



2015 West Coast Harmful Algal Bloom: Toxic, Extensive, Persistent

Dan Ayres
WDFW Coastal Shellfish Manager
Region Six / Montesano

TUESDAY, JUNE 16, 2015



PARTLY SUNNY

High, 72. Low, 52. > B8

seattletimes.com/weather

The Seattle Times

WINNER OF 10 PULITZER PRIZES

\$1.00

1.6 million readers

Toxic algae bloom might be largest ever

SHELLFISH HARVESTS SHUT DOWN

High temperatures suspected

Marine biotoxins

Marine biotoxins are produced by microscopic algae. Unlike the bacteria or viruses that can also contaminate shellfish, biotoxins

By SANDI DOUGHTON
Seattle Times science reporter

A team of federal biologists set out from Oregon Monday to survey what could be the largest toxic algae bloom ever recorded off the West Coast.

The effects stretch from Central California to British Columbia, and possibly as far north as Alaska. Dangerous levels of the natural toxin domoic acid have



Closures of Puget Sound beaches frequently change. Check State Department of Health for latest conditions: dah.wa.gov

WA Dept. of Fish and Wildlife, Information subject to changes and amendments over time



CONTENTS OF THIS PRESENTATION

- Harmful algal blooms (HAB)
- The 2015 bloom event
- WDFW Monitoring and ORHAB
- Fishery closures
- Effects on fishers and communities
- What have we learned
- What the future holds

- Marine algae (or phytoplankton) are at the start of the ocean's food chain and all aquatic species ultimately depend on them for food.
- Most species of phytoplankton are harmless.
- However, a few dozen phytoplankton produce potent toxins - given the right conditions.
- Harmful algal bloom (HAB) impacts include human illness and mortality following consumption of or indirect exposure to HAB toxins, substantial economic losses to coastal communities and commercial fisheries, and bird and mammal mortalities.

Aerosols and wind transport may cause human health problems

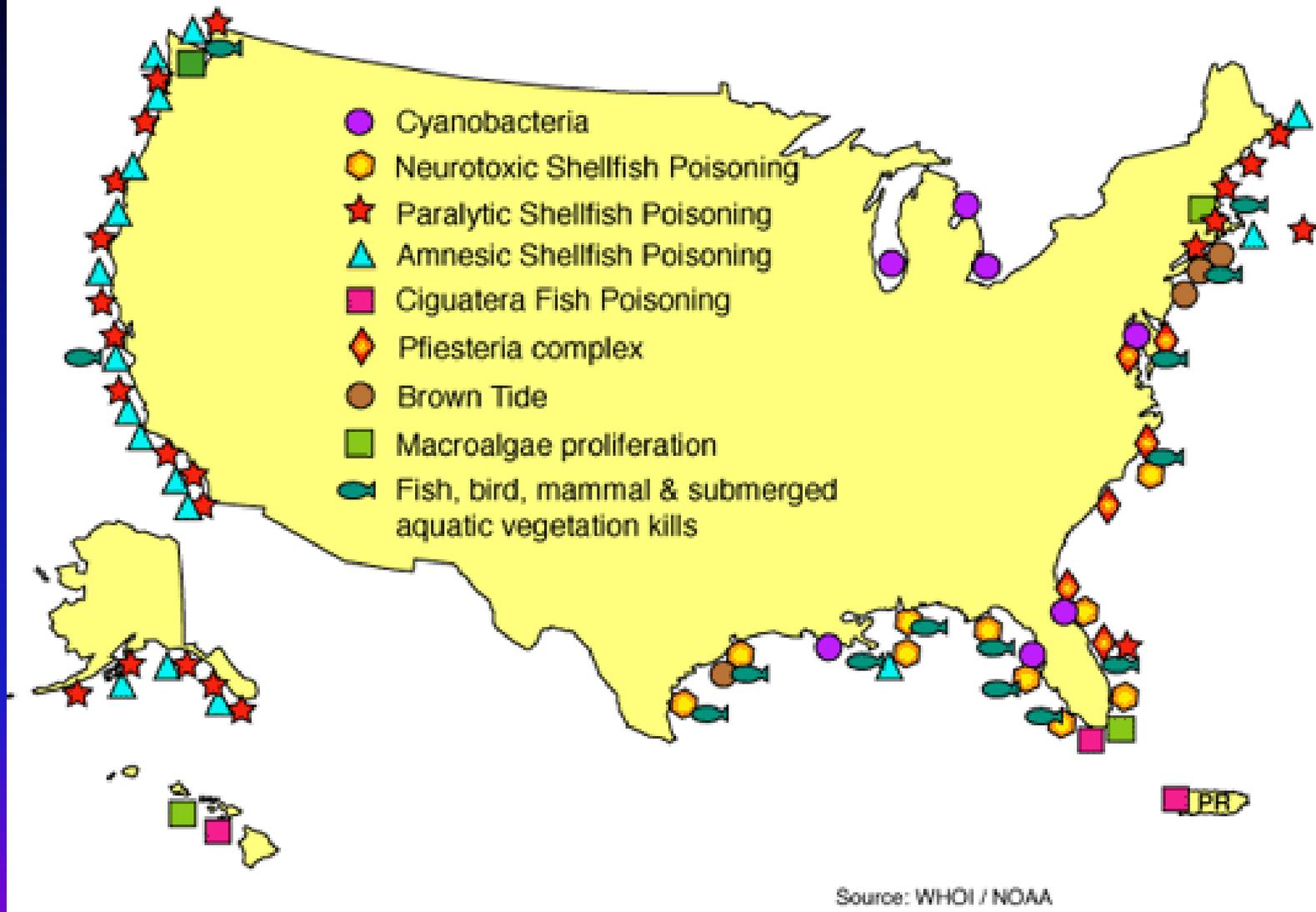
Foams may aggregate on the water surface

Algae may accumulate causing visual discolouration and may result in hypoxia or declines in submerged aquatic vegetation upon their decay

Fish kills may occur due to toxic algae

Shellfish may become contaminated with algal toxins

Major HAB-related Events in the Coastal U.S.





<http://www.orhab.org/>

Olympic Region Harmful Algal Blooms

ORHAB PARTNERSHIP

- Washington Dept. of Fish and Wildlife
- Quinault Indian Nation
- Washington Department of Health
- University of Washington
 - Olympic Natural Resources Center
 - School of Oceanography
- NOAA NW Fisheries Science Center
- Makah Tribe
- Olympic Coast National Marine Sanctuary

- **2000; ORHAB began with grant funding through NOAA MERHAB program.**
- **2006; Program transitioned to state funding through a surcharge on recreational shellfish license.**
- **2015; HB 1620 passed providing an increase in the license surcharge, sustaining ORHABs future.**

**WDFW and QIN
monitor surf
zone
plankton,
toxins, and
water quality...**



**...to determine
the environmental
conditions
associated with
blooms
of harmful
species.**

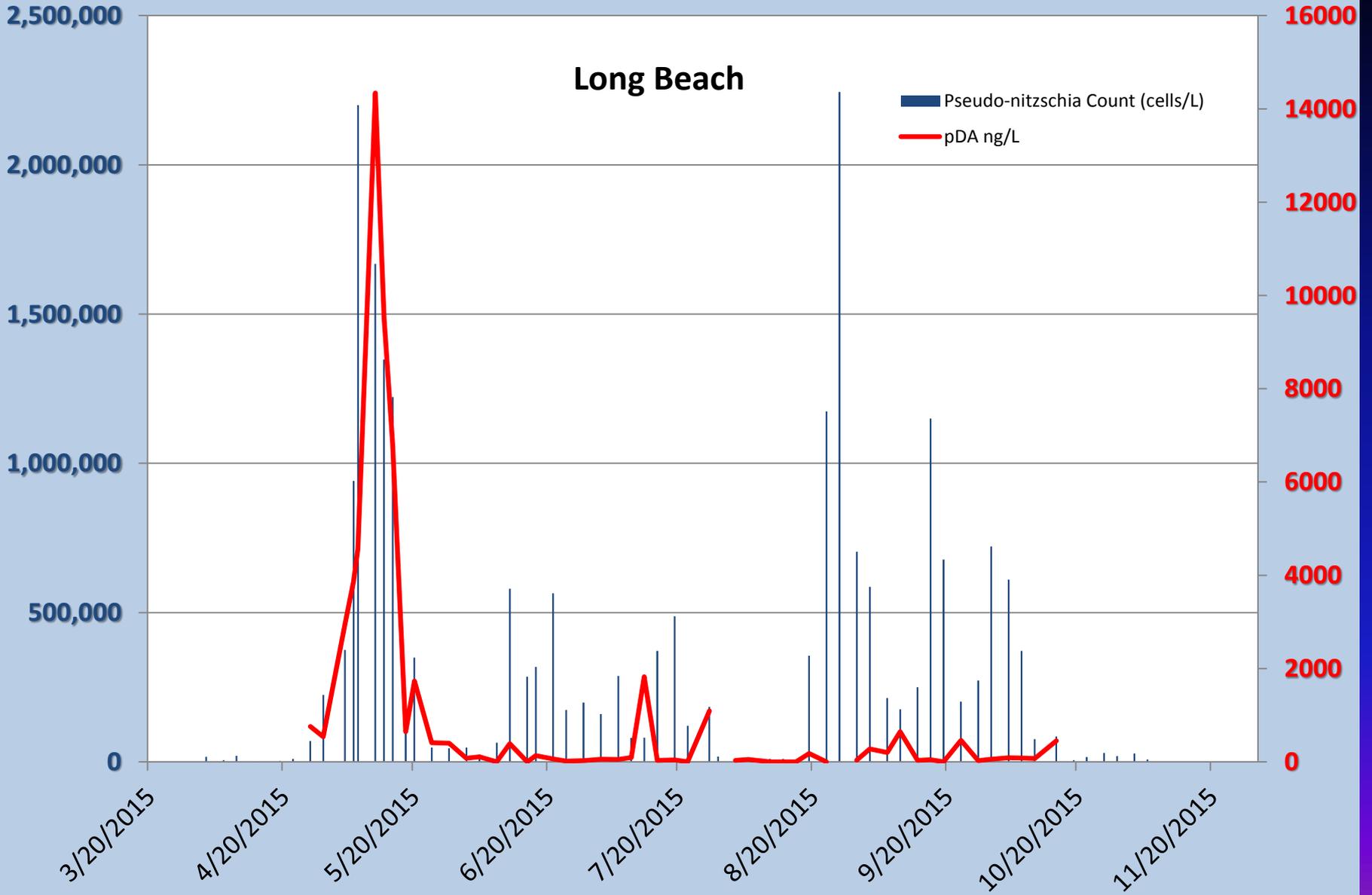


WDFW and QIN are now able to conduct a rapid field test using the ELISA method for the presence of domoic acid in shellfish and seawater

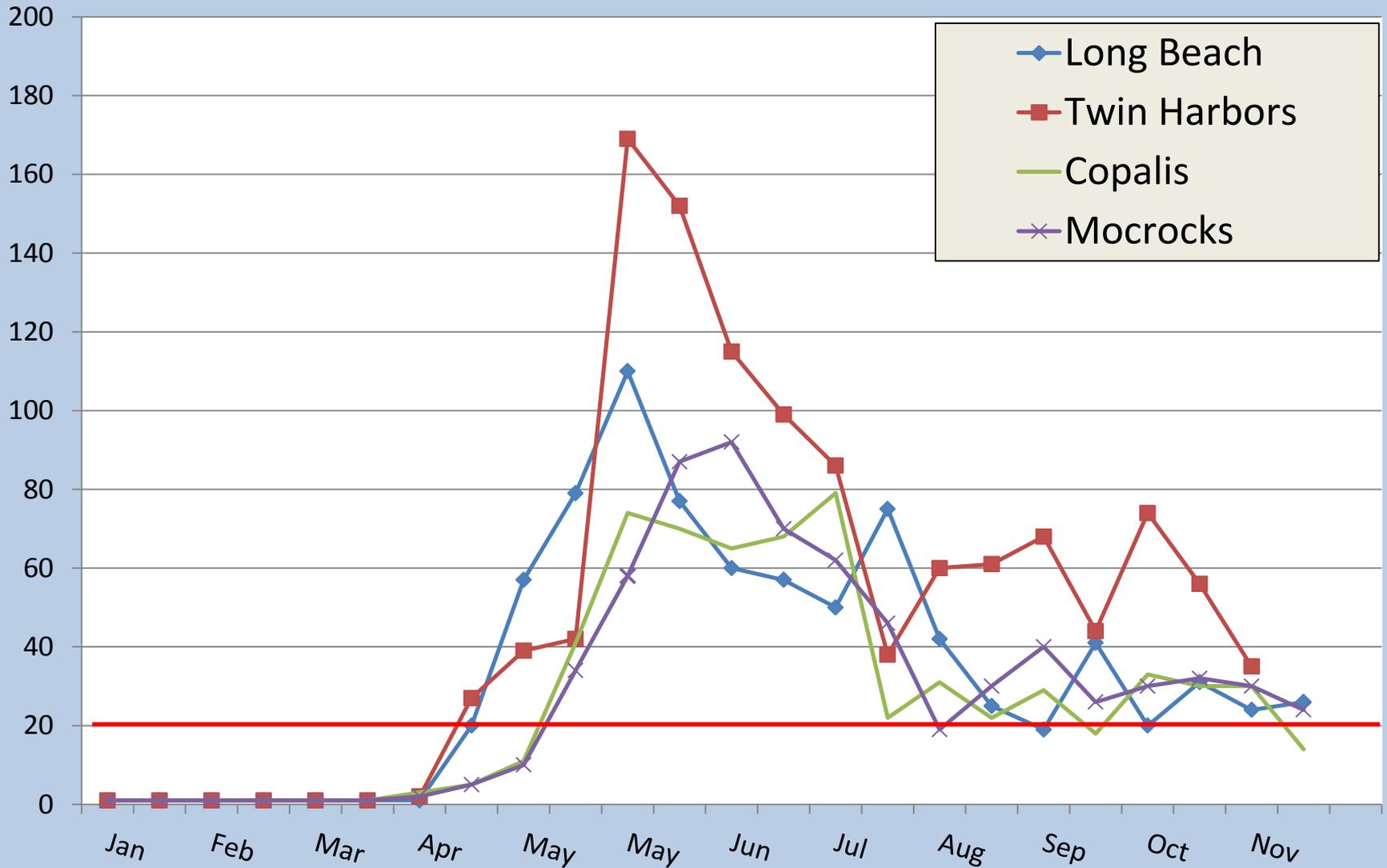


Pseudo nitzschia Cell Counts

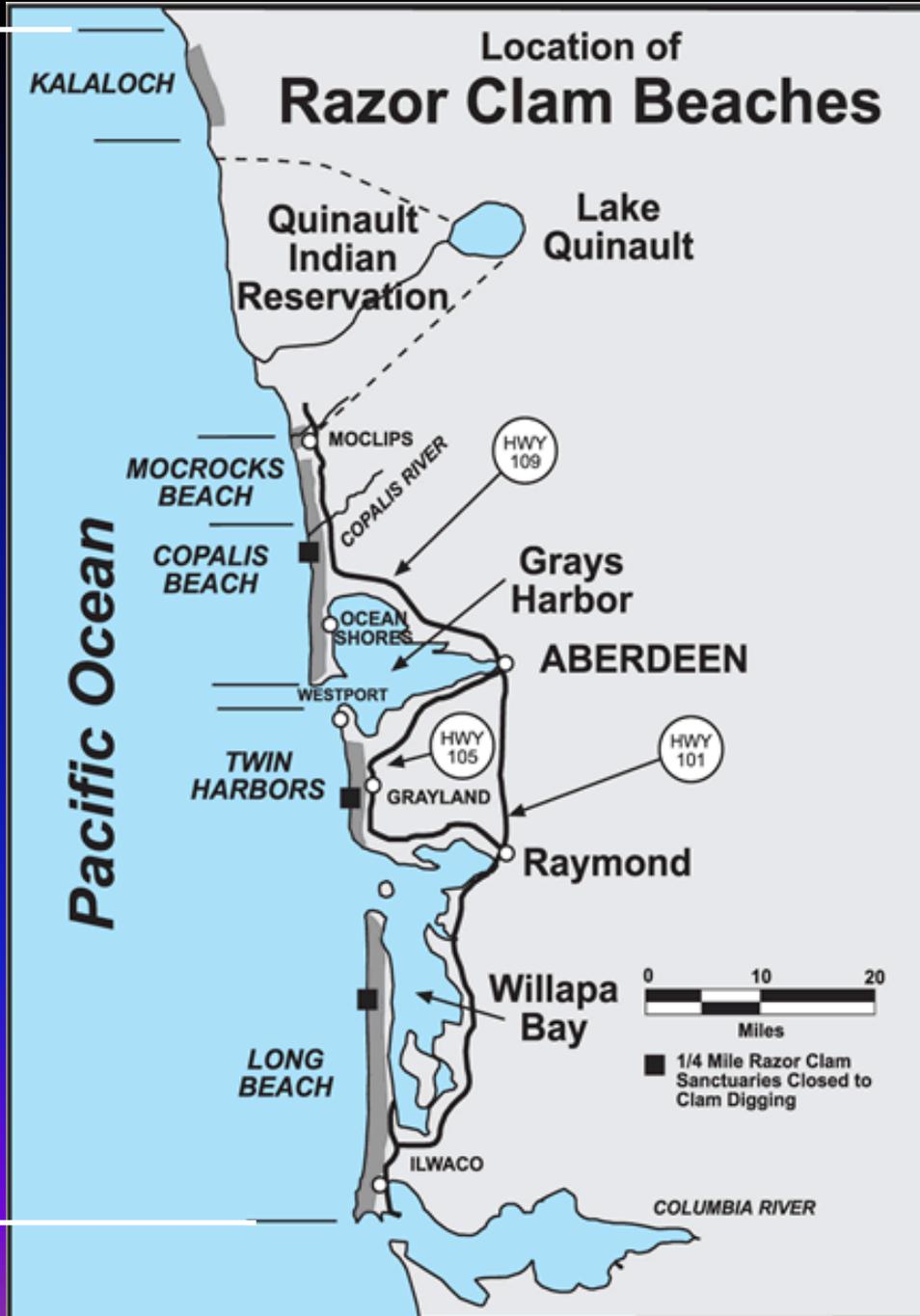
Particulate Domoic Acid



Domoic Acid in Razor Clam Tissue - 2015



May 8 all
Razor
clam
fisheries
closed and
they remain
closed.



WA Dept. of Fish and
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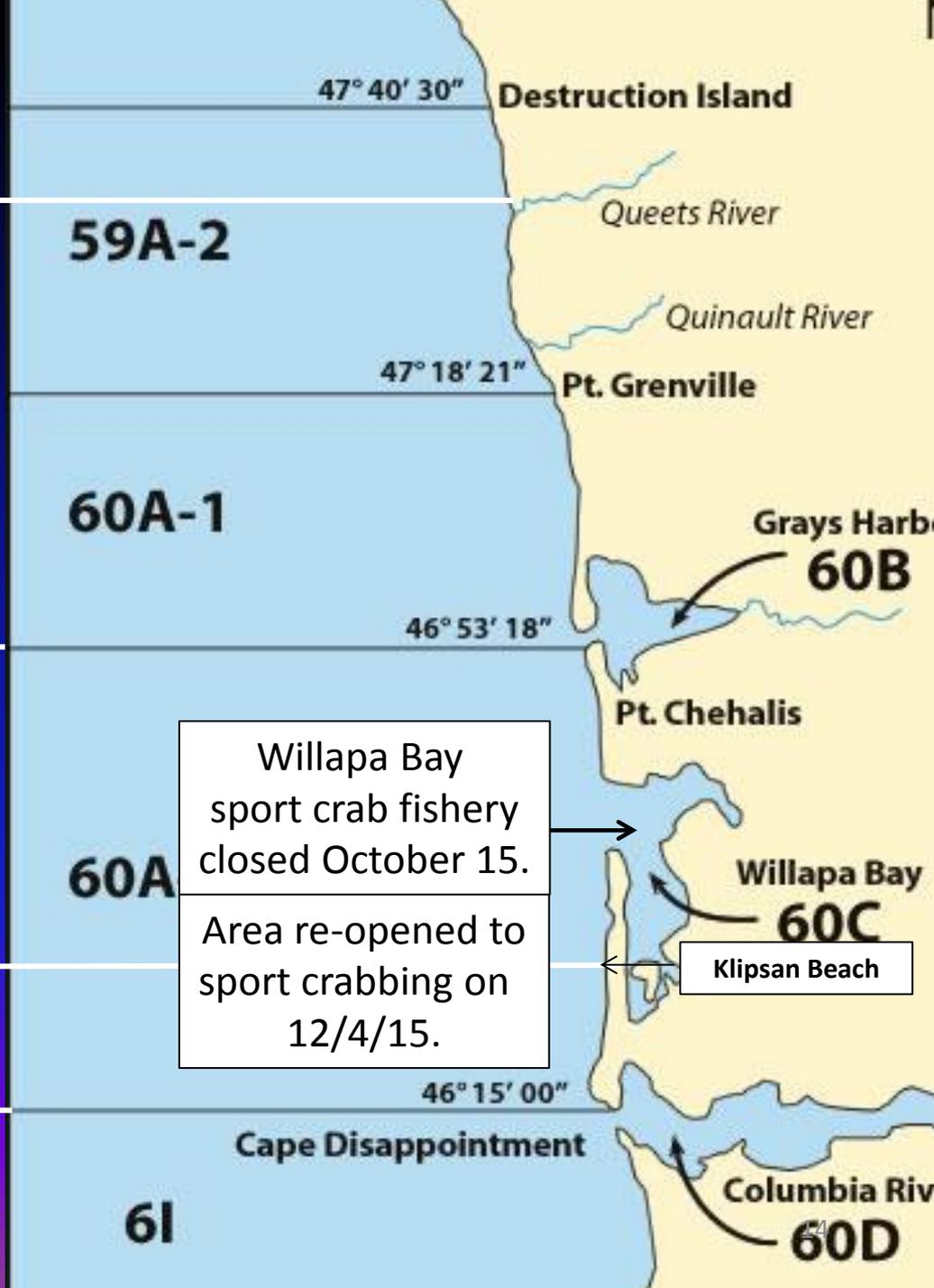
**August 3 commercial and sport
Dungeness crab
fisheries closed.**

Area reopened August 28
to commercial and sport.

**June 5 commercial and sport
Dungeness crab
fisheries closed.**

Sport reopened September 25,
(commercial season ended
September 15.)

**Typical December 1 opening of the
2015-16 season delayed, including
Oregon and California fisheries.**





The **Pacific razor clam** (*Siliqua patula*) is an exceptionally meaty shellfish which ranges from California to Alaska and they are especially abundant on surf-pounded ocean beaches of coastal Washington.

2014-2015 Fishery Review



Total harvest of
million clam

Average of
14.4 clams
per digger
trip





Washington Recreational Razor Clam Total Effort By Season

Digger Trips

450,000

400,000

350,000

300,000

250,000

200,000

150,000

100,000

50,000

0

1997-98

1999-00

2001-02

2003-04

2005-06

2007-08

2009-10

2011-12

2013-14

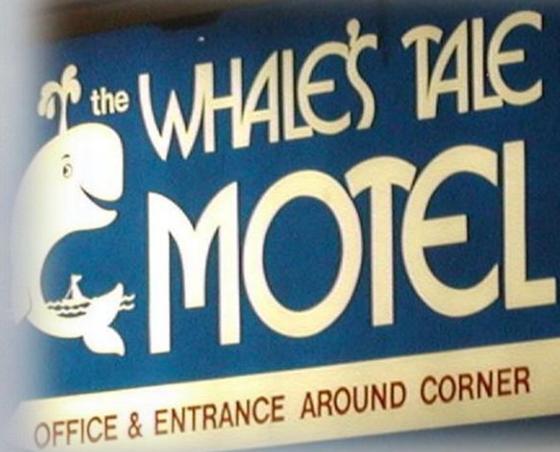
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Domoic acid closure

Domoic acid closure

Domoic acid closure





Businesses in coastal communities use revenue from winter clam digs to bridge the gap between summer seasons. Whether a beach opens for clamming or not can make or break these coastal towns.

BY JEFFREY P. MAYOR
The News Tribune

As many as 30,000 diggers a day descend on small beach communities during the normally quiet fall and winter months.

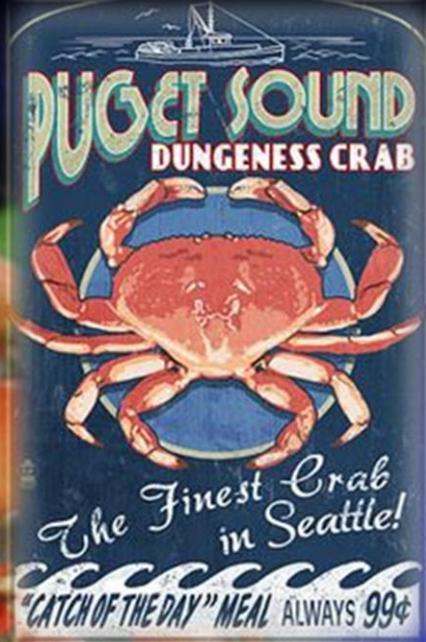
Washington Recreational Razor Clam Fishery Value



Closure of the majority of the 2015 commercial razor clam season resulted in a \$300 K loss to a small community of commercial harvesters.



Portland Crab



NEWPORT

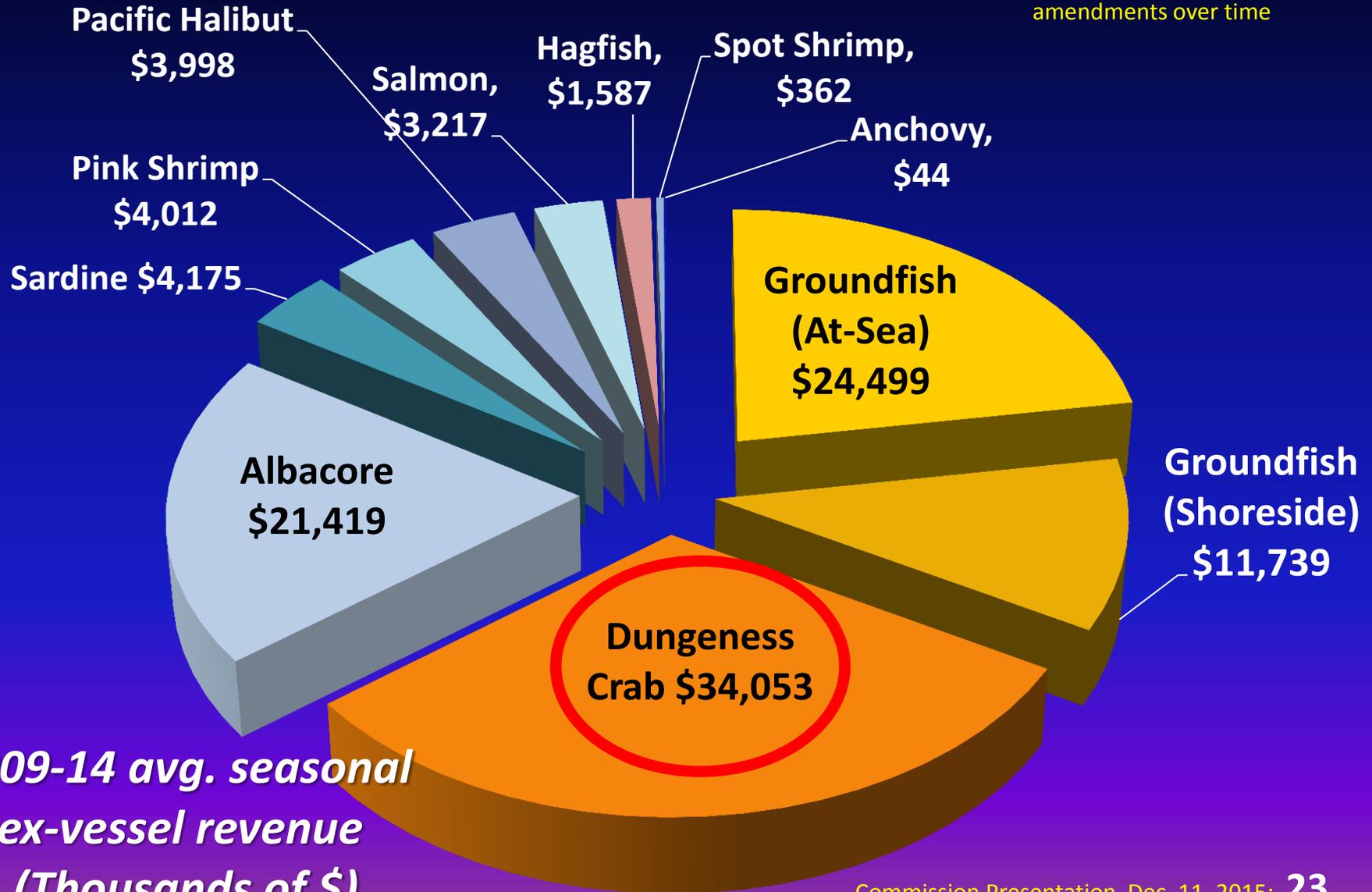


OREGON



WA Coastal Commercial Fisheries

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*2009-14 avg. seasonal
ex-vessel revenue
(Thousands of \$)*

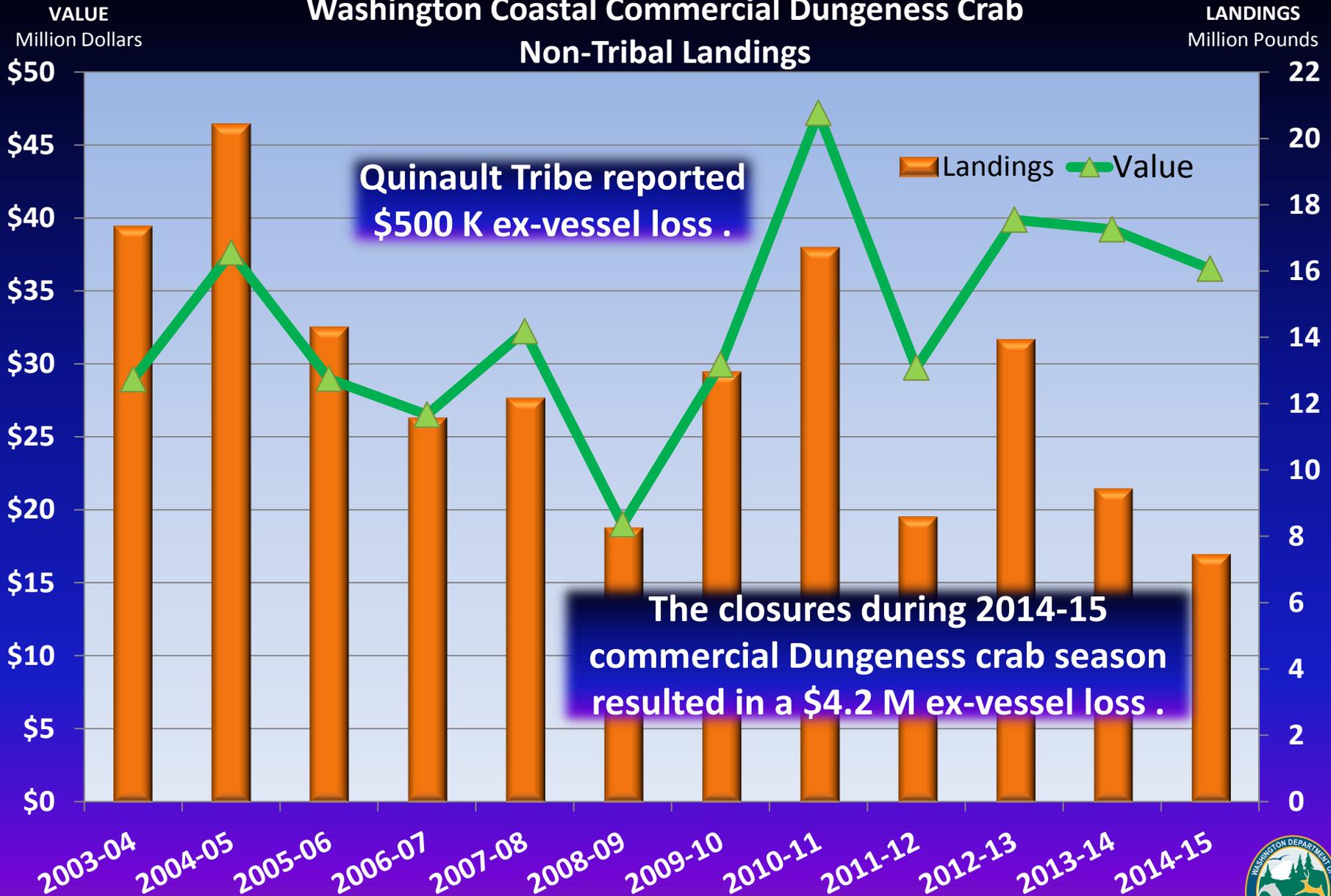






Washington Coastal Commercial Dungeness Crab

Non-Tribal Landings



Quinault Tribe reported \$500 K ex-vessel loss .

The closures during 2014-15 commercial Dungeness crab season resulted in a \$4.2 M ex-vessel loss .



2015 West Coast Harmful Algal Blooms: Toxic, Extensive, and Persistent

Friday, November 6, 2015 | 1:00 p.m.-2:00 p.m.
Cannon House Office Building | Room 121

Honorary Host – Representative Suzanne Bonamici (OR)

Starting in May 2015, a massive toxic bloom of the marine diatom *Pseudo-nitzschia* hit the west coast from central California to Alaska. It resulted in fisheries closures and numerous sea lion seizures, with some of the highest bloom-related toxin levels ever reported. NOAA has been working with federal, state, tribal, academic, and other partners to respond to and understand the harmful algal bloom (HAB). Speakers will describe impacts to state and tribal commercial, recreational, and subsistence fisheries, the communities that depend on the fisheries, and marine mammals. The panel will also share emerging information about the implications and possible causes of this year's HAB. The briefing is sponsored by the National Oceanic and Atmospheric Administration (NOAA) and the Integrated Ocean Observing System Association.

Welcome

Mary Erickson, Director for NOAA's National Centers for Coastal Ocean Science

Featured Speakers

Dan Ayres, Washington Department of Fish and Wildlife

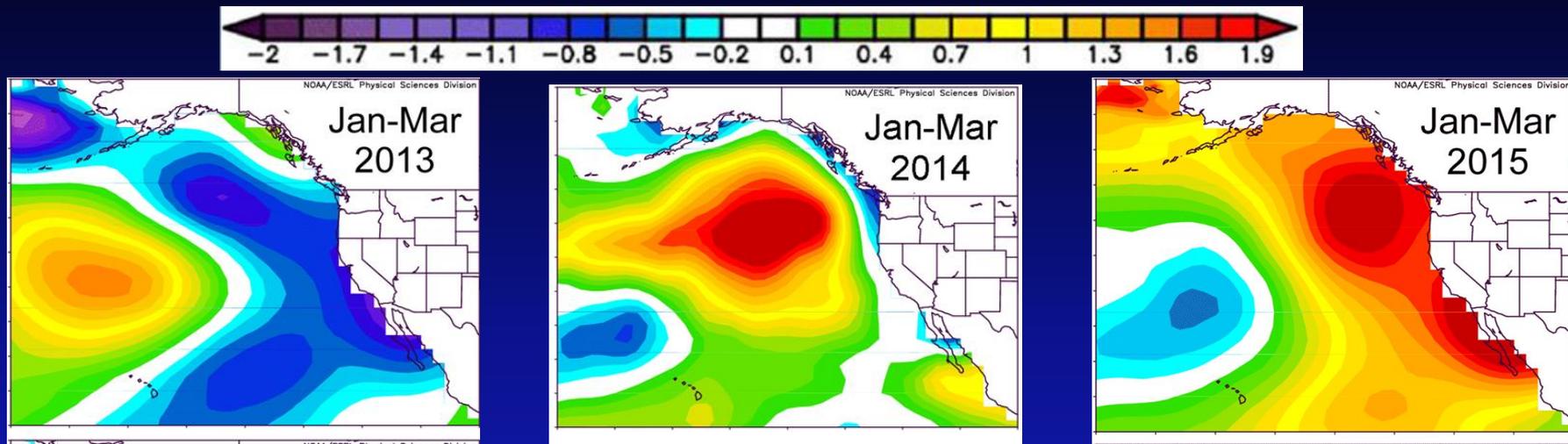
Raphael Kudela, Ph.D., University of California, Santa Cruz

Vera Trainer, Ph.D., National Oceanic and Atmospheric Administration

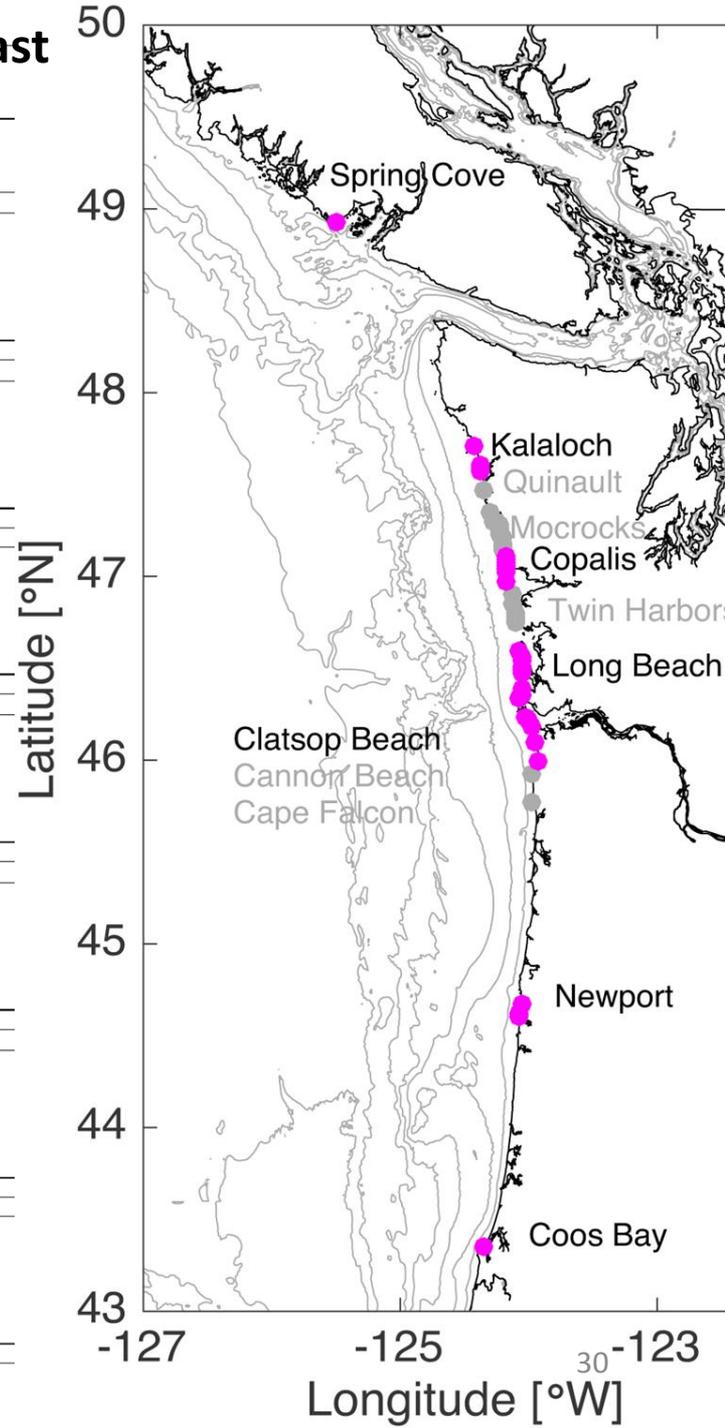
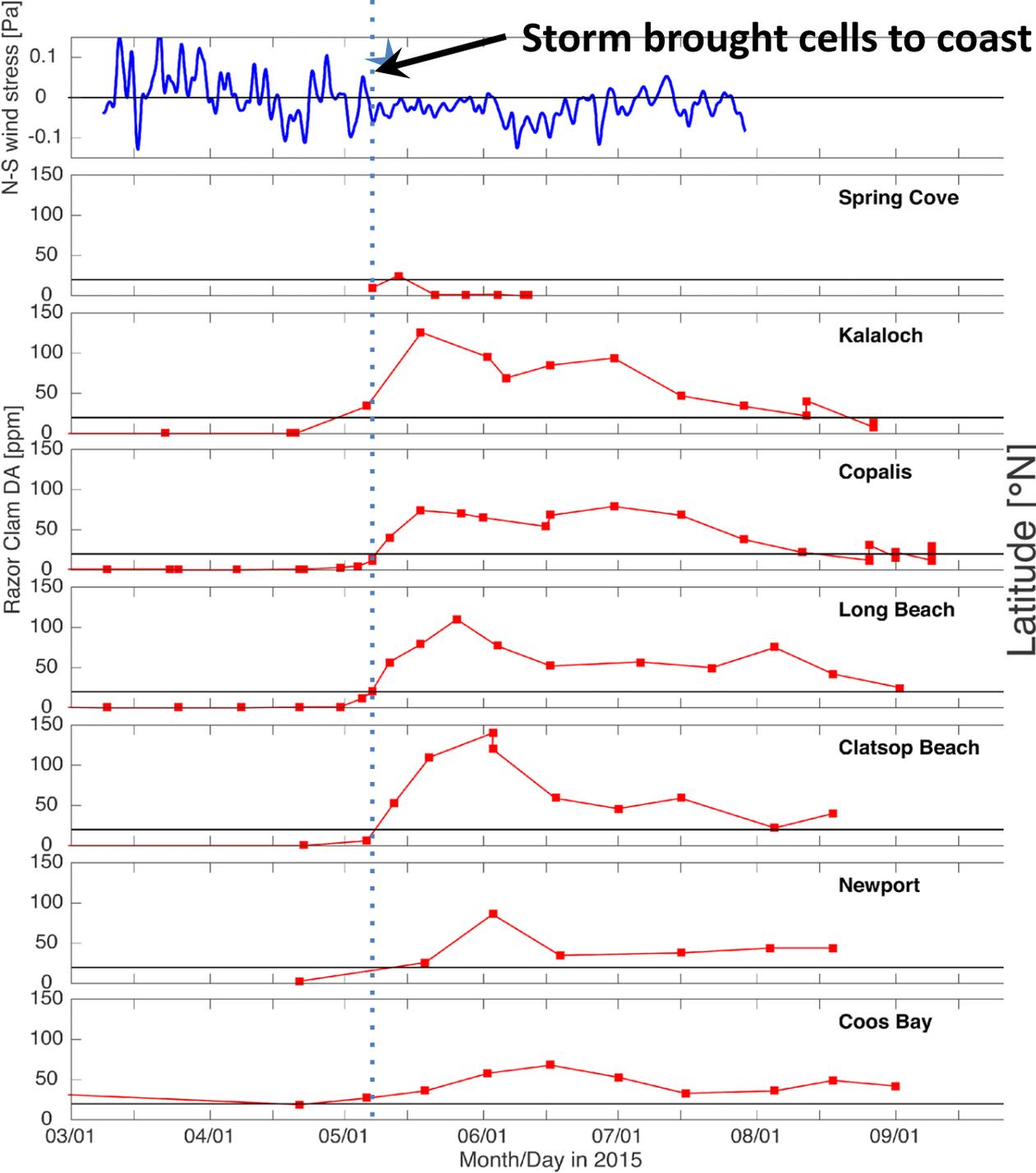
RSVP: Michael.Jarvis@noaa.gov, NOAA's Office of Legislative and Intergovernmental Affairs

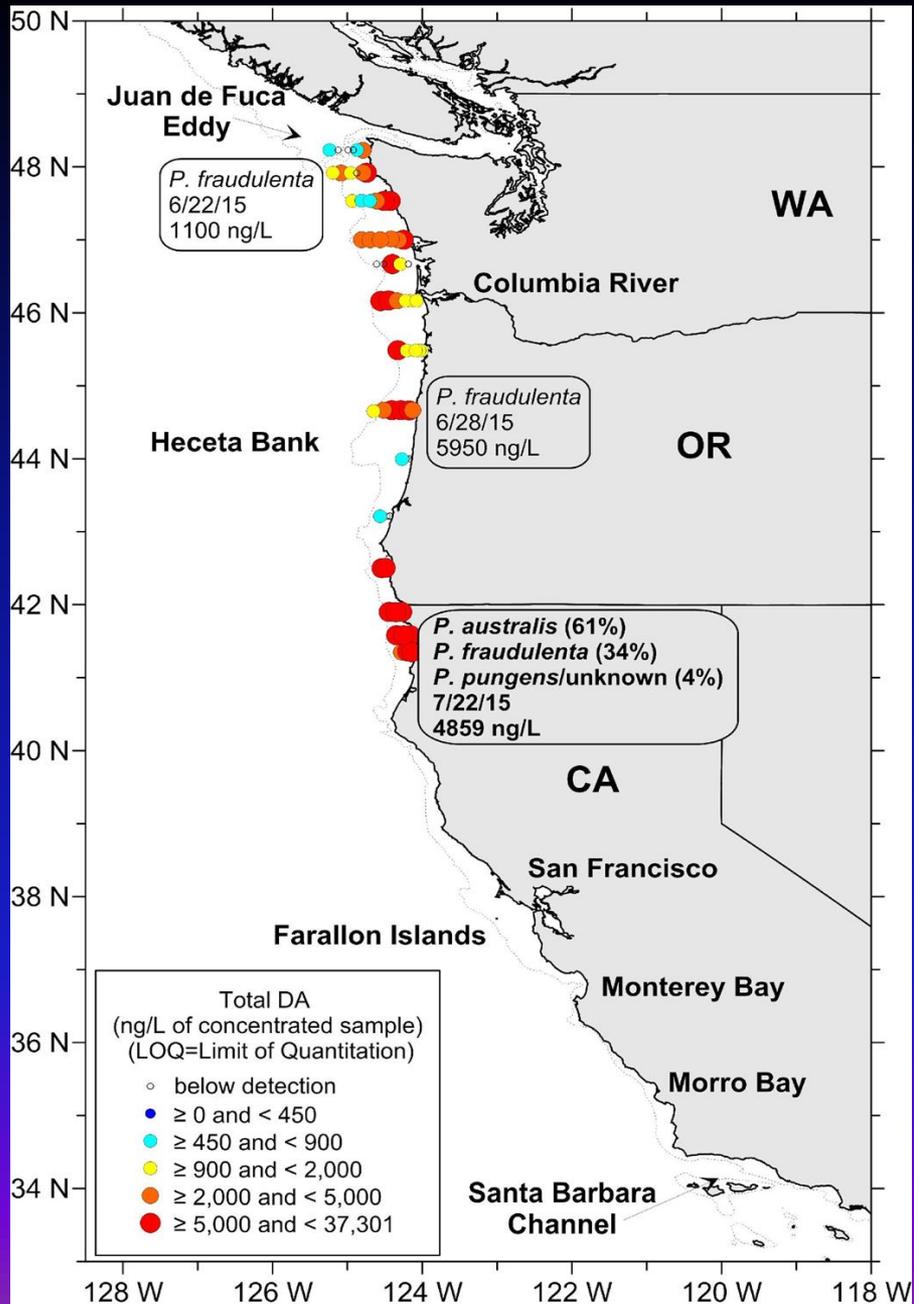


The "Blob"



- Drought, low snowpack
- Ocean temperatures 4°C (7°F) above normal.
- The blob is 1000 miles long and 300 ft deep
- An “incubator” for toxic algae
- Blob does not appear to be caused by climate change but is a “dress rehearsal” and is producing conditions that we believe will be more common with global warming

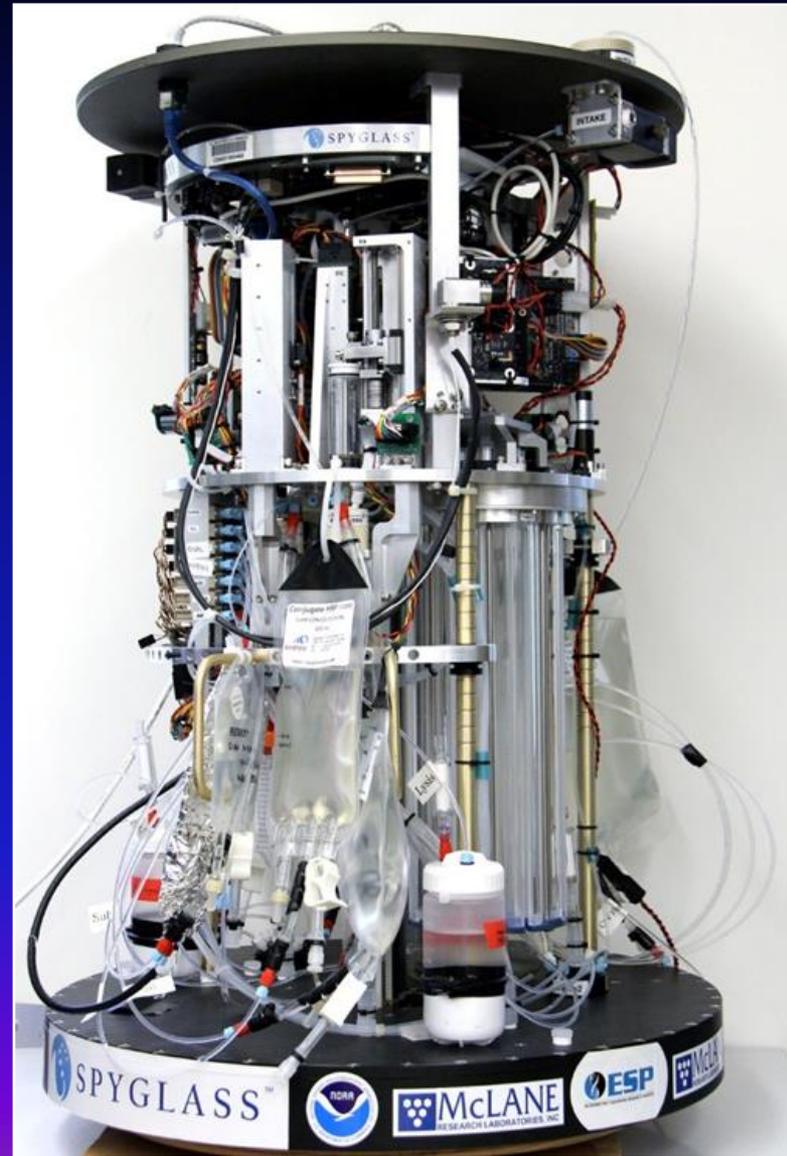




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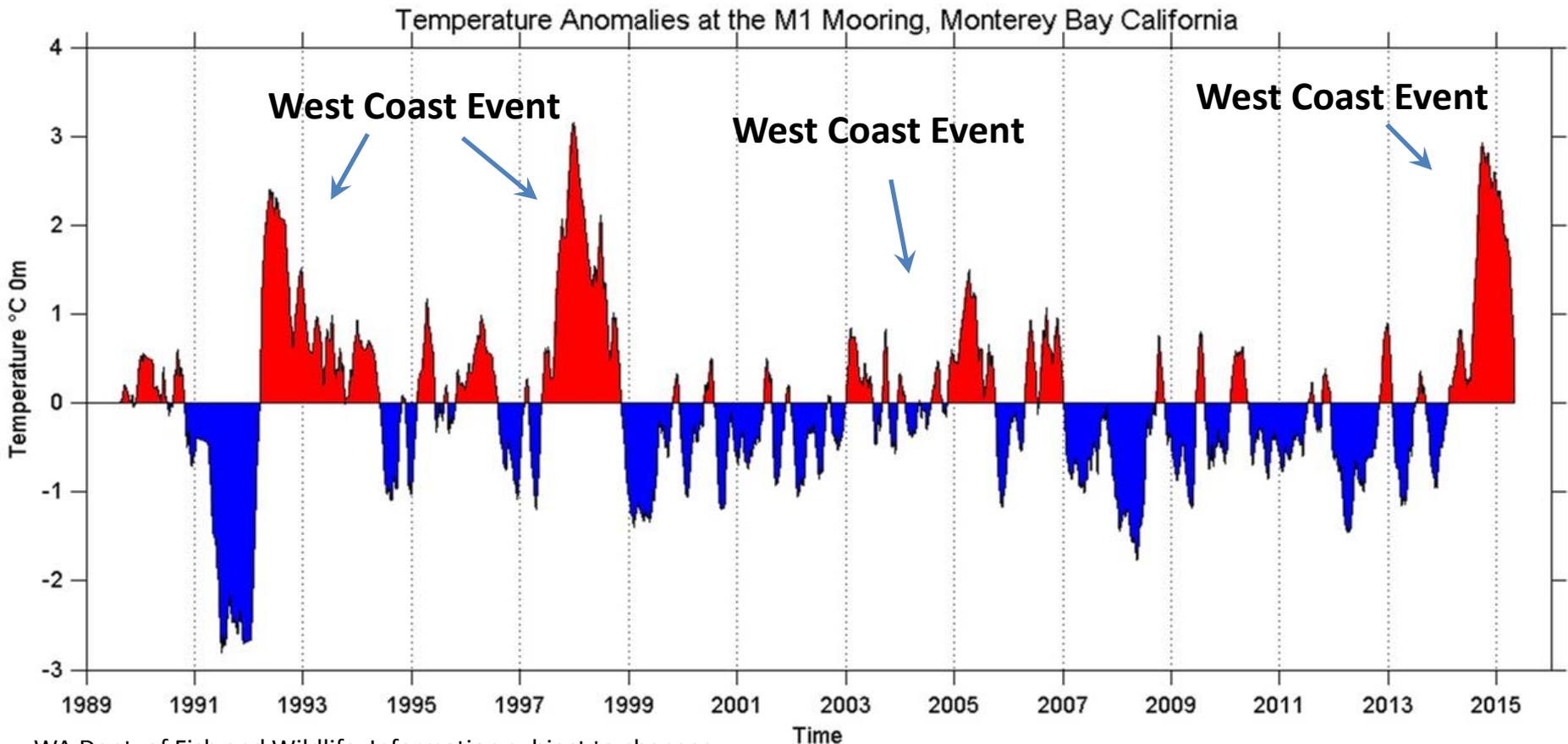
Environmental Sample Processor: “Lab in a Can” for Real-Time Toxicity & Intensity

- Provided early warning of toxicity in 2015 in California
- Expanded deployment in 2016 off WA Coast
- Data supports regional & national HAB forecasts



What does the future hold?

A strong El Nino could mean that additional fisheries closures lie ahead...





Oregon, Washington delay start of crab season because of toxin, joining California. *Nov. 23, 2015*



Clam closure bites coastal economy

Small snippets of text from the Chinook Observer article, including a red circle around a portion of the text.

Alarm rises over huge, persistent toxic algae on West Coast

CREATURES FROM ALASKA TO CALIFORNIA AFFECTED
Hoping for a 2016 Oregon crab season in Washington
By LYNDIA V. SHIFFRIN
It's among the bluest of bluing things, just a single cell. But Pseudo-nitzschia, a type of algae that revealed dangerous levels of domoic acid, produced by the algae, in the crabs.
Washington regulators are optimistic that state's prized crab fishery will open on time next month.
In Washington, the major clam season has been shut since spring and won't open until mid-December at the earliest. California has delayed its harvest since winter damage to the fishery.
The algal toxin also shut down the recreational razor-clam harvest in Oregon and caused the first ever closure of the Washington state Duquenois crab fishery on the coast.
The algal toxin has not caused as many deaths as it has in the past, said Dan Agon, coastal shellfish manager for the Washington Department of Fish and Wildlife.

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Commission Presentation.