# Opportunities to Reduce Wildfire GHG Emissions In Boreal Forests

Peter C Frumhoff
Woodwell Climate Research Center & Harvard University

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NASEM Workshop on GHG Emissions from Wildland Fires
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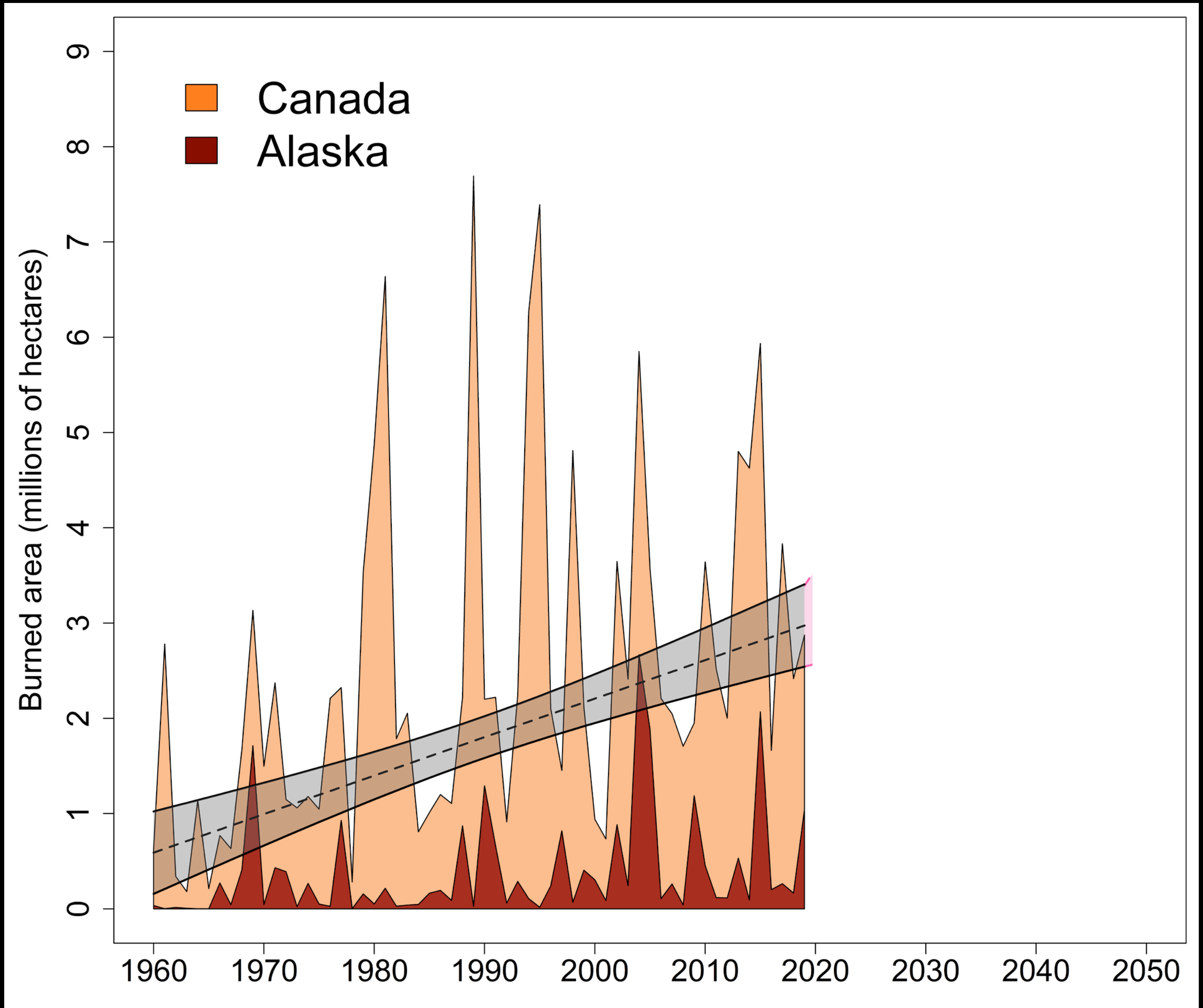
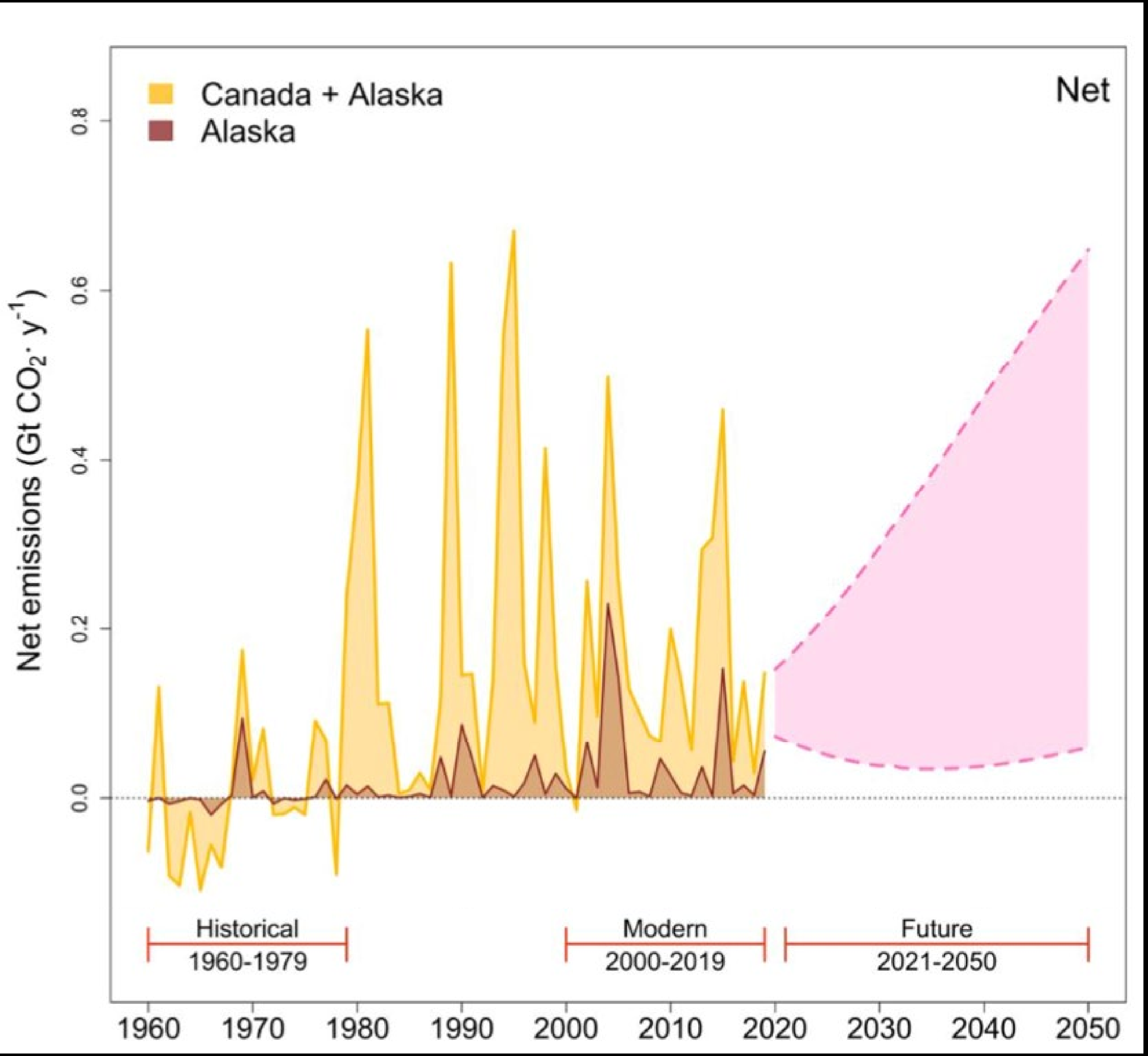
Photo: Government of Alberta




Phillips et al. (2022)

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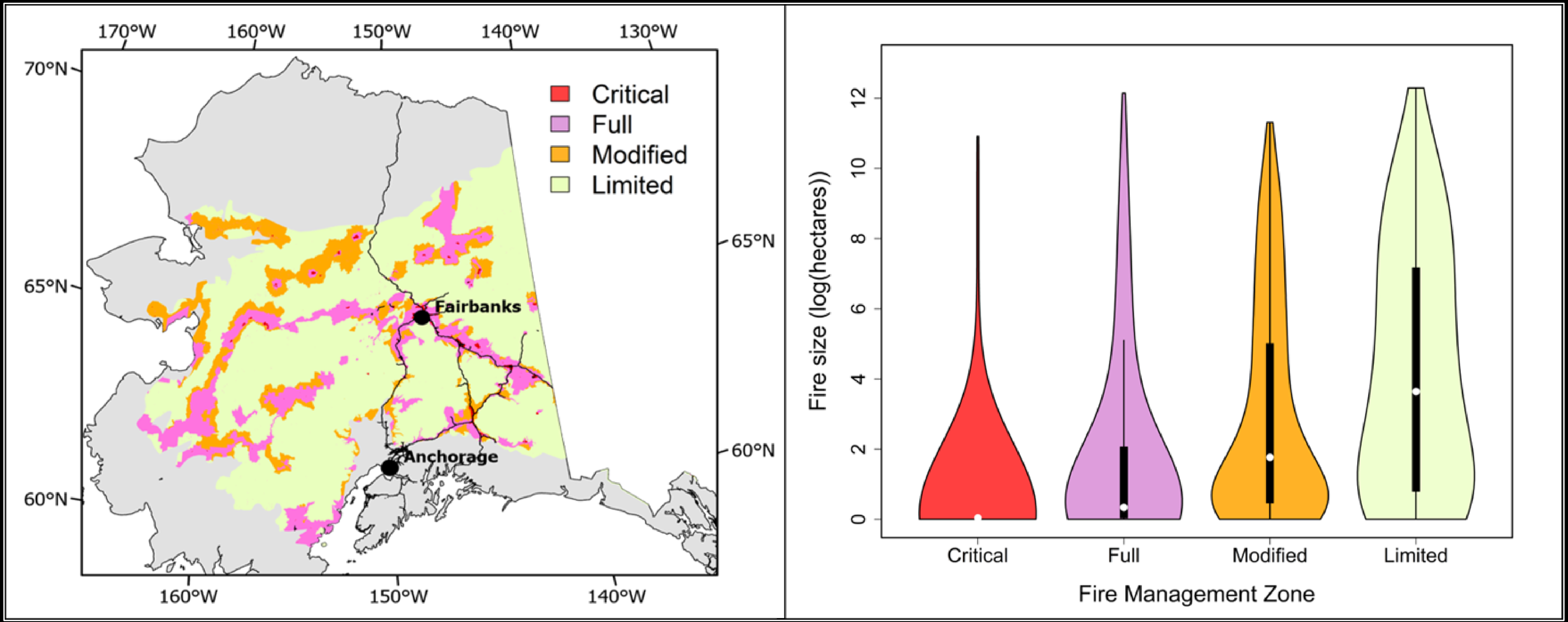
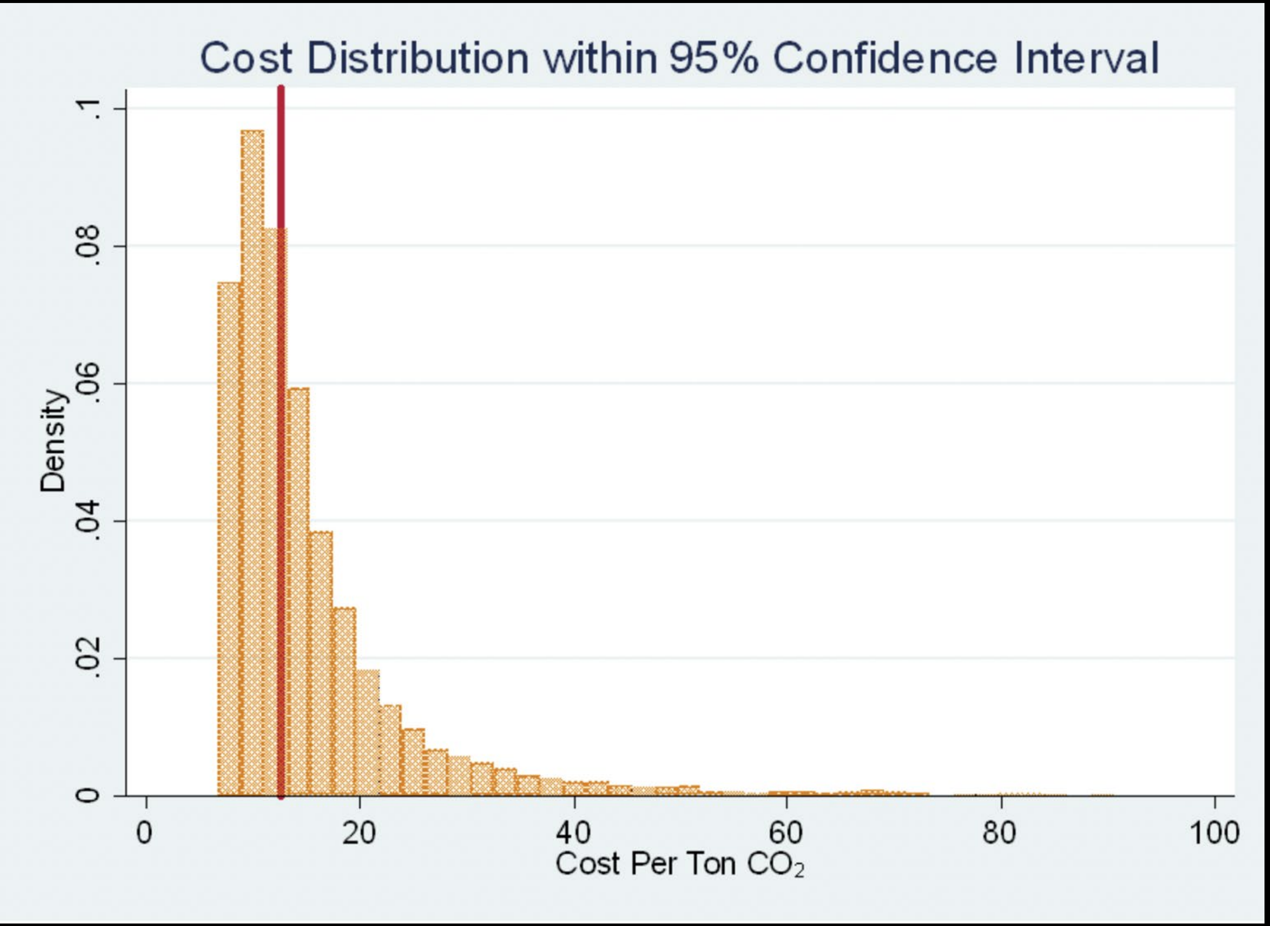



Phillips et al. (2022)




Phillips et al. (2022)

**Table 1. Estimates of static, direct costs of $CO_2$ emissions reduction and negative emissions technologies and approaches.** Ranges for fire management represent a 95% confidence interval. Values for other approaches and technologies represent the range of estimates depending on land availability, scale of implementation, and market demand.

| Technology or approach | Cost (USD/metric ton of $CO_2$) |
|---|---|
| **Power sector technologies*** | |
| Onshore wind | 23–26 |
| Utility-scale solar photovoltaic | 32–41 |
| "Advanced" nuclear | 58 |
| **Negative emissions technologies and approaches†** | |
| Coastal blue carbon | 0.75–30 |
| Soil carbon sequestration | 0–50 |
| Direct air capture | 90–600 |
| Afforestation, reforestation, forest management | 15–50 |
| **Fire management** | |
| Boreal fire management in Alaska | 6–91 |

*Estimates compare the cost per metric ton of $CO_2$ abated by replacing electricity generated from coal or natural gas with electricity generated by a cleaner alternative (*80*, *81*).
†Estimates represent current costs per metric ton of $CO_2$ sequestered for implementation at scale (*82*).

The Washington Post
*Democracy Dies in Darkness*

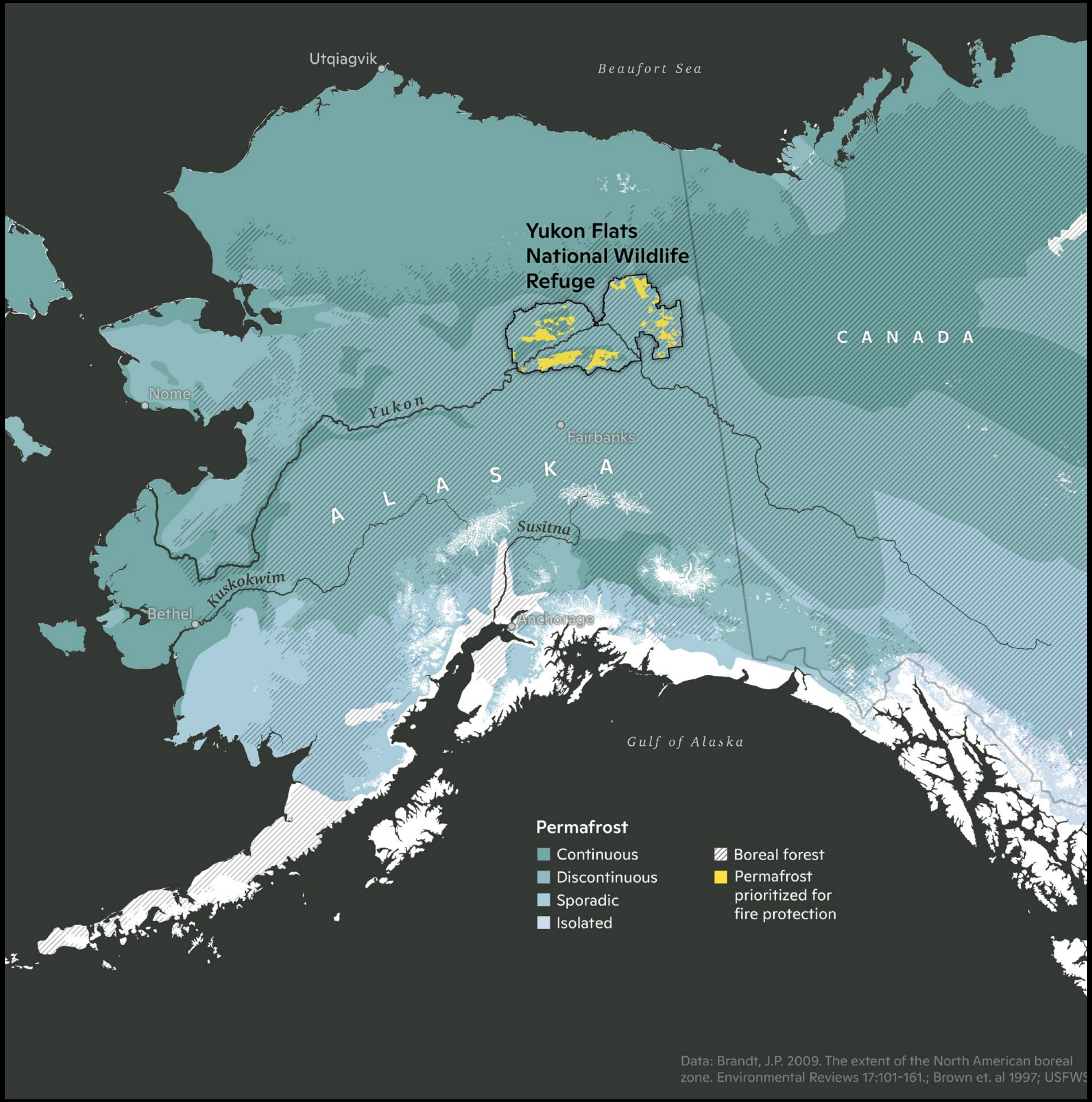
NATIONAL

# Alaska firefighters experiment with targeting blazes to save carbon

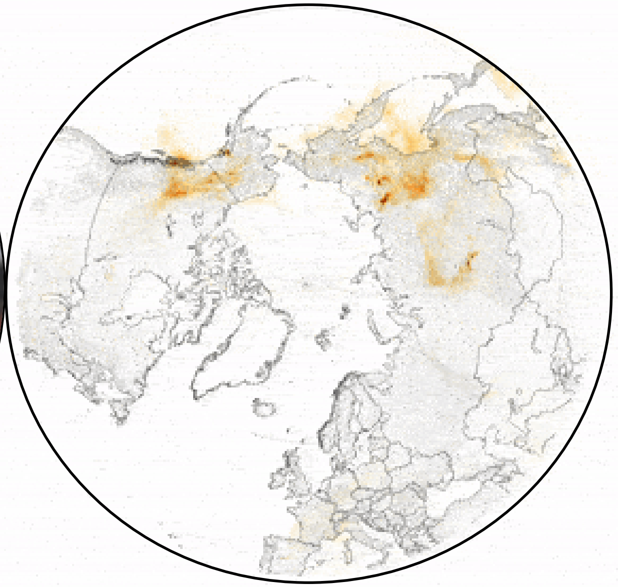
The Bureau of Land Management pilot program represents a shift designed to help curb climate change

By Alexandra Heal

September 8, 2023 at 6:00 a.m. EDT



- Black carbon deposition on snow and ice
- Smoke inhalation & human health
- Aviation
- Tourism
- Wildlife
- Infrastructure



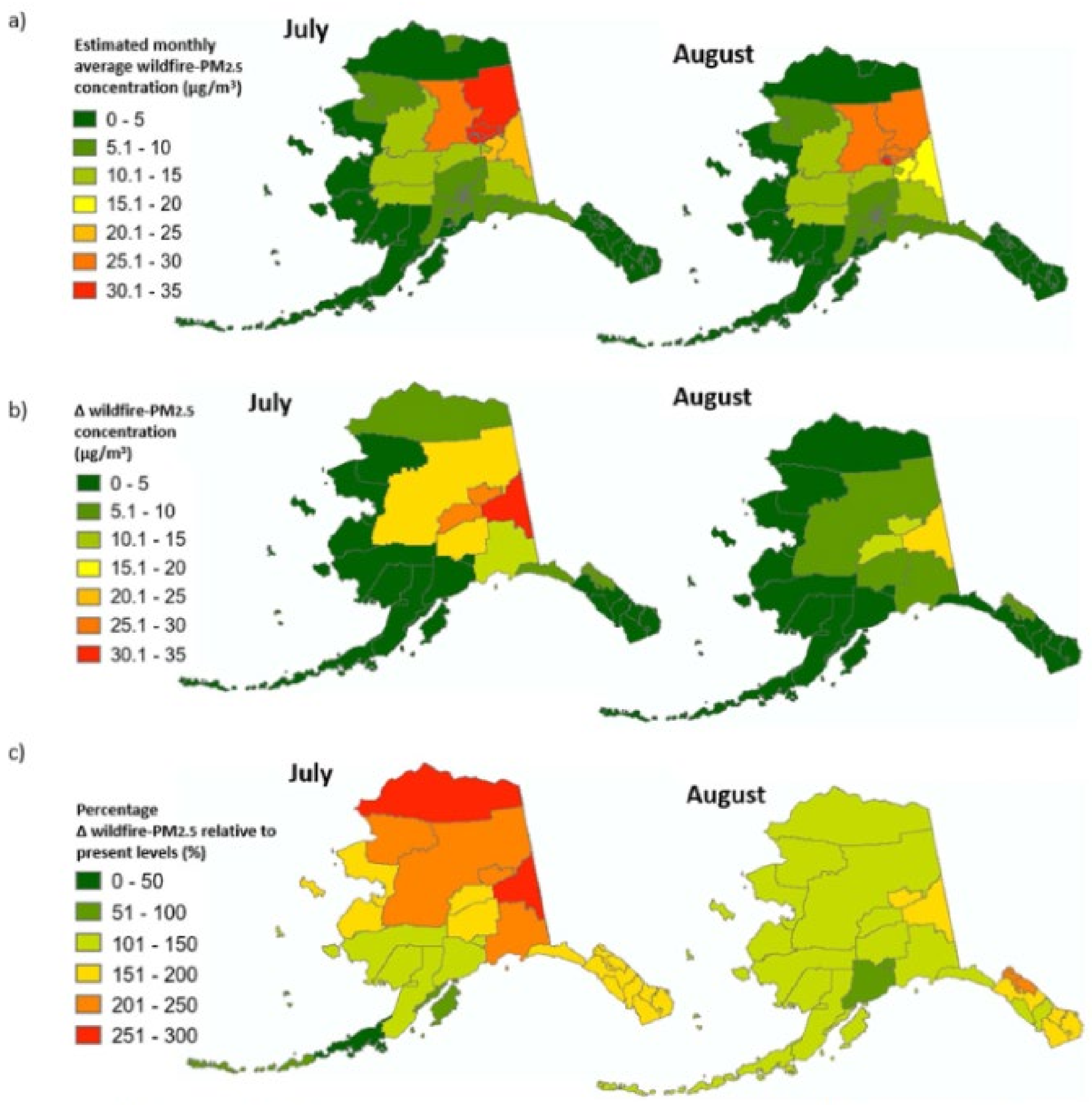
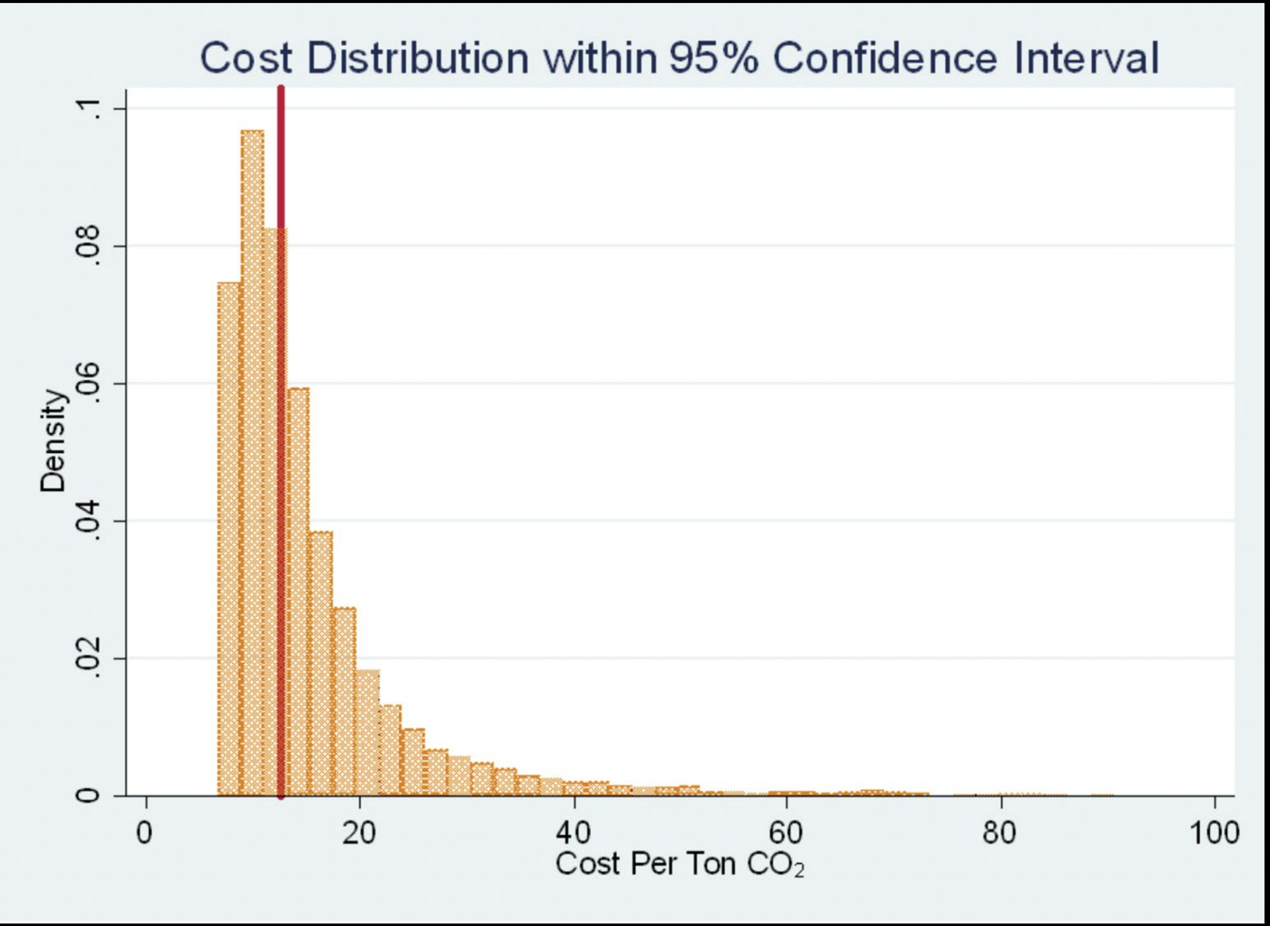



**Figure 2.** Wildfire-$PM_{2.5}$ levels by borough and census tract in Alaska for July and August. (a) Wildfire-$PM_{2.5}$, present day (1997 to 2010), (b) Change in wildfire-$PM_{2.5}$ for 1997–2001 to 2047–2051 under climate change, (c) Percent change in wildfire-$PM_{2.5}$ exposure relative under climate change (2047–2051) relative to the present-day (1997–2010)

Woo et al 2020

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Phillips et al. (2022)


Photo: Xanthe Walker

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Earth System Dynamics
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# Northern-high-latitude permafrost and terrestrial carbon response to two solar geoengineering scenarios

Yangxin Chen[1], Duoying Ji[1], Qian Zhang[1], John C. Moore[1,2,3], Olivier Boucher[4], Andy Jones[5], Thibaut Lurton[4], Michael J. Mills[7], Ulrike Niemeier[8], Roland Séférian[6], and Simone Tilmes[7]

Atmos. Chem. Phys., 23, 5467–5486, 2023
https://doi.org/10.5194/acp-23-5467-2023


Atmospheric Chemistry and Physics
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# Impact of solar geoengineering on wildfires in the 21st century in CESM2/WACCM6

Wenfu Tang[1], Simone Tilmes[1], David M. Lawrence[2], Fang Li[3], Cenlin He[4], Louisa K. Emmons[1], Rebecca R. Buchholz[1], and Lili Xia[5]


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Thank you!