PILOT APPROACH TO GROW WEATHER DATA USE AT A PUBLIC HEALTH AGENCY

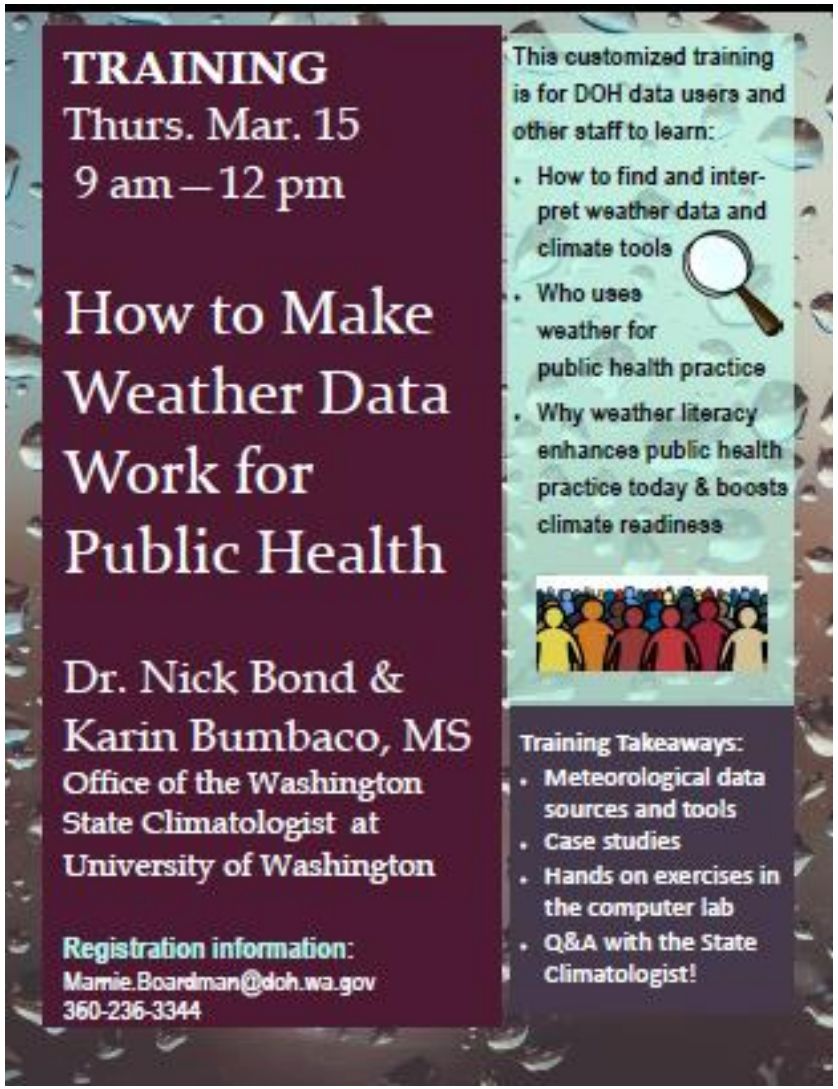
Marnie Boardman, Washington State Department of Health

Internal Capacity Development Focus: Grow use of weather data in public health practice

Rationale:

- Weather information under utilized in public health
- May seem more actionable for practitioners than long range climate projections
- Build on experience of staff who already use weather observations and forecasts
- Emerging tools (e.g., ESSENCE)

Custom Training on Using Weather Data at DOH



OWSC

Office of the Washington State Climatologist

Nick Bond

State Climatologist, is a senior research scientist with the Joint Institute for the Study of Atmosphere and Ocean (JISAO) of the University of Washington (UW) and also is an affiliate associate professor with the Department of Atmospheric Sciences at UW. His research is on a broad range of topics with a focus on the weather and climate of the Pacific Northwest, and the linkages between the climate and marine ecosystems of the North Pacific. He has a PhD in Atmospheric Sciences from the UW.

Karin Bumbaco

Assistant State Climatologist, is the primary point of contact for queries about Washington climate, access to data, outreach activities, etc. Her research focuses on WA weather and climate, and includes projects on optimal network design, heat waves, and recent droughts. Karin has a MS in Atmospheric Sciences from The Ohio State University; her thesis research examined hydrometeorological variables from automated weather stations in the Peruvian Andes, where she spent time doing fieldwork. She earned a BS in Meteorology from Pennsylvania State University.

Extreme Weather Changes Health

Reserve Citizen Airmen deliver aid to Hurricane Maria survivors

By Tech. Sgt. Peter Dean, 927th Air Refueling Wing / Published September 25, 2017

PHOTO DETAILS / DOWNLOAD HI-RES 1 of 4

Reserve Citizen Airmen assigned to the 45th Aeromedical Evacuation Squadron, carry patients aboard a C-17 Globemaster III in St. Croix, U.S. Virgin Islands, Sept. 24, 2017. Reserve Citizen Airmen conduct humanitarian mission to St. Croix to evacuate victims affected by Hurricane Maria. (U.S. Air Force photo by Tech. Sgt. Peter Dean)

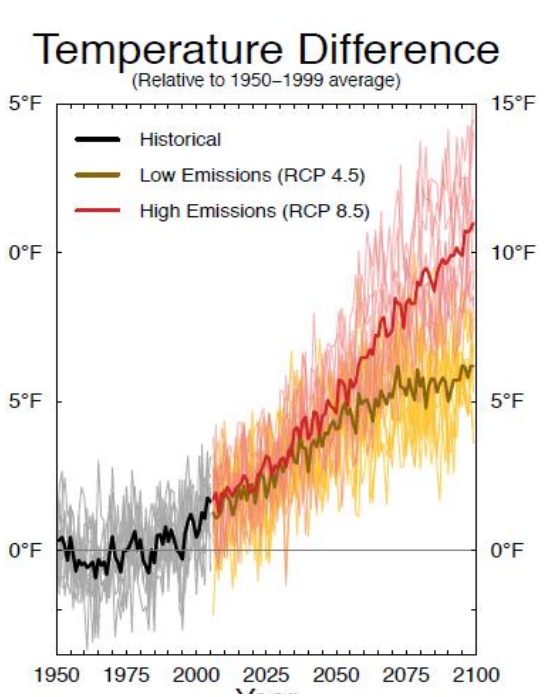
Texas Army National Guardsmen help residents affected by flooding caused by Hurricane Harvey in Houston, Aug. 27, 2017. Army National Guard photo by Lt. Zachary West

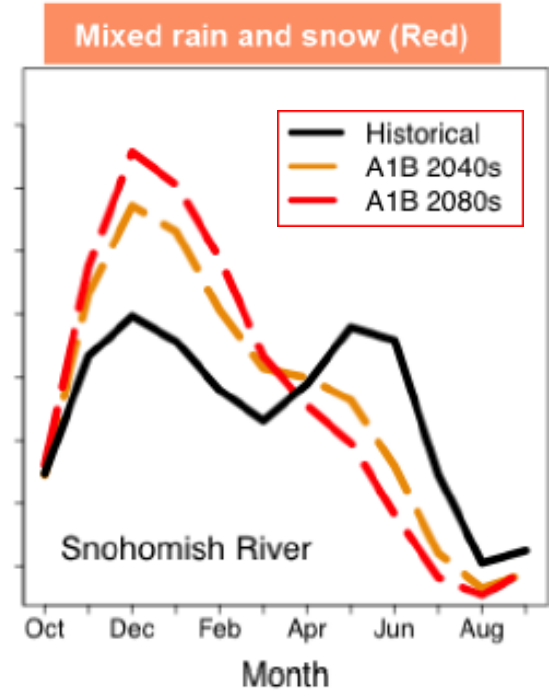
Regular weather also factors into health

History won't predict the future as well as it once did.

Climate change will destabilize patterns and norms, with consequences for health and public health operations.

Weather data may give public health an extra measure of control in an increasingly uncertain environment.





Temp and Streamflow figures: *Puget Sound State of Knowledge Report* (2015). UW Climate Impacts Group. See citation in notes.

Weather can inform Essential PH Operations

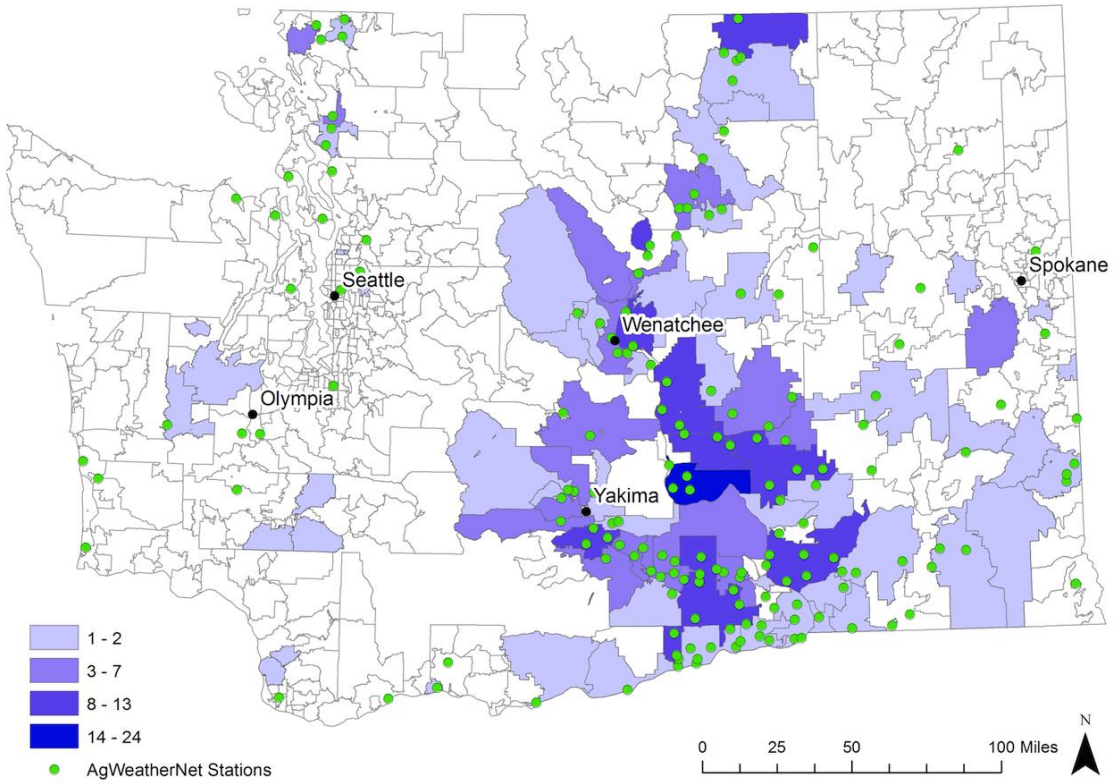
- **Surveillance and monitoring** (e.g., include / **gather meteorological variables** as part of systematic health/risk monitoring)
- **Understand risk and exposure** retrospectively (e.g., link weather observations to health risk, exposure and outcome obs to **look for associations & epi patterns**; in case **investigations**, examine how weather influenced exposure)
- **Examine changing seasonality** of risk factors (e.g., monitor seasonality of health risk factors to establish baseline "normal" season; i.d. influencing meteorological factors; monitor shifts in seasonality and out of season spikes in cases)
- Use forecasts to inform **early detection and response systems** (e.g., where relationship between weather and risk factor is clear, use **forecast tools** to increase vigilance in health risk monitoring and target health protection messaging)
- **Predict** risk & surge; **forecast** windows of opportunity? (e.g., where body of evidence is sufficient, use weather forecasts to anticipate impact of weather on demand for public health & health care services; evaluate efforts to manage surge)
- **Plan** (and budget) workforce capacity needs (e.g., use seasonal forecasts to anticipate start/end of work)
- Protect **workforce** (and save resources) (e.g., use forecasting to assure workforce safety / preparation)
- **Enhance** health promotion/protection **messaging timing** (e.g., time messages to coincide with weather conditions relevant to desired behavior)
- **Model** future risk/burden of **climate-sensitive health conditions** (e.g., use projected long term changes in climate to **model shifts in risk conditions, exposures and burden of injury/illness/death**)

Pesticide Program: Study wind data & exposure factors retrospectively

WIND DATA: CATCH MY DRIFT?

Eddie Kasner, PhD

Space: drift event zip code count and AWN stations, all crops



Vector Borne Disease: Collect weather as part of monitoring; track seasonal shifts, improve models

WA DOH Vector Surveillance Projects

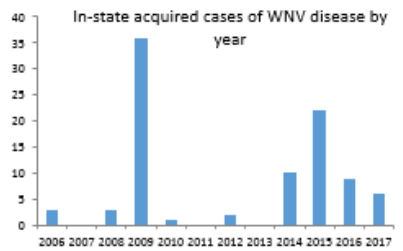
1. **Mosquito Surveillance**
   - Targeted towards West Nile Virus detection
   - Secondarily track species distribution trends

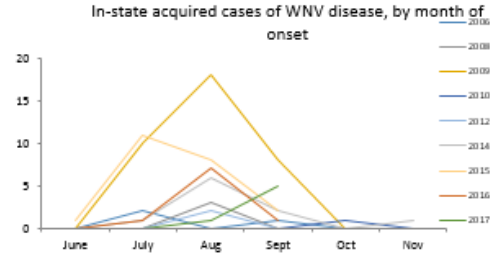
2. **Tick Surveillance**
   - Targeted towards pathogen detection and tick species distribution in WA
   - Collect weather data just before and immediately following field surveillance activity
     - Temperature
     - Relative Humidity
     - Wind Speed and Direction

Disease Modeling

We are interested in both short-term and long-term disease modeling

Short term: WNV severe season versus no disease season, seasonal shifts





A VECTOR FOR ALL SEASONS

Liz Dykstra and Hanna Oltean

Shellfish Safety: Use forecasts for early detection of marine biotoxins; explain events; model future risk

Using Weather and Climate Data

Current Weather Conditions

Helps predict where and when harmful algal blooms may occur or where they will travel once present.

Long term Climate Trends

Helps our program explain current events and prepare for the future.

Working with Partners

Research partners help develop resources which aid in the forecasting of current and future biotoxin trends.

HAB-ITUAL FORECASTING

Jerry Borchert and Audrey Coyne

Pacific Northwest Harmful Algal Blooms Bulletin

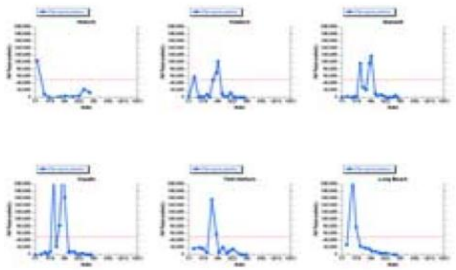
School of Oceanography, University of Washington

Sept

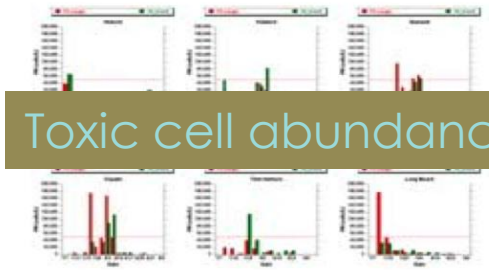
ORHAB Partnership

ORHAB Sample Sites

Pseudo-nitzschia Totals



Pseudo-nitzschia Species

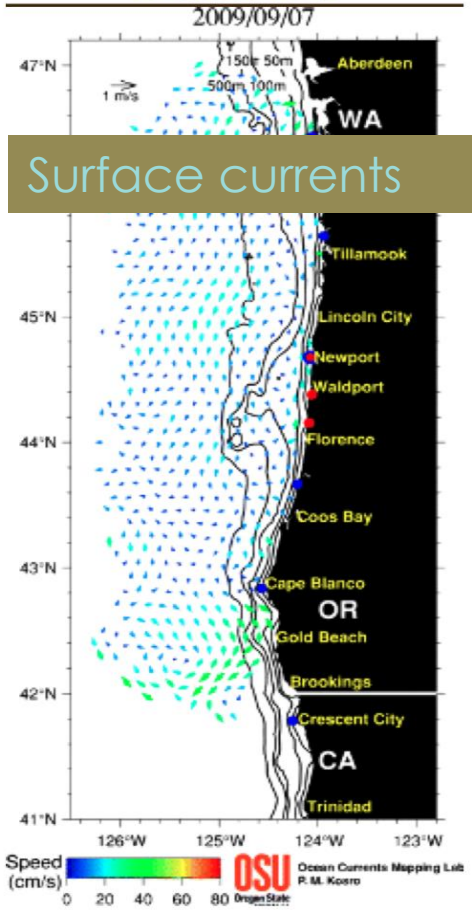


Toxic cell abundance

Pseudo-nitzschia (PN) totals are identified by light microscopy and grouped by *PN* Large and *PN* Small. The 50k cells/L threshold level for large *PN* that triggers toxin testing is indicated by a red line across the *PN* plots. (The trigger for toxin testing for small *PN* is 1 million cells/L)

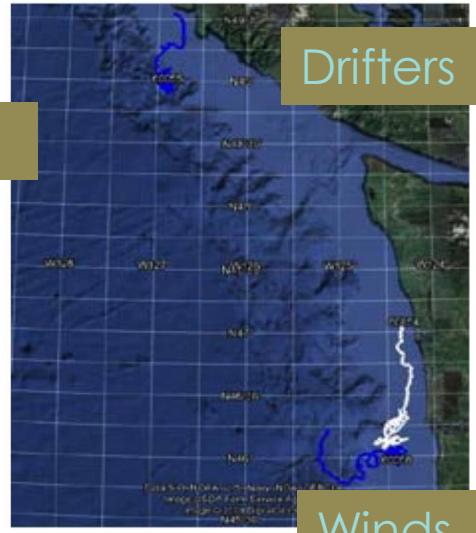
Pseudo-nitzschia spp. have not been ent whole water samples except Hobuck Beach on 9/4 at 14,000 cells/L of the small cell type. The highest levels of DA in razor clams are found at Quinault Res. B & MocRocks BC on 8/24 at 7 ppm. *Alexandrium* spp. are present all along the WA coast in recent samples. The highest counts are at Long Beach on 9/4 at 7,000 cells/L of A. catenella. PSP is detectable in shellfish at several sites along the WA coast. The highest levels are found at La Push, Second Beach on 9/2 at 63µg/100g in CA mussels according to WDOH. *Dinophysis* spp. have been common in recent samples. The highest levels are at Raft River on 8/27 at 4,000 cells/L of *D. acuminata.*

Surface Currents



Surface currents

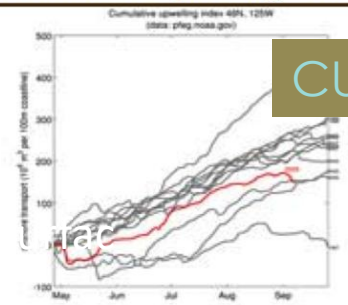
ARGOS Drifters



Drifters

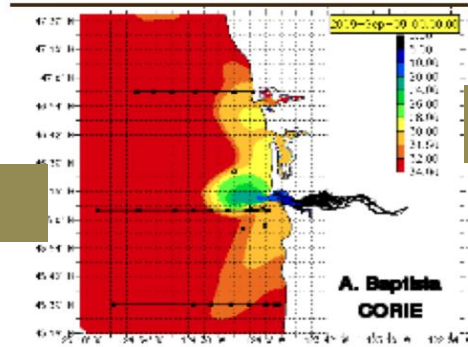
Winds

Cumulative Upwelling Index



CUI

Columbia River Model Output

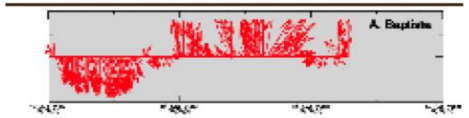


Columbia River model

Strong downwelling favorable winds (from the south) have been prevalent during early September, as observed at NDBC buoy 46029. Surface currents are directed northward over the continental shelves of southern Washington and northern Oregon, and surface drifters have moved northward and toward shore. Model results show the Columbia River plume influencing the southern Washington coast. It is likely that phytoplankton populations along the coast have orginated from offshore, especially along the northern Washington coast where the

Forecast – Upwelling favorable winds are expected to resume Thursday 9/10 through Saturday 9/12. The marine forecast has winds returning to downwelling favorable by Monday 9/14. As the fall season approaches, there is a greater likelihood of downwelling winds. We forecast high risk levels for transport of *Pseudo-nitzschia* (not necessarily toxic) from the Juan de Fuca eddy region to coastal beaches in the following week. Condition is red.

Winds - NDBC Buoy 46029



Columbia River Discharge

River discharge

Weather Forecast - Ocean Shores

Wed	Thu	Fri	Sat
65 | 52	70 | 52	72 | 54	67 | 54

Weather

Shellfish Growing Area Conditional and Emergency Management

- **Conditional Closures**: shellfish areas closed during predictable bacteria pollution events
  - Rainfall
  - Seasonal
  - Stream Flow
- **Emergency Closures**: shellfish areas closed during extreme or unexpected pollution events
  - Flooding
  - Excessive Rainfall
  - Sewage Spills