March 2021

1 Introduction

Scientific observations have monitored High Northern environmental conditions for well over a century. Alaska Native and other Indigenous
millennia to promote human prosperity under a wide range of conditions. Both show rapidly

Despite the early interest in statewide planning for changes to weather and climate, as of 2021 there have been no comprehensive and sustained climate action plans or similar policies at the state level, nor, it should be noted, at the federal level. Federal policy related to climate change has not been wholly absent. For example, Congressionally mandated United States Global Change Research Program (USGCRP) has put in place instruments such as the National Climate Assessments to identify and assess climate change impacts, risk, and adaptation. Mitigation efforts related to energy efficiency and greenhouse gas emissions reductions exist in the form of programs like EnergySTAR and NaturalGasSTAR and legislation such as the Clean Air Act after the U.S. Supreme Court determined greenhouse gases could be regulated by the federal government in a series of cases 2007-2014. The result has been a piecemeal and often voluntary suite of activities rather than an overarching coordinated climate action policy in the U.S., and many programs have not been sustained across years and thus funding cycles. However, there have been numerous plans at lower levels of government within the state of Alaska between 2007 and 2020. At the point of our research, we have identified 23 climate action plans (CAPs), adaptation plans (APs), and impact assessments with associated response strategies that have emerged (see Appendix B), as well as a number of other local climate-related task forces and resolutions, suggesting strong public and Tribal support at the local and regional levels for policies addressing climate change. Reasons for this may be the suite of internationally verified indicators demonstrating a climate system in flux at the global scale, with rapid changes happening in Alaska and across the circumpolar North, and the science of Arctic amplification demonstrating an unpredictable future.[3]

1.1 Climate change in Alaska: The physical basis

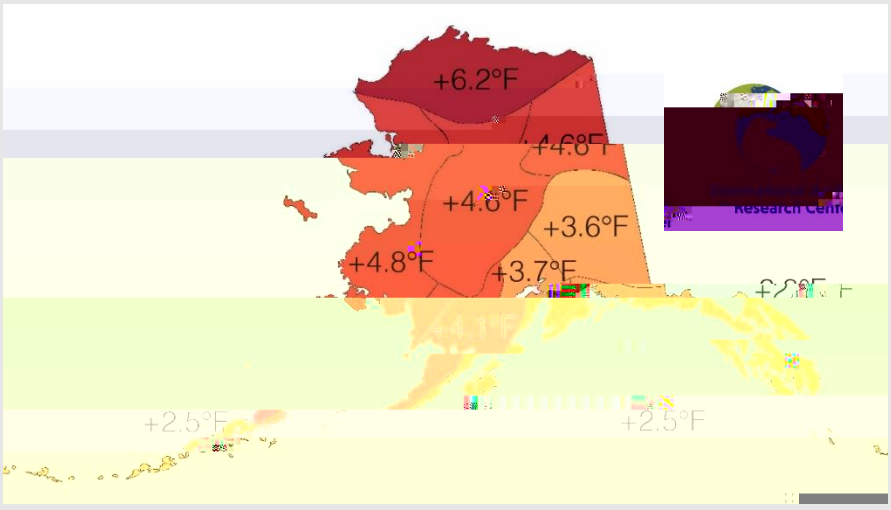
Scientific evidence distinctly indicates that the Arctic is undergoing rapid environmental changes driven by net global warming. According to the U.S. Global Change Special Report, over the past 50 years, annual average surface air temperatures across Alaska and the Arctic have increased at a rate more than twice as fast as the global average.[4] This warming has precipitated other changes in Arctic systems, especially in places where frozen water is present (i.e., the cryosphere). These include melting land ice, such as glaciers, diminishing sea ice, with decreases in sea ice age, thickness and extent; and thawing permafrost, both on land and under coastal waters. Because of the interconnected nature of these cold elements that define the Arctic, interactions between them serve to speed up the rate of change in the Arctic, with impacts at the planetary scale.[5] The effects within Alaska are wide-ranging and, as recently documented in the report (a comprehensive synthesis of climate change observations across a range of different subsystems within the state), they include more frequent larger fire seasons, earlier river ice break-up, more temperature extremes and fewer very cold days, changing precipitation patterns, declining sea ice, loss of glacial ice and perm

entirety tomorrow, the planet will still continue to warm for at least two decades before enough carbon is absorbed to result in modest cooling.[7] The polar regions of the Earth are par
any change in the net radiation balance (for example, a result of greenhouse gas emissions) tends to produce a larger change in temperature near the poles than the planetary average.[8] The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) states that the Arctic region is likely to continue to warm more rapidly than the global mean through the end of the current century.[9] Recent research indicates that the Greenland Ice Sheet has undergone a transformation to a new dynamic state in which sustained mass loss will continue even if there is a decline in surface melt. In other words, its current glacial melt trend appears irreversible.[10] This does not bode well for Alaska and other places whose people and ecosystems are defined by annual cycles of cold. These cumulative effects have led scholars to declare that we are now no longer in the Holocene era but the Anthropocene, characterized by humans as a major influence on global changes in the biophysical environment.[11]

A brief overview of the most recent Arctic Report Card 2020 points to key indicators of persistent and ongoing climate changes.[12] The average annual surface air temperature north of 60° N was the second highest since at least 1900. Annual temperature trends in Alaska over the past 50 years show increases between 2.5- and 6.2-degrees Fahrenheit, with more extreme increases in the northern part of the state (see Fig. 1).[13] Arctic warming is associated with a range of changes, including loss of summer sea ice. Summer sea ice extent in 2020 was the second lowest over a 42-year period of satellite records, 2012 was the record minimum. Sea surface temperatures have risen over most of the Arctic Ocean. In addition, permafrost thaw

Annual temperature trends in Alaska since 1970 show significant warming, with more extreme increases in the northern part of the state. Arctic warming is associated with a range of changes including loss of summer sea ice, permafrost degradation, and coastal erosion.

Annual temperature trend, 1970–2019. Credit: Thoman, R. (2020). Summer's getting hotter. Wildfire Environment, in Grabinski, Z. & H. R. McFarland, www.frames.gov/afsc/acv Data source: NOAA/NCE NWS.



and coastal erosion rates are increasing even as there are record lows of snow cover across the Eurasian Arctic. Glaciers and ice sheets, not including Greenland, have continued to lose significant amounts of ice, with Alaska and Arctic Canada losing the most. In short, the biologically changed Arctic remains .[14] The consequences of this trend are significant changes to the seasonal and annual cycles that people in Alaska have adapted to and centered their lives around for millennia. This impacts not only cycles of hunting, harvest, and fishing, but also cultural events and celebrations, mobility (including village-to-village connections), health, food storage, and safety of people and infrastructure.

1.2 Climate change in Alaska: Human and social impacts

Environmental changes in the Arctic are directly intertwined with human lives. Residents across Alaska, from the northernmost city of Utqiaġvik (formerly Barrow) to the capital in Juneau and further south, observe and interact with the effects of these changes. Extreme weather events,

Figure 2. Components of the C ryosphere in the Arctic

The main components of the cryosphere in the Arctic: sea ice, permafrost, ice sheets, and glaciers. Credit: Eeva Turunen, 2019, https://nordregio.org/maps/components of the cryosphere in the arctic/. Data source: Permafrost from Brown, Ferrians, Heginbottom, & Melnikov, 2002 NSIDC [2019.01.11].

6RPH RI WKH PRVW QRWDEOH FKDQJHV DUH LQ WKH FU\ surface characterized by the presence of frozen water, (e.g. snow, ice, sea ice, permafrost, glaciers, and ice sheets Ö see Fig. 2)[20]. In Alaska, as throughout much of the Arctic, cryospheric services (i.e. what is provided by the environment for humans) contribute significantly to human well-being (see Fig. 3).[21] 7KHVH Û FU\RVSKHULF VHUYLFHVÜ UHJXODWH systems, such as the complex food chains of the Arctic Ocean; play key cultural roles; facilitate transportation; and support existing human and animal habitats.[22] Permafrost thaw, for example, directly impacts the stability and vulnerability of infrastructure in Alaska. Climate-driven changes from thawing, flooding, and changes in precipitation are projected to cost the state of Alaska (without adaptation measures) as much as $5.5 billion from 2015 to 2099 in damage to public infrastructure.[23] Other studies suggest that in the next 35 years, accounting as well for cost savings from less heating required, climate changes will cost the state $300 million, or 0.6% RI $ODVND Ù V *'3 RYHU WKH QH[W \HDUV.[24] The loss of coastal sea ice and river ice has significant impacts for people living in the region by eliminating opportunities for snow- and ice-dependent travel between communities in the Y-K Delta, the Kotzebue Sound region and the North Slope (for which there are also major impacts on industry).[25] The famed ice roads leading to the oil installations of Prudhoe Bay are significantly threatened,[26] and as of yet there are no clear cost-effective alternatives to move supplies, including the industry rigs themselves, north to Prudhoe Bay and other oil and gas installations. As ocean temperatures U L V H D Q G D F L G L I L F D W L R Q L Q F U H D V H behavior are shifting.[27] This directly impacts subsistence activities and sport and commercial fishing in Alaska. The state K D V W K H Q D W L R Q Ù V O D U J H V W F R P P H U F L D O I L V K H U L H V Z L W billion dollars annually and employing over 50,000 people.[28] The uncertainty surrounding these, and other climate-related changes, K D V D O U H D G \ O H G W R Û F O L P D W H U H D G \ Ü other preparatory measures by agencies and fishermen alike.[29] In short, in an attempt to survive, many major industries, including the tourism sector, and subsistence users alike are compelled to cope with and adapt to the impacts of climate change.

Figure 3. The Impacts of a changing Cryosphere

Climate change is impacting the cryosphere and are affecting subsistence communities across the Arctic and Alaska in many ways. The use of underground ice cellars built within permafrost in Alaska, a traditional practice to store foodstuffs, has allowed year-round storage of essential foods. But as temperatures rise and these cellars thaw, any meat stored become inedible. Ice is also becoming much more unpredictable for subsistence users, making it dangerous for traveling and hunting on the thinning ice

> Climate change is taking its toll. The weather played havoc one autumn. When I thought it was time to make quaq (frozen fish) and then it warms up too much for the quaq DQG VSRLOV WKH ILVKà:H KDG PRUH SHRSOH than the last five years put together.
>
> ÕEnoch Mitchell of Noatak at a public National Park Service Subsistence Resource Commission meeting in Kotzebue, Alaska, in 2019

Some of the ways shifting environmental patterns impact subsistence. Credit: Krista Heeringa, 2020 Living off the Land: Environmental impacts to access in Interior Alaska. http://mapventure.org/environmental-impacts-access/index.html

national and state constitutional limitations, but as the only Arctic state in the U.S. it often plays a unique role in international affairs. $ O D V N D Ù V O R F D W L R Q L V V W U D W H J L F organizations and governments, as well as national agencies and industries have interests in the region. As such, it can be difficult to specifically prove why people and institutions have pressed for different climate change activities over the last few decades, but clearly there has been a

contributes to further challenges of transparency, monitoring, and reporting. As data and efforts increase globally, cataloging and coordinating these efforts becomes more difficult and more necessary.

Coinciding with the emergence of the UNFCCC in the 1990s, the Arctic Council was established (In 1996)

As asignatory to

successor, Bill Clinton, a Democrat following the single-term Republican, continued the United States' participation in international climate change negotiations, though the U.S. Senate declined to ratify it. President Clinton also established the Climate Change Action Plan in 1993, which included a series of new or expanded programs (including public-private partnerships with key industries) aimed at reducing GHG emissions, and the Climate Change Task Force in 1997. His successor, President George W. Bush, did not prioritize climate policy and withdrew the U.S. from the Kyoto Protocol in 2001, replacing it with an alternative voluntary strategy to reduce greenhouse gases. Under his administration, the presidential public-private partnership initiative ClimateVISION (Voluntary Innovative Sector Initiatives: Opportunities Now) was created, with the goal of fostering cost-effective industry-driven GHG emissions. Some successful initiatives prompted by Climate VISION, such as EnergyStar and NaturalGasStar, are ongoing,[16] though the broader Climate VISION program platform disappeared in the 2010s with the transition of presidential administrations.

The U.S. pivoted toward more explicit recognition of climate change and attention to climate-related policies in 2009 under the administration of President Barack Obama, elected in 2008 on the Democrat ticket. During his tenure, the Council on Climate Preparedness and Resilience was created along with the State, Local, and Tribal Leaders Task Force. In addition, cap-and-trade legislation passed the House and more efforts pushing for clean energy emerged. The Clean Power Plan (under the Clean Air Act) was passed into law in 2015, setting state-by-state targets for carbon emissions reductions by 2050. There was an increase in investments into clean energy and encouragement by the Obama administration for federal agencies to develop adaptation plans. In 2016, Obama approved the U.S. adoption of the Paris Agreement by executive action, committing the U.S., with other countries of the world, to hold global temperature increase to less than 2-degrees Celsius above pre-industrial levels. Before the end of his second term, Obama released the United States Mid-Century Strategy for Deep Decarbonization to set goals and visions for the year 2050.

During the Trump Administration (2017-2021), many steps were taken to alter or abandon climate change actions and activities from previous administrations with a new heavy emphasis on resource extraction and energy independence. In 2017, President Trump signed WKH ØHQHUJ\ ,QGHSHQGHQFH and Price Reform Executive Order, which sought to eliminate climate and clean energy initiatives. Later that year, Trump withdrew the United States from the Paris Agreement with no alternative plan. During his tenure, Congress debated climate change issues without much progress, but the policies that have emerged generally focus on reducing greenhouse gases or improving existing environmental standards as attempts to curb climate change. Recently, as of 2019, there has been a renewed interest in climate change when the Democrats regained control of the House of Representatives. Developments included the introduction of the Green New Deal[17], the formation of a Select Committee on the Climate Crisis within the House, and the formation of a bipartisan Climate Solutions Caucus in the Senate.

The current political polarization and related ideological divisions in the U.S. pose a problem for large scale, international, or sweeping climate change policy. If there is not stability in the policy-making realm for long-term planning, funding, research, and environmental

Figure 4. The Stafford Act

Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) was signed into law into 1988 and outlines when and how the federal government will respond to disaster. The Stafford Act therefore defines (and limits) Federal Emergency Management Agency disaster relief and hazard mitigation activities.[64] Outside of drought, slow-onset ecological processes triggered by climate change have not been included in listed natural hazards that could trigger a disaster declaration under the Stafford Act. This has prevented many Alaska communities, such as coastal Shishmaref (pictured below), from seeking support to address concerns like sea-level rise and coastal erosion or permafrost degradation. Moreover, the Stafford Act confines activities to recovery Ö i.e., rebuilding on the same site Ö and therefore prevents support for Alaska village relocation projects.

Some federal legislation has marginally sought to remedy these shortcomings of the Stafford Act. The Disaster Mitigation Act of 2000[65] modified the Stafford Act to allow for pre-disaster mitigation but stipulates s

The first of these was the early climate policy suggested in 1990 in HCR 56, which, though it failed, resulted in Governor Steve Cowper endorsing the 1990 climate report, An Alaska Strategy in Response to Global Climate Change (see HCR 56 in Appendix B), the goal of which was to investigate the impacts of climate change on various economic and environmental sectors. Subsequent climate-related state policy has included executive action in the form of two Administrative Orders (AO) and legislative action in the form of two House Concurrent Resolutions (HCR), three House Joint Resolutions (HJR), three House Bills (HB), and one Senate Bill (SB).

The Alaska legislature saw little conclusive climate-related policy and action after the 1990 Governor's Report until 1999, when the Alaska House of Representatives passed a resolution urging the U.S. Senate to decline to ratify the UNFCCC Kyoto Protocol (HJR 3). While this piece of legislature died in the Alaska State Senate, the U.S. Senate still declined ratification of the Kyoto Protocol (as discussed in sections 2.1 and 2.2). It was not until 2006 that climate was again addressed when HCR 30 was adopted by the Alaska Legislature, creating an Alaska Climate Impact Assessment Commission tasked with studying and evaluating the impacts of climate change around the state and suggesting policies. In 2007, Governor Palin established a Climate Change Sub-Cabinet (AO 238), composed of the commissioners of Environmental Conservation, Fish & Game, Commerce, Transportation, and Natural Resources.[76] A year later, in 2008, the final commission report of the Alaska Climate Impact Assessment Commission was submitted to the legislature. Drawing on testimony from local public officials, Tribal leaders, and mayors of eight municipalities, the report identified various areas of concern and ongoing local efforts to identify and respond to climate impacts and advocated for WKH *RYHUQRU¶V &OLPDWH Change Sub-Cabinet to serve as the entity responsible for developing a statewide implementation plan.[77] The Sub-Cabinet for Climate Change established four advisory bodies: the Immediate Action Workgroup, the Research Needs Workgroup, the Adaptation Advisory Board, and the Mitigation Advisory Board. These groups produced multiple reports advising and making recommendations to the sub-cabinet related to near term goals, long-term research needs, and adaptation and mitigation plans and priorities.[78] In spite of both significant progress toward an Alaska climate change strategy under the sub-cabinet and recommendations by the Climate Impact Assessment Commission that the sub-cabinet be established as a recognized state council with guaranteed existence across administrations,[79] 3DOLQÙV VXFFHVVRU *RYHUQRU 3D [é•€ ó

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to the challenges of coastal erosion, perm

the possibility of such a connection for future fires in the state due to the science demonstrating the link between shifting climate patterns and more frequent, intense, and larger fires in northern latitudes.[89]

2.3.2 Intergovernmental climate policy in Alaska: The Denali Commission

Outside of executive and legislative climate activities, Alaska has some intergovernmental climate policy and activities produced by interactions of governments at multiple levels. The most obvious example of intergovernmental policy in Alaska has perhaps been the Denali Commission. The Denali Commission was established in 1998 by the U.S. Congress at the instigation of Senator Ted Stevens of Alaska. It is technically an independent federal agency with the objective of providing critical utilities, infrastructure, and economic support to Alaska communities through inter-agency cooperation and a focus specifically on remote communities.[90] However, the Commission has a special institutional structure that leads it to function as an intergovernmental entity linking the federal, state, and local governments.[91] Its governance structure includes seven commissioners from federal and state government, the University of Alaska, Alaska Native entities, and the private sector, and is controlled largely at the state level.[92]

The Denali Commission, as noted in section 2.2, was selected to serve as the lead agency addressing climate-related village infrastructure threa

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2.33 Intergovernmental climate policy in Alaska: The Alaska Federation of Natives

The Alaska Federation of Natives (AFN) is another example of unique intergovernmental relations at work on

the association between Alaska and the oil market is over 60 years old, naturally the relationship between politics and the industry are deep today. The last four governors of Alaska have all had ties to the oil industry or have voted their favor for oil companies in the past. This has made it an important factor for political campaigns and an ongoing subject in the legislative and judicial branches. The existence of the Alaska Permanent Fund, an investment IXQG WKDW DFFUXHV FDSLWDO IURP UHYHQXH REWDLQHG IU creates a culture of reliance on and appreciation for $ODVNDÙV oil wealth. However, the annual dividend, which returns a portion of State minerals revenue to Alaskans, has also become a political debate as oil prices currently drop and there are efforts to move away from big oil.[109] $V PDQ\ $ODVNDQV FRQVLGHU WKH GLYLGHQG D ÛULJKW motivator for electoral participation. For example, during the lead up to the 2018 election, *RYHUQRU 'XQOHDYÙV FDPSDLJQ SURPLVHG WR SD\ RXW D EHHQ UHGXFHG WR DFFRXQW IRU EXGJHW VKRUWIDOOV touched for this purpose.

Over the decades these relationships have created strong economic ties between the State of Alaska and oil companies and their supporting businesses, both large and small. For example, in the recent sale of oil leases in the Arctic National Wildlife Refuge (ANWR) in January 2021, which were shunned by many investment companies boycotting Arctic oil development, it was the state of Alaska itself that purchased the majority of the leases.[110] At the time of publication, President Biden, a Democrat elected in 2020, has placed a moratorium GULOOLQJ LQ $1:5 $V SDUW RI D VXLWH RI H[HFXWLYH SRO

Figure 5. Northern Bering Sea Climate Resilience Area (NBSCRA)

President Obama issued an executive order in December 2016 designating the U.S. northern Bering Sea and Bering Strait region as the Northern Bering Sea Climate Resilience Area.[116] This designation was revoked, alongside restrictions in oil and gas development on the outer continental shelf in the Arctic, Chukchi and Beaufort Seas, in an executive order by President Trump in 2017. In 2021, at the request of more than 70 federally recognized Tribes in the region, President Biden reinstated the Obama-era executive order, which includes policies on marine shipping, pollution, marine debris and oil spills, and other Arctic marine-related issues. For Western Alaska communities that are rural and primarily Indigenous, the order is especially significant because it recognizes the importance of including local and Indigenous Knowledges, and the federal task force that will be responsible for the NBSCRA is set to include an intergovernmental Tribal advisory council.[117]

Source: The Northern Bering Sea Climate Resilience Area: https://www.pewtrusts.org/-/media/assets/2016/12/northern_bering_sea_climate_resilience_area_ma

Management Program, which works to build coastal community resilience to threats including climate change.[118] This functionally limits the availability of funds for local communities and governments to work in the context of coastal resilience frameworks.

The importance of local governments in a sparsely populated, remote, largely roadless state should not be overlooked. Despite the necessity that climate change be addressed at the global and national scale, without clear and consistent guidance from state or federal government, many local entities such as boroughs, Tribes, and municipalities have taken it upon themselves to fill the gap. In particular, since the U.S. withdrawal from the Paris Agreement, subnational authorities have begun to gain more attention.[119] There are a range of organizations and initiatives for smaller scale action to find inspiration, guidance, and resources. Organizations such as the International Council for Local Environmental Initiatives (ICLEI) and the Cities for Climate Protection Campaign have materialized to build capacity. ICLEI has become an influential global network of municipalities committed to building a sustainable future; it is open to any city or town and currently has over 1,750 local and regional government members, many within the U.S. A similar organization domestic to the U.S., the U.S. Conference of Mayors Climate Protection Center, currently has 1,066 signatories to the Climate Protection Agreement (as of November 2019). In Alaska, the first three cities with Climate Action Plans (Homer, Sitka, and Juneau) were members of ICLEI and were inspired by their recommended process for climate action.

3 Alaska climate change governance by local government actors

Despite the lack of consistency from the state and federal governments, there has been ongoing development of local-scale climate policies and plans in Alaska (see Fig. 6). Many communities, villages, cities, boroughs, and Tribes have begun to address climate change for themselves and have created climate action/adaptation plans, assessments, or strategies. In 2007, the City of Homer created the first climate action plan in the state, which was later followed by plans in Sitka (2010) and Juneau (2011). Most recently, $ O D V N D Ù V O D U J H V W F L Anchorage, completed a climate action plan in 2019 and the Fairbanks North Star Borough passed a resolution in the same year to take action on the climate crisis by creating a climate action plan and advocating for state and national legislation to address climate change. Actions such as these are not unique to municipalities. Starting in 2010 with Port Heiden, the Alaska Native Tribal Health Consortium (ANTHC) began working with Tribal governments in rural villages to create a series of twelve climate impact assessments and associated response strategies (Strategies for Community Health). Seven additional plans by Tribal governments have also been created. Alaska now has at least 23 examples of local climate policy in the form of plans and assessments (see Appendix C) as well as additional task forces, resolutions, and strategies from around the state. The variety in the forms of action stems in part from a lack of top-down guidance or standardization, but also serves as an indicator of the diversity of Alaska. The state is home to many groups of people (e.g., Alaska Natives, permanent transplants from the lower 48 and beyond, short-term and rotational employees, military personnel). The

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from rainforest in the South to Arctic tundra desert in the North. This calls for a variety of responses to address climate impacts. Many local entities have acknowledged their positions within the climate crisis and taken the initiative in responding. As a result, numerous civil society organizations have emerged to counteract the growing effects of climate change in the state.

, Q $ODVNDÙV OD UJHU FLWLHV DQG WRZQV WKHUH DUH RSSRUWXQLWLHV IRU HOHFWHG RIILFLDOV WR participate in climate action. In Fairbanks, the Fairbanks Climate Action Coalition (FCAC) was formed in November of 2015. It was a result of community members organizing localized solidarity actions with the 2015 United Nations Climate Change Conference in Paris. Afterwards, FCAC hosted an event where individuals that attended the Paris conference shared what they had learned and what inspired them at the conference. From then on, FCAC continued growing as Fairbanks community members felt the need for action on climate change. Anchorage and Juneau have similar climate action groups that offer outlets for pushing legislation or carrying out local direct actions.

Tribal groups have been responding as well. Over 19 climate action efforts (i.e., plans and strategies) have emerged from Indigenous communities. These actions overwhelmingly focus on assessing and adapting to the current impacts of climate change that threaten ways of life, rather than focusing on climate change mitigation. For example, such plans mention threats to food and water security, public health, and physical security as their primary areas of concern. Only one Tribal Plan (the Pedro Bay Emissions Inventory and Climate Action Plan) has mitigation efforts as its primary objective, and it is worth noting that this is the sole Tribal plan to be initiated and undertaken by a State of Alaska governmental department (Environmental Conservation) on behalf of the Tribe.

3.1 Municipal-level action (cities and villages)

As local-scale climate actions grow, more numerous different methods of responding to climate change have arisen around the state. Most common is the creation of a climate action or climate adaptation plan, though there are many examples of direct responses to the climate crisis that are beyond the scope of this report. Climate Action Plans (CAPs) and Adaptation Plans (APs) are commonly created out of a

As mentioned above, many of the first municipal climate action plans were inspired by initiatives taken on an international scale. Additionally, the founding documents of many call for more initiative to be taken by the federal and state governments. For example, the Homer Climate Action Plan was passed and adopted by their City Council in 2007. This plan was as a result of work led by Mayor Jim Hornaday and the Global Warming Task Force established by the Homer City Council. The plan focused on lowering greenhouse gas emissions. A CAP Implementation Project final report was released in 2009 in order to assist with implementation of the Homer Climate Action Plan.[120] In 2010, the Sitka Climate Action Plan was created.: R U N W R Z D U G started in December of 2007, when the city and borough of Sitka endorsed the U.S. Mayors Climate Protection Agreement. In 2011, the Juneau Climate and Implementation Plan was created. The same year, the Norton Bay Watershed Area Climate Adaptation and Action Plan was created.

In 2019, the Anchorage Climate Action Plan was created with the help of University of Alaska Anchorage (UAA). $ Q F K R U D J H Ù V S D U W Q H U V K L S Z L W K 8 $ $ J U D Q W allowed a fairly swift completion of a climate action plan that comprehensively addressed both mitigation and adaptation. Anchorage is the largest municipality in Alaska and also has borough status as a "city-borough", meaning the borough and city are consolidated and operate as a unified government. The plan was created over a year-long process, with a goal of reducing greenhouse gas emissions 80% from 2008 levels by 2050, with an interim goal of 40% by 2030.[121]

3.2 Borough-level actions

Responses on a broader borough scale have been few outside of the municipalities of Anchorage and Sitka, which both operate as consolidated city-borough with single unified governments. In 2019, the Fairbanks North Star Borough (FNSB) passed a resolution to create a Joint Climate Change Task Force to guide the borough while they create climate action and adaptation plan. This resolution was drafted and presented to the borough by the local civil society organization Fairbanks Climate Action Coalition (FCAC) and sponsored by Borough Assembly members Leah Williams and Marna Sanford. This resolution was passed on the tail of $ Q F K R U D J H Ù V D G R S W L R Q D Q G R Z D V F D W L P H W K H V W U R Q J O \ L Q V S L U H urban hub taking action.

urban hub taki

community scale rather than the Tribal scale, they are undertaken in partnership with Tribal governments and are done with a strong emphasis on community inclusion and incorporation of Indigenous knowledge and values. These various types of climate-oriented activities serve somewhat different purposes but all help communities to take the first step towards addressing climate change as a holistic concern.

3.4 Regionally coordinated action and coalitions

Due to the size of Alaska and the fact that 82% of its communities are not served by a contiguous road system[135], accessible only by plane or waterways (in summer) or iceways (in winter), many organizations have formed coordinated actions. This can be seen with the CAP iceways

this section, we talk about some of the similarities and differences that emerge across local climate plans in Alaska.

4.1 Motivations specifically identified in the local plans and actions

Actors from all around Alaska continue to respond to climate change with varying levels of commitment. A significant difference between Tribal and municipal action often lies in the motivation. While the initiatives for climate plans, assessments, and strategies all stem from a general impulse to address the new reality facing Alaska, the specific motivations for taking action vary by community. The variety of motivations within these can be seen through their goals and objectives. Alaska is a large state with various sizes and types of communities, cities, and villages so the impacts felt and the scale of what is possible as a response also vary.

Of the 23 Climate Action Plans and Assessments analyzed (see Appendix C), all mention specific motivations for developing the plans. Five of them particularly point to the lack of federal or state action. For example, the first climate action plan in Alaska, from the city R I + R P H U G L U H F W O \ U H I H U H Q F H V W K H Û I D L O X U H R I W K H 8 G L P S O H P H Q W V X F F H V V I X O S O D Q V W R P L W L J D W H J U H H Q K R X V

The Oscarville Tribal Climate Adaptation Plan G L U H F W O \ F L W H V D Û O D F N R I understanding of culture, traditions and rural lifestyles Ü3 Q G D Û O D F N R I F R P P X Q L W \ L I U R P L Q L W L D O S O D Q Q L Q J Ü31 While highlighting the unique subsistence D F W L R position Indigenous $ O D V N D Q V D U H L Q W K H U H S R U W L V D Q Û D W W H , Q G L J H Q R X V N Q R Z O H G J H D Q According to the Federal D Q G L V Ûwhere we are From: Our History, ÜÛwhere we are Today, Üand Ûwhere we are Going: A Path Forward Ü. Similar to other Tribal plans, this exemplifies the interconnectedness of nature and culture and identifies the impacts to the environment as a motivator to take action.

In city municipal plans CAPs were more frequently initiated by their elected leader the cases of Homer and Sitka, for example, both plans were sparked by the U.S. Mayors Climate Protection Agreement and are involved with ICLEI. The involvement with organizations such 0.g53(>3<0058004A004A004F0048092 re W* n BT /F000912 0 612 792 re W*6

marginalization of people of different ethnicities, skin colors, and epistemologies have to be addressed.[133]

It is these intersections that have motivated stakeholders to form coalitions and to work to bring underrepresented voices to the forefront of climate discussions. Moreover, these localized coalitions also work to support each other at a broader scale. For instance, Alaska Rising Tide (a statewide climate change activist group that works primarily out of $QFKRUDJH FDPH WR)DLUEDQNV LQ-time spokesperson for the Iditarod[134], and the Just Transition Summit in Fairbanks in January 2020 brought together different community organizations from around the state to create a space for Indigenous and non-Indigenous collaboration to address economic and social issues. The summit was organized by Native Peoples Action, Native Movement, The Alaska Center, Alaska Public Interest Research Group, Fairbanks Climate Action Coalition, and the Zero Waste Alaska.

Some coalitions are inspired by international efforts such as the Paris Agreement of the UNFCCC COP22 in 2016. Adjacent to the Paris Conference, marches and rallies were held to call on world leaders to make more progressive changes.[135] Pope Francis released an encyclical on the environment titled Laudato si' inspired Catholics and non-Catholics around the state to act on climate change at the local level (as demonstrated above, interfaith organizing is a key part of the climate justice movement in Anchorage, Fairbanks, and Juneau).

5 Concluding thoughts

Absent consistent direction on climate change policy by either state or federal governments, Alaskans have been creating policies to take action on both climate mitigation and adaptation. Every ecoregion in the state—from southern rainforest to northern tundra—is affected by changing seasonal patterns and is experiencing these changes more rapidly than much of the rest of the U.S. and mid-latitudes. The majority of the climate policies we document here are located in small rural communities with negligible local contributions of GHGs to the global load, and have a focus on adaptation. The few policies that cover territories with larger populations (e.g., the Anchorage Climate Action Plan) tend to focus on mitigation approaches with little to no mention of adaptation. We have also explained some relevant intergovernmental activities such as the role of the Denali Commission and the Alaska Federation of Natives. However, the report was not intended to address every study, project, or ongoing activity in the state. We encourage our readers to delve more deeply into those we have not included. For example, the Tanana Chiefs Conference, a Tribal health and social services consortium established by the Interior Alaska Tribes and T

upon by the governments or citizens we serve. In this instance, the science of climate change is globally accepted, the planetary processes affected can be observed in many places, Alaskans are at the forefront of the impacts of these changes, and bipartisan acknowledgement of the need to address climate change is growing.[136] While we do not presume to recommend how the State of Alaska should create mitigation or adaptation policy, we do strongly recommend that the state develop an enduring Alaska climate change commission that serves to increase the information available about climate change for all Alaskans and provides a consistent accountable body of knowledge and suggestions to decision makers. Such an idea is not novel; Alaska has twice established climate oversight entities by f5/brnmt riaa executiveor

July 2021, which has issued reports annually since 2015. Crime, like climate change, is a non partisan phenomenon, though, like climate change, various partisan definitions of the problem of crime and potential solutions can be. However, this has not prevented the state from forming this board or creating a diversity of perspectives on it via its membership. Another example of an effective commission with a longer history is the Alaska Commission on Agi
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has a roster that mixes seats reserved for certain governmental as well as the public. An effective climate commission would include representatives from across the state and various sectors: Alaska Natives, rural and urban Alaskans, natural resource managers, subsistence users, youth and elders, coastal and interior residents, and the private sector.

For the State of Alaska to not address many of the changes in an integrated way suggests two very likely outcomes. First, the costs of managing the results of the rapid changes across our state and region will be high. These will not only be monetary costs but also costs to values Alaskans hold dear (lives, livelihoods, distinct cultures, and a flourishing natural environment. Secondly, the window for addressing these changes through adaptation is narrowing because the options people, businesses, and governments can take decrease as the problems mount. Given this context, it is a prudent option to form a board or commission for the state that can, at a minimum, collect, curate, and pass forward the science and knowledge of climate change in the state and its surrounding waters across administrations. While state
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References

[1] Spencer R. Weart, The discovery of global warming (Cambridge: Harvard University Press, 2008); National Snow and Ice Data Center (NSIDC), "Climate Change in the Arctic," o o } µ š Œ š] o] u š } o } P Ç v D š } Œ } o modified May 4, 2020, https://nsidc.org/cryosphere/arctic-meteorology/climate_change.html.

[2] Henry Cole and the Science and Engineering Advisory Commission, An Alaskan Strategy in Response to Global Climate Change (Juneau: State of Alaska Office of the Governor Division of Policy, 1990), 1.

[3] Gerd Wendler and Martha Shulski, "A Century of Climate Change for Fairbanks, Alaska," Arctic 62, no. 3 (2009): 295–300, www.jstor.org/stable/40513307; J. Cohen š o Ç v Ç u Recent consensuses on Arctic amplification influence on midlatitude severe winter weather

[17] Inuit Circumpolar Council Alaska. Inuit Food Security Conceptual Framework: How to Assess the Arctic from an Inuit Perspective (Anchorage, AK: Inuit Circumpolar Council, 2017), https://iccalaska.org/wp-icc/wp-content/uploads/2016/05/Food-Security-Full-Technical-Report.pdf

[18] Thoman and Walsh, o • l [• Z v P] v P tv À] Œ } v u v

[19] through a well- Ecology and Society 25, no. 2 (2019):18.

[39] Anne Johnson, Solmaz Spence, Katie Thomas, and Lauren Eve Arctic matters: the global connection to changes in the Arctic (National Research Council, 2014). http://nas-sites.org/arctic/files/2015/06/Arctic_Matters booklet.pdf

[40] Larry D. Hinzman et al., "Evidence and implications of recent climate change in northern Alaska and other arctic regions," Climatic Change 72, no. 3 (2005): 251-298. https://doi.org/10.1007/s10584-005-5352-2.

[41] Riley E. Dunlap and Angela J. Mertig, eds., American environmentalism: The US environmental movement, 1970-1990 (London: Routledge, 2014)

[42] Anthony Adragna, "GOP lawmaker: Green New Deal 'tantamount to genocide'," Politico, March 14, 2019. https://www.politico.com/story/2019/03/14/green-new-deal-genocide-1270839; Adam Shaw, "[illegible] admits Green New Deal about the economy, not climate," Fox News, July 12, 2019. https://www.foxnews.com/politics/aoc-top-aide-admits-green-new-deal-about-the-economy-not-the-climate.

[43] Danielle Kurtzleben, Lexie Schapitl, and Alyson Hurt, "[illegible] Green New Deal And More," NPR, September 11, 2019. https://www.npr.org/2019/09/11/758173003/climate issues-where-2020-democrats-stand-on-the-green-new-deal-and-more.

[44] Daniel Kreiss, "The Fragmenting of the Civil Sphere: How Partisan Identity Shapes the Moral Evaluation of Candidates and Epistemology," in Politics of Meaning/Meaning of Politics: Cultural Sociology of the 2016 U.S. Presidential Election, eds. Jason L. Mast and Jeffrey C. Alexander (Cham, Switzerland: Palgrave Macmillan, 2019), 223-241. https://doi.org/10.1007/978-3-319-95945-0_13.

[45] Elaine Kamarck, "[illegible]

[59] U.S. Government Accountability Office, o] u š D] P Œ š] } v W] o } š W Œ } P Œ u } µ o v Z v š Z and Reduce Federal Fiscal Exposure, GAO-20-488 (Washington, DC, 2020), https://www.gao.org/assets/gao-20-488.pdf.

[60] Alaska Community Coastal Protection Project https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/AlaskaCommunityCoastalProtectionProject.aspx.

[61] Mary David Oral testimony of Mary David, Executive Vice President Kawerak, Inc. U.S. Senate Committee on Indian Affairs, July 30, 2014. https://www.indian.senate.gov/sites/default/files/upload/files/7.30.14%20SCIA%20Witness%20Testimony%20%20Mary%20David%20%20Kawerak.pdf

[62] Ibid.; Meeker and Kettle, A Synthesis of Climate Adaptation Planning Needs; U.S. Government Accountability Office, Alaska Native Villages: Limited Progress Has Been Made on Relocating Villages Threatened by Flooding and Erosion, GAO-09-551 (Washington, DC, 2009), https://www.gao.org/products/GAO-09-551.

[63] U.S. Government Accountability Office, Strategic Federal Planning Could Help Government Officials Make More Informed Decisions, GAO-10-113 (Washington, DC, 2009), https://www.gao.org/products/GAO-10-113.

[64] Bronen, "Climate-induced community relocations; The Robert T. Stafford Disaster Relief and Emergency Assistance (Stafford) Act, 42 U.S.C. §§ 5121-5208 (2006), https://www.fema.gov/disasters/stafford-act.

[65] Disaster Mitigation Act, H.R. 707 (2000), https://www.congress.gov/bill/106th-congress/house-bill/707

[66] Disaster Recovery Reform Act, H. Rept. 115-1098 (2018), https://www.fema.gov/disasters/disaster-recovery-reform-act-2018

[67] Ari A New Approach to Disaster Relief Funding? The Disast - Disaster Mitigation Harvard Environment & Energy Law Program, January 28, 2021. https://eelp.law.harvard.edu/2021/01/a-new-approach-to-disaster-relief-funding-

2009

[120] Deerstone Consulting and Abel Cooper, City of Homer Climate Action Plan Implementation Project Final Report (Homer, AK: City of Homer, 2009). https://www.cityofhomer-ak.gov/sites/default/files/fileattachments/community/page/6822/cap_implementation_final_report-101-10.pdf.

[121] Anchorage Climate Action Plan Steering Committee, Anchorage Climate Action Plan, adopted MAY 21, 2019. Anchorage Assembly Resolution 2018-158. https://www.muni.org/Departments/Mayor/AWARE/Resilient%20Anchorage/Documents/2019%20Anchorage%20Climate%20Action%20Plan_ADOPTED.pdf

[122] Paul Goodfellow et al, Pedro Bay Emissions Inventory & Climate Action [Plan Presentation]. State of Alaska Department of Environmental Conservation, 2018. https://www.uaf.edu/caps/our-work/climate-policy-in-alaska/pedro-bay-cap-2018.pdf; Paul Goodfellow, Pedro Bay Emissions Inventory Results [Presentation], State of Alaska Department of Environmental Conservation, August 2, 2019, https://www.epa.gov/sites/production/files/2019-08/documents/1025am_goodfellow.pdf

[123] Meeker and Kettle, A Synthesis of Climate Adaptation Planning Needs

[124] M. Brubaker, J. Berner, J. Bell, and J. Warren, Climate Change in Kivalina, Alaska

NBITWC	Norton Bay Inter-Tribal Watershed Council
NBSCRA	Northern Bering Sea Climate Resilience Area
NCEI	

ENDIX C. Local-scale climate policy in Alaska

ıate Plan Title					
Scale	Produced by/for	Motivation	Goals	Funding Source	Affiliations & Partnerships
of Homer Climate Action Plan www.cityofhomer-ak.gov/sites/default/files/fileattachments/city_council/page/6722/climate_action_plan.pdf					
Municipal/Homer is a city (pop. ~5700) in the Kenai Peninsula Borough.	By City Council's Global Warming Task Force for the City of Homer.	Urgency of IPCC reports, failure of state and federal action, U.S. Mayors Climate Protection Agreement.	GHG reduction, prepare for impacts of climate change, an to inspire further action and influence policy within other political bodies & governments. Reduction targets of 12 percent by 2012 and 20 percent by 2020.	Plan creation- N/A. Options identified for implementation: state and federal programs and private foundations, a Climate Action Plan tax.	Alaska Marine Conservation Council, Sustainable Homer, Home Chamber of Commerce, Alaska Islands and Ocean Visitor Center, Alaska Conservation Solutions, ICLEI.
and Borough of Sitka Climate Action Plan www.cityofsitka.com/government/documents/SitkaClimateActionPlan-12-10.pdf					
Municipal/Sitka is a city and borough (pop. ~8500) in the southeast panhandle of Alaska.	By the Sitka Climate Action Plan Task Force, for the Sitka Assembly.	Plan creation was spurred upon joining the U.S. Mayors Climate Protection Agreement.	Targets municipal operations and actions; focuses on reducing GHG emissions with an implementation plan from 2010-2020.	Plan creation: N/A. Options identified for implementation: Municipa funds, grants, revolving energy fund.	U.S. Mayors Climate Protection Agreement, ICLEI.
ate Change in Point Hope, Alaska: Strategies for Community Health.					

4. Juneau Climate Action & Implementation Plan https://chstm2y9cx63tv84u2p8sh-wpengine.netdna-ssl.com/wp-content/uploads/2018/04/CAP_Final_Nov_14.pdf		
2011	Municipal/ Juneau is a city borough and state capital (pop. ~32,000) in the southeast panhandle of Alaska.	By the Juneau Commission for Sustainability and

7. Climate Change in Kivalina, Alaska: Strategies for Community Health https://anthc.org/wp-content/uploads/2016/01/CCH_AR_012011_Climate-Change-in-Kivalina.pdf						
2011	Tribal/ANTHC Assessment. Kivalina is an Iñupiat village (pop. ~400) located on a small barrier island in the Northwest Arctic Borough.	By M. Brubaker, J. Berner, J. Bell, and J. Warren for ANTHC Center for Climate and Health and the Village of Kivalina	Arctic communities are vulnerable to climate change and seek to adapt to protect their health and infrastructure. Created based on requests from Tribal health representatives and local and regional leadership.	To document climate change impacts as described by local people and climate change effects or potential effects, especially related to health concerns and infrastructure; to make recommendations for addressing these impacts.	Strategy creation: U.S. Indian Health Service Cooperative Agreement No. AN 08-X59. Implementation: N/A.	Kivalina IRA Council, City of Kivalina, Maniilaq Association, Northwest Arctic Borough, NANA Regional Corporation, Red Dog Mine, Glenn Gray and Associates, ACCAP, ACRC, SNAP, UAF Geophysical Institute, UAF Permafrost Laboratory, UAA Institute for Circumpolar Health, UAF Water & Environmental Research Center, various departments of the State of Alaska, NOAA, NWS, USGS, USACE, CDC, EPA, USFWS, Selawik National Wildlife Reserve, AOOS.
8. Climate Change in Selawik, Alaska: Strategies for Community Health https://anthc.org/wp-content/uploads/2016/01/CCH_AR_052012_Climate-Change-in-Selawik.pdf						
2012	Tribal/ANTHC Assessment. Selawik is an Iñupiat village (pop. ~800) located in the Northwest Arctic Borough.	By M. Brubaker, P. Chavan, J. Berner, M. Black, and J. Warren for ANTHC Center for Climate and Health and the Village of Selawik.	Arctic communities are vulnerable to climate change and seek to adapt to protect their health and infrastructure. Created based on requests from Tribal health representatives and local and regional leadership.	To document climate change impacts as described by local people and climate change effects or potential effects, especially related to health concerns and infrastructure; to make recommendations for addressing these impacts.	Strategy creation: USFWS, EPA, U.S. Indian Health Service. Implementation: N/A.	Native Village of Selawik, City of Selawik, Maniilaq Association, Northwest Arctic Borough, NANA Regional Corporation, Selawik National Wildlife Reserve, Northwest Inupiat Housing Authority, ACCAP, SNAP, UAF, UAA Institute for Circumpolar Health, various departments of the State of Alaska, USACE, CDC.
9. Climate Change in Nondalton, Alaska: Strategies for Community Health https://anthc.org/wp-content/uploads/2016/01/CCH_AR_112013_Climate-Change-in-Nondalton.pdf						
2013	Tribal/ANTHC Assessment. Nondalton is a Dena'ina village (pop. ~130) located in the Lake and Peninsula Borough.	By M. Brubaker, C. Balluta, S. Flensburg, J. Skarade, and R. Drake for ANTHC Center for Climate and Health and the Village of Nondalton.	Inspired by a 2011 workshop in Dillingham and assessment team was established following resolution of support from Nondalton Village (Tribal government).	To document climate change impacts as described by local people and climate change effects or potential effects as interpreted through the lens of public health; to make recommendations for addressing these impacts.	Strategy creation: Western Alaska	

10. Climate Adaptation & Action Plan for the Norton Bay Watershed http://www.mfpp.org/wp-content/uploads/2011/04/Norton-Bay-Watershed-Climate-Adaptation-Action-Plan_2013-Final.pdf				
2013	Regional (Inter-Tribal)/Norton Bay Watershed is locate on the Seward Peninsula and is home to the Native Villages of Elim, Unalakleet, Shaktoolik, Golovin, and Shishmaref (combined pop. ~1,900).	By E. Murray (Norton Bay Inter-Tribal Watershed Council [NBITWC]), Laoch Consulting and Climate Solutions University on behalf of the NBITWC and the Norton Bay Alaska Native Villages.	Substantial impacts of climate change are already felt by Native Villages' cultures and economies.	The first step in a long-term objective of addressing the consequences of climate change and other non-climate stressors; to provide an example plan that can be used in locations throughout 5/pdTJ

13. Climate Change in Levelock, Alaska: Strategies for Community Health https://anthc.org/wp-content/uploads/2016/01/CCH_AR_042014_Climate-Change-in-Levelock.pdf		
2014	Tribal/ANTHC Assessment. Levelock is an Alutiiq and < X S Ù L community(pop. ~70) located in the Lake and Peninsula Borough.	By M. Brubaker, G. Andrew, S. Andrew, S. Flensburg, J. Skarada, and R. Drake for ANTHC Center for Climate and Health and the Village of Levelock.

16. Climate Change in Wainwright, Alaska: Strategies for Community Health
https://anthc.org/wp-content/uploads/2016/01/CCH_AR_062014_Climate-Change-in-Wainwright.pdf
2014 Tribal/ANTHC