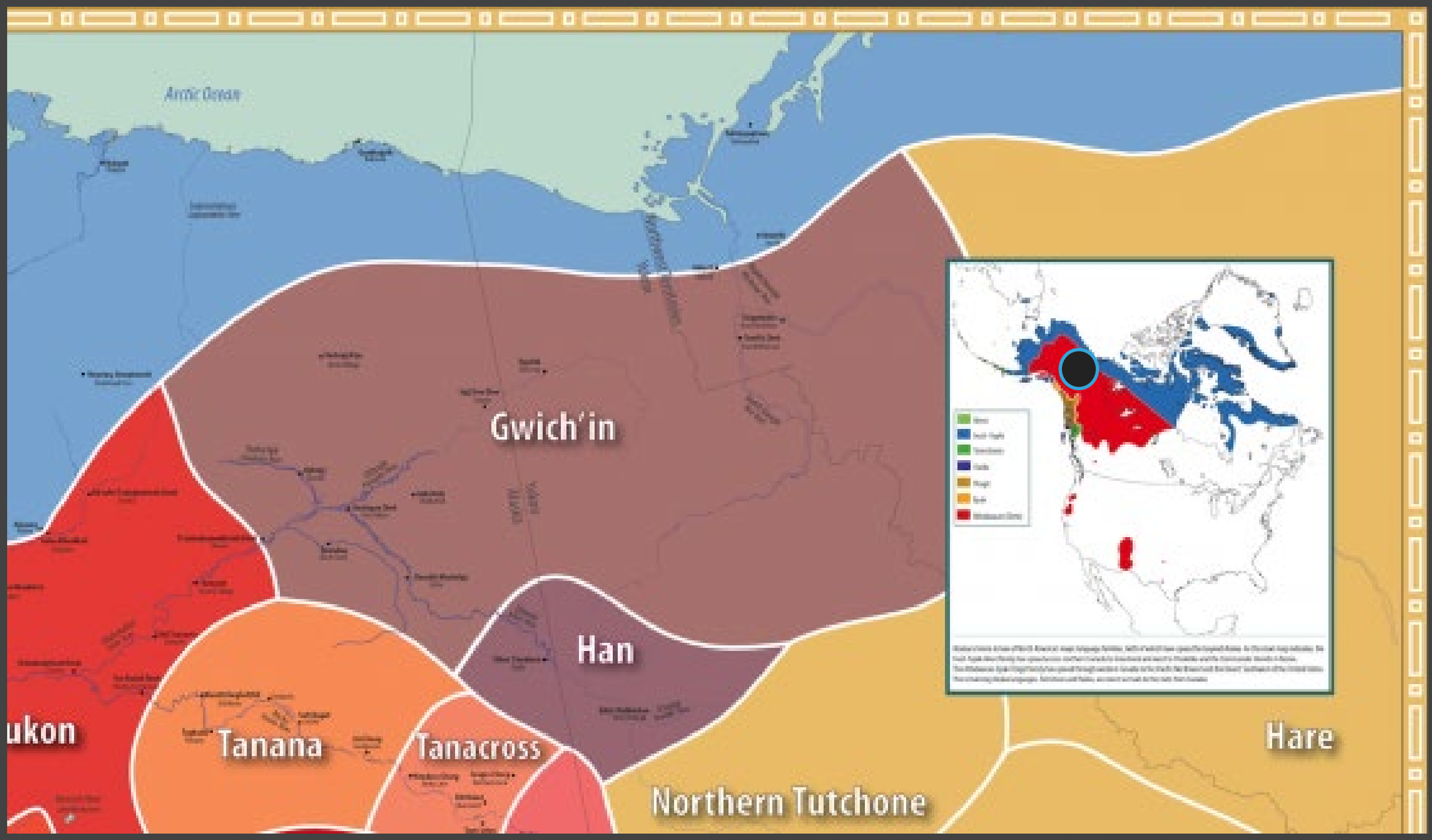
THE SOCIAL ECOLOGICAL CONSEQUENCES OF FUTURE WILDLAND FIRE IN THE WEST: CLIMATE IMPLICATIONS OF CIRCUMPOLAR WILDLAND FIRE

NATIONAL ACADEMY OF SCIENCES

EDWARD ALEXANDER
GWICH'IN COUNCIL INTERNATIONAL
CO-CHAIR, HEAD OF DELEGATION
1EDWARD.ALEXANDER@GMAIL.COM

IRVINE, CA
JUNE 14TH, 2024

GWICH’IN COUNCIL INTERNATIONAL (GCI)



GWICH'IN COUNCIL INTERNATIONAL (GCI)

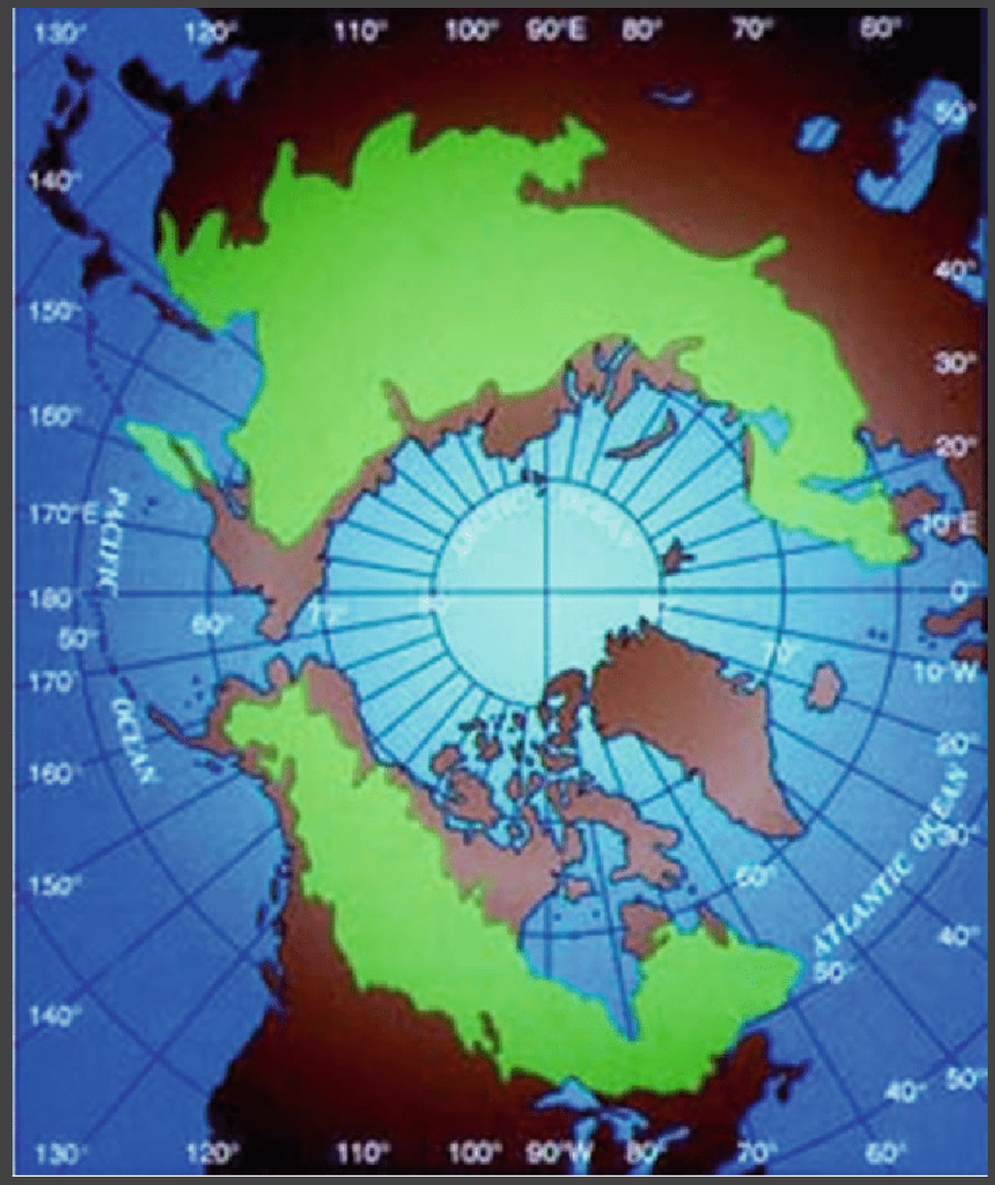
- Mission is to amplify the voice of the Gwich'in Nation on sustainable development and the environment at the international level to support resilient and healthy communities.
- Represent all 10,000 Gwich'in Nation members in Alaska, the Yukon, & the NWT as a Permanent Participant at the Arctic Council.
- 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.

THE ARCTIC COUNCI

- 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 CIRCUMPOLAR BOREAL AND WHAT IT CAN DO FOR YOU

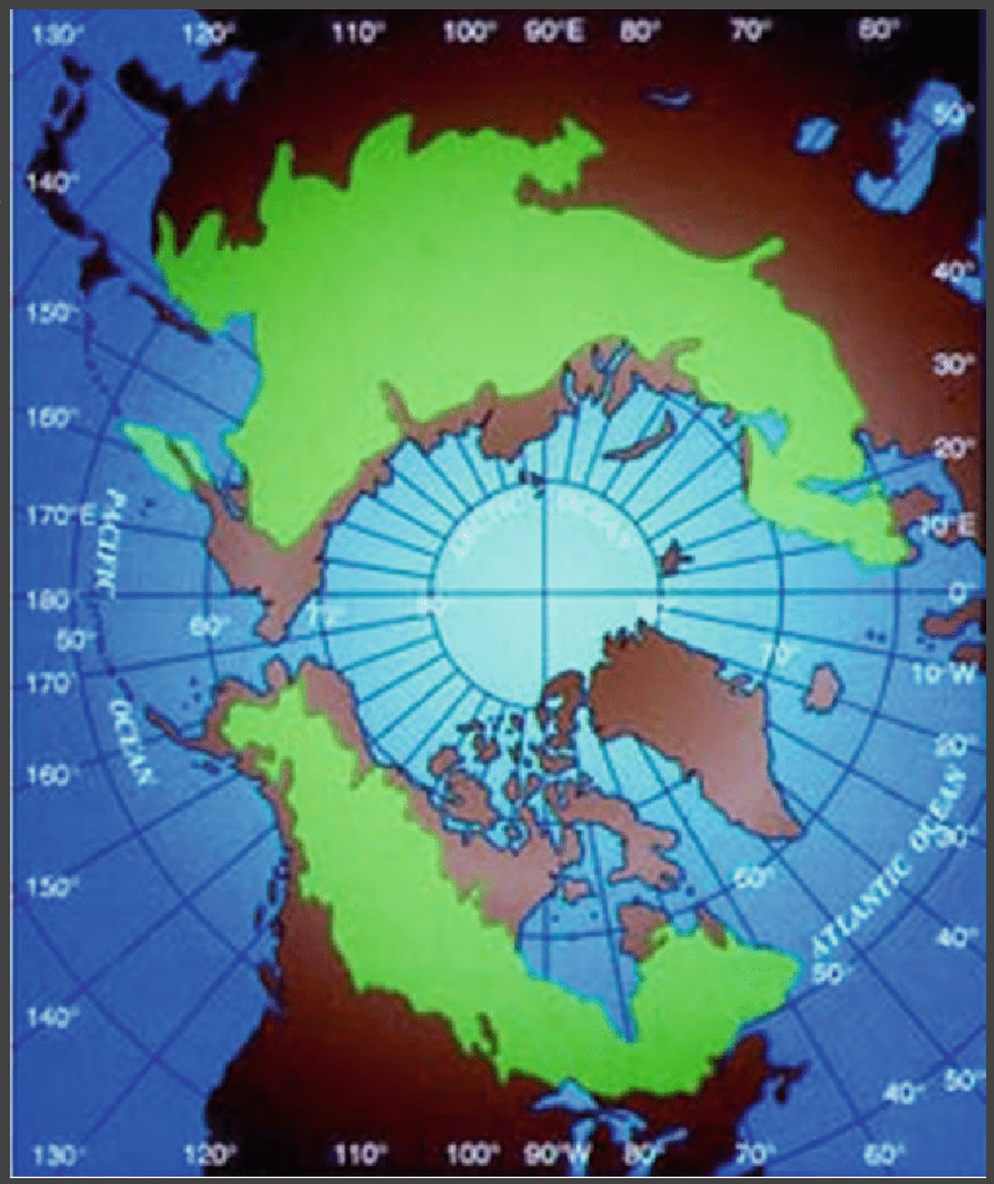
- Largest terrestrial carbon sequestration system on the planet.
- International concern.
- Global ecosystem services.
- It’s pretty great.



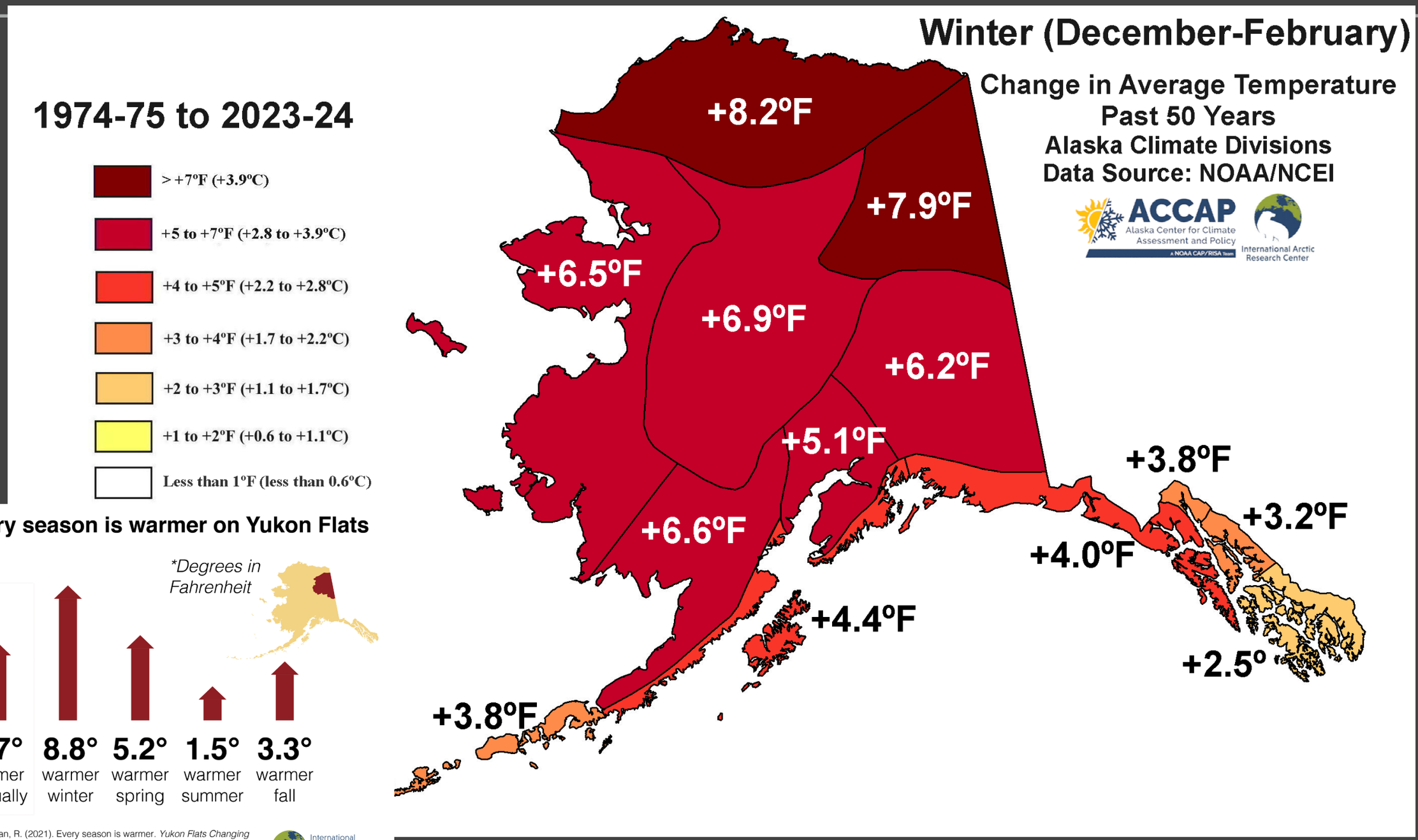
THE CIRCUMPOLAR BOREAL AND WHAT IT CAN'T DO FOR YOU

- Can't stop fires on its own very well.
- 3x the fires since 2018.

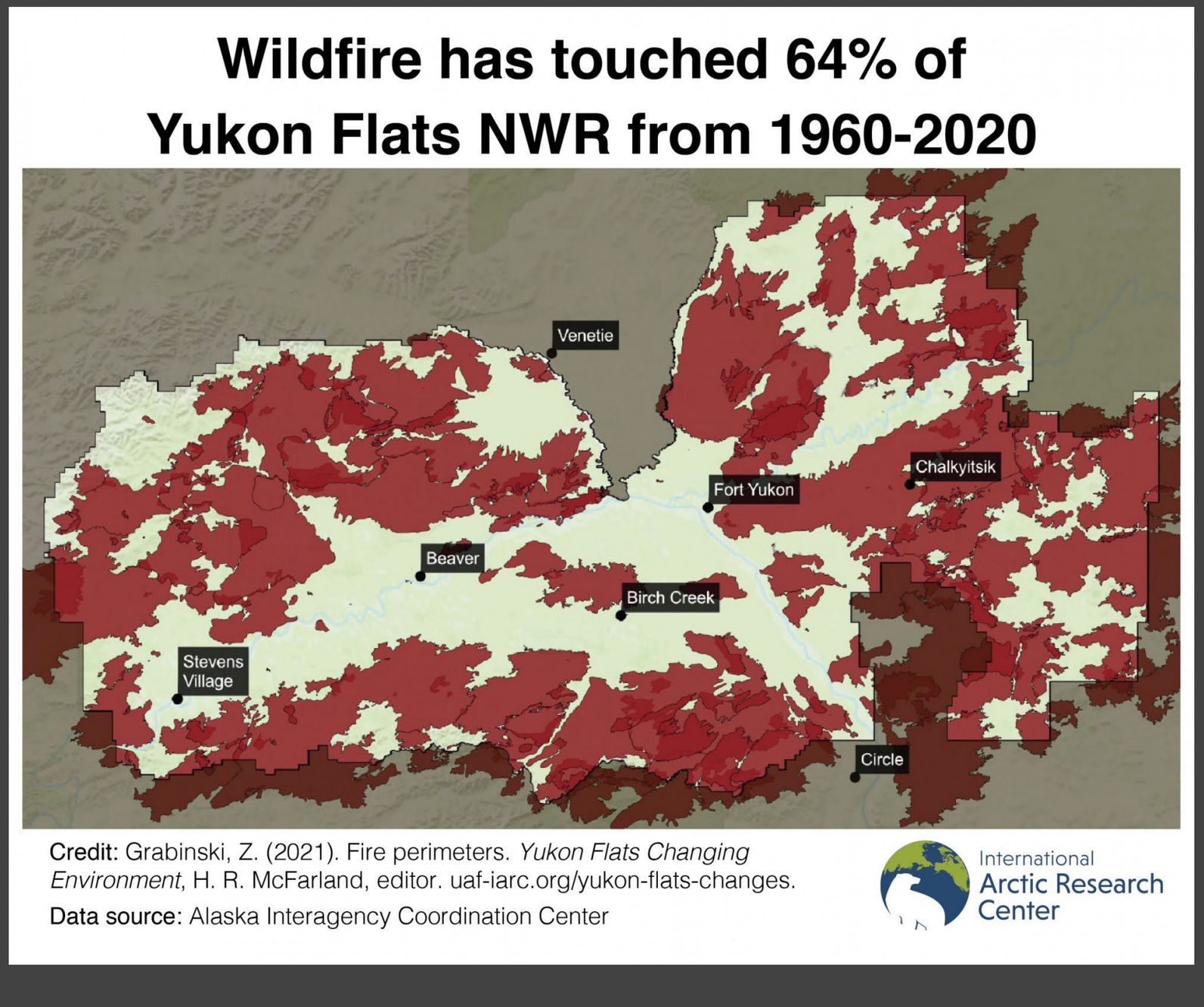
  According to the Global Wildland Fire Information system.
- 2023 Canadian Fire Season
  - 45.7 million acres
- 2003 Russian Fire Season
  - 55 million acres
- 2012 Russian Fire Season
  - 74 million acres
- +200 million acres of boreal burned
  - Greater than 2x the size of California



THE ARCTIC CHANGED QUICKLY, THE YUKON FLATS MORE SO:



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



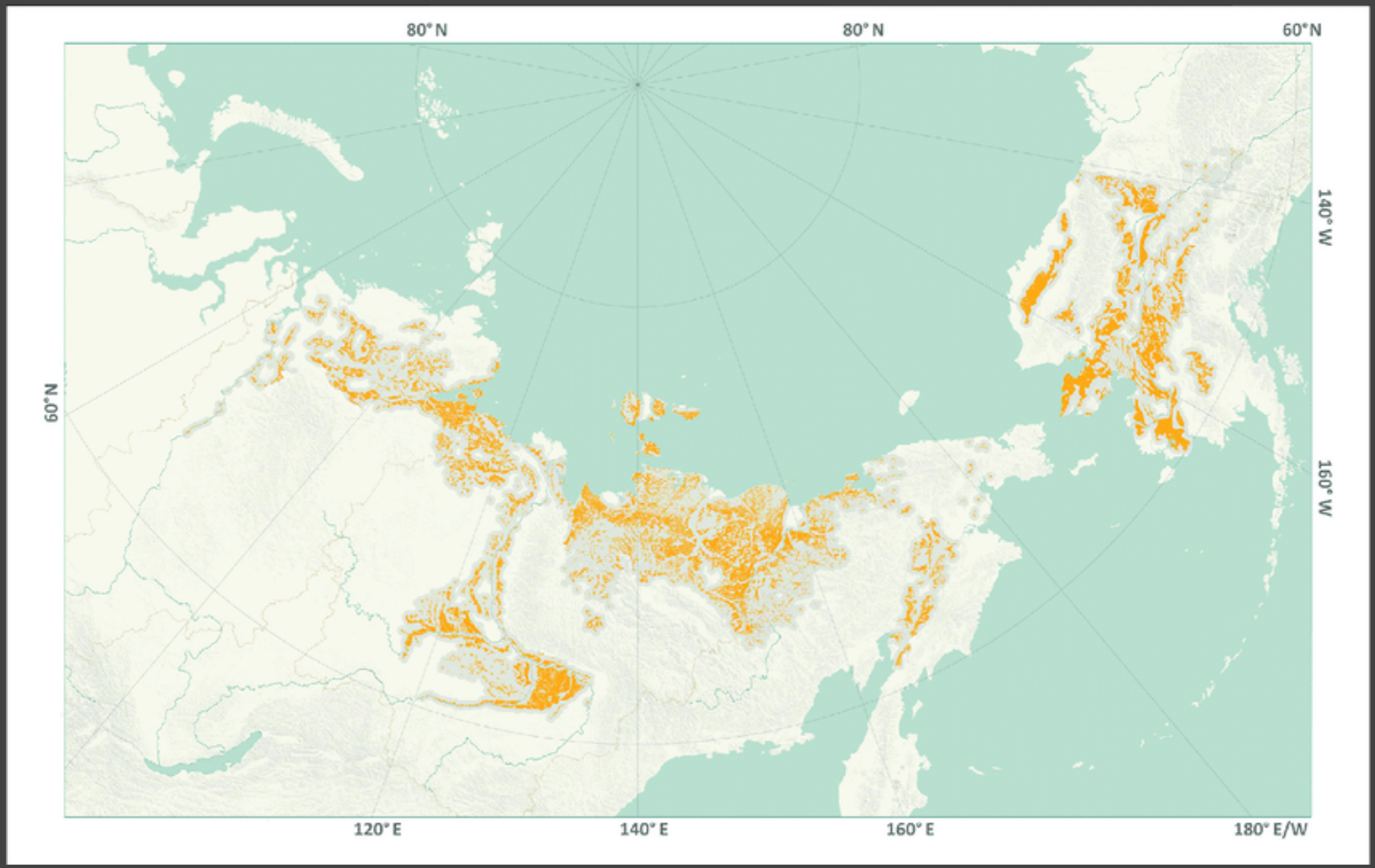
WILDLAND FIRES ARE CHANGING

- 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

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

- 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 GT (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.

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



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

- 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 CO2. Nitrous Oxide 100X as powerful as CO2.
- 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?

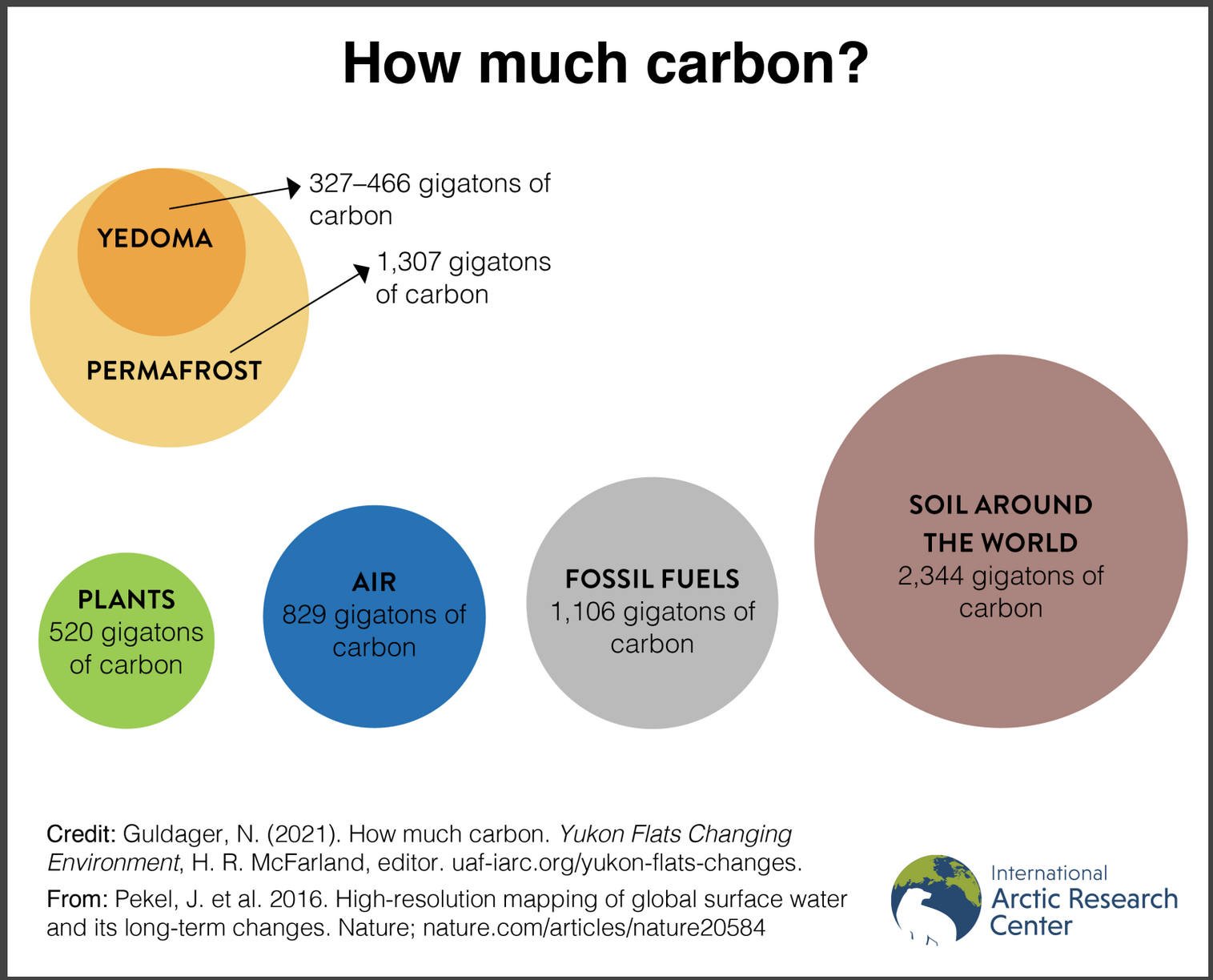
- University of Alaska Fairbanks, Water and Environmental Research Center.
- Photo: M. Kanevskiy
- Small insulation.
- Big problem.

WHAT IS “YEDOMA” AND WHY SHOULD I CARE?

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

WHAT IS “YEDOMA” AND WHY SHOULD I CARE?

- How much carbon?
- A lot.

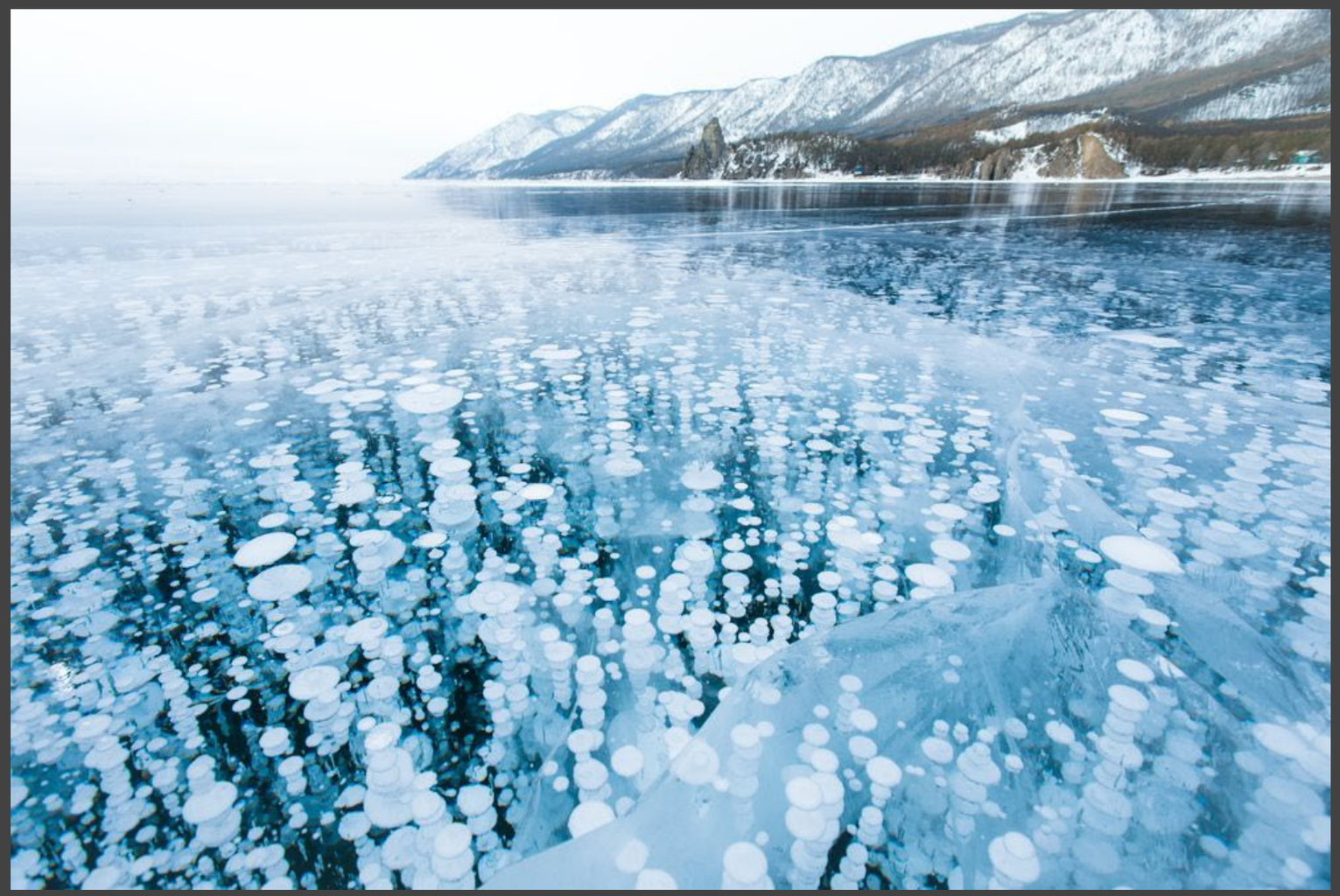


WHAT IS “YEDOMA” AND WHY SHOULD I CARE?

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

WHAT IS “YEDOMA” AND WHY SHOULD I CARE?

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

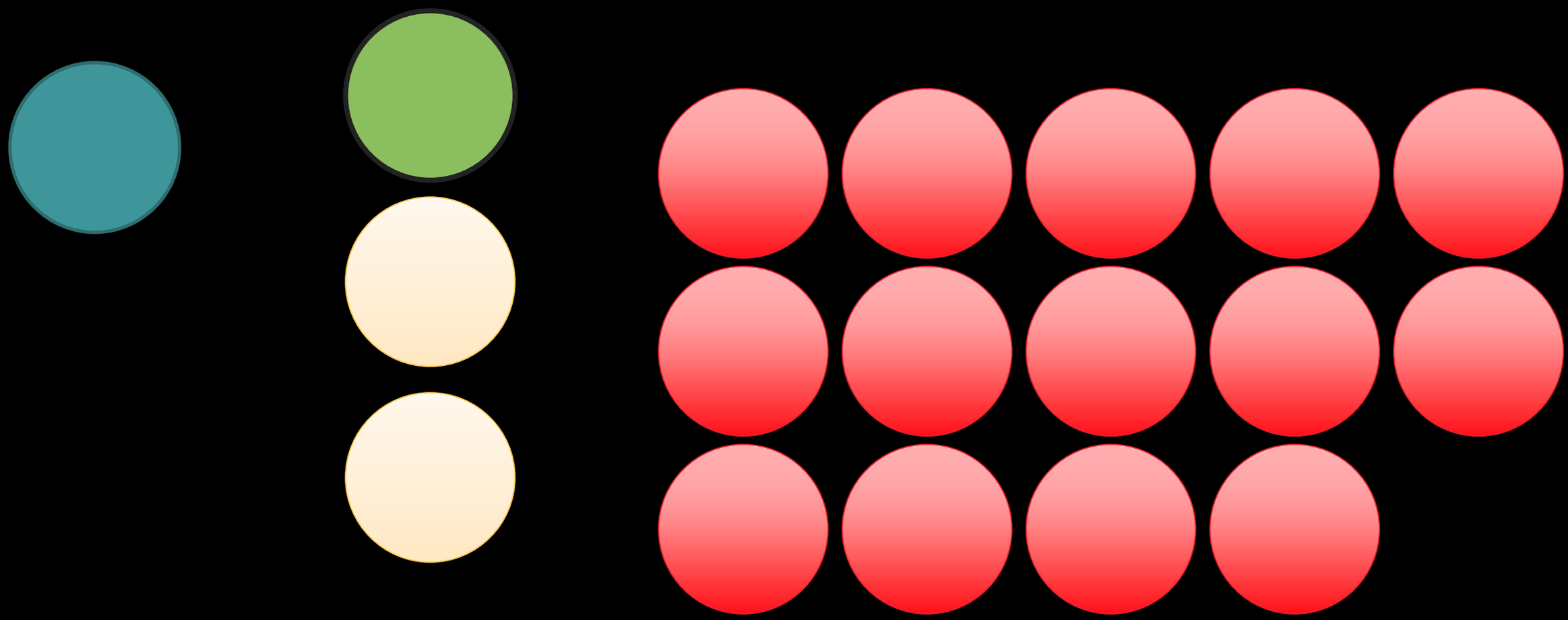


WILDLAND FIRE: THE ARCTIC AND GLOBAL IMPLICATIONS

Current Atmosphere, All releases since industrialization:

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

Yedoma potential: These red dots are the CO2 equivalent from yedoma if released entirely as methane. Percentages are currently unknown. NO2 is unknown…



Edward Alexander, Co-Chair, Gwich'in Council International
cochairs@gwichincouncil.com

ACCELERATION OF WILDLAND FIRES IN THE ARCTIC NECESSITATES ACTION

- Climate impact is global and massive
- Current plans aren’t inclusive of Indigenous knowledge
- Wildland fires, smoke, don’t respect territorial integrity
- Impacts on food security/harvesting traditional foods, transportation, health, migratory species, and more.
- Coordination of response exercises and training is needed for wildland fire management

➔TWO PROJECTS AT THE ARCTIC COUNCIL

TWO ACTIVE PROJECTS

- **<u>Arctic Fire at CAFF</u>**
- 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

- **<u>Circumpolar Fire at EPPR</u>**
- 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

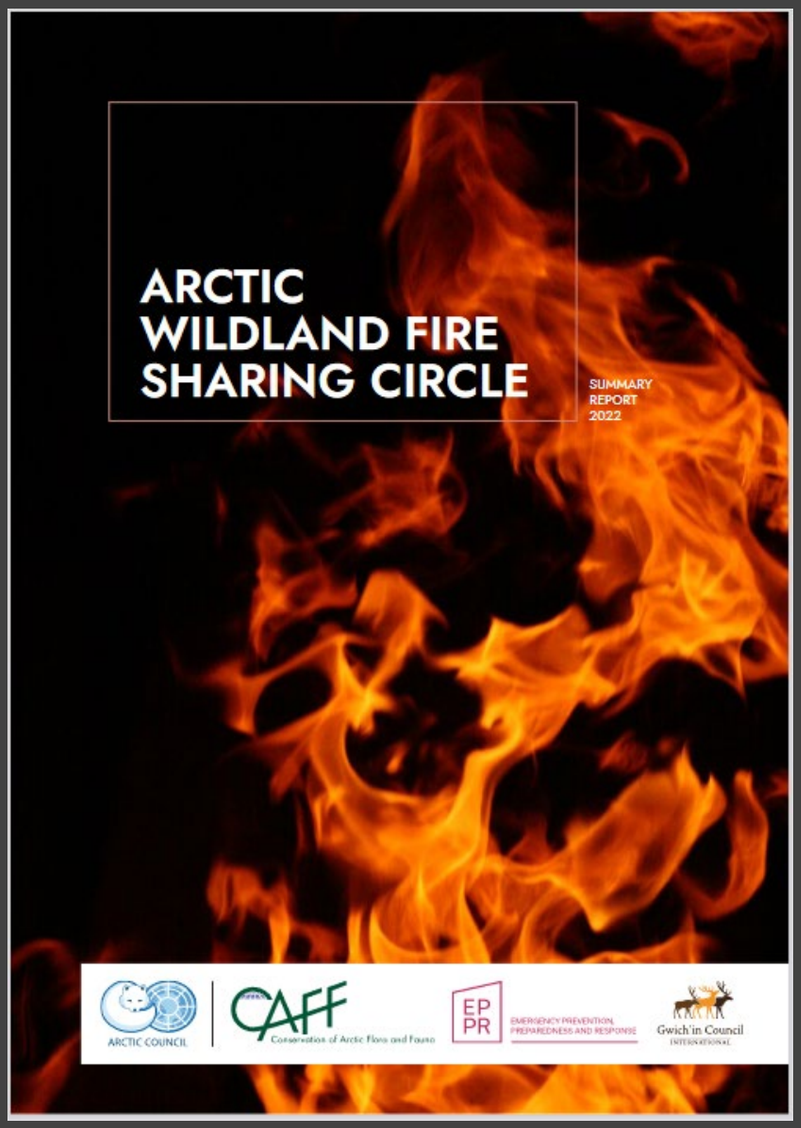
- Norwegian Chairship Initiative
- Amb. Morten Høglund
- Gwich’in Council Co-Chair
- Increased profile
- Spurring innovation
- International cooperation

Launching the Chairship Initiative in Iceland

ARCTIC COUNCIL CHAIRSHIP INITIATIVE ON WILDLAND FIRE

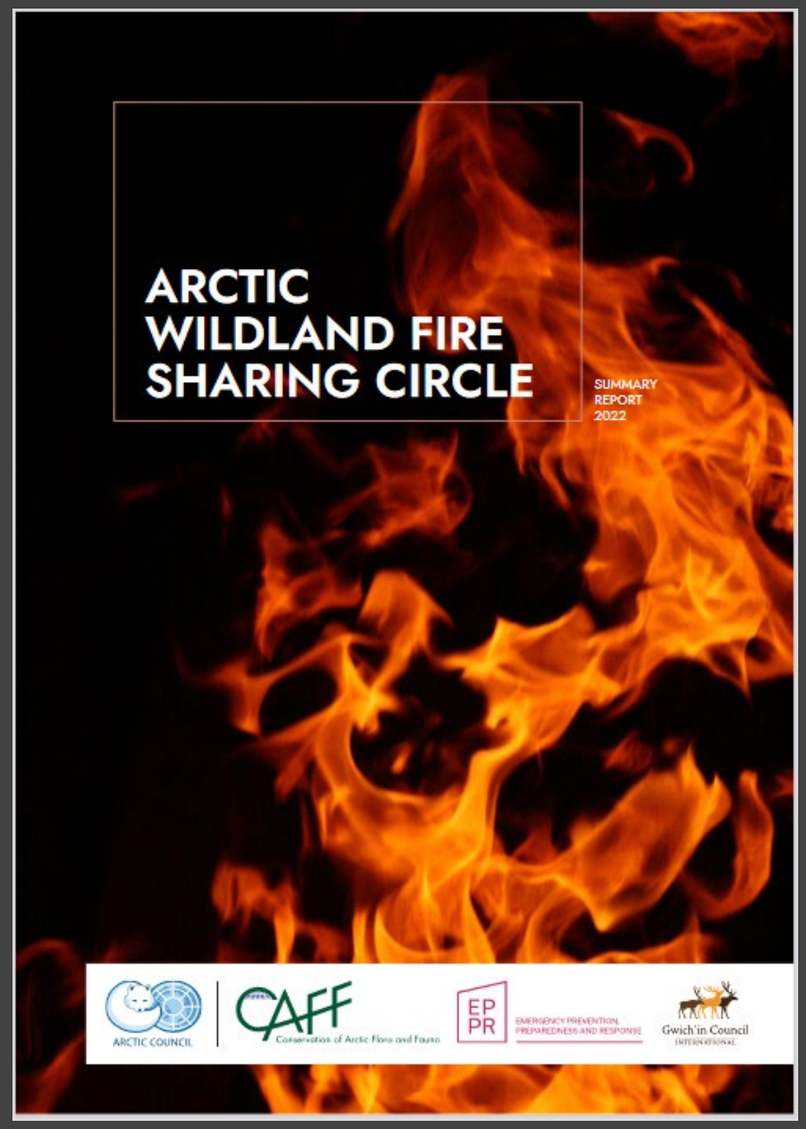
THE ARCTIC COUNCIL'S WILDLAND FIRE INITIATIVE: ADVANCING COOPERATION, DISCUSSIONS, SOLUTION BUILDING, ELEVATING THE ISSUES, RECOMMENDATIONS.

- Launched October 2023 at Arctic Circle Assembly.
- Events at
  - Arctic Circle Assembly, Arctic Encounters (WG, Yellowknife)
  - Arctic Frontiers: Indigenous Sharing Circle on cultural burns
  - Arctic Science Summit Week: second WFI panel with CAFF, AMAP, EPPR and GCI.
  - International Association of Wildland Fire, Tralee, Ireland.
- Arctic Circle Assembly Berlin: Morten Høglund (Chair of the Senior Arctic Officials, Ambassador for Norway), Clara Ganslandt (EU Special Envoy for Arctic Matters), Angela Rodrigo (Head of Service of Forest Fire Defense Area, Spain), Col. Tomasz Grelak, Deputy Commander in Chief of the Polish Regional Fire Brigades).



EXAMPLES OF INTERNATIONAL COOPERATION ON FIRE IN THE ARCTIC – PROJECTS

- Arctic Community Resilience to Boreal Environmental change: Assessing Risks from fire and disease (ACRoBEAR)
- Forest fires in Fennoscandia under changing climate and forest cover (IBA-ForestFires)
- ArcResc - Capacities of the rescue services in the Arctic: advancement of knowledge and cooperation
- Kluane National Park and Reserve Fire History and Stand Origin Mapping
- Arctic FIRE (CAFF)
- EPPR Circumpolar Wildland Fire Cooperation
- Arctic PASSION
- Global fire communication & monitoring (Copernicus Atmosphere Monitoring Service)
- NASA Arctic-Boreal Vulnerability Experiment

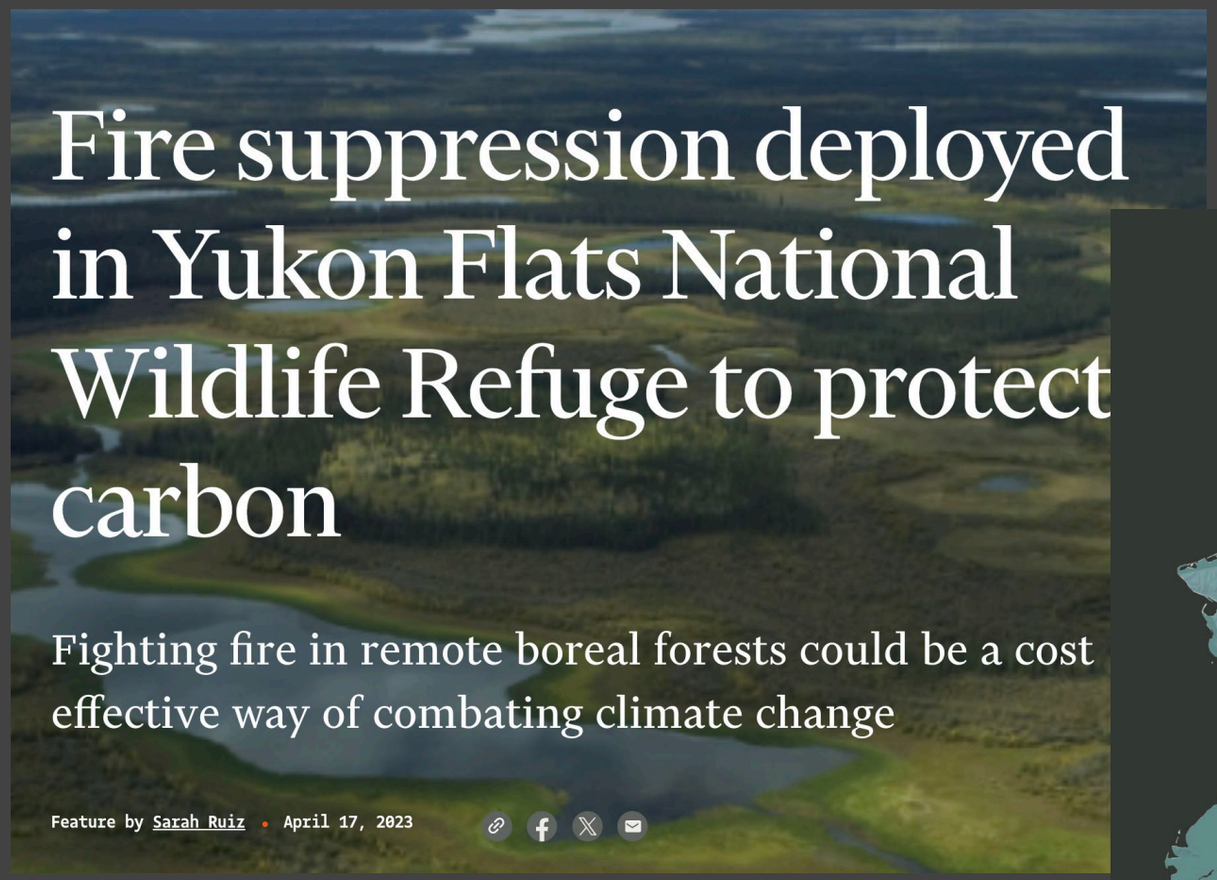


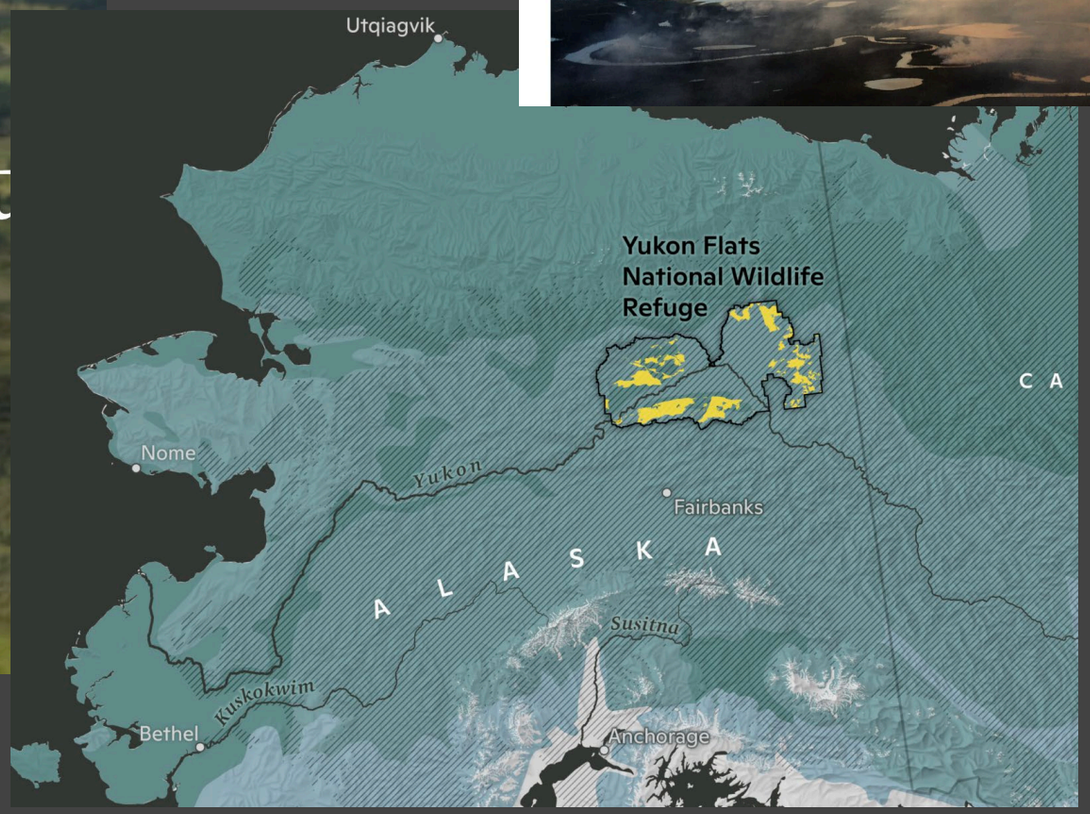
IMPORTANCE OF INTERNATIONAL COOPERATION & COLLABORATION

- Accessing and contributing knowledge & expertise
- Accessing and spurring greater funding
- Directing research and opportunities
- International cooperation and diplomacy
- Educating the public, regional, national, and international partners

YUKON FLATS ACTIONS, SHOULD BE NATIONAL POLICY

- Refuge moves to protect Yedoma.





GWICH'IN ARE ACTIVE IN USING & RESPONDING TO WILDLAND FIRE

- Cultural burning and significance, tip of the flame.
- Language and directionals
- Caribou fences, camps.
- Wildland fire crews
- Land and resource management
- Survival & Sovereignty
- Local issue to global issue.

DION ALEXANDER

DONALD CARROLL

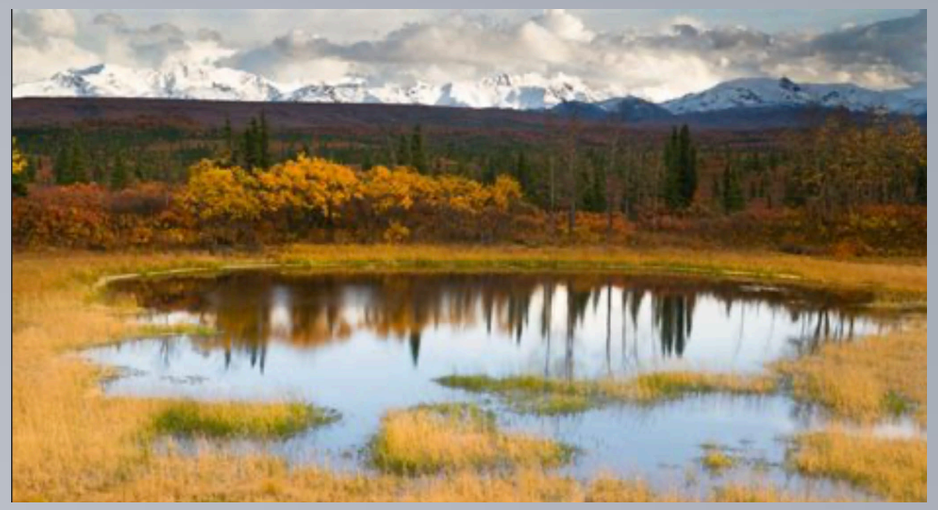
GWICH'IN CULTURAL FIRE IS STRATEGIC

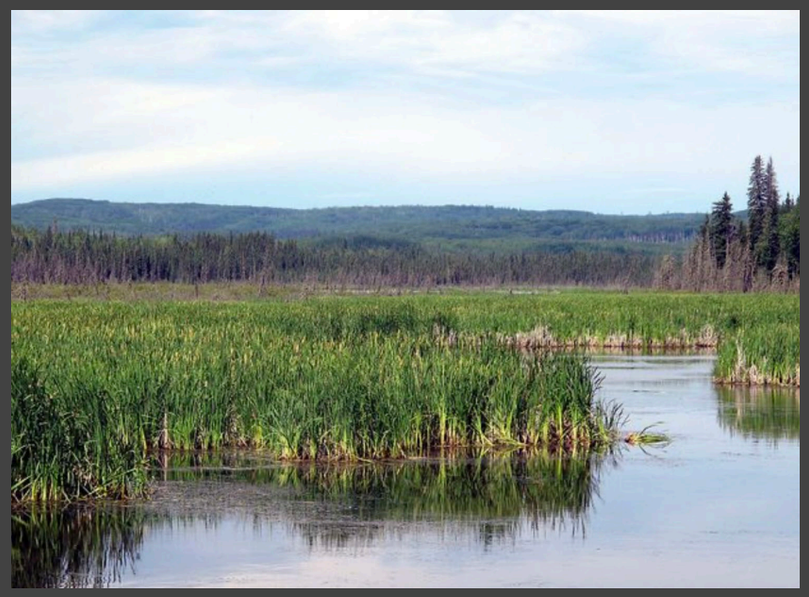
- Burn while there's snow in the forest in early spring.
- Use the natural fire break of snow, to create a natural fire break of fresh grass later in the season.
- Burn while the ground is still frozen and the duff layer is protected.
- Less smoke, less intensity, fewer acres burned
- Less cost to do, 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.

Edward Alexander, Co-Chair, Gwich'in Council International
cochairs@gwichincouncil.com

GWICH'IN CULTURAL FIRE FOR ECOSYSTEM HEALTH

- From dense monocultures of grass and depleted willow, to biodiverse and thriving nutrient rich landscapes.
- Protects the soil and permafrost from severe fire later in the season.





Edward Alexander, Co-Chair, Gwich'in Council International
cochairs@gwichincouncil.com

GWICH'IN CULTURAL FIRE FOR ECOSYSTEM HEALTH

- Increases nutritional value of all the plants that regrow afterwards.
- Increases biodiversity and carrying capacity.
- Primes these areas for migrating birds and their nutrition.
- Decreases nuisance bugs, increases habitat for pollenating bugs and others.

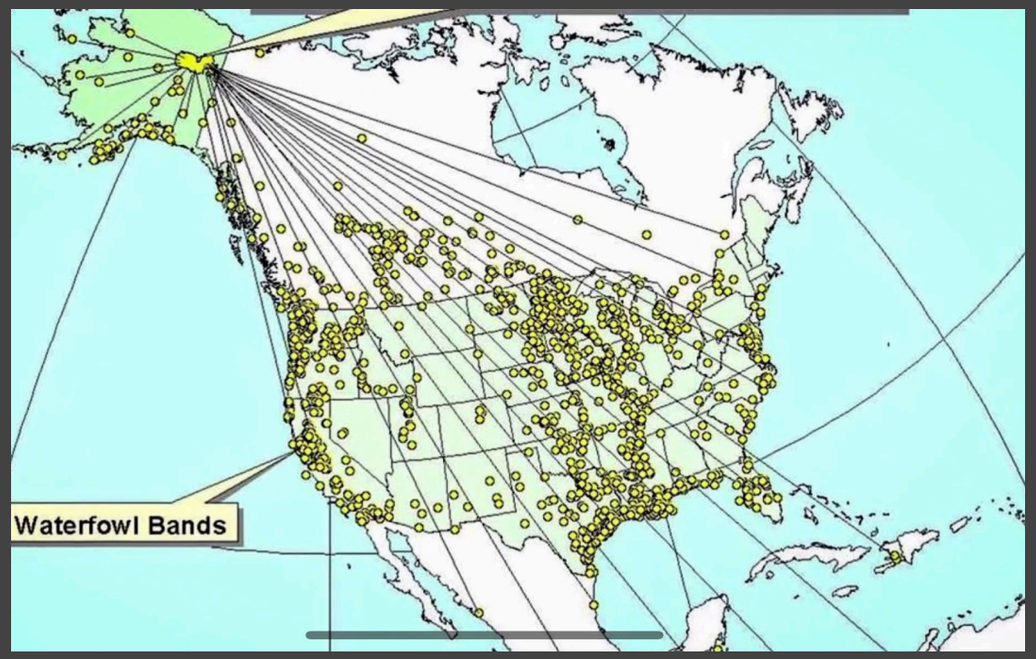
Alexander, Co-Chair, Gwich'in Council Intern
cochairs@gwichincouncil.com

GWICH'IN CULTURAL FIRE FOR BIODIVERSITY

- A diversity of healthy plants, increases the health of insects, herbivores, birds, and predators as well.
- Healthier animals have more offspring
- More resilience for dealing with climate change.
- An ecosystem restored.

ard Alexander, Co-Chair, Gwich'in Council Int
cochairs@gwichincouncil.com

GWICH'IN CULTURAL FIRE, GREAT MIGRATIONS, THE ARCTIC AND GLOBAL IMPLICATIONS



Edward Alexander, Co-Chair, Gw
cochairs@gwichi

NECESSARY TO SHARE WORK AND KNOWLEDGE

- Community
- Regional
- National
- International

- Engagement
- Policy advice & direction
- Tangible projects
- Facilitating connections and cooperation

ITS HARD TO IMAGINE BUT MORE CARBON IS RELEASED FROM THE SOIL THAN FROM THE FOREST FIRE.

xander

Edward Alexander, Co-Chair, Gwich'in Council International
cochairs@gwichincouncil.com

GWICH'IN ARE DOING OUR PART.

Edward Alexander, Co-Chair, Gwich'in Council International
cochairs@gwichincouncil.com

A SHARED RESPONSIBILITY

- Spur research on the yedoma/wildland fire interface.
- How do we engage with wildland fire in the Arctic?
- How can we spur more research, and be inclusive of the need for Indigenous Knowledge and cultural burns?
- How do we inspire more people to research wildland fire in the Arctic?
- How do we tackle the amplifying climate feedback loop of Arctic wildfire and permafrost melt?
- How can nations/organizations assert on this issue?
- This is a shared global responsibility.

A SHARED RESPONSIBILITY

- Are Gwich'in cultural burns carbon negative? Co-produced research is needed.
- USA needs a yedoma protection strategy inclusive of wildland fire, private, state, federal lands.
- Global yedoma policies needed.
- IPCC inclusion on national inventories.
- Carbon credit methodology for yedoma is needed.
- International strategy between US/Canada/Russia is necessary on yedoma protection.

SOME REFERENCES…

https://uaf-iarc.org/yukon-flats-changes/

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

https://www.scientificamerican.com/article/methane-a-menace-surfaces/

https://www.sierraclub.org/sierra/abrupt-permafrost-thaw-has-scientists-worried

https://d197for5662m48.cloudfront.net/documents/publicationstatus/151208/preprint_pdf/dd2b6ab908a30580a36cf815765a3208.pdf

https://phys.org/news/2024-04-northern-permafrost-region-emits-greenhouse.amp

https://earthobservatory.nasa.gov/images/79161/wildfires-in-siberia