

# Climate and Health: Overview from the United States

NOAA, the US Climate Health Assessment,  
the National Integrated Heat Health Information System,  
and International Engagement



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**One Health Lead, Climate and Weather Extremes Integration Lead**  
**NOAA Climate Program Office**

OCG Climate and Health Summit  
June 21, 2016

# Walk Through

- Overview of US Global Change Research Program Climate Change and Human Health Interagency Crosscutting Group
- The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment: overview and follow on actions
- The NOAA One Health Group
- The National Integrated Heat Health Information System (NIHHIS) and Global Heat-Health Information Network
- International Activities

# US Global Change Research Program: Interagency Crosscutting Group on Climate Change and Human Health (CCHHG)

## Mission Statement:

*To promote and protect the Nation's public health by leading and coordinating Federal scientific activities related to climate change and human health in an end-to-end manner, from basic research through public health practice.*

## Foci:

- Advance scientific research and predictive modeling of health outcomes
  - Produce data integration tools and products
  - Support assessment activities
  - Provide focal point and engage with Federal and non-Federal stakeholders, both domestically and internationally
- *USGCRP established by law in 1990: Thirteen Federal Agencies*

# CCHHG Membership

- Co-chaired by CDC, NOAA, and NIH
- Representatives from USAID, DOS, EPA, NIEHS, NASA, USGS, USDA, DHS, OSTP, DoD, HHS—ASPR, OASH, FDA...



# USGCRP Climate and Health Assessment

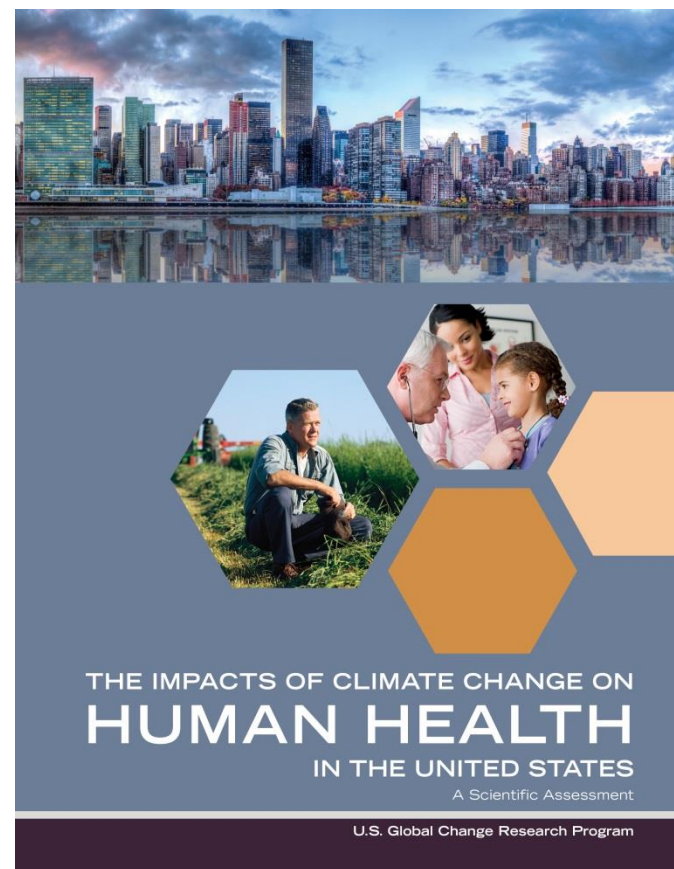
**White House Released April 4, 2016!**

## **What is the USGCRP Climate and Health Assessment?**

- An Interagency product of the US Global Change Research Program (USGCRP)
- Part of the National Climate Assessment (NCA) sustained assessment process and called for under the President's Climate Action Plan

## **What is the purpose of the Climate and Health Assessment?**

- Enhance understanding about the growing threat climate change poses to the health and well-being of Americans
- Inform decisions made by public health officials, planners, decision makers, and stakeholders



[health2016/globalchange.gov](http://health2016/globalchange.gov)

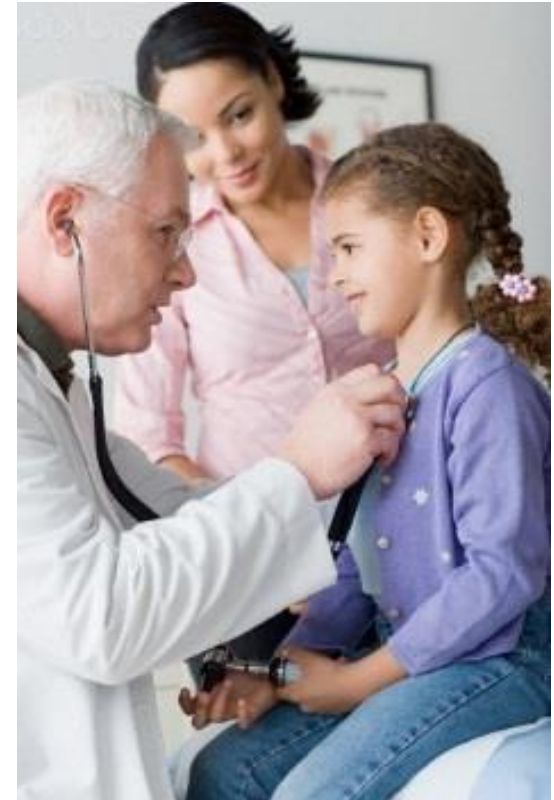





# Process and People

## What was the process for development?

- Driven by the USGCRP Interagency Crosscutting Group on Climate Change and Human Health (CCHHG)
- Coordinated by the EPA
- Written by a team of ~100 Federal employees, contractors, and grantees from eight U.S. Federal agencies: HHS (NIH, CDC, NIOSH, ASPR, FDA, SAMHSA), NOAA, EPA, USDA, NASA, USGS, DOD (USUHS), VA
- Extensively reviewed by the public and experts, including a committee of the National Academies of Sciences and the 13 Federal agencies of the USGCRP; draws from a large body of scientific peer-reviewed research



# Top Line Messages of the Report

- 
- Climate change is a significant threat to the health of the American people.
  - Climate change exacerbates some existing health threats and creates new public health challenges.
  - This assessment significantly advances what we know about the impacts of climate change on public health, and the confidence with which we know it.
  - Every American is vulnerable to the health impacts associated with climate change.

## Table of Contents

1. **Climate Change and Human Health (Introduction)**
2. **Temperature-Related Death and Illness**
3. **Air Quality Impacts**
4. **Extreme Events**
5. **Vectorborne Disease**
6. **Water-Related Illnesses**
7. **Food Safety, Nutrition, and Distribution**
8. **Mental Health and Well-Being**
9. **Populations of Concern**



# Significant Findings

## Quantifies future increases in temperature-related deaths

- Confirms very high confidence in association between hotter- and colder-than-normal temperature and increased illness and death
- Quantifies the increase of thousands to tens of thousands of premature heat-related deaths projected in the summer due to climate change
- Assesses the impact of changes in tolerance to extreme heat on future deaths from heat

## Confirms air quality impacts and provides likelihood for ozone, wildfire impacts

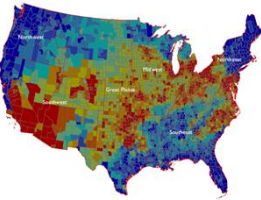
- Provides new likelihood assessment (likely) and high confidence that climate change will make it harder for any given regulatory approach to reduce ground-level ozone pollution, and that increased wildfires increase risk of premature death, adverse cardiovascular/respiratory outcomes
- Confirms high confidence that increases in airborne allergens will worsen allergy and asthma conditions and confirms indoor air health risks as significant emerging area

## Connects changes in extreme events to increased exposure to health impacts

- Describes health impacts to extreme events with high confidence, including death, injury, or illness; exacerbation of underlying medical conditions; and adverse effects on mental health

## Identifies impacts to health from disruption of essential infrastructure

High confidence that coastal flooding will impact vulnerable communities





# Significant Findings



## **Provides likelihood of changing vector distribution, expands discussion of WNV**

- Likely, high confidence in changing geographic and seasonal distribution of ticks carrying Lyme, and likely, medium confidence in increases in risk to human exposure
- Assessment of impacts of West Nile virus show very likely, high confidence in climate change influence on distribution, abundance, and prevalence of infection in mosquitoes



## **Details sources and pathways (drinking, recreational) of waterborne illness risk**

- Disaggregates confidence and likelihood for changes in multiple water-related illnesses from Vibrio bacteria, marine harmful algae, freshwater harmful algae, and runoff sources
- Describes health impacts of water infrastructure damage or failures



## **First assessment of rising CO<sub>2</sub>, climate on quality (nutritional value) of food**

- Describes impacts of pathogens, toxins, and chemical contaminants in US food chain



# Significant Findings



## **Presents an important emerging area: increased mental health consequences**

- Confirms Very High Confidence in extreme weather and climate related impacts including post-traumatic stress disorder (PTSD), depression, and anxiety, often at the same time
- Introduces issue of mental health impacts from the real and perceived threats of climate change and risks of heat exposure to people with pre-existing mental health illnesses or prescription medications



## **Details the ways in which climate change affects the health of us all**

- People experience different inherent sensitivities to the impacts of climate change at different ages and life stages. For example, the findings confirm with very high confidence the very young and old are particularly sensitive to climate-related health impacts.

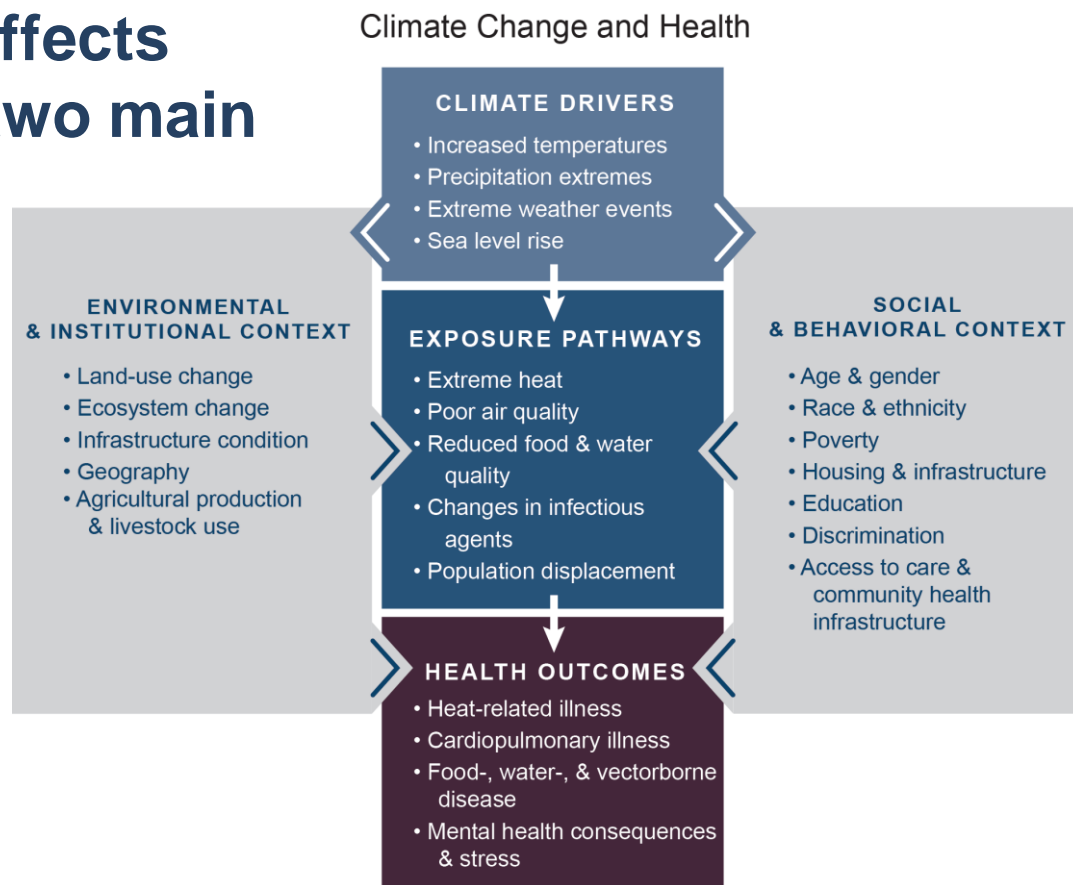


# Chapter 1: Introduction: Climate Change and Health



## Climate change affects human health in two main ways:

1. Changing the severity or frequency of health problems that are already affected by climate or weather factors
2. Creating unprecedented or unanticipated health problems or health threats in places where they have not previously occurred.



# CCHHG Next Steps

- Develop Science/Research Plan
- Cross Agency Investigator Meeting (Feb 2017)
- National Climate Assessment-focus on Regions
- International engagement coordination: India, GEO, GFCS, US/Mexico/Canda
- Climate and Health Training and Capacity Building

# NOAA One Health Goals

This NOAA-wide Group will advance NOAA's science and services to inform health decisions through:  
*improved understanding of the linkages between environmental conditions and health outcomes, and  
delivery of useful prediction products, data and tools*



Animal  
Health



Human  
Health



Ecosystem  
Health

Thematic areas include:

- Wildlife and Zoonotic Disease
- Air Quality
- **Heat (Thermal Extremes)**
- Vector-Borne Disease
- **Water-borne Illness**
- Natural Products
- Safe Food
- Arctic



# NOAA One Health Group

## Tasks and Functions

### Tasks include:

- Communicating relevant science and services to health decision makers
- Identifying and promoting innovative science and services
- Developing tools and technologies
- Facilitating transfer of research to applications
- Promoting commercialization of applications
- Creating and leveraging strategic health partnerships
- Engaging stakeholders

### Functions include:

- Communicating relevant science and services to health decision makers;
- Identifying and promoting innovative science and services
- Coordinates and Implements the NOAA/CDC MOU
- Providing and ensuring health community connection with Ecological Forecasting Roadmap
  - Strong ties to Food and Drug Administration
  - Connections to CDC and State Health Departments
- Coordinating NOAA engagements with public health community

# NOAA One Health Theme: Water-Related Illness

## ■ Goal/Scope

Facilitate and coordinate internally on research and product development for WRI

Build links with CDC, State Health Departments and Internationally

Support connections with EFR, GFCS, and GEO

## ■ NOAA Participants

NCCOS, NWFSC, GLERL, MMHSRP, AOML, OER, NCEI, NESDIS STAR, GFDL, RISAs, COCA

## ■ Activities

- Develop HAB and vibrio products for state health departments, shellfish and beach managers
- Provide research and operational capacity to other countries and international organizations
- Develop and validate EFR products and connections with health community
- Develop projections for the USGCRP Climate and Health Assessments

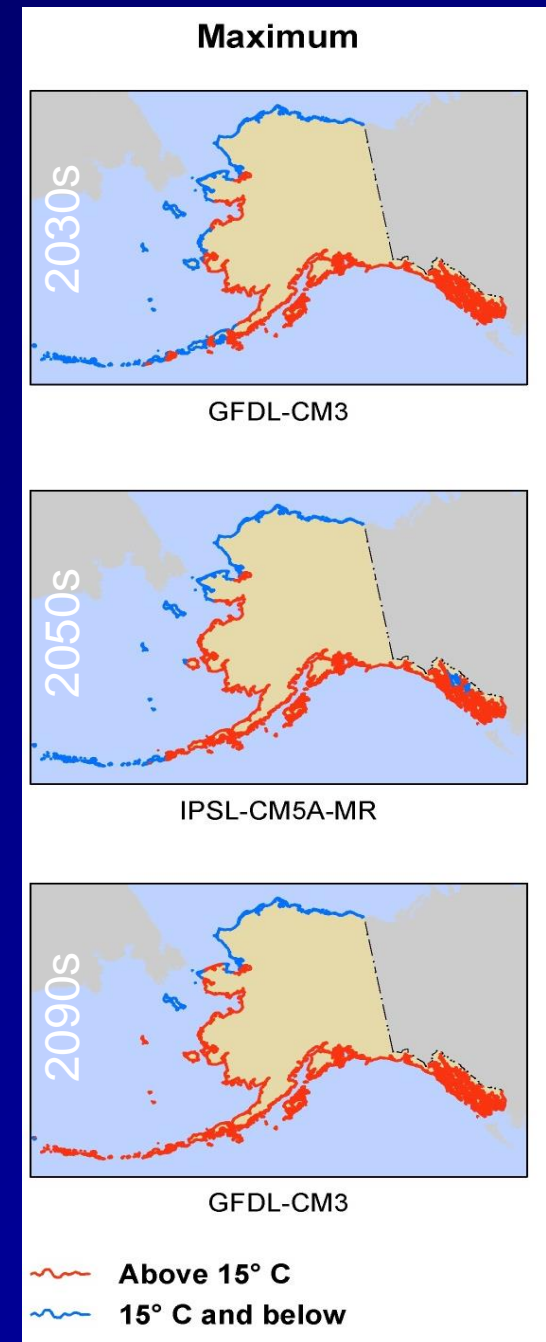
## ■ Other Partners

CDC, FDA, Shellfish growers, WHO, EU, State Health Departments-MD, WA, MS, FL, OH, WI, RI

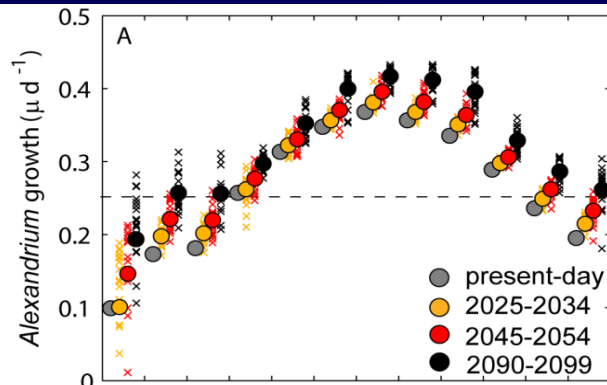
# Changing Geographic Range for Vibrios: links with Ecological Forecasting Roadmap

- Potential for extensive **geographic range shifts** based on the temperature niche ( $SST > 15^{\circ}\text{C}$ ) for *Vibrio*

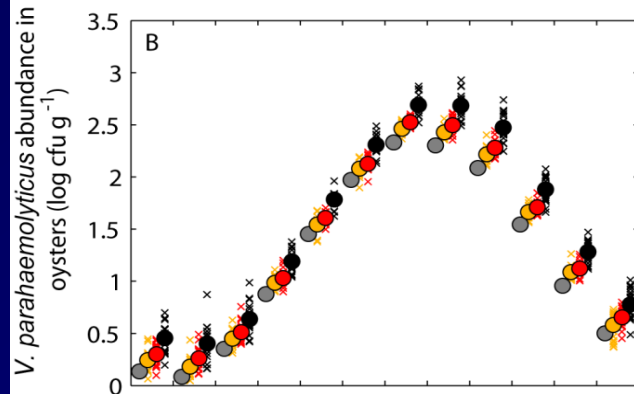
Climate models	Projected % of Alaskan shoreline with $SST > 15^{\circ}\text{C}$ during August (Average)		
	2030s	2050s	2090s
GFDL	22.0%	39.2%	79.6%
IPSL	30.7%	30.2%	62.1%
Nor_ESM1_M	13.1%	33.6%	51.5%
Nor_ESM1_ME	20.7%	28.0%	38.9%



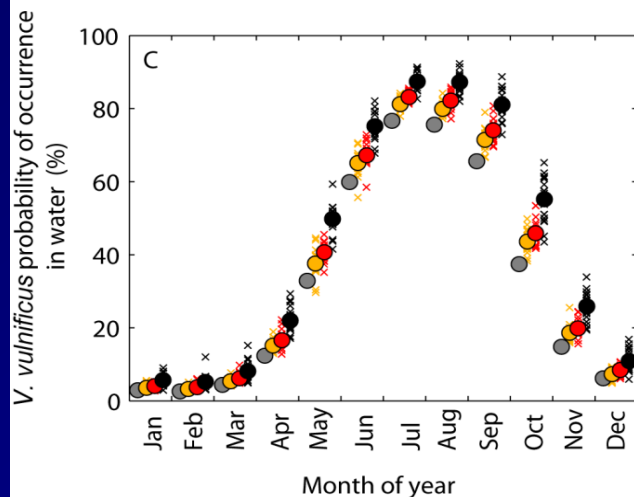
# Climate change impacts on coastal pathogens



*Alexandrium*



*V. parahaemolyticus* in oysters



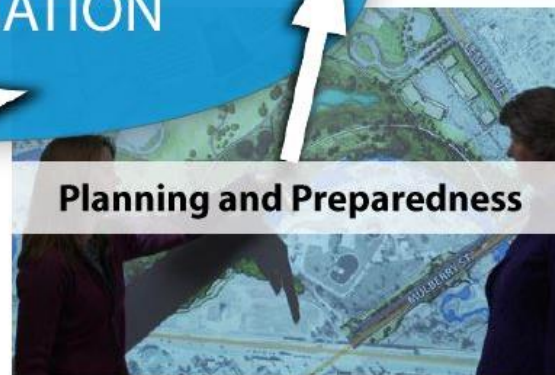
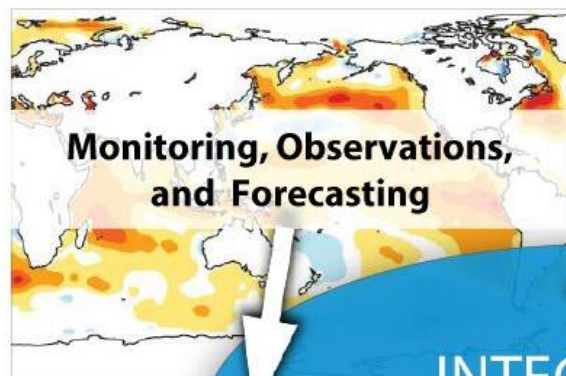
*V. vulnificus* in water



- Statistically downscaled climate projections for the 2030s, 2050s, and 2100 from 21 CMIP5 models using RCP6.0
- Progressive **expansion of the seasonal window** for harmful algal blooms and pathogenic bacteria in U.S. coastal waters (Puget Sound and Chesapeake Bay)
- Managers will need to adapt monitoring and mitigation strategies to be prepared for human health risks outside of the typical season (Jacobs et. al, submitted)



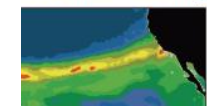
# From Environmental Intelligence to Resilience



## Tools for Resilience

Programs and expertise help the nation understand, anticipate and respond to changes in water resources and water-related hazards.

### Better Understanding



aims to improve understanding of the precipitation events and land conditions have on amplifying or mitigating drought and flood impacts.

#### LINKS AND RESOURCES

ports: Origins of the 2012 Great Plains droughts [July 2012 Drought](#)  
 RP Case Studies: Water Resource Strategies  
 Information Needs in Response to severe Weather and Climate Events [July 2012](#)  
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 Pacific Northwest RISAs [powerinc.org/projects](#)

### Communication Tools



NOAA is developing timely, accessible communication tools to inform preparedness and adaptation

#### LINKS AND RESOURCES

- U.S. Drought Monitor [droughtmonitor.unl.edu](#)
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## Crafting an Integrated Information System



To make the best decisions, stakeholders need access to more than just one piece of the puzzle. Integrated Information Systems are designed to evolve over time, offer opportunities for diverse participation, and integrate what we learn through practice.

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Resea  
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capacit

- Overcoming impediments
  - Do this for a long time

watersheds to the nation's coasts.

#### LINKS AND RESOURCES

- Floodplains by Design [www.floodplainsbydesign.org/partnerships](#)
- Regional Integrated Sciences and Assessment (RISA) [July 2012](#)
- Weekly Colorado Drought Assessment Webinars [July 2012](#)
- Drought Impacts Report [droughtimpacts.unl.edu](#)
- NIDIS portal [www.drought.gov](#)



# National Integrated Heat Health Information System (NIHHIS)

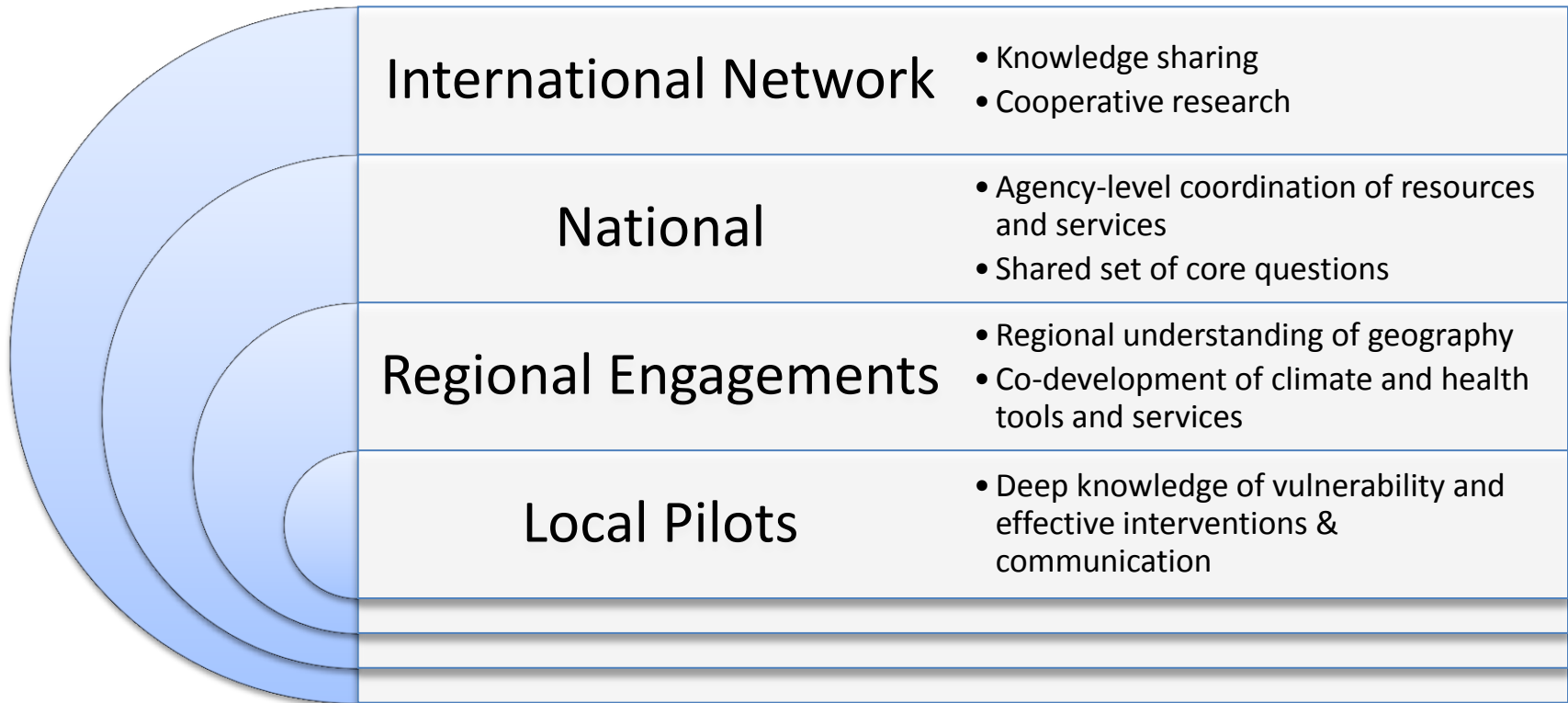
- Future extreme heat events will be more frequent, more intense, and longer in duration.(IPCC; US Natl. Climate Assessment)
- White House announced **NOAA and CDC** launch the National Integrated Heat Health Information System (NIHHIS) in 2015 to integrate heat information across agencies.
- NIHHIS designed to inform decision makers in many sectors including urban planning, design, construction, public health, emergency management, city government, energy, and transportation. It reduces heat-related impacts on many vulnerable groups including the elderly, children, athletes, pets, and outdoor workers.



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

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

# NIHHIS Framework: Network and Domestic Pilots



NIHHIS is a global network that integrates partners' knowledge, experience, and activities to effect a coordinated response to heat-health at many levels.

# The National Integrated Heat Health Information System



NIHHIS Framework:  
core questions for all pilots



NIHHIS Network: **international partners** and local-regional pilots

The National Integrated Heat Health Information System (NIHHIS)

NIHHIS is an integrated system that builds understanding of the problem of extreme heat, defines demand for climate services that enhance societal resilience, develops science-based products and services from a sustained climate science research program, and improves capacity, communication, and societal understanding of the problem in order to reduce morbidity and mortality due to extreme heat. NIHHIS is an interagency partnership.

— VIEW HEAT WARNING MESSAGES FOR YOUR STATE — Submit

Quick Start Guide | Understanding the Risk | Heat Health Tools | Reports & Plans | Case Studies | Heat Forecasts | About NIHHIS

Planning for heat waves beyond warnings  
Browse by weekly, monthly, seasonal and beyond forecasts.

CLIMATE DRIVERS

- More frequent elevated temperatures
- Prolonged heat waves
- Seasonal timing of event

ENVIRONMENTAL & INSTITUTIONAL CONTEXT

- City planning: Urban heat island effect
- Access to support services & resources (electricity, water, cooling centers)

EXPOSURE PATHWAYS

- Exposure to elevated temperatures (daily maximum, minimum, and mean)
- Combined impact of temperature, humidity, wind & rainfall

SOCIAL & BEHAVIORAL CONTEXT

- Social isolation, poverty, and homelessness
- Access to & use of air conditioning
- Outdoor work, recreation, and commuting
- Appropriate heat prevention

At Risk Groups

Extreme heat affects everybody, but some populations may be exceptionally vulnerable. Learn more about how these at risk groups can adapt to extreme heat to reduce their risk.

CHILDREN

EMERGENCY RESPONDERS

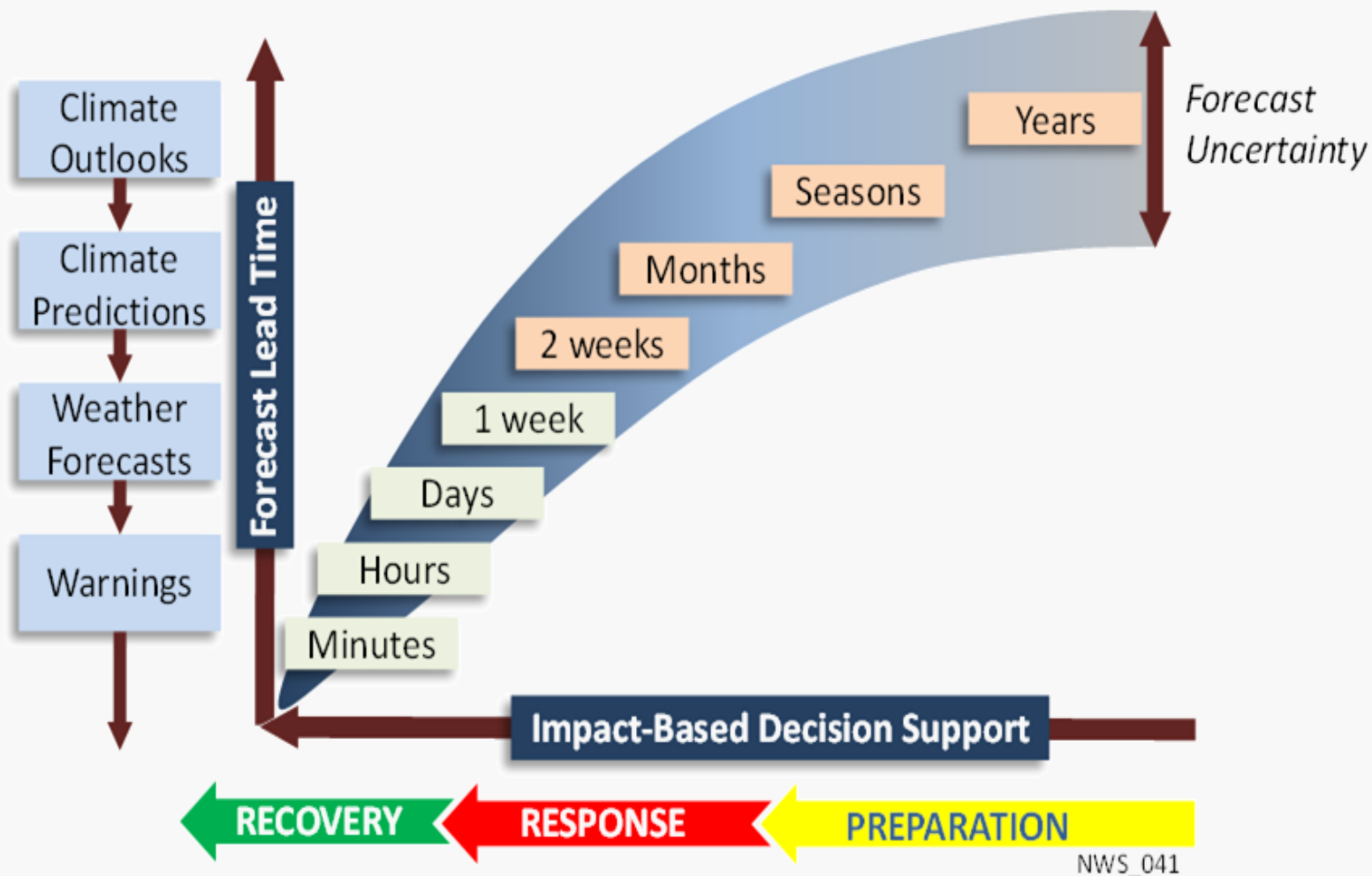
THE ELDERLY

NIHHIS is made possible by our participating agencies.

Logos for EPA, NOAA, FEMA, OSHA, SAMHSA, NIOSH, ASPR, and CDC.

NIHHIS interagency web portal ([climate.gov/nihhis](http://climate.gov/nihhis))

# Heat-Health Information along the Weather-Climate Continuum



NWS\_041



# NIHHIS Framework and Core Questions

- **Institutional Capacity & Partnerships**
  - What institutional partners have you engaged to help define the needs (esp. bridging disciplines: health, env. science, emergency management); is that sustainable and if so, how and why?
- **Heat Parameters & Health Outcomes**
  - What heat parameters (tmax, tmin, heat index, etc) are most important for which specific population and in what geographic conditions?
- **Data and Forecast Products**
  - What data and forecast products, indicators, and monitoring is needed (at what spatial and temporal resolution & lead time) and what is currently being used by health professionals to make decisions?
- **Engagement and Communication Strategies**
  - What communication strategies are most effective both during an event and for long lead time planning (seasonal outlooks)?



# Executing the Heat Wave Implementation Plan of the Disaster Reduction Grand Challenge

- White House NSTC Subcommittee on Disaster Reduction spun up a 2016 task force addressing the grand challenge.
- FEMA PrepareAthon's first Extreme Heat Week: 23-28 May 2016.
- Launch of NIIHIS web portal to share interagency resources and coordinate an integrated approach to resilience.
- Multi-agency webinar featuring OSTP Director Dr. John Holdren and several distinguished guests to discuss community resilience needs and approaches to protect the most vulnerable from extreme heat.
- At risk groups include: athletes, older adults, children, emergency responders, outdoor workers, and pets.

**HEAT FORECASTS**

- 6-10 Day Temperature Probability Outlook
- 8-14 Day Temperature Probability Outlook
- One Month Temperature Probability Outlook
- Summer Temperature Probability Outlook (JJA)
- 6-10 Day Heat Index Outlook
- 8-14 Day Heat Index Outlook
- 8-14 Day Probability
- 8-14 Day Probability
- Global Tropical Heat
- U.S. Hazards Outlook
- Weeks 3-4 Exposure

**6-10 Day Temperature Probability Outlook**  
In this map, shaded areas show where average temperature has an increased chance of being warmer or cooler than usual. The darker the shading, the greater the chance for the indicated condition. White areas have equal chances for average temperatures that are below, near or above the long-term average for the month.

**The National Integrated Heat Health Information System (NIIHIS)**  
NIIHIS is an integrated system that builds understanding of the problem of extreme heat, defines demand for climate services that enhance societal resilience, develops science-based products and services from a sustained climate science research program, and improves capacity, communication, and societal understanding of the problem in order to reduce morbidity and mortality due to extreme heat. NIIHIS is an interagency partnership.

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**HEAT HEALTH**

**CLIMATE DRIVERS**  
• More frequent elevated temperatures  
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• City planning  
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• Exposure to elevated temperatures (daily maximum, minimum, and mean)  
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**SOCIAL & BEHAVIORAL CONTEXT**  
• Social isolation, poverty, and homelessness  
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• Appropriate heat prevention messaging  
• Chronic illness, medication use, or personal, physical,

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**CHILDREN** **EMERGENCY RESPONDERS** **THE ELDERLY**



FEMA

OSHA

Substance Abuse and Mental Health Services Administration  
SAMHSA

National Institute for Occupational Safety and Health  
NIOSH

ASPR  
ASSISTANT SECRETARY FOR PREPAREDNESS AND RESPONSE



National Integrated Heat Health Information System (NIIHIS) Federal Partners



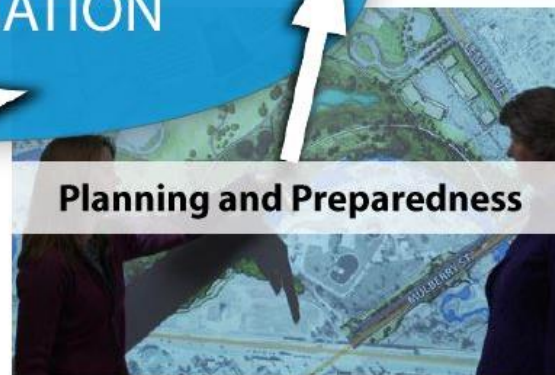
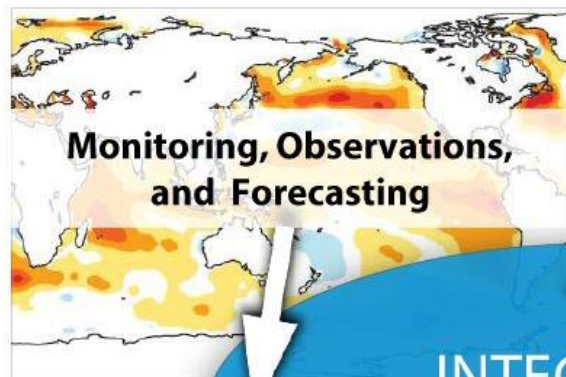
National Integrated Heat Health Information System (NIIHIS)

# Other USG Engagements

- OSTP Pandemic Prediction and Forecasting Science and Technology Group
- Group on Earth Observations: Integrated Information Systems for Health, US Assessment
- Climate Sustainable Resilient Development-Bangladesh, Ethiopia, Colombia
- Clim-Health Africa
- North American Climate Change and Human Health Partnership
- North American Climate Services Partnership
- Environment Canada MOU
- US/EU Marine Research, Marine Genomics, Climate and Health Research
- Global Framework on Climate Services



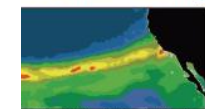
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## Pathway for Resilience

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- capaciti

- Overcoming impediments
  - Do this for a long time



# Key Gaps and Opportunities

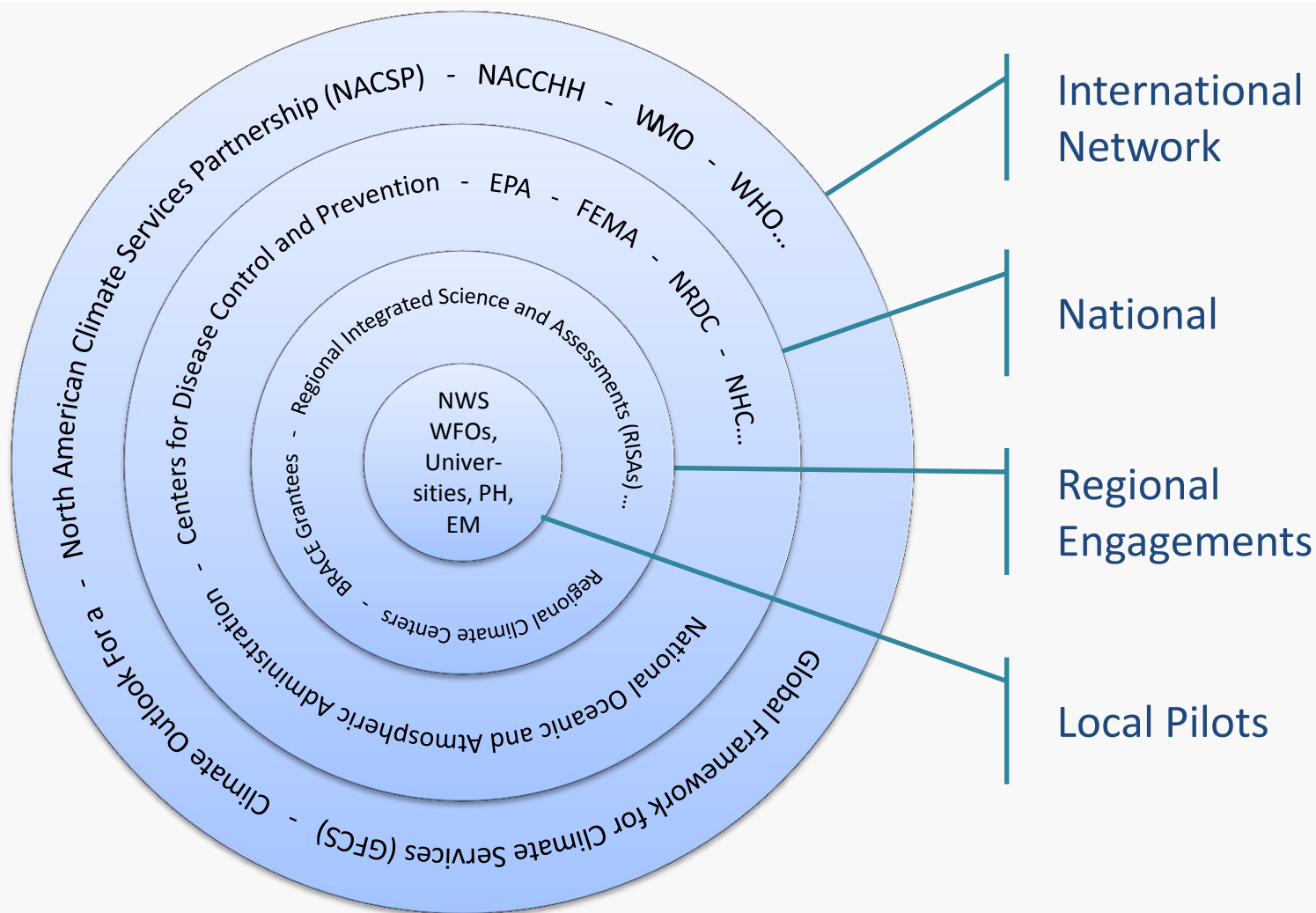
- What is a key application area / marketplace requirement? What is a key interoperability need / gap?
  - Predictive models at the right scale and level of certainty
  - Research collaborations targeted to application
  - Public Health and Environmental Data integration
- How best to support advancing interoperability standards, interoperability projects, or best practices.
  - Platforms that allow public health data to be used and displayed along with more robust but often mismatched environmental data
  - Test Beds
  - Strengthen existing networks and research funding
  - Ensure identification of data needs in each project
  - Longer term sustained engagement needed—IIS for health
- Is there opportunity for Spatial Data Infrastructure? What is needed / What are pathways forward?
  - Longer term sustained engagement needed—IIS for health

Thank you!

Juli.Trtnanj@noaa.gov



# NIHHIS: Involvement of Partners at Every Level



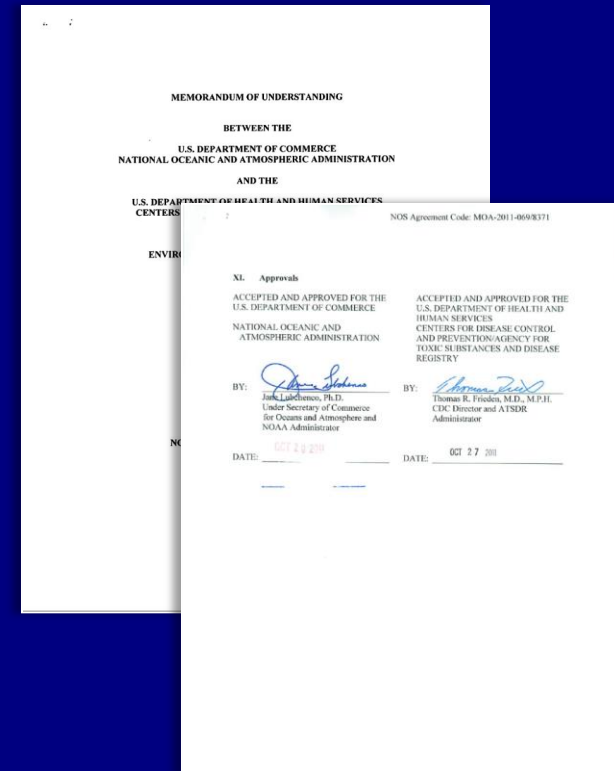
# Recent and Upcoming NIIHIS Events

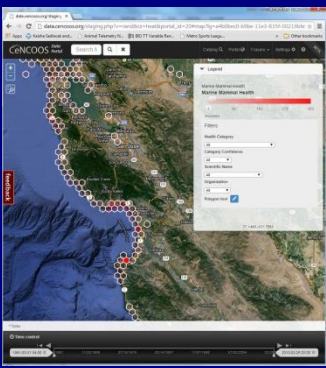
- Apr 4-10 National Public Health Week
- Apr 4 USGCRP Climate and Health Assessment Release
- Apr 23-May 3 FEMA PrepareAthon!
- Apr 25-26 South Asia Climate Outlook Forum SASCOF8 (w/ heat focus)
- Apr 26 Design for Risk Reduction Extreme Heat Report Release
- Apr 26-28 Heat focused Health Forum for SASCOF8
- Apr 28 CPO Webinar on Extreme Heat Prediction Improvement
- **May 22 NIIHIS Web Site Launch**
- **May 22-28 FEMA Prepareathon Extreme Heat Week**
- **May 24/26 NSC Extreme Heat Webinar (vulnerable populations focus)**
- Jul 13 RGB NIIHIS Pilot Focusing Workshop

# NOAA and CDC

## Memorandum of Understanding

- NOAA has a comprehensive interagency MOU with Centers for Disease Control and Prevention (CDC)
  - Signed October 2011 by Administrators Dr. Lubchenco and Dr. Frieden
  - Cross NOAA and 5 CDC Divisions
- **Provides a formal cooperative framework to further collaborative efforts for:**
  - preparedness and planning
  - integrated data management
  - surveillance and monitoring
  - prediction and forecasting
  - emergency response and assessment
  - communication and capacity development, including rotational assignments





# NOAA One Health Theme Marine Zoonotics



NOAA Permit 932-1905-  
MA009526

## ■ Goal/Scope

Determining the cause of disease in marine mammals, understanding changes in trends of health and disease with environmental changes, and inform ecosystem, population, public health risks of environmental change.

## ■ NOAA Participants

NMFS Marine Mammal Health and Stranding Response Program; NMFS SC/Regions; NCCOS

## ■ Activities

- Baseline Marine Mammal Health & Disease Surveillance
- Unusual Mortality Event and Outbreak Investigations
- Marine Mammal Health M.A.P.

## ■ Other Partners

CDC, EPA, FDA, MMC, NAVY, NPS, USCG, USDA, USFWS, USGS, State Wildlife Health Agencies, IOOS, NAPHV, WDA, CCWHC, EU Wildlife Health, Australian Wildlife Health Network, FAO, OIE, IWC, Regional/state stranding and diagnostic labs

# NOAA One Health Air Quality Theme

## ■ Goal/Scope

- Increase synergy and coordination between the NOAA line offices on air quality products and services
- Engage partners to gather requirements for air quality, mercury and radiological modeling to provide decision support services
- Develop collaborations with CDC and NIH on projects that study linkages between air quality and respiratory and cardiovascular health

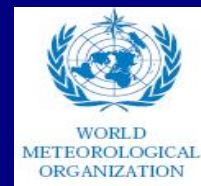
## NOAA Participants:

Name	Office	Title
Richard Artz	OAR	Deputy Director, Air Resources Laboratory
Richard Fulton	OAR	OWAQ Air Quality Portfolio Manager
Larry Horowitz	OAR	Physical Scientist
Margaret Kerchner	OAR	Program Analyst
Shobha Kondragunta	NESDIS	Research Physical Scientist
Jim Roberts	OAR	Research Chemist
Ivanka Stajner	NWS	Manager for the National Air Quality Forecast Capability
Eric Williams	OAR	Deputy Director for Planning, ESRL/CSD

## ■ Activities

- Monthly Meetings (1<sup>st</sup> Tuesdays)
- National Air Quality Forecast Capability (NAQFC) [*Operational*] – new public PM2.5 predictions
- Atmospheric Dispersion Modeling
- Fire Influence Regional and Global Environments Experiment (FIREX)
- Global Health Burden of Anthropogenic O3 and PM2.5 [*Research*]
- Remote sensing of air quality in support of air quality monitoring and forecasting [*Operational*]

## ■ Partners



- Comprehensive Nuclear Test Ban Treaty Organization
- State departments and local emergency managers
- DOE's Idaho National Laboratory
- Nevada National Security Site



# The Impact of **Wildfires** on Air Quality, Human Health, and Climate

A 2015-2019 focus of the NOAA ESRL Chemical Sciences Division

## Motivation: The “New Normal” for Wildfires

A warmer and drier climate is expected to lead to more frequent and more intense fires near or within populated areas.

**Wildfires Affect Air Quality and Health.** Wildfires emit substantial amounts of volatile and semi-volatile organic materials and nitrogen oxides that form ozone and organic particulate material. Direct emissions of toxic pollutants can affect first responders and local residents. In addition, the formation of other pollutants as the air is transported can lead to harmful exposures for populations in regions far removed from wildfires.

**Wildfires Affect Climate.** Wildfires release large amounts of carbon dioxide, black carbon, brown carbon, and ozone precursors into the atmosphere. These emissions affect climate via changes in radiative balance and cloud properties on regional and even global scales.



## What is Needed?

- Information on
- fire emissions, especially from different source materials
  - transport and chemical transformations in fire plumes
  - evolution and dynamics of fires and fire plumes

## Why?

- To improve model predictions of fire and smoke behavior near a fire and transport of pollutants downwind from fires; and improve the value of satellite data products
- To understand effects of fire activity on climate, air quality, and ultimately public health



## FIREX: Fire Influence on Regional and Global Environments Experiment

- FIREX is a 2015-2019 interagency collaborative research mission, led by NOAA ESRL CSD, to improve understanding of fire impacts on the environment and human health.
- FIREX has ground-based, aircraft, and fire-lab components.
- FIREX results will help provide a policy-relevant scientific basis for evaluating fire management approaches.
- Partners in FIREX are also principals in the Fire and Smoke Model Evaluation Experiment (FASMEE):
  - Joint Fire Science Program
  - USDA/US Forest Service
  - Desert Research Institute
  - US Environmental Protection Agency

## Expected Payoffs

- Improved understanding of fire emissions and chemistry
- Better “fire weather” predictions for on-scene responders
- Quantitative assessments of human exposure to fire pollutants



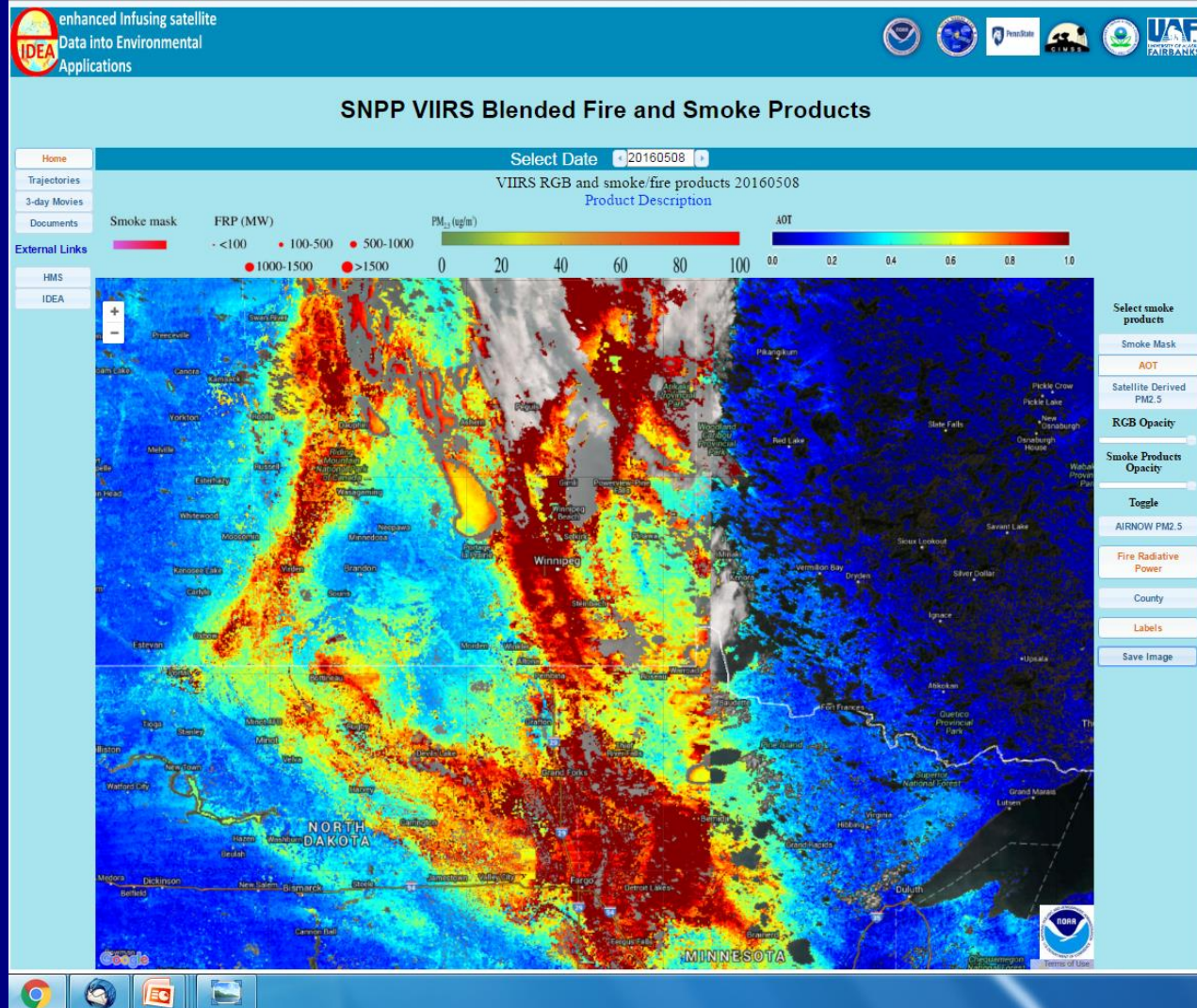


# Air Quality Alerts and Public Health

More than 3 million premature deaths globally per year\* due to poor air quality.

Satellite data help fill gaps in EPA ground monitors not dense enough to provide monitoring and warnings for 40 million people living in rural areas in the US.

Through a new "Fire & Smoke" initiative NESDIS is supporting the NWS field forecasters and Incident Meteorologists (IMETs) by providing near real time blended fire and smoke products from Suomi National Polar-orbiting Partnership Visible Infrared Imaging Radiometer Suite (SNPP VIIRS)

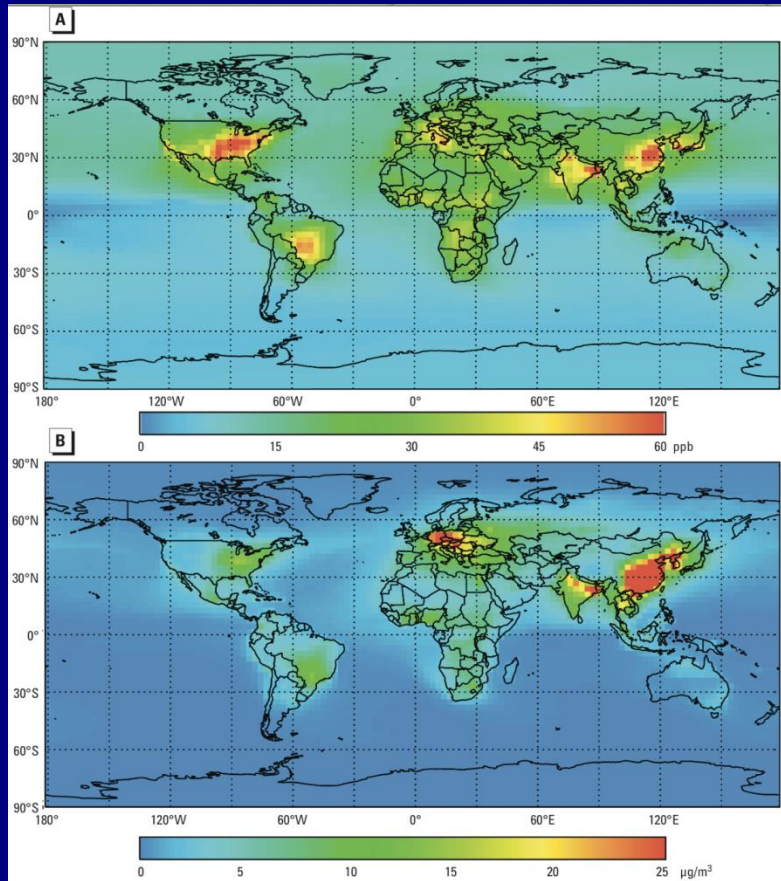


Operational air quality forecasters rely on satellite-derived aerosol products to provide air quality alerts and warnings due to long-range and regional transport of smoke from fires. Image above shows screen capture of May 8, 2016 smoke aerosol optical thickness from Ft. McMurray fires in Alberta, Canada (fires started May 4<sup>th</sup>). Transported smoke impacted surface air quality in the mid-West and as of May 11<sup>th</sup> continues to impact US air quality.

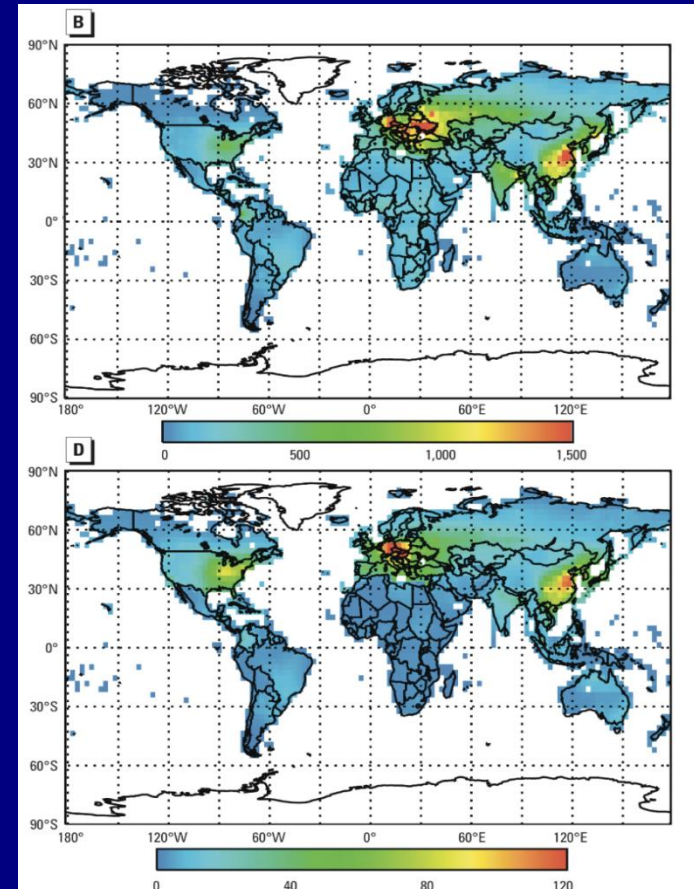
# Global Health Burden of Anthropogenic O<sub>3</sub> and PM<sub>2.5</sub>

**Highlight:** ARL and GFDL worked with health experts to estimate premature deaths from exposure to global air pollution using atmospheric models

## Global O<sub>3</sub> (Top) & PM<sub>2.5</sub> Levels



## Resultant Cardiovascular deaths & lung cancer rates (per million)




Reference: Anenberg, S.C et al. 2010. *Environmental Health Perspective*. 118(9).1189-1195.



# NOAA One Health Theme Vector-borne Disease

- Pandemic Prediction and Forecasting Science and Technology Working Group-OSTP/NSC
  - Dengue Forecasting Opportunity Launched June (DengueForecasting.noaa.gov)
  - Dengue and El Niño—Forecasting in South Asia/Malaysia Workshop (NCEI)
  - Rift Valley Fever Notification (multi-agency)
- NCEP International Desks
  - Two Climate and Health Workshops: Senegal (July), Tanzania (August)
  - Clim-Health Africa partner
- NOAA Role PPFST:
  - Working Group Representation, Andy Stern (NWS), Juli Trtanj (OAR), Michelle Hawkins (NWS)
  - NCEI/CICS (Jesse Bell) provided ALL of the environmental data and code
  - NWS stood up in record time the Dengue Forecasting website
  - NOAA Comms, NWS and CPO Comm/Ed actively engaged in the communications
  - **Much research on which this is based was funded by NOAA/CPO with other agencies**




**Emerging Health Risk Notification, 18 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. *The views expressed do not necessarily represent those of all departments and agencies that participate in the Pandemic Prediction and Forecasting Science and Technology Working Group.*

**Summary:** *The risk of El Niño-driven RVF outbreaks is high in east Africa. Intensified efforts within the next 30 days are needed to mitigate the threat. Countries at risk likely require additional assistance with animal vaccination and mosquito control, key measures to minimize RVF activity.*

**El Niño status and possible global health impacts.**  
NOAA's El Niño advisory [1] predicts the current El Niño will likely peak during the Northern Hemisphere

Major east Africa outbreaks coincided with strong El Niño events in 1997-8 and 2006-7. The current potential for RVF outbreaks is of US importance for at least 2 reasons:

**Regional health and economic impacts:** The 2006-7 outbreaks in Kenya, Somalia, Tanzania, Sudan, and Madagascar are estimated to have caused > 200,000 human infections with > 500 deaths [5], and cost Kenya alone \$22 million from livestock losses and



CHARTER  
of the  
PANDEMIC PREDICTION AND FORECASTING SCIENCE AND TECHNOLOGY  
WORKING GROUP  
SUBCOMMITTEE ON BIOLOGICAL DEFENSE RESEARCH AND DEVELOPMENT  
COMMITTEE ON HOMELAND AND NATIONAL SECURITY  
NATIONAL SCIENCE AND TECHNOLOGY COUNCIL

**A. Official Designation**

The Pandemic Prediction and Forecasting Science and Technology Working Group (WG) is hereby established by the National Science and Technology Council, Committee on Homeland and National Security, Subcommittee on Biological Defense Research and Development (BDRD).

**B. Purpose and Scope**

The purpose of the PPFST WG is to provide a focused forum for coordinating and integrating biological defense research and development efforts across the Federal Government. In this context, "forecasting" refers to the development of specific mitigation measures.

**C. Functions**

Discussions underway to build a National Infectious Disease Forecasting System/Center/ Capacity

# Arctic – Operationalizing a One Health Approach

- **NMFS Marine Mammal Health and Stranding Response goals in the Arctic?**
  - Marine mammal populations and emergency response in the Arctic
  - Marine mammal populations and increased anthropogenic impacts in the Arctic
  - Marine mammal health surveillance - species-specific health surveillance sampling program for stranding network, subsistence harvested animals, live capture release programs and other partners
  - Marine mammals and public health –Food safety and Security due to reliance on subsistence foods
- **Key Partners**
  - NMFS OPR MMHSRP, NMFS AKR, AKFSC, USFWS, ANOs, NOS ORR, USGS, IWC, AOOS, AK State Dept of Health, Alaska Native Tribal Health Consortium, AK CDC, Marine Mammal Stranding Network, Alaska communities and other partners
- **Active but still diffuse engagement across NOAA, with USGCRP CCHHG, Multiple other agencies, and State to develop One Health Approach**