

NORTHERN ALASKA SCENARIOS PROJECT REPORT



CREATING HEALTHY SUSTAINABLE
COMMUNITIES IN ARCTIC ALASKA

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These are the participants who graciously gave their time, energy,
and ideas to shaping scenarios for creating healthy sustainable
communities in Arctic Alaska. The affiliations listed are those given
at the workshops (2015-2016). We thank them, again, for their work
with us. The project team list is similar, these are the affiliations
in 2015-2016. Please note that all four PhD students have now
graduated as of September 2017.

This report was compiled and written by: Amy Lauren Lovecraft,
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EXECUTIVE SUMMARY

What makes northern Alaska communities resilient? Building on the North Slope Borough's (NSB) *Healthy Communities Initiative* and the Northwest Arctic Borough's (NWAB) *Healthy Kotzebue, Our Future!* a team led by University of Alaska Fairbanks completed a study that brought together Arctic Alaska resident experts and researchers to develop scenarios for healthy sustainable communities by the year 2040. In times of rapid change, scenarios have been shown to help with strategic planning, adaptation, and problem-solving at the community level. At the beginning of the project, background research by the project team included Indigenous and local expert knowledge with a holistic systems approach to community resilience. It also highlighted the complex nature of change in Arctic Alaska. Figure A details the process – from beginning with identification and deliberation over the factors essential to community resilience through to the development of indicators to track a community's path into the future.

While it is not possible to predict the future in a series of three workshops, it is possible to explore what aspects of different likely futures might look like under diverse circumstances. Working with the ideas and deliberations of over fifty participants during 2015 - 2016, the research team developed a series of scenarios for community health and sustainability by 2040. In particular, three scenario outcomes were produced with the workshop participants' expertise that are plausible and internally consistent. In the future only one particular future will come to be; and it may be different from those contained in the report. However, as shown in past studies, scenarios analysis can aid people and organizations in better preparing for any one future by asking "what if" and considering what in a community matters most to carry into the future. This is a proactive approach to adaptation where local-scale actors can strategize how to best meet possible challenges rather than passively adapt to whatever happens.

To get to these scenarios, participants in Workshops 1 and 2 developed, deliberated, and refined a multitude of key factors down to twenty-one that are likely to have major influence in the future of health and sustainability in Arctic Alaska communities. The key factors cluster around five major themes or levers: local control over governance, sustaining natural resources, accessibility to markets, promoting education that integrates cultural values, and holistic well-being. For each key factor, drawing on the compiled background information and additional expert input, the team developed a series of future projections. These projections describe the range of possible trends centered around any particular key factor. For example, for sustainable energy, the future projections identified by the participants and the research team range from continued reliance on diesel-generated power to local control over alternative energy sources, or creation of large transmission lines for delivery of power from generation facilities on the North Slope and elsewhere (Figure A).

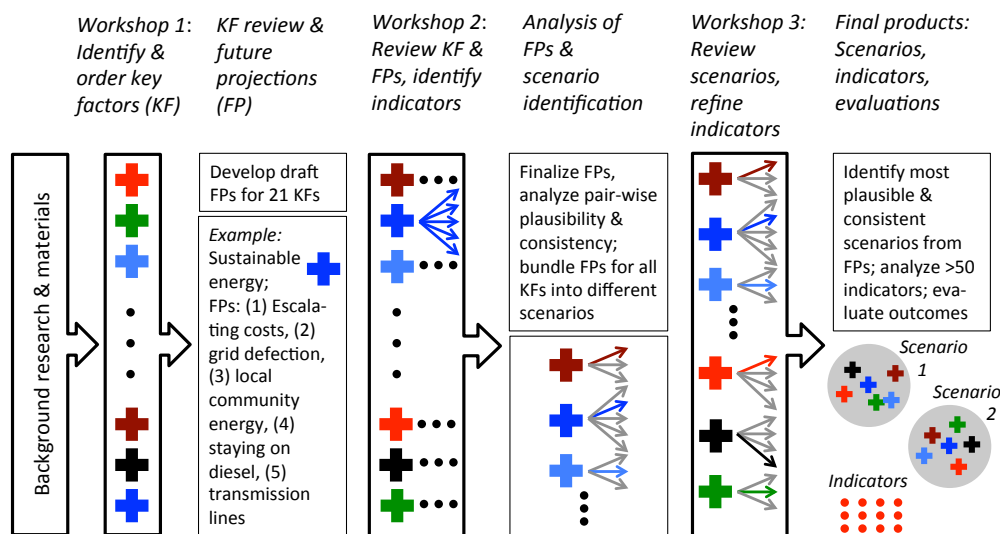
The workshops also revealed how different key factors are linked and interact with one another. For example, early in the process participants ranked climate change in the lower half of key factors in terms of importance. However, participants emphasized how changes in the climate and, in particular, access to subsistence resources controlled by snow, ice, and permafrost conditions have impacted the annual cycle of subsistence activities which in turn are linked to important community celebrations. Through the workshops and background research, indicators were identified that can help a community track and potentially anticipate important changes in relation to possible future scenarios. For example, when evaluating access to subsistence resources, indicators that are meaningful in terms of the condition of the permafrost are much more useful than standard measures like the air temperature over the course of a year. More than fifty indicators were identified for the key factors and future projections. The project team determined that

not all of these are currently tracked or monitored to help decision-makers in the region, and provided recommendations on how to address these policy and data gaps.

After Workshop 2, pairwise combinations of all the future projections for the different key factors were evaluated to determine which were most plausible and consistent with one another. From this analysis, the research team identified a number of future scenarios related to community health and sustainability. In Workshop 3 these scenarios were evaluated and participants imagined how these stories could play out in the coming decades. This combination of community members deliberating well-researched possible futures is powerful. It enables villages, boroughs, regions, organizations, and individuals to think about what sorts of forces are at work that can change the future. Scenarios can also demonstrate what may be beyond our control. For all the possible futures in Arctic Alaska there are four key drivers that seem to be tipping points making the key factors produce desirable or undesirable results: (1) the boom bust cycle of economies, (2) government relations, (3) community relations, and (4) largely external forces. Each of these drivers has elements that can be monitored, controlled, managed, or affected by local governments, organizations, or community members. Each also has aspects that individuals, regions, and in some cases even national policy cannot directly affect. Understanding what is subject to democratic political debate and change, such as policies related to education, intersectional engagement, and housing is important for residents now and in the future to shape their communities. At the same time, citizen science such as observations of climate change, tracking demographics, and monitoring subsistence animals may help communities to better determine their own futures.

Key conclusions: The results of the Northern Alaska Scenarios Project demonstrate the core values and key characteristics Arctic Alaska residents find significant to creating community resilience. The key factors, future projections, and possible scenarios of the project can help guide community action and policy. Potential social and environmental hazards can be identified via indicator tracking over time, based on the knowledge and data collected from the workshops. A few next steps would be to expand the indicators being identified and collected, in particular filling gaps where community members recognize an important trend but there is not yet a monitoring process in place; to create a holistic community resilience dashboard specific to Arctic Alaska needs; and to engage other locations in Alaska in similar scenarios workshops to look for shared concerns and strategies across regions.

FIGURE A: SUMMARY OF NASP PROJECT ACTIVITIES, WITH SCHEMATIC REPRESENTATION OF EXAMPLES OF SOME OF THE MAIN PRODUCTS GENERATED BY THE PROJECT.



WHAT IS THE NORTHERN ALASKA SCENARIOS PROJECT (NASP)?

A PROJECT WITH AND FOR THE PEOPLE OF NORTHERN ALASKA

What were the goals of NASP?

The Northern Alaska Scenarios Project, NASP, was a three-year project funded by the National Science Foundation. Its purpose was to create an opportunity for resident experts in the Northwest Arctic and North Slope Boroughs (Alaska, USA) to fully address the question, **“What is needed for healthy sustainable communities in Arctic Alaska by 2040?”**

The goals of the project were: (1) to identify key factors of community health and sustainability as understood by resident experts of Arctic Alaska, (2) to jointly examine multiple potential futures for each key factor, as well as linkages among them, (3) to create and share detailed scenarios of multiple plausible futures for Arctic communities, and (4) to begin to develop indicators of use to local communities for tracking progress in coming decades.

Who participated?

The importance of engaging arctic resident experts was written directly into the grant that funded the project. While the grant writers did not include community members, the grant proposal was evaluated and endorsed by both the Alaska Native Tribal Health Consortium (ANTHC) and the North Slope Science Initiative. Once the grant was received, the project team worked hard to ensure many different people and organizations across both boroughs would be aware of the project and invited to participate. Indeed, the National Science Foundation funding allowed the project to make participation virtually cost-free. We were able to pay anyone who was a resident of Arctic Alaska with expertise related to community health and sustainability to participate, with a small honorarium. Thus, there was no exclusion of any potential participant based on financial costs.

The project also focused on engaging the broadest possible range of participants. The research team recruited participants by taking part in meetings such as those of the Iñupiat Community of the North Slope (ICAS), talking to individuals directly, making personal phone calls, sending formal email invitations, and – perhaps most importantly – engaging in “snowball sampling”. This means that participants were asked to recruit other potentially active and engaged participants from among their communities, colleagues, and acquaintances. Finding participants in this way allowed the research team to build a participant group within a population in which they did not initially know all the key individuals.

What do we mean by “scenarios”?

Scenarios are stories of possible futures. We all use them in our daily lives, and they have long been used by businesses as a more formal planning tool. Considering multiple possible futures allows individuals, companies, or communities to think ahead in rapidly changing complex environments, and to make crucial decisions in the absence of complete information about the future.

Scenario exercises do not produce forecasts of what is to come. Nor are they visions of what participants would like to happen. Instead, they address questions of, “What would happen if...” They create opportunities for strategic decision-making to reduce risk and promote community-level, local-scale resilience. Scenarios are useful for decision makers when uncertainty is high (Cavana 2010), and when there are strong differences among multiple justifiable opinions. We use scenarios to talk about the scope of all possible future events and risks, and to help prepare for them.

Engaging in scenarios planning changes the way we think about the future (Wollenberg et al. 2000, Lebel et al. 2006, Bohensky et al. 2011). Rather than being an unclear blob or a location of fear, the future becomes a suite of possibilities that a community or individual works towards through joint efforts to address needs, possible perturbations, and outcomes.

What do we mean by “resilience”?

A healthy and sustainable community is a resilient community. *Resilience* is the maintenance of fundamental properties of a system in the face of perturbation (Gunderson and Holling 2002). For our project this meant that we wanted to understand what key qualities of communities the resident experts thought were most important to any community’s ability to thrive. The research team contributed many different sources of information but primarily spent the three workshops, and in between, listening to deliberations and processing outcomes from our participants as they discussed - What makes a community able to hold together and be healthy over time when faced with hardships such as economic downturns, or a widespread illness, or a period of cultural instability? Protecting and promoting those qualities can help a community be resilient. In contrast, vulnerability is the likelihood that a system will experience harm due to exposure to a perturbation or stress (Turner et al. 2003). At times of rapid change, aspects of a system will respond to stress differently. The goal of listening and learning from the resident experts enabled the research team to better inform the participants and their organizations about the key factors of resilience. Listing, thinking, and deliberating the impact, value, and uncertainty of these key factors could inform better planning at the borough and local levels.

Borough residents understand that social, cultural, and environmental changes are happening and their communities will not be the same places by 2040 that they were today, or were in 1950. Our project brought people together who are living through these changes so that they can think about what kind of communities can thrive in 2040, even though they will not be the same as they are today. If a system is in a stable equilibrium, it can return to a “normal” condition after a disturbance – like a marble rolling back to the bottom of a bowl, a village rebuilding a school after a flood, or a town reorganizing its buildings after a forest fire. But when systems are in *dynamic equilibrium*, we have to define resilience to allow for change, as long as basic functions remain the same – like a bicycle remaining upright as it is ridden along a winding trail. Another example could be the use and distribution of Indigenous Knowledge, but through social media – the core importance of the knowledge remains, but how it may be shared is new. This project addressed linked social and ecological resilience from a dynamic perspective, with an emphasis on communities thriving, not just surviving (Almedom 2015). Just as a person can learn and grow and change but remain the same person, communities can be dynamic – changing – and adapt without losing the core values and meaning to the people living there. This is the meaning of dynamic equilibrium.

Most governmental risk management tools emphasize risk avoidance, reduction and prevention. In contrast, a resilience approach to sustainable futures aims to ensure that a system is able to absorb shocks and risks.

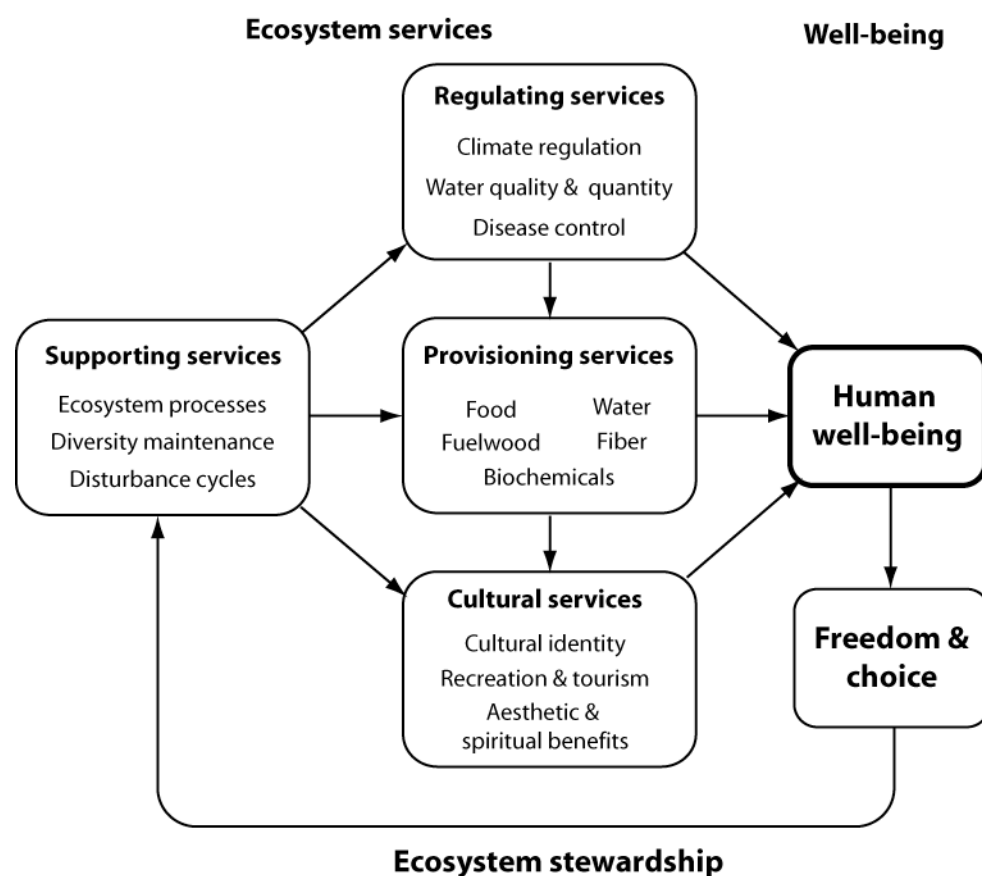
As such, this project's first task was to determine what core functions or key factors arctic residents think will provide resilience into the future, in the face of change.

Can we define what it means to have a “better life”?

The Millennium Ecosystem Assessment, MEA (2005) defined human well-being as having several components: 1) security; 2) basic material for good life; 3) health; and 4) good social relations. These four components support the fifth: freedom of choice and action, meaning “opportunity to be able to achieve what an individual values doing and being” (MEA 2005, vi).

The MEA also defines four categories of “ecosystem services” – provisioning, regulating, cultural, and supporting – that directly or indirectly provide humans with goods or social needs. However, we can’t assume that ecosystem services alone create human well-being and the “opportunity to be able to achieve what an individual values doing and being.” Freedom and choice must also play a role (Figure 1).

FIGURE 1: COMPONENTS AND LINKAGES RELATED TO HUMAN WELL-BEING. FROM THE MILLENNIUM ECOSYSTEM ASSESSMENT, 2005.



In the project we asked arctic residents about their own perceptions of the good life – what would they choose as the key components of healthy sustainable communities in the future? In other words, what can make their communities resilient? If our shared goal is to ensure that people and communities are able to choose how to adapt to change, this requires a deliberative democratic process.

What is “deliberative democracy”?

Deliberative democracy is understood to mean a decision-making process that includes true representation by members of the public, and which has the potential to produce decisions that are fairer and more rational than “normal” governmental

decisions (Baber 2004). For the process to produce useful results (1) participants must be free and equal citizens in terms of power and knowledge (2) they must justify their opinions by giving reasons that all others find understandable and acceptable for discussion and (3) they must reach conclusions that are

binding but also open to future deliberation (Guttman and Thompson 2004). Selection of participants must be fairly representative, the results of the process must be transparent, and there should be a clear link to elected policy officials (Hanssen et al. 2008). In our project we worked hard to ensure our participants understood that their forms of deep local, cultural, and organizational knowledge were vital contributions to the workshops and that all participants should value the expertise of the others.

The process is not without pitfalls, including high costs, uneven representation, complacency, self-interest, and lack of authority to create policy (Irvin and Stansbury 2004). Nonetheless, deliberative democratic processes like scenarios development workshops can be particularly important for policy making in the face of problems too complex for single solutions (Gollagher and Hartz-Karp 2013) and for creating and strengthening communities of practice.

What are “communities of practice”?

Communities of practice (CoPs) are informal groups of people who share experiences, goals, and a willingness to work together to achieve those goals. CoPs can form when people come together to discuss and debate important issues as part of deliberative democracy. Even when the process has ended, the group remains, as does the drive to work together. As such, CoPs may prove to be extremely important in promoting social, economic, and ecological resilience in Arctic communities.

WHAT HAPPENED DURING THE NASP PROCESS?

What were the major steps in the process?

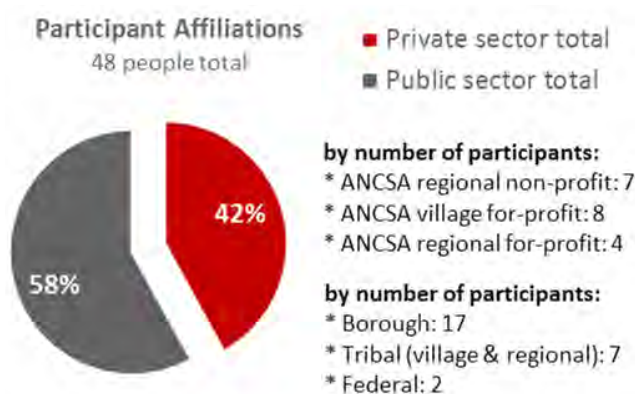
As stated above, the focal question for the project was “**What is required for healthy sustainable communities in Arctic Alaska by 2040?**” To address this question, NASP created a *participatory explorative scenario process* consisting of four stages: (1) gathering of information relevant for the problem at hand, (2) evaluation and synthesis of this information to develop raw scenarios, (3) review and revision to develop final scenarios, and (4) use of scenarios to develop monitoring indicators for social and environmental systems that matter to those people living in the Arctic.

NASP used a series of three workshops in Utqiagvik (formerly Barrow), Kotzebue, and Anchorage in 2015–2016 to bring experts from both boroughs together to share creative strategies for the next few decades so that those living in Arctic Alaska can maximize their ability to proactively shape their futures. Before, between, and after the workshops, NASP team members worked on multiple information-gathering and synthesis tasks. The final goal of the project included making all the steps in the process as transparent as possible.

Before the workshops: 2013-2015

Before we could hold the first workshop, we had two major tasks: connecting and communicating with participants to assure the best possible input and engagement, and information-gathering to provide the best possible background information. Our team did not want to seem as though we were inventing a new issue, nor did we want to leave out the work done by previous community members, researchers, and others also concerned with how to help rural communities thrive.

FIGURE 2: PARTICIPANT AFFILIATIONS



We spent about a year researching all the information we might need to make this project a success. This included gathering information on many of the topics described above, including resilience, participatory democracy, scenarios planning, and communities of practice. We wanted to learn from the successes and failures of other researchers and local participants engaged in similar projects locally and globally. The reports and articles that were read and incorporated are listed in the bibliography of this report.

We also gathered data to provide project participants with baseline information tied to the key components of the social-environmental system. In trying to

model the understanding of holistic and interconnected pieces we used a seven-system approach to the region focusing on the following sectors: health, biophysical, economic, education, communication, socio-political, and justice. Our intent was to use this information to augment personal and local knowledge provided by participants. A full list and discussion of all the resources used are included in the Comprehensive Data Package made available to participants and their organizations.

The participants

During this time, we also gathered names and information related to potential participants. As described above, the goal was to be balanced and inclusive. For scenarios work a group of 20-30 participants for each workshop is the goal. Information included in the project brochures, included at the end of this report, was a recruiting tool and summarized the project for potential participants.

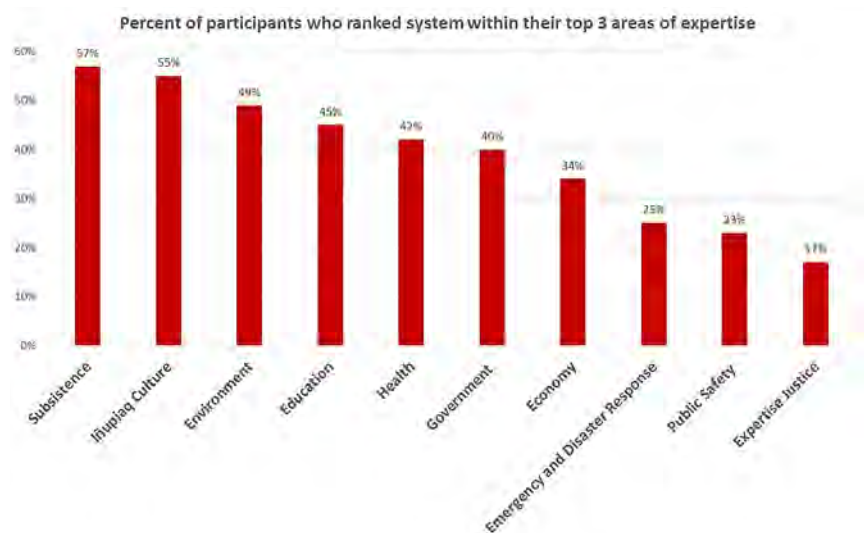
Participants came from the public and private sectors as noted above in Figure 2. Participants took part in one, two, or three of the workshops. Most participants also completed surveys relating to particular questions posed as part of the project. The participants were surveyed before and after each workshop.

In total, out of 52 participants, we had 47 useable surveys completed over the course of 3 workshops in 12 months from February 2015—February 2016.

We had 33 participants in Utqiagvik with 29 completed surveys, 25 participants in Kotzebue with 24 surveys, and 18 participants in Anchorage with all 18 surveyed. In sum, there were 30 one-time participants, 17 two-time participants, and 4 three-time participants.

Participants were asked about their own areas of expertise in the seven sectors. Responses are summarized in Figure 3.

FIGURE 3: PARTICIPANTS' ASSESSMENT OF THEIR OWN AREAS OF EXPERTISE



What kinds of change did we examine?

In the Arctic, climate change, economic change, and social change are all already occurring. These different types of changes are tightly linked (Chapin, 2006; Berkes and Folke 1998), based on how people in Arctic Alaska interact with their natural surroundings.

Climate change is complex. The poles are warming more rapidly than any other place on earth, and the Arctic is now warmer than any time since the start of the last century (Serreze and Stroeve 2015). Evidence suggests that in addition to warming there are other changes occurring, such as increased precipitation (often not as snow), drying on the tundra, degraded permafrost zones, decrease in snow cover, diminishing sea ice, warming of the Arctic Ocean, and increased storminess (AMAP, 2011b and AMAP 2012, IPCC, 2013; USGCRP, 2014). In short, people living in the Arctic are experiencing rapid changes for which there is no applicable recorded or remembered history (Lovecraft and Eicken 2011).

Social and economic changes across the Arctic are tied to global trends and boom-bust cycles of the mining, oil, and gas industries. The general population trend is slow growth overall, with increases in cities and decreases in smaller rural communities. Most of rural Alaska and a majority of its Indigenous inhabitants operate in a mixed-subsistence economy. (Usher et al. 2003, Trainor et al. 2007, Loring and Gerlach 2009, Fazzino and Loring 2009).

THE FIRST WORKSHOP

Workshop structure

The first workshop took place in Utqiagvik, Alaska February 18-20, 2015. Our team provided the process (Figure 4), but the discussions, debates, and data production, were driven by the participants.

NASP team members started by providing participants with a summary of the workshop agenda and key concepts. Team members then presented baseline information on the region of the Northwest Arctic and North Slope Boroughs based on published data, published articles, and reports produced by communities, agencies, and other entities. This data was compiled into a lengthy Briefing Book. It is a part of the Comprehensive Data Package. The Briefing Book covered a wide range of topics that might potentially affect community wellbeing and resilience, including human health, the natural environment, economics, education, communication, politics, and justice. Each of these topics was further broken down into sub-topics.

Participants brainstorm

While the baseline information was extensive, participants' knowledge, questions, and concerns were at the heart of the process. Thus, the Briefing Book was merely a starting point to help trigger the conversations and information sharing that took up the bulk of the workshop.

Over the course of two days, the NASP team worked with the participating resident experts to think about the important "key factors" driving change. What changes were likely to affect the community most? The discussions started with the focal question, and participants first identified how to define "sustainable communities" -- as well as to define their expectations (Figure 5, on next page).

Participants took part in small-group discussions that were in-depth and detailed. Each participant had the opportunity to share their knowledge of the past and the present, and to offer thoughts, knowledge, and ideas about ongoing and future change (Figure 6, on next page). This discussion continued into the exploration of possible futures, both desirable and undesirable. Throughout the workshop, ideas were captured on flip-charts (Figure 6) and shared with the group. More than forty such pages were generated and shared --they are included in the Comprehensive Data Package made available to participants and their organizations.

FIGURE 4: THE PARTICIPATORY PROCESS USED IN WORKSHOP ONE, AS OUTLINED IN THE WORKSHOP

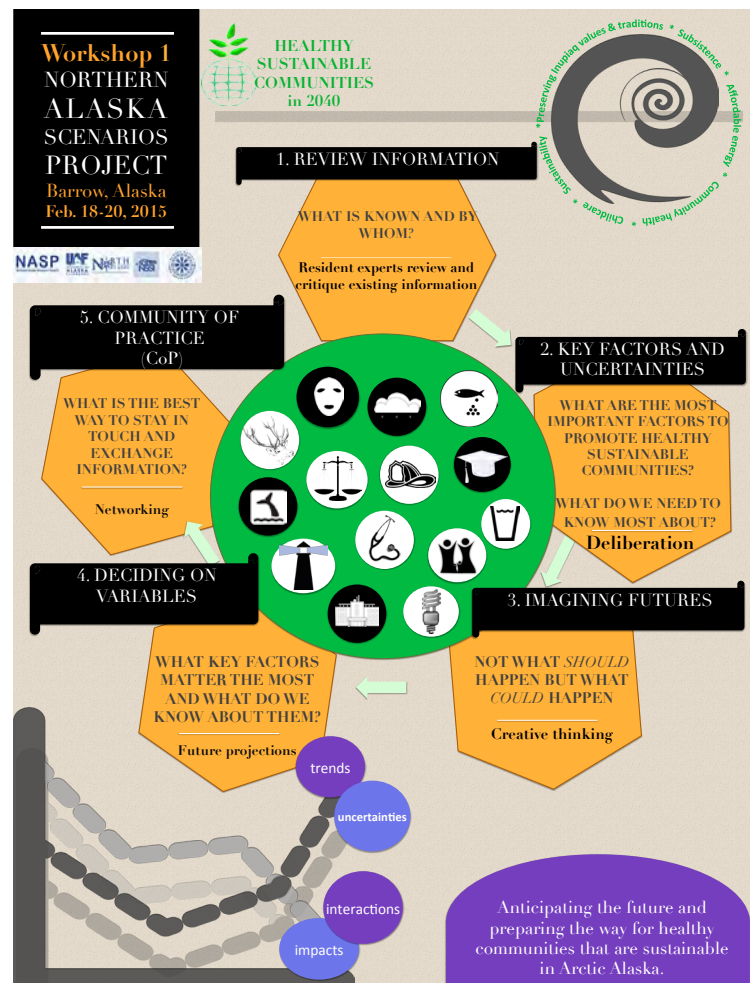
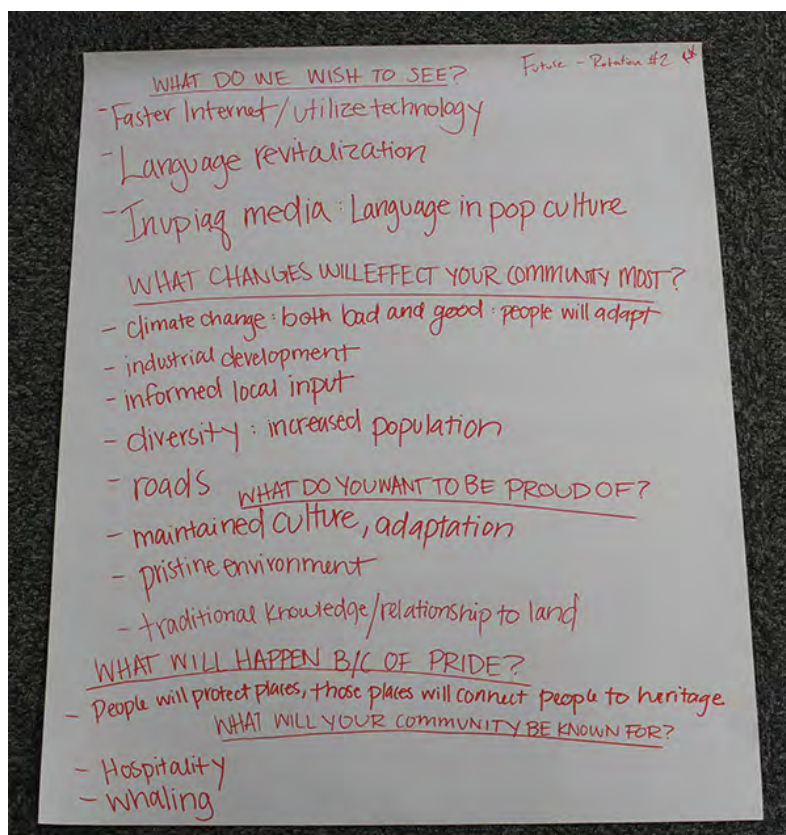


FIGURE 5: PARTICIPANT INPUT FROM WORKSHOP ONE, DAY ONE



FIGURE 6: IDEAS WERE GATHERED FROM ALL PARTICIPANTS THROUGHOUT THE WORKSHOP



Economics, globalization, climate change, tourism, and development all came to the forefront, as did the cost of transportation, borough tax revenue, and diversified economies. Management of subsistence resources was also identified as a potential key factor, with self-regulation or co-management specified as important to governance and well-being. Climate-linked key factors were coastal erosion (rivers and oceans) and flooding; access to subsistence resources altered by changes in seasonal cycles; invasive species; permafrost degradation and impacts on infrastructure; and changes in snow cover and freshwater availability. Culturally, the discussion honed in on the importance of community unity; the strength of Indigenous culture as represented by Inupiaq values, language, and Indigenous knowledge; and the role of effective planning at the community level that leads to real action.

FIGURE 7: KEY FACTORS IDENTIFIED IN WORKSHOP ONE

GOVT + PVR SERVICES
 LOCAL → STATE/FEDERAL DISCONNECT
 EDUCATION ABOUT GOVT LACKING
 INTERRELATION
 SERVICES PROVIDED NOT MEETING
 NEEDS AND INCREASE FUNDING
 INDIGENOUS GOVERNANCE
 TRADITIONAL WAYS OF LIVING
 - MASSIVE FLEXIBILITY IN GOV
 TRADITIONAL GOVT EDUCATION
 ECONOMICS + ENERGY
 SUBSIDIZED ECONOMY - VALUATION
 VALUE LEAVING THE REGION
 RESOURCES + JOBS
 OUTSIDE INTERESTS → ORIENTATION - MATERIAL
 OUTSIDE REGULATIONS
 PARADOX BETW. SUBSIDIZED + ECON. DEV.
 GREAT DIFFERENCE BETW. COMMUNITIES
 NEW SOURCES OF REVENUE

HEALTH
 SAFETY OF WOMEN + CHILDREN
 HEALTH DISPARITIES
 HEALTH OF SUBSIDIZED RESOURCES
 + ACTIVITIES
 AFFORDABLE, ACCESSIBLE HEALTHCARE
 - MENTAL HEALTH - ACTIVITIES
 BETTER CONNECTIVITY
 WATER/SEWER + AIR QUALITY
EDUCATION
 BALANCE BETW. WESTERN + TRADITIONAL
 WAYS OF LEARNING + CONTENT
 PREPARE STUDENTS FOR AFTER HIGH SCHOOL
 PRIORARE GRADUATES - SUCCESSFUL
 VARIETY + FLEXIBILITY

JUSTICE
 INDIGENOUS TRIBAL COURTS (ABSENT)
 ALCOHOL/DRUGS ROT OF JUSTICE ISSUES
 SUBSIDIZED AND RIGHTS (ABSENT)
 ENV. JUSTICE
 ENFORCEMENT CHALLENGE
 FEEDBACK LOOP W/ INVESTMENT
 - \$ FOR REHAB
NATURAL ENVIRONMENT
 CONNECTED TO OTHER ISSUES
 ATTRIBUTION OF CHANGE POSSIBLE
 SUBSIDIZED RESOURCES
 - SELF-REGULATION → CHANGING CLIMATE
 UNCERTAINTY IN CLIMATE MODELS
 - ABILITY TO MAKE DECISIONS
 URBAN ISLANDS - DUST

Small groups discussed key issues, and then reported back to the larger group with their thoughts and findings. Topics included justice, the natural environment, health, education, government and public services, and energy and economies (Figure 7).

Participants delved into important questions about the past, present, and future. With regard to the histories of their communities, they thought about what they would bring from the past to 2040, what important leadership lessons contribute to health and sustainability, what cultural values and practices have helped to build community, what have the biggest challenges been, and what have been the most important decisions? Regarding the present, participants discussed what they appreciate most and see as the biggest assets in their communities. They also outlined the biggest current challenges, and responses to change, both good and bad. In thinking about the future, the questions posed included, "What changes will affect your community most?" and "What do you wish you could see in your community"? In order to visualize a better future, participants challenged themselves to think about what they imagine being most proud of in 2040, and what their community might best be known for by that time. But, it is important to remember that the goal of the scenarios process is not to develop a list of what one wants for the region, even though that was discussed. The goal was to narrow down a long list to the core components participants thought mattered most to community success or failure to thrive in decades to come. That list represents the first step in developing the Key Factors.

As participants collected ideas about what Key Factors were most important, they discussed and voted upon draft versions of what ultimately became the final Key Factors list. In selecting Key Factors, these discussions of importance centered around identifying which issues or choices would have the greatest impact on community members. While issues that did not receive many votes might still be included, this thought process helped to exclude potential factors that participants agreed truly would not have a substantial impact on future well-being.

What did the participants think we should pay attention to on the road to 2040?

While the goal of the project was to think through key components and to envision and describe multiple possible futures, rather than to select and plan for any one particular future, participants inevitably had strong opinions about which futures were more desirable than others. Rather than sideline or discount these thoughts, project leaders and participants made time to discuss and summarize these priorities. The intent of this analysis was to foster an eventual link between the scenarios planning process, and the more concrete planning processes that will hopefully reference this project in the future. Defining preferred futures also helped participants to clarify among themselves the difference between what is most likely and what is most desirable.

When participants did describe what they would most like to see in their communities, and what they would feel proudest about in the future some of the ideas expressed included:

- Everyone speaking fluent Iñupiaq
- Respect for women (greater safety, greatly reduced incidence of rape and domestic violence, and equality in community building roles)
- Positive economic development – although “it’s not all about money”
- Strong Iñupiaq values
- Local people having excellent education and skills, and good jobs
- Local people in leadership roles, and local sovereignty
- Strong subsistence values, traditions, and skills
- Respect of nature, known for local culture

TABLE 1: IMPORTANCE ASSIGNED TO A DRAFT VERSION OF THE KEY FACTORS LIST EARLY IN THE NASP PROCESS. PARTICIPANTS WERE GIVEN 3 VOTES.

Votes	Key Factor
12	Pathways/Access to Higher Education + Workforce Dev/Career Readiness
10	Wellness
8	Iñupiaq Values
7	Place-based/Culturally sensitive education
7	Local Determination
7	Economy - Jobs, Reduce barriers to businesses, etc.
6	Subsistence Resource Management (Food Security)
6	Physical Infrastructure (intermodal transportation, water/sewer and telecommunications)
6	Cost of Living
6	Tribal Governance (and Sovereignty)
5	Sustainable Energy
5	Transmission and Recognition of Traditional Knowledge
4	Participation in Regulatory Process
4	Access to Quality Physical and Mental Health Care
3	Pan-Arctic Collaboration
3	Housing
2	Land Management and Ownership
2	Interaction of Levels of Government
2	(Impact of and Adaptation to) Climate Change
2	Language Proficiency
1	Intergenerational (and Cross-Cultural) Engagement
0	Demographics

Between workshops one and two

The information gathered in the Utqiagvik workshop was collated and distilled prior to the second workshop. The goal was to organize the information, flesh out all pertinent details, draw upon the wealth of information available in the academic literature and in the knowledge bases of other researchers, and write up everything in a form that could be easily shared with all participants for discussion at the next workshop. Most significantly, each possible Key Factor had to have 3-5 different Future Projections. While we know that climate change is a Key Factor to future thriving communities, we also need to be able to evaluate the “what ifs.”

First, the NASP team extensively researched the key factors identified by participants in Workshop One. This research included discussion among experts from different academic fields, followed by full literature review across multiple disciplines. The goal was to reflect the importance and meaning of the Key Factors based on the participants' deliberations. Secondly, each Key Factor had to have several possible future states by 2040. We often explain it this way: imagine you are standing in a room that is NOW. In front of you are many doors and each door is a FUTURE. Any one door you open and walk through is a future that will have a mix of the Key Factors. Each door represents a different mixture. So, if climate change is a Key Factor, we have to think about what possible future projections of climate change there may be. Will 2040 be hotter? Drier? Colder? Wetter? Will subsistence management by government be more restrictive? Less restrictive? Will it rely more on Indigenous Knowledge? Will Alaska Natives and others living in the Arctic face higher costs to feed their families? When we consider that each Key Factor has multiple Future Projections we realize how complicated the future can be and why it is important to decide with each another what really matters for future planning.

Each Key Factor and subsequent Future Projections for that key factor were clearly defined in draft form. The final version is included in Appendix B. As a draft it was intended for review by our experts between workshops and was formally reviewed during the second workshop. Participant feedback ultimately shaped the final version in terms of not only content but also wording and order. For example, even though the order of the Key Factors does not technically matter to their evaluation, participants thought that Inupiaq Values be listed first because of their importance to the region.

As this research progressed, NASP team members checked back with workshop participants as well as their records of the workshop to make sure that the overall direction and focus matched with what participants had expressed. The goal was to create a draft that would be not only rich in information and cover as many plausible future scenarios as possible for each key factor, but which would also be legitimate from the perspectives of all involved.

THE SECOND WORKSHOP

Format and content

The second workshop (Figure 8, next page) took place in Kotzebue, July 8-10, 2015. As in the first workshop, participants were provided with a Participant Booklet outlining the agenda and other basic information. In addition, they received a Key Factor Booklet, which was a draft summary of the Key Factors and their Future Projections as identified in Workshop One.

Participation

Although participation in the NASP workshops was financially costless, thanks to the generous structure of the NSF funding, location and timing still made it more difficult for some people to participate than others. Thus, although many participants were able to take part throughout the process, not all individuals were at all workshops. On the other hand, the addition of new participants provided fresh perspectives. Those who had missed earlier events were brought up to speed with background materials.

Activities and outcomes

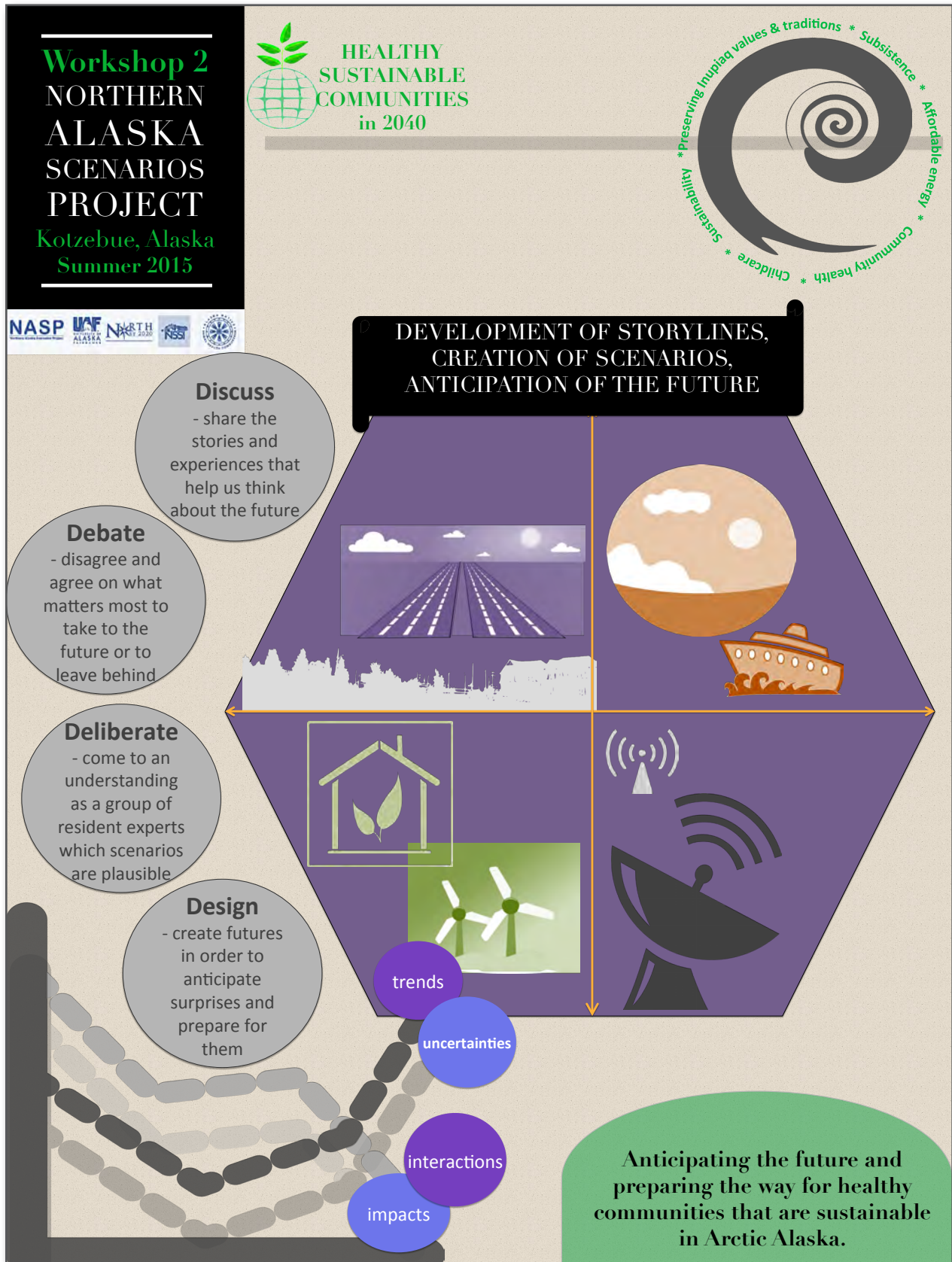
Participants first revisited the central question, **“What is needed for healthy sustainable communities by 2040?”** and collectively generated ideas about what this might mean, now and in the future. This served as a refresher for those who had participated in Workshop One, and brought on board those who had not.

Finalizing the Key Factors and Future Projections

Next, the group went through the draft Key Factors and Future Projections agreed upon in workshop one, and identified gaps, errors, and omissions. At this stage, participants offered advice and made some changes with respect to wording and emphasis. For example, the language used to describe subsistence activities was altered based on feedback. One of the most striking changes was based on the Key Factor of Access to Education between workshops 1 and 2. There was a decision by participants to add access to economic markets resulting in the final list of 21 Key Factors, each with 3-5 Future Projections. Below is the finalized list.

- Inupiaq Values
- Land Management and Ownership
- Subsistence Resource Management (Security)
- Sustainable Energy
- Regulatory Process
- Interaction of Levels of Government
- Substance Abuse and Related Crime
- Intersectional Engagement
- Preparation of Teachers and School Administrators
- Climate Change
- Access to Quality Health Care
- Transmission and Recognition of Traditional Knowledge
- Demographics
- Cost of Living
- Pan-Arctic Collaboration
- Tribal Governance
- Housing
- Local Determination
- Language Proficiency
- Local Access to Education for College, Career, and Livelihood Readiness
- Access to Markets

FIGURE 8: THE PARTICIPATION PROCESS USED IN WORKSHOP TWO, AS OUTLINED IN THE POSTER



Determining indicators

How can we determine which path we are on? How do we know anything about the status or health of our key factors? Workshop Two participants worked together to discuss, debate, and create lists of indicators -- measurable signs of progress toward particular outcomes -- for sets of related key factors.

Sub-groups each worked on two indicators, using local knowledge and group brainstorming to pin down which factors might be most important in measuring each pair. As part of this process, the sub-groups created narrative scenarios about the future, based on just the two factors under discussion. This was facilitated by creating quadrants with four possible futures, representing the full range for the two key factors chosen by participants.

The group brainstormed what to monitor and how to track future outcomes in ways that were meaningful and useful to them. These Indicators are listed below.

FIGURE 9: SMALL GROUP DISCUSSION AND BRAINSTORMING AT WORKSHOP TWO

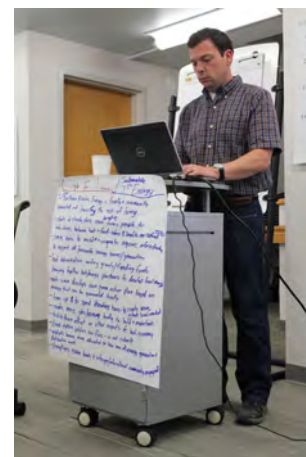


Access to Higher Education and Demographics

1. Proportion (%) of skilled labor jobs filled by locals
2. Proportion (%) of local applicants for available jobs vs. percentage hired
3. Proportion of local jobs reflecting local education and skill development opportunities
4. Enrollment in/certificates for academic or training programs
5. Recruitment retention and completion leading toward employability
6. Number of partnerships engaged
7. Cost/affordability of programs

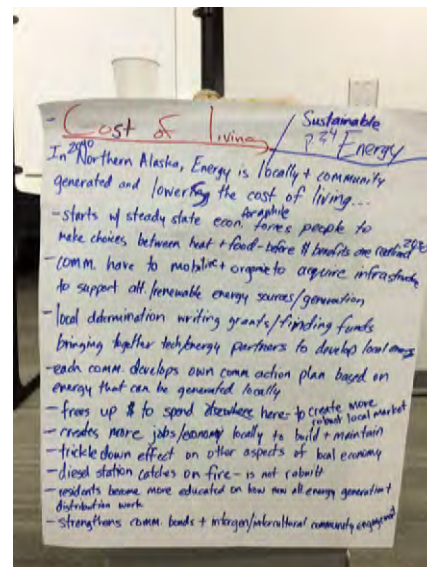
Sustainable Energy and Cost of Living

1. Number of successful energy projects in Arctic environments
2. Number or proportion of households behind on energy/utilities payments
3. National or global action on carbon (greenhouse gases)
4. Energy poverty, i.e., proportion (%) of household budget spent on energy
5. Increase in costs of current household energy supply systems
6. Capacity/functionality of community organizations
7. Number of years of functional governance
8. Current infrastructure maintenance track record
9. Emerging energy technologies (cost reduction, suited to Arctic environment)
10. Proportion of diesel use displaced in communities
11. Frequency of updates of community plans & number of different individuals providing scoping comments on plans



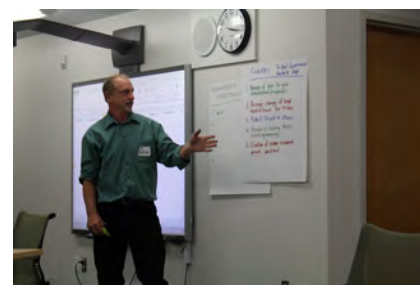
Iñupiaq Values and Intergenerational Engagement

1. Voter registration numbers and increase in voter turnout
2. Number of intergenerational community celebrations per year
3. More community involvement in organizational meetings by different age groups
4. Number of students learning Iñupiaq language
5. Number of people that can say they strongly live by Iñupiaq values
6. Number of artists
7. Proportion of population (%) who believe their culture is healthy
8. Access to cultural resources included in activities
9. Proportion (%) of subsistence harvest shared
10. Implementation of local practices into state/national programs
11. Leave policy



Tribal Governance and Pan-Arctic Collaboration

1. Number of government-to-government consultations/responses
2. Acreage change of land held in trust for tribes
3. Ratio of Iñupiat to others
4. Number of binding Arctic Council agreements
5. Fraction of science research permits declined



Subsistence Resource Management and Transmission and Recognition of Traditional Knowledge

1. Number of collaborations and alliances at the local scale
2. Number of newspaper articles covering subsistence resource management
3. Retention of highly educated residents of the Borough
4. Number of cross-borough meetings and communications
5. Number of co-management agreements that involve law enforcement
6. Number of people interested in serving on borough subsistence advisory board
7. Federal and state agency staffing levels in rural communities
8. Number of young people engaged in subsistence activities
9. Voluntary reductions in bag limits

The goal of this brainstorming, and why we include these lists here, is to generate ways community members and organizations, as well as scientists and others who conduct research in the region, to focus on what matters to communities through indicators of changes in the Key Factors. Creating ways to track changes that make sense to those who live in Arctic Alaska could mean better attention paid to changes over time and the ability to steer communities through difficult times without having to rely on expensive equipment or outsiders on a regular basis. Through 2017 the NASP team has continued to work on developing Indicators, based on the discussions and results of the workshops, to return to the communities.

BETWEEN WORKSHOPS TWO AND THREE

What was the role of computers in the process?

This project used a modeling software package called ScenLab, which was originally developed by Marc Mueller-Stoffels, one of the NASP team members, and his colleague Erik Gauger from the University of Edinburgh. ScenLab offers a mathematical approach to determining, based on expert input, which combinations of Future Projections of the Key Factors are likely to occur in the same future. Think back to the example of the doors earlier. Not all futures we imagine are consistent and plausible. For example, one cannot have a future with maximum resource development and pristine oceans. While each is a plausible future - we can think about how maximum resource development might happen and we can imagine pristine oceans - they are inconsistent to one another because they cannot exist in the same future. On the other hand, some resource development and an environment that sustains a rich diversity of species is likely consistent because such a future state can exist. There are so many possible combinations of futures that determining which combinations are most consistent and plausible - that is, most robust overall -- requires the help of a computer. The computer software does not make any decisions. It simply helps us manage the trillions of bits of data generated.

Participation in this stage

Workshop participants were all invited to participate in this stage in the process (and to be paid for their time), but the process for any one person involved about 40 hours of relatively tedious analysis and computer time, and there were no takers. Thus, the NASP leadership team took on the task of evaluating the participant-vetted future projections with regard to how plausible they were and whether they were consistent with each other.

The eight-member research team represented diverse backgrounds and knowledge bases (Geography, Geophysics, Biology, Natural Resources Management, Energy Systems, Political Science, Cross-Cultural Studies). All have experience in Alaska and with Indigenous peoples and social-environmental system thinking. During the review and analysis of the Key Factors, Future Projections, and resulting futures, they attempted to bring to bear not only their own expertise, but also the expertise, advice, and insights gained from participants during the workshops.

Scoring: what scenarios are plausible for each key factor?

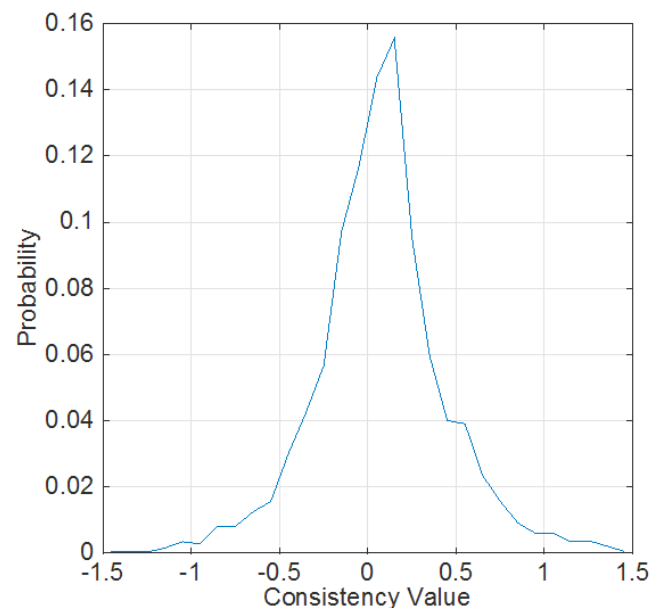
Although the Future Projections described for each scenario were (by definition) plausible, some were clearly more likely than others. For example, scorers agreed that with regard to the Climate Change key factor, it is more likely that climate conditions will become warmer and wetter than climate change being put on hold. Scorers used background information, expert opinion, and local knowledge from the workshops to estimate the probability of each of the 3, 4, or 5 futures described for each key factor. No future was assigned a plausibility of less than 5%, and the plausibility scores for all the futures for any given factor had to add up to 1.0 (100%). A specific category of complex risks are those perceived as 'black swans' or 'wild cards', which pose a particular challenge for risk assessment and management because such futures are not necessarily expected or considered likely. However, most scenarios analyses, like this one, focused on more likely futures. To lessen any individual bias, scores from all the team members were averaged, although agreement among scores was already high.

Scoring: what combinations of key factors are consistent?

Key factors are linked in complex ways. How does access to higher education affect demographics? How does intersectional engagement affect language proficiency? Analysis involved numerically scoring all possible Key Factor pairs for every possible future projection of each Key Factor. With 21 Key Factors and between 3 and 5 distinct Future Projections for each one, the number of pairings to score was enormous: 3195 in all. **This is why the power of communities to think through scenarios about what matters to them if so important.** If we can understand that some Key Factors for our communities have a small effect on other Key Factors we can plan policy for each fairly independently. For example, cost of living has less of an effect on language revitalization than K-12 teacher preparation. So, those Key Factors that are more related to one another, more consistent, such as cost of living and affordable housing or participation in the regulatory process and subsistence security should have related indicators and planning for those policy areas should happen together when possible.

NASP team members assigned every pairing of every Future Projection from every Key Factor a value ranging from -2 (completely inconsistent, and thus extremely unlikely to co-occur) to +2 (completely consistent, and thus extremely likely to co-occur), with a value of zero being considered neutral (factors don't affect one another one way or the other). As can be seen in Figure 10, many pairings were neutral, with a consistency value of zero, but others were given positive or negative values, judged to the best of each scorer's ability, based on all background information, expert opinion, and local knowledge gleaned during the workshops. For example, in a future in which Iñupiaq Values are stronger, it is more likely that language proficiency has increased rather than decreased. Similarly, greater local determination in governing natural resources would be unlikely if there were a decrease in participation in regulatory processes.

FIGURE 10: FREQUENCY OF CONSISTENCY VALUES FOR ALL PAIRINGS OF KEY FACTOR FUTURES



What did the ScenLab computer program do with all these numbers?

These scores were combined within the model in order to create overall possible futures with associated probabilities. Patterns emerged that spelled out distinct future pathways.

First, the model assessed all possible combinations of futures for all Key Factors in terms of plausibility. Highly plausible futures for each key factor received higher scores; thus, the hypothetical “Most Plausible” overall future included all key factor futures that received the highest plausibility scores, when viewed independently.

However, this “most plausible” future is not necessarily internally consistent, given that Key Factors are not actually entirely independent of one another. Thus, the model also assessed consistency. Every possible combination of Key Factor Future Projections had a consistency score, based on the evaluations for every

Finally, plausibility and consistency were mathematically combined into one score for “robustness.” “Robust” sets of factors scored highly in both consistency and plausibility. In other words, the “Most Robust” model output tells a story about a future that is both internally consistent and reasonably likely in all its component parts. In this first iteration, plausibility and consistency were given equal weighting in determining robustness.

The final model results from ScenLab can be viewed in Figure 12, Figure 13, and Figure 14. In each graphic, the highest-scoring combination is represented by a red line. The red line passes through the Future Projections that are indicated in either the Robust, Consistent, or Plausible future. This is discussed fully in a few pages. Note that the results for robustness, Figure 14, represent a weighted output designed to reflect both consistency and plausibility. Initial outputs for robustness yielded outputs that were almost identical to the scenarios that scored highest for plausibility. This suggested that the initial mathematical weighting of consistency and plausibility did not work particularly well, an issue that was discussed at Workshop Three, and adjusted later in order to create the final results shown in this report.

FIGURE 12: THE MOST CONSISTENT SCENARIOS, AS SCORED IN SCENLAB. THE RED LINE CONNECTS THE MOST INTERNALLY CONSISTENT KEY FACTOR FUTURES, WITHOUT TAKING INTO ACCOUNT THEIR INDEPENDENT LIKELIHOOD (PLAUSIBILITY).

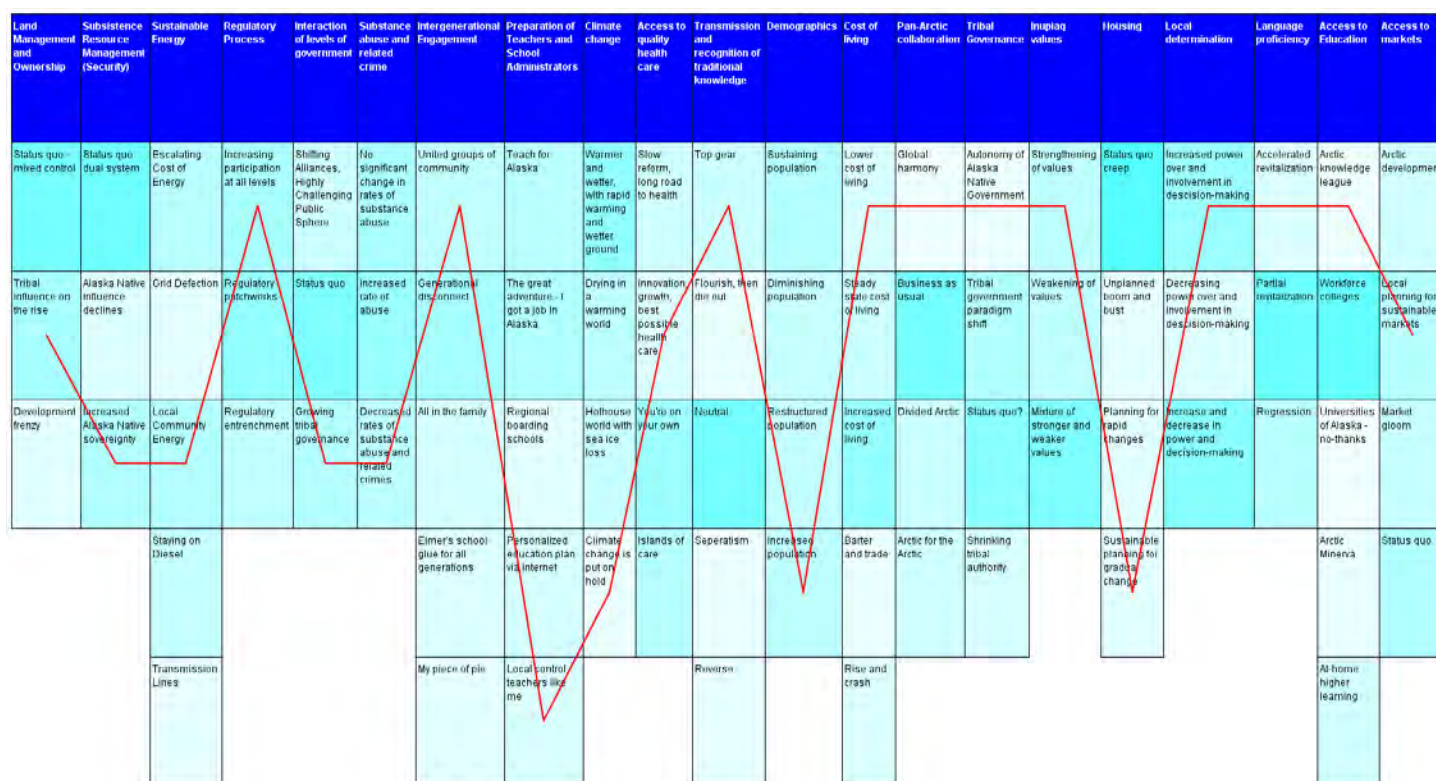


FIGURE 13: THE RED LINE CONNECTS THE FUTURE THAT WAS CONSIDERED INDEPENDENTLY MOST LIKELY (HIGHEST PLAUSIBILITY) FOR EACH KEY FACTOR, WITHOUT TAKING INTO ACCOUNT INTERNAL CONSISTENCY.

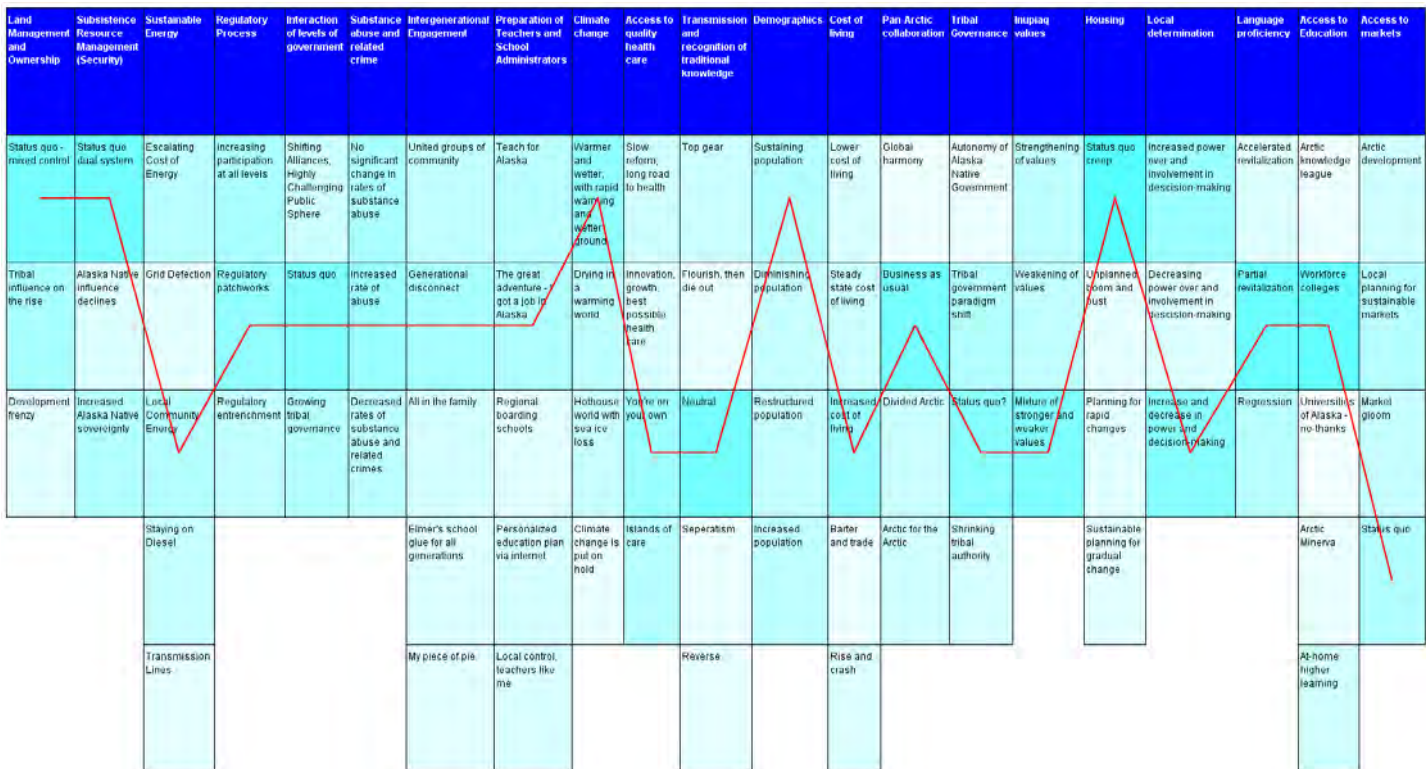
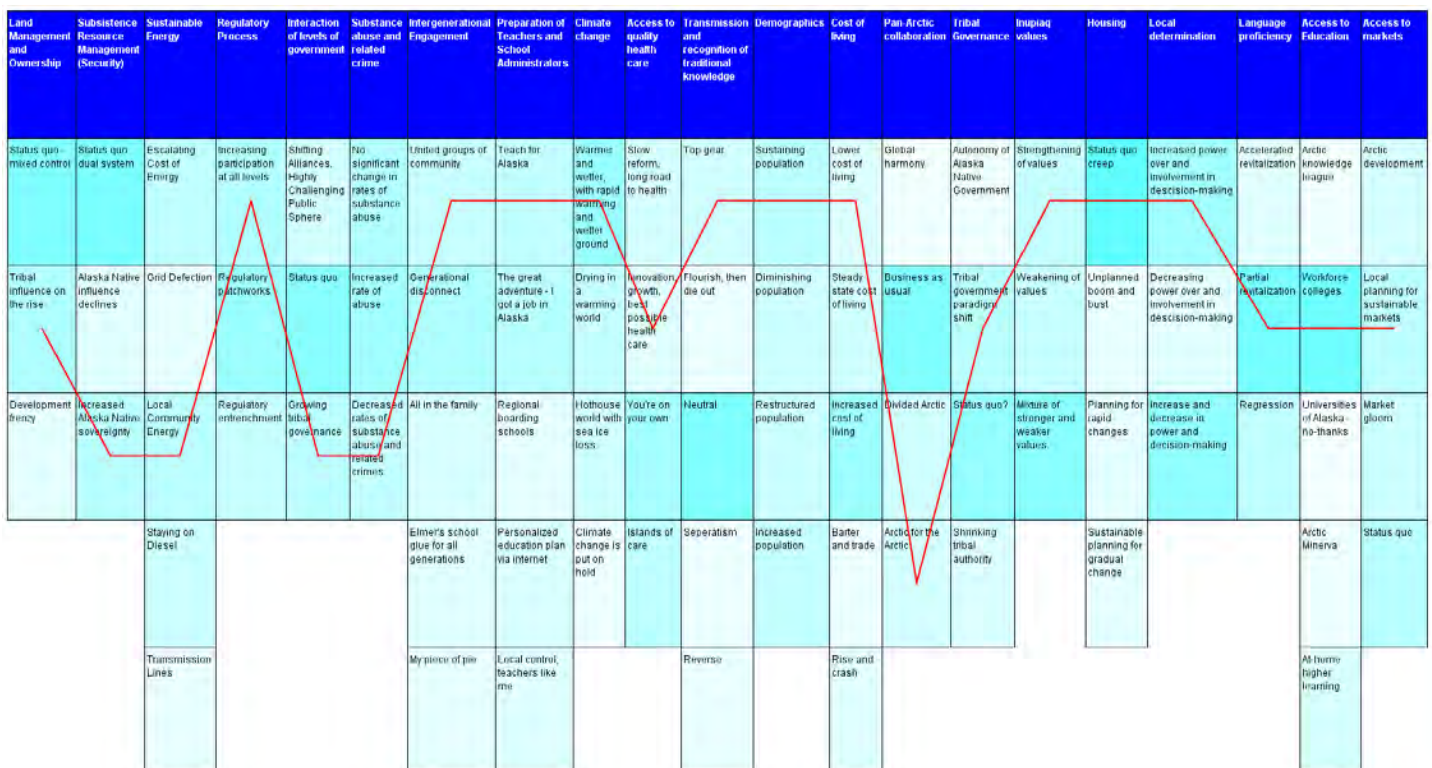


FIGURE 14: IN THE FIRST ITERATION, THE MATHEMATICAL WEIGHTING OF CONSISTENCY AND PLAUSIBILITY CREATED ROBUSTNESS RESULTS ALMOST IDENTICAL TO PLAUSIBILITY RESULTS. THIS WAS LATER MODIFIED TO GIVE MORE WEIGHT TO CONSISTENCY, AS SHOWN HERE IN THE FINAL RESULT.



THE THIRD WORKSHOP

Reporting back again

The final workshop was held in Anchorage in February 2017 in conjunction with the Alaska Forum on the Environment. At this workshop, the NASP team brought back preliminary scenarios to resident experts for ground-truthing. Team members reviewed the scenarios with participants, and participants discussed and further refined the products.

Re-scoring plausibility

Participants revisited the idea of plausibility, and re-scored the plausibility of futures associated with each key factor (Figure 15). Each participant was given three votes at this stage in the process. These plausibility scores were averaged with those of the NASP team, and were used in final runs of ScenLab.

Plausibility versus desirability

As already discussed, just because a future scenario is likely does not mean that anyone wants it to occur. Although the goal of the NASP project was to define consistent, plausible, and robust futures, participants found it valuable to discuss which robust futures might also be desirable. Participants brainstormed more about which futures – that is, which sets of key factor futures, and which overall futures – were not only reasonably robust, but also matched with the lived realities and desired futures of rural communities across Arctic Alaska.

The most desirable futures were deemed to include elements of strong self-determination, with local control, Iñupiaq Values, and effective collaboration (Table 2, next page). These elements tended to be highly internally consistent within ScenLab, as scored by the NASP team. Thus, the most consistent scenarios in ScenLab were seen as desirable. However, these scenarios were not among the highest-scoring for plausibility, and thus not scored as most robust overall.

FIGURE 15: WORKSHOP THREE RESCORING OF PLAUSIBILITY OF FUTURE SCENARIOS FOR EACH KEY FACTOR. Color shading indicates previously scored plausibility. Participants in workshop three voted by placing dots.



TABLE 2: DESIRABILITY AND PLAUSIBILITY OF EVERY FUTURE ASSOCIATED WITH EVERY KEY FACTOR

Key Factor Name	Future Projections	Plausible (#Votes)	Plausible (Score)	NASP Team scores	Adjusted scores	Desirable (#Votes)	Desirable (Score)
Land Management and Ownership	Status quo - mixed control	9	0.60	0.483	0.54	0	0.00
	Tribal influence on the rise	5	0.33	0.35	0.34	14	0.88
	Development frenzy	1	0.07	0.17	0.12	2	0.13
Subsistence Resource Management	Status quo dual system	9	0.69	0.43	0.56	4	0.20
	Alaska Native influence declines	1	0.08	0.20	0.14	0	0.00
	Increased Alaska Native sovereignty	3	0.23	0.38	0.30	16	0.80
Sustainable Energy	Escalating Cost of Energy	6	0.32	0.24	0.28	0	0.00
	Grid Defection	1	0.05	0.16	0.11	0	0.00
	Local Community Energy	6	0.32	0.28	0.30	11	0.92
	Staying on Diesel	4	0.21	0.24	0.23	0	0.00
	Transmission Lines	2	0.11	0.09	0.10	1	0.08
Regulatory Process	Increasing participation at all levels	6	0.40	0.27	0.33	11	0.92
	Regulatory patchworks	5	0.33	0.52	0.42	1	0.08
	Regulatory entrenchment	4	0.27	0.22	0.24	0	0.00
Interaction of Levels of Government	Shifting Alliances, Highly Challenging Public Sphere	2	0.17	0.25	0.21	0	0.00
	Status Quo	7	0.58	0.42	0.50	1	0.07
	Growing Tribal Governance	3	0.25	0.34	0.29	13	0.93
Substance Abuse and Related Crime	No significant change in rates of substance abuse	5	0.31	0.36	0.34	0	0.00
	Increased rates of abuse	9	0.56	0.24	0.40	0	0.00
	Decreased rates of substance abuse and related crimes	2	0.13	0.40	0.26	13	1.00
Intergenerational Engagement	United groups of community	4	0.29	0.20	0.24	12	0.86
	Generational disconnect	7	0.50	0.19	0.35	0	0.00
	All in the family	1	0.07	0.27	0.17	0	0.00
	Elmer's school glue for all generations	1	0.07	0.20	0.14	0	0.00
	My piece of pie	1	0.07	0.15	0.11	2	0.14
Preparation of Teachers and School Administrators	Teach for Alaska	5	0.31	0.23	0.27	1	0.06
	The great Adventure - I got a job in Alaska	5	0.31	0.30	0.31	1	0.06
	Regional boarding schools	1	0.06	0.17	0.11	3	0.17
	Personalized education plan via internet	2	0.13	0.20	0.16	0	0.00
	Local control, teachers like me	3	0.19	0.11	0.15	13	0.72
Climate Change	Warmer and wetter, with rapid warming and wetter ground.	9	0.53	0.34	0.43	0	0.00
	Drying in a warming world	4	0.24	0.29	0.26	2	0.15
	Hothouse world with sea ice loss	3	0.18	0.27	0.22	0	0.00
	Climate change is put on hold	1	0.06	0.11	0.08	11	0.85
Access to Quality Health Care	Slow reform, long road to health	1	0.07	0.31	0.19	0	0.00
	Innovation, growth, best possible health care	1	0.07	0.22	0.15	13	0.93
	You're on your own	8	0.57	0.20	0.38	1	0.07
	Islands of care	4	0.29	0.28	0.28	0	0.00
Transmission and Recognition of Traditional Knowledge	Top Gear	3	0.20	0.21	0.20	13	0.93
	Flourish, then die out	0	0.00	0.17	0.09	0	0.00
	Neutral	11	0.73	0.35	0.54	1	0.07
	Seperatism	0	0.00	0.16	0.08	0	0.00
	Reverse	1	0.07	0.12	0.09	0	0.00
Demographics	Sustaining population	4	0.27	0.32	0.29	6	0.67
	Diminishing population	2	0.13	0.31	0.22	0	0.00
	Restructured population	4	0.27	0.20	0.23	2	0.22
	Increased population	5	0.33	0.18	0.25	1	0.11
Cost of Living	Lower cost of living	3	0.18	0.13	0.15	11	0.69
	Steady state cost of living	3	0.18	0.24	0.21	2	0.13
	Increased cost of living	9	0.53	0.31	0.42	0	0.00
	Barter and Trade	0	0.00	0.17	0.08	3	0.19
	Rise and Crash	2	0.12	0.16	0.14	0	0.00
Pan-Arctic Collaboration	Global harmony	0	0.00	0.13	0.07	9	0.60
	Business as usual	8	0.57	0.51	0.54	2	0.13
	Divided Arctic	3	0.21	0.20	0.21	0	0.00
	Arctic for the Arctic	3	0.21	0.17	0.19	4	0.27
Tribal Governance	Autonomy of Alaska Native Government	1	0.06	0.10	0.08	6	0.43
	Tribal Government Paradigm Shift	5	0.31	0.30	0.30	7	0.50
	Status Quo?	8	0.50	0.42	0.46	1	0.07
	Shrinking Tribal Authority	2	0.13	0.20	0.16	0	0.00
Inupiaq Values	Strengthening of values	3	0.21	0.30	0.25	14	0.88
	Weakening of values	3	0.21	0.27	0.24	0	0.00
	Mixture of stronger and weaker values	8	0.57	0.44	0.50	2	0.13
Housing	Status Quo Creep	12	0.92	0.41	0.66	0	0.00
	Unplanned boom and bust	0	0.00	0.21	0.10	0	0.00
	Planning for Rapid Changes	1	0.08	0.16	0.12	2	0.13
	Sustainable Planning for Gradual Change	0	0.00	0.23	0.12	13	0.87
Local Determination	Increased power over and involvement in decision-making	6	0.43	0.36	0.39	17	1.00
	Decreasing power over and involvement in decision-making	0	0.00	0.27	0.14	0	0.00
	Increase and decrease in power and decision-making	8	0.57	0.37	0.47	0	0.00
Language Proficiency	Accelerated revitalization	1	0.06	0.22	0.14	16	0.94
	Partial revitalization	11	0.69	0.48	0.58	1	0.06
	Regression	4	0.25	0.31	0.28	0	0.00
Access to Education	Arctic Knowledge League	0	0.00	0.15	0.07	9	0.64
	Workforce Colleges	11	0.85	0.37	0.61	3	0.21
	Universities of Alaska - No-thanks	0	0.00	0.11	0.06	0	0.00
	Arctic Minerva	0	0.00	0.17	0.08	1	0.07
	At-home higher learning	2	0.15	0.21	0.18	1	0.07
Access to Markets	Arctic Development	2	0.14	0.23	0.18	4	0.25
	Local Planning for Sustainable Markets	5	0.36	0.23	0.29	11	0.69
	Market Gloom	3	0.21	0.23	0.22	1	0.06
	Status Quo	4	0.29	0.32	0.30	0	0.00

Table 2 shows each key factor with the three to five Future Projections associated with it, as created by team members and participants. The numbers associated with each of these futures show their plausibility and desirability estimates by project participants and by NASP team members. The columns labeled “# Votes” refer to the actual number of plausibility and desirability votes given to each future scenario by participants in Workshop Three. The column labeled “NASP team scores” shows raw scores given by team members. Team Members did not vote on desirability, because they are not community members. Columns with adjusted scores show the same information, mathematically regularized so that the totals add up to 1.00 for each key factor.

Telling stories

Scenarios, as described in the introduction, are essentially stories of possible futures. Participants met in small groups (Figure 17) and created stories such as “Travis’ Travails” (Figure 16) to make the future more grounded and vivid. The goal of storytelling was twofold. From a research perspective it shifts the focus in a workshop to those telling the stories and away from the facilitators. We wanted participants to experience their possible futures as their own narrators to consider what could happen. Secondly, by telling stories about characters who may inhabit different future worlds, it explored how different resident experts and the NASP team might characterize the different Key Factors, Future Projections, and Indicators.

Strategizing about the future

From stories about “what if” to strategies about what to do if any one particular future arises, the participants further discussed the idea of indicators, as defined in Workshop Two. How can we tell if we are heading for a desirable future? In this context, they also considered the question of how communities can close the gap between what groups considered most plausible and most desirable. In other words, how can communities – each with their own characteristics – track the indicators of Key Factors to make adjustments towards desired outcomes?

FIGURE 16: TRAVIS’ TREVAILS STORY

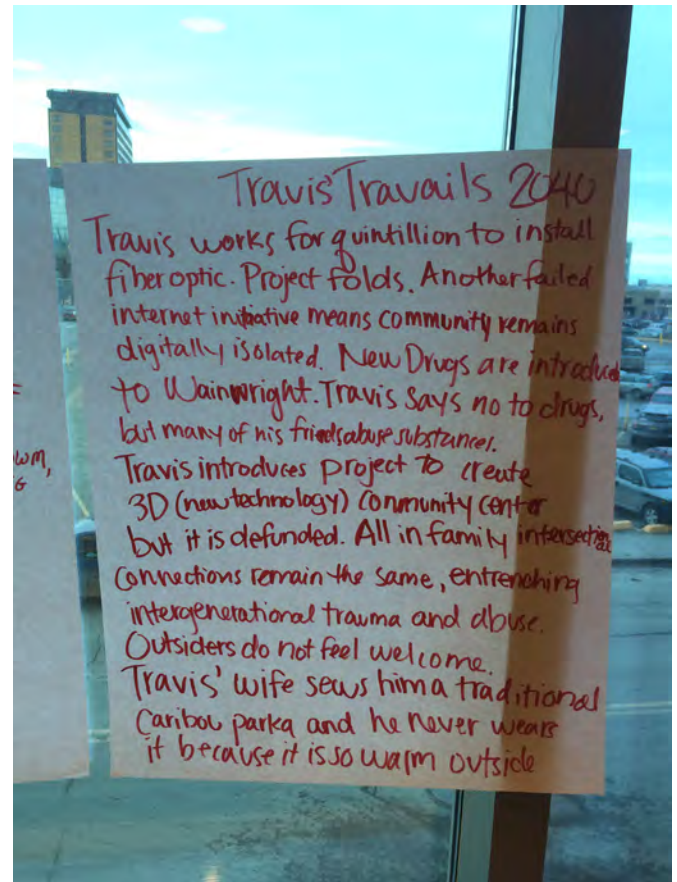


FIGURE 17: PARTICIPANTS IN WORKSHOP THREE TOOK PART IN SMALL GROUP DISCUSSIONS AND REPORTED BACK TO THE LARGER GROUP



Strategies that emerged focused on intersectional engagement, resources, influence, and decision-making. Participants suggested that control over decisions affecting communities should be based on individuals discussing and learning from one another, and that organizations should know how to attract community members to participate in meetings. It was noted that Native Corporations do not speak for entire communities, and that communities with trilateral agreements between city government, tribal government, and local Native Corporations (e.g., Wainwright, Kotzebue, and Point Lay) are more successful in intersectional engagement. It can be hard for people to allocate time to attend meetings, and that more resources are needed to ensure individual rather than merely corporate representation. Nor can regional corporations be used to change influence, because of low voter turnout. Social media was cited as an effective mechanism to get more engagement, because people who do not or cannot speak up in public meetings are able to voice their perspective. Participants agreed that decision-makers should have information about indicators, and that neutral parties are needed to keep track of indicators for other communities.

The Possible Futures of Arctic Alaska in 2040

We must remember, the future is never certain. Just ask anyone who predicts horse races, oil prices, or technology advancements. Our project focused on working with resident experts to provide the people of Arctic Alaska a clear window into what matters most to communities and how what matters may look in thirty years. Different people can tell different stories based on how they perceive these Key Factors to operate in their community, state, and region. This is a demonstration of the power of scenarios. The Key Factors can help people talk together about how to shape the future by making changes now. Scenarios let us consider what the world can look like and how we can take steps now to make it what we want it to be in 2040 and beyond. Below we provide narration for the most robust scenario. The most plausible and consistent results are reported as tables, but for space we do not tell their stories.

Robust Result (consistent + plausible) (Table 3)

It is most common when doing scenario analysis for robustness to weight the consistency and plausibility of Key Factors at 50%-50%. In other words, the robust outcome is made up of half consistency results and half plausibility results. You can see plausibility consistency in Table 4 and Table 5. The original “most robust” scenario is noted in Appendix C. However, given that a major goal of this project has been to provide insight into strategies for communities to develop their resilience over the coming decades, we used a measure of robustness that was weighted for 80% consistency and 20% plausibility. What does this mean? It simply means we wanted to ensure the scenario developed from the participants’ inputs was one where all the pieces, all the Future Projections, were strongly able to co-exist together. This is in keeping with feedback from the participants, because when scores were weighted 50/50 way, robustness appeared to be almost the same thing as plausibility, which was not the intent of the exercise. Participants agreed that internal consistency – a future in which related key factors changed in ways that made sense together – deserved greater emphasis. Accordingly, the team re-ran the model with a weighting that reflected this, with 80% of the importance assigned to consistency, and only 20% to plausibility. The Robust result generated a more useful view of the future, from the perspective of participants. This future was also more in keeping with the “most desirable” future defined in the workshops, and thus applicable to actions moving forward to reach that future.

This possible future is still plausible; it is not a “pie in the sky” wish list. It simply has a higher internal

consistency across the Key Factors than a 50/50 Robust outcome to demonstrate that outcomes expressed as desirable by participants (increased sovereignty over subsistence) can coexist with those that are less desirable (partial revitalization of language). The future is not “all or nothing.” In the story of this robust future, Arctic Alaska is somewhat more affordable for those who live there, still sustains a population, and demonstrates slow but ongoing revitalization of Iñupiaq culture in the region. Governance has greater Indigenous self-determination, but boom-bust cycles still dominate. The narrative below explains only ONE future possible in 2040. While it is the most robust future, it is not THE FUTURE.

TABLE 3: MOST ROBUST FUTURE RESULTS (WEIGHTED)

Key Factor	Robust Result
Inupiaq values	<i>Tribal influence on the rise</i>
Subsistence Security	<i>Increased Alaska Native sovereignty</i>
Sustainable Energy	<i>Local community energy</i>
Regulatory Process	<i>Increasing participation at all levels</i>
Interaction of levels of government	<i>Growing tribal governance</i>
Substance abuse and related crime	<i>Decreased rate of substance abuse and related crimes</i>
Intersectional engagement	<i>United groups of community</i>
Preparation of teachers and school administrators	<i>Teach for Alaska</i>
Climate change	<i>Warmer and wetter, with rapid warming and wetter ground</i>
Access to quality health care	<i>Innovation, growth, best possible healthcare</i>
Transmission and recognition of traditional knowledge	<i>Top gear</i>
Demographics	<i>Sustaining population</i>
Cost of Living	<i>Lower cost of living</i>
Pan-Arctic collaboration	<i>Arctic for the Arctic</i>
Tribal governance	<i>Tribal government paradigm shift</i>
Land Management and Ownership	<i>Strengthening of values</i>
Housing	<i>Status quo creep</i>
Local determination	<i>Increased power over and involvement in decision-making</i>
Language proficiency	<i>Partial revitalization</i>
Access to education	<i>Workforce colleges</i>
Access to markets	<i>Local planning for sustainable markets</i>

In this 2040 future *land ownership and management* sees tribal influence on the rise. Tribes gain land ownership through the removal of the Alaska exception. There is increased government-to-government tribal consultation and the expansion of Indian Country facilitates a significant shift towards tribal sovereignty through increased jurisdiction and influence over the management of resources. Increased sovereignty over land-based resources creates greater possibility to control multiple aspects of Indigenous wellness. Similarly, *subsistence security* is bolstered by increased Alaska Native sovereignty. State and federal laws are changed, potentially through changes in the Alaska Constitution, state legislation, or through the process of land into trust, resulting in the requirement of Native preference or increased tribal jurisdiction

over lands and waters or both. Co-management is strengthened through new rules, made more effective through increased funding, and some economic gain from subsistence resources is allowed, for example by selling subsistence harvest surplus. There is increasing Indigenous and local participation across all regulatory levels. Successes demonstrated by co-management and consultative models, in particular in view of budget crises at the state and national level lead to increasing direct involvement or transfer of regulatory authority to the local level.

Harmonization of legislation between borough, state and federal governments, support of participatory governance through web-based resources and improved Internet access, and consolidation of consultative frameworks such as the Coastal Zone Management Act foster direct involvement at all levels of government. The interactions of levels of government are more influenced by growing tribal governance. Encouraged by the deletion of the Alaska Exception (final sentence in 25 CFR 151.1, which provides that “[t]hese regulations do not cover the acquisition of land in trust status in the State of Alaska, except acquisitions for the Metlakatla Indian Community of the Annette Island Reserve or its members”) in 2014, reaffirming the Department of Interior’s (DOI) statutory authority to take land into trust in Alaska, proponents of Indian Reservations enable sweeping reforms across Alaska. The final ruling by the DOI in essence allows tribes in Alaska to create reservations and take advantage of the opportunities in Indian Law. As a result, tribal environmental law enforcement and subsistence jurisdiction expand, funding increases and co-management councils such as the Alaska Eskimo Whaling Commission, the Nanook Commission, and others change from information sharing entities into tribal-dominated rule-making and enforcing entities. Likewise, local determination on policy increases. 85% or more of Alaska Natives are registered to vote and do, more Alaska Natives run for office outside the two boroughs, and local scale interests can agree among themselves how to resolve key debates over development, social services, education, and other significant regional issues. More attention on the region is translated into effective pressure placed on governments at the state and national level along with the Arctic Council through lobbying, testimonies, and media. As more residents gain credentials and follow with a willingness to take on decision-making roles in governments, tribal and community organizations, there will be more people from the two boroughs in positions of power. This increases decision-making authority. This authority may include changes to the rules of engagement to require more local scale actors in decisions affecting their region. In terms of global governance there has been a shift to the Arctic for the Arctic. Strong collaboration among Arctic nations focuses on the protection of resources and careful development for the exclusive benefit of Arctic nations and Indigenous residents. Non-Arctic states are increasingly shut out of Arctic resource development opportunities, although there is increasing global pressure to gain access to Arctic resources. The Arctic Council is effective at ensuring that Indigenous interests are strongly represented, resulting in a slow pace of development with an emphasis on environmental protection.

The changing climate produces a wetter and warmer environment. Temperatures increase by about 10°F in winter and 5°F in summer by the second half of the Century. Precipitation increases by 25-50%, especially as the longer open-water season allows for more evaporation from the Arctic Ocean to feed storm systems. The snow season becomes shorter but snows are deeper. Summers are longer, but more active Arctic Ocean storms and even thunderstorms contribute to increased flooding. Permafrost active layers deepen, and the overland travel season shortens, while the longer open water season allows more offshore transportation. Ecosystem shifts alter the availability of some subsistence species.

Demographically the Arctic Alaska population has sustained itself over the last thirty years. The general nature and character of hub and village communities remain similar to 2015. Village communities remain

predominantly Iñupiat. Hub communities exhibit greater cultural diversity as the extractive industries of both boroughs cycle through growth and decline. There is a slow growing cultural disparity between those Iñupiat who move away to seek opportunities and live in Fairbanks or Anchorage, returning only for whaling or hunting, and those people who remain in the communities year round. Non-Iñupiat continue to live in the boroughs during their employment in extractive industries or government or non-profit jobs.

The cost of living has decreased in the last 25 years. Efficient locally generated energy lowers household energy expenses, abundant and accessible subsistence resources lower food costs and expenses tied to mental and physical well being, increased employment and local business opportunities improves availability of cash. In addition the cost of energy has shifted somewhat from fossil fuel dependence, but more significantly, communities have diversified their energy portfolios. Local utilities have transformed themselves into energy generation and distribution coordinators that manage all power production, in other words, large wind farms, or distributed residential solar, or combined heat and power. At the same time, locally operated utilities support efficiency measures such as development of local fleets of electric vehicles for short distances that reduce the cost of local transportation. This allows many people to participate in local energy production and can create job opportunities. While diesel and gas may still be used, everybody benefits from locally produced power that reduces costs and dependence on fuel that is imported. Access to markets is based on local planning for sustainability. The boom and bust cycle tied to extractive industries remains. This means there are some periods of infrastructure development and cash flow followed by periods of high unemployment and out-migration. But, borough budgets are directed towards long-term investments in sustainable projects for communities that provide jobs such as renewable energy systems, education centers, tourism, and health care. There is an increased focus on education for jobs that can be “remote” and on jobs that fill community needs. There is heavy lobbying to change federal and state laws to permit management and sale of harvested animals.

Housing policies and housing availability is similar to 2015. Population numbers stabilize in Northern Alaska. Energy costs remain on average similar to the last 30 years with similar boom and bust cycles. In addition, the climate warms steadily, but there are few unexpected catastrophes of heat or cold. There is slow increase in both locations of renewable energy infrastructure and more efficient homes, but not enough to reduce energy costs to zero. There is little coordinated planning across agencies at borough, tribal, state, and federal levels to help manage housing stock. Living conditions generally improve with the advance of technology, with those living in the least affordable housing having the most improvement in quality of housing, but there is little innovation in community planning. Access to quality health care in this future means there has been a boom in private infrastructure investments, partially motivated by the expansion of information technology to rural Alaska, thereby stimulating the growth of telemedicine. Individuals are able to monitor basic health biometrics via apps on their cellphones. With better infrastructure and opportunities for professionals, each hub city has a fully staffed and equipped hospital, only available in big cities before. There is also a cultural shift where health is considered a priority for individuals, and taking responsibility for it is widespread regardless of age or economic status. In addition, public health programs approach health care from a holistic standpoint, allocating for prevention as well as treatment and providing for all types of needs e.g. behavioral health care facilities, or long-term health care facilities in all hub cities.

This future also sees a decrease in substance abuse disorders and related crime. There have been positive impacts from alcohol and marijuana regulations, cultural support programs, and efficient policies and regulations, causing a drop in substance abuse rates and related crimes. The positive changes contribute to further strengthening the vitality of Iñupiaq cultural assets, which then positively feed back in this

reinforcing cycle by making treatment available and getting people into treatment thus reducing substance abuse disorders and crime rates. Some of the success in health care and substance abuse can be linked to intersectional engagement. Throughout the course of the year, festivals, community celebrations, and harvest celebrations - like Kivgiq, Halloween, or landing a whale are attended by youth, adults and elders across cultures, frequently. Through these gatherings local traditions, cultural knowledge, and Iñupiaq values and language are passed on from generation to generation and amongst the varied cultures of the community. Drumming and dancing are important expressions of cultural renewal and vibrancy. Teaching and learning, often of the Iñupiaq ways, occurs formally and informally across generations and amongst peer-groups. Volunteer opportunities abound and are taken up voraciously. There are strong relationships between organizations and the community. Communities are building the social fabric via inclusion of all generations and ethnic groups in the processes of deliberation, decision-making, and planning. Respect and reverence for elders perseveres but knowing that there are different paths for every generation, group, and individual to contribute to community and garner respect. Engagement fosters a culture of support and connection within peer groups and the community for those who stay and those who leave the community. Tribal governance experiences a paradigm shift. There is an affirmation and expansion of Indian Country under "land into trust" in Alaska that increases the jurisdictions of tribal organizations, in particular over the management of key aspects of "traditional and customary" use of land (i.e. subsistence livelihoods). In particular this process recognizes a Native Ways of Life priority, creates more and more equitable partnerships between science and Indigenous peoples where there is co-management, provides greater rural and Indigenous control over school systems, and fully develops a system of tribal justice in accordance with recent Supreme Court decisions and the Indian Law and Order Commission Report (2015). Tribal compacting would expand dramatically so that program design and delivery are culturally responsive and regionally appropriate. Larger numbers of Alaska Native and rural people are elected or appointed to offices.

The preparation of teachers and school administrators remains challenging. Teacher preparation programs in state like UA system's Schools of Education continue to ineffectively produce and/or train the needed teachers for rural mostly Indigenous schools. Cultural preparation is hit or miss. Barriers to employment continue to be an obstacle for most local prospective school employees. Nationalized curriculum, standards, and testing continue to dominate allowing for adventurous teachers from urban areas or the Lower 48 to proliferate the system. The transmission and recognition of traditional knowledge neither declines nor advances. Some inroads are made to cite and give credit to traditional knowledge holders but the process and policies are inexact and inconsistently enforced. Collaboration amongst local or Iñupiaq knowledge holders and scientists occurs sparingly and typically amongst only those with long-term work relationships and trust capital built through honoring and recognizing traditional knowledge (TK). Transmission of TK is around the harvest of subsistence resources and language use concerning harvest but otherwise Iñupiaq language and traditional knowledge mostly suffers the fate of extinction. Perhaps not surprisingly, Iñupiaq values are a mixture of stronger and weaker values. These values, their associated traditions and skills are held in high esteem, but few people use them in their daily lives. There are few public activities where the values are practiced or discussed. The education systems in the boroughs teach the Iñupiaq language which reinforces learning about the culture, but few Alaska Natives or non-Alaska Natives have the opportunity to practice subsistence hunting and gathering or to come together for activities where the values can be expressed. In terms of language proficiency there is a partial revitalization. Iñupiaq continues to be taught as a second language class in school from kindergarten on, but is only sporadically used at home in everyday conversation, and is not institutionally incorporated. Different school systems offer different programs with no consistent pattern across the region. Scattered social media groups devoted to maintaining awareness

and sharing vocabulary persist and are well used but do not move beyond the “Iñupiaq-as-a-second-language” premise that they currently operate under.

Access to education focuses on job training. Northern Alaska colleges continue to offer the same type of programming that they offer today. Administrators do their best to address pressing workforce needs through new class offerings. Enrollment continues to steady but opportunities are piecemeal to impact immediate job training needs. Nevertheless, many students must still leave their communities to seek access to higher education opportunities. Both colleges continue to offer accelerated dual-credit learning opportunities for high school students. Non-accelerated high school students arrive to post-secondary learning opportunities completely unprepared as curriculum collaboration and advisement between public school system and colleges remains undeveloped. Traditional Iñupiaq skills development occurs informally in the community. Subsistence skills are still highly valued but other skills dwindle in importance and die out over time. Internet bandwidth still remains elusive, which limits the capacity for a full suite of distance learning opportunities.

Important questions

Stories, all human stories, are designed to cause the listeners/readers to think about their meaning. Scenarios are no different, but knowing the Key Factors and Future Projections it is important to ask questions about why the future is the way it is. This lets one act to promote or discourage that future.

What caused the changes in self-determination policies and the increased local involvement in governance systems?

What caused the changes in energy production and distribution?

How can we, in a period of low fossil-fuel costs, plan for a future that keeps these prices affordable?

How can we adapt to a different environment where there is wetter ground and warmer temperatures?

What would it take to change from partial language revitalization to a fully revitalized system?

How expensive would full access to quality health care be in this scenario?

In the Robust future there are many advantages over today for Indigenous self-determination. Would all of these advantages actually produce the best outcomes for the people of the region? For example, would the change in language teaching reduce the racial and ethnic diversity in Arctic Alaska schools, or enhance it? Could it disadvantage young Alaska Natives who may choose to move out of the state, or will it advantage them?

Think about the most Consistent result in Table 5. This future was not robust because it is somewhat less likely than the one above. For example, in the story below climate change is “put on hold” – this is not impossible but highly unlikely. Similarly, it is not probable that an autonomous Indigenous government will develop – but not impossible. Still, this future below is entirely possible because all of its Key Factor Future Projections are consistent with one another. This future has some of the characteristics preferred by the workshop participants.

Think about the most Plausible result in Table 4. This future was not robust because, while it is the most plausible combination of all the Key Factors, it has some internal pairings that are not fully consistent in 2040. Much of what is most plausible in these Key Factors is “status quo” or “business as usual.” What will it take to make the Robust future happen instead?

TABLE 4: MOST PLAUSIBLE FUTURE RESULTS

Key Factor	Most Plausible Result
Inupiaq values	<i>Status-quo mixed control</i>
Subsistence Security	<i>Status-quo dual system</i>
Sustainable Energy	<i>Escalating cost of energy</i>
Regulatory Process	<i>Regulatory patchworks</i>
Interaction of levels of government	<i>Status quo</i>
Substance abuse and related crime	<i>Increased rate of abuse</i>
Intersectional engagement	<i>Generational disconnect</i>
Preparation of teachers and school administrators	<i>The great adventure</i>
Climate change	<i>Rapid warming with wetter ground</i>
Access to quality health care	<i>You're on your own</i>
Transmission and recognition of traditional knowledge	<i>Neutral</i>
Demographics	<i>Sustaining population</i>
Cost of Living	<i>Increased cost of living</i>
Pan-Arctic collaboration	<i>Business as usual</i>
Tribal governance	<i>Status quo</i>
Land Management and Ownership	<i>Mixture of stronger and weaker values</i>
Housing	<i>Status quo creep</i>
Local determination	<i>Increase and decrease in power and decision-making</i>
Language proficiency	<i>Partial revitalization</i>
Access to education	<i>Workforce colleges</i>
Access to markets	<i>Status Quo</i>

TABLE 5: MOST CONSISTENT FUTURE RESULTS

Key Factor	Most Consistent Result
Inupiaq values	<i>Tribal influence on the rise</i>
Subsistence Security	<i>Increased Alaska Native sovereignty</i>
Sustainable Energy	<i>Local community energy</i>
Regulatory Process	<i>Increasing participation at all levels</i>
Interaction of levels of government	<i>Growing tribal governance</i>
Substance abuse and related crime	<i>Decreased rate of abuse</i>
Intersectional engagement	<i>United groups of community</i>
Preparation of teachers and school administrators	<i>Local control, more teachers like me</i>
Climate change	<i>Climate change is put on hold***</i>
Access to quality health care	<i>Innovation, growth, best care</i>
Transmission and recognition of traditional knowledge	<i>Top gear</i>
Demographics	<i>Increased population</i>
Cost of Living	<i>Lower cost of living</i>
Pan-Arctic collaboration	<i>Global harmony</i>
Tribal governance	<i>Autonomy of Alaska Native government</i>
Land Management and Ownership	<i>Strengthening of values</i>
Housing	<i>Sustainable planning for gradual change</i>
Local determination	<i>Increase in power and decision-making</i>
Language proficiency	<i>Accelerated revitalization</i>
Access to education	<i>Arctic knowledge league</i>
Access to markets	<i>Local planning for sustainable markets</i>

Key lessons

Comparing scenarios and imagining how their storylines may be written over decades lets us think about what sorts of drivers, forces, are at work that can change the future. Scenarios can also demonstrate what may be beyond our control.

For all the possible futures there are four key drivers that seem to be tipping points for making the Key Factors produce desirable or undesirable results. (1) The boom bust cycle of economies, (2) government relations, (3) community relations, and (4) largely external forces are four aspects of life driving the social, economic, and environmental components of Arctic Alaska. Each of these drivers has elements that can be controlled, managed or affected by local governments or communities. Each also has aspects that individuals, organizations, and in some cases even national policy cannot directly affect.

Booms and busts are difficult to predict, but preparing for them is not. Alaska experiences a boom-bust cycle not only in economics tied to natural resources such as the price of oil, but also for various species that are either naturally, such as lynx and hare, or through human manipulation, such as overhunting, abundant or depleted. Those Key Factors tied to such cycles have great potential for local scale management to maintain positive results. For example, if a sudden inflow of cash to a community is tied to an upswing of substance abuse disorders and crime, measures can be taken to prevent this that are appropriate to community values. Another example would be careful municipal planning so that downswings in the economy don't wipe out funding for important projects such as schools. When we were planning the workshop process in 2014, oil was around \$100 a barrel, by the time of the workshop in February 2015 it was half that. Planning ahead for such "what ifs" can reduce their impact on social and environmental conditions.

Governmental relationships at all levels between policy-makers and Alaska Natives (some of whom themselves may be key decision-makers) and other rural residents will not change without political pressure. Government relationships on the one hand can be very difficult to change, think of the struggles over legal powers of Indigenous people in the U.S. over the centuries. But, on the other hand, change can move rapidly when you consider how a key election may alter those in positions of power. Thinking about the kind of relationships a community or region would like to have with borough, state, and federal governments outside of the short term electoral cycles can help shape the communications, information exchanges, and policy feedbacks. For example, the change from the Department of the Interior to remove the Alaska Exception happened quickly (a memo) but it had decades of persistent political pressure behind it.

At the **community level** individuals and small groups, local and state agencies, and even federal programs can make quite a difference in how the future develops. Within a community - village or hub – and across the region's communities many of the Key Factors can be directly impacted like education or programs of intersectional engagement. Yet, local community governments and organizations are often budget-driven and must invest their time and energy wisely. Lastly, there are some **forces largely beyond our control**, not because we do not care or make an effort, but because global trends dominate. For example, climate change is highly unlikely to be reversed, wars starting or stopping that affect the price of oil are generally out of local control, and access to markets depends in part on international consumers. But identifying and tracking these trends and considering how they may impact any community's resilience is still an important task. Scenarios let us think about the "what ifs" and our imaginations are of vital importance to help plan locally when we cannot directly affect global activities. One example of a local to global connection may be international shipping. The causes of increased vessel traffic in U.S. and Alaska waterways are largely global, but coastal communities can plan in advance of this increase and create policies to mitigate unwanted

spillover effects such as conflict with subsistence or strains on local government related to search and rescue.

Our hope is that this work done by resident experts in conjunction with the Northern Alaska Scenarios Project has at a minimum provided a starting point for future community resilience by reporting what matters and how we might find ways to track these trends and create innovative, locally generated, solutions to problems that arise.

PROJECT EVALUATION BY PARTICIPANTS

How did participants feel about the process overall?

The NASP team surveyed the participants on six dimensions related to how they felt about the scenarios workshop and the deliberative process: political tolerance, mutual understanding of opinions, quality of deliberation, political efficacy, uptake of information, and level of discussion with others. There are several sets of questions valuable to note here.

The nature and quality of deliberation

The participants were surveyed before and after each workshop. Participants in multiple workshops had slightly different surveys to account for their ongoing participation, though some questions remained the same in order to test the process of learning in relation to thinking about the future. Using a framework from Andersen and Hansen (2007), informed by decades of deliberative democracy literature (Ryfe 2005) we surveyed the participants on six dimensions: political tolerance, mutual understanding of opinions, quality of deliberation, political efficacy, uptake of information, and level of discussion with others. In addition, we asked about their perception of their own community's resilience. The raw data is in Tables 1-7 in the Appendix. Each table shows the percent of participants who were in agreement or disagreement with each statement. Agreement includes participants who agreed or strongly agreed, while disagreement includes those who disagreed and strongly disagreed. Median scores and interquartile ranges are reported based on the original ranking scale of each question item, ranging between 1 (strong disagreement) and 5 (strong agreement). First time participants that completed the pre and post surveys number 39. Second time participants numbered 19. There were four participants able to attend all three meetings and we do not report their impressions statistically.

Political tolerance

The process had a mixed affect on **political tolerance** (Table 6) with the first question showing a marked change from prior to the process to after their first workshop. However, after participating twice this indicator drops. In the second question there is a slight increase in political tolerance after a slight drop after first participation. The reason for the ambiguity may be that over the course of two workshops the participants became more thoughtful about their own rationales behind their arguments. Andersen and Hansen (2007) saw similar results and noted that as participants gained experience in deliberating and debating on a complex issue they did not become more intolerant but had stronger beliefs in their own argumentation. Noteworthy is the interquartile range for the second question. When asked to evaluate whether "Other citizens have good arguments for supporting plans or visions of the future of the region different from mine" there is tight agreement across respondents that this is the case.

TABLE 6: POLITICAL TOLERANCE (%)*

	Agree	Neutral	Disagree	Median**	Interquartile range
Lack of knowledge is the reason why other citizens have plans or visions of the future of the region that are different from mine					
Before first participation	53	19	28	4	2-4
After first participation	37	42	21	3	3-4
After second participation	58	32	10	4	3-4
Other citizens have good arguments for supporting plans or visions of the future of the region different from mine					
Before first participation	77	21	2	4	4-4
After first participation	74	23	0	4	3.75-4
After second participation	79	16	5	4	4-4

N (Before first participation) = 47
 N (After first participation) = 39
 N (After second participation) = 19

Agree includes "strongly agree" and "agree," disagree includes "strongly disagree" and "disagree" and neutral consists of "neither agree nor disagree."* Percent values may not add up to 100 due to missing values (< 5.0 % of total).

**Calculated on a scale where strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1

Mutual understanding of opinions

The effect on **mutual understanding of opinions** (Table 7) are resoundingly positive even without a baseline reference. In particular after a second workshop no participant disagreed that the nature of the discussions were responsive, respected, and helpful. The first and fourth questions in this set also have statistical significance indicating that participation in two workshops directly contributed to participants' largely agreeing that discussions were characterized by responsiveness and listening to others' arguments were useful. The first and third questions show a tightening of agreement as well in the interquartile range.

TABLE 7: MUTUAL UNDERSTANDING OF OPINIONS (%)*

	Agree	Neutral	Disagree	Median**	Interquartile range
The discussions were characterized by a responsiveness towards each other's arguments.					
After first participation	67	21	8	4	3-4
After second participation****	89	11	0	4	4-4
I developed an understanding of positions that were opposite my own.					
After first participation	69	21	5	4	3-4
After second participation	74	26	0	4	3-4
All positions in the group were considered with equal respect.					
After first participation	72	21	3	4	3.5-4
After second participation	84	16	0	4	4-5
The arguments of the other participants were useful in forming my own position.					
After first participation	64	28	3	4	3-4
After second participation*****	89	11	0	4	4-5

N (After first participation) = 39

N (After second participation) = 19

"positive view of mutual understanding of opinions" mean composite score***

After first participation = 3.77 (SD 0.75)

After second participation = 4.13 (SD 0.66)

Agree includes "strongly agree" and "agree," disagree includes "strongly disagree" and "disagree" and neutral consists of "neither agree nor disagree."

*Percent values may not add up to 100% in case of missing values (< 5.0 % of total)

**Calculated on a scale where strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1

***Dimension calculated across all question items, providing a mean composite score, where strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1. Internal validity of 4 question items: Cronbach's α (1st time participants) = 0.52. Cronbach's α (2nd time participants) = 0.86

****An independent samples two-tailed t-test indicated statistical significance between the first-time participants group's (M=3.65, SD=0.12) and second-time participants group's (M=4.1, SD=0.166) scores, $t(54)=2.238$, $p=.0294$. A Wilcoxon signed-rank test confirmed these results ($Z = 2.16$, $p = .0304$).

*****An independent samples two-tailed t-test indicated statistical significance between the first-time participants group's (M=3.73, SD=0.121) and second-time participants group's (M=4.31, SD=0.169) scores, $t(54)=2.814$, $p=.0068$. A Wilcoxon signed-rank test confirmed these results ($Z = 2.73$, $p = .0062$).

Deliberation in group sessions

The questions that related directly to the **deliberation in group sessions** (Table 8) had a consensus dimension and a discussion dimension. In the both we, again, did not have a pre-experience question. But in both it seems the participants who experienced two workshops reflected a desire to discuss more, found the discussions not superficial, felt discussions were generally not dominated by any single faction and a movement towards consensus was evident. For the majority of the questions there is general group agreement and there is statistical significance on the question that perhaps matters most to our project "Towards the end there was consensus in our workshop about the meaning of healthy sustainable communities." The workshops are reflecting a consensus across political jurisdictions and social sectors in relation to regional resilience. In sum, this indicates an open and thoughtful process especially when balancing respondents' thoughts on the nature of the discussions.

TABLE 8: MUTUAL UNDERSTANDING OF OPINIONS (%)* (continued on next page)

	Agree	Neutral	Disagree	Median**	Interquartile range
CONSENSUS					
From the beginning there was consensus in our workshop about the meaning of healthy sustainable communities					
After first participation	44	41	10	3	3-4
After second participation	53	31	16	4	3-5
Towards the end there was consensus in our workshop about the meaning of healthy sustainable communities					
After first participation	67	18	10	4	3-4
After second participation****	84	16	0	4	4-5
There was often consensus on the subjects discussed in small working groups					
After first participation	67	18	10	4	3-4
After second participation	84	11	5	4	4-5
It was difficult to agree on any of the subjects discussed in small working groups [†]					
After first participation	8	36	51	2	2-3
After second participation	21	37	42	3	2-3

N (After first participation) = 39

N (After second participation) = 19

Dimension: "positive view of consensus" mean composite score***

After first participation= 3.63 (SD 0.86)

After second participation= 3.84 (SD 0.97)

TABLE 8: MUTUAL UNDERSTANDING OF OPINIONS (%)* (continued)

DISCUSSIONS	Agree	Neutral	Disagree	Median**	Interquartile range
A few participants dominated the discussions ^r					
After first participation	38.5	33.5	23	3	2.5-4
After second participation	21	47	32	3	2-3
Alliances between some of the participants arose ^r					
After first participation	36	38	21	3	3-4
After second participation	63	32	5	4	3-4
The discussions in the small working groups were superficial ^r					
After first participation	23	21	51	2	2-3.5
After second participation	26	32	42	3	2-4
There was too little time to discuss ^r					
After first participation	31	33	31	3	2-4
After second participation	53	21	26	4	2-4
All aspects of healthy sustainable communities were covered in the small groups or during the workshop					
After first participation	44	21	31	3	2-4
After second participation	47	26	26	3	2-4

N (After first participation) = 39

N (After second participation) = 19

"positive view of discussions" mean composite score***

After first participation= 2.98 (SD 1.02)

After second participation= 2.93 (SD 1.06)

Agree includes "strongly agree" and "agree," disagree includes "strongly disagree" and "disagree" and neutral consists of "neither agree nor disagree."

*Percent values may not add up to 100% due to missing values (< 5.0 % of total)

**Calculated on a scale where strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1

*** Calculated across all question items, providing a mean composite score, where strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1. In the composite score, negatively worded question items (marked with r) were reverse coded to calculate the "positive view" dimension.

****An independent samples two-tailed t-test indicated statistical significance between the first-time participants group's (M=3.76, SD=0.136) and second-time participants group's (M=4.32, SD=0.19) scores, $t(54)=2.4$, $p=.0201$. A Wilcoxon signed-rank test confirmed these results ($Z = 2.3$, $p=.0214$).

CONSENSUS: Internal validity of 4 question items: Cronbach's α (1st time participants) = 0.52. Cronbach's α (2nd time participants) = 0.62

DISCUSSIONS: Internal validity of 5 question items: Cronbach's α (1st time participants) = 0.59. Cronbach's α (2nd time participants) = 0.53.

Political efficacy

In terms of **political efficacy** (Table 9) the dimension on responsiveness was generally positive indicating that after participants first workshop they felt an increase in efficacy in relation to local and national governments. However, by the end of the second workshop they felt less efficacious, but still more positive than prior to participation. In terms of competence we see a troubling pattern that participants seem less sure of their ability to participate in debates over U.S. Arctic Policy after the second workshop, but they felt much more competent after the first. We are unsure of the explanation for this, especially as the second workshop had some overlap with subjects in the first. It may be that the complexity of the region's governance became more apparent with repeated examination. An alternative explanation could simply be that a single exposure to the empowering qualities of a well-run scenarios workshop related to topics of local concern is more likely to raise feelings of political efficacy than extended work.

TABLE 9: POLITICAL EFFICACY (%)*

	Agree	Neutral	Disagree	Median**	Interquartile range
RESPONSIVENESS					
Citizens like myself have no say in decisions made by state and national government					
Before first participation	28	21	51	2.5	2-4
After first participation	10	26	62	2	2-3
After second participation	16	26	58	2	2-3
Citizens like myself have no say in decisions made by the borough					
Before first participation	21	11	68	2	2-3
After first participation	8	18	72	2	2-3
After second participation	16	26	58	2	2-3
COMPETENCE					
Citizens like myself are qualified to participate in the debates over U.S. Arctic Policy					
Before first participation	66	28	6	4	3-5
After first participation	74	18	5	4	3.75-5
After second participation	58	37	5	4	3-4
Citizens like myself have viewpoints that are worth taking into consideration					
Before first participation	81	19	0	5	4-5
After first participation	90	8	0	5	4-5
After second participation	79	21	0	5	4-5

N (Before first participation) = 47

N (After first participation) = 39

N (After second participation) = 19

Agree includes "strongly agree" and "agree," disagree includes "strongly disagree" and "disagree" and neutral consists of "neither agree nor disagree."

*Percent values may not add up to 100% due to missing values (< 5.0 % of total)

**Calculated on a scale where strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1

Sense of being well-informed

A key success in terms of civic communication was the **sense of being well-informed** (Table 10) dimension. Across all three questions participants demonstrate the value of the workshops related to learning across governance scales. The first question does have a small dip in the “very well” column, but “somewhat well” is far higher and “not very well” much lower.

TABLE 10: SENSE OF BEING WELL-INFORMED (%)*

	Very Well	Somewhat Well	Not Very Well	Median**	Interquartile range
To what extent do you feel informed about borough policies tied to community health and sustainability?					
Before first participation	32	47	19	2	2-3
After first participation	28	59	10	2	2-3
After second participation	42	58	0	2	2-3
To what extent do you feel informed about Alaska state policies tied to Arctic Policy?					
Before first participation	9	49	40	2	1-2
After first participation	15	41	41	2	1-2
After second participation	38	51	10	2	2-3
To what extent do you feel informed about the U.S. role in the Arctic Council?					
Before first participation	11	51	34	2	1-2
After first participation	15	41	41	2	1-2
After second participation	26	42	32	2	1-3

N (Before first participation) = 47

N (After first participation) = 39

N (After second participation) = 19

*Percent values may not add up to 100% due to missing values (< 5.0 % of total)

**Calculated on a scale where Very Well=3, Somewhat Well=2, Not Very Well=1

Level of political discussion

The **level of political discussion** (Table 11) does not change much and this is not surprising because the participants already have expertise related to community health and sustainability, though there is a drop to zero for those who rarely or never discuss the related issues.

TABLE 11: LEVEL OF POLITICAL DISCUSSION (%)*

	Quite / Very Often	Sometimes	Rarely / Never	Median**	Interquartile range
Within your circle of friends, how often do you discuss political issues related to community health and sustainability?					
Before first participation	72	17	9	4	3-5
Before second participation	75	25	0	4	3.25-4.75

N (Before first participation) = 47

N (Before second participation) = 20

*Percent values may not add up to 100% due to missing values (< 5.0 % of total)

**Calculated on a scale where Very Often=5, Quite Often=4, Sometimes=3. Rarely=2, Never=1.

Community resilience

One of the most significant question sets is the **sense of community resilience** (Table 12). The workshop process was meant to create deliberation and co-production of knowledge related to key concerns of arctic residents in Alaska. In post questions the participants come away from their participation in a workshop feeling more prepared for social and environmental challenges. In addition as a group they are closer in their opinions. Lastly, there is statistical significance for the workshop's role in participants' views that their own communities are prepared to prosper in turbulent times.

TABLE 12: SENSE OF COMMUNITY RESILIENCE (%)*

	Agree	Neutral	Disagree	Median**	Interquartile range
My community is prepared to face future economic and environmental challenges.					
Before first participation	43	17	37	3	2-4
After first participation	56	18	23	4	2.75-4
My community is prepared to prosper even in turbulent times.					
Before first participation	40	21	37	3	2-4
After first participation***	69	15	13	4	3-4.25

N (Before first participation) = 47

N (After first participation) = 39

Agree includes "strongly agree" and "agree," disagree includes "strongly disagree" and "disagree" and neutral consists of "neither agree nor disagree."

*Percent values may not add up to 100% due to missing values (< 5.0 % of total)

**Calculated on a scale where strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1

***An independent samples two-tailed t-test indicated statistical significance between the pre-workshop group's (M=3.8, SD=0.19) and post-workshop group's (M=3.1, SD=.17) scores, $t(82)=2.66$, $p=.0093$. A Wilcoxon signed-rank test confirmed these results ($Z = 2.48$, $p = .0131$).

PRODUCTS

What was produced in this process?

The three workshops involved participation of 51 resident experts. Products included a set of robust scenarios related to the Arctic residents' futures thinking, based on co-produced key factors that will affect the future of the Arctic. Products also included priorities and opinions regarding the relative desirability of these scenarios; indicators to watch and monitor in order to measure the direction and path of change; and suggestions and directives regarding effective engagement in guiding change. This report and the Comprehensive Data Package were made available to all participants and their organizations. The Comprehensive Data Package also has the Briefing Book that was created prior to Workshop 1 that has data for both boroughs' social-environmental systems as well as visual and written records of the project process. Scholarly articles in peer-review journals are being written (2017-2018) to explain our process and to contribute to the discussion of arctic resilience. There have also been scholarly conference presentations. In late August 2017 and September 2017 NASP team members will return to Utqiagvik and Kotzebue to personally disseminate results.

AFTER THE WORKSHOPS

Refining the products

The NASP team would like to continue to work with the participants and or their organizations to get feedback on the results. As the survey results above indicate, the workshops were significant in bringing together people concerned with the future resilience of their communities to deliberate fairly. The process produced data useable for a wide variety of organizations and governments. It also gave community members from two boroughs a place to swap ideas, strategies, and it enhanced their sense of resilience into the future. Taking a next step with regional residents to consider developing a dashboard related to what was learned about community health and sustainability would be valuable. This would also let us evaluate the most informational and impactful aspects of the 2015-2016 period to potentially reduce the length of the workshop process and better work together. We take the feedback so far from the surveys and other exchanges with participants seriously.

Locating other participants and interested organizations to include in future grant writing, research development, and production of results would further the good work already done. The NASP products are already useful for school districts, borough planning, industry, co-management regimes, and other individuals and organizations whose futures matter deeply to communities. The NASP team would be interested in comparing results as well, for example, creating a similar process in Nome or Bethel to see how many of these Key Factors are shared in common by other locations. In addition, a version of this project was designed for and held in Kotzebue for high school students from across the Northwest Arctic Borough. Called Arctic Future Makers, its report will be finished in September 2017. It would be significant to have Arctic Future Makers replicated in the North Slope Borough School District.

In short, alongside our tangible products we highly value the relationships we have built and the lessons we have learned. We welcome emails and phone calls from anyone interested in the results or moving the project forward. The two Arctic boroughs will continue to develop and face new challenges as the social-environmental conditions change. The research team's perspective is that coordination and learning across the region can directly impact future conditions in communities.

Making the most of this material

This report can be used in a variety of ways to brainstorm around the question “**What is needed for healthy sustainable communities in Arctic Alaska by 2040?**” There are a few different “thought games” that can be played. For example:

Sorting the Key Factors in different ways that you find they are similar or dissimilar from one another.

- What patterns can be found about what is controlled locally?
- Who is in charge of the different Key Factor outcomes? Why?
- Which Key Factors does any one person see as most significant to his or her future?

You could also ask a person or group to come up with Key Factors before they ever see this report.

- Is what others come up with similar to the Key Factors produced here?
- An agency or management organization could consider what is currently used to track some Key Factors and whether their own monitoring systems in any way link to other Key Factors?
- What ways can community members evaluate if their livelihoods will be impacted by any of the Future Projections?

Telling stories is a fun way to make data come alive. Various organizations can brainstorm policy or procedural implications.

- How might we continue to do the work we are doing now while implementing new policy or process to mitigate the disaster or perturbation that might come along with negative potential outcomes of a future?
- How can we plan for the best possible outcome? If we have specific goals in mind, what story can explain how we reach those goals in the future by starting today?
- Are there any wild cards or highly unlikely events that would be a “game changer” to the scenarios?

Compare this report to the Comprehensive Plans for Barrow and Kotzebue or any of the other federal, state, regional, and local planning processes.

- How might city planning be affected by the expressed need in this report for intersectional engagement?
- What federal management programs should change in order to increase local determination of key issues?
- How might both boroughs plan jointly for the future of the region by tracking trends that matter to their citizens?
- What are the implications of this project and its report for implementing policies?

Benefits of the process

Scenarios thinking and scenarios exercises can create new ways of thinking about uncertainties, and can bring a sense of ownership to participants. Scenarios allow for thinking and rethinking, bringing “complex” concepts such as climate change into a circle of more familiar concepts in which participants can assess limitations and trade-offs. The flexible thinking inherent to scenarios planning frees participants to expand their knowledge and use their imaginations, which in turn allows for innovation, creativity, diversification of

current strategies and social learning. This type of social learning can help residents and other stakeholders cope with uncertainty while increasing fairness, consensus, and empowerment. These strategies, when coupled with the scenarios themselves, can bolster social resilience.

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APPENDIX A: PROJECT BROCHURE 1

Scenarios for the North Slope and Northwest Arctic Boroughs

A Long View on Healthy Sustainable Communities

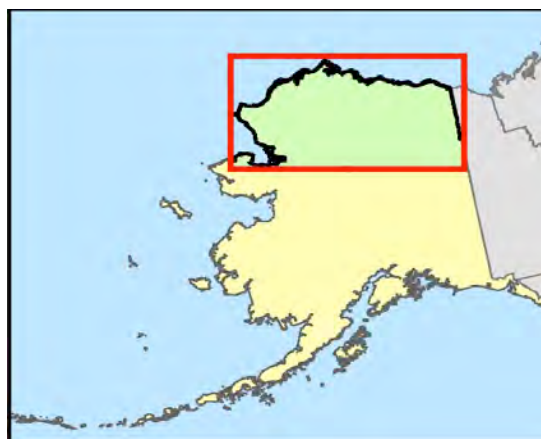
NASP

Northern Alaska Scenarios Project

This project is led by the University of Alaska Fairbanks with financial support from the National Science Foundation in partnership with the Alaska Native Tribal Health Consortium and North Slope Science Initiative. We seek to engage representatives from multiple sectors across the Northwest Arctic Borough and the North Slope Borough in scenarios development related to key aspects of healthy communities: “peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice and equity.”

BACKGROUND

Different stakeholders in the Northwest Arctic and North Slope Boroughs have taken significant strides to address concerns of community health, well-being, youth engagement, cultural pathways, and education. Across both boroughs, in different ways, community well-being and self-reliance have been set as goals. As state, national, and international pressures on decision-making in the northern region of Alaska rise, we are asking for partners in the two boroughs for a scenario workshop process that will enable the region to move forward with strategies for healthy sustainable communities. The primary goal as university researchers is to serve as honest brokers of information and offer a process to address future uncertainties while listening carefully in order to produce deliverables that help the region meet its own self-defined goals.



WHAT ARE SCENARIOS?

Scenario workshops provide answers to the question “What if...” They enable proactive risk management. They are a tool to help people envision the future in a way that can inform decision-making. Scenario workshops bring together people who will be affected in the future by plausible, but sometimes also unexpected, factors, as well as situations and problems that exist in some small form currently.

A scenarios process will allow regional stakeholders to plan for, respond to, and shape plausible futures in a setting that fosters broad participation. Because of this, it is also a great way to build capacity to deal with rapid and complex changes within communities. The scenario process gathers input from workshop participants to describe a set of plausible outcomes for a particular guiding question. In this case, the guiding question would build on the desire for healthy, sustainable communities. The goal is to have participants with different expertise review the information about today and consider a question about tomorrow. The focal question is:

“What is required for sustainable healthy communities on the North Slope by 2040?”

OBJECTIVES

Building on the collaborative and forward thinking work of others in the region around this subject the project has several objectives: (1) to learn from the regional stakeholders their information needs for fostering healthy sustainable communities, (2) to enable innovative communication and cooperation between stakeholders in a Community of Practice where “what works” and “what doesn’t” can be shared, (3) and to analyze the scenarios from workshop participants and report in follow-up so that the stakeholders can identify and prioritize the key social and environmental variables in the region to track progress to achieve desired long-term outcomes: healthy communities that are sustainable.

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APPENDIX A: PROJECT BROCHURE 1

WHY DO THIS?

By focusing on the region's concern for healthy sustainable living, we hope to help communities in northern Alaska develop their own responses to rapid Arctic environmental and social changes at the local and regional scale. We would like to meet this goal through a partnership with different stakeholders to connect local priorities, information needs, and a vision of the region's future that includes the participation of young people. Scenarios can enable communities to manage risk by anticipating changes, bringing people together to solve problems so no one is "doing it alone", and to figure out where organizations and methods are inflexible and should be changed. When disclosed years in advance, problems can be avoided or their impacts reduced more effectively than if similar real-life problems were considered in an emergency situation.

The value to the stakeholders in both boroughs comes from the process and the products. (1) The process itself is valuable. Prior to the workshop the University team will bring to the stakeholders information to share that has been gathered from many different sources related to healthy sustainable community priorities. We will ask what needs to be added or deleted for the scenarios workshop and stakeholder deliberation. This will be a two-way process providing valuable learning for everyone about just what people in communities want to know. The workshop itself, brings together people from governments, social services, schools, businesses, and associations who normally may not share ideas and skills. These subject experts can form the kernel of a community of practice to move forward with shared goals. (2) Once the workshops and feedback processes have finished both boroughs will have a set of information that includes detailed analysis of the plausible futures in the region related to healthy sustainable communities. In an era of shrinking budgets and the need to attract young people and revenue to remote villages and communities this means the stakeholders will be able to prioritize what key factors matter the most for well-being and self-reliance. They will be able to set up systems to observe and track the trends that matter most and determine progress towards meeting goals over time. Plus, with information defining priorities communities can plan for funding and develop partnerships.

A specific goal is for the participants to select the key social and environmental variables to monitor so the two boroughs can gauge their progress towards the sustainability of healthy communities.

HOW WILL THE WORKSHOPS WORK?

We are bringing approximately 50 people together for a 3-day scenario workshop in Barrow. Participants will come from communities, local organizations, and governments providing leadership in different areas to the region. They will be subject matter experts from a wide variety of sectors. For example, law enforcement, land managers, school administrators, healthcare providers, subsistence hunters, elected officials, and city planners. But, we also include the participation of young people, 16-25, students, and early career community members. This will serve as the first step in the process, followed by additional activities that further refine strategy and provide implementation tools.

In this workshop these different experts will convene to discuss healthy sustainable communities and envision the future. In particular the participants will need to consider what the key uncertainties are related to the region and how these are important to the different participants and the people they represent. The workshop's products will include several lists of key uncertainties, desired outcomes, and anticipated problems and solutions related to the creation of sustainable healthy communities in 2040.

We will have two follow-up workshops to go over the products and provide feedback to the communities. The first workshop will take place in Kotzebue approximately 1 month after the initial workshop in Barrow. A second follow-up workshop will take place about a month after Kotzebue, in a location to be determined later. In these follow-up workshops the Project Leaders will have analyzed the lists and contacted a subset of willing participants to help give deeper perspectives on the data in a Community of Practice. The project team will work with this subset of participants to help develop a more consistent and plausible set of scenarios. This additional level of detail is of particular value in identifying indicators that should be tracked in coming years to better prepare for future changes.

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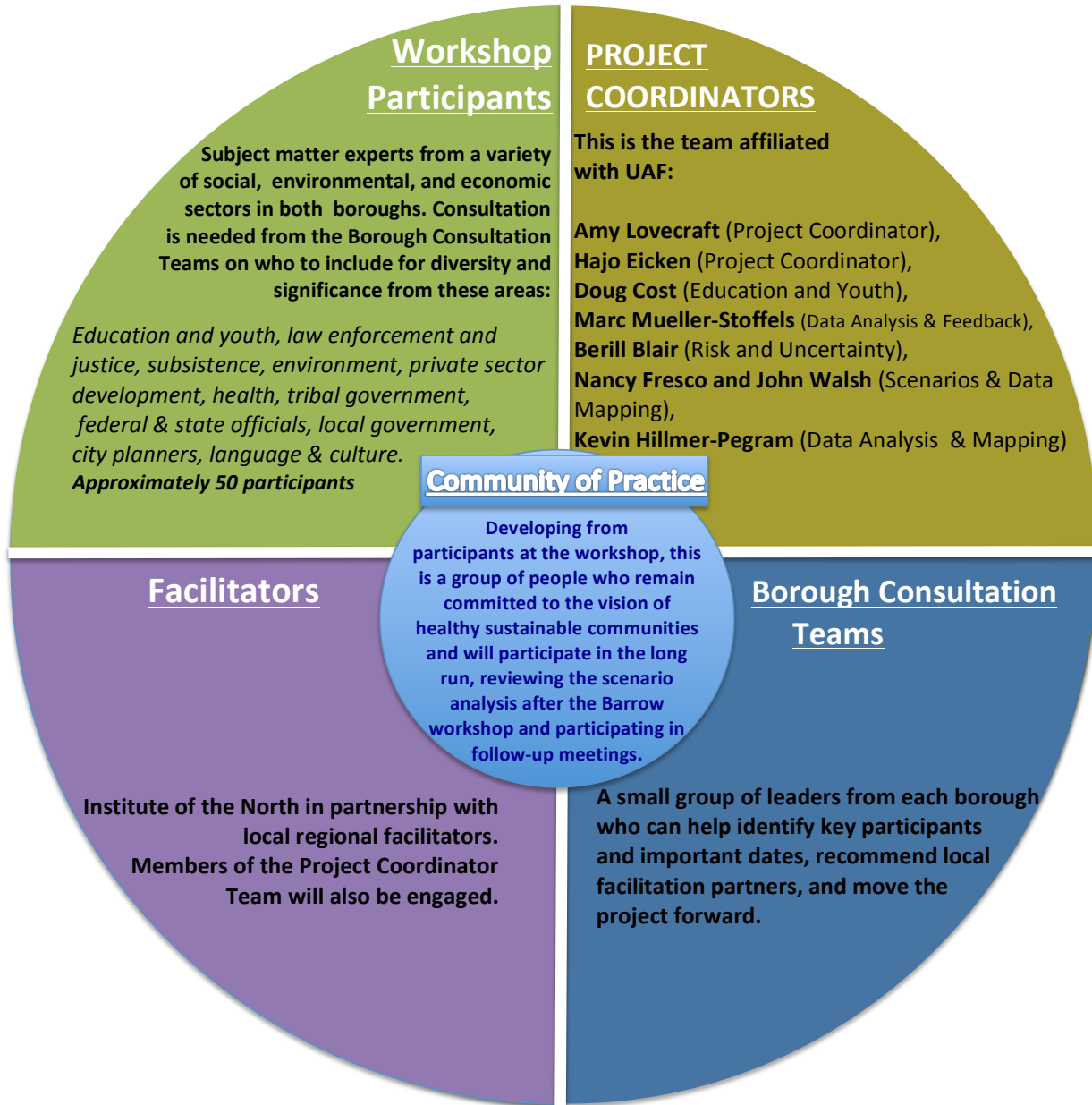
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APPENDIX A: PROJECT BROCHURE 1

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APPENDIX A: PROJECT BROCHURE 1

PROPOSED TIMELINE		
	Role	Responsibility
Oct 2013 - February 2014	Project Coordinators	Build network of contacts, develop consultation teams in both boroughs, review regional priority documents and compile already existing data into summaries, develop website, visit Barrow and Kotzebue.
Jan 2014 – August 2014	Project Coordinators, Borough Consultation Teams, Facilitators	Creating participant lists, setting dates, identifying local facilitators, developing background materials and consulting on briefing book draft, locating and finalizing meeting logistics.
Sept-Oct 2014	Project Coordinators, Facilitators, Borough Consultation Teams	Finalize briefing books for workshop participants
Nov 2014	***We recognize these dates are flexible. We need to agree on dates all participants can meet. What follows is an example of the timeline****	Scenarios Workshop - Barrow Scenarios Development; creation of a Community of Practice from the workshop.
Jan 2015	Project Coordinators, Facilitators, Community of Practice	First Feedback Session: Kotzebue Review of scenarios workshop data; development of strategies, identification of social and environmental indicators to track for success.
Mar 2015	Project Coordinators, Facilitators, Community of Practice	Second Feedback Session: Second review of workshop data
August 2015	Project Coordinators, Facilitators, Community of Practice	Implementation meeting and Returning results: Barrow
Autumn 2015		Additional outreach

SUMMARY BENEFITS

New communication and knowledge shared between the two boroughs; narratives of different futures for the region; a shared regional definition of healthy communities and how they can be sustainable; specific lists of key factors and drivers of social and environmental uncertainties; an evaluation of what this means for the region and what types of indicators should be tracked; and the creation of user-friendly maps that can measure progress over the years.

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APPENDIX A: PROJECT BROCHURE 2



Northern Alaska Scenarios Project Team

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Kevin Hillmer-Pegram (Data analysis and Mapping)
Rich Hum (Social media and Communication)

Workshop facilitation
Nils Andreassen (Institute of the North)

NASP has been funded by a grant from the National Science Foundation. It is a part of an ongoing commitment by North by 2020 at the University of Alaska Fairbanks to support the production and exchange of information for sustainability in a rapidly changing Arctic by promoting stakeholder engagement and guidance to applied scientific research.

North by 2020 is a forum to explore, discuss, plan and prepare opportunities for sustainable development in a North experiencing rapid transformation. We do so by facilitating research and education across disciplinary boundaries to address the real world concerns surrounding Northern futures while at the same time engaging public, private, and government stakeholders. Please visit us and our projects at: <http://www.iarc.uaf.edu/NV2020>.

One of the objectives of the Northern Alaska Scenarios Project includes facilitating communication and conversation through social media. Let's talk about what you would like your community to be like in 2040, what would make you want to keep coming back to and keep living in Arctic Alaska? Like us and stay in touch on Facebook at: <https://www.facebook.com/NorthernAlaskaScenariosProject>

Northern Alaska Scenarios Project

"Creating healthy sustainable communities for 2040"

A series of three workshops inviting experts from the two Arctic Boroughs to create scenarios for healthy sustainable communities by 2040.

In cooperation with:
North by 2020
University of Alaska Fairbanks
Alaska Native Tribal Health Consortium
North Slope Science Initiative
National Science Foundation

Workshop 1 Barrow 18-20 February 2015
Workshop 2 Kotzebue Summer 2015
Workshop 3 October/November 2015

How does the Northern Alaska Scenarios Project benefit the region?

With your participation this project will create products and strategies for the region building on the work that has already taken place to help sustain healthy communities into the middle of the century. NASP can help you answer your community's important questions.

What information about any of the social and environmental sectors related to healthy communities are service providers lacking? What needs to be known that isn't and what information currently exists that the borough, state, or federal governments have yet to monitor?

The scenarios workshops are designed for you to develop and prioritize uncertainties in the areas you identify as mattering the most to the sustainable future of the region. The project team will provide information based on your expressed needs and ideas from the Barrow workshop.

Where should village, city, borough, state, and federal money be spent in the coming decades?

This project will map potential futures based on your expert review of information from the Barrow workshop. In the Kotzebue workshop these scenarios will receive further review from experts, you and other participants, to create long-term shared strategies to guide future science studies, technology development, and funding in the region.

How can I get information about the different things affecting community health and discuss it?

This project can enhance communication across the boroughs' experts to share best practices, help develop more robust strategies for tracking data and progress, and provide guiding scenarios based on community goals for long-range planning. By the final workshop we will have created, together, a Community of Practice, a system designed according to your expert input, to share information.

Why should I participate as an expert or encourage the participation of other experts I know?

The future is uncertain. NASP is a great opportunity to let a grant-funded team bear the cost of bringing together experts in community health and sustainability (Arctic residents, students, researchers, and decision-makers in governance) to work on deciding what matters most for the future and how these goals can be achieved for the region.

State, national, and international pressures on decision-making in the northern region of Alaska are increasing. Two goals set by Alaska's Arctic communities are community well-being and self-reliance. Different stakeholders in the Northwest Arctic and North Slope Boroughs have already taken significant strides to address concerns of community health and long-term sustainability. This project partners with experts from the two boroughs in a scenario workshop process to foster effective communication among these experts across different interests such as education, justice, mental and physical health, subsistence, Iñupiaq values, and business development. We are holding a series of three workshops in 2015 to bring people from both boroughs together to share creative strategies for the next few decades so that those living in Arctic Alaska can proactively shape their futures.

APPENDIX A: PROJECT BROCHURE 2

Why scenarios in Arctic Alaska now?

The federal, state, and local governments have recognized the need for long-term observations to track a rapidly changing Arctic. Different government agencies are now in the process of identifying priorities and measurement sites, and methods for such observations. **But what matters the most to residents and communities in Arctic Alaska?** It is reasonable to assume that over the course of the next decade or so, several tens of millions of dollars will be spent in Alaska's Arctic to put in place and sustain such a long-term observing network. The Northern Alaska Scenarios Project can help identify and synthesize input for this process related to the future of healthy sustainable communities.

There will be several opportunities in the near and mid-term, when results from the scenarios project can help communities in the Northwest Arctic and North Slope Boroughs to have a guiding voice in such long-term observations. For example:

- Ongoing borough and regional planning and decision-making.
- Alaska and the State Legislature will consider how to implement key recommendations of the Alaska Arctic Policy Commission. These include monitoring to meet the information needs of Arctic communities.
- In March of 2016, the University of Alaska will host the Arctic Observing Summit and Arctic Science Summit Week. Many people will be planning to implement research and observation programs that meet the information needs of Arctic Indigenous peoples, residents, and communities as well as other stakeholders. These two events are jointly coordinated with the first meeting of the Arctic Council Senior Arctic Officials under U.S. Chairmanship of the Arctic Council 2015-2017; they also serve as a starting point for broader National Arctic strategy discussions.
- The Arctic Council's work on Adaptation Actions for a Changing Arctic (AACCA) has recognized that thinking several decades in advance and using scenarios at the local scale can be a significant part of helping Arctic regions to plan for adaptation to climate and economic changes.

What are scenarios?

Instead of passively adapting to whatever comes, scenarios can help you actively and creatively shape the future of your Arctic region.

A scenario exercise is not planning or decision-making. It is a process of asking "what if?" that enables the participants to help their communities establish what matters most for the future and to manage risks. It forms a solid foundation for understanding uncertainties that can directly inform planning and decision-making in the future.

The Barrow scenarios workshop (18-20 February 2015) is based on the expert deliberation of people living and working in Arctic Alaska. The goal is to think in new ways about possible futures of the two boroughs from many different standpoints. The scenarios produced will enable stakeholders to work together to more effectively communicate about and manage risks to health and sustainability. In this project participants will:

- be a part of bringing people together to discuss present problems and share best practices so no one group is "doing it alone."
- brainstorm what matters most to take into the future and anticipate how to track progress as things around us change.
- creatively explore how Arctic communities can be the places people want to live in 2040 so the boroughs can communicate and plan how to meet those needs now and into the future.
- and evaluate what is certain and uncertain about the future to create scenarios.

In short, the NASP provides the two boroughs with a process

- to determine and prioritize those variables most important to community health and sustainability
- to provide information about the social and environmental conditions that matter most to the participants for decision-making,
- to offer different methods to monitor for desired change,
- and to assist with strategies to observe and track these variables to 2040 and beyond.

Project Objectives

Working with the forward thinking and collaboration of others in the region, the project has several objectives:

1. To learn from the regional stakeholders their information needs for fostering healthy sustainable communities,
2. To provide the research and information to meet those needs, both in the workshops and beyond,
3. To enable innovative communication and cooperation between stakeholders in a Community of Practice where different people and groups working toward healthy sustainable communities can learn from one another,
4. To analyze the scenarios created in the workshops and communicate with the stakeholders to build on current efforts and develop new strategies for the future,
5. And to learn about the scenarios process and receive feedback from participants that will enable us to fine-tune and further develop our research to serve other rural communities experiencing rapid change in complex environments.

APPENDIX B

KEY FACTOR: IÑUPIAT VALUES

Definition

From the beginning of the Iñupiat occupation of the Arctic to the present day, these lands and waters have provided the people with the necessities of life and the places of cultural and spiritual identity. (ICAS 1979). "(...) the direct homeland relationship has endured as the vital center of Iñupiat culture and consciousness. Within this geographical base the people constantly renew the lifeblood of their culture. The people who live here, who hunt and fish and trap here, know this landscape throughout. There are no nameless valleys here, no places vacant of memory and association. This is no frontier to be conquered. It is home. The Iñupiat have demonstrated continuing ability to adjust and adapt to change." (Brown, 1979). Knowledge accumulated through the centuries has allowed the Iñupiat to adapt to changing conditions and to sustain their society and culture from a seemingly austere environment. (ICAS 1979)

Future Projections

These three suites of values are interdependent and overlapping. This is recognized and noted because "Iñupiat Ilitqusiak is not a program; it is a way of life..." (Reggie Joule). Iñupiat Ilitqusiak in English essentially means Those things that make us who we are. Like all values these are dependent upon people. In the 1800s and 1900s the decline of the number of Iñupiaq persons in Alaska meant a loss of language, displacement from land, loss of skills, and with it many of the values associated with being a member of a tribe, of a group with healthy and various members to reinforce values. Now in the 2000s there are significant programs by and for Alaska Natives to reinvigorate the values and the skills associated with them. We identify the following future projections for Iñupiat Values:

1. Strengthening of values:

The values, their associated traditions and skills are held in high esteem as communities in the Northwest Arctic and North Slope Boroughs grow in population, both Alaska Native and non-Alaska Native, but remain predominantly Indigenous. There are more Iñupiat who have learned these values and who practice them in their daily lives. The education systems in the boroughs teach the Iñupiaq language which reinforces learning about the culture. New cross-cultural centers of learning enable people moving into the region to learn both language and values from residents. The majority of decision-makers in the boroughs understands and practices these values so they become a part of public life in the hubs and villages.

2. Weakening of values:

The dominant culture of the region is not one that places high priority on these values and the majority of decision-makers do not practice them in their daily lives. The school system does not promote knowledge of traditional language or offer information on regional culture. There are few Iñupiat Elders able to teach younger generations and younger generations ignore the practice of the values. Few Iñupiat live in the region so there are not groups of people able to study and practice the values in a meaningful way.

3. Mixture of stronger and weaker values:

The values, their associated traditions and skills are held in high esteem, but few people use them in their

daily lives. There are few public activities where the values are practiced or discussed. The education systems in the boroughs teach the Iñupiaq language which reinforces learning about the culture, but few Alaska Natives or non-Alaska Natives have the opportunity to practice subsistence hunting and gathering or to come together for activities where the values can be expressed.

KEY FACTOR: LAND MANAGEMENT AND OWNERSHIP

Definition

Land management and ownership refers to the entities that own or control the terrestrial and marine areas of Alaska and make many of the economic, legal, and environmental decisions that occur there. These may be public (municipal, state, federal) or private (individual, corporate, tribal). With the various layers of government, jurisdictions may overlap.

Future Projections

1. Status quo mixed control:

Land ownership and management does not change substantially from current conditions. Co-management arrangements continue but may or may not meet indigenous interests depending on the context. Issues of overlapping jurisdictions continue to be settled in the courts rather than through new legislation or agency policy.

2. Tribal influence on the rise:

Tribes gain land ownership through the removal of the Alaska exception. There is increased government-to-government tribal consultation and the expansion of Indian Country facilitates a significant shift towards tribal sovereignty through increased jurisdiction and influence over the management of resources. Increased sovereignty over land-based resources creates greater possibility to control multiple aspects of indigenous wellness.

3. Development frenzy:

Federal domain declines while state domain increases with transfer of federal land into state and private ownership resulting in increased development. Native organizations (especially corporations) continue to play a similar role in land management as they do today, but spaces available for subsistence decrease as development expands.

KEY FACTOR: SUBSISTENCE SECURITY

Definition

Subsistence security refers to the power of those directly tied to marine and terrestrial natural resources to determine and enforce the regulations that shape human interactions with nature, generally with the intent of sustaining a resource while allowing sufficient access for cultural, economic, and social needs. This includes decisions about hunting and gathering in terms of timing, harvest levels, methods, accessibility, and sanctions for rule violations.

Future Projections

1. Status quo dual system:

Little change from current dual management system, as defined by current definitions and laws. On state lands, all Alaskans remain eligible to participate in subsistence activities, and no co-management or Native representation is legally mandated (although some may exist). On federal lands, rural subsistence preference remains, with no Native preference, but with legally mandated Subsistence Regional Advisory Councils (i.e., co-management). Limited financial resources and complicated bureaucracies challenge the coordination of land managers and subsistence users.

2. Alaska Native influence declines:

Due to decreased coordination on the part of tribal organizations and increased pressure from external interests (State of Alaska, federal government, and private industry) to develop natural resources, co-management arrangements crumble. Subsistence activities begin to decrease as development pressures threaten marine and terrestrial harvest areas.

3. Increased Alaska Native sovereignty:

State and federal laws are changed - potentially via Constitutional amendments or through the process of land into trust - resulting in requirement of Native preference or increased tribal jurisdiction over lands and waters or both. Co-management is strengthened, made more effective through increased funding, and codified. Economic gain from subsistence resources is allowed (e.g. via selling subsistence harvest surplus).

KEY FACTOR: SUSTAINABLE ENERGY

Definition

Sustainable energy is affordable and sufficiently low-impact such that individual and community health are not threatened and day-to-day operations not impeded by energy production, storage or transmission. Sustainability includes an energy infrastructure that includes local production, or productive capacity, and local employment of skilled people to maintain the production and distribution systems. Also considered are cost of ground, sea and air travel and transportation, as well as the overall efficiency of energy use.

Future Projections

1. Escalating Cost of Energy:

Energy other than for minimal support of life in the harsh Arctic conditions has become unaffordable due to a significant rise in fossil fuel cost, elimination of subsidy and incentive programs and the failure of alternative energy sources to meet necessary cost targets to support an affordable energy supply. The cost of freight and travel has escalated to the point where access to outside goods and services is very limited, and extended travel for subsistence activities is generally not affordable.

2. Grid Defection:

With significant reductions in state and federal support the cost of utility generated electricity to the consumer has steadily increased. As more and more residents have left the grid to generate their own electricity of alternative sources, or not using energy at all, the increase in cost of utility-generated power has further increased to the point where many local utilities had to shut down. With new technologies for

small-scale power generation, residents are able to sustain a reasonable level of energy production to meet basic heating and electricity demand. At the same time, the efficient use of energy for electricity and heating has reduced demand such that small-scale residential generation for residential energy needs is affordable.

3. Local Community Energy:

Local utilities have transformed themselves into energy generation and distribution coordinators that manage all power production, i.e. large wind farms, or distributed residential solar or combined heat and power. At the same time, locally operated utilities support efficiency measures and development of local fleets of electric vehicles that reduce the cost of local transportation. This allows many people to participate in local energy production; while everybody benefits from locally produced power that largely is no longer dependent on imported fuel.

4. Staying on Diesel:

Due to increased production and reduction in use in industrial centers, costs of fossil fuel products have steadily decreased to the point where no other alternative energy resource can be competitive even when taking the long supply lines to rural Alaska into account. Due to this, while much of the rest of the world largely is no longer using fossil fuels for energy, remote Alaska is bucking this trend and mostly produces electricity and heat from diesel fuel. Due to the low cost of fuel and transportation efficiency measures are generally considered unnecessary. This leaves communities exposed to remaining volatility in the price of oil.

5. Transmission Lines:

The State of Alaska, after years of discussion, has come to a consensus to build a large-scale natural gas power plant close to the North Slope oil fields. While the primary market for the electricity generated at this plant is the lower-48, to get representatives to agree to this project transmission spurs have been built to connect all rural villages to the greater transmission grid and electricity is provided at low enough cost to also be economical to be used for heating. Local transportation is mostly converted to electric vehicles, and only the cost of freight and regional transportation remains tied to fuel cost. At the same time, the state's newly developed resources wealth due to electricity sales provides public funding for extensive energy efficiency measures.

KEY FACTOR: PARTICIPATION IN THE REGULATORY PROCESS

Definition

Many activities at the individual, community and higher levels of government are governed by regulations or rules aimed at balancing individual liberties against the common good. In Arctic Alaska, participation in the regulatory process typically refers more specifically to those regulations put in place and enforced at the state and federal level as these are furthest removed from the individual household and community-level. Moreover, state and federal regulations are often critical factors controlling subsistence activities or high-impact endeavors such as resource exploration and development. However, boroughs and municipalities also have some regulatory capacity and both the North Slope and Northwest Arctic Boroughs are "home-rule" boroughs; Article X Section 11 of the Alaska Constitution grants them "all legislative powers not prohibited by law or by charter."

Future Projections

Over the years, federal regulatory agencies have been somewhat responsive to calls for increased local, community-level participation in the regulatory process. However, recurring episodes of antagonistic stances between state and federal government remains a major uncertainty with potential impacts on the degree of involvement in the regulatory process. We identify the following future projections for participation in the regulatory process:

1. Increasing participation at all levels:

Successes demonstrated by co-management and consultative models, in particular in view of budget crises at the state and national level lead to increasing direct involvement or transfer of regulatory authority to the local level. Harmonization of legislation between borough, state and federal governments, support of participatory governance through web-based resources and improved internet access, and consolidation of consultative frameworks such as the Coastal Zone Management Act foster direct involvement at all levels of government.

2. Regulatory patchworks:

With competing interests and at times contrarian positions taken by different levels of government, participation in the regulatory process is complicated and varies by jurisdiction and over time. While co-management bodies mostly persist, regulations with regards to land use, air quality and industrial development are drafted and updated mostly with little or no input from the local level, and with little to no enforcement. Legal action and advocacy result in some concessions made for high-profile issues, in particular related to property rights and threatened habitats.

3. Regulatory entrenchment:

Increasing antagonism between governments at the federal, state and local level eliminate past concessions and avenues for involvement of local communities and Indigenous interests in the regulatory process. The dismantling of frameworks for participation such as co-management bodies or the Coastal Zone Management Act greatly curtails the ability of local interests to contribute to or help guide the regulatory process. The few rules put in place at the local level are not followed or recognized.

KEY FACTOR: INTERACTION OF LEVELS OF GOVERNMENTS

Definition

In Alaska, many branches of local, borough, state, and federal government interact with each other and with stakeholders in the decision-making processes. The public dialogue takes place at multiple levels of governance, each with a different scope of interests and responsibilities but all within a complex hierarchy of intersecting jurisdictions.

Future Projections

1. Shifting Alliances, Highly Challenging Public Sphere:

Conflicting interests, disputes over scope of powers and distribution of resources among the various levels of government creates an environment in which the top-down hierarchies among the various parties is

replaced by constantly shifting alliances as actors “jump scale” to gain power at higher platforms when limited by traditional jurisdictions. For example, boroughs may use planning and zoning oversight to bring state actors to their table. This is a highly volatile environment, but with a potential for innovation and new leadership.

2. Status Quo:

Conflicting priorities frequently challenge an otherwise stable, hierarchical governance system. There are established avenues of interaction between and among the different actors within all levels of governance. These avenues are more or less effective, or at least effective enough not to bring about sudden major reforms.

3. Growing Tribal Governance

Encouraged by the deletion of the Alaska Exception (final sentence in 25 CFR 151.1, which provides that “[t]hese regulations do not cover the acquisition of land in trust status in the State of Alaska, except acquisitions for the Metlakatla Indian Community of the Annette Island Reserve or its members) in 2014, reaffirming the Department of Interior’s statutory authority to take land into trust in Alaska, proponents of Indian Reservations enable sweeping reforms across Alaska. The final ruling by the DOI in essence allows tribes in Alaska to create reservations and take advantage of the opportunities in Indian Law. As a result, tribal environmental law enforcement and subsistence jurisdiction expand, funding increases and co-management councils such as the AEWC, the Nanook commission and others change from information sharing entities into tribal dominated rule making and enforcing entities.

KEY FACTOR: SUBSTANCE ABUSE AND RELATED CRIME

Definition

Discussions of substance abuse and related crimes in Northern Alaska generally revolve around alcoholism and domestic violence, but other substances and crimes may be involved. As is often the case in remote Arctic communities, these social issues are strongly interconnected with economic opportunity, cultural support systems, and funding for solutions. Substance abuse and related crime and social repercussions are a component of a much larger discussion about individual and community well-being, but it clearly stands out as an important driver of community sustainability. There are various programs and initiatives in rural Alaska implementing prevention and early intervention, and treatment and recovery programs to address the various stages of substance dependency.

Future Projections

1. No significant change in rates of substance abuse:

There are no significant changes in either the regulations impacting availability of alcohol and illicit drugs in rural Alaska, or to the approach of prevention and treatment programs, policies and funding. For example, no improvement in policies to support subsistence activities as a way of life, no effort in ‘putting respect back into subsistence.’ Status quo in terms of other Key Factors such as Intersectional Community Engagement that impact overall well-being.

2. Increased rates of abuse:

Decreasing attention and funding invested in culturally appropriate mental health programs, inefficient and/or no policies regulating the sale of alcohol. There are significant increases in the rates of substance abuse and consequently to the cost of mitigation of both the illness itself and resulting crimes. Due to the high rates of abuse and lack of effective prevention programs, the health of Iñupiaq culture suffers with cultural heritage and language loss, which then help further reinforce the cycle of substance abuse and socio-economic problems.

3. Decreased rates of substance abuse and related crimes:

There have been positive impacts from alcohol ban regulations and cultural support programs and efficient policies and regulations, causing a drop in substance abuse rates and related crimes. The positive changes contribute to further strengthening the vitality of Iñupiaq cultural assets, which then positively feed back in this reinforcing cycle by reducing substance abuse and crime rates.

KEY FACTOR: INTERSECTIONAL COMMUNITY ENGAGEMENT

Definition

Intersectional engagement describes the interaction and participation across and amongst various ages, cultures, professions and demographic groups and individuals within the community around leadership, community events, decision-making, planning, and other activities.

Future Projections:

1. United groups of community:

Throughout the course of the year, festivals, community celebrations, and harvest celebrations- like Kivgiq, Halloween are attended by youth, adults and elders across cultures, frequently. Through these gatherings local traditions, cultural knowledge, and Iñupiaq are passed on from generation to generation and amongst the varied cultures of the community. Drumming and dancing are important expressions of cultural renewal and vibrancy. Teaching and learning, often of the traditional ways, occurs formally and informally across generations and amongst peer-groups. Volunteer opportunities abound and are taken up voraciously. There are strong relationships between organizations and the community. Communities are building the social fabric via inclusion of all generations and ethnic groups in the processes of deliberation, decision-making, and planning. Respect and reverence for elders but knowing that there are different paths for every generation, group, and individual. Engagement fosters a culture of support and connection within peer groups and the community for those who stay and those who leave the community.

2. Generational disconnect:

There is little shared life or experience amongst the generations of the community. The youth gather at the youth center. The elderly gather at the community center. The middle-aged conduct most of the decision-making and allocation of community resources behind closed doors. The youth antagonize both groups through the subversive derailing of programs, vandalism, and refusal to participate. The elderly follow suit mostly refusing to get involved in anything community related that is not specifically elderly oriented. Most

citizens congregate within age groups and little if any crossings occur. Imbalance between the youth and the elderly population numbers. Either the elderly or the young have out migrated from the community, leaving it heavy at one end of the age continuum.

3. All in the family:

The only occasion when intersectional engagement occurs is during family events and it is mostly contained within family units. Engagement varies widely from family to family. Groups that gather in the community are aligned along family allegiances and age-similar peer groups. Cross-age or cross-family interactions are rare and there appears to be a lack of trust outside these regular/typical interaction groups.

4. Elmer's school glue for all gatherings:

School contains and connects all intersectional engagement. A multitude of activities around education engage all sorts of citizens in many different events/activities and roles for various community members. School personnel and community have developed a productive model for interaction of generations around education program, policy, and curriculum. Participation in other forms of intersectional engagement outside of school are mostly non-existent either because of lack of time, energy or interest. This is a model most often seen in the smaller outlying villages.

5. My piece of pie:

Intersectional engagement only occurs around governance or decision-making especially around resource distribution. The community lacks any continuity because programs and benefits are enacted in a piecemeal method based on leadership alliances. Leaders represent sectors, supporters and special interests instead of in the best interests of the community at large. Certain sub-groups gather around common interests like church, softball, or knitting but cross-pollinations or groups and sharing of ideas is infrequent.

KEY FACTOR: PREPARATION OF TEACHERS AND SCHOOL ADMINISTRATORS

Definition

Local indigenous teachers have navigable pathways in becoming career educators and administrators at their local schools. Recruitment process is transparent, incorporates cultural competencies, and adequately informs new hires of the social and environmental conditions they will face in their new positions. Teachers and school administrators participate in training so that they are better able to design, deliver, administer, and facilitate instruction cross-culturally.

Future Projections

1. Teach for Alaska:

Teachers and school administrators are culturally and professionally prepared. Local teachers are given opportunities to move into leadership roles in the school system. Established culturally relevant curriculum per borough and per community that is linked to the cultural preparation. There is a consistent and mandatory course of cultural preparation for all school employees that immigrate to rural communities to teach. This course of study is either a month during the summer vacation or a semester of coursework on-

site while teaching in the school. In similar methods, local teacher preparation is much improved to make the state mandated requirement much simpler to navigate and achieve which puts all rural indigenous school staffs at approximately 60% local and 40% from outside the community. Those chosen from the outside go through a rigorous selection process and sign three-year contracts with the school district through a new program called Teach for Alaska. Local indigenous school employees have fair and clear pathways to advancement and higher positions within organization.

2. The great- adventure- “I got a job in Alaska”:

Teacher preparation programs in state like UA system’s Schools of Education continue to not produce or provide the needed teachers for rural mostly indigenous schools. Cultural preparation is hit or miss. Barriers to employment continue to baffle most local prospective school employees. Nationalized curriculum, standards, and testing continue to dominate allowing for adventure teachers to proliferate the system.

3. Regional boarding schools:

Local schools close doors because of continued lack of success with school populations. There is no further need for local school employees. Regional boarding schools hire whomever is most qualified according to CV’s and resumes. Cultural preparation of teachers is looked back upon as ancient artifact of an old education system.

4. Personalized education plan (PEP) via Internet:

Lack of consensus in communities on how schools should be preparing or governing students. This leads to devolution of current school system model and the individuation of educational process and content, to each his or her own to mixed results. Students stay in their communities but learning is a much less social activity. Learning personnel take roles locally as personalized learning advisors facilitate the learning process for students. Students develop learning plans biannually with their advisors and a majority of learning occurs via the Internet. Students pursue what interests them with benchmarks that are to be achieved by the close of each learning year. Learning advisors are tasked with the monitoring and supplementing student’s self-guided learning to reach benchmarks. Schools are transformed into multi-use community centers that still support some learning activities but more informally and typically in group settings.

5. Local control, local teachers:

State eliminates budgets for public schools. Schools are handed over to local communities. The only teachers that are hired are local teachers. Quality of global education declines and subsequently opportunities for graduates to leave and pursue outside vocational or educational pursuits declines as well. But as a direct result of global compromise, local school curriculum is rife with connections to Iñupiaq language, culture, and tradition. Iñupiaq language revitalizes culture, culture retains a strong sense of valued self, this mental wellness contributes to a better ability for one to care for one’s health. This leads to an Iñupiat Renaissance.

KEY FACTOR: CLIMATE CHANGE AT THE GLOBAL AND REGIONAL SCALE

Definition

Climate describes the average seasonal cycle of air temperature, winds, ice cover and other properties of the environment. Climate change at the global level can be caused by natural processes such as changes in

the output of solar energy or interaction between the ocean and atmosphere, and also from factors driven by humans, in particular greenhouse gas emissions and land-use change. These global processes determine climate change at the regional level – with all of Arctic Alaska counting as a single region. At the regional level, climate change can have a range of positive and negative impacts on people and communities, such as milder winter temperatures, longer vegetation season, more hazardous weather conditions, reduced access to subsistence resources, threats to infrastructure from thawing permafrost, or changes in demographics due to migration. In evaluating all changes, a clear time baseline is vital.

Future Projections

Future warming of the Arctic is almost certain, as is an increase of precipitation in the Arctic. The major uncertainties are associated with the rate of change and natural variations on top of human-driven changes. An additional uncertainty pertains to the relative increases of precipitation and evapotranspiration, especially during the expected longer and warmer summers. If evapotranspiration increases more than precipitation, summer drying of soils, vegetation and ponds will increase the risk of fires and other disturbances.

We therefore distinguish several scenarios of climate change over the North Slope:

1. Warmer and wetter, with rapid warming and wetter ground:

Temperatures increase by about 10°F in winter and 5°F in summer by the second half of the Century. Precipitation increases by 25-50%, especially as the longer open-water season allows for more evaporation from the Arctic Ocean to feed storm systems. The snow season becomes shorter but snows are deeper. Summers are longer, but Arctic Ocean storms and even thunderstorms contribute to increased flooding. Permafrost active layers deepen, and the overland travel season shortens, while the longer open water season allows more offshore transportation. Ecosystem shifts alter the availability of some subsistence species.

2. Drying in a warming world:

Increased evapotranspiration more than offsets the greater precipitation. Tundra ponds and lakes shrink, and tundra fires increase. The longer summer season and reduced ice cover allow offshore navigation and industrial activity. Villages experience an increase of wind-blown dust because of the drier conditions. Ecosystems shifts alter subsistence.

3. Hothouse world with sea ice loss:

Natural variability and other drivers lead to an abrupt loss of summer sea ice, resulting in a nearly ice-free Arctic Ocean for one to two months each year. The Beaufort and Chukchi Seas are ice-free for 4-6 months, and winter ice is thin and readily deformed. As a result, temperatures increase by 10 to 15°F year-round with increased storm frequency and intensity and accelerated coastal erosion.

4. Climate change is put on hold:

Natural variability leads to a cessation of sea ice loss, and the ice of the Beaufort/Chukchi Seas becomes thicker with greater fractions of multiyear ice. Offshore ice is more stable than at present during winter and spring. As sea ice returns to its coverage of the 2000-2010 decade, the Arctic warming pauses. In particular, the recent autumn warmth along the northern Alaskan coastline does not continue, and freeze-up/break-up patterns of the early 2000s return. Climate change is put on hold for a decade or two.

KEY FACTOR: ACCESS TO QUALITY HEALTH CARE

Definition

Health care services comprise a continuum of care from prevention through treatment, rehabilitation, and maintenance of optimum health, and may include inpatient, outpatient, acute and long-term care, and behavioral health facilities. Access to quality health care is an essential component of community well-being, as it directly impacts individuals' physical and mental health and related social ills, and poses potential economic and emotional hardships when families have to seek care far away from home. Access to health care in the Northern Alaska region may refer to both physical access to care due to the unique geographical demands of remote locations in sparsely populated territories; and affordability of services. Quality of health care may refer to the quality in delivering services or the efficient and accessible documentation of patient medical history and needs.

Future Projections

1. Slow Reform, Long Road to Health:

Public and private infrastructure investments decrease, technological innovations slow. In terms of health care as a business, the prognosis is not good, hospitals are forced to close and the public demands that government take over health care to secure it as a civil right. There is a major cultural shift. Health care is a major public concern, a salient issue. Public health programs go through major reforms in an effort to streamline and coordinate care to ensure a continuum of care (from prevention to treatment), and health education programs aim to motivate individuals to take control of their own health. In short this future describes a state where funding is tight and is increasingly coming from the public sector, but program structuring is improved out of necessity to meet the unique challenges of North Alaska residents.

2. Innovation, Growth, Best Possible Health Care:

There is a boom in private infrastructure investments, partially motivated by the expansion of information technology to rural Alaska, thereby stimulating the growth of telemedicine. Individuals are able to monitor basic health biometrics via apps on their cellphones. With better infrastructure and opportunities for professionals, each hub city has a fully staffed and equipped hospital, only available in big cities before. There is also a cultural shift where health is considered a priority for individuals, and taking responsibility for it is widespread regardless of age or economic status. In addition, public health programs approach health care from a holistic standpoint, allocating for prevention as well as treatment and providing for all types of needs e.g. behavioral health care facilities, or long-term health care facilities in all hub cities.

3. You're On Your Own:

In Alaska there is a lack of public and private infrastructure investments that lead to a decline in availability and quality of healthcare. After the initial crash, certain private entities seize the opportunity to invest in Alaska's struggling health care system, alleviating the situation somewhat, but creating factions of "haves" and "have nots" in terms of access to health care. Health care is barely supported by public funds, while health insurance premiums and out of pocket expenses are extremely high. As the health of Alaska's population declines, due to the lack of preventative as well as treatment options, health care resources are pushed to a limit and leading to the outmigration of health care professionals due to extreme work conditions.

4. Islands of Care:

There is a boom in both public and private infrastructure investments, as well as technological innovations that boost telemedicine. Despite this influx of money, and technology, there is a stagnation in terms of smart program structuring, allocation of resources to meet the unique needs of Alaska residents, and a growing demand for healthcare professionals to provide services. This results in a fragmented patchwork, or islands of healthcare that is not streamlined for efficiency, with a lack of preventative and educative services. There is also a growing need for diversification of services in hub cities, such as available behavioral health centers, or long-term care facilities.

KEY FACTOR: TRANSMISSION AND RECOGNITION OF TRADITIONAL KNOWLEDGE

Definition

Traditional knowledge is any knowledge that is passed between, and co-created through, the shared intergenerational life experiences of a closely connected group of people. In northern Alaska, accumulated life experiences of more than 100 generations of Iñupiat living intimately with the Arctic environment are a part of traditional knowledge. Transmission should be understood to have multiple possibilities including the transference between knowledge holders and others who may be Indigenous or not, who may be living in rural and indigenous communities or not. Recognition is also twofold. On the one hand it means acceptance of this form of knowledge as existing and containing truth, for example resource managers understanding there is traditional knowledge related to animal migrations. On the other hand it means creating pathways so that traditional knowledge itself can be recognized, for example what language skills must a young person have to recognize and receive traditional knowledge from an Elder? In the last two centuries cultural trauma created by western colonialism has fractured traditional transmission processes and altered the form and content of current knowledge creation.

Future Projections

1. TK Top Gear:

There is full transmission and recognition of traditional knowledge across the region and among different populations. A system for documentation and dissemination and of traditional knowledge developed by joint groups (e.g. tribal governments, community groups, universities) to recognize and cite the holders and contributors of traditional knowledge. Multiple methodologies developed so that this is not just visual or text-based documentation and sharing. The program is so successful UN adopts as global model. Schools spend 50% of the day practicing and participating in traditional knowledge of local culture and other 50% of the day delivering state developed program of education. Youth consistently engaged in traditional activities within the community as well as sharing skills more broadly in travel to other locales.

2. TK Flourishes then dies out:

Traditional knowledge becomes widely recognized. Local experts regularly cited. Elders held in equal esteem to scientists and academics for the knowledge they hold and convey. Co-management processes include the use of TK in decision-making and planning. But, there is a major disconnect with the transmission of

traditional knowledge to younger generations, as such, traditional knowledge experiences a short-lived revival. The revival is followed by gradual disappearance of Iñupiaq traditional knowledge, as the youth cannot be pried from screen time to participate in traditional Iñupiaq customs.

3. TK in Neutral:

Some inroads are made to cite and give credit to traditional knowledge holders but the process and policies are inexact and inconsistently enforced. Collaboration between local knowledge holders and scientists exists sparingly and typically amongst only those with long-term work relationships and trust capital built through honoring and recognizing traditional knowledge. Transmission of TK is around the harvest of subsistence resources and language use concerning harvest but otherwise Iñupiaq language and traditional knowledge mostly suffers the fate of extinction.

4. TK Separatism:

All collaborations amongst the academy and local Northern Alaska communities are disbanded. Emphasis within communities is only concerned with the transmission of TK to subsequent generations of Iñupiat. A renaissance period ensues around Iñupiaq culture, language, and traditional knowledge. Knowledge bearers feel it has never been stronger. The lack of collaboration with scientists from the academy results in incomplete adaptation based upon traditional knowledge that has not grappled with the rates of change Northern Alaska communities are observing impacting their communities. Communities fall into decline.

5. TK Reverse:

Academics co opt traditional knowledge and use without acknowledgement of source. Generational disconnect develops wider and deeper chasm between generations of potential TK holders and future practitioners. Digital culture develops at exponential speed with terrestrial Internet connectivity. Traditions from Iñupiaq cultures become museum pieces. Iñupiaq language dies off by mid-century, 2050.

KEY FACTOR: DEMOGRAPHICS

Definition

Demographics refer to the measurement of human populations across both space and time. Age, gender, and ethnicity are often considered. General population density and distribution is a consequence of birth and mortality rates combined with household and individual decisions on where to live and when to move. In northern Alaska, trends concerning out migration of Iñupiaq populations, as well as, in-migration of non-Iñupiaq populations are important factors. Age and gender distributions within these populations are important to consider in thinking about how populations are composed in the future. Movement between villages, hub communities, and urban centers is another important consideration.

Future Projections

1. Sustaining population numbers:

The general nature and character of hub and village communities remain similar to today. Village communities remain predominantly Iñupiat. Hub communities exhibit greater cultural diversity as the extractive industries of both boroughs cycle through growth and decline. There is a slow growing cultural disparity between those Iñupiat who move away to seek opportunity and live in Fairbanks or Anchorage,

returning only for whaling or hunting, and those people who remain in the communities year round. Non-Iñupiat continue to live in the boroughs during their employment in extractive industries or government or non-profit jobs.

2. Diminishing population:

People leave across the age groups and the majority of them do not return. Youth leave their home communities for hub communities and southern cities for educational opportunities, young women (in particular young mothers) leave to access social services, those in middle age who cannot find employment leave for jobs, and the elderly leave for medical care (often taking youth with them for assistance). Over time the population of the region is largely made up of part-time employees with no roots in the communities (e.g. oilfield or future port or mine workers), some Iñupiat who for different reasons have not sought opportunity elsewhere, and some other government employees. The remaining population is majority male or seasonal subsistence hunters.

3. Restructured population:

Major growth and development in the region occurs without long-range planning and large flows of cash into the region means non-Iñupiat in large numbers move into rural communities to take advantage of new economic opportunities and subsequently have a major impact on culture and age/gender distributions. Many residents decide to leave due to changes in their communities and the new opportunities that wealth in the region creates for them to travel and live elsewhere.

4. Increased population:

Long-range planning to keep and grow population in the boroughs pays off. People across the age groups leave in smaller numbers and the majority of them return because communities are safe and there are job opportunities. The creation of sustainable energy infrastructure has lowered the cost of living and the remote characteristics of the region attract outsiders to move in, further diversifying the local economies of the hub cities and some villages. There is an increase in non-Iñupiat residents, but the Iñupiat population remains a majority in both boroughs.

KEY FACTOR: COST OF LIVING

Definition

Cost of living refers to the relative expenses of a household to define and achieve a standard of living that meets their expectations. This is context dependent and highly variable at community and family scales. However, for many households in the Northern Alaska, this involves a balance of subsistence and cash-based activities to meet (minimum) cultural, nutritional, medical, transportation, energy, and housing needs. Worldview and cultural identity shape the way in which these needs are met and require trade-offs in the amount of time invested in either subsistence or cash-based activities. The modern context requires at some level participation in the cash economy to engage in subsistence activities

Future Projections

1. Lower cost of living:

Efficient locally generated energy lowers household energy expenses, abundant and accessible subsistence resources lower food costs and expenses tied to mental and physical well being, increased employment and local business opportunities improves availability of cash.

2. Steady state cost of living:

Mixed locally derived and imported energy sources helps to mitigate potential rising fuel importation costs and decreased state energy subsidies, changing patterns of subsistence resource abundance and accessibility creates occasional resource scarcity, continued reliance on state, tribal, or other public funding sources for cash-based employment opportunities provides limited and uncertain long term economic security.

3. Increased Cost of Living:

Increased dependence on external fuel sources makes communities dependent on volatile energy and transportation prices. Subsistence resources become scarce and no longer offer sufficient nutritional or cultural benefits to lower food, mental or physical health expenses. Declining state and public funding opportunities decrease cash flow into communities.

4. Barter and Trade:

A return to primarily a locally generated economy. Energy and nutritional needs are met from local resources with the effect that there is a dramatic decrease in cash-based needs. This results in fewer connections to outside economies- decreasing the impacts of larger scale economic fluctuations, but increasing sensitivity to changes in local resources and the ability to impact the larger scale factors that impact them.

5. Rise and crash:

Rapid increase in the cost of living results from non-regional factors (climate stressed food markets, changes in the energy market, or regulatory/policy environment). The local ability to dampen the results is tested and a severe regional economic depression ensues

KEY FACTOR: PAN-ARCTIC COLLABORATION

Definition

Pan-Arctic collaboration describes the degree to which arctic stakeholders cooperate around political, economic, social, and environmental issues in the region. The eight arctic nations play the key role in pan-Arctic collaboration, but other entities are influential too, such as the Permanent Participants at the Arctic Council (representing indigenous interests), and certain international agreements, corporations, non-government organizations, and non-arctic states.

Future Projections

1. Global harmony:

Highly collaborative international partnerships exist between Arctic and non-Arctic nations that share responsibility for sustainable development, environmental protection and Arctic security. All nations have ratified United Nations Convention on the Law of the Sea (UNCLOS) and there are no territorial boundary disputes. Indigenous interests are well represented as the Arctic Council strengthens ties among Arctic stakeholders, and ensures that wealth from increasing resource development activities compensates for impacts to Indigenous communities. Decades of coordinated scientific research in the Arctic help to improve system-level understanding of climate change.

2. Business as usual:

The Arctic Council helps to facilitate continued cooperation in the Arctic, but national interests and political actions outside of the Arctic result in strained relationships among Arctic states. Non-Arctic states

retain an observer status in the Arctic Council and are not very influential in Arctic activities. Indigenous interests are considered important but large-scale organizations do not accurately understand indigenous interests. Implementation of Arctic national strategies differ, and do not uniformly align with Arctic Council recommendations. The US has still not ratified UNCLOS and there are some territorial disputes, but these have not escalated to conflict because there is no rush for resources.

3. Divided Arctic:

Arctic nations focus on national policies with an emphasis on resource development and national security. Nations withdraw into domestic agendas and exhibit reduced international engagement. Non-Arctic states significantly influence Arctic development and marine transportation activity. Territorial disputes occur. Significant Russian investment in Arctic infrastructure leaves other Arctic nations lagging behind in Arctic infrastructure and military presence. Distrust among Arctic nations escalates and conflicts arise due to a lack of cooperation over responses to climate change impacts and environmental disasters. Indigenous interests come second to national security and a rush for greater development. The Arctic Council is not effective at improving international collaboration as nations scramble to protect their boundaries and compete for investments to build Arctic infrastructure.

4. Arctic for the Arctic:

Strong collaboration among Arctic nations focuses on the protection of resources and careful development for the exclusive benefit of Arctic nations and indigenous residents. Non-Arctic states are increasingly shut out of Arctic resource development opportunities, although there is increasing global pressure to gain access to Arctic resources. The Arctic Council is effective at ensuring that indigenous interests are strongly represented resulting in a slow pace of development with an emphasis on environmental protection.

KEY FACTOR: TRIBAL GOVERNANCE

Definition

Tribal governance refers to the traditionally organized decision-making structures within the Indigenous groups in the Arctic from families to regions. It includes the traditional process of selecting leaders and coming to consensus on decisions. The concept of governance is broader than simply a government - a public institution in the U.S. subject to electoral democracy in accordance with the U.S. Constitution. Today, Alaska Native organizations can be divided into several categories, in accordance with their type as legal entities: 1) governments; 2) economic profit organizations; 3) nonprofit organizations; 4) multiregional and international organizations (Case & Voluck, 2002, p. 317-318). The many Alaska Native authorities and their differing capacities to make or influence decisions means tribal governance exists within many structures and processes related to power and the shaping of individual and collective actions.

Future Projections

These rest on the capacity of tribal organizations to wield power over individuals and collective actions through decisions related to the territories for which tribes are responsible and the people and activities in those locations. This will depend primarily on the negotiations among Alaska Native organizations, state and federal governments over time.

We identify the following future projections for tribal governance in Alaska:

1. Autonomy for Alaska Native Government:

The authorization of a return to the Indigenous people of the region the governance of what was the State of Alaska, given that the Indigenous people living here for millennia never surrendered, ceded, or formed treaty for their lands. This future would create an Autonomous Alaska Native Territory (AANT) with a relationship to the United States as a sovereign nation. The AANT would assume responsibility for its own formation of governments, political processes, legal guarantees, enforcement capacity for these guarantees, and funding mechanisms. Non-Alaska Native peoples can remain in the territory but are subject to AANT rules as they would be in any nation.

2. Tribal Government Paradigm Shift:

There is an affirmation and expansion of Indian Country under “land into trust” in Alaska that increases the jurisdictions of tribal organizations, in particular over the management of key aspects of “traditional and customary” use of land (i.e. subsistence livelihoods). In particular this process recognizes a Native Ways of Life priority, creates more and more equitable partnerships between science and Indigenous peoples where there is co-management, provides greater rural and Indigenous control over school systems, and fully develops a system of tribal justice in accordance with recent Supreme Court decisions and the Indian Law and Order Commission Report (2015). Tribal compacting would expand dramatically so that program design and delivery are culturally responsive and regionally appropriate. Larger numbers of Alaska Native and rural people are elected or appointed to offices.

3. Status Quo?

Organizations and their formal authority remain the same, but degree of decision-making varies based on ongoing negotiations among governments and informal political gains or losses. The ongoing struggle between state and federal authority in relation to subsistence priorities continues. Business priorities and development remain dominated by the South. Collaborative practices continue among tribes and governments but under the dominant idea that rural areas are a drain on the state and have little capacity to govern themselves. The traditional public government arenas remain open to Indigenous people.

4. Shrinking Tribal Authority:

There is a second wave of colonialization as ever increasing state and federal laws tied to Southern priorities reduce the decision-making that can be exercised. New federal and state legislation prevents effective tribal growth and development by banning a suite of Alaska Native practices related to land stewardship, religious practices, education, and justice. Larger numbers of non-rural residents and non-Indigenous people are elected and appointed to offices that make decisions for tribal areas and people. Police and other employees in rural locations are increasingly from outside Alaska. The majority of programs targeting Indigenous people for educational and workplace development are no longer funded.

KEY FACTOR: ACCESS TO AND AFFORDABILITY OF HOUSING

Definition

“Housing” as a concept generally refers to the social concern that people have safe access to a home in which to live, whether that be a single house, an apartment, or other form of dwelling. For housing to function there are “four factors found to be central to successful housing outcomes... (i) socio-demographic issues, (ii) culture and design, (iii) consultation processes, (iv) the costs of remoteness, and (v) procurement and delivery processes and systems” (1) The U.S. Department of Housing and Urban Development defines affordable housing as housing, including utility costs, that costs 30% or less of a

family's total gross income. Housing is considered an important factor in a comprehensive public health assessment, and is a recommended component to effective, strong public health system partnerships in the Northern Alaska region (2).

Future Projections

Over the years the quality, affordability, and use-ability of housing in the region has depended on land ownership, population changes, energy and construction costs, climate and weather patterns along with structural aging, and community needs.

We identify the following four future projections for housing in the region:

1. Status Quo Creep:

Population numbers stabilize in Northern Alaska. Energy costs remain on average similar to the last 10 years with similar boom and bust cycles. In addition, the climate warms steadily but there are few unexpected catastrophes of heat or cold. There is slow increase in both locations of renewable energy infrastructure and more efficient homes. There is little coordinated planning across agencies at borough, tribal, state, and federal levels to help manage housing stock. Living conditions generally improve with the advance of technology, with those living in the least affordable housing having the best improvement in quality of housing, but there is little innovation in community planning.

2. Unplanned Boom and Bust:

Rapidly warming temperatures and heavy industrial development press large numbers of people move into the hub cities and even villages. There is a construction boom to catch up to demand and oversupply on the short-term. Little consultation occurs between construction companies and communities to determine appropriate housing design. In the short term vacancy rates across Northern Alaska provide a robust real estate market for buyers and renters. Then, new home construction comes to a halt. Overcrowding conditions worsen. A patchwork of tribal and government organizations and private funders continue to build new housing in Northern Alaska. This does little to address the needs of lower income families, or transitory workers, who continue to live in sub-standard housing or pay more than 30% of their income on housing expenditures.

3. Planning for Rapid Changes:

Rapidly warming temperatures and heavy industrial development press large numbers of people move into the hub cities and even villages. Tribal organizations and local governments require consultation with construction projects to ensure effective community reviewed design of homes and other buildings across the region. More land is made available for purchase by individuals. The region invests heavily in making homes energy efficient for oil and gas usage. Housing remains largely a free market process. Housing speculation allows people and organizations to make money from selling real estate, but with better quality homes produced. This does little to address the needs of lower income families, or new residents, who continue to live in sub-standard housing or pay more than 30% of their income on housing expenditures.

4. Sustainable Planning for Gradual Change:

Tribal and state housing authorities are able to modestly increase available housing, for rent and purchase, in communities. Tribal organizations and local governments require consultation with construction projects to ensure effective community reviewed design of homes and other buildings across the region. The region invests heavily in making homes energy efficient and tied to renewable sources of energy across the community. Strong tribal and governmental regulations shift building and community planning codes to

provide affordable, culturally relevant housing for all residents of the region. There is a marked shift in the organization and layout of buildings and homes to create largely self-sustaining communities that integrate community needs. For example, people's homes will have ice cellars, homes will be close to community gathering buildings, energy and food production or childcare and eldercare buildings will be combined.

KEY FACTOR: LOCAL DETERMINATION

Definition

Local determination of choices made by governments at different levels would mean that residents and interests in locations affected by government choices would play a major role in determining the policies that affect them. This key factor is tied to local preferences regardless of ethnicity; the definition does not specifically address indigenous sovereignty (see Land Management and Ownership).

Future Projections

Over the years participation in decision-making that directly impacts the local-levels in the Northwest Arctic and North Slope Boroughs have been tied to (1) legal regime changes that formally include local residents in decision-making through a variety of means from listening sessions and public input processes to grant of decision-making authority; (2) amplification of the voices of local residents to influence decisions made by non-locals through increased voting, monetary power, larger populations, and attention focused on local issues; (3) the number of residents from the region who are in positions of power to formally make decisions, such as elected and non-elected offices in government administration, agency management, and tribal and corporate organizations.

We identify the following future projections or local determination of decisions affecting the North Slope and Northwest Arctic Boroughs:

1. Increasing power over and involvement in decision-making:

85% or more of Alaska Natives registered to vote and do, more Alaska Natives run for office outside the two boroughs, and local scale interests can agree among themselves how to resolve key debates over development, social services, education, and other significant regional issues. More attention on the region is translated into effective pressure placed on governments at the state and national level along with the Arctic Council through lobbying, testimonies, and media. As more residents gain credentials and willingness to take on decision-making roles in governments, tribal and community organizations there will be more people from the two boroughs in positions of power. This increases decision-making authority. This authority may include changes to the rules of engagement to require more local scale actors in decisions affecting their region.

2. Decreasing power over and involvement in decision-making:

The two regions isolate themselves and turn inward to focus only on local priorities over which they have control. Voting and political activism declines and fewer residents make efforts to discuss difficult subjects to form agreements about how to plan for the future. Local authorities, residents, and groups cannot reach agreements among themselves to press claims on higher levels of decision-making so there won't be changes in local determination and there could be a removal of local decision-making control over time because state and federal actors decide they must manage lands and other concerns for the rural and Indigenous populations. Population declines as more residents leave the region due to lack of opportunities

in education, jobs, and social services, and/or there are severe impacts to subsistence livelihoods.

3. Increase and decrease in power and decision-making:

This is due to competing local scale interests that due to debate cannot consolidate a voting bloc or reach consensus on where to focus money, energy, and time in political debates. As more residents gain credentials and willingness to take on decision-making roles in governments, tribal and community organizations there will be more people from the two boroughs in positions of power. This increases decision-making authority. This authority may include changes to the rules of engagement to require more local scale actors in decisions affecting their region. However, if local authorities, residents, and groups cannot reach agreements among themselves to press claims on higher levels of decision-making there won't be changes in local determination and there could be a removal of local decision-making control over time.

KEY FACTOR: LANGUAGE PROFICIENCY

Definition

Language proficiency implies the ability to use an acquired language in everyday settings and in a fluent manner that is easily understood between communicators. Exactly what defines "proficiency" is debated. However, it is certain that real language proficiency moves beyond the classroom to involve competency in applying the language to a variety of environmental and social settings. Maintaining or revitalizing language proficiency requires intergenerational communication and the transmission of traditional knowledge. It entails much more than utilizing a few key phrases and words into another more dominant language.

Future Projections

1. Accelerated revitalization:

Language revitalization efforts reach a tipping point with Iñupiaq used as the primary language in school, at homes, and in institutional settings for tasks such as business applications, election ballots, and resource permits. Signs and other public expressions of language are required to be bilingual. As a result, future generations learn Iñupiaq as a first language and English is taught in schools as a second language in "English class."

2. Partial revitalization:

Iñupiaq continues to be taught as a second language class in school from kindergarten on, but is only sporadically used at home in everyday conversation, and is not institutionally incorporated. Scattered social media groups devoted to maintaining awareness and sharing vocabulary persist and are well used but do not move beyond the "Iñupiaq-as-a-second-language" premise that they currently operate under.

3. Regression:

As the few remaining elders who speak Iñupiaq fluently pass away, awareness for the importance of language revitalization declines and the knowledge base to build it back up disappears. Efforts to teach the language in the schools diminish and eventually fade away all together. The language is not spoken at home and never seen in public places or documents. Knowledge of the language becomes cloistered in dusty university databases that are only rarely-- if ever-- accessed by people studying past cultures.

KEY FACTOR: LOCAL ACCESS TO EDUCATION FOR COLLEGE, CAREER, AND LIVELIHOOD READINESS

Definition

Education that is locally accessible should be available that will prepare people to enter college, vocational and skill based programs, and to learn livelihoods. These can come from different post- secondary learning institutions for academic degrees and vocational skill sets, but also include situations such as one-on-one learning (mentorship), and socio-cultural activities (e.g. sewing, sled- making) that prepare people for independent livelihoods. This process begins during K-12 school years and continues through post-secondary learning institutions and options.

Future Projections

1. Arctic Knowledge League (AKL):

Local options like Ilisagvik College and Chukchi Campus develop into small universities offering 4-year degrees in many locally necessary career fields, especially Arctic studies related. The two universities offer a variance of courses from traditional Iñupiaq skills, workforce skills in demand in the region, and 4-year degree course offerings. The universities also offer a wealth of global courses through programs like the University of the Arctic. All of Northern Alaska is united via high bandwidth Internet. Each of the higher education hubs ends up specializing and through digital connectivity, they become partners in offering local access to meaningful higher and continuing education opportunities. Students are attracted from within the community and internationally. Education in Northern Alaska becomes an important driver of regional economics. Alaska Natives revisit and develop new pedagogical methods that incorporate the old ways of teaching and anticipate the new through concerted efforts in Northern Alaska. Alongside this there also develops one of the newest university rivalries, the famous Ilisagvik vs. Chukchi basketball games and Pan-Arctic Alaska Sno-Go Challenge.

2. Workforce Colleges:

Northern Alaska colleges continue to offer the same type of programming that they offer today. Administrators do their best to address pressing workforce needs through new class offerings. Enrollment continues to steady but opportunities are piecemeal to impact immediate job training needs. Nevertheless, many students must still leave their communities to seek access to higher education opportunities. Both colleges continue to offer accelerated dual-credit learning opportunities for high school students. Non-accelerated high school students arrive completely unprepared as curriculum collaboration and advisement between public school system and colleges remains undeveloped. Traditional Iñupiaq skills development occurs informally in the community. Subsistence skills are still highly valued but other skills dwindle in importance and die out over time. Internet bandwidth still remains elusive, which limits the capacity for a full suite of distance learning opportunities.

3. Universities of Alaska, No-thanks:

All colleges and universities shutter their doors. State of Alaska deletes all funding of universities in the year 2025 over the course of the next 5 years. Students must finish their degrees by 2030. On-the job training or training in Indigenous skills happen informally in communities. Populations dwindle. Villages decline and hollow out. Most congregations of populations are only around what resources can be extracted from Alaska's lands. The vibrancy of Alaska's Indigenous cultures and languages fades into a distant horizon by the year 2040.

4. Arctic Minerva:

Both colleges develop into facilitators of access to higher educations and job training. Each college is a hub of enormous bandwidth. Students come to attend classes in small classrooms hooked up digitally. Technological support, educational advisement, career planning and local educational experts on Iñupiaq culture/skills/language become primary employees of the new universities. Distance learning is the wave of the futures. University networks become more fully developed and reciprocity between universities enables university credits to flow like knowledge currency.

5. At-home higher learning:

Both colleges close down. Enrollment drops with neither college meeting the demands of local industry nor student needs. Students must seek higher education outside of their communities. Large bandwidth access is universal and affordable. Students develop their own personalized learning plans. Out of the colleges' demise sprout a new industry of educational advisement that is done on a local or digitally delivered basis. Higher education access is more accessible but because of its lack of face-to-face time, students do not engage and system works for select few. Traditional Iñupiaq skills experience revival across Northern Alaska communities as students seek out ways to reconnect.

KEY FACTOR: ACCESS TO MARKETS

Definition

Rural communities in Northern Alaska lack efficient access to modern marketplace economics due to their remoteness [see Cost of Living, Housing, Local Access to Education for College, Career and Livelihood Readiness] and regulatory restrictions [Subsistence Security, Participation in the Regulatory Process]. Market access can enable competition of local vendors and can lower costs of goods, it also means goods produced in the boroughs may be able to make it to markets elsewhere in the U.S. and abroad. Market access can stimulate community development but it can also bring influences that may be unwelcome to communities - this may be related to physical development, demographic shifts, or black market goods.

Future Projections

1. Arctic Development:

There is a boom in oil and gas production in the northern coastal region. This produces a new deepwater port in Nome to manage increased shipping traffic and the Roads to Resources project creates infrastructure and travel routes into both the North Slope and Northwest Arctic boroughs. This increases the flow of goods in both directions, and somewhat lowers costs.

2. Local Planning for Sustainable Markets:

Borough budgets are directed towards long-term investments in sustainable projects for communities that provide jobs such as renewable energy systems, education centers, tourism, and health care. There is an increased focus on education for jobs that can be "remote" and on jobs that fill community needs. There is heavy lobbying to change federal and state laws to permit management and sale of harvested animals.

3. Market gloom:

A global recession results in a decrease in shipping and extractive industries. Infrastructure development slows and cash becomes scarce in villages as unemployment rises in the boroughs. Innovative programs in

education and workforce development loses funding. People rely more than ever on subsistence, family, and community networking to provide for themselves.

4. Status Quo:

The boom and bust cycle tied to extractive industries remains. There are some periods of infrastructure development and cash flow followed by periods of high unemployment and out-migration.

APPENDIX C

ORIGINAL “MOST ROBUST” RESULTS

Key Factor	Most Robust Result (consistent + plausible, original unweighted)
Inupiaq values	<i>Status-quo mixed control</i>
Subsistence Security	<i>Status-quo dual system</i>
Sustainable Energy	<i>Escalating cost of energy</i>
Regulatory Process	<i>Regulatory patchworks</i>
Interaction of levels of government	<i>Status quo</i>
Substance abuse and related crime	<i>Increased rate of abuse</i>
Intersectional engagement	<i>Generational disconnect</i>
Preparation of teachers and school administrators	<i>The great adventure</i>
Climate change	<i>Rapid warming with wetter ground</i>
Access to quality health care	<i>You're on your own</i>
Transmission and recognition of traditional knowledge	<i>Neutral</i>
Demographics	<i>Sustaining population</i>
Cost of Living	<i>Increased cost of living</i>
Pan-Arctic collaboration	<i>Business as usual</i>
Tribal governance	<i>Status quo</i>
Land Management and Ownership	<i>Mixture of stronger and weaker values</i>
Housing	<i>Status quo creep</i>
Local determination	<i>Increase and decrease in power and decision-making</i>
Language proficiency	<i>Partial revitalization</i>
Access to education	<i>Workforce colleges</i>
Access to markets	<i>Status quo</i>