Public Health as a National Weather Service Deep Core Partner

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Improving support to populations disproportionately impacted by weather hazards has been a priority for NWS Seattle for years.

More recently, the new NWS Director’s Priorities (People, Infrastructure, & Future) includes a focus on service equity.

But where are the gaps and how do we create sustainable service equity?

June 2021 Pacific Northwest “Heat Dome” event provided an ideal lens upon which to view service gaps.
Supporting Disproportionately Impacted Populations

NWS Seattle Extreme Heat Workshop

• March 22-23, 2022
• Identified 4 primary focus areas to increase reach & service to disproportionately impacted populations

1. Developing New & Enhanced Partnerships
2. Providing Targeted Messaging & Resources
3. Integrating into Core Partner Planning & Response
4. Supporting Data Needs in a Changing Climate
Importance of Expertise

- Easy to get to the first peak where someone “knows enough to be dangerous”
- It takes a career to climb the slope of enlightenment
- When addressing complex issues, it’s absolutely critical to bring in expertise to avoid perishing at the peak of “Mount Stupid”

Source: Wikimedia Commons
Who can the NWS partner with within those focus areas?
Visions, Missions, & Goals

Equity and optimal health for all [...] works with others to protect and improve the health of all people...

Protect and improve the health and well-being of all people [...] Whenever possible, employ strategies, policies and interventions to reduce health disparities.

We work with communities to advance health equity, protect the most vulnerable, and promote health and wellness for everyone.

Provide weather, water and climate data, forecasts, warnings, and impact-based decision support services for the protection of life and property and enhancement of the national economy.
Visions, Missions, & Goals

**Washington State Department of Health**
Equity and optimal health for all [...] works with others to protect and improve the health of all people...

**Public Health Seattle & King County**
Protect and improve the health and well-being of all people [...] Whenever possible, employ strategies, policies and interventions to reduce health disparities.

**Multnomah County Health Department**
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**National Weather Service**
Provide weather, water and climate data, forecasts, warnings, and impact-based decision support services for the protection of life and property and enhancement of the national economy.
Public Health Engagement
Step 1: Connecting the Dots

• #1 Tip from Public Health Partners: Go in and LISTEN

• NWS & Public structures may not be well aligned. The first step is getting the right subject matter experts to the table.

• In Washington, the priority weather-health overlap areas are
  – Extreme Heat
  – Extreme Cold
  – Wildfire Smoke & Air Quality
  – However, Public Health is involved in every type of disaster

• Engage as Weather-Ready Nation Ambassadors

• Schedule regular (e.g. quarterly) meetings with public health partners
Step 2: Find the Opportunities

- Operations & Response
- Planning, Recommendations, & Public Information
- Research, Development, & Feedback
- Training
Operations & Response

- **Situational awareness is key, in both directions!**
  - Public Health should be included on the distribution of significant weather briefings as that information is utilized for operational decisions & messaging. Examples:
    - Multnomah County Health Department uses probability-focused weather forecasts with a focus on the reasonable worst-case scenario in recognition that it is far easier to stand down a response than to stand one up
    - [Washington SAFER Dashboard](#)
  - NWS needs to maintain awareness of ongoing event impacts to the population

- **Health Data Surveillance & Reporting**
  - NWS collects impact data for use in services assessments, event reviews, verification, science studies, and FEMA major disaster declarations.
  - NWS has specific data needs to meet reporting requirements that should be coordinated with Public Health.
Daily Weather Brief
April 27, 2023

NWS Regional Offices Forecasts

**NW Quadrant**
4/27/2023
Increased chance of mountain snow. Increasing breezy to gusty winds

**NE Quadrant**
4/27/2023
Morning snow/scattered rain/snow showers

**SW Quadrant**
4/27/2023
Rain

**SE Quadrant**
4/27/2023
Mountain snow, breezy to windy
Planning, Recommendations, & Public Information

NWS & Public Health have the same goal during significant events → to save lives.

- **Align & share impact and call-to-action statements**
  - Public Health may have resources to assist in the translation of these statements for those with limited English proficiency

- **Explore Alignment of Public Health & NWS Recommendation Strategies**
  - Example: Public Health Seattle & King County Heat Recommendations
Human Health Impacts

- #1 Cause of Weather-Related Fatalities
- Heat Cramps
- Heat Exhaustion
- Heat Stroke
- Reduced Air Quality

Infrastructure & Other Impacts

- Damage to roads, bridges, railways, power & telecommunications lines
- Strain on power systems
- Rapid increase in wildfire danger
- Agriculture/Aquaculture impacts

Urban Heat Island

- Significant warming due to urbanization & human activities
- Effect most noticeable overnight
Heat Decision Metrics:

- Ambient Temperature
- Heat Index*
- Wet-Bulb Globe Temperature*
- HeatRisk*
- Kalkstein & Other Systems

*Most frequently used by the National Weather Service

**Heat Index**

Traditional measure of what the temperatures feel like to the human body when humidity is combined with air temperature.

However, there is a limited humidity climatology, particularly in the western US. Most heat index approaches do not consider overnight temperatures.

**Wet Bulb Globe Temperature (WBGT)**

Parameter that estimates the effect of temperature, humidity, wind, and solar radiation on humans.

This hyper-local index is a particularly useful measure for acclimatized, healthy, & physically active people including the military, outdoor workers, athletes/marching bands, etc. However, it is not a universal measure for the risk posed by heat. WBGT can be difficult to predict on the local scale, however NWS does provide WBGT forecasts.
NWS HeatRisk

Puts heat into an actionable, impacts-based context to support decision-making at a local level.

HeatRisk takes into account:

- **Local Climatology**
  - Location
  - Time of Year

- **Forecast**
  - Forecast High Temperature
  - Forecast Low Temperature
  - Event Duration

- **Impacts**
  - Uses CDC heat health data to identify at-risk groups for a given level of heat.

HeatRisk is the primary driver of NWS heat-related Watch, Warning, & Advisory products

[HeatRisk Forecast] [Historical Data] [About]
National Weather Service HeatRisk Tool Anticipates Risks to Health

NWS HeatRisk Prototype

Identifying Potential Heat Risks in the Seven Day Forecast

<table>
<thead>
<tr>
<th>Category</th>
<th>Level</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>0</td>
<td>No Elevated Risk</td>
</tr>
<tr>
<td>Yellow</td>
<td>1</td>
<td>Low Risk for those extremely sensitive to heat, especially those without effective cooling and/or adequate hydration</td>
</tr>
<tr>
<td>Orange</td>
<td>2</td>
<td>Moderate Risk for those who are sensitive to heat, especially those without effective cooling and/or adequate hydration</td>
</tr>
<tr>
<td>Red</td>
<td>3</td>
<td>High Risk for much of the population, especially those who are heat sensitive and those without effective cooling and/or adequate hydration</td>
</tr>
<tr>
<td>Magenta</td>
<td>4</td>
<td>Very High Risk for entire population due to long duration heat, with little to no relief overnight</td>
</tr>
</tbody>
</table>

HeatRisk Tool forecasts for May 3, 2023

HeatRisk Tool forecasts posted June 23, 2021
<table>
<thead>
<tr>
<th>NWS HeatRisk Values</th>
<th>Public Health Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2 Moderate</strong></td>
<td><strong>INITIATE EARLY WARNING, PUBLIC MESSAGING, AND RESPONSE ACTIVITIES</strong></td>
</tr>
<tr>
<td></td>
<td>• Recommend sharing information about available cooling locations where general population can go to access air conditioning or cooling features such as water recreation facilities or other public places</td>
</tr>
<tr>
<td></td>
<td>• Recommend dissemination of key public health heat safety messaging and risk communications to at-risk populations, including those experiencing homelessness, older adults, children, and outdoor workers</td>
</tr>
<tr>
<td></td>
<td>• Consider limiting strenuous outdoor activities during the hottest period of the day</td>
</tr>
<tr>
<td></td>
<td>• Consider cancelation and/or rescheduling of outdoor children’s activities, day-camps, athletic practice, and games taking place during the hottest period of the day or consider moving them indoors where temperatures are cooler</td>
</tr>
<tr>
<td></td>
<td>• Consider distribution of water and other cooling supplies for at-risk communities and populations</td>
</tr>
<tr>
<td></td>
<td>• Consider activation of daytime cooling centers for unsheltered individuals</td>
</tr>
<tr>
<td></td>
<td>• Consider undertaking preparation activities required to meet recommendations of higher HeatRisk levels, if forecast indicates increase in risk and temperatures</td>
</tr>
<tr>
<td></td>
<td>• Monitor NWS HeatRisk forecast and alerts until forecast conditions become more favorable (e.g., HeatRisk Value of 1 - yellow - or lower)</td>
</tr>
<tr>
<td><strong>3 High</strong></td>
<td><strong>RECOMMEND ACTIVATION OF COOLING CENTERS &amp; REDUCTION IN OUTDOOR ACTIVITIES</strong></td>
</tr>
<tr>
<td></td>
<td>• Continue outreach efforts to reach at-risk populations with risk communications, cooling supplies, and water resources</td>
</tr>
<tr>
<td></td>
<td>• Recommend activation of daytime cooling centers for unsheltered individuals</td>
</tr>
<tr>
<td></td>
<td>• Recommend activation of daytime cooling centers for general population</td>
</tr>
<tr>
<td></td>
<td>• Recommend temporary suspension of strenuous outdoor activities during hottest times of the day</td>
</tr>
<tr>
<td></td>
<td>• Recommend cancelation and/or rescheduling of outdoor children’s activities, day-camps, athletic practice, and games</td>
</tr>
<tr>
<td></td>
<td>• Recommend conducting wellness checks on elders and people living with disabilities to ensure access to air conditioning or cooling centers</td>
</tr>
<tr>
<td></td>
<td>• Consider expanding hours of operation for cooling centers for unsheltered individuals to accommodate overnight use</td>
</tr>
<tr>
<td></td>
<td>• If school is in session, consider capabilities of schools to maintain cooler indoor air temperatures; <strong>Public Health will recommend closure if indoor temperatures cannot be maintained reasonably free of excessive heat (WAC § 246-366-080)</strong></td>
</tr>
<tr>
<td><strong>4 Very High to Extreme</strong></td>
<td><strong>RECOMMEND CANCELATION OF OUTDOOR EVENTS AND ACTIVITIES</strong></td>
</tr>
<tr>
<td></td>
<td>• Recommend expanding hours of operation for cooling centers to accommodate overnight use</td>
</tr>
<tr>
<td></td>
<td>• Recommend cancelation of outdoor activities and events during hottest times of the day</td>
</tr>
</tbody>
</table>
Air Quality Coordination & Alerting
Air Quality Forecaster Resources

High Resolution Rapid Refresh (HRRR) Smoke Guidance

**HRRR Smoke - Smoke Visualizer**
Provides hourly guidance for
- Surface Visibility
- Vertically Integrated Smoke
- Near Surface Smoke

**HRRR Smoke - Model Graphics**
Provides hourly guidance for
- Surface Visibility
- Vertically Integrated Smoke
- Near Surface Smoke
- Hourly Wildfire Potential
- Fire Radiative Power
- & More!

NWS/EPA Air Quality Forecast Guidance

The NOAA National Weather Service’s (NWS) website (weather.gov) provides weather forecasts and hourly Air Quality forecast guidance for ozone, smoke, and dust in the form of interactive national maps.

NWS, in partnership with the Environmental Protection Agency (EPA), issues hourly air quality forecast guidance twice daily as part of a national Air Quality Forecasting Capability.

- **Operational Guidance Viewer**
- **Prototype Guidance Viewer**
Washington Smoke Information

So long 2022 wildfire smoke season: See you in 2023!

We are happy, as many of you are as well, to see the smoke finally dissipate from Washington and close out this year's crazy season. Who knows our first wildfire of this season would start in mid-July and continue to burn into November? Just goes to show how unpredictable wildfire smoke season can be.

This will conclude our reporting for 2022 on the WASmoke blog. We’ll return in 2023 when wildfire season kicks off again.

Recommendations during the off-season:

The map at the top of this page remains active throughout the year. During the off-season, you can still find information here on:
- Monitoring & Forecasting
- Health Information
- WA’s fire action teams
- Health recommendations

Winter Air Quality burn bans:
Colder weather is upon us, which means an uptick in wintertime wood smoke.
Air quality burn bans typically occur in the winter when wood smoke pollutes the air. They are called by Ecology, local clean air agencies, and tribes to protect people’s health. A burn ban limits wood stove use and outdoor burning.

Save if there is Air Quality Burn ban in effect before firing up your wood stove or fireplace.
Air quality burn bans do not apply if it is your ONLY source of heat.
If you do burn wood to heat your home, those clean air fans are still useful to help keep your indoor air clean.

Washington Smoke Blog
wasmoke.blogspot.com

Oregon Smoke Blog
oregonsmoke.org

Idaho Smoke Blog
idsmoke.blogspot.com

California Smoke Blog
californiasmokeinfo.blogspot.com
Partner-Driven

Air Quality Alert (AQA)

To relay non-routine air quality alerts and information compiled by state and local air quality agencies. → **The NWS is *not* the lead agency for AQA issuance**

The function of initiating and issuing air quality messages is performed by state and local air quality forecasters. The NWS’ primary function in this process is providing, on request, a means of disseminating these state and locally issued air quality messages.

Processes & players vary by state.

NWS-Driven

Air Stagnation Advisory

Typically issued in coordination with AQ partners for Atmospheric conditions stable enough to cause air pollutants to accumulate in a given area.

- Stagnant conditions have developed AND
- Are forecast to persist for at least 72 hrs AND
- 24 hour pollution levels are rising over a wide area

*Generally a winter-time product.*
Who Has The Authority?

Washington
- 8 Agencies & 11 Separate Jurisdictions
- WA Dept of Ecology will lead coordination beginning 2023

Oregon
- Oregon DEQ
- Lane Regional Air Protection Agency (LRAPA)

Idaho
- Idaho DEQ

Tribal Nations

Air Quality Advisory
In Washington State, the WAQA system was retired prior to the summer 2022 wildfire season. The NWS and partnering agencies use the AQI, simplifying messaging across agencies.

Local NWS offices may relay messages from state or local health authorities.
• **Long Term Planning**
  – Public Health uses historical weather data & long term projections to inform planning & recommendations

• **Local Research**
  – Example: The University of Washington, Public Health Seattle & King County, and NWS Seattle are collaborating on a grant proposal to research the development of a framework for communicating extreme cold risk

• **NWS products & services are constantly evolving.**
  – For instance, the current nationwide effort to determine new Extreme Cold alerting criteria.

• **After Action Reviews (AARs)**
  – NWS Seattle requests AAR input after significant weather events
  – NWS Seattle reviewed & submitted input into the WA DOH 2021 “Heat Dome” AAR
  – NWS Portland & Multnomah County Health Department iteratively revise procedures & thresholds after significant weather events/season.
Training Collaboration

• Public Health Partner Training
  – NWS Portland annual air quality trainings
  – NWS Seattle exploring seasonal public health trainings

• Conferences, workshops, or training that could further each others missions
  – NWS-hosted Hazard-Based Training Workshops
  – Emergency Management Conferences
  – Public Health Conferences
    • Tribal Public Health Emergency Preparedness Conference
    • National Environmental Health Association Conference
  – Meteorological Conferences
    • American Meteorological Society
  – Emergency Management Conferences
    • International Association of Emergency Managers (IAEM)