



NOAA's One Health Approach: Integrating Environmental Information to Reduce Health Risks

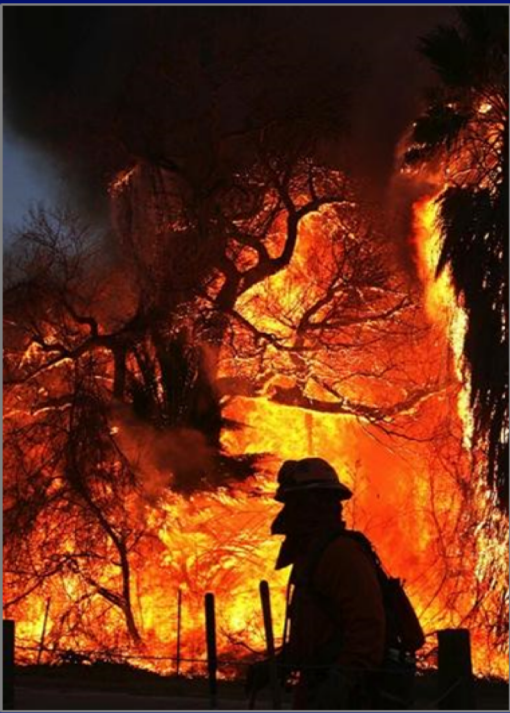
Juli M. Trtanj

**One Health and Integrated Climate
Extremes Research Lead**

NOAA Climate Program Office

**Drought and Health Summit
June 17-19, 2019**

Many human, animal and ecological systems are already beyond limits




What is One Health?



Animal Health



Human Health

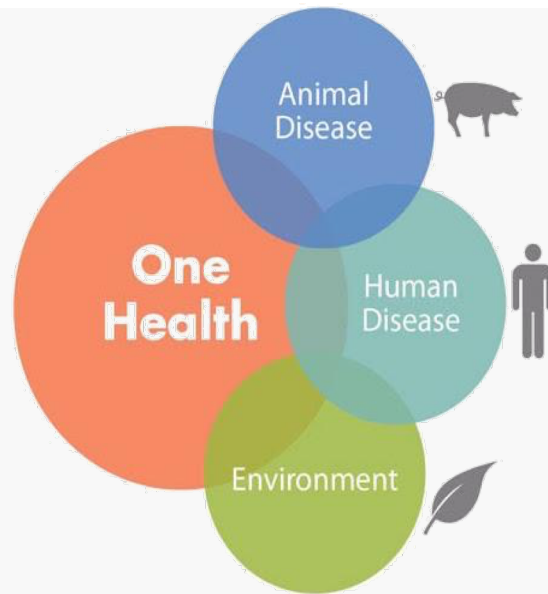


Ecosystem Health

One Health is "the collaborative effort of multiple disciplines – working locally, nationally and globally – to attain optimal **health** for people, animals and the environment".

NOAA's One Health Approach

Human health is intimately tied to environmental conditions, and NOAA provides key stakeholders in the public health sector with the environmental intelligence from NOAA they need to mitigate emerging health threats.



Current Activities

- Engagement between ESRL FIREX and CDC to share field campaign outcomes with health experts.
- Developing One Health Story Map for NOAA (September)
- Organizing NOAA One Health and NWS Weather Ready Nation Health Ambassadors Roundtable (2020).

Extreme Conditions

Heat, Drought,
Severe
Weather

The Arctic

Dramatic climate-driven changes to regional ecosystems impact local human health

Air Quality

Aero-allergens, pollution
Weather patterns and
atmospheric drivers

Vector-Borne Disease

Climate impacts on ranges and transmission

Benefits from the Sea

Marine products and nutrition

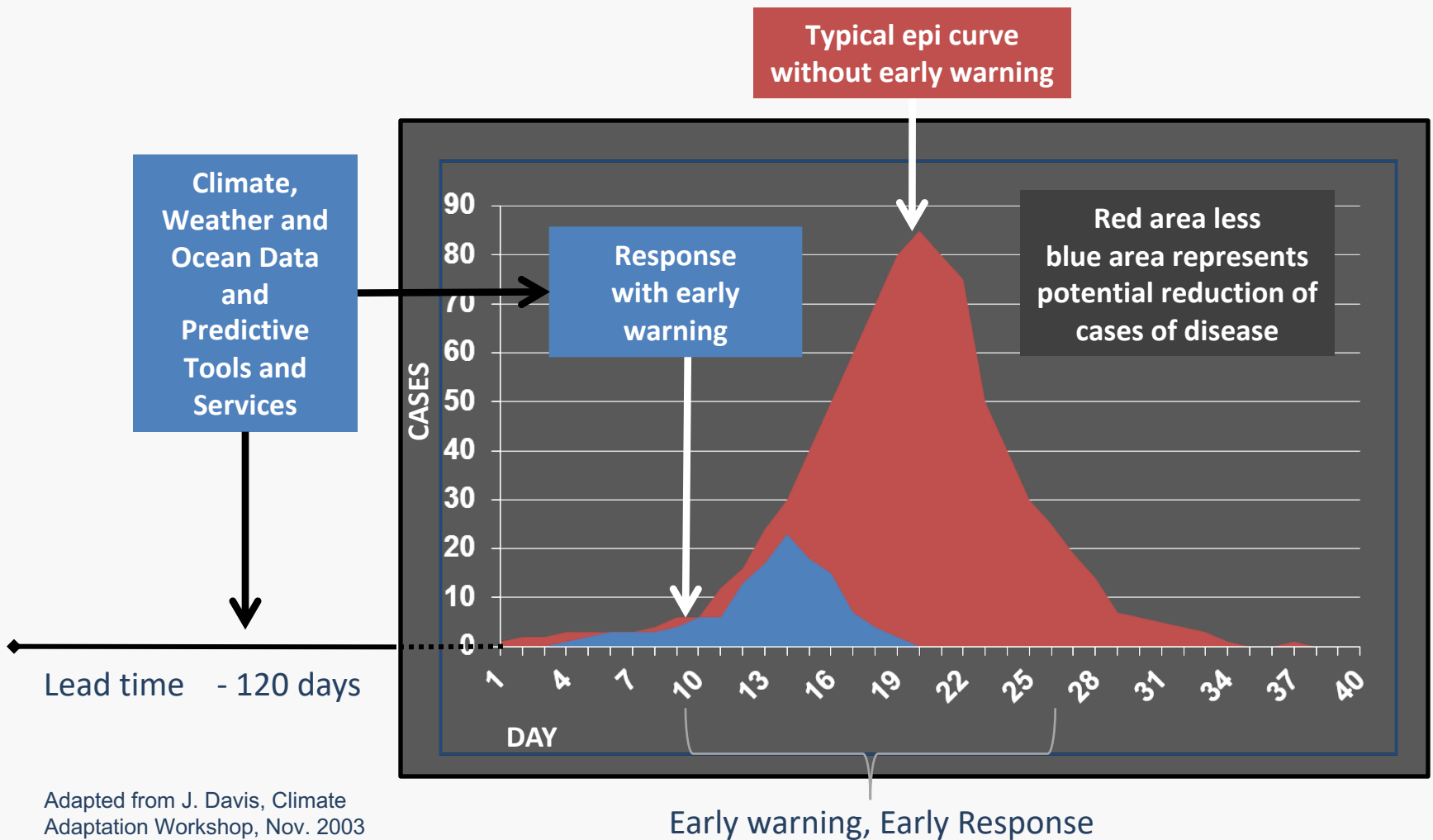
Water-Borne Disease

Harmful algal bloom and Vibrio forecasts; Water Quality

Marine Mammal Disease

Marine Mammal Health M.A.P.
Unusual Mortality Events

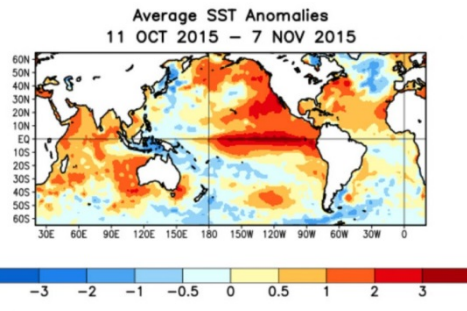
Getting ahead of the Curve: Changing the Culture to Prediction, Planning, and Prevention



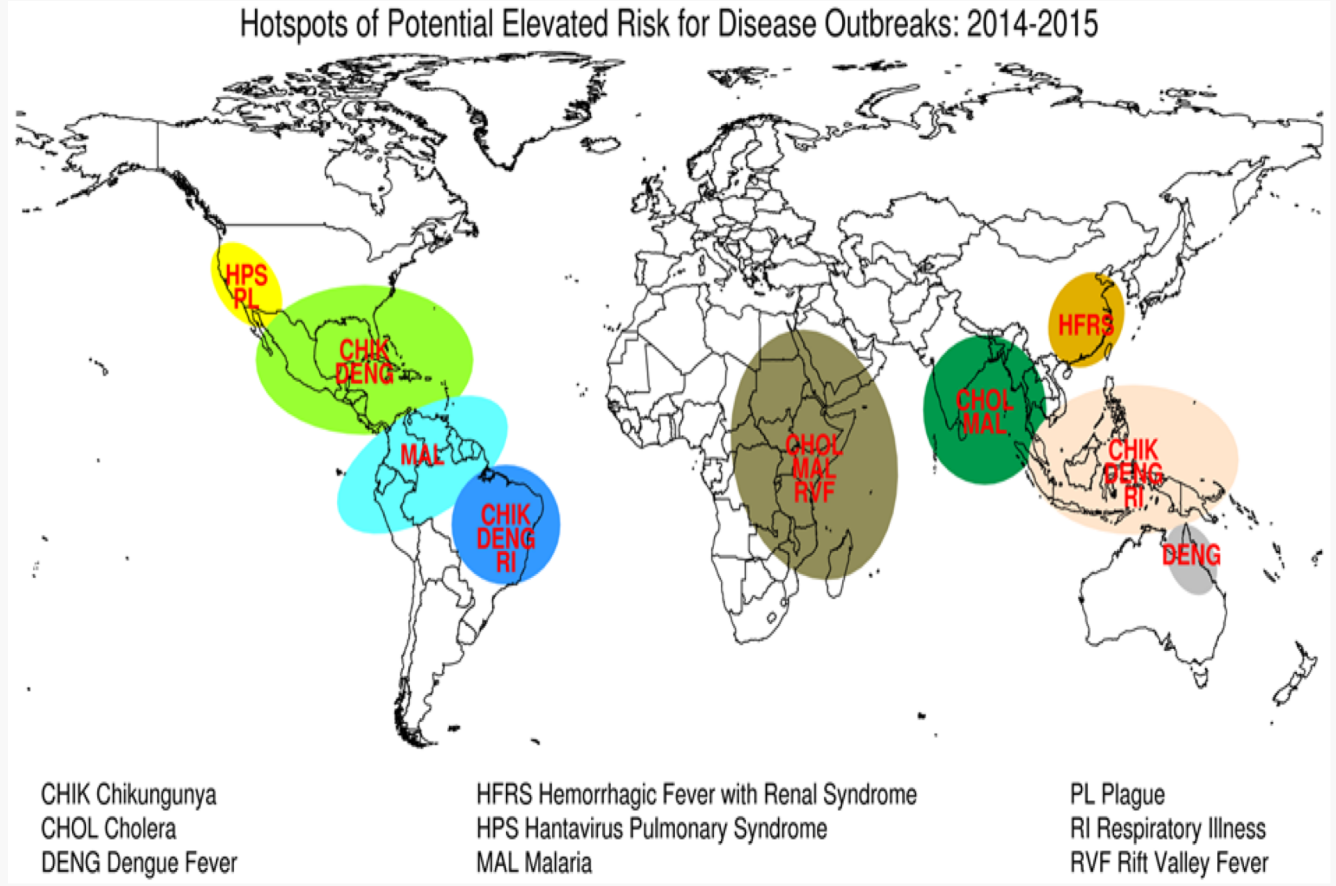
Adapted from J. Davis, Climate Adaptation Workshop, Nov. 2003



Predicting Infectious Disease Risk



Predicting possible disease outbreaks during El Niño events such as the '14-'16 event could inform early action

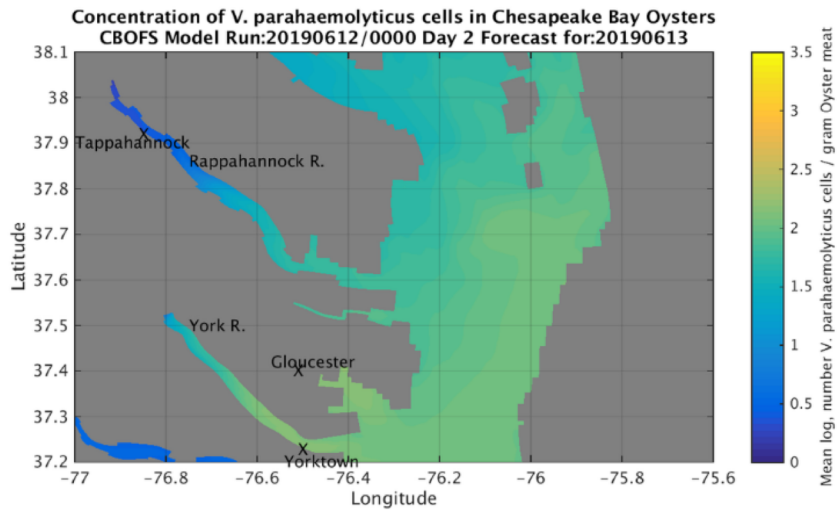


Chretien J, Anyamba A, Small J, Britch S, Sanchez JL, Halbach AC, Tucker C, Linthicum KJ. Global Climate Anomalies and Potential Infectious Disease Risks: 2014-2015. PLOS Currents Outbreaks. 2015 Jan 26 . Edition 1. doi: 10.1371/currents.outbreaks.95fbc4a8fb4695e049baabfc2fc8289f.

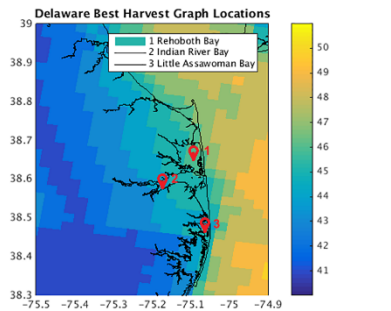


Predicting Vibrio Risk

Vibrio Prediction 13 June 2019

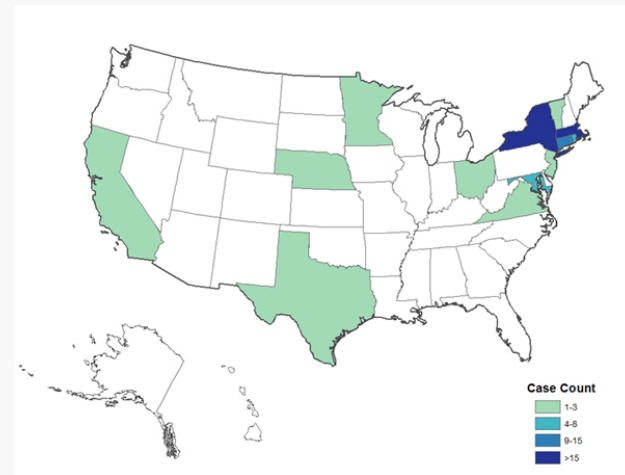


These graphs allow users to determine where and when the highest doubling times will occur in advance to plan harvest and cooling strategies

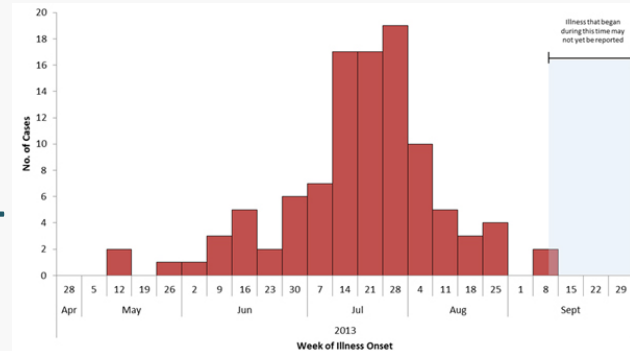


2013 parahaemolyticus Outbreak

Case Count = 104



Epi Curve



Public Health - 2010

Rift Valley Fever

Emerging Health Risk Notification

- **Emerging Health Risk Notification, 20 Dec 2015. El Niño and Rift Valley fever (RVF) risk, east Africa.** This Notification is a pilot effort of an interagency working group that integrates Federal expertise to synthesize risk information and response options for biological threats to US citizens and interests. The Notification is provided to USG operational biosurveillance centers for analysis and dissemination. *Pandemic Prediction and Forecasting Science and Technology Working Group (PPFST).*

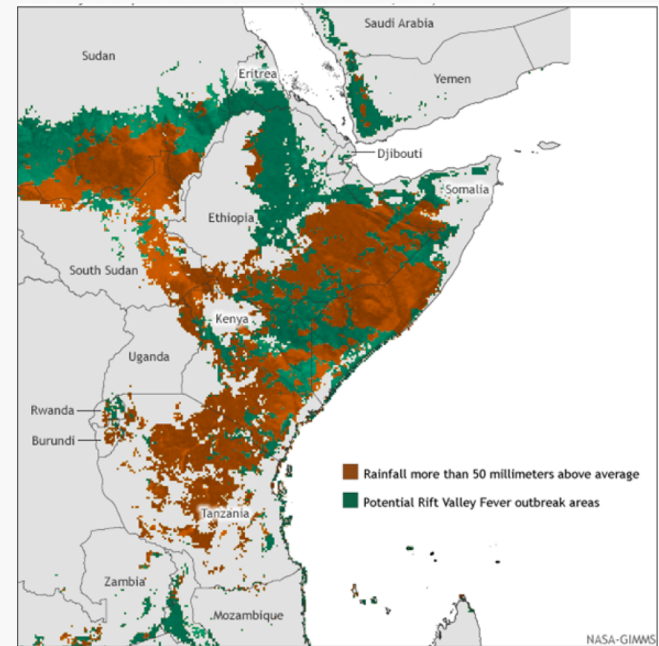


Fig 2. Rainfall RVF hotspots in east Africa, 1 Oct-16 Dec 2015.

Dark green: Potential epizootic areas (areas with previous known or predicted presence of RVF virus).
Dark red: Potential epizootic areas with recent heavy rainfall. These are current RVF risk areas.
NASA/GSFC/GIMMS, USDA/ARS/CMAVE.

Predicting Climate Sensitive Infectious Diseases to Protect Public Health and Strengthen National Security

- While NOAA, NASA, and other agencies have supported research on this topic, the activities are not well integrated nor well used by decision makers for planning, preparing and building resilience.
- Activities were conducted under the auspices of the USGCRP Interagency Group on Integrated Modeling (IGIM), the USGCRP Interagency Crosscutting Group on Climate Change and Human Health (CCHHG), and the Pandemic Prediction and Forecasting Science and Technology Working Group (PPFST).

Key takeaways from the report include needs for:

- **Engaging the Academic Community**
- Identifying sustainable **institutional design** & best practices
- **Interagency and Academic partnership arrangements** for joint product development.
- **Global Risk Mapping** to support troops abroad
- **Seasonal Forecasts for Health** early warning
- **Platform(s) to share data** from earth observation, environmental sampling, public health, and socio-economic data sets
- **Innovation challenges** to encourage novel solutions



Drinking and Recreational Waters and Harmful Algae

Toledo's water crisis



An algal toxin in Lake Erie contaminated the drinking water used by Toledo and many of its suburbs in August, 2014. It prompted a "do not drink" advisory for parts of three days and fueled public discussions about what created the problem and how to prevent it from happening again.

Saturday, Aug. 2: City issues 'do not drink' water advisory

Over a half million people impacted by "Do Not Drink Advisories" in Northwest Ohio and Southeast Michigan.

(August 1--3, 2014)



What Sentinels Species Are Telling us?



Ken Weiss

- **Unexplained mortalities of marine mammals and sea turtles increasing**
- **HABs kill manatees; 50% of sea otter mortality related to exposure to run-off of land-based pathogens; 15% of CA sea lions have cancer**
- **Degraded coastal habitats provide early warning of large-scale aquatic ecosystem impairment that can impact human health**
- **Links to El Nino Southern Oscillation and Pacific Decadal Oscillation**

Building Awareness and Capacity-people and institutions

**Answer the Right Question
Define Demand and Requirements**

Provide Information Useful for Decision-makers

Effective Actions for Preparedness and Resilience

Communicate and Engage

Make or sustain Surveillance, Observations, Monitoring & Predictions

Research Underpins the ENTIRE Integrated Information System

National Integrated Heat Health Information System

- NOAA and CDC launched the National Integrated Heat Health Information System (NIHHIS) in June of 2015 to address heat across timescales
- NIHHIS quickly grew to include representation from several agencies (right) in an interagency working group. The group launched the [NIHHIS portal](#) and began harmonizing information and guidance.
- NIHHIS has also launched regional, trans-boundary pilots to understand local decision-making contexts and needs, and to improve the information.
- Interagency, Pilots, Partners, Web Portal, student rotations, GHHIN



The National Integrated Heat Health Information System weaves together existing pieces, identifies information needs and helps to develop needed climate services.

NIHHIS will facilitate an integrated approach to providing a suite of decision support services to reduce heat related illness and death



NOAA's 9 Key Focal Areas



Weather >



Climate >



Oceans & Coasts >

Health isn't one of them.



Fisheries >



Research >



Satellites >

It's in all of them.



Marine & Aviation >

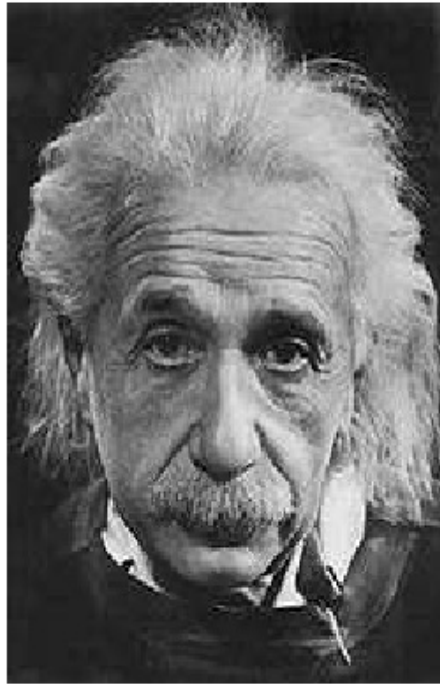


Charting >



Sanctuaries >

Thinking in Systems



“The problems we have created in the world today will not be solved by the level of thinking that created them.”

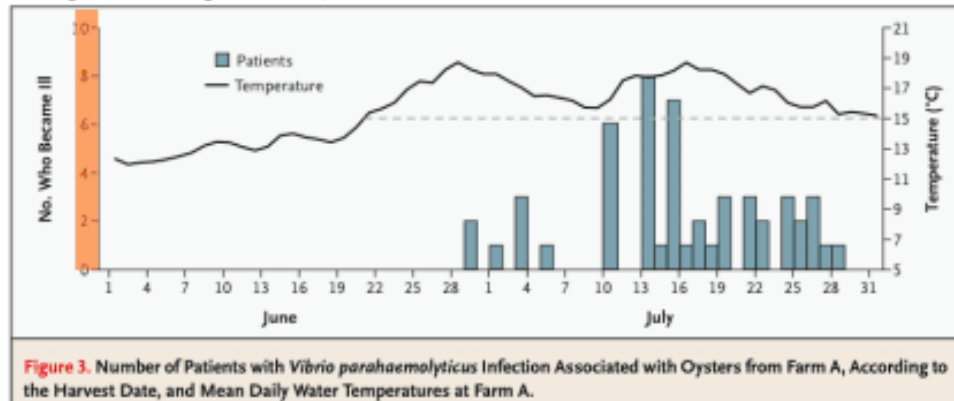
--Albert Einstein

Image Source: Flickr Creative Commons, by [mansionwb](#)

Thank You!

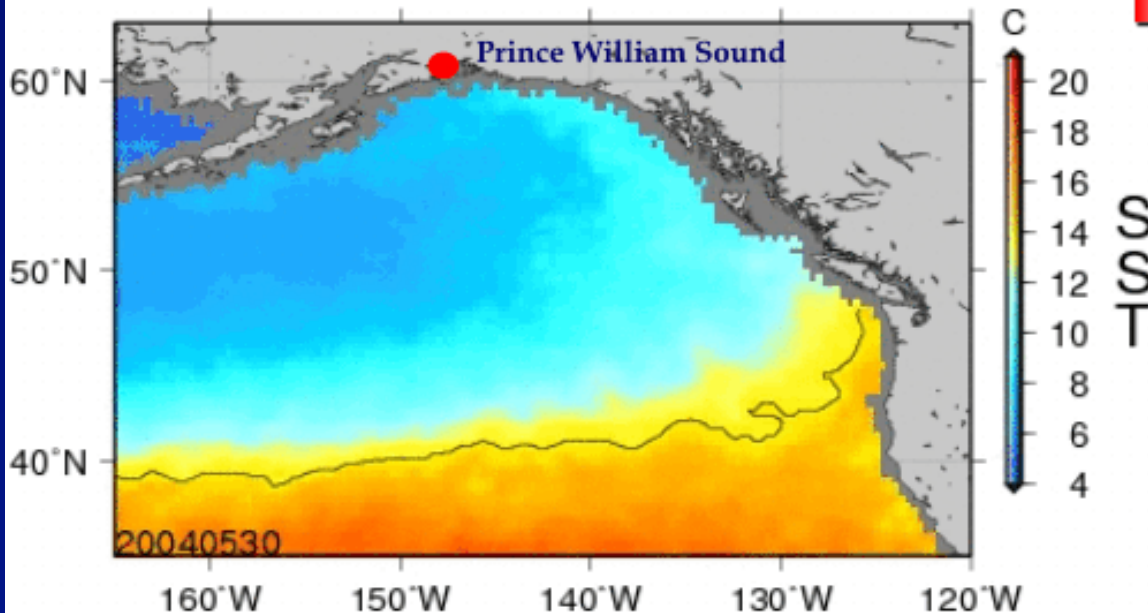
Alaska Vibrio Outbreak

McLaughlin et al. N Engl J Med 2005;353:1463-70



■ 2004 – 62 cases associated with shellfish consumption.

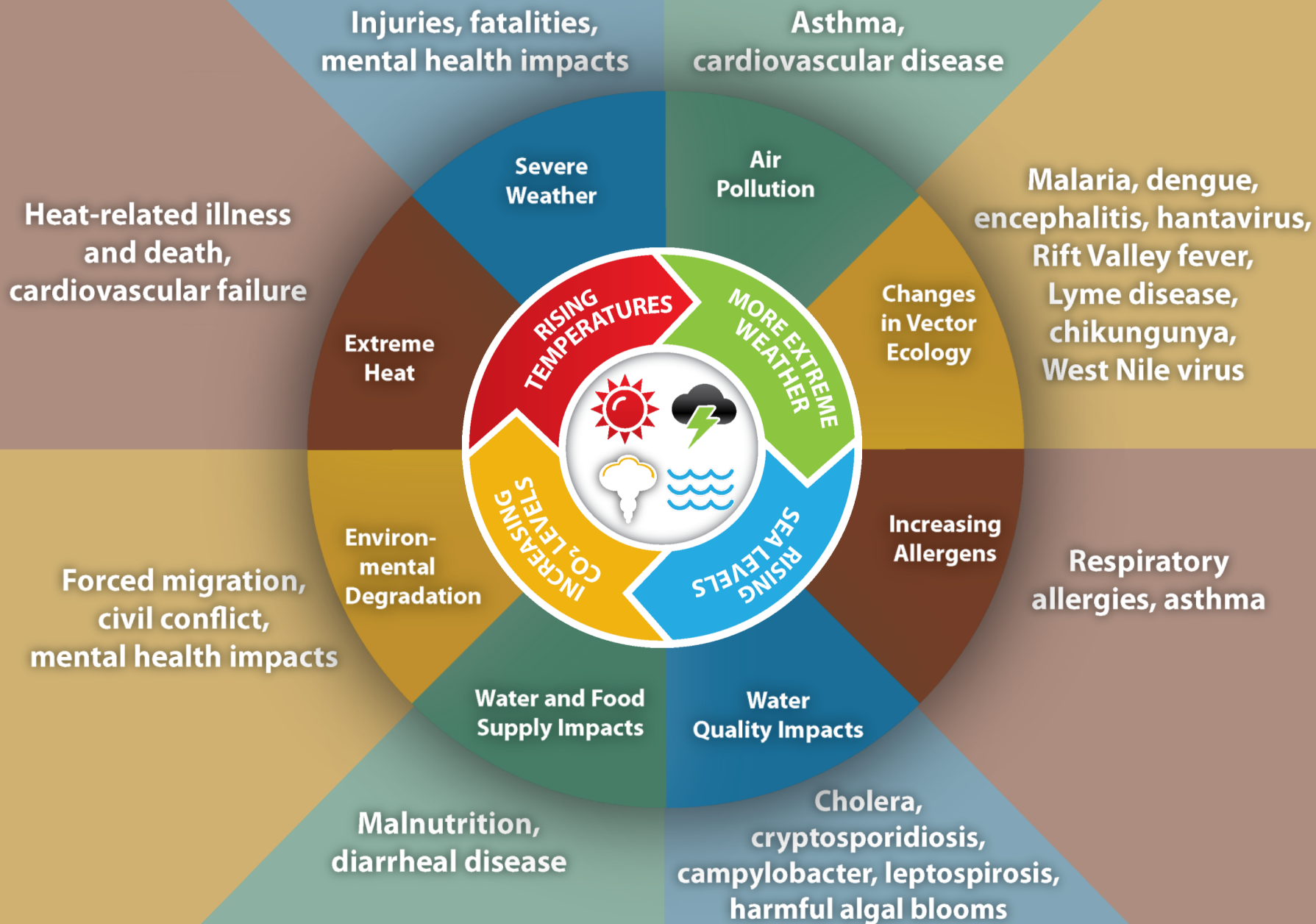
■ *Vp* O:4 K:12 – transported from Puget Sound



Joaquin A. Trinanes & J. Martinez-Urtaza NOAA/AOML (USA)-University of Bath (UK)-Univ. of Santiago de Compostela (Spain)

Martinez-Urtaza, Bowers, Trinanes, and Depaola (2010) Food Research Int.

Impact of Climate Change on Human Health



Links and Resources

- National Center for Environmental Information-weather and climates, oceans, coasts, geophysics
<https://www.ncei.noaa.gov>
- Climate Resilient Toolkit-tools, case studies, do it yourself, learn from others <https://toolkit.climate.gov/>
- NIHHIS <https://toolkit.climate.gov/nihhis/>
- Global Heat Health Information Network <https://ghhin.org>
- NOAA Climate Program Office
<http://cpo.noaa.gov/GrantsandProjects.asp>

