



IMPACTS OF GROWING  
WILDFIRE-RELATED  
EMISSIONS  
ON THE GLOBAL CARBON  
BUDGET,  
THE +1.5 LIMIT, AND THE  
NEXT NDCS  
AND ADAPTATION

COP 29  
BAKU, AZERBAIJAN  
SIDE EVENT ROOM 6

NOVEMBER 19TH, 2024  
EDWARD ALEXANDER  
CO-CHAIR OF THE ARCTIC COUNCIL'S



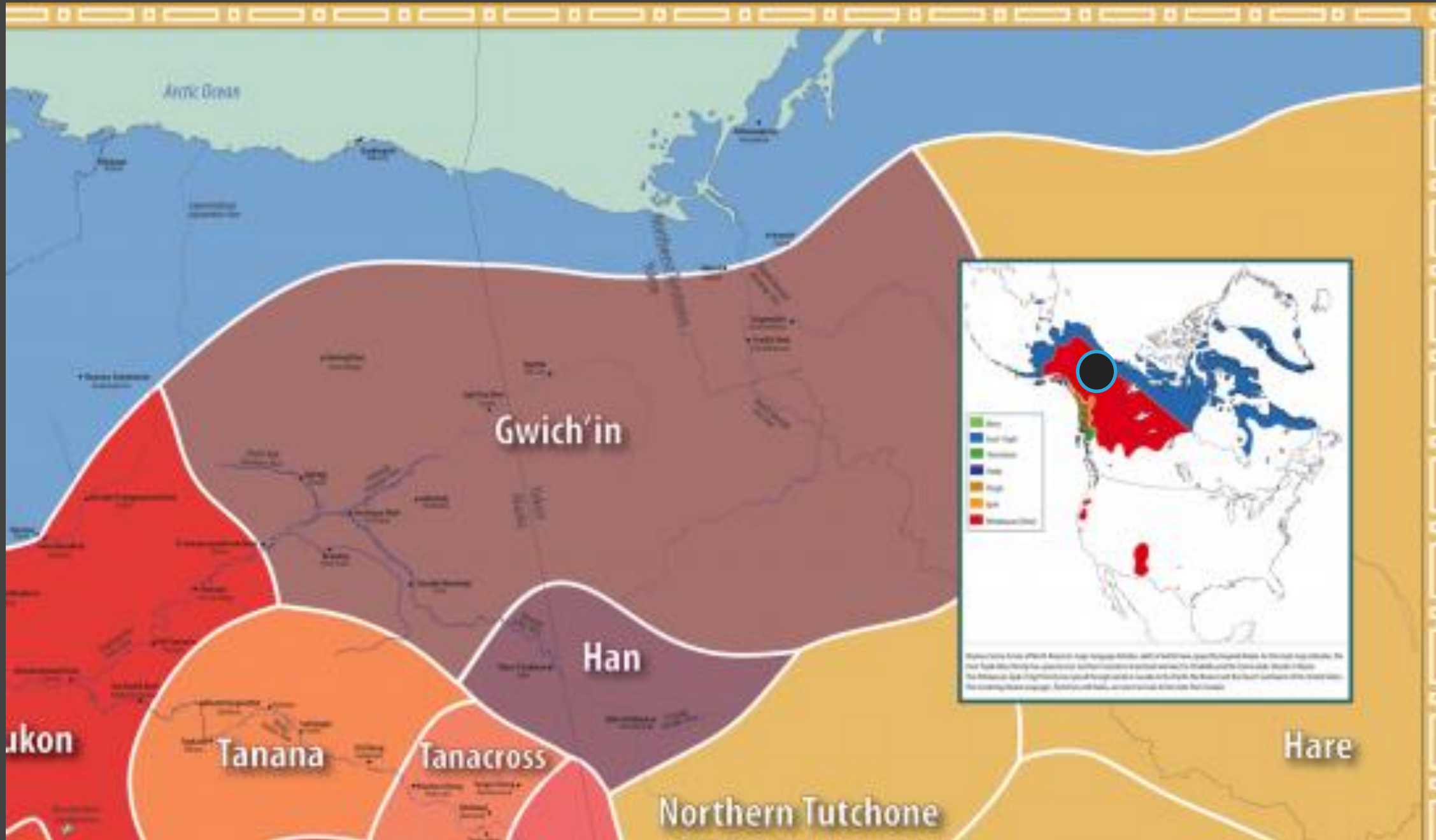
# GWICH'IN COUNCIL INTERNATIONAL (GCI)

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- ▶ Mission is to amplify the voice of the Gwich'in Nation on sustainable development and the environment at the international level to support resilient and healthy communities.
- ▶ Represent all 10,000 Gwich'in Nation members in Alaska, the Yukon, & the NWT on international matters.
- ▶ Inhabit an area roughly the size of Germany and Denmark combined.
- ▶ Three membership governments appoint an 8-member Gwich'in Board; staff (1) based in Yellowknife, Canada.



# GWICH'IN COUNCIL INTERNATIONAL (GCI)





# THE ARCTIC COUNCIL



- ▶ Eight Arctic States: The US, Canada, Russia, Iceland, Sweden, Norway, The Kingdom of Denmark, Finland
- ▶ Six Permanent Participants: Gwich'in Council International, the ICC, Sami Council, RAIPON, Arctic Athabaskan Council, Aleut International.

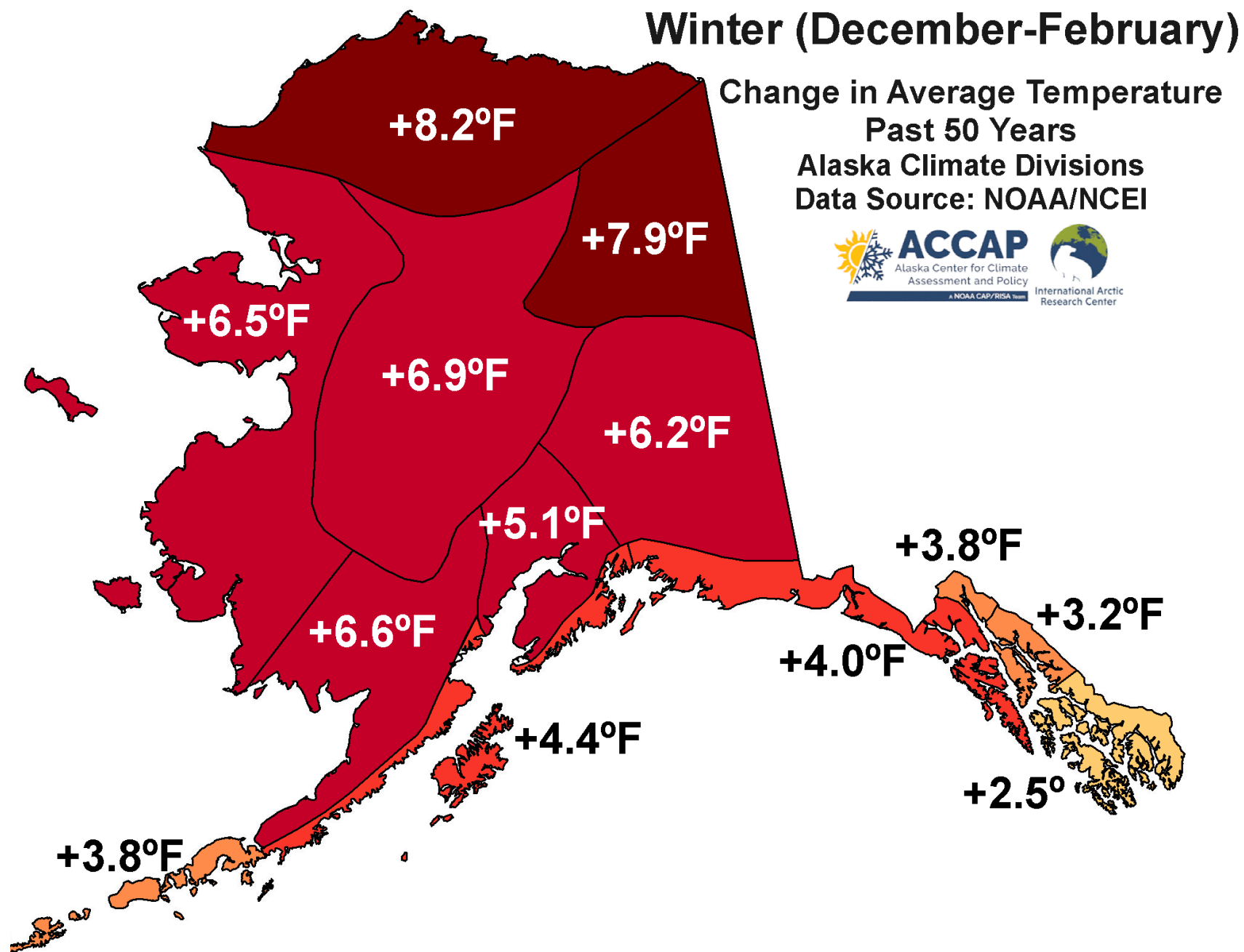
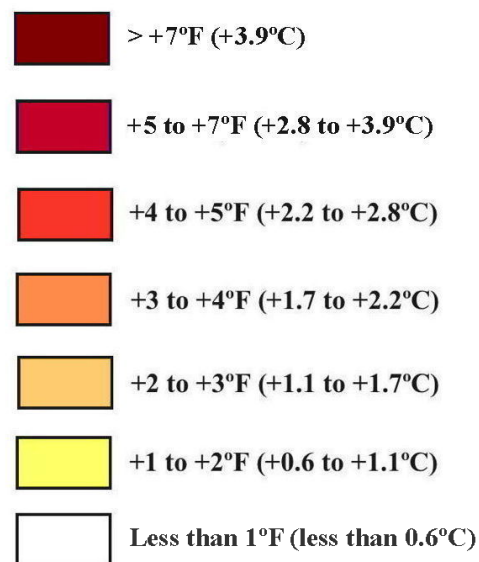




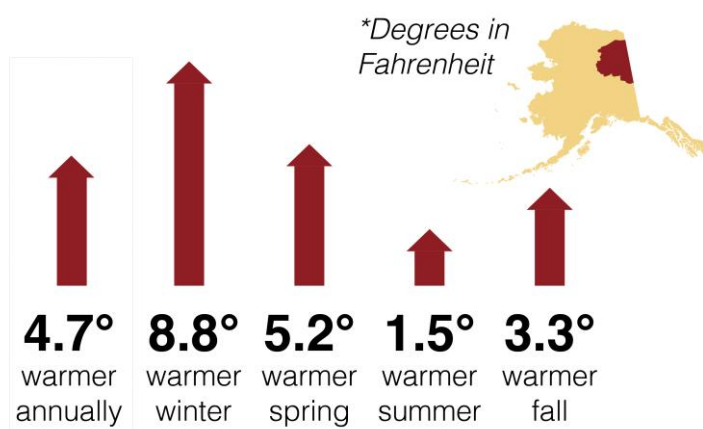


# THE ARCTIC CHANGED QUICKLY, THE YUKON FLATS MORE SO:

1974-75 to 2023-24



Every season is warmer on Yukon Flats



Credit: Thoman, R. (2021). Every season is warmer. *Yukon Flats Changing Environment*, H. R. McFarland, editor. [uaf-iarc.org/yukon-flats-changes](http://uaf-iarc.org/yukon-flats-changes).  
Data source: ERA5 courtesy of ECMWF/Copernicus



# WILDLAND FIRES ARE CHANGING

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- ▶ Fires are increasing in intensity, duration and area across the circumpolar Arctic.
- ▶ Trends across the circumpolar Arctic – including in Alaska – show
  - ▶ Hotter summers, more warm nights
  - ▶ Shorter snow seasons
  - ▶ Longer fire seasons, more acres burned annually (Russia/Canada)
  - ▶ Increased extreme fire weather
  - ▶ More evacuations like McMurray/Yellowknife/Old Crow

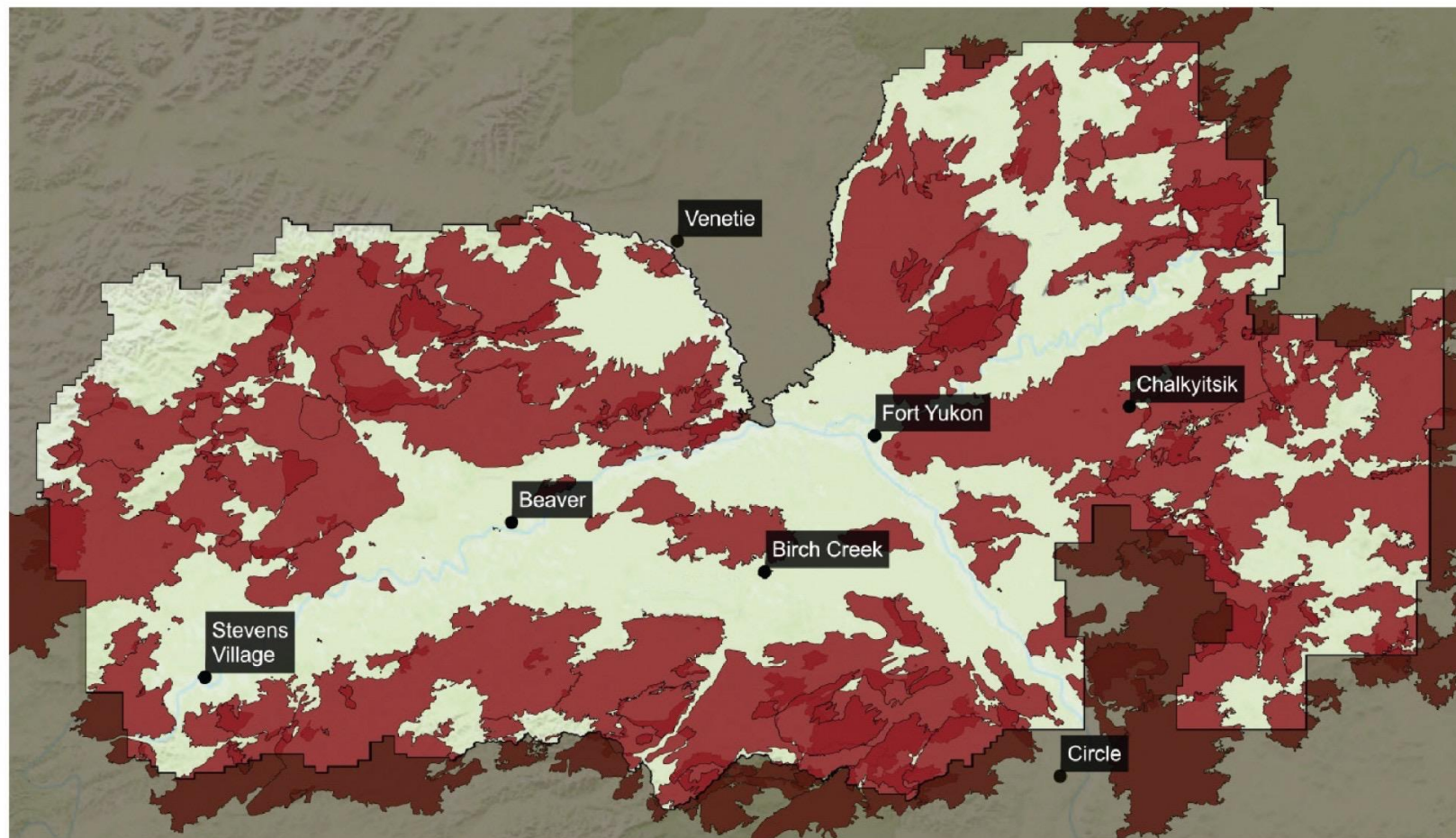
In June 2019, Arctic wildland fires emitted 50 megatons of CO<sub>2</sub>, equivalent to Sweden's total annual emissions and more than the past eight Junes combined.

Kasha Patel, NASA Earth Observatory



WILDLAND FIRES ARE CHANGING QUICKLY:  
OUTER HIGHLIGHTED BOUNDARY THE SIZE OF MARYLAND,  
BURNED AREA IN RED = 4 DELAWARES

## Wildfire has touched 64% of Yukon Flats NWR from 1960-2020



Credit: Grabinski, Z. (2021). Fire perimeters. *Yukon Flats Changing Environment*, H. R. McFarland, editor. [uaf-iarc.org/yukon-flats-changes](http://uaf-iarc.org/yukon-flats-changes).

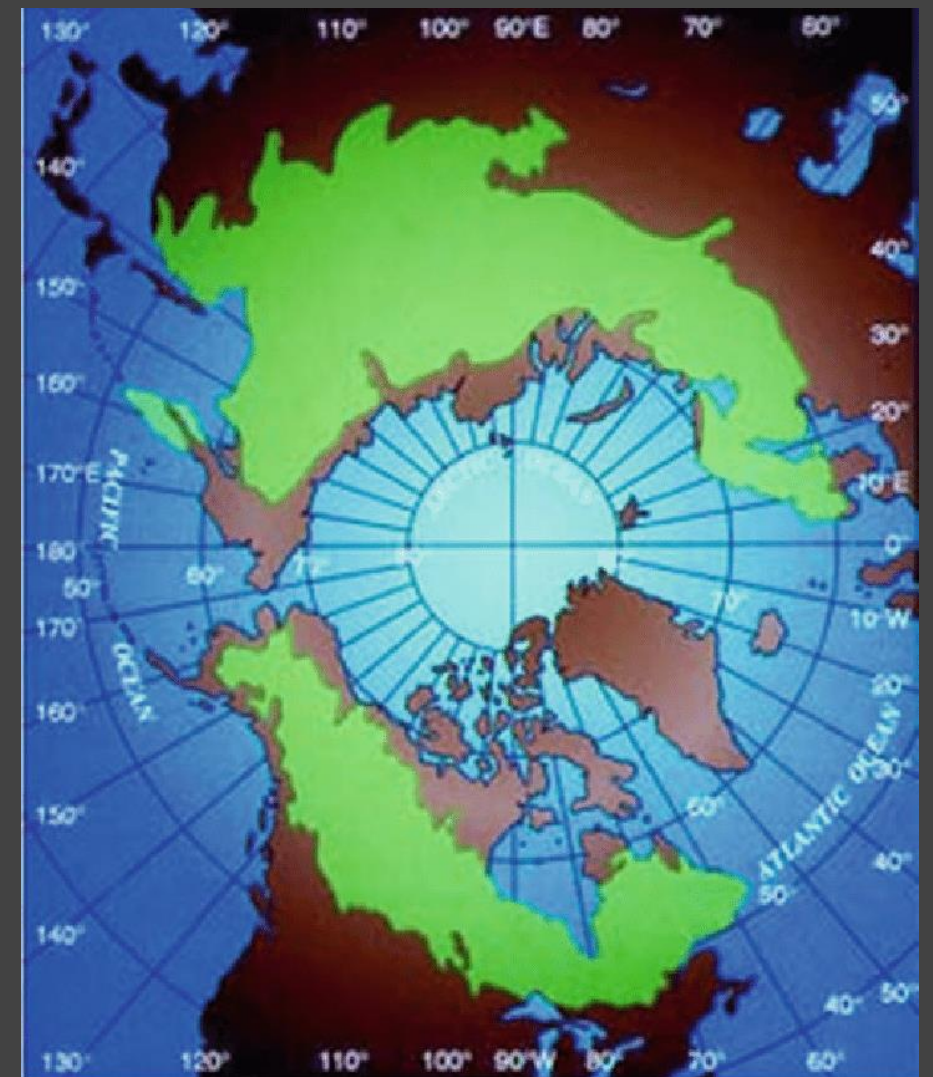
Data source: Alaska Interagency Coordination Center





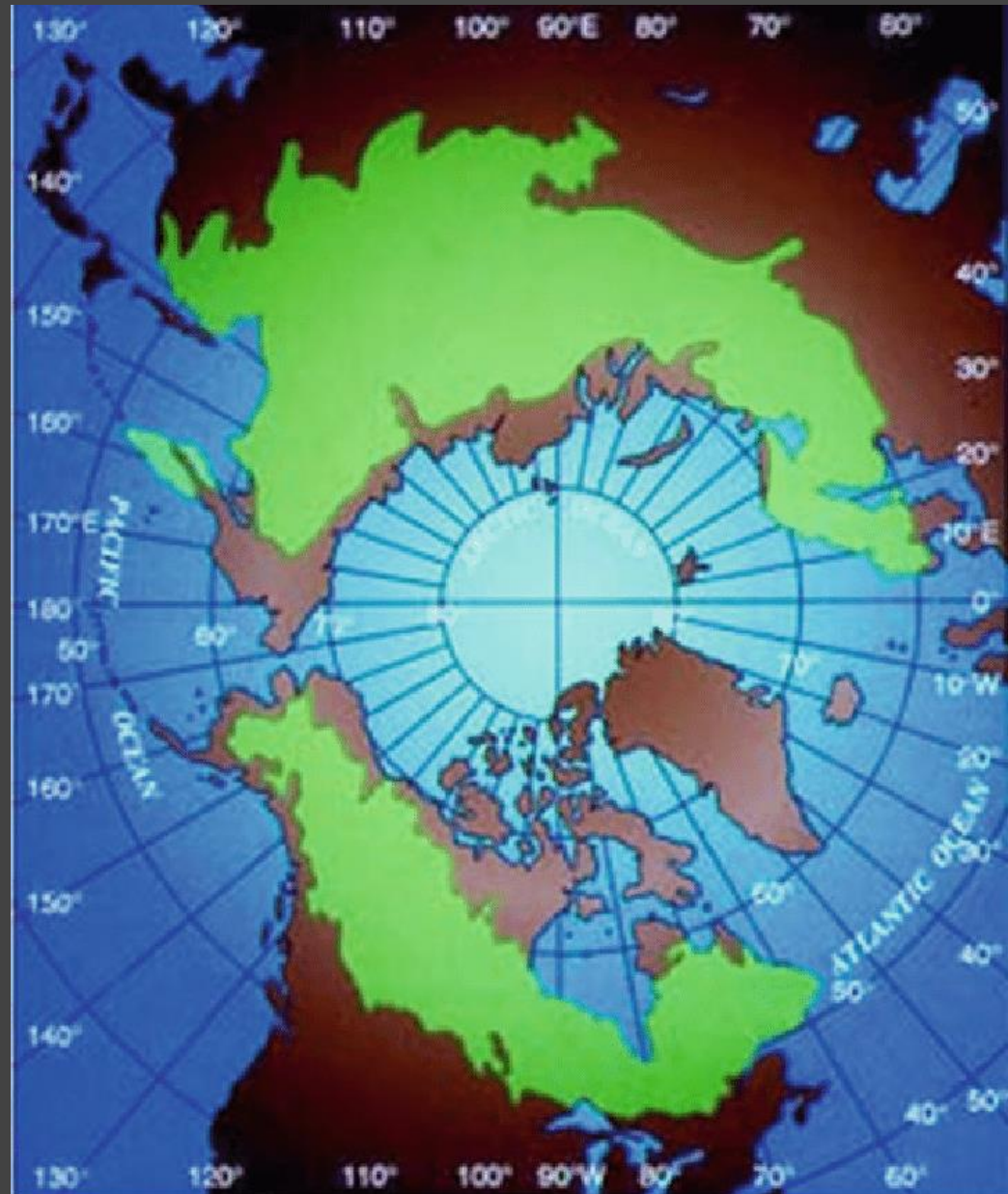
# THE CIRCUMPOLAR BOREAL, PERMAFROST AND WELLNESS

- ▶ The boreal forest, combined with the permafrost beneath it, forms the largest terrestrial carbon sequestration system on the planet.
- ▶ Global ecosystem services, natural infrastructure and foundation of the world.
- ▶ Has regulated our world for millennia, but now it's on fire.
- ▶ Possible abrupt thaw scenarios for yedoma.



# THE CIRCUMPOLAR BOREAL AND WHAT IT CAN'T DO FOR YOU

- ▶ Can't stop fires on its own very well.
- ▶ 3x the fires since 2018.
- ▶ 2023 Canadian Fire Season According to the Global Wildland Fire Information system.
  - ▶ 45.7 million acres
- ▶ 2003 Russian Fire Season
  - ▶ 55 million acres
- ▶ 2012 Russian Fire Season
  - ▶ 74 million acres
- ▶ 430 million acres of boreal burned last 20 years
  - ▶ According to NASA-Modis Data





# ACCELERATION OF WILDLAND FIRES IN THE ARCTIC IS A GLOBAL THREAT, NECESSITATES ACTION

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- ▶ The Boreal forest is the largest forest and is part of the largest terrestrial carbon sink on planet Earth.
- ▶ As a forest it sequesters as much carbon as is in the entire global atmosphere.
- ▶ Beneath the boreal and tundra lies 2X the amount of carbon (2,066PgC-petagrams) as is currently in the atmosphere of the entire planet.
- ▶ The degradation of boreal Yedoma is a particular threat; the global supply of 480 PgC (1/4 of all carbon in permafrost) is concentrated in a small area in the Yukon Territory, Alaska and Russia, much of which will be released as methane, which is 28X as powerful a greenhouse gas.



# WHAT IS “YEDOMA” AND WHY SHOULD I CARE?

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- ▶ University of Alaska Fairbanks.
- ▶ Photo: Dr. Torre Jorgenson
- ▶ Yukon Flats fire slump
- ▶ Yedoma-fire interface
- ▶ Pleistocene era





# 430 MILLION ACRES, 20 YEARS, THE PYROCENE HAS MET THE CRYOSPHERE

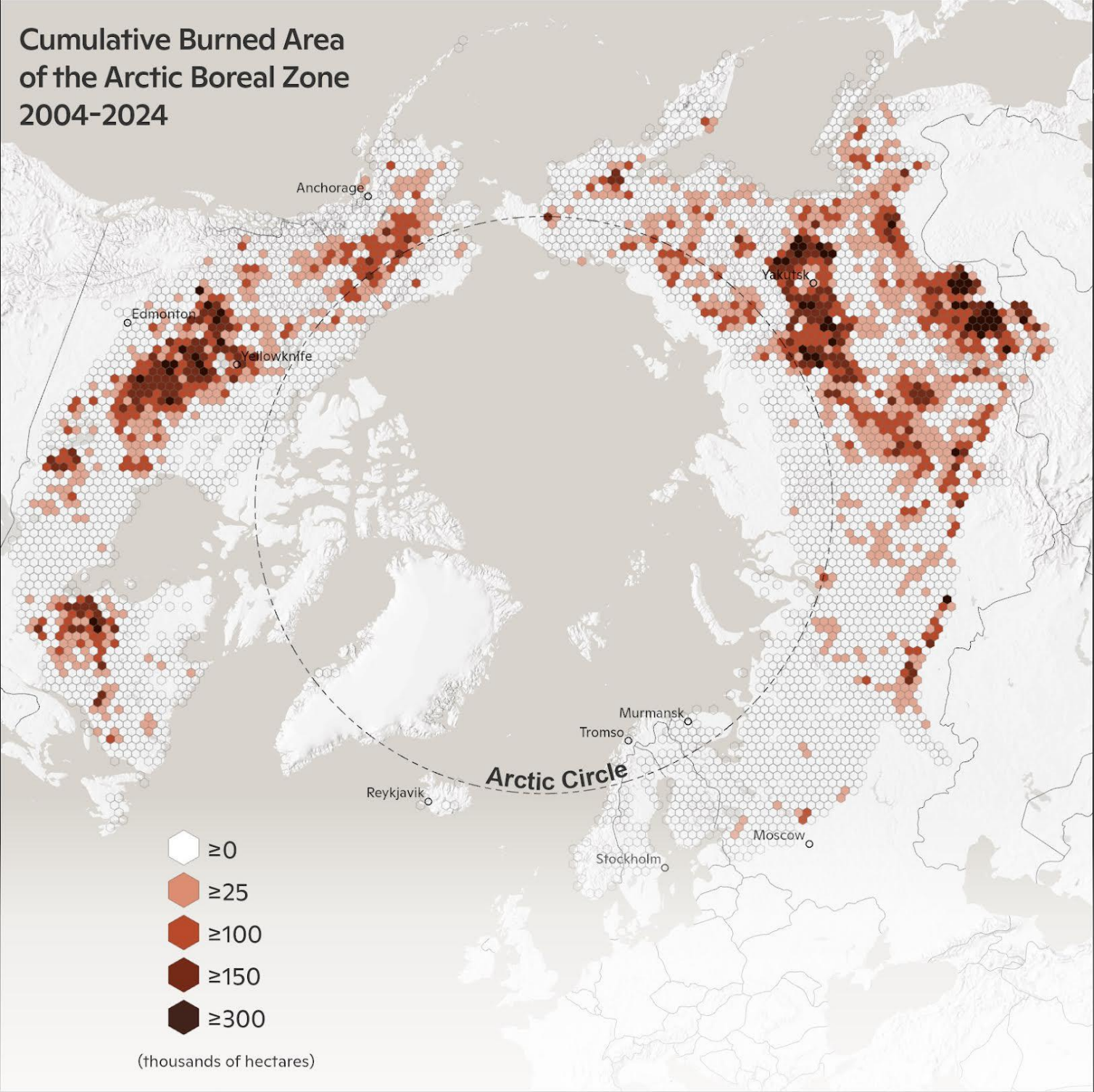
As we are facing an accelerating emergency, we need a comprehensive overview of the best available knowledge that is both accessible and actionable. Morten Høglund, Chair of the Senior Arctic Officials of the Arctic Council

Image created by Dr. Brendan Rogers

Woodwell Climate

Using NASA-MoDIS Data

Cumulative Burned Area of the Arctic Boreal Zone 2004-2024



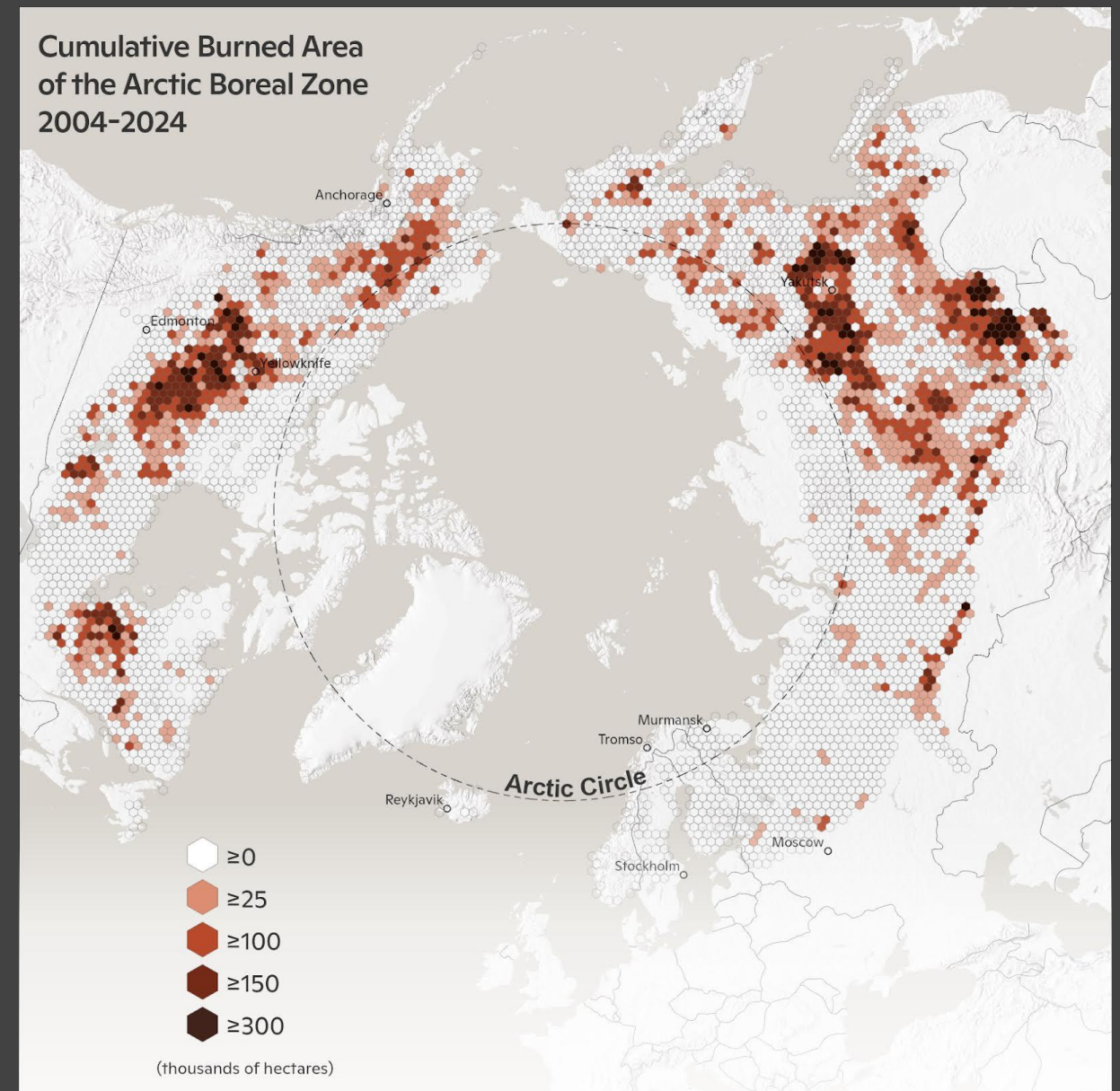


# NOW IMAGINE THIS HAPPENING ON 174 MILLION HECTARES THAT'S HOW MUCH HAS BURNED IN THE CIRCUMPOLAR NORTH IN THE LAST 20 YEARS



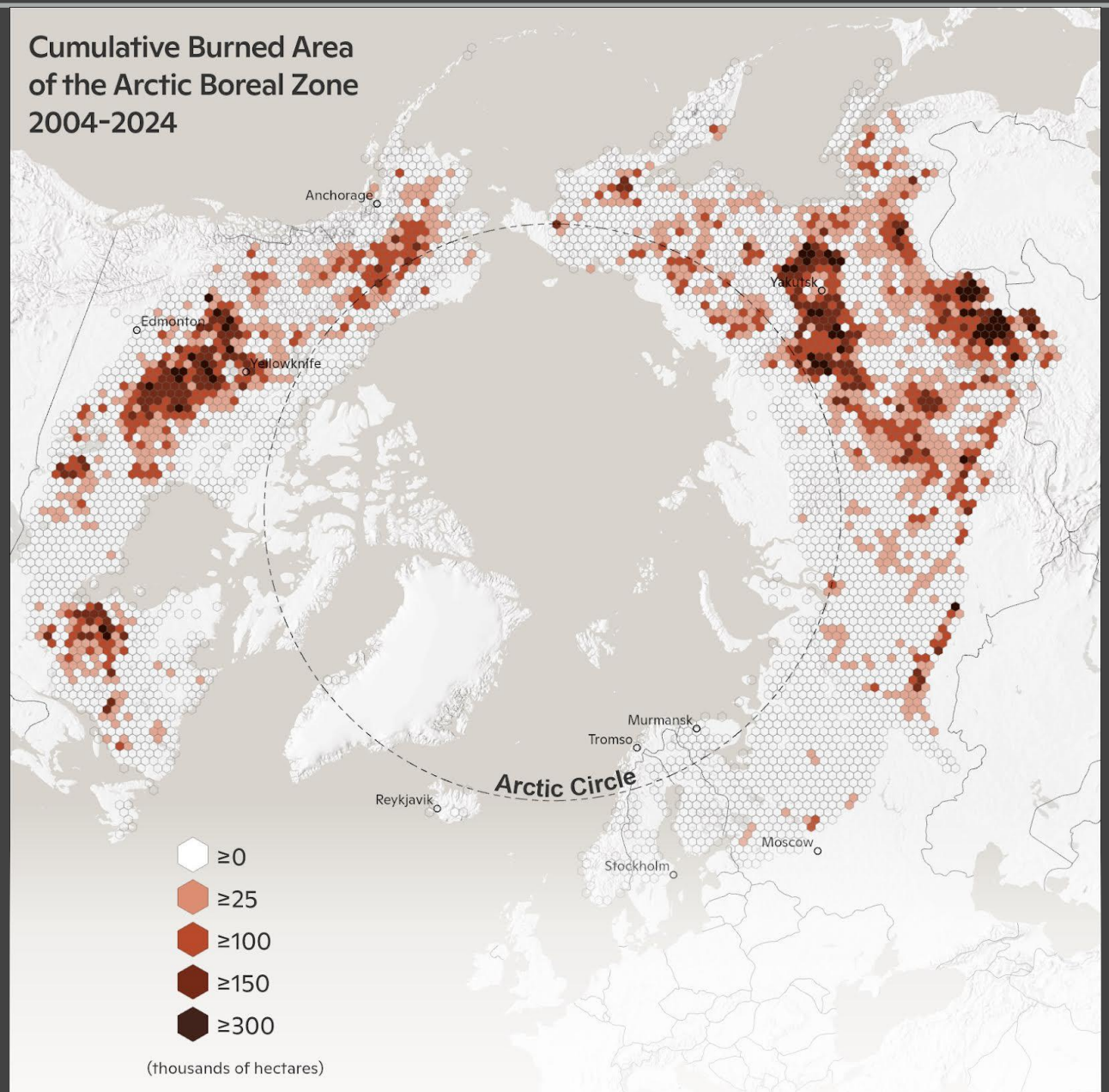
Image courtesy of Dr. Torre Jorgenson, UAF

Map courtesy of Dr. Brendan Rogers,  
Woodwell Climate Research Center





# 174 MILLION HECTARES = 430 MILLION ACRES

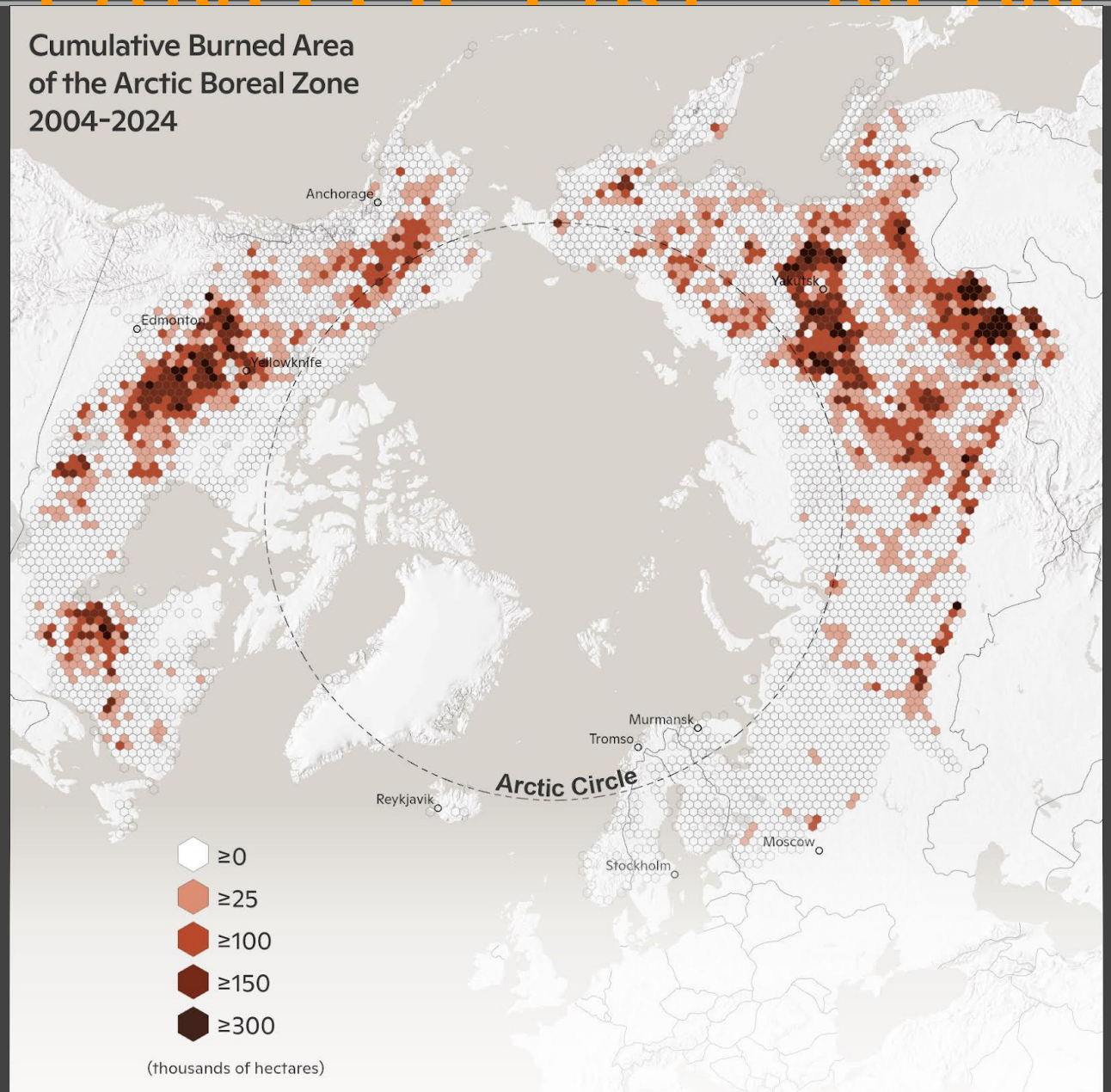


Circumpolar Cumulative Burn Map courtesy of Dr. Brendan Rogers, Woodwell Climate Research Center. NASA-Modis data

# 174 MILLION HECTARES = MORE THAN 20 AZERBAIJANS.

## WHICH ONE IS THE “LAND OF FIRE” NOW?

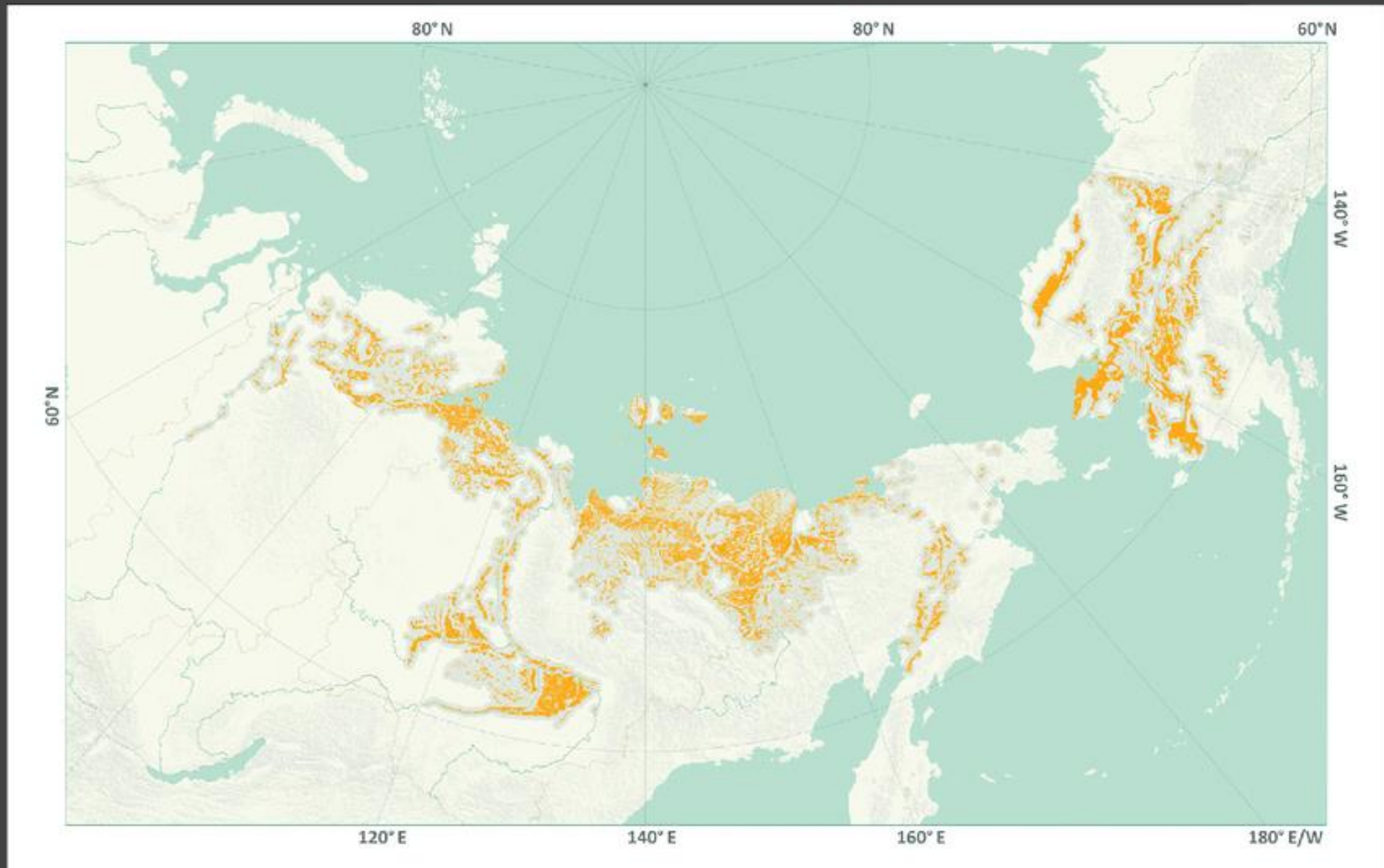
Azerbaijan, the land of fire, would have to burn more than **20 times** in its entirety to equal what has happened in the circumpolar



Circumpolar Cumulative Burn Map courtesy of Dr. Brendan Rogers, Woodwell Climate Research Center. NASA-Modis data



► The imminent threat of yedoma: rapid destabilization and release of massive



# WHAT IS “YEDOMA” AND WHY SHOULD I CARE?

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- ▶ University of Alaska Fairbanks, Water and Environmental Research Center.
- ▶ Photo: M. Kanevskiy
- ▶ Small insulation.
- ▶ Big problem.





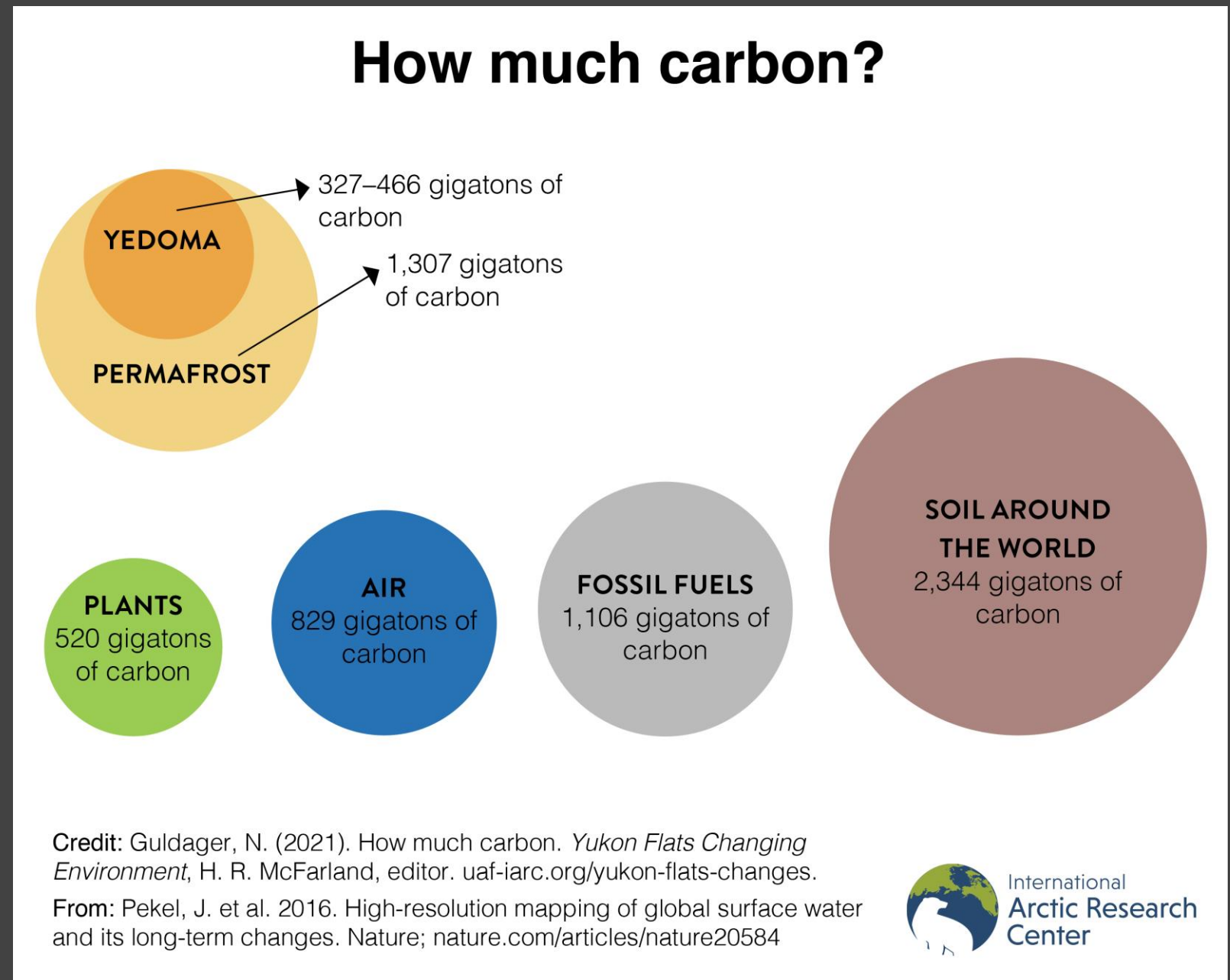
# WHAT IS “YEDOMA” AND WHY SHOULD I CARE? THE IMPORTANT SLIDE.

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- ▶ Yedoma is an ancient, carbon rich, frozen freshwater deposit. Its akin to permafrost.
- ▶ The amount of gases released from these areas could be a significant driver of emissions as the Arctic rapidly melts, and burns.
- ▶ It is very ice rich, fragile and can rapidly collapse, causing a amplifying feedback loop leading to runaway greenhouse effects.
- ▶ Again, 480 GT, is a world changing amount of Carbon... If released as methane, roughly 100X the amount of methane currently in the atmosphere. Again, 28X as potent as CO<sub>2</sub>. Nitrous Oxide 100X as powerful as CO<sub>2</sub>.
- ▶ The permafrost and boreal combined contain over 3,000 GT of C. 3x as much as has been released globally since the Industrial Revolution.

# WHAT IS “YEDOMA” AND WHY SHOULD I CARE?

- ▶ How much carbon?
- ▶ A lot.





# WHAT IS “YEDOMA” AND WHY SHOULD I CARE?

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- ▶ Photo: Nicholas Hasson, UAF
- ▶ Methane releasing in the winter



# WHAT IS “YEDOMA” AND WHY SHOULD I CARE?

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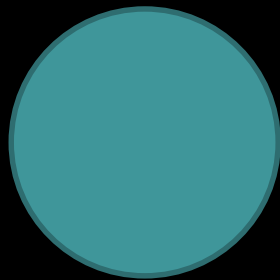
- ▶ Photo: Katey Anthony, UAF
- ▶ Methane bubbles
- ▶ Year round production



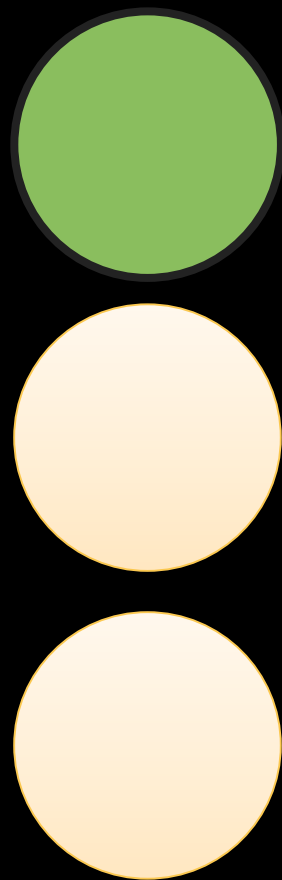


# WILDLAND FIRE: THE ARCTIC AND GLOBAL IMPLICATIONS OF TRIGGERING YEDOMA THAW

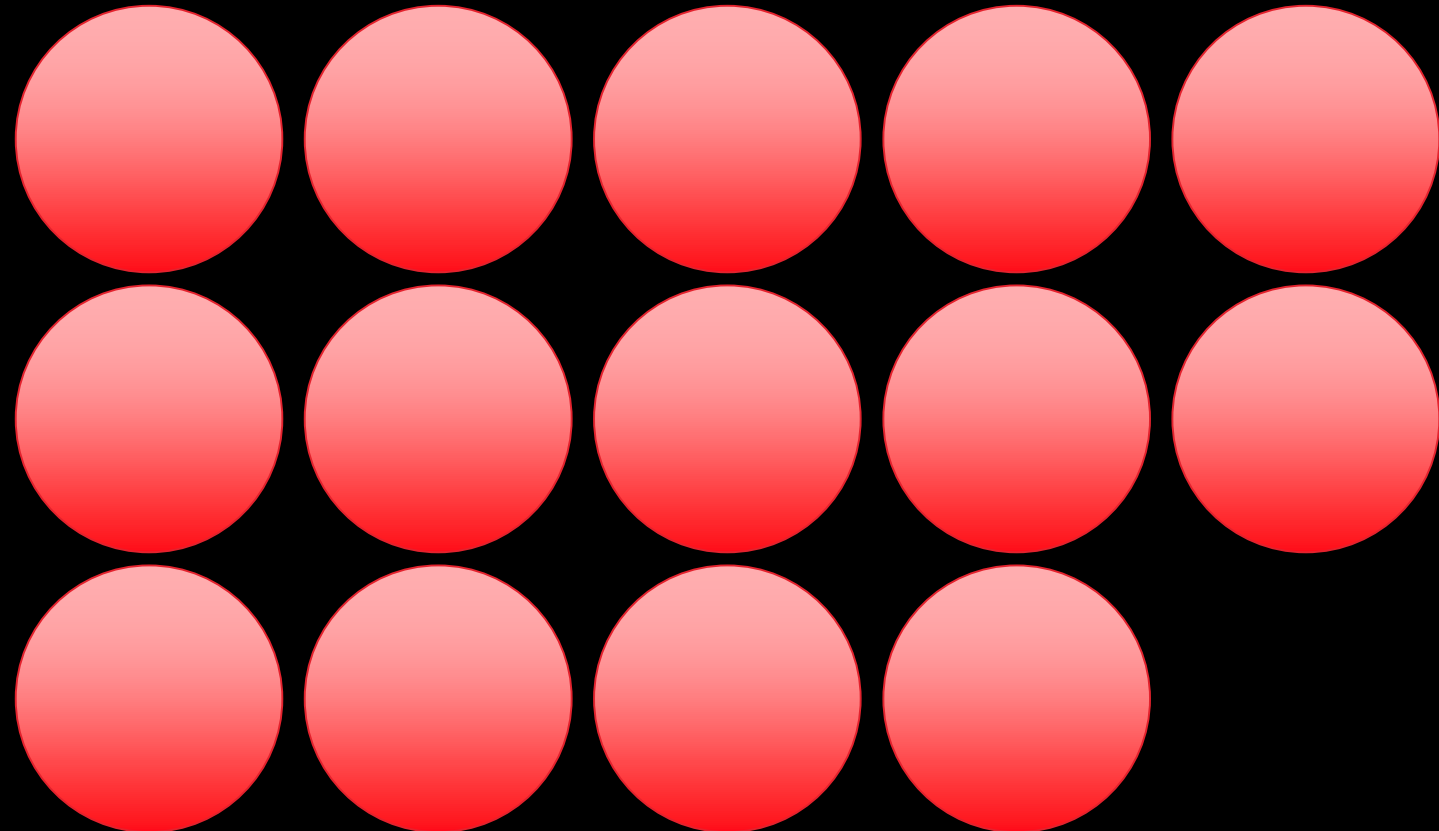
Current Atmosphere,  
All releases since  
industrialization:



Carbon volume in  
the boreal (Green)  
and Permafrost  
(white):



Yedoma potential: These red dots are the CO2  
warming equivalent from yedoma if released entirely  
as methane. Percentage of release as CO2, CH4 and  
NO2 is unknown...



# GWICH'IN CULTURAL BURNING: ECOSYSTEM AND CLIMATE HEALTH

- ▶ Burn while there's snow in the forest in early spring.
- ▶ Use the natural fire break of snow, to create a natural fire break of fresh grass later in the season.
- ▶ Burn while the ground is still frozen and the duff layer is protected.
- ▶ Less smoke, less intensity, fewer acres burned
- ▶ Less cost to do, with a greater return of ecosystem services.
- ▶ Protects the root systems of plants, the soil and duff layers, subterranean animals.
- ▶ Disrupts monoculture and fertilizes the soil.





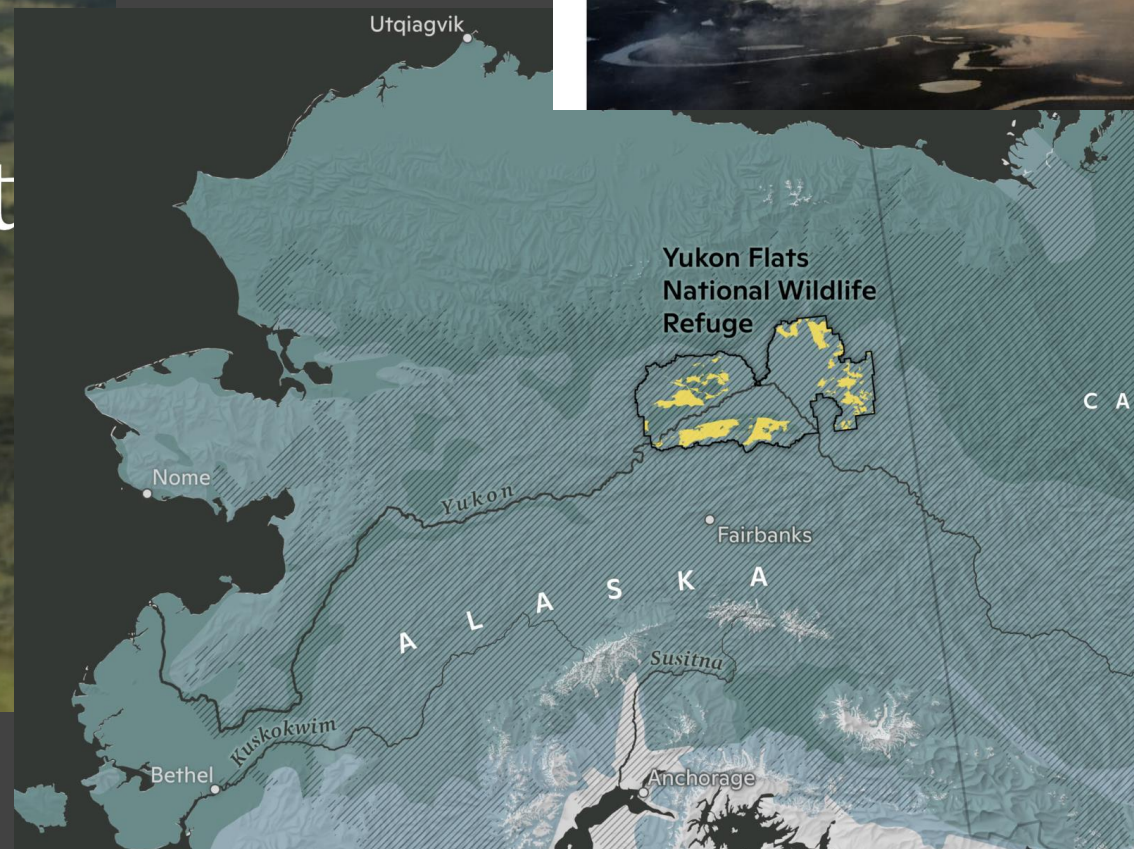
# YUKON FLATS ACTIONS, SHOULD BE INTERNATIONAL POLICY

- ▶ Refuge moves to protect Yedoma.

Fire suppression deployed in Yukon Flats National Wildlife Refuge to protect carbon

Fighting fire in remote boreal forests could be a cost effective way of combating climate change

Feature by Sarah Ruiz • April 17, 2023



An Alaska wildlife refuge is changing its wildfire strategy to limit carbon emissions

By Yereth Rosen, Alaska Beacon - June 5, 2024





# GWICH'IN CULTURAL FIRE SHOULD BE

An Alaska wildlife refuge is changing its wildfire strategy to limit carbon emissions

By Yereth Rosen, Alaska Beacon - June 5, 2024

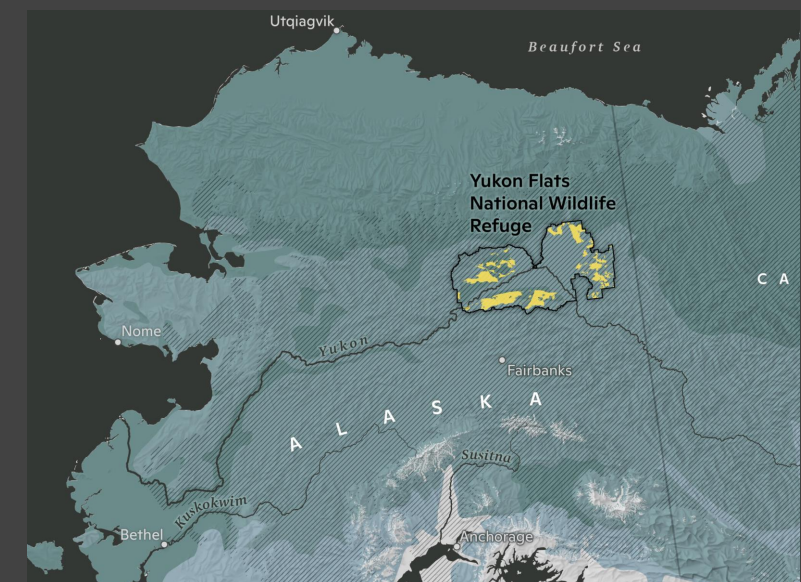


- ▶ Suppression alone won't protect Yedoma, or limit emissions sufficiently.
- ▶ Living with fire, means using it appropriately. We can't just suppress our way out of this crisis.
- ▶ Gwich'in cultural fire may help store carbon in the soil.

Fire suppression deployed in Yukon Flats National Wildlife Refuge to protect carbon

Fighting fire in remote boreal forests could be a cost effective way of combating climate change

Feature by Sarah Ruiz - April 17, 2023





# ACCELERATION OF WILDLAND FIRES IN THE ARCTIC NECESSITATES ACTION

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- ▶ Climate impact is global and massive, IPCC needs to include in the 7th Generation Models.
- ▶ Wildland fires, smoke, don't respect territorial integrity
- ▶ Impacts on food security/harvesting traditional foods, transportation, health, migratory species, and more.
- ▶ Current plans aren't inclusive of Indigenous knowledge



## TWO ACTIVE PROJECTS

### ▶ Arctic Fire at CAFF

- ▶ Understand extent and impact of wildland fires
- ▶ Understand good practices for fire management (to achieve social, ecological, cultural goals) from Western science & IK perspectives
- ▶ Share practices and ongoing work and learnings

### ▶ Circumpolar Fire at EPPR

- ▶ Document & understand good practices for international cooperation agreements targeting operational activities
- ▶ Improve coordinated response by Arctic States and Permanent Participants, and promote international cooperation
- ▶ Create template for discussion of MOU for Arctic fire collaboration (response, training)



# ARCTIC COUNCIL CHAIRSHIP INITIATIVE ON WILDLAND FIRE

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- ▶ Norwegian Chairship Initiative
- ▶ Amb. Morten Høglund (Nor), Co-Chair
- ▶ Edward Alexander (GCI), Co-Chair
- ▶ Increased profile on fire impacts
- ▶ International cooperation



Launching the Chairship Initiative in Iceland

# ARCTIC COUNCIL CHAIRSHIP INITIATIVE ON WILDLAND FIRE

- ▶ Arctic Council Chair, Norwegian Amb. Morten Høglund: “Wildland fires are a growing emergency, and a prime example of why we need circumpolar cooperation... This serves as a stark reminder that we must urgently address climate change to minimize its immediate and long-term impact in the Arctic and globally. To do this, we need to turn our attention towards better understanding the causes and impacts of wildfire fires on the Arctic ecosystems and communities.”



Ambassador Høglund, Co-Chair

Of the Arctic Council Wildland Fire Initiative and Chair of the Senior Arctic Officials



GWICH'IN ARE DOING OUR PART, THANK YOU  
FOR DOING YOURS.

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Photo: Dion Alexander

Edward Alexander, Co-Chair, Gwich'in Council International  
[cochairs@gwichincouncil.com](mailto:cochairs@gwichincouncil.com)

# A SHARED RESPONSIBILITY

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- ▶ Wildland fire in the north, disturbances, permafrost and yedoma thaw, all need to be urgently included in 7th Generation IPCC models.
- ▶ National policies, and international focus, must include circumpolar wildland fire action and yedoma protection.
- ▶ International strategy between US/Canada/Russia is necessary on yedoma protection, and between all Arctic States on wildland fire reduction.
- ▶ We must include practices like Gwich'in Cultural fires to reach our goals of protecting the environment and insure climate stability.



# SOME REFERENCES...

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<https://arctic-council.org/explore/topics/climate/wildland-fire/>

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