EPA United States Environmental Protection Agency

Innovation through ORD's Partnerships and Collaborations

Pre-recorded material provided for the NASEM Committee on Anticipatory Research for EPA's Research and Development Enterprise to Inform Future Environmental Protection, in advance of November 17, 2021 Committee Meeting

The Importance of ORD's Collaborations

- ORD has asked the Committee to:
  - identify advancing scientific and technological areas important to ORD's work over the next several decades and how we may take advantage of them, and
  - provide recommendations on how ORD can strategically position itself to anticipate and respond to future research needs of the Agency.
- Collaborations are one way through which ORD advances science, innovates, and takes advantage of new scientific areas.
- Collaborations allow for more diverse, inclusive, interdisciplinary, and cross-sector expertise and resources to be brought to the table.

Examples of Innovative Collaborations

- This series of pre-recorded presentations will highlight a few examples of research areas in ORD where different types of collaborations have been leveraged to push forward into new scientific or technological fields, approaches, or innovations.
- These examples are meant to demonstrate for the Committee:
  - the different ways in which ORD collaborates, which could be mechanisms through which ORD takes advantage of the emerging scientific and technological areas identified by the Committee,
  - the characteristics that enable successful collaborations to drive innovation and advance into new scientific areas.

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ORD's Collaborative Research to Reduce Wildland Fire Smoke Exposure

Gayle Hagler, Ph.D.
Associate Director (acting)
Center for Environmental Measurement and Modeling
Office of Research & Development

Provided for the NASEM committee on Anticipatory Research for EPA's Research and Development Enterprise to Inform Future Environmental Protection

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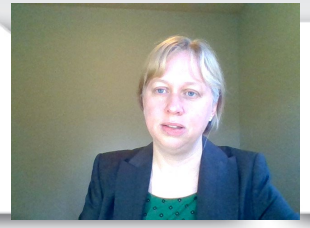


Wildland Fires and Smoke: Partnerships are Essential to Tackle this Complex Problem

"The interagency approach used to conduct this assessment is critical…essential for characterizing complicated system-level impacts across varying fire management strategies, and to establish the interagency linkages needed to address identified research gaps." (Comparative Assessment of the Impacts of Prescribed Fire Versus Wildfire (CAIF): A Case Study in the Western U.S. , 2021)

2021 Monument Fire in northern California (credit: Ali Kamal)

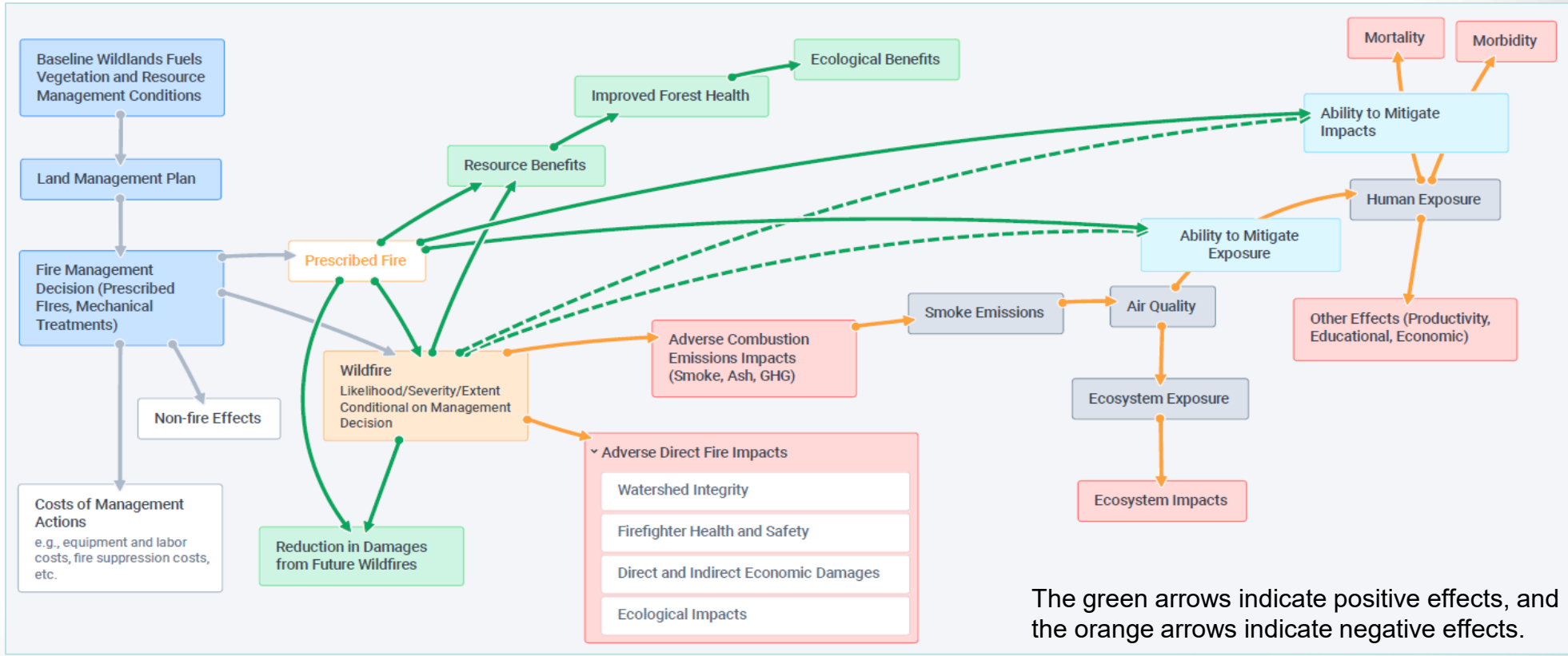


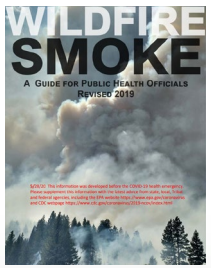
Figure 2-1. Conceptual framework for evaluating and comparing fire management strategies. (Adapted from CAIF report, 2021)

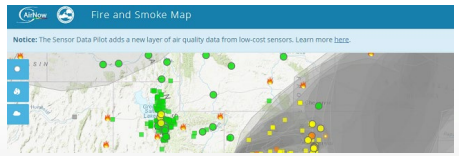
ORD's work: Long-standing research; renewed emphasis

Images: John liames (CPHEA) deployed as Air Resource Advisor to the Summit Trail fire in July 2021

Continuing areas of R&D: Studying source emissions to health and ecosystem impacts; methods development in modeling, monitoring, and data visualization

Bench to field: ORD support to wildfire air quality response:





…with many partners inside and outside of EPA

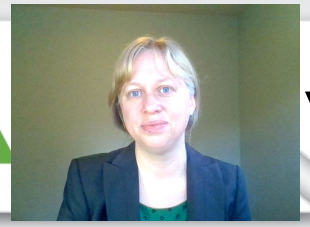
Wildland Fire Smoke: Critical Partnerships

ORD's continuing research interests span the source to health impact trajectory:

1. Expanding methods to measure and model air quality impacts under wildfire smoke scenarios
2. Enhancing characterization of emissions generated by wildland fires (prescribed fires and wildfires)
3. Improving exposure assessment and risk communication
4. Determining strategies to reduce exposure in indoor spaces
5. Understanding health and ecosystem impacts

Parties with shared interests

- **Other federal organizations: USDA, DOI, NIH / CDC, DOD, DOS, NOAA, NASA**
- **Tribes**
- **State and local air agencies**
- **Health departments**
- **University researchers**
- **Private sector**
- **Nonprofits**



Wildland Fire Smoke: Critical Partnerships

Six collaboration examples to discuss today

Wildland Fire Sensors Challenge

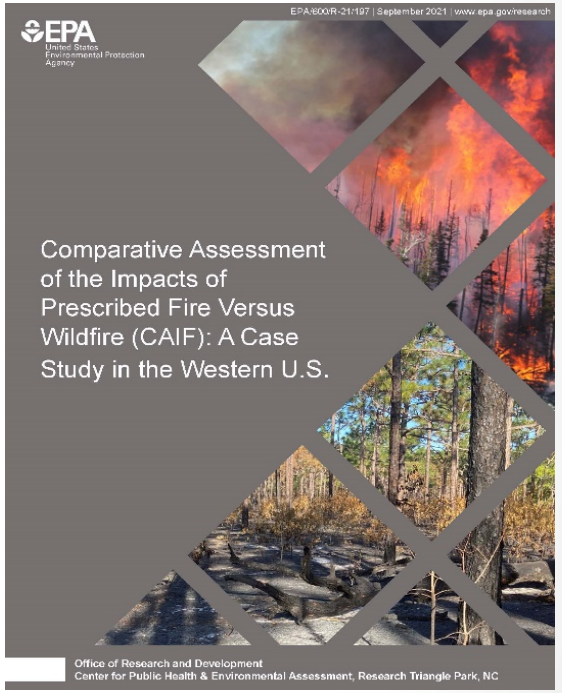
Wildfire ASPIRE study

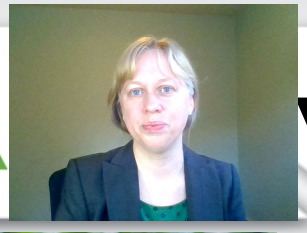
Advancing Science Partnerships for Indoor Reductions of Smoke Exposures

INTERAGENCY WILDLAND FIRE AIR QUALITY RESPONSE PROGRAM

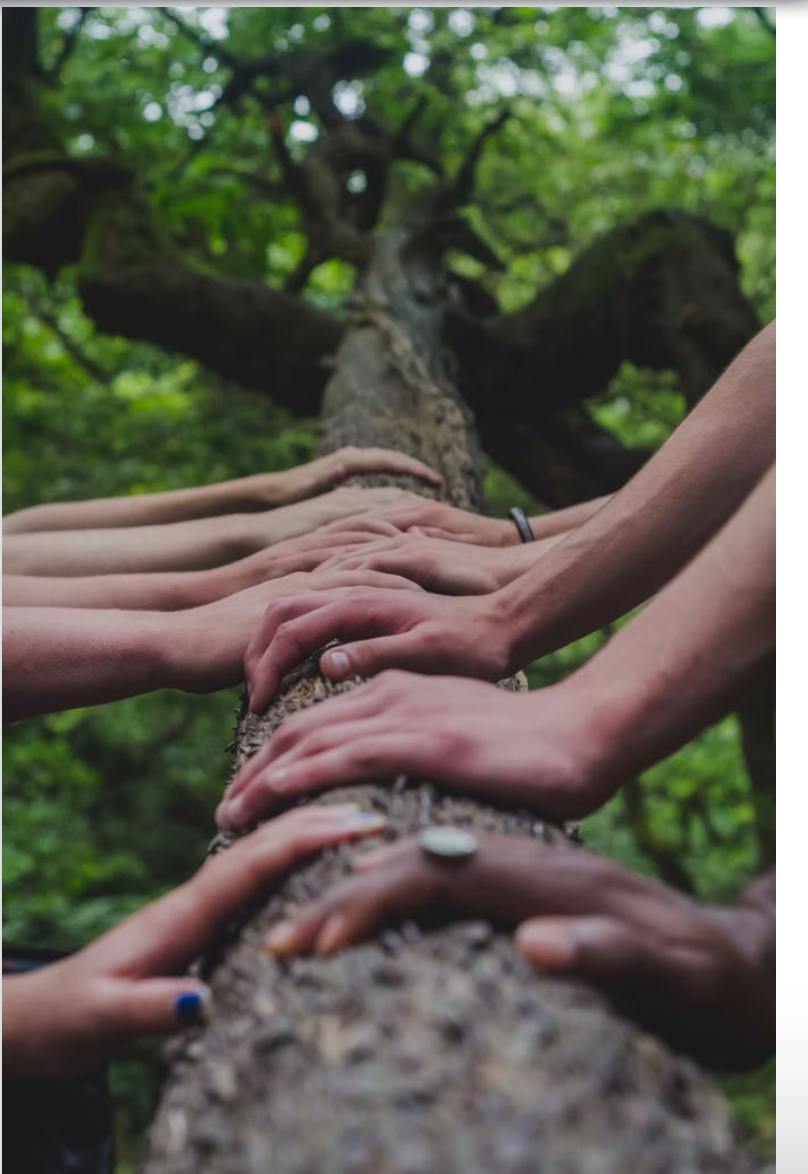
Smoke Sense

Emissions characterization studies





Wildland Fire Smoke: Critical Partnerships



Each example will cover:

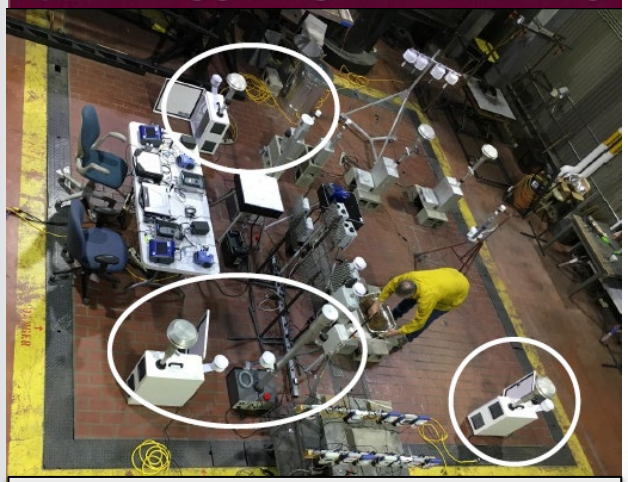
ORD research priority and initiation of the scientific activity

The partnership story – what forms of partnership occurred throughout the effort

Benefits realized from the collaborative approach

Image: Unsplash.com

Example 1: Wildland Fire Sensors Challenge



ORD Contacts: Matt Landis, Gayle Hagler, Gail Robarge

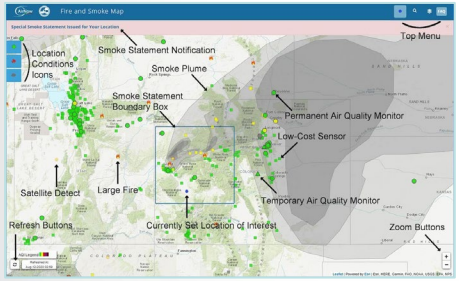
Initiation: Idea proposed during an ORD Air, Climate, and Energy brainstorming session for a prize-based Challenge.

Partnership story: ORD staff reached out through their contacts to connect to interested partners.

- USFS – highest degree of involvement; EPA + USFS scientists worked together to test prototypes in USFS laboratory in Missoula, MT.
- All partners helped develop technology criteria, judge prototype results
- NASA and NOAA provided funding

Partnership benefits: Higher visibility of the Challenge; important cross-agency deliberation on technology targets supporting tech development. Follow-on collaborations.

Example 2: IWFAQRP partnerships



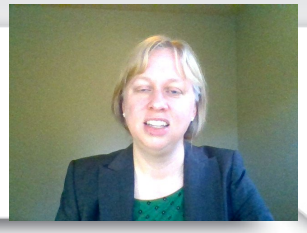
ORD Contacts: Amara Holder, Gayle Hagler, Lara Phelps, Karoline Barkjohn, Andrea Clements

Initiation: US Forest Service initiated the Interagency Wildland Fire Air Quality Response Program (IWFAQRP).

Partnership story: Several staff in EPA Regions and OAR initially applied to be trained as Air Resource Advisors (ARAs) and connected with ORD scientists. ORD has since partnered in several ways:

1. Two ORD staff trained as ARAs (2017, 2018)
2. Collaboration to integrate new smoke technology testing, initiated by EPA internal research proposal (2018-present)
3. Broadening new technology use under the Wildfire Smoke Air Monitoring Response Technology (WSMART) Pilot in 2021
4. R&D supporting sensor data integration into AirNow Fire and Smoke Map

Partnership benefits: Translation from research to emergency response applications; understanding of research needs; broader connections to ARAs from other institutions (state agencies, etc.)



Example 3: Smoke exposure and health

Smoke Sense

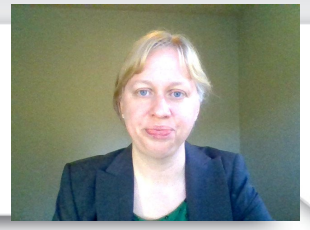
Initiation: ORD scientist conceived of the concept and conducted a number of internal exploratory conversations within EPA (e.g., air quality modeling scientists in ORD and OAQPS).

Partnership story: Multiple forms of partnership

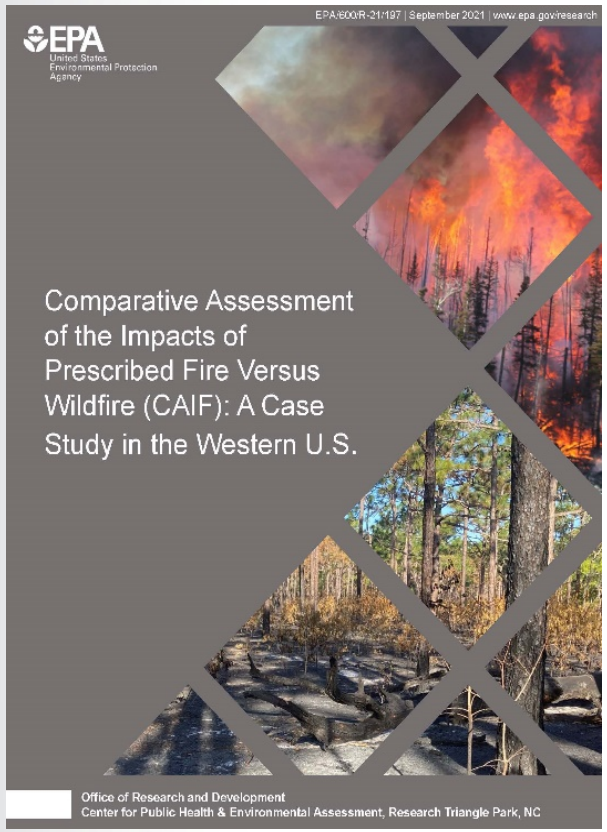
- Data providers: Working with USDA and NOAA to incorporate their data, update over time as needed
- Research organizations using the app: e.g., Washington State University School of Nursing, Stanford University, North Carolina State
- Release of code to partnering organizations for their use: California Air Resources Board, state of Kansas, University of Southern California

Partnership benefits: Higher impact of the Smoke Sense tool; feedback from wider scientific community on continuing R&D needs

ORD Contacts: Ana Rappold



Example 4: CAIF Report



Initiation: Idea developed at the senior leader level during a Wildland Fire Leadership Council (WFLC) meeting. Interagency policy challenges supported this collaboration: USDA and DOI – need to reduce negative wildfire impacts through expanded use of prescribed fire; EPA – need to limit air quality and public health impacts. EPA identified to lead report.

Partnership story: Two forms of partnership

- Interagency agreements with USDA and DOI to support EPA's contributions to the report
- Authorship: USFS, DOI, and NIST contributed as coauthors to multiple chapters

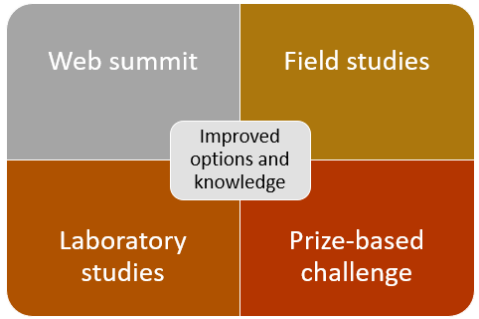
Partnership benefits: Identification of shared research needs; funding and in-kind collaboration to complete significant report in a timely manner.

ORD Contact: Jason Sacks

Example 5: WF-ASPIRE

Wildfire ASPIRE study

Advancing Science Partnerships for Indoor Reductions of Smoke Exposures



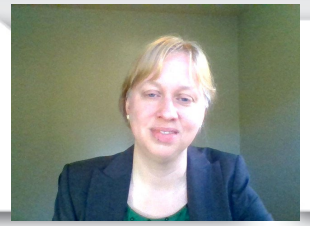
Initiation: ORD initiative to conduct "Solutions-Driven Research" effort that focuses on a specific outside partner's scientific needs and builds from there. Partnered with Missoula City-County Health Dept and together decided to focus on reducing indoor exposure to wildfire smoke.

Partnership story: Started with one, which turned into many

- Field study expanded partnerships: University of Montana, Climate Smart Missoula, Hoopa Valley Tribe in California, Humboldt State University
- Laboratory experiments to test do-it-yourself air cleaner safety: Underwriters Laboratories
- Information for building managers: ASHRAE
- Prize-based Challenges: 10 federal, state, local, tribal partners – shared technology development goals

Partnership benefits: Research needs were grounded in real-world issues; partners amplified and accelerated impact.

ORD Contacts: Gail Robarge, Amara Holder, Emily Snyder, Beth Hassett-Sipple



Example 6: Emissions Characterization

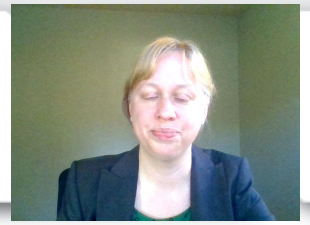
ORD Contact: Brian Gullett

Initiation: ORD has long-standing research characterizing smoke emissions in a specialized test chamber (burn hut) and field studies. Focus on determining factors (e.g., fuel, weather, ignition) driving emissions → opportunities for emissions reduction.

Partnership story:

- Funders: Department of Defense SERDP program, USGS
- Landowners: DOD, USDA, Tall Timbers Research Station
  - Coordination to sample during prescribed fires
- Field study collaborators and modeling collaborators: Los Alamos National Lab, Desert Research Institute (e.g., Unmanned Aircraft System with EPA payload), universities (e.g., University of North Carolina, Worcester Polytechnic Institute)

Partnership benefits: Access to field sampling opportunities, funding, field study implementation, data sharing – overall, broader impact of the research.

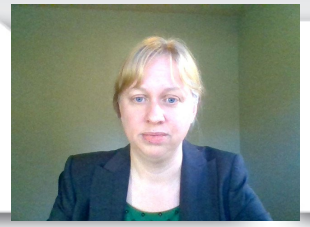


How we partner

- Why partner
  - Bring together unique skills, knowledge, and resources to tackle complex topics
  - Amplified impact and accelerated innovation
  - Technology transfer from lab bench to emergency applications

- Multiple levels
  - Senior leader involvement at the outset (e.g., CAIF, ASPIRE)
  - Staff-initiated collaboration at a technical level (e.g., Smoke Sense)

- Formal and informal
  - Interagency agreements, co-sponsorship, or other funding mechanisms
  - Informal or proposal based: collaborative research proposals, joint field study planning, data sharing and information exchange



Thank you for your time!

Gayle Hagler: hagler.gayle@epa.gov