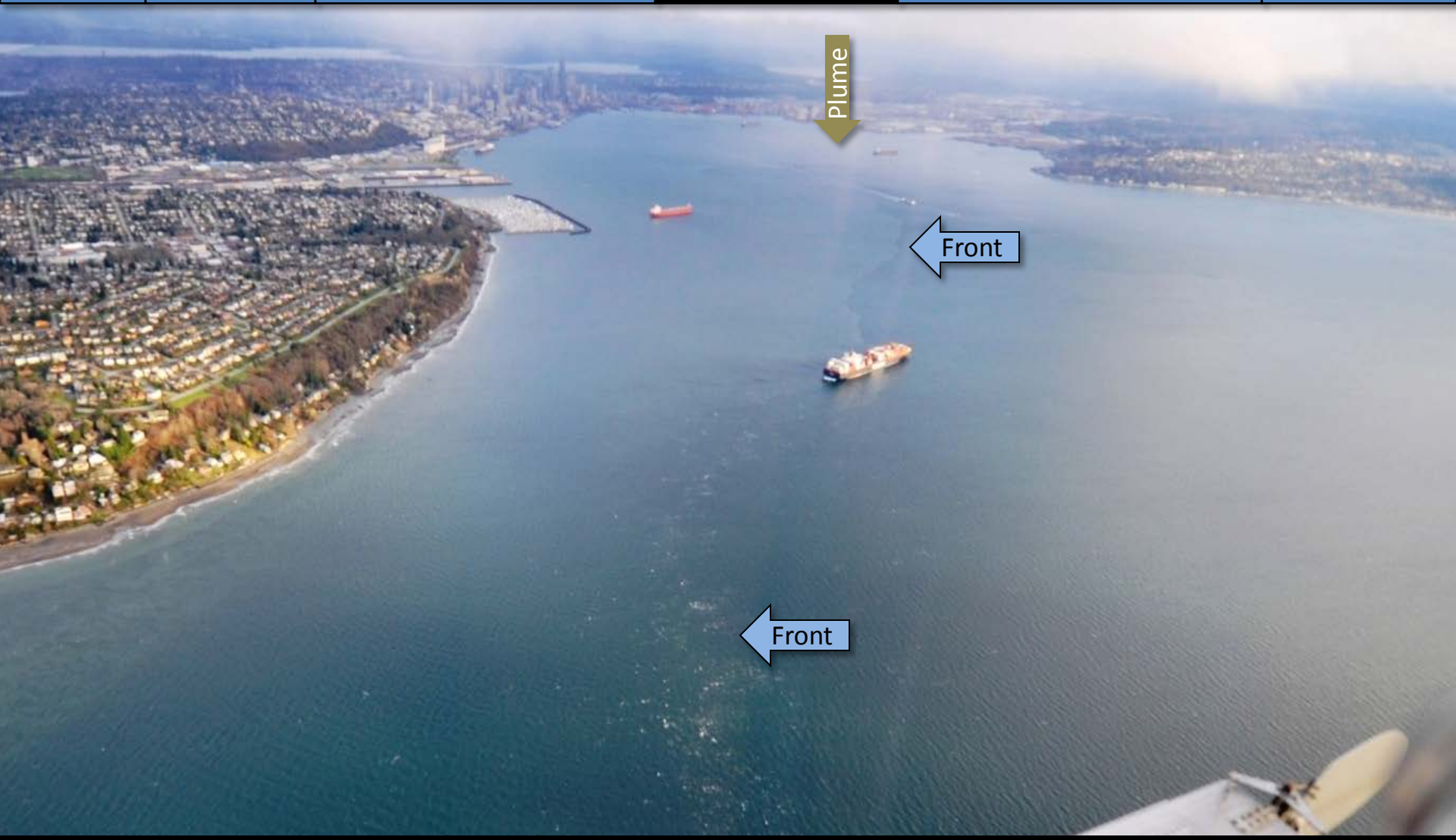
# Aerial photography



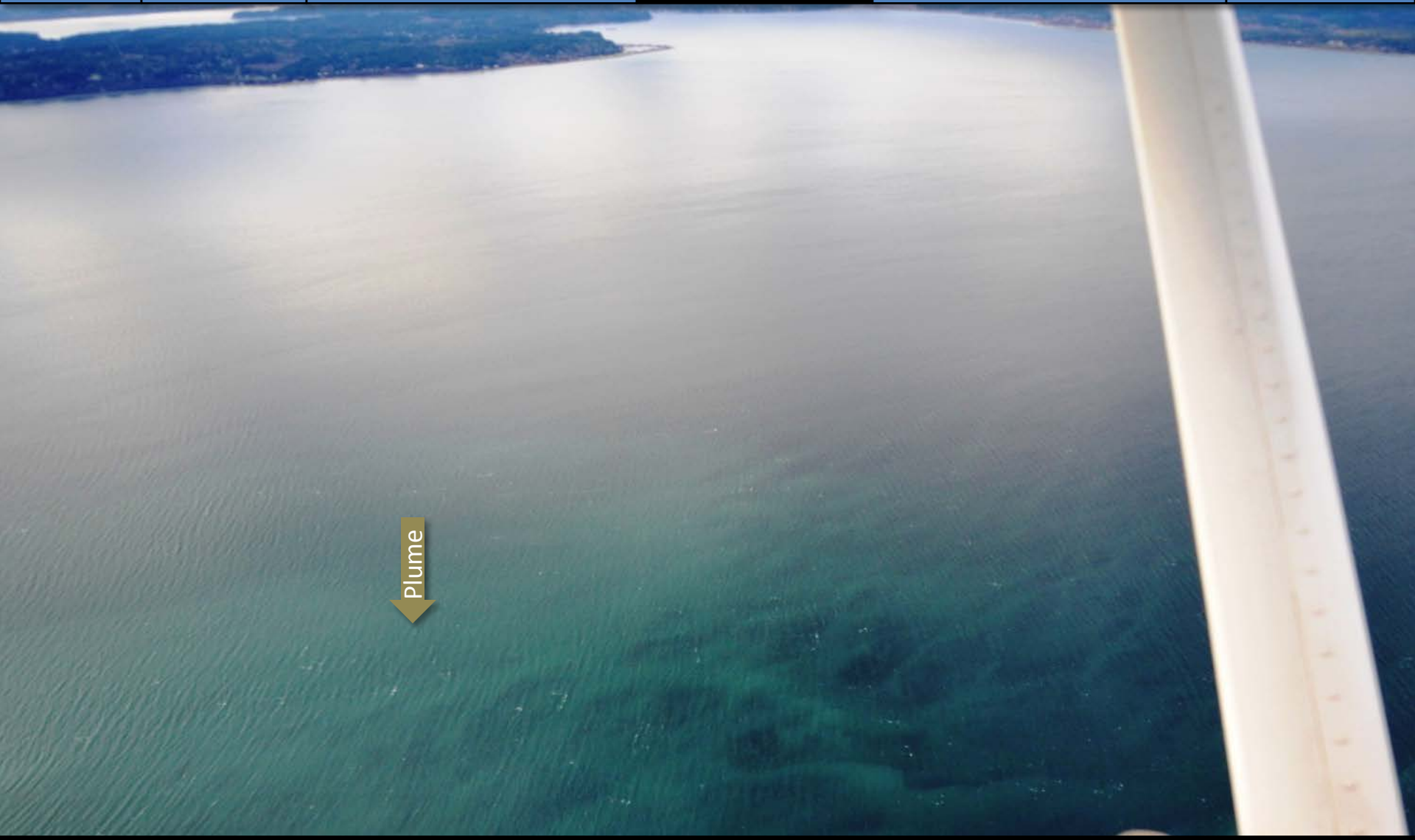

Front and breaking waves,  Location:  West Seattle in background (Central Sound), 4:40 PM




Front. Location: Alki Point in background (Central Sound), 4:40 PM




River plume/debris lines and container ships. Location: Elliott Bay (Central Sound), 4:41 PM



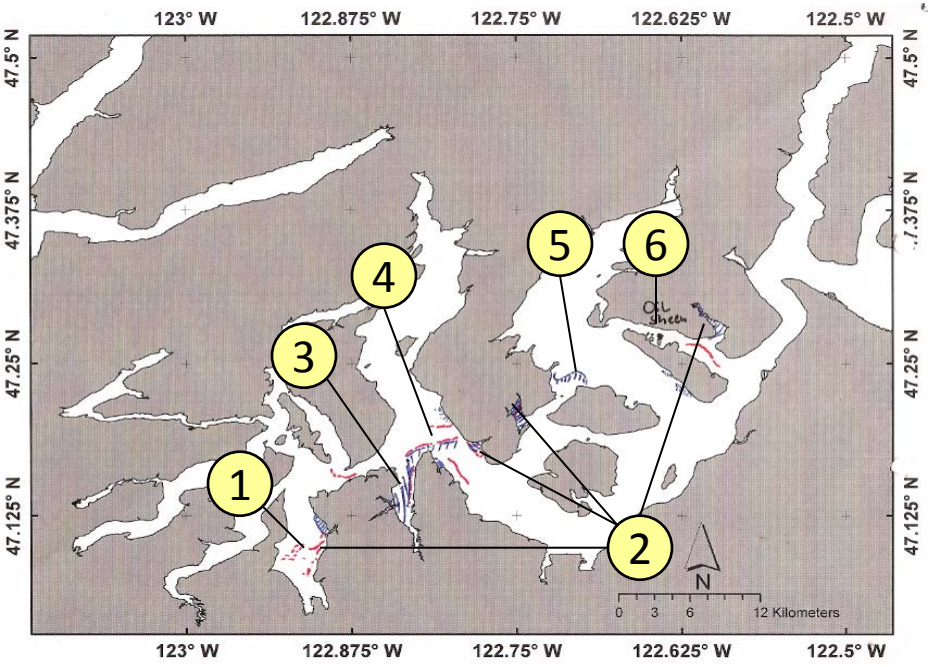

River plume slowly mixing.  Location: Off Shilshole Bay, Port Madison in the distance, 4:43 PM

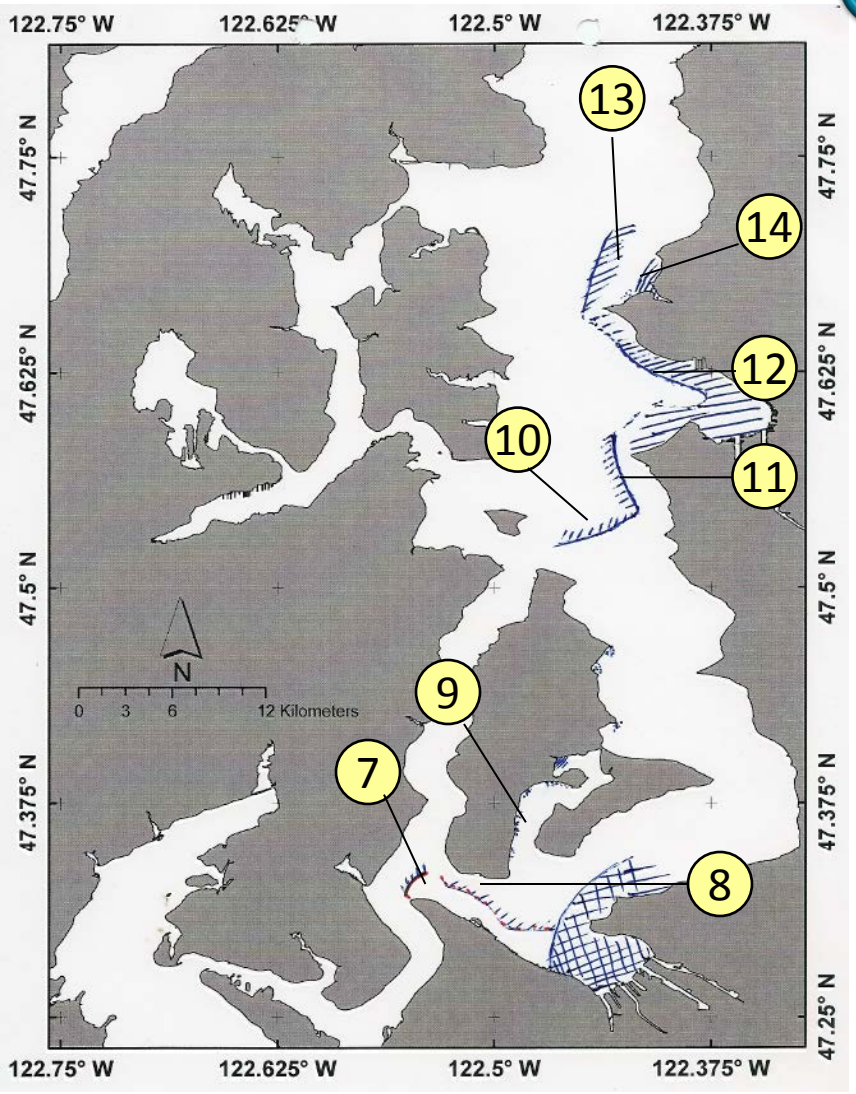

River plume and suspended sediment  Location:  West Point, Shilshole Bay (Seattle), 4:44 PM

# Aerial photography observations in Central Sound

Navigate

For January 30, 2012 only the afternoon aerial flight was conducted.



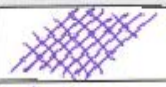
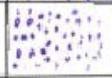




*Numbers on map refer to picture numbers for spatial reference*

DEPARTMENT OF ECOLOGY State of Washington

# 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 |  |

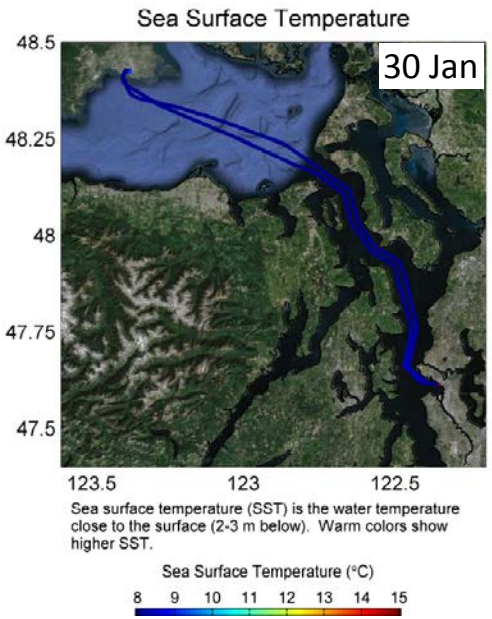
Comments:
Maps are produced by observers during and after flights. They are intended to give an approximate reconstruction of the surface conditions on scales that connect to and overlap with satellite images in the section that follows.

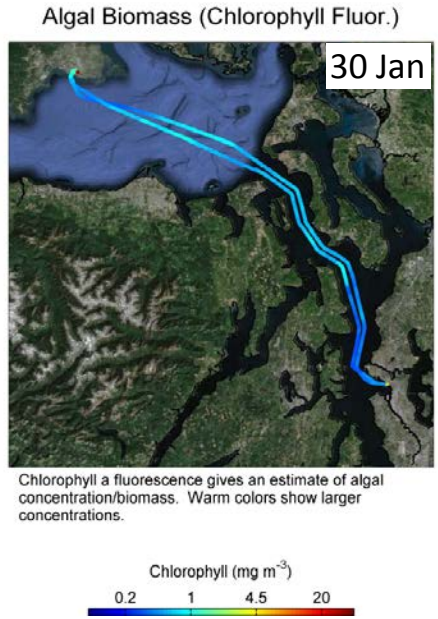
# Daily ferry and satellite observations in Central Sound, 1-30-2012



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:** Low fluorescence throughout Puget Sound; surface temperatures are 8-9 °C in Central Sound and <8 °C in the Strait of Juan de Fuca.

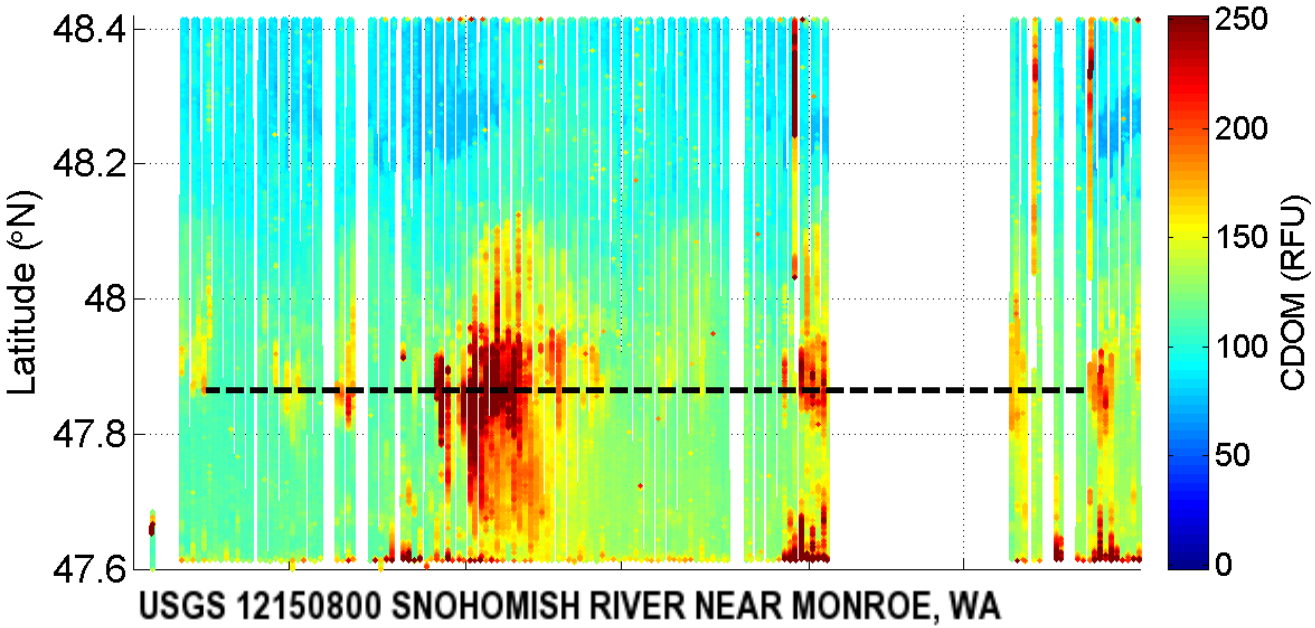
**--- Daily 'Quick-Look' Products Available ---**

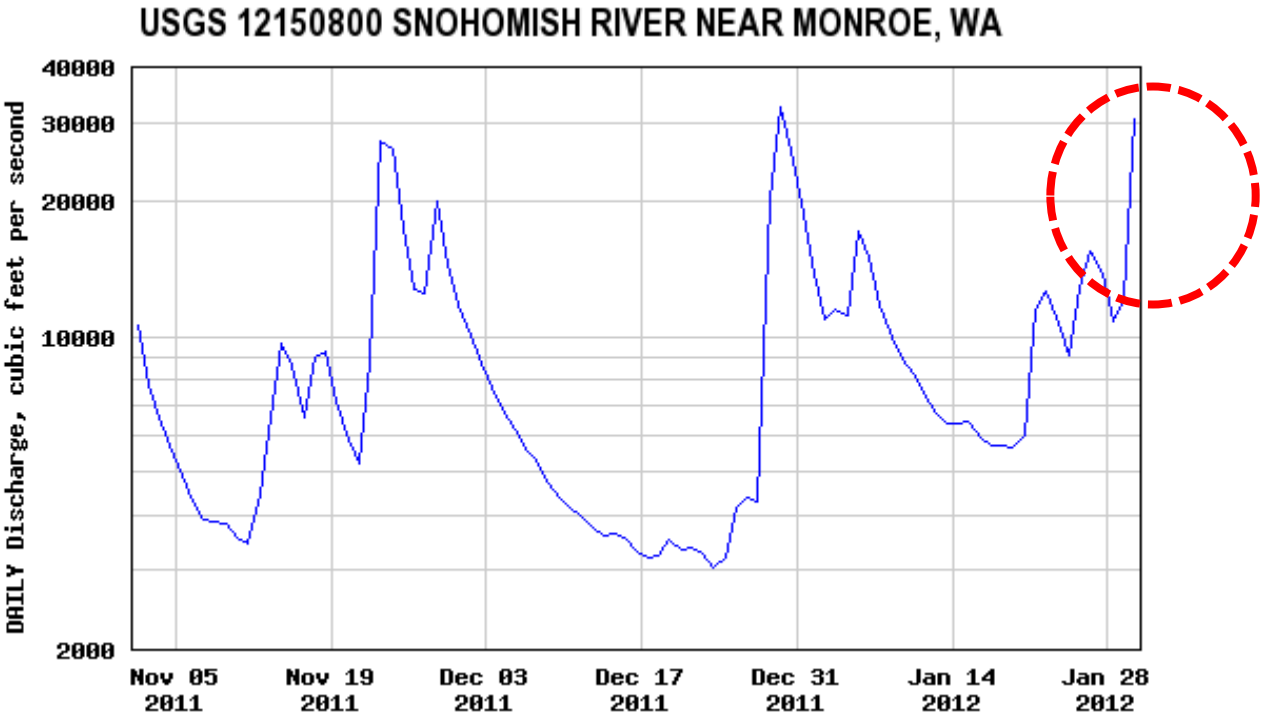
(http://www.ecy.wa.gov/programs/eap/mar_wat/eops/clipper.html)

# CDOM fluorescence as an indicator of freshwater influence in Central Sound

A primary source of Colored Dissolved Organic Matter (CDOM) to Puget Sound is from rivers.

We expect to see highly colored water making its way into Puget Sound later this week, associated with the recent rainfall and high river flows in Whidbey Basin.




DEPARTMENT OF ECOLOGY State of Washington

# Mooring observation and trends

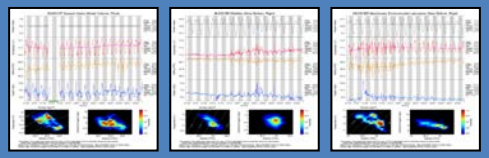


Go to our mooring site at: http://www.ecy.wa.gov/programs/eap/mar_wat/moorings.html

**Summary:** Not available due to maintenance work

**We apologize, the mooring report is currently not available due to pressing technical maintenance work at one of our stations.**

1. **Mukilteo, Whidbey Basin near Everett:** Not available due to maintenance work
2. **Manchester, Central Sound:** Not available due to maintenance work
3. **Squaxin Passage (South Sound) near Olympia:** Not available due to maintenance work



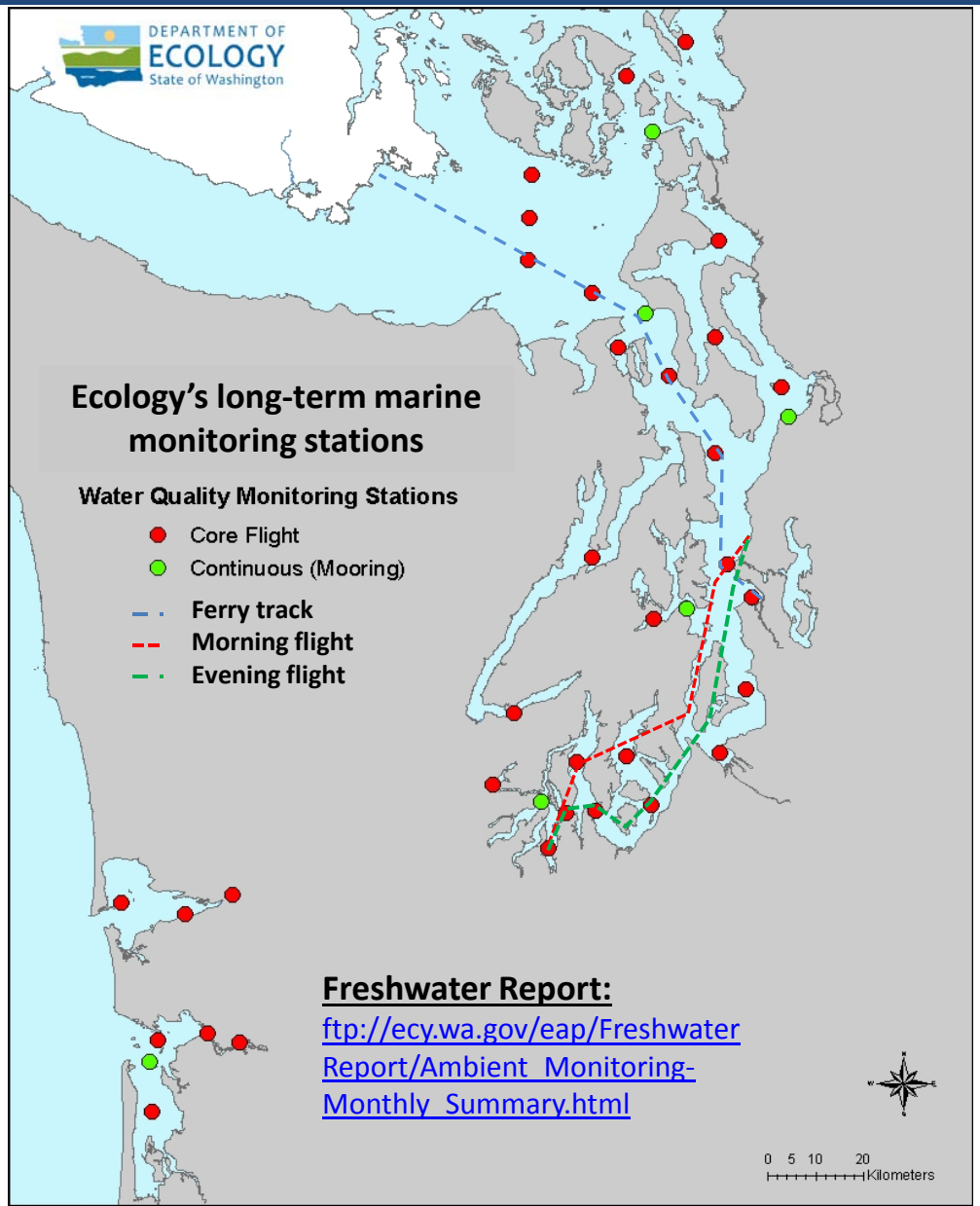
Real-time data online (click)

# 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




## 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:
http://listserv.wa.gov/cgi-bin/wa?A0=ECOLOGY-EYES-OVER-PUGET-SOUND

**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.