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# CLIMATE CHANGE IN NATIVE AMERICAN COMMUNITIES: CHALLENGES OF COMPREHENSION, CONTEXT, & COMMUNICATION

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For the degree of Master of Science



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CLIMATE CHANGE IN NATIVE AMERICAN COMMUNITIES:  
CHALLENGES OF COMPREHENSION, CONTEXT, & COMMUNICATION

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of

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Patrick A. Freeland

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We are honored to live in this world together as all peoples are indigenous to this planet. We are proud that we have the opportunity to live up to our individual and collective rights and responsibilities as we remain mindful of generations. We respect the life that we are blessed to share as we carry out our disciplines to the best of our abilities. This thesis is dedicated to the young Native researcher, with any luck the lessons learned from this endeavor will help to save some time and promote good work in Indian Country.

In service and friendship, Mvto.

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## PREFACE

Long before I began a career as a researcher, before I even realized that I was an American Indian, Native American, or Hvtvltvlke Mvskoke (Wind Clan, Muscogee Creek Nation) I was just a child, my worldview shaped by the country around me and my ways of knowing were shaped by my family. One summer afternoon, my Mother was driving me home from school. Earlier that day, I had learned about something called “pollution.” After our third grade teacher had discussed the recent news regarding a thinning of the ozone layer in Antarctica, questions about how long it took for all those chemicals to reach the ozone layer led to more questions: what else was in the air? How old was the air? How it had changed over time? Naturally, if I wanted to know what something was like, I would ask my Mom. My first question was simply, “what was the Earth like when you were a little girl?” She thought for a moment and said simply, “it was cooler.” I was always amazed at how my Mother managed to simplify some of the complexities of knowledge into just a few words. I knew that what she told me was the truth because she had experienced it.

It is one thing to be told something, and another to experience it. It is through both contexts that knowledge is constructed. The concept of *experience* does not necessarily denote a singular event, as during experience, each of the senses are engaged. Experiential knowledge is based on space, more so than time, as some experiences can span decades in totality, and shared cultural experiences can span centuries or even millennia. These interpersonal constructions of knowledge are plural, constructed by society through individual and shared epistemologies. As singular beings, our own construction of objective reality leads us to act, and therefore affect true objective reality. As collective beings, we socially construct reality, based on shared perceptions, verified through interpersonal feedback. By relying upon multiple knowledges, we gain a clearer understanding of our world.

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## ABSTRACT

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Very little literature exists which details how climate change impacts Indian Country. This study first investigates how US newspaper stories published from 1991 to 2011 present American Indian/Alaska Native (AI/AN) perceptions, and observations, of environmental changes resulting from climatic change. Several specific risk, impacts, and vulnerabilities were documented, and observations of climate change from AI/AN perceptions were analyzed for content to identify three frames of perspective: pan-Indian, tribally-specific, and individual perceptions. By law, ethical considerations are paramount when dealing with research in Native American tribes and communities. While each nation is supposed to review research to assess the risk and beneficence of research, in practice several tribes have neither a standing research ethics committee nor institutional review board. This research next details the methodology of contact, communication, and consideration when working with tribal nations in the US. This research further identifies the challenge of bridging information from Indigenous knowledge systems, public media, and western scientific methodologies, while complying with ethical standards, scientific objectivity, and transcultural honor, pride, and respect.

## 1. INTRODUCTION

*“Native Nations have already disproportionately suffered the negative compounding effects of global warming and a changing climate” [1]*

American Indian, and especially Alaska Native, tribal cultures are integrated within their respective ecosystems. The plants, animals, land, and waters serve as the principle source of subsistence and also hold immeasurable cultural significance [2] [3]. The Fourth Assessment Report of the UN Intergovernmental Panel on Climate Change emphasized that American indigenous communities are among the most sensitive to climate change in North America and that “indigenous communities in northern Canada and Alaska are already experiencing constraints on lifestyles and economic activity from less reliable sea and lake ice (for traveling, hunting, fishing, and whaling), loss of forest resources from insect damage, stress on caribou, and more exposed coastal infrastructure from diminishing sea ice” [4]. The Native Peoples Native Homelands II brought together AI/AN community members, youth and elders, spiritual and traditional leaders, scientists, and activists to “acknowledge that to deal effectively with global climate change and global warming issues all sovereigns must work together to adapt and take action on real solutions that will ensure our collective existence” [1]. Most recently, the third draft of the National Climate Assessment contains a section specifically addressing impacts of climate change on tribal, Indigenous, and Native lands and resources to only further clarify the severity of climate change impacts and urgency to address transnational policies to mitigate, and adapt to a rapidly changing planet [5].

## 1.1 What The Literature Says About Climate Change in Indian Country

Politically, there have been several calls for action; however, the ability to affect proactive change must rely on accurate and comprehensive information about impacts on indigenous communities. While some sovereign AI/AN testimonies and policy decisions are included in the intergovernmental reports, the most significant contributions to the reports have been through scholarly and legal documentation. The academic literature analyzing the impacts or perceptions of climatic change within indigenous communities in the United States remains fairly limited, however the overall amount of information is increasing exponentially, especially as continued large-scale environmental changes occur in Indian Country and the greater United States as a whole. In the past two years, more research has been published concerning American Indians and Climate Change than in the previous two decades. Early works focused on general overviews of environmental values, most information assessed from historical record, with an attempt to identify a land ethic as common ground for natural resource management [6] [7]. However, the literature concerning Native Peoples perceptions of climate change, or the impacts to specific indigenous communities has only been really expounded upon within the past 20 years. Of particular focus, Alaska Natives and other arctic communities have seen the greatest foci of impacts both experiential and predicted. As a result, research related to species migration, ice and permafrost melt, removal and cultural degradation all describe, in plural, the very real effects of anthropogenic climate change [8] [9] [10] [11] [12].

Other research identifies the impacts of climate change, and some common perceptions, within tribes aggregated into comprehensive studies which further highlights the problems that tribal nations face in loss of ecosystem services, such as drinking water due to drought, fish due to warming waters, land due to sea rise, and other systemic impacts which effect everything from tribal economies to cultural practices [13] [14] [15] [16] [17] [18] [19] [20] [21] [22]. A fairly novel method to develop a less “top-down” approach is to identify how climate change affects the tribes through

collaboration with tribal members. Reo and Parker [23] assert that ecohistorical rather than ethnographic analysis couples humans and environment over time into a single system. Shearer [24] also utilized a political ecological framework to observe adaptation to climate change based on both internal perception and external pressure which recognizes the hegemony of western research in indigenous communities; another way to think of this is to identify climate change as a conflict and make the observable effects of climate change the unit of analysis rather than the specific tribe or nation, and any form of adaptation is framed as an enactment of justice as a form of resistance to neoliberal institutionalism. This transdisciplinary approach has also been utilized to blend other forms of geospatial data with traditional knowledge to ascertain both the specific impacts of climate change as well as provide an avenue to increase adaptive capacity [25] [26] [27]. The concepts of Honor, Pride, and Respect, may therefore be further thought of as a research method, as opposed to simple ideals [28]. Furthermore, AI/AN researchers who infiltrate western institutions have the responsibility and “authority to ask new and different questions based on histories and experiences as Indigenous people” [29].

While the current literature illustrates several pertinent cases, the heterogeneous nature of tribal communities within the US indicates that there exists a large amount of unknowns. Within the literature, there still exist challenges to connect local and regional vulnerability assessment. Outlines for proactive policy as a climate change adaptation measure also seem to be unaddressed. The most common suggestions usually default to non-fossil fuel based energy sources, federal assistance, and more research. Finally, a major component missing in literature are the methods to gain consent for research in tribes which have no research review process, which is ultimately a major reason why the AI/AN voice is lacking in research publication. Most researchers do not have the capital of time, funding, or personnel, to properly gather information from tribal nations. Arguably, the majority of researchers do not realize that when consent is sought to collect data, the researchers are asking to forever be a part of the lives of the People.

## 1.2 Concerning That Which Is Not Written Down

The general lack of AI/AN perceptions of climate change in scholarly literature can be further complicated by cultural biases and an over-generalization of native peoples' perspectives [30]. Oral histories, story-telling, and local ethnographies are often discounted in traditional scientific understanding as mythology or folklore [31]. Other challenges are in the interpretation of cultural foundations. For instance, an idea which emerges from this worldview is the idea that space is not a commodity, rather it is a relative. "By regarding all things as relatives, not resources, natural laws dictate that people care for their relatives in responsible ways" [5]. This stems from the *pan-indigenous* theme of identity relative to place and family [32]. Often times, these types of knowledges are dismissed as ethnocentrism. In order to understand native peoples' perceptions of climate change, it is important to understand the context of the indigenous knowledge system in relationship to the tribal nations' understanding of place, as well as understand how the indigenous group fits into the surrounding cultures.

The idea of a changing climate is not a novel concept to the indigenous peoples of North America. The Hohokam civilization existed in what is today Phoenix, between 750-1200 AD [33]. The cultural complex had meticulously constructed an irrigation system, yet due to diminishing water resources, the civilization left the area long before European contact. In contrast, the Cahokia cultural complex of 1810, consisting of massive earthen mounds and woodhenges, predated St. Louis [34]. A "warming-hole" in the upper Mississippi River Watershed allowed for more favorable conditions for civilization [35] allowing access to more natural resources and agriculture, resulting in increased specialization, which led to increased trade along the Mississippi river. The warming trends and receding glaciers lead to the growth and elaboration of the cultural complexes in relationship with the surrounding environment. While most of the documented histories of these places rely on archaeological evidence or

record from European contact, the same knowledges are present in descendants of these cultural bases.

In the United States today, there exist 566 federally recognized tribes [36], and although all tribes have faced a degree of imposed western hegemony, oral histories and language remain an important cultural aspect of each nation. Contemporary perceptions and social constructions of climate change range from a collective pan-Indian call for action against global warming, to local observations of change in weather, and plant and animal migrations, as well tribal and mainstream media. Analyzing the flow of information from a frame of ethnography through western documentation poses a particular problem when gaining an understanding of climate change, as an Indigenous Knowledge System (IKS) is neither static, nor uniform, and entirely dependent upon the culture, space, and time in which it is observed [37] [38]. Observations of environmental changes in the surrounding environs are all described in familiar terms based on a relationship to the specific place. Observations from tribal members are recorded in memories of how a place has changed over time, or how immediate family members recall certain environmental conditions that have changed. For instance, a study conducted of an Inupiat Eskimo village on Alaskas North Slope in 2003 and 2004 sought to observe the effects of environmental change through local cultural perceptions [39]. In this study, nearly 1 in 3 of all people surveyed lived a subsistence lifestyle, with traditional ecological knowledge being the primary information system.

The source and content of information observed through a western lens can seem purely anecdotal with no literature or objective quantifiable data to illustrate the depth of changes. The idea of knowledge integration is resisted in scholarly work on the grounds that the conceptual models and ontologies of traditional knowledge and science are sufficiently distinct to make these knowledge systems incommensurable [40]. Other problems arise with the idea of either indigenous knowledge systems (IKS) and/or traditional ecological knowledge (TEK) is sacred knowledge and is not meant to be exploited in any fashion by western institutions [?] recovering. Ordinarily



this would pertain specifically to ceremonies and religious customs within a specific tribal community, which are often inseparable from everyday lifeway systems [41]. Nonetheless, there have been instances in which integration of IKS and science served a greater community. A recent study of drought conditions and sand-dune migrations in the Navajo Nation conducted by the United States Geological Survey utilized climate data and remote sensing to observe climate changes. TEK corroborates the conclusions reached by scientists by asking Navajo elders about what they have seen. The reports illustrated that “that they had seen grass grow in areas where no grass grows now” [42]. While there are ecological principles of succession and colonization, the IKS frame explains the same information. Given the complementary strengths and weakness of both TEK and science, the integration of the two in a respectful way has the potential to increase the efficacy of both understanding climate change and managing natural resources.

### **1.3 Bridging Indigenous Knowledges and Scientific Record**

The lack of academic literature which thoroughly details climate change impacts to AI/AN communities is also further limited by the lack of positionality. Jacobs and Huey [43] outlined the way that “Researchers are increasingly expected to account for how their own positionalities and ways of asking, seeing/interpreting , and speaking influence their production of ‘emphpartial representations of their engagements in the field.” This includes the examination of the sordid history of injustice inflicted by members of scholastic institutions within indigenous communities [44] [45] [46] [47] [48]. Cohen [49] also emphasizes that “knowledge produced in the process of ethnographic inquiry is also situational and hence temporal/provisional.” This requires that researchers must identify both their own privileges as well as their position in relation not only to the study populations, but also the institutions in which they develop the dissemination of their knowledge. Brayboy and Dehyle [50], as native peoples conducting research elicit that “Indigenous people, both as researchers

and participants, hold the keys to getting, analyzing, and reporting 'good data' in qualitative and ethnographic studies examining their lived experiences." However, this sort of "insider" approach can pose difficulties for researchers which come from indigenous backgrounds, as the compartmentalization of knowledge and person can lead to a sort of schizophrenic worldview [51]. This further emphasizes why the frame of Honor, Pride, and Respect, are so important to the entire research process, from question formulation, methodological development, data inclusion and exclusion, and finally publication and dissemination.

Science was born as a human artifact with the highest ideals of objectivity so that our social knowledges may be verified and challenged by our peers. With a scientific method, we can ask a question, and develop a standardized way find evidence to answer that question. While there may never be a complete or purely objective answer to a posed question, it becomes easier to identify the wrong answers and shed our collective consciences of misinformation. That's the idea anyway history shows us that science, as an institution, may fall prey to the same misconceptions, false realities, and tribalism which is inherent in all human institutions.

Taking into account the potential biases of individual perception, the incompleteness of the scientific method, and sensationalism within journalism and other media, one could then ask, "what sort of knowledge system yields the highest quality information?" This, however, is the wrong question as no human knowledge system is universally superior to another. A much more pertinent question might be, "which phenomena are similarly described in plural?" Through multiple perspectives and ways of knowing, plural knowledge systems rely upon strengths of multiple epistemologies while accounting also for each knowledge systems inherent biases. In the context of identifying the environmental effects of climate change in Indian Country, the challenge is to bridge information from Indigenous knowledge systems, public media, and western methodologies while complying with ethical standards, scientific objectivity, and transcultural honor, pride, and respect.

This thesis will first investigate how US newspaper stories published from 1991 to 2011 present American Indian/Alaska Native (AI/AN) perceptions, and observations, of environmental changes resulting from climate change to supplement the recorded literature. The specific observations presented from AI/AN perceptions were analyzed for content to identify three frames of perspective: pan-Indian, tribally-specific, and individual perceptions, to identify the way in which the AI/AN voice is framed in the context of print-media, which may not always accurately reflect the objective voice of AI/AN communities. This research also details the methodology of contact, communication, and consideration when working with tribal nations in the US Corn Belt. While each nation is supposed to review research to assess the risk and beneficence of research, in practice several tribes have neither a standing research ethics committee nor institutional review board (IRB). The challenge remains to specifically outline how “plural knowledge” as a framework, leads to incorporating traditional ecological knowledge specifically for capacity building.

## 2. CONTENT ANALYSIS OF AMERICAN INDIAN AND ALASKA NATIVE PERCEPTIONS OF CLIMATE CHANGE RISK, IMPACT, AND VULNERABILITY IN NEWSPRINT MEDIA

### 2.1 Introduction

Climate change is publicly represented primarily through the media, and it is especially through the media that climate change is constructed as a social problem [52] [53] [54]. The media plays a key role in setting the daily agenda of public interest and environmental issue communication [55] [56] [57]. Depending on the amount of attention given to a particular issue, news media can affect public opinion and behavior [58] [59] [60]. Through the lens of the news media, the identification and interpretation of environmental issues are framed in the context of individual human trials and tragedies as a fundamental journalistic norm [61] [62] [63]. This research seeks to clarify the varied newsprint-based perceptions of AI/AN communities through newsprint content analysis.

A fair amount of media analysis observes Americans in aggregate [64] [65] [66] [67]. Methods exist to identify trends in perception among separate ethnic groups, however when categorizing multiple identities into singular categories, over-simplification can lead to misrepresentation [68] [69] [70] [71] [72]. As there currently exist 566 federally recognized tribes in the US and 13 Alaska Native Corporations [36], a significant problem arises when a single category is assigned to American Indians and Alaska Natives in that the peoples that comprise this category are heterogeneous, not only in identity, but also in land-base [73] [74] [75] [31] [76]. Similarly, newsprint analysis focusing on climate change as a social issue falls into the same trap of conglomerating perceptions into singular categories [77] [78] [79]. A solution to overcome

this challenge is to identify the context of place associated with a significant climate change ‘emphtrigger event and clarify the indigenous perspectives of that event based on frame and context [80] [81] [82]. The heterogeneity of people, place, and context makes the identification of specific events difficult, and nearly impossible in the context of newsprint media. The solution to overcome this problem is to instead quantify specifically the risk, impacts, and vulnerabilities of climate change in an AI/AN context, as well as quantify the coverage that particular AI/AN perspectives are presented.

This chapter seeks to identify, and quantify, the reports of risk, impact, and vulnerability associated with climate change to explore specifically how AI/AN communities are affected. Furthermore, this study investigates the personalization of AI/ANs; framed as pan-Indian, tribally/regionally-specific, or individual actors in order to determine the specific places where climate change is set as a social issue as well as determine the narrative voice of AI/ANs.

## **2.2 Methodology**

This study employs a directed content analysis as an informative empirical method to understand how newsprint media constructs perceptions of risk associated with climate change within the specific context of AI/AN communities and perspectives [83] [84] [85] [86].

### **2.2.1 Article Searches**

The search period for this study was from 1991 to 2011; however no publications met the search criteria before 1998. Data were compiled from newspaper articles from 1998 through 2011 that specifically address American Indian perceptions of climate change. The research examined tribal and general publications in the US, and international publications that focused on AI/AN within the US. Articles were accessed through online newspaper databases ProQuest Newsstand, Ethnic News Watch, and

LexisNexis searching for “American Indians” and/or “Native Americans,” and “Climate Change” and/or “Global Warming.”

Suitable articles in daily national and regional papers were searched for stories about American Indian and Alaska Native perceptions of climate change. The online databases utilized offer the most complete collections of newspapers specific to the US, and included stories published which described individual, tribally/regionally specific, and/or pan-Indian articulation of risks, impacts, and/or vulnerabilities correlative to global climate change. The initial search yielded 2484 articles from ProQuest Newsstand, 585 articles from Ethnic Newswatch, and 482 articles from LexisNexis. Redundant, irrelevant, or inappropriate articles were removed, leaving 64 total articles from 27 separate publications. Tribal publications include tribally owned and operated newspapers and publications specific to American Indian/Alaska Native readership. General publications are either national papers or regional papers with a general readership. Authorship was determined by identifying biographical information using Google searches with the authors name and publication name. Authors were categorized as Native, Non-Native, or Unknown (see Table 2.1 for publication, authorship, and coverage type). Articles were also further organized by publication year to compare trends of AI/AN-focused reporting compared to national trends in climate change newspaper coverage [87] [88] [89].

Table 2.1: Publication, Authorship, & Coverage Type

Publication Name	Authorship	Coverage
Cultural Survival Quarterly	1 Unknown	Tribal
Indian Country Today	15 Native	Tribal
Indigenous Peoples Issues & Resources	1 Unknown	Tribal
Native American Times	1 Native, 1 Unknown	Tribal
Native Americas	7 Native, 1 Unknown	Tribal
Navajo Times	1 Native	Tribal
News from Indian Country	2 Native	Tribal
Pequot Times	1 Unknown	Tribal
Sho-Ban News	1 Unknown	Tribal
The Circle: News from an American Indian Perspective	1 Unknown	Tribal
The Native Voice	1 Native	Tribal
The Ojibwe News	2 Native, 2 Unknown	Tribal
Tribal College Journal	5 Native, 1 Unknown	Tribal
Alaska Journal of Commerce	1 Unknown	General
Boston Globe	1 Non-Native	General
Daily Times	1 Unknown	General

*continued on next page*

Table 2.1: *continued*

Publication Name	Authorship	Coverage
Gannett News Service	1 Unknown	General
Knight Ridder/Tribune	1 Native, 1 Non-Native, 1 Unknown	General
McClatchy-Tribune Business News	3 Unknown	General
New York Times	1 Unknown	General
Space Daily	1 Unknown	General
States News Service	1 Unknown	General
Targeted News Service	2 Unknown	General
The Herald [Everett, WA]	1 Native	General
International Herald Tribune	1 Non-Native	International
The Sunday Telegraph	1 Non-Native	International
Windspeaker	1 Unknown	International



### 2.2.2 Inductive Coding

Articles were downloaded, converted to PDF file format, and imported into the qualitative data analysis software QSR NVivo 9 for directed content analysis. The coding method utilized a hybrid of conventional content analysis and directed content analysis to examine the communicated perceptions of climate change in context with AI/AN communities. Two trained coders conducted the coding and analysis. Inter-coder reliability was calculated by comparing two identical coding sets, a random sample of seven articles representing approximately 11% of the total dataset (n=64). Inter-coder agreement was calculated using NVivo9, utilizing Cohens kappa coefficient to identify the index of agreement (k=.95) [90] [91].

Two separate coding schemes were used to analyze each type of AI/AN perceptions and perspective of specific risks, impacts, and/or vulnerabilities (RIVs) attributed to climate change. The first coding scheme identifies the frequency and occurrence of RIVs by article and publication year, and the second scheme identifies the composition of AI/AN perceptions of climate change, separated into three sub-categories: pan-Indian, Tribally/Regionally Specific, and Individual (see Appendix A for further explanation of search criteria and of the coding nodes and sub-nodes).

The first coding scheme identified how specific perceptions of climate change are elucidated. For each news article, the units of analysis were specific risks, impacts, and/or vulnerabilities, each coded by sentence according to corresponding RIV type. The RIV types were ascertained by inductive analysis so that each recorded RIV fit into a specific category: Glaciers, Melting Permafrost, Plant Species, Reduced Sea Ice, Reduced Snowpack, Rising Sea Levels, Rising Temperatures, Water Shortage, and Weather Extremes. Phrases and sentences, in which the words, “climate change,” are used as a general descriptor, or as a rhetorical device, were not encoded as a specific impact. The classification examines the specific risks and impacts that are most commonly communicated and compares the frequency that each impact is reported within the dataset by year.

The second coding scheme analyzes AI/AN perspectives of climate change, framed as: individual, tribally/regionally specific, or pan-Indian perspectives, in relation to total volume of text. Perceptions of climate change RIVs presented in the context of AI/ANs were coded as either specific phrases or as an individual sentence excluding rhetorical lead-ins. Communications of risks/impacts from individuals were categorized into two sub-nodes: (1) the authors communication of climate change risks and impacts, and (2) testimonial of climate change impacts, risk, and/or vulnerability by an AI/AN individual. Tribally specific perceptions were categorized by region (Alaska Native, Eastern, Great Lakes, Oklahoma, Pacific Northwest, Plains, and Southwest). In articles that include several impacts to individual tribes or communities within the same sentence each clause is encoded in its respective category without overlap. Pan-Indian, or global concerns, were encoded when the communications of risk were general to American Indian or Native American population as a whole.

### **2.2.3 Analysis of Articles Per Year, RIVs, and AI/AN Perceptions**

Data from articles were exported from NVivo 9, and analyzed with Apple Numbers 2009 (version 2.2). The frequency of articles was plotted by publication year. Individual categories of RIVs were graphed from largest to smallest as a percentage of total RIVs. Total RIVs per year were graphed to express the general trends in reporting, and were normalized by dividing total RIVs by total articles per year to downplay individual articles contributions to total RIVs per year. Specific RIVs (Changes in Animal Species, Cultural Degradation or Removal, Reduced Sea Ice, Rising Temperature, Weather Extremes) were graphically analyzed to identify the most common type of RIV in comparison to total reported RIVs. Total RIVs per year were averaged by dividing RIVs by the total number of articles published per year. Each RIV was compared to total number of RIVs by type, as well as an aggregated view of each RIV per year. RIVs were categorized as specific to impacts on pan-Indian lifeway systems, Arctic Impacts, and Atmospheric impacts and also represented graphically.

Aggregated Tribally Specific perceptions (Alaska Native, Eastern, Great Lakes, Oklahoma, Pacific Northwest, Plains, and Southwest) were expressed graphically and analyzed to identify the amount of each types specific amount of perceptions.

## 2.3 Results

### 2.3.1 Article Frequency

Figure 2.1 illustrates the frequency of publications per year. The number of articles generally increased from 1998 to 2011 ( $y=0.422x+1.5495$ ;  $R^2=0.22$ ). There were peaks in articles in 2000, 2007, and 2009 which matched spikes in overall US media coverage of climate change [92]. The years 1999 and 2011 held the greatest amount of publications specific to AI/AN communities and climate change. During the year 2001, zero articles were published dealing with AI/AN perspectives or impacts from climate change. In 1998, 2002, 2003, 2004, 2005 and 2010 there were 3 or fewer relevant articles published.

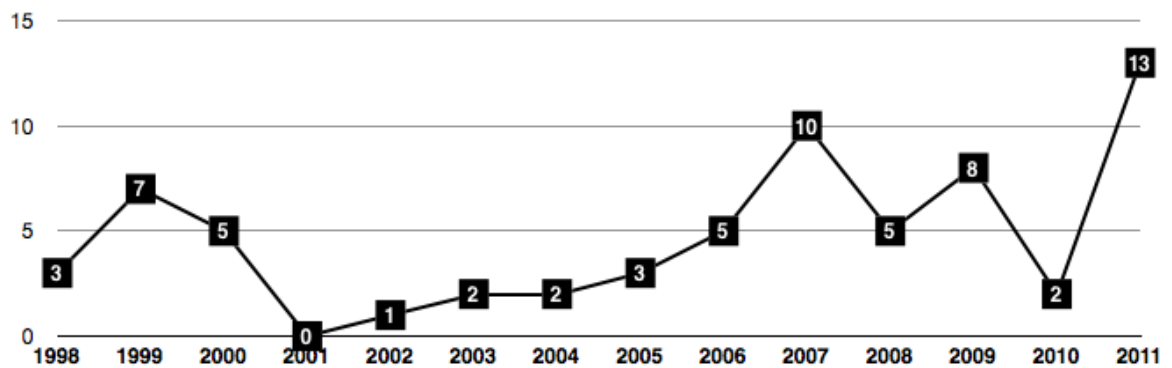


Fig. 2.1. Total Publications Per Year

“Trigger events” can explain how specific phenomena are commonly presented in multiple articles. The majority of articles in 1998 focused on the study of global warming and potential threats to AI/AN ways of life. In 1999, several articles focused

on combined scientific and indigenous knowledge in assessing threats and impacts of climate change; while other articles focus heavily on climate change impacts to Alaska Natives during this time. The Native Peoples Native Homelands Climate Change Conference II was held in 1999, a major inter-tribal forum on impacts to indigenous communities. During the peak year of 2011, when 13 articles specific to these issues were published, the US again experienced record drought and heat as well as marked loss of sea ice [93]. However, while several of these events are commonly mentioned, a post hoc analysis cannot be accurately attributed to any specific event or series of events.

### **2.3.2 Risk, Impact, and Vulnerability**

For this research, each reported hazard of climate change was identified as a particular threat to indigenous communities. While the concepts of risk, impact, and vulnerability associated with climate change each have specific definitions within academic literature, public perception often combines these concepts when constructing climate change as a social problem [94] [95] [96] [97] [98] [99] (Hewitt 1983; Comfort et al. 1999; Slovic 2000; Petts et al. 2001; Dessai et al. 2004; Leiserowitz 2005).

Fifteen separate RIVs were identified; however five stood out, each representing over 10% of total RIVs (Table 2.2). The most commonly reported signals associated with a changing climate were identified as: (1) animal species loss/migration, (2) rising temperatures, (3) reduced sea ice, (4) weather extremes, and (5) cultural degradation/removal.

Of all the RIVs reported in the sample, 15.6% were specific to animal species loss and/or migration. Each of the years in which an article was published contained reference to animal species loss/migration particularly 1999, 2009, and 2011. 12.1% of all RIVs were attributed to rising temperature and each year had some discussion of the rise, particularly 1999, 2005, and 2011. 10.6% of the total articles reported reduced sea ice as a serious impact of climate change within native communities.

Table 2.2  
Total RIVs by Type

<b>RIV Type</b>	<b>Total Occurrences</b>	<b>Percentage</b>
Animal Species Loss/Migration	103	15.6%
Rising Temperature	80	12.1%
Reduced Sea Ice	70	10.6%
Weather Extremes	69	10.5%
Cultural Degradation/Removal	67	10.2%
Plant Species Loss/Migration	57	8.6%
Drought	53	8.0%
Economic Impacts	32	4.8%
Rising Sea Level	31	4.7%
Flooding	24	3.6%
Coastal Erosion	20	3.0%
Melting Permafrost	19	2.9%
Glacial Retreat	18	2.7%
Loss of Drinking Water	11	1.7%
Reduced Snowpack	6	0.9%

10.5% of all RIVs construct weather extremes as an indicator of a changing climate, with the years of 1999 and 2011 having the largest occurrences of extreme weather reporting. 10.2% of all RIVs report cultural degradation and/or removal associated with climate change.

The aggregate information concerning RIVs proves to be a useful tool to identify which problems are the most widely communicated, however identifying the context of the RIVs is important to understand how these specific problems are distributed. Teasing out information that is not directly attributable to both AI/ANs and climate change allows for a more objective indication of the context of information being

communicated. RIVs categorized into sets (Figure 2.2) highlights that Lifeway, Arctic, and Atmospheric groups, while somewhat interconnected, can explain the major contexts of articles.

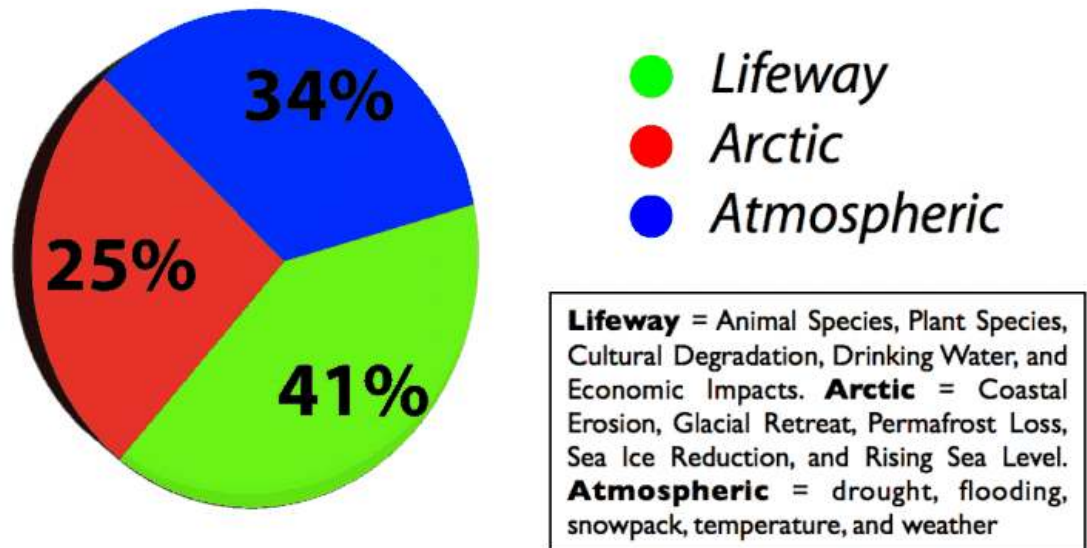


Fig. 2.2. Aggregate RIVs by Type

Lifeway systems which include animal species loss and/or migration, plant species loss and/or migration, cultural degradation, loss of drinking water, and economic impacts account for the majority of RIVs (41%). The meteorological affect type, categorizes as atmospheric RIVs which include drought, flooding, snowpack loss, temperature rise, and flooding account for 34% of total RIVs. Finally, RIVs specific to arctic environs which include coastal erosion, glacial retreat, permafrost loss, sea ice reduction, and rising sea levels account for 25% of the total RIVs.

### 2.3.3 Perspective and Frame

AI/AN perspectives accounted for 36.5% of the total content of all articles as individual, tribally/regionally specific, and pan-Indian frames. Figure 2.3 shows the total percentages of AI/AN reported perceptions per year and by frame. The years of 1998, 2000, 2007, and 2011 each contained over 40% of the total content as primary sources. Tribally and/or regionally specific framing accounted for the highest percentage (17.9%) of total content including Alaska Natives (13.3%), Southwestern tribes (2.1%), Plains tribes (1.2%), Great Lakes tribes (0.4%), Pacific Northwest tribes (0.3%), Eastern tribes (0.2%), and Oklahoma tribes at less than .1%.

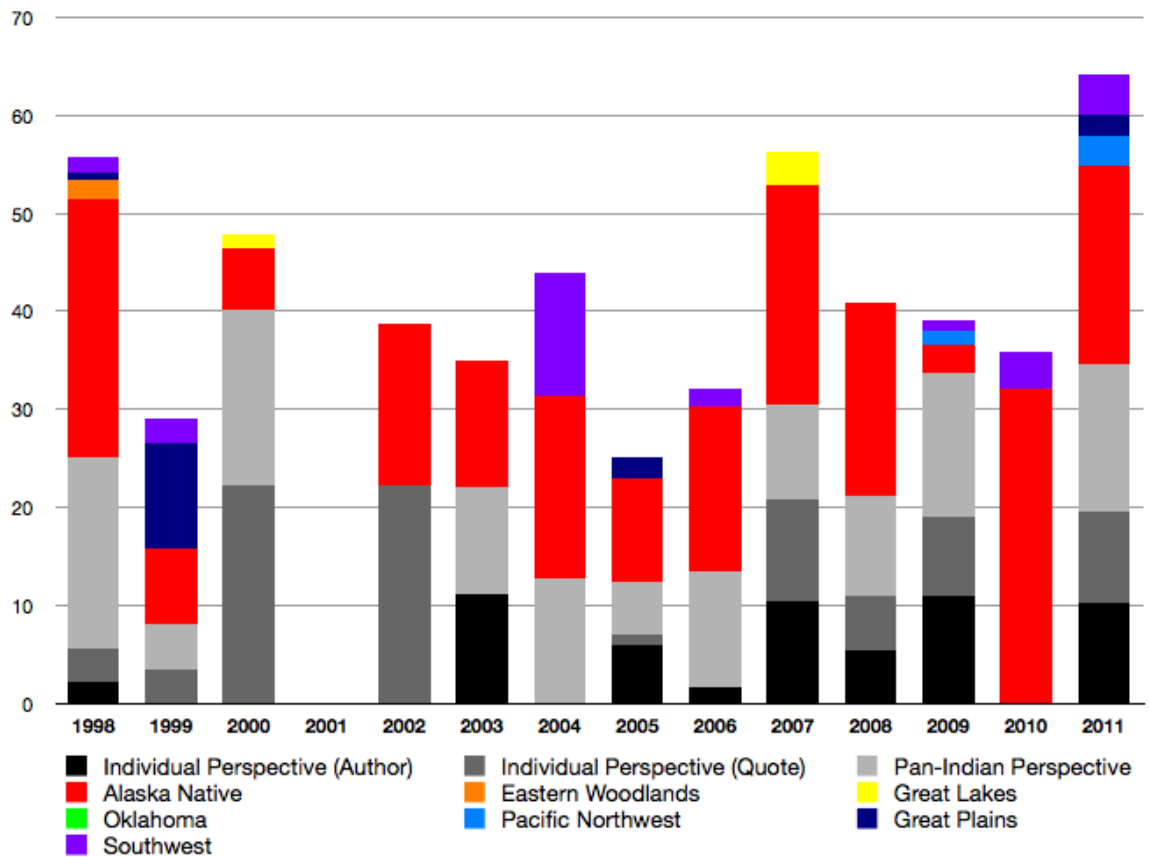


Fig. 2.3. Perspective Type by Publication Year

The years of 2010, 1998, 2007, 1999, and 2011 had the highest amounts of tribally/regionally specific content. Perceptions framed as pan-Indian accounted for 10.2% of total content, the most significant years being 1998, 2000, 2011, and 2009 respectively. Individual perceptions accounted for 8.4% of all AI/AN reporting of climate change including both AI/AN authors (1.7%) and sources (6.6%). The years of 2000 and 2002 contained the highest number of first-hand accounts from interviewed sources, while the year 2003 was significant for having the highest amount of perceptions based on AI/AN authorship.

## **2.4 Discussion**

The construction of climate change in newsprint as a serious problem in AI/AN communities reflects political statements from indigenous, national, scientific, and international groups. Although several of the issue triggers are from similar sources, the testimony of indigenous peoples offers insight into the experienced consequences of a warming planet.

### **2.4.1 Trigger Events and Issue Attention**

The frequency in article volume illustrates that reporting of climate change in conjunction with AI/ANs does not follow the “issue-attention cycle” of national newsprint media [92] [100] [101] [72]. Boykoff and Boykoff [79] explained issue frequency in a similar study as being driven by three primary effect types ecological/meteorological, political, and scientific to account for the trends in publication. However it is of note that these post hoc observations can offer some clue, the concise connections between the events and the amount of publication is not directly attributable. This highlights a limitation of content analysis with such a small sample size.

The scientific effect type can somewhat explain the majority of the earliest articles. The earliest articles in 1998 focused primarily on potential threats of global warming



to AI/AN ways of life. In 1999, several articles focused on combined scientific and indigenous knowledge in assessing threats and impacts of climate. Most articles cited scientific literature to explain the threat of climate change, and correlated AI/AN perceptions of the threat as a sort of “Canary Effect” [102].

Political effects are also a driver of reporting on climate change in the AI/AN context. The year 2001 saw a marked increase in US media coverage of climate change [92], yet climate change reporting in the context of AI/AN perceptions was non-existent. The political effects of the recently elected President George W. Bush, and his highly publicized resistance to the Kyoto Protocol [103], could have served to overshadow any news concerning indigenous Americans and climate change. The peak coverage year of 2007 showed a significant focus on the Inuit village of Kivalina which was literally falling into the sea. Similarly in 2008, the majority of articles focused on the ensuing Kivalina Lawsuit, which sought to seek damages from Oil and Gas companies blamed for contributing to global warming. In 2009, the Mystic Lake Declaration had been signed and highly publicized after the convening of the Native Peoples Native Homelands II conference.

The ecological/meteorological effect type played a notable role concerning issue attention during the years of 1999 and 2011. During the summer of 1999, the United States experienced an intense drought and heat wave [104]. This same year marked the beginning of a dramatic loss of sea ice [105]. The peak year of 2011 the US again had record drought and heat as well as drastic loss of sea ice attributable to global warming [106] [107]. In both 2010 and 2011, the majority of articles focused on both scientific as well as ecological/meteorological contexts.

While there are marked instances of effect types that drive issue-attention of climate change within the AI/AN context, there appears to be no causative indicator that would determine future publication trends. Article publication spurred by trigger events are somewhat qualifiable, specifically: major scientific publications pertaining to indigenous peoples, AI/AN conferences and law suits, and major drought years. Yet the quantifiable “triggers” are limited in significance for this study.

### 2.4.2 Articulation of Risk, Impact, and Vulnerability

While specific trigger events may account for the timing and frequency of article publication, the usefulness of this content analysis stems from the ability to identify specific RIV types, and quantify them in relation to other RIV types. This analysis indicates that the observed effects of climate change are negatively affecting subsistence-based lifestyles, while also highlighting a difference between AI/AN cultures, which identify problems predominately as local, and typical American perceptions, which identify “threats to nature” as a global, rather than local, concern [108].

A significant population of native nations relies heavily on local fish and wildlife for subsistence [109]. Of all the RIVs reported in the sample, 15.61% were specific to animal species loss and/or migration. Most perceptions of changes in wildlife were framed as changes in abundance and migration of important game, specifically “those interviewed spoke of a change in the range of species of mammals (moose and beaver) as well as a decrease in the number of some bird species (ptarmigan)” [110], and fish species “our salmon are not showing up” [111]. Some perceptions were generalized observations of changes in animal habits attributed to climate change, commonly referencing that the “migration of the animals has been significantly noted by our people” [112], as well as the impact to traditional lifeways, as “the harvest of certain plants and animals are central to the lives and cultures of many Indigenous peoples - and the loss of those resources due to climate change leads to a loss of traditional knowledge” [113]. Changes in animal species were also attributed to other RIVs, particularly loss of sea ice and cultural degradation, highlighting the interconnectedness of native peoples and the surrounding ecological system, “If the polar bears and seals disappear, and if there is no place for the walrus to rest, to give birth and to nurse their pups, and if fisheries change as currents shift because of the redistribution of heat, then Native populations that subsist and maintain their cultures, at least in part, on the polar bear, the seal, the fish, and the walrus, are going to find their way of life in grave danger” [112]. This finding is especially important as it corroborates pre-

vious findings that climate change affects AI/AN communities disproportionately as AI/AN have a reliance on the local area for subsistence and sustenance [14] [21] [109].

The second largest RIV was temperature rise, presented as observations of seasonal differences with “winters being warmer” [114] and that, “summer heat waves, once periodic and rare, are now nearly an annual event” [115], the general themes reflect that “Earth’s temperature has begun to rise at a potentially disastrous rate” [116]. Rising temperatures were observed to be a significant threat to local environmental conditions which are reliant upon seasonal cold temperatures as “winter freezes are coming later, and thaws earlier. New animals, lacking local names, are moving into traditional hunting and fishing grounds where they had not been seen before” [117]. Rising temperatures were particularly problematic for Alaska Natives, where “the Arctic ice pack, or permafrost, now breaks off in huge chunks as temperatures rise to heights never before recorded or remembered” [citeict2004]. An emphasis on inter-generational knowledge as a verification of changes in climate is fairly common within AI/AN frames, for instance “native elders say the warm winter is yet another sign of profound climate change that poses an enormous threat to our global community” [citepequot2000]. The communication of rising temperatures as local perceptions is particularly useful in assessing the impacts of anthropogenic global warming within indigenous communities; however the language explicates the social construction of climate change by connecting local observations and knowledge to global threats.

The reporting of reduced sea ice seems to be the most tangible example of climate change impacting native communities, observable from outside the communities themselves. While several reports explicitly detail the shrinking arctic ice cap [106] [118], the direct cultural impacts on places like Shishmaref and Kivalina are explicit within the newsprint media analyzed. While sensationalism is attributable to the Kivalina Lawsuit against major oil companies in several articles, the story of a town being literally washed away into the sea due to diminishing sea ice is quite palpable, as “Kivalina faces imminent destruction from global warming due to the melting of sea ice that formerly protected the village from coastal storms during the fall and win-

ter” [119]. As reduced sea ice is frequently reported, it is of note that this specific RIV only pertains to Alaska Natives, such as “Inupiat hunters who depend on bowhead and beluga whales, walrus, seals and polar bears for food, clothing and cultural traditions [who] say that changes in the ice pack have inhibited their ability to provide much-needed food for their communities” [120]. The Alaskan Native perspective on changes in sea ice, attributed to climate change, serve as a way to connect the global threat of Arctic ice melt to local indigenous communities.

It is challenging to directly attribute extreme weather events to climate change [93] [121]. Recent studies have indicated that anthropogenic global warming, “loads the dice” [122] in terms of probability for extreme weather. Within an AI/AN context, observations of environmental change are often constructed from local inter-generational knowledge. In this analysis, extreme weather was attributed to climate change, evidenced by “having tornadoes where there used to be none, and they are occurring several a season!” and “A severe storm last July blew down millions of trees in the northern Minnesota region” [123]. Other articles indicate that indigenous communities will see greater vulnerability, as “extreme weather events are destructive and recovery costs are great, which will further burden Indian tribes more than others due to their lack of infrastructure, capacity and financial support to address these challenges” [124]. Once again, the years of 1999 and 2011 saw the largest occurrences of extreme weather reporting in the context of AI/AN perspectives.

Within tribal governance, a changing climate as a result of anthropogenic manipulation is seen as a disrespect of Mother Earth. This does not mean that all decisions made by tribal councils are based on this knowledge construction, on the contrary, just as tribal lands were ceded in the past on the basis of individual economic gain, contemporary tribal enterprise contribute to global warming, particularly in coal, oil and gas production. In fact, addressing identity on a national, tribal, or even individual scale is nearly impossible. There exist cultural norms which are held as high ideals, the protection and well-being of relatives, human or otherwise, being the most supreme.

As American Indian/ Alaska Native nations have been denied a voice in the United Nations, various indigenous caucuses such as the National Congress of American Indians, and the Intertribal Council on Utility Policy have addressed climate change and promoted inter-tribal dialogue. The Native Peoples - Native Homelands Climate Change Workshop in 1998 was formulated to serve to address the needs of tribal nations to understand the potential impacts of climate change. With the message that global warming would have the greatest impact on the world's peoples and cultures most closely tied to the land, the Native Peoples - Native Homelands II conference stressed the urgency of the need for climate change to be addressed on a local, national, and global level [1]. While tribal nations recognize that under numerous treaties, statutes, executive orders and policies, the United States has direct and express legal obligations to members of federally recognized tribes.

Tribal sovereignty has its limitations, particularly the geopolitical boundaries of the United States. Most recently, the United Nations Declaration on the Rights of Indigenous Peoples seeks to implore some of the same ideas expressed in the Mystic Lake Declaration from the Native Peoples - Native Homelands II conference, particularly the clause that “that control by indigenous peoples over developments affecting them and their lands, territories and resources will enable them to maintain and strengthen their institutions, cultures and traditions, and to promote their development in accordance with their aspirations and needs” [125]. The idea expressed in these declarations suggests that native peoples view of the planet in distress is correlative to their traditional understandings of the environment.

### **2.4.3 Perception and Place**

This quantifiable information is useful in identifying the percentage of direct perceptions of climate change from individuals as either source or author. Key individuals can be identified and the testimony becomes a source of qualitative data that can be gleaned without having to directly interview the subjects. Granted some journalis-

tic bias may be exercised in the decisions surrounding what is printed, however the testimony and who said it, and in what context, can be useful. For instance, the highest concentrations of individual observations of climate change occurred in 2000 and 2002, while the year 2010 had none whatsoever. The testimonial included personal narrative detailing the impact of climate change, such as “‘I don’t want to live in permafrost no more,’ said Frank Tommy, 47, standing beside gutted geese and seal meat drying on a wooden rack outside his mother’s house. ‘It’s too muddy. Everything is crooked around here’” [126] with attention to the personal narrative, for example:

‘It’s pretty normal to see livestock coming from the reservation that don’t look good,’ said Atkinson, who is on hand every Monday at the Cow House in Kirtland, where she inspects livestock before they go to auction. As many as 80 or 90 percent of all livestock that go through the Cow House come from ranchers on the various local American Indian reservations, Atkinson said. Ranchers have struggled with drought since 1995, she said. ‘This year is especially bad,’ she said. ‘We have horses, cattle that are in critical condition, so people are selling earlier before they get too bad’ [124].

The previous excerpt highlights the focus on the individual story to contextualize the impacts of climate change. In some instances, however, where the author of an article identified with a tribal community, the testimony could be analyzed for its rhetorical implications, for instance:

We now have a situation on the planet much worse than any scientific climate change forecasters predicted 11 years ago, but entirely consistent with centuries old prophesies and forecast by our indigenous wisdom-keepers. It is now time for indigenous peoples and our allies to reconvene - gather as we have always done when threats faced us to address the very real climate change threats our peoples and homelands face. In 1998,

almost no one in the United States scientific community made the fundamental connection between Native peoples and Native homelands and climate change - not only with regard to impacts, but more tellingly with respect to the deep knowledges and wisdom that resided in Native homelands and with Native peoples. We have a situation on the planet - our Mother Earth - that requires Native people to come together so we can acknowledge our inalienable responsibility to care for the beautiful and diverse life of our blue green Mother Earth [127].

No specific RIVs are mentioned in the above excerpt, however the construction of climate change as a *conflict* specific to Native peoples indicates the problems, and potential solutions, to provide resolution to the conflict. It is important to note, however, that individual testimony (while the most interesting and useful), represents the smallest portion of tribal perspectives in newsprint media.

Pan-Indian perspectives generally frame climate change as a social problem, much in the same way that climate change is framed as a global problem in the American context [108]. Most communication within this frame is generalized, employed primarily as a rhetorical device, e.g. “Indian communities are the canaries in the mine shaft of climate change” [128], or “Indigenous people around the world, those most dependent upon the natural environment for daily sustenance, [are] rapidly experiencing the negative impacts of global warming” [129]. This frame is important to identify, as it accounts for a significant amount of total communication of RIVs. The pan-Indian call to action does indicate however that AI/AN communities are connected and express an atypical degree of solidarity. This is illustrated in several communications, identifying that:

Worldwide, indigenous peoples are the first and worst hit by global warming. As subsistence cultures dependent upon intact habitats, they are directly threatened by climatic changes that disrupt the stability of existing habitats. But their deeply adaptive cultural roots may well provide

contemporary indigenous communities with a unique foundation in the face of accelerating impacts of global climate change that are no longer mere threats to some unimagined future, but rather changes occurring daily throughout Indian Country [117].

While the generalized reaction to the threat of climate change isn't useful as a way to gauge which specific impacts are happening where and to what degree, it is an indicator of the social connection of AI/AN communities. The largest collection of total perceptions comes from tribally/ regionally specific perspectives. From this, it is clear that the predominately Alaska Native reporting of RIVs corresponds to some of the greatest observed individual RIVs, particularly Rising Sea Level, Reduced Sea Ice, Melting Permafrost, Coastal Erosion, as well as Animal Species Loss/Migration. Southwest, along with Plains and Great Lakes, tribes were represented particularly in terms of drought; however the greatest amount of attention is on the Arctic.

#### **2.4.4 Summary of Observations**

Directed content analysis as a method to identify the risks, impacts, and vulnerabilities communicated in newsprint media is a useful tool to compare multiple perspectives of climate change in pan-Indian, tribally specific, and individual frames. This analysis illustrates how the total amount of publications, the total amount of RIVs, and the percentage of content which is primarily based on AI/AN perception reflect peak events in climate-variability yet can be overshadowed by political events. The analysis also demonstrates how a rise in publications and impacts is not necessarily correlative to the degree of perceptions of climactic changes. It is apparent that the environmental change that native people face due to climate change, particularly Alaska Natives, is a very real and compounding problem.

The reconstruction of specific RIVs based on a total aggregate and also by occurrences per year tells an interesting story of what sorts of changes are perceived and which images are communicated most. From a usability perspective, the ready



identification of how climate change impacts native communities would indicate that most vulnerable communities are those which rely on local hunting and fishing for food supply, and communities which are threatened by coastal erosion. While there were several frames of climate change effects, it is quite evident that each RIV is connected with others, and that the complex ecological system that AI/AN nations rely on is being significantly damaged and thus damaging the communities with alarming severity.

Reflecting the heterogeneity of indigenous peoples in the US, the impacts and perspectives are quite varied within newsprint media. However, the bias of sensationalism becomes apparent when specific perceptions are separated from total article text, and each perception frame is identified for relevance. This indicates how both quantitative measurement as well as qualitative contextualization is necessary and useful. The narrative details quite explicitly that the effects of climate change are impacting Native Communities, although the distribution, and context, of impact is not spread evenly through tribal communities.

Further research could continue the study to include publications in the years after 2011 to observe how the volume of publications rises or falls, as well as which RIVs are reported and how they are presented. Other studies could contextually analyze other media including film, TV News stories, and online media and content. Also, further studies could compare AI/AN perceptions of climate change to reports issued from the United States Department of the Interior, United States Geological Survey, National Oceanic and Atmospheric Administration, United Nations International Panel on Climate Change, and integrate remote sensing and climate modeling with local sensing and other situated knowledges.

### 3. NAVIGATING TRIBAL INSTITUTIONAL REVIEW BOARDS: THE CHALLENGE OF GAINING CONSENT

*“Conducting research in an ethical manner within indigenous communities necessitates an active awareness of the extent to which federal government agencies and affiliated institutions have oppressed, discriminated against, and engaged in culturally biased practices with these communities” [130].*

The Useful To Usable (U2U) project is designed to work with farmers throughout the US Corn-Belt to aide in adapting to climate change and variability through tools and assistance aimed at making better information available for crop-planning decisions. Through the utilization of an interdisciplinary approach, the U2U project is described as:

Useful to Usable: Transforming Climate Variability and Change Information for Cereal Crop Producers, is a USDA-funded research and extension project designed to improve the resilience and profitability of U.S. farms in the Corn Belt amid a changing climate. Our team of over 50 faculty, staff, and students from nine Midwestern universities are experts in applied climatology, crop modeling, agronomy, cyber-technology, agricultural economics, and other social sciences. We are working together, and with members of the agricultural community, to develop decision support tools, resource materials, and training methods that lead to more effective decision making and the adoption of climate-resilient practices [131].

By developing tools and information services based on farmer and adviser inputs, the likelihood of adoption is increased. A significant component of this social research is designated to also include the inputs of American Indian farmers. Within typical

agricultural and rural research, potential study participants are contacted through the utilization of records kept by the USDA or local Soil and Water Conservation Districts. American Indian peoples represent less than 2% the US population, and signify a special political class with sovereign rights based on international treaties, however in most literature, the peoples are mostly identified as a minority group [132]. American Indians as potential study participants are considered “vulnerable populations,” and require additional ethical considerations. This study details the challenges of ethical consideration in tribal research review, and highlights the approach of gaining consent to deploy a survey of American Indian farmers from multiple tribes within the US Corn Belt.

### **3.1 Ethical Considerations for Research Within Indian Country**

Ethical considerations in working with tribes are paramount, as there exists a sordid history of abuse and exploitation of native populations under the label of human subjects research [133] [134] [135] [136]. The Belmont Report [137] sought to enforce protection of vulnerable study populations, while codifying ethical considerations into federal law (45 CFR 46). In the case of ethical research review within American Indian communities, any research proposal would ideally satisfy the institutional review board (IRB) of the research university, or other agency, while equally gaining consent from tribal nations IRBs. There exists a problem, however, Western hegemonic methods of research, consent, and cultural consideration can be incongruent to a tribes lifeways, as well as suffering technical inconsistencies as very few tribes have an IRB protocol in place, while a large portion of tribal officials are not familiar with the IRB process whatsoever [138] [139] [140] [141] [142].

The lack of established IRB protocols indicates that researchers interested in working with tribal populations must also work collaboratively with the community to educate and inform them of both the proposed research as well as the function and process of ethical research protocol. The methods of contact presented primarily

in the literature identify a comprehensive, and often costly, method to work with tribes [143] [144]. However, most literature glosses over the actual process of collaborative development of an IRB or other research review process [145] [146]. American Indian communities are generally interested in promoting beneficent research, particularly environmental, ecological, and health-related research which can lead to proactive transgovernmental policy [139] [140] [141]. Furthermore, despite the historical injustices from western institutional abuse, current ethical review processes are congruent with indigenous values of Honor, Pride, and Respect [147] [148] [149]. This chapter outlines the pluralistic approach to satisfy the technical process of gaining consent, while responsibly informing the community in a way that is customized specifically for tribe(s) involved in the study.

Research within AI/AN communities has a rocky and somewhat disturbing history. The humanities and social sciences are implicated in violating human rights, proposing false premise of the “primitive” or “savage” nature of North American indigenous peoples, stealing artifacts for personal gain, performing cruel psychological experiments, developing fabricated histories presented as fact, not to mention the utilization of such “scientific knowledge” to justify the large-scale theft of land, children, and culture from native peoples in general [150] [48] [151] [152] [153] [154] [155]. The American Indian Movement of the 1970s sought to reclaim control of native knowledges through entry into the institutions of academia, led by such scholarly works as Vine Deloria's *Custer Died for your Sins* [156], actively criticized the collected knowledges of AI/AN peoples by western researchers [157] [154] [158] [159]. Critical inquiry from both native and non-native researchers, coupled with political and educational activism, led to ethical reforms, culminating in the Belmont Report which outlined specific protections for AI/AN communities classified as “vulnerable communities,” and further codified these protections into federal law [137]. The specific method for this ethical protection was through the commandment of research review through approval from both the institutional IRB (such as a university) and the tribal nations’ IRB.

While the development of the IRB protocol and federal ethical protections did serve to reduce the abuse of AI/AN communities through research, the process of western academic research itself has also been challenged as being incongruent with native lifeways, and/or the documentation of certain knowledges has been wrought with translation errors due to erroneous epistemological interpretation. Despite the historical injustices of researchers, the hegemonic research methodologies themselves tend to seat science as an ethnocentricity specific to western positivism [139] [160] [154]. Several considerations to research methodologies have taken this into account, including: Participatory Action Research (PAR), which seeks to intersect lifeway, experience, and research in a dynamic system of inquiry; Community Based Research Protocols (CBPR) which strives to build partnerships with study populations and develop the research questions, methodology, and dissemination strategy directly with the populations being studied, and “insider research,” which utilizes tribal members to lead studies concerning tribal populations [161] [162] [163] [29]. While each approach shares commonalities, it is through a complex adaptation of pluralistic methodologies that current research in American Indian communities takes place. There still exists, by law, the absolute necessity for the IRB process to be fulfilled, however within scholarly literature there exists virtually no discussion of how to work with tribal nations to develop an IRB.

### **3.2 Background Information Acquisition**

This chapter details the research process in order to obtain consent to distribute a climate change and variability perception survey with 67 different tribes and tribal institutions within major cereal crop producer states in the US including: background information acquisition, project preparation, and initial consent. Within the last 20 years, several agencies, researchers, and tribal-consultants have developed research frameworks to investigate social phenomena and navigate the multi-layered complex of tribal-federal law, research ethics, and human subjects’ protec-

tion [164] [165] [166] [167]. The tribal college movement, seeking to enable young American Indian professionals to engage scientific research disciplines is an extension of the tribal self-determination policies and a bastion to promote “insider” research [29], while addressing the understanding of community, national, and global responsibility. Published literature which seeks to outline the method of contact, collaboration, and communication identifies key commonalities, specifically the recognition that the process takes considerably more time to fully address the ethics of not only a research proposal, but also the idea of research itself as a western institution. A comprehensive outline proposed by the American Indian Law Center [166] suggests a rigorous list of questions to be answered about a particular form of research, and then the collection of those answers would be the binding word of the agreement, limitations, and methods between the tribal representative body and the researcher.

At a meeting in Fairfax, Oklahoma, the inter-tribal consulting firm Paradox Corporation, convened a panel of American Indian researchers to identify contemporary research issues, concluding with a recommendation for a research protocol, beginning with a series of tangible actions to identify the context of a particular issue within a tribal community [166]. The method involves (1) critically examining the history and ethnographic analysis of the tribal nations, (2) establishing an acquaintance with the legal rights of Indians and tribal governments, (3) identifying traditions and spiritual practices of native peoples as a means of honor and respect for the people to involved with the study [28], (4) becoming familiar with cultural sights and places, and finally (5) attending workshops and conferences which focus on the issues of American Indians which incorporate multiple ways of knowing, and especially the plural and diverse perspectives expressed by American Indian representative bodies. While this method was developed with the intention of researching primarily health and medical phenomena, it can be modified to consider specific climatic change effects on agriculture in the context of human dimensions as well as geospatial data.

### **3.2.1 Historical/Ethnographical Analysis**

It's important to recognize that "history is written by the victor," and that the various accounts of the historical contexts recorded and documented are often missing large amounts of information, and/or written from an ethnocentrically biased perspective, particularly in western literature. While a certain degree of variance can be gleaned from these multiple forms of view, the next step of identifying legal standing can serve to make grey issues a little more "black and white," at least in concert with legal considerations. For this research, each tribe involved in the study was listed by Tribe/Nation including the associated tribal college or university (TCU), the state(s) in which the tribe/nation resided, the total land base, the total population (US Census 2010). This list can be found in Appendix B.

### **3.2.2 Legal Rights of American Indians and Tribal Governments**

The federal government has adopted laws and procedures regulating federally-funded and federally-sponsored research affecting human subjects. Two parallel sets of regulations govern such research. One set applies to all federally funded or conducted projects which involve human subjects and the other applies to drug studies that will be submitted for marketing approval to the federal Food and Drug Administration. Some states also have laws setting ethical standards for research. Institutional Review Boards (IRBs) are the vehicles used to ensure that federally funded or sponsored projects comply with the regulations. The primary mission of an IRB is to protect the rights and welfare of people who will be subjects of research. IRBs, generally, are set up by institutions performing research on a large scale, such as universities and medical facilities. A few IRBs are company-based or independent. Membership ideally include laypersons or proposed consumers as well as scientists, and reflect the cultural and ethnic mix of study populations. The Indian Health Service (IHS) has a national IRB as well as one in each Area. A few tribes have established their own IRBs, and a number are investigating the feasibility of doing

so. For this research, the existence and protocol of an IRB was assessed by contacting the tribal agencies by phone.

### **3.2.3 Identifying Traditional/Spiritual Practices**

Corn is generally considered sacred amongst several tribes indigenous to the Americas. Several nations indigenous to the Missouri River basin, including the Three Affiliated Tribes, the Lakota, Dakota, Nakota Nations, Kickapoo, Omaha, and Ponca each, have a history of corn integrated into the traditional cultural practices [168]. Tribes of the Great Lakes also had varieties of corn, however the principal agricultural crops were wild rice and berries [169]. Tribes of the upper Eastern woodlands also utilized corn, however the histories become clouded from west to east in conjunction with Euro-American westward expansion. Literature concerning AI/AN perception of genetically modified organisms (GMO) suggest that the traditional relationships with corn, and the protection of indigenous strains from corporate exploitation, suggests a general abhorrence to genetically modified cereal grains [170] [171] [172]. [173], however their perceptions and traditional relationships to corn have not been documented. This research will focus on any commercial or municipal cereal grain production for either food, fuel, or feedstock and will neither promote nor condemn GMOs in terms of crop-production.

### **3.2.4 Important Cultural Spaces**

Several areas throughout the study area are considered sacred sites, most notably the entirety of the Great Lakes, the Black Hills of South Dakota, and certain burial sites such as the graves of Sitting Bull and Red Cloud, as well as sites of major massacres such as Crow Creek and Wounded Knee. For this research, these spaces will have be observed as sacred, and *will not be utilized* for any form of data.



### **3.2.5 American Indian Conventions/Workshops**

While some American Indian agricultural organizations exist, such as the Traditional Native American Farmer's Association (TNAFA) and the Intertribal Agricultural Council (IAC), as well as climate-change focused organizations such as the American Indian/Alaska Native (Indigenous Peoples) Climate Change Working Group (AIANCCWG/IPCCWG) National Congress of American Indians (NCAI), U.S. Forest Service, and countless tribally based initiatives, there seems to be no clear network of interoperability. While some documents and policy recommendations have been released, there is currently no specific organization or convention devoted specifically to American Indian cereal crop producers.

### **3.2.6 Geospatial/Ecological Assessment**

For cereal crop producers, the north-eastern United States faces the lowest adaptive capacity to respond to decreases in precipitation, while the central US is likely to experience worse droughts but has a higher adaptive capacity (Fraser, et. al. 2012). While climate change is expected to affect crop production, water balance, and other biophysical effects, the human dimensions are uncertain, especially in American Indian communities. Climate variability will impact the welfare of socio-economic groups differently, and projections from most economic studies indicate substantial losses from a doubling of CO<sub>2</sub>e (Adams et. al. 1998). In Native American reservations, cereal price changes as a result of climate change could lead to an economic destabilization. Price-induced earnings changes can be a driver of poverty, particularly in that commodity price fluctuations as a result climate change will institute a cost of living increase (Hertel et. al. 2010).

### **3.3 Project Preparation and Initial Consent**

As this project seeks to understand American Indian cereal crop producers' crop-planning decisions, this research will employ a survey instrument to develop a culturally appropriate method of usable climate information dissemination. In collaboration with the U2U project, American Indian cereal crop producers will be surveyed to assess how and if climate change information is utilized in crop-planning, and to determine effective, and culturally appropriate, methods for disseminating usable climate knowledge. Producers surveyed will be those identified as a member of a tribal nation within the 22 of the top corn/soybean producing watersheds of the North Central Region. After considering the background information, several components of the project were created in compliance with IRB procedures as well as a contact methodology. A "mailer" was created to send to specific tribes that included an advance letter from a well-known American Indian academic that deals specifically with climate change in Indian Country, an easy to read project overview, a survey draft, a contact list of tribal institutions, a cover letter draft, and recruitment tool (postcard) draft. A fax was created and utilized in conjunction with the mailer to draw attention to the mailed research proposal. A call log and was created to detail the communication and consent process. Finally, to address the issue of some tribal communities unfamiliarity with the IRB process, an informative video was created to specifically address the question of "What is an IRB?" to provide even further clarity of the research process.

#### **3.3.1 Mailed Documents and Fax Protocol**

A general IRB application was created to explicitly define the research parameters. The application included: (1) Project Title, (2) Anticipated funding source, (3) Principal Investigator(s) and contact information, (4) co-investigators and key personal, (5) statement of intent to adhere to federal research ethics laws, (6) project locations, (7) potential vulnerable subject populations, (8) anticipated number of re-

search subjects, (9) consent gaining technique, and (10) application narrative. The application narrative is the most comprehensive portion as it details (a) the proposed research rationale, (b) specific procedures to be followed, (c) subjects to be included, (d) recruitment of subjects and obtaining informed consent, (e) procedures for payment of subjects, (f) confidentiality, (g) potential risks to subjects, (h) benefits to be gained by the individual and/or society, (i) investigators evaluation of the risk-benefit ratio, (j) written informed consent form, (k) waiver of informed consent (including questions specific to beneficence), (l) international research, (m) selected literature, and (n) supporting documents.

While the application is comprehensive, it can be quite overwhelming. To address this, a 4-page project overview was created using Apple Pages which announced the title of the research project, researcher contact information, the research questions to be addressed, research justifications, ethical consideration for research collaboration with American Indian communities, an explicit detail of how the data will be used, project support and collaborations, and finally a detailed explanation of confidentiality and risk. While each aspect included is further detailed in the application narrative, the overview format is designed to be easily readable and include full-color graphics and color-matching to add visual appeal. The sections which detail study participants protections and confidentiality, as well as the absolute compliance with IRB protocol, were bolded and stressed in order to emphasize the effort to minimize harm throughout the study.

The survey instrument is modified from the U2U cereal crop producer survey (U2U 2011b), which covers seven topical areas: (1) types of farming practices used and timing of management decisions, (2) influence of weather and climate information on decision making, (3) weather and climate risk management strategies and belief, (4) concerns and beliefs about climate change and its impact on Midwestern agriculture, (5) influence of various groups and individuals on farm management practices, (6) impacts to traditional life-ways and/or impacts to tribal nations, and (7) the role of traditional ecological knowledge utilization in perception and adaptation to climate

change. The survey also included a draft of the cover letter which explains briefly the study, as well indicate that participation in the study was entirely optional and that absolutely no confidential information specific to the individual or farm would be published.

Other materials included were drafts of the recruitment tools to be used (postcards), a bibliography of relevant and cited research, a copy of CITI training certificate, and a letter of introduction. Postcards are effective means to contact individual study participants and effectively “snowball” the research to other interested parties, while also maintaining a form of communication about the survey to be mailed after potential study participants have been identified. As the research application narrative and proposal contains references to previous studies, legal cases, and relevant political discourse, a bibliography of all references was included so that interested parties may conduct further research into the current literature. In further compliance with ethical considerations of research, a copy of the CITI training completion certificate was included to indicate that ethical foundations were being observed. Finally, the letter of introduction was utilized by identifying a key figure in the development of collaborative climate change adaptation strategies, as a sort of letter of recommendation to reinforce the explication of the ultimate goal of beneficence and desire to facilitate tribal well-being amidst environmental hazards due to a changing climate.

Mailing addresses were identified by first identifying the tribal institutions within the study area, then searching online for contact information from tribally operated websites. A preliminary mailer was sent to each of the addresses utilizing a mail-merge of the research proposal. After mailing, a fax was sent to each of the tribal institutions to alert the office staff of the incoming documents.

### **3.3.2 Call Log and Contact Protocol**

While the mailer and the fax allow the tribal institutions to have a hard-copy of the research proposal, rationale, and supporting materials, the process of gaining consent

must rely heavily on establishing interpersonal communication and developing trust and familiarity with the research and researcher. Working with a singular tribe or tribal institution can be difficult, and expanding a search frame to incorporate 67 separate tribal institutions requires a data management technique which includes a contact sheet and a call log. Call Log and Contact Sheet are kept private at all times and will be destroyed at the conclusion of the research project.

To build the tribal contact status sheet, a Microsoft Excel spreadsheet was created with columns for: (1) tribal institution name, (2) street address 1, (3) street address 2, (4) city, (5) state, (6) zip code, (7) phone number, (8) fax number, (9) irb detail, (10) application status, (11) last date contacted, and (12) contact person. This sheet is also useful for incorporating mail merge for future mailings. Its important to regularly update this sheet as phone/fax numbers may change unexpectedly as well as addresses and key contact persons. The IRB detail is useful as a way to indicate which tribes have standing IRB committees compared to other tribes which form IRB committees ad hoc, or simply are unaware of the IRB process entirely. Application status is useful to indicate which tribes have received the mailed documents, as well as which tribes have approved the research. The last date contacted section is important as it can be useful to determine which calls to prioritize.

A call log is especially critical in maintaining an active relationship with the tribal institutions. The call log can be either written or electronic, however the log should be kept in a secure location at all times as information collected is not meant to be published or intended for any use except to update the contact sheet and allow the researcher to externalize the contact made. For this study, a call log was created in Microsoft Word utilizing the following format for each individual phone call:

**(TIME) TRIBAL INSTITUTION CONTACTED**  
**(PERSON'S NAME & OFFICE) DETAILS OF PHONE CALL**  
**(RESOLUTION)**

The time and tribal institution contacted should be bolded, making it easier to quickly identify relevant information, specific to either a time or tribe. By writing the names

of the people during the call, it can be easier to talk with others within a tribal institution, as in “Hi! I just talked to (person) in the (office) and they recommended that I talk with you...” The details of a call can also indicate specific tasks that a researcher must complete, such as calling back a certain time, or in identifying the specific way that the tribe operates as each may have similar structure and departments, yet each will have a unique way of conducting business. Finally a resolution indicator should end the call. For this log, multiple resolutions were possible each colored differently to draw attention to the tasks. *CB*, bolded and in red indicated that the researcher should “call back” as a key person of contact was not reached, or that a line was potentially disconnected. *LM*, bolded and in orange, indicates that a key person was identified, however unavailable for a call, therefore the researcher “left a message” and should call back another day. *LM*, bolded and in green, indicated that a courtesy call or follow up call was placed after a specific task was completed, for instance if a researcher had contacted a person earlier and the person asked for a new mailer, after the mailer had been sent, the researcher would call and if the person was unavailable, a message would be left indicating that the task had been completed. *RES*, bolded and in red, indicates that a contact person had been reached, and a plan of action agreed upon, next to the indicator, a brief description of the “resolution” should be noted. *RES*, bolded and in green, indicates that a specific concern or task had been resolved during the phone conversation and requires no further action. *X*, bolded and black, can be used if the phone number is no longer in service.

There are several stages of phone contact; however the following protocol has proven to be the most effective at identifying an appropriate research and review committee. The first cold call will most likely yield an operator or tribal secretary, upon first contact, greet the person and announce your name, institution, followed by a cordial return address, e.g. “Good afternoon! My name is (name), and I am calling from (dept., institution), how are you doing today?” This will add a dimension of personality to the call and depending upon the response, a gauge of the persons attitude can be assessed to determine the next appropriate approach. If the person

sounds warm and inviting, continue reciprocating the care, while explaining that you are interested in conducting research within the tribe, however you recognize that consent must first be gained, at which point, politely ask the operator to connect you with someone who might be familiar with either the “institutional review board,” or “research review board.” Do not use acronyms! While some may be familiar with the terms, several tribes will not be readily familiar with research, at which point a suggestion to be connected with a natural resources department, environmental department, human resources department, or compliance department will be your next step.

The second call, or connection, will usually yield a person more readily aware of research, although there will most likely be continued transferring to other departments/offices. Be sure to write the names of the people down that have been contacted, as well as their numbers and email addresses. Once the person most likely to manage the IRB process has been identified, speak to them completely about not only the research project, but also yourself, why you wish to conduct the research, and explain fully the ultimate goal of beneficence. Note that each tribe will operate differently, and communication norms may be different than what a researcher may be accustomed to. Constant contact and communication and a sort-of “opening up,” is crucial to building trust.

The ultimate goal of this contact process is to determine first whether or not an IRB protocol is in place within the tribe. If there exists a standing committee and procedure, calls are important to ensure that the application process is followed through. If the tribal institution utilizes an ad hoc basis for IRB approval, then contact is important for identifying the individuals that the appropriate information should go to, as well as continuing contact to schedule conference calls or other questions about the research. If there does not exist an IRB, often times this will be accompanied by an unfamiliarity with the research process in general, in this case, the researcher assumes the role of informing the tribal community of the IRB process and ethical considerations.

### 3.3.3 Establishing Community IRBs

IRB existence and protocol was recorded to determine the method in which IRBs are convened (standing committee, through TCU, ad hoc committee) while a determination of the confidence level was recorded as: non-existent (IRB does not exist), low confidence (IRB is formed Ad Hoc), medium confidence (Tribal College handles IRB procedure but no standing protocol exists), and high confidence (IRB protocol is clear and easily accessible). In the case of non-existent IRBs, it can be difficult to simply explain over the phone what an IRB is, and what the function of the IRB is. For this project, a video was created that specifically addresses the question of “What is an IRB?” in context of American Indian communities. The video was made in Apple iMovie, and incorporates cinematic elements of the research process, as well as Apple Keynote slides that define key terms and graphically represent parts of the IRB process. Face time is important in this, as it identifies the researcher, connecting a name to a tangible personality. By presenting the video in multiple common web formats such as Windows Media and YouTube, and assigning a shortened URL (<http://tinyurl.com/whatisanirb>) which links to the video, it allows the researcher to quickly reference the video to alleviate on-phone explanations. While this sort of extension can be helpful to inform communities of the function of an IRB, it must be noted that establishment of an IRB and the approval of the research still may take a significant amount of time and effort. The majority of literature reaffirms that the “face-to-face method” is an absolute necessity and for this research, the IRB establishment is currently still ongoing.

### 3.4 Summary of Observations

As part of ethical research concerning human subjects, several safeguards are in place to ensure that risk of physical or psychological harm is minimized for study participants; particularly the Institutional Review Board. American Indian communities are granted further protections as sovereign entities. Tribal profiles are listed in



Appendix B which indicate the Tribe/Nation, State(s) in which the tribal reservation and/or trust lands are located, the total size of the land base, the treaties which lead to their current locations, the population of tribal members on the land, and the IRB protocol and confidence level (if it exists). These profiles are useful to have on hand to gain a clearer understanding of the tribe, as each tribe is quite unique. For instance, the Oglala Lakota are currently placed in an area in which they historically occupied, while the Winnebago Tribe of Nebraska was once located in Connecticut. A method to overcome this challenge is to work collaboratively with the tribe to inform them of the purpose, function, and operation of an IRB, and potentially aide in further collaborative research. A problem occurs however when tribal IRBs are either underutilized or simply nonexistent.

Table 3.1: Tribe/Nation with TCU and/or IRB

<b>Tribe/Nation</b>	<b>TCU</b>	<b>IRB</b>
Bad River Band of Lake Superior Tribe of Chippewa Indians	No	No
Crow Creek Sioux	No	No
Flandreau Santee Sioux Tribe	No	No
Forest County Potawatomi Community	No	No
Grand Traverse Band of Ottawa and Chippewa	No	No
Iowa Tribe	No	No
Kickapoo Tribe of Indians	No	No
Lac du Flambeau Band of Lake Superior Chippewa	No	No
Lac Vieux Desert Band of Lake Superior Chippewa	No	No
Lower Brule Sioux tribe	No	No
Lower Sioux Indian Community	No	No
Menominee Indian Tribe of Wisconsin	No	No
Nottawaseppi Huron Band of the Potawatomi	No	No
Pokagon Band of Potawatomi Indians	No	No

*continued on next page*

Table 3.1: *continued*

<b>Tribe/Nation</b>	<b>TCU</b>	<b>IRB</b>
Ponca Tribe of Nebraska	No	No
Prairie Band of Potawatomi	No	No
Prairie Island Indian Community	No	No
Sac & Fox Nation of Missouri	No	No
St. Croix Chippewa Indians of Wisconsin	No	No
Upper Sioux Indian Community	No	No
Cheyenne River Sioux	No	Yes
Ho-Chunk Nation of Wisconsin	No	Yes
Oneida Nation of Wisconsin	No	Yes
Sac & Fox Tribe of the Mississippi in Iowa	No	Yes
Shakopee Medewakanton Sioux Community	No	Yes
Yankton Sioux Tribe	No	Yes
Lac Courte Oreilles Band of Lake Sup. Chippewa Indians	Yes	No
Oglala Sioux Tribe of the Pine Ridge Reservation	Yes	Yes
Omaha Tribe of Nebraska	Yes	Yes
Rosebud Sioux Tribe	Yes	Yes
Saginaw Chippewa Indian Tribe of Michigan	Yes	Yes
Sisseton-Wahpeton Oyate of the Lake Traverse Res.	Yes	Yes
Spirit Lake Tribe	Yes	Yes
Standing Rock Sioux Tribe	Yes	Yes
Three Affiliated Tribes of the Fort Berthold Res.	Yes	Yes
Turtle Mountain Band of Chippewa Indians	Yes	Yes
Winnebago Tribe of Nebraska	Yes	Yes

Identifying potential research bridges in Indian Country is an effective way to navigate the research review process, especially as a large portion of tribes offload the IRB

function to local tribal colleges and universities (TCUs). Table 3.1 shows tribes with access to TCUs also tend to have an IRB protocol. The mission of TCUs is to promote educational opportunity by providing access to academic resources. However, TCUs are only a component of a much larger movement of nation building. Often times the tribal nation will partner with a local TCU for research review, indicating an opportunity for intertribal connections. Tribal Colleges and Universities are members of the American Indian Higher Education Consortium (AIHEC). Students from TCUs also connect, with several inquiries into how climate change impacts their homelands. The connections become especially important for smaller tribes with limited resources. TCUs provide access to journals, however publications are increasingly becoming available for free and easily searchable through Google Scholar, and other global information resources. The ability to not only access information, but also publish, information has become easier as well. High quality audio-visual media, accessible on scale from a desktop computer to a phone, can explain some of the questions of the research process, the ethics behind it, and the potential public benefits.

### **3.5 Implications for Further Study**

The American Indian Law Center recommendation to develop a sort of background knowledge when working with tribes is an effective way to gain a much more in-depth understanding of tribal nations' situation within both political and environmental contexts. Through critical examination of the history of the tribal nations, the common thread of removal to marginal lands is common, with most arable lands being deeded out to non-native farmers or simply unavailable. The recognition of each tribal nation as a sovereign entity, and absolute adherence to tribal IRB satisfaction is in recognition of the legal rights of Indians and tribal governments, even though certain agencies for research review may not exist. Outlining the context of the U2U survey as being in compliance with the respect of tribal traditions and spiritual practices is a key element of study compliance. Furthermore, the study ideally incorporates a

sort of “opt out” mechanism, should a traditional/spiritual bias come into play. The study recognizes cultural sights and places, however these places have no relation to the study of farmers perceptions. Finally, attending workshops and conferences which focus on the issues of American Indians and climate change, and American Indians and science and technology, indicates a need for research into the impacts of climate change on food security, however these conferences rarely yield deliverables of documentation which can be shared with the larger scientific and policy communities. This contact methodology sought to utilize teleconference and other forms of correspondence information communication. Ultimately, the methodology of consideration, the long-distance contact protocol, and the incongruencies between American Indian and research institutions have highlighted the difficulties of research review, and especially the investment of time required for research approval. *One glaring recommendation that several pieces of literature note, is that personal, face-to-face, contact is an absolute imperative.*

The IRB process is in place to protect native nations, and arguably it has been useful to curb the historic injustices imposed by research. However, it becomes quite clear that environmental research in American Indian communities will have an order of magnitude greater difficulty than comparable rural communities due to the IRB mandates in place. Ironically, even though several inter-tribal groups call for research, and suffer from lack of funding or professional capital in order to conduct, and disseminate, research, the IRB processes which seek to “protect” these communities are in fact a major hindrance. There is no telling how many researchers, Native and non-Native alike, have an interest in working with tribal communities, yet are unable to do so due to institutional failures. While it is documented that working with tribes takes much more time than typical research with non-tribal stakeholders. When dealing with large-scale problems such as food security issues, impacts associated with climate change, and other pressing matters, time becomes a precious resource that should not be so easily wasted.

The next step in this research is to find a way to work face-to-face with tribes, to build the interpersonal connections which are vital to working with American Indian tribes. Another avenue would be to work directly with American Indian scientists, educators, and/or tribal college administrators who are not considered “vulnerable populations” and dont require tribal IRB approval. Perhaps, by incorporating some methods of *Community Based Research Protocol*, which seeks to empower the tribal nations themselves to take a larger role in the overall research process from questions to dissemination, the U2U project can be utilized to help tribes adapt to climate change.

While it can be easy to become pessimistic about the problems of research within Indian Country, it only serves to highlight that research involves more than a simple quest to expand knowledge. It is an investment of time, of self, and the researcher must have a desire to assist the community while generating useful, and especially usable, knowledge. A researcher who seeks to work with Native nations must avoid framing their study in terms of ethnography, anthropology, and typical objective data collection. Instead, the researcher must approach the study in terms of collaboration. As far as a research frame, the Honor, Pride, and Respect model implicitly asks: what do the People need, and how can I bridge the academic resources at hand to the People in order to facilitate that need? This does introduce some limitations as a researcher must realize that they are investing themselves into peoples lives, and that its both ineffectual and rude to simply come in with a study, collect data, and then leave. Its a lifelong commitment. This is not to say that a researcher will do this and only this, but the discipline requires some self-sacrifice. Finally, this presents an opportunity for tribal members themselves to become invested in the research process, as for tribal peoples working with both their own people and the greater academic community, there is no longer the schizophrenic divide of self-identity [132] [152]. The tribal person who utilizes science as a tool to better their own surrounding society and environment rather than a determinant of objective reality may break free of

the typical researcher role of objective exclusion and be, as Swisher [29] described, a “broker of sorts” between their home and academic community.

The lesson learned is that a researcher must first and foremost establish trust with a tribe, and disillusion themselves of the idea of knowledge for knowledge’s sake. A researcher must develop partnerships with the specific tribal community from the ground up, which absolutely requires face-to-face interaction and identifying directly the partners with stake in the outcomes of the research. Information which comes from this process will be helpful for future researchers (especially native researchers), so any and all experiences, including those of the researcher, must not be discounted. Ultimately, a researcher needs to understand that they come from a position of privilege, and that it is unfair to assume that tribal nations will have the same infrastructure and access to resources that are typical of a university environment.

## 4. CONCLUSION

Over 566 federally recognized tribal nations span across a gradation of six biomes. Native American Communities are culturally, and climatologically, diverse yet share common impacts to lifestyle, particularly those tribes which rely on the local environs for hunting, fishing, water and land base. When multiple knowledge systems verify a singular event, it becomes a foundation for practical action. This thesis seeks to ask this question through a pragmatic application by: first identifying the current literature addressing real and perceived impacts of climate change in AI/AN communities, secondly identifying how climate change is constructed in newsprint media, and finally by identifying the method of research inquiry into tribal nations based on a framework of Honor, Pride, and Respect, as a method to aide in the development of tribal collaboration to address climate change vulnerability. Deconstructing the aggregated AI/AN perceptions of risk, impact, and vulnerabilities associated with climatic change, it becomes apparent that the focus is predominately in the arctic. The generalized pan-Indian assertion that American Indians are affected more by climate change is true, however the common-pooling of AI/AN communities can lead to oversight, this is evidenced particularly by the large gap in literature concerning the Great Plains region. The problem of a lack of literature is further compounded by lack of clear policy recommendation. This indicates that any and all research and discussion needs an avenue for dissemination outside of the typical academic collection as AI/AN tribal, commercial, state, and federal representation suffers from a lack of interconnectivity and unified discourse. The method of identifying climate change risk, impacts, and vulnerability as the actor within a frame of conflict, rather than grouping AI/AN into a singular category is a useful way to avoid pooling AI/AN perception which can lead to oversight in policy and academic literature.

Developing research initiatives which involves the selected input of AI/AN tribal members is tedious due to the necessity to satisfy the federally codified ethical protocol of institutional review, regardless of whether or not such protocol, or established research review committee, exists within the tribal nations. Tribes which utilize a tribal college are most likely to have an established IRB and/or research review board, however there exists virtually no methodology to aide in the establishment of an IRB for one or more tribal nations. Such difficulties can lead to reduced research into pressing issues of risk and vulnerability of AI/AN communities, leading to lowered adaptive capacity for individual tribal nations. The tribal college movement, and the advent of community based research protocols and “insider” research based on tribally sponsored initiatives each contribute to a rise in adaptive capacity. Current adaptive capacity for tribal institutions is fairly low, as tribes often have high unemployment, problematic transgovernmental bureaucracy, and degraded agency due to historical trauma, however reframing adaptive capacity in terms of community resilience, tribal nations potentially have “less to lose,” and with the right tools, could develop proactive solutions to adapt to long-term climatic change.

The keystone ideas of Honor, Pride, and Respect, are not simply lip service, rather they encompass a research framework which seeks to develop partnerships from the ground up. Research in Indian Country takes time and personal connection, and researchers who desire to work for the beneficence of native communities must take into account tribal sovereignty, as well as cultural respect and researcher privilege and positionality. A researcher who decides to work in Indian Country must dissuade themselves of the idea that they can simply be an objective observer, come in to collect data, and then simply publish and move on. An investigator is asking to actively change peoples lives, and relationships developed during a study are lifelong commitments. To respect a people, a researcher must find partners with a stake in outcomes of the research, especially when engaging the conflict of climatic change. Information that comes from the process will be helpful, however it is unfair to expect tribal communities to have the same privileges which accompany university infrastructure.



To honor a people, a researcher will most likely undergo some form of sacrifice, be it time, resources, and/or worldview. This is especially true for the American Indian researcher who must learn to eschew themselves of the “walk in two worlds” mentality, and must instead combine knowledges and even lifeways by engaging and modifying the academic, political, and social institutions in which the person exists. As a result, a researcher, irrespective of ethnicity, may take pride in their framing of climate change problems into a singular condition in which the researcher, and the study population, have an equal stake. This fellowship can lead to a sense of pride, and a connection of one’s self to an amalgam of the *People*, where the cold isolation of academia becomes only a small price to pay for the opportunity to restore some balance to centuries of abuse.

## APPENDICES

**A. SEARCH CRITERIA AND CODING SCHEME FOR  
CONTENT ANALYSIS OF AMERICAN INDIAN AND  
ALASKA NATIVE PERCEPTIONS OF CLIMATE  
CHANGE RISK, IMPACT, AND VULNERABILITY IN  
NEWSPRINT MEDIA**

Suitable articles in daily US national and regional papers available from online archives, published between December 31, 1991 and December 31, 2011, were searched for stories about American Indian and Alaska Native perceptions of climate change. Three online newspaper databases were utilized: ProQuest Newsstand, Ethnic News Watch, and LexisNexis. These databases offered the most complete collections of US newspapers, and included stories published which described individual, tribally specific, and/or pan-Indian communication of risks, impacts, and vulnerabilities (RIVs) of climate change.

The ProQuest Newsstand and Ethnic News Watch searches utilized the following Boolean search string: (“American Indian” OR “Native American”) AND (“Climate Change” OR “Global Warming”). The initial search yielded 2484 publications from ProQuest Newsstand and 585 publications from Ethnic Newswatch. To overcome the challenge of the Lexis Nexis search cap of 1000 articles, the following search string was utilized: (“global warming” OR “climate change”) AND (“American Indian” OR “Native American”) AND NOT legislation AND NOT festival AND NOT calendar AND NOT event AND NOT concert AND NOT museum AND NOT African AND NOT Jewish AND NOT Energy AND NOT Live AND NOT Governor AND NOT Secretary AND NOT Pipeline AND NOT drinking-water AND NOT Grants AND NOT Canada AND NOT Canadian AND NOT mascot AND NOT archaeology AND NOT pollution AND NOT markets AND NOT Military AND NOT Bolivian AND

NOT 9-11 AND NOT Colombia AND NOT Fellowship AND NOT London AND NOT Montreal AND NOT Scotland AND NOT Saskatchewan.

The search yielded 482 publications which met the search criteria totalling 3551 articles. The dataset was further reduced by removing articles: pertaining only to Canadian First Nations or other indigenous peoples outside of the US; focused on political climate change; community event calendars or public agendas; transcriptions of presidential speeches or speeches from any other non-native politicians; announcements of entertainment or art venues; focused on investment in agriculture, infrastructure, or alternative energy; pertaining to political campaign, election results, political agenda; pertaining to climate change as a foundation for convention rather than specific observation of climate change; focusing on environmental degradation; focusing on green building techniques; pertaining to Jewish issues or other theological foundations without direct reference to Native Americans; pertaining to literary review without direct correlation to climate change perceptions or risks; with offensive rhetoric, i.e. perpetuating harmful stereotypes; with the broad scope of “people of color” or “indigenous”; pertaining to specific risks or impacts of global warming/climate change with no reference to Native Americans; describing environmental impacts to a specific aspect of Native American culture (fishing, rice, etc.) with no references to climate change; which were redundant; pertaining to tribal/federal policy; pertaining to tribal education; expressed as satire rather than objective journalism.

Definitions of the coding categories and subcategories of interest

<u>Categories of Interest</u>	<u>Description</u>
<b>Risk, Impact, &amp; Vulnerability</b>	<b>Specific risks &amp; impacts attributed to climate change</b>
Animal Species Loss/Migration	Changes in animal species population and/or migration patterns i.e. "Our animals are moving further and further away and our salmon are not showing up"
Erosion	Land loss due to coastal/river erosion i.e. "Erosion has made Newtok an island, caught between the ever-widening Ninglick River and a slough to the north"
Cultural Degradation	Removal from homelands or changes in traditional hunting, ceremonial, or lifeway systems i.e. "widespread environmental upheaval resulting from climate change violates the Inuit's right to practice and enjoy the benefits of their culture"
Drought	Occurrence of extended/abnormal drought "ranchers in the Southwest are affected by one of the driest seasons in recent history, those on the Navajo Nation may be hit the hardest"
Flooding	Occurrence of flash-flooding or other types of flood i.e. "flood waters overtook communities in North Dakota and Montana "
Glacial Retreat	Receding glaciers/ reduced glacial density i.e. "The glaciers are melting so fast that they're actually causing a steady stream of water"
Melting Permafrost	Melting permafrost, or related damage to infrastructure i.e. "Permafrost is no longer permanent across the thousands of square miles of coastal plains"
Plant Species Loss/Migration	Changes in plant species population and/or migration i.e. "Plant and animal species are moving north"
Reduced Sea Ice	Loss or thinning of sea ice i.e. "Sea ice off the Alaskan coast has retreated by 14 per cent since 1978"
Reduced Snowpack	Reduction in amount of snow i.e. "We used to have several feet of snow in the winter, now we are lucky if we get a few inches"
Rising Sea Levels	Increases in sea level i.e. "Global warming is causing a rise in sea level from thermal expansion as the sea warms up and from the melting of the planet's ice caps"
Rising Temperatures	Rise in air/sea temperatures i.e. "global warming is expected to increase temperatures in the Four Corners area 10 degrees by 2100"
Water Shortage	Water scarcity impacts to humans i.e. "One reservation, Cheyenne River in South Dakota, reports it will be completely dry by August, leaving 14,000 residents scrambling for water"
Weather Extremes	Severe weather, or changes in weather patterns "We are having tornadoes where there used to be none, and they are occurring several a season"
<b>Individual Perceptions</b>	<b>Acknowledgement of risks/impacts attributed to climate change from an individual perspective</b>
Testimony/Quotation	Direct quote from individual tribal member within an article
Author	AI/AN author describes firsthand risk/impacts of climate change thru Native Publications such as <i>Indian Country Today</i> or <i>Tribal College Journal</i> . Generalized reporting will be encoded as either Pan-Indian or Tribally Specific
<b>Pan-Indian Perceptions</b>	<b>Climate change risk, impact, and/or vulnerability described in a pan-Indian or multi-tribal context.</b>
<b>Tribally Specific</b>	<b>Climate change risk, impact, and/or vulnerability described in a tribally specific context</b>
Alaska Natives	Specific to Alaska Natives and/or communities i.e. Inuit, Eskimo, Aleutian, or Newtok, Kivalina, etc.
Southwest	Specific to tribes in the Southwest (including California) i.e. Navajo, Pueblo, etc.
Great Plains	Specific to tribes in the Great Plains region i.e. Lakota, Cheyenne River Sioux, etc.
Great Lakes	Specific to tribes in the Great Lakes region i.e. Red Lake, Ojibwa, Potawatomie, etc.
Oklahoma	Specific to tribes in Oklahoma i.e. Cherokee, Comanche, etc.
Eastern	Specific to tribes along the Eastern coast i.e. Seminole, Iriquois, etc.

**B. COLLECTED BACKGROUND INFORMATION  
DETAILING TRIBAL DEMOGRAPHICS,  
INTER-GOVERNMENTAL RELATIONSHIPS, AND  
COMMUNICATION CONFIDENCE**

The following information includes: the Tribe and/or Nation and associated Tribal College and/or University, the State(s) in which the tribe is currently located, the Treaty which delineates the tribal reservations and/or allotted lands, the total land base, the tribal population within the reservation and/or allotted lands, and a description of the IRB procedure for each tribe and an assignment of a confidence level in navigating the tribal IRB process ranging from *LC*, or “low confidence,” *MC*, or “medium confidence,” *HC*, or “high confidence”, and “Non-Existent” if no IRB protocol could be identified.

*This section, “List of Tribal institutions with standing IRB and/or research review committees” is in compliance with the IRB exemption from Purdue University (IRB Protocol #1310014129).*

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Spirit Lake Tribe (Mni Wakan Oyate) Cankdeska Cikana Community College, UTTC	North Dakota	1867, Treaty with the Sioux-Sisseton and Wahpeton Bands
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
1,283.777 km <sup>2</sup> (495.669 sq mi)	6,677	Through Tribal CCCC, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Standing Rock Sioux Tribe Sitting Bull College, UTTC	North Dakota South Dakota	1868, Treaty with the Sioux-Brule, Oglala, Miniconjou, Yanktonai, Hunkpapa, Blackfeet, Cuthead, Two Kettle, Sans Arcs, and Santee – And Arapaho
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
9,251.2 square kilometers (3,571.9 sq mi)	8,250	Through SBC, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Three Affiliated Tribes of the Fort Berthold Nation Fort Berthold Community College, UTTC	North Dakota	1851, Treaty of Fort Laramie with Sioux, etc.
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
3,415.923 km <sup>2</sup> (1,318.895 sq mi)	5,915	Conflicted: through chairman's office and/or FBCC, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Turtle Mountain Band of Chippewa Indians Turtle Mountain Community College, UTTC	North Dakota South Dakota Montana	XO Dec 21, 1882; XO Mar 29, 1884; XO Jun 3, 1884; The McCumber Agreement of October 22, 1892, and Pertinent Sections of the Act of April 21, 1904, Which Amended and Approved it
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
175.04 km <sup>2</sup> (67.583 sq mi)	8,331	Conflicted: through chairman's office and/or TMCC, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Cheyenne River Sioux Tribe	South Dakota	1868, Treaty with the Sioux-Brule, Oglala, Miniconjou, Yanktonai, Hunkpapa, Blackfeet, Cuthead, Two Kettle, Sans Arcs, and Santee – And Arapaho
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
11,051.447 km <sup>2</sup> (4,266.987 sq mi)	8,470	In Process, currently ad hoc

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Crow Creek Sioux Tribe	South Dakota	Treaty of 1859; Established 1880
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
421.658 sq mi (1,092.09 km <sup>2</sup> )	1,230	Non-existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Flandreau Santee Sioux Tribe (Mdewakantonwan)	South Dakota	1934, Indian Reorganization Act
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
5,000 acres (20 km <sup>2</sup> )	726	Non-existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Lower Brule Sioux Tribe	South Dakota	1868, Treaty with the Sioux-Brule, Oglala, Miniconjou, Yanktonai, Hunkpapa, Blackfeet, Cuthead, Two Kettle, Sans Arcs, and Santee – And Arapaho
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
207.189 sq mi (536.617 km <sup>2</sup> )	1308	Non-existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Oglala Sioux Tribe of the Pine Ridge Indian Reservation, Oglala Lakota College	South Dakota	1868, Treaty with the Sioux-Brule, Oglala, Miniconjou, Yanktonai, Hunkpapa, Blackfeet, Cuthead, Two Kettle, Sans Arcs, and Santee – And Arapaho
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
3,468.86 sq mi (8,984.306 km <sup>2</sup> )	28,700	Through OLC, HC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Rosebud Sioux Tribe, Sinte Gleska University	South Dakota	1868, Treaty with the Sioux-Brule, Oglala, Miniconjou, Yanktonai, Hunkpapa, Blackfeet, Cuthead, Two Kettle, Sans Arcs, and Santee – And Arapaho, Est. 1889
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
1,970.362 sq mi (5,103.214 km <sup>2</sup> )	21,245	Through SGU, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Sisseton-Wahpeton Oyate of the Lake Traverse Reservation, Sisseton Wahpeton College	South Dakota	1867, Lake Traverse Treaty



<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
1,970.362 sq mi (5,103.214 km <sup>2</sup> )	12,300	Ad hoc, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Yankton Sioux Tribe	South Dakota	1858, Treaty with the Yankton Sioux
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
665.712 sq mi (1,724.186 km <sup>2</sup> )	6,465	Ad hoc, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Omaha Tribe of Nebraska, Nebraska Indian Community College	Nebraska	1854, Treaty with the Omaha
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
12,421 acres (50.27 km <sup>2</sup> )	5,194	Ad hoc, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Ponca Tribe of Nebraska	Nebraska	1858, Treaty with the Ponca; Supp. 1865; re-establish 1899
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
27,202.08 acres (110.0829 km <sup>2</sup> )	2,783	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Winnebago Tribe of Nebraska, Little Priest Tribal College	Nebraska	1855, Treaty with the Winnebago
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
106,040.82 acres (429.1320 km <sup>2</sup> )	4,192	Ad hoc, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Iowa Tribe	Kansas	1861, Treaty with the Iowa
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
12,000 acres (49 km <sup>2</sup> )	2000	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Kickapoo Tribe of Indians	Kansas	1832 Treaty of Castor Hill
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
19,200 acres (77.7 km <sup>2</sup> )	1,653	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Prairie Band Potawatomi	Kansas	1829 Treaty of Prairie du Chien; 1846 est.
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
121.429 sq mi (314.501 km <sup>2</sup> )	1,238	Ad hoc, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Sac & Fox Nation of Missouri	Kansas, Nebraska	1815 Treaty with the Sauk, 1815 Treaty with the Foxes, 1837 Reloc.
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
121.429 sq mi (314.501 km <sup>2</sup> )	442	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Lower Sioux Indian Community	Minnesota	1851 Treaty of Traverse des Sioux
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
2.705 sq mi (7.006 km <sup>2</sup> )	335	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Shakopee Mdewakanton Sioux Community	Minnesota	1969 Federal Recognition
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
2,000 acres (8.1 km <sup>2</sup> )	658	Ad Hoc, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Prairie Island Indian Community	Minnesota	1889 Est.
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
1.6689 sq mi (4.3225 km <sup>2</sup> )	199	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Sac & Fox Tribe of the Mississippi in Iowa (Meskwaki Nation)	Iowa	1815 Treaty with the Sauk, 1815 Treaty with the Foxes, 1934 Indian Reorganization Act
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
7,000 acres (28 km <sup>2</sup> )	1,300	Ad Hoc, LC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Upper Sioux Indian Community	Minnesota	1938 Est.
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
1.984 sq mi (5.139 km <sup>2</sup> )	57	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Grand Traverse Band of Ottawa and Chippewa	Michigan	1980 Federal Recognition
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
2.539 km <sup>2</sup> (0.9804 sq mi)	545	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Nottawaseppi Huron Band of the Potawatomi	Michigan	1980 Federal Recognition

<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
129.4 acres (524,000 m <sup>2</sup> )	800	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Lac Vieux Desert Band of Lake Superior Chippewa	Michigan	Treaty of St. Peters of 1837, Treaty of La Pointe of 1842 and Treaty of La Pointe of 1854, 1988 "Lac Vieux Desert Band of Lake Superior Chippewa Indians Act" (H.R. 3697)
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
328.04 acres (1.3275 km <sup>2</sup> )	135	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Pokagon Band of Potawatomi Indians	Michigan	1994 Federal Recognition
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
4,700 acres	4,500	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Saginaw Chippewa Indian Tribe of Michigan, Saginaw Chippewa Tribal College	Michigan	1855 Treaty with the Chippewa, 1930 Indian Reorganization Act
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
217.67 sq mi (563.8 km <sup>2</sup> )	3,296	Ad Hoc, MC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Bad River Band of the Lake Superior Tribe of Chippewa Indians	Wisconsin	1854 Treaty of La Pointe
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
497.477 km <sup>2</sup> (192.077 sq mi)	1,800	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Forest County Potawatomi Community	Wisconsin	1825 Treaty of Prairie du Chien; 1833 Treaty of Chicago
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
50.5795 km <sup>2</sup> (19.529 sq mi)	531	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Ho-Chunk Nation of Wisconsin	Wisconsin	1837, Treaty with the Winnebago; Est. 1875
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
6.5625 sq. mi acres (16.997km <sup>2</sup> )	6,563	Ad Hoc, MC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Lac Courte Oreilles Band of Lake Superior Chippewa Indians, Lac Courte Oreilles Ojibwa Community College	Wisconsin	1854 Treaty of La Pointe
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
107.912 sq mi (279.492 km <sup>2</sup> )	2,900	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Lac du Flambeau Band of Lake Superior Chippewa	Wisconsin	1854 Treaty of La Pointe
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
108.065 sq mi (279.887 km <sup>2</sup> )	2,995	Non-Existent

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Menominee Indian Tribe of Wisconsin, College of Menominee Nation	Wisconsin	1968, Menominee Tribe v. United States; Est. 1975
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
353.894 sq mi (916.581 km <sup>2</sup> )	8,700	Thru CMN, MC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
Oneida Nation of Wisconsin	Wisconsin	1784, Treaty of Fort Stanwix; 1838 Treaty with the Oneida
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
265.168 km <sup>2</sup> (102.382 sq mi)	21,321	Ad Hoc, MC

<b>Tribe/Nation &amp; TCU</b>	<b>State(s)</b>	<b>Treaty</b>
St. Croix Chippewa Indians of Wisconsin	Wisconsin	1854 Treaty of La Pointe; 1934 Indian Reorganization Act
<b>Land Base</b>	<b>Population</b>	<b>IRB Procedure</b>
9.140 km <sup>2</sup> (3.529 sq mi)	641	Non-Existent

**C. U2U CEREAL CROP PRODUCER APPLICATION  
AND SURVEY PACKAGE PREPARED FOR TRIBAL  
RESEARCH REVIEW**

This appendix includes the materials sent to tribes including: Application To Use Human Research Subjects, U2U Project Overview, Cover Letter & U2U Survey Draft, and Postcard Text.

**APPLICATION TO USE HUMAN RESEARCH SUBJECTS**

Prepared For Institutional Review Board of the

[Insert Tribe Here](#)

***Project Title: Climate Variability & Change Information Perceptions of American Indian Cereal Crop Producers in the North-Central Region of the United States (Purdue University IRB Ref#I206012422)***

*For Expedited Review*

**Anticipated Funding Source: Agriculture and Food Research Initiative Competitive Grand no. 2011-68002-30220 from the USDA National Institute of Food and Agriculture**

**Principal Investigator:**

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The Principal Investigator agrees to carry out the proposed project as stated in the application and to promptly report to the Institutional Review Board any proposed changes and/or unanticipated problems involving risks to subjects or others participating in the approved project in accordance with the HRPP Guideline 207 Researcher Responsibilities, Purdue Research Foundation- Purdue University Statement of Principles and the Confidentiality Statement. The principal investigator has received a copy of the Federal-Wide Assurance (FWA) and has access to copies of 45 CFR 46 and the Belmont Report. The principal investigator agrees to inform the Institutional Review Board and complete all necessary reports should the principal investigator terminate University association.

**This project will be conducted at the following location(s): (please indicate city & state)**

*See Attached Survey Locations*

**If this project will involve potentially vulnerable subject populations, please list all that apply:**

Minority Groups and/or Non-English Speakers

**Indicate the anticipated maximum number of subjects to be enrolled in this protocol as justified by the hypothesis**

3000

**This project calls for:**

Waiver of informed consent (*Survey Cover Sheet*)

## APPLICATION NARRATIVE

### A. PROPOSED RESEARCH RATIONALE

For cereal crop producers, the north-eastern United States faces the lowest adaptive capacity to respond to decreases in precipitation, while the central US is likely to experience worse droughts but has a higher adaptive capacity (Fraser, et. al. 2012). While climate change is expected to affect crop production, water balance, and other biophysical effects, the human dimensions are uncertain, especially in American Indian communities. Climate variability will impact the welfare of socio-economic groups differently, and projections from most economic studies indicate substantial losses from a doubling of CO<sub>2</sub>e (Adams et. al. 1998). In impoverished communities, such as Native American reservations, cereal price changes as a result of climate change could lead to an economic destabilization. Price-induced earnings changes can be a driver of poverty, particularly in that commodity price fluctuations as a result climate change will institute a cost of living increase (Hertel et. al. 2010).

Within American Indian communities there exists a “red alert” to adapt to climate change (Wildcat 2009; Mann 2012). The tribal college movement, and partnerships forged by the American Indian Higher Education Consortium with Science, Technology, Engineering, and Math (STEM) disciplines seeks to answer this call (Pember 2010). Pan-Indian councils and governing bodies such as the National Congress of American Indians (NCAI), Council on Utility Policy (COUP), and American Indian/ Alaska Native Climate Change Working Group all have issued statements regarding the urgency to learn more about how climate change will affect native communities. The idea and method of integrating knowledge systems of IKS and western science is not detailed in depth, and in many ways the two systems could prove to be incompatible (Bohensky 2011). Yet, within indigenous communities, there exists the idea that multiple knowledge systems serve to increase both social and ecological resilience (Rotarangi 2009). Gathering information through IKS or TEK also poses a methodological challenge, in that so much of the information is based on oral tradition and human memory (Lauer 2009). Nevertheless, in native communities in North America, it is imperative to acknowledge the role that traditional life-way systems play in decision making, especially at the community level (McBeath 2007). **The call for response to a changing climate in native communities extends beyond development of climate change policy or decision support services. An answer will require the integration of native and western epistemologies.**

A preliminary literature review highlights the relative lack of research into AI/AN perceptions of climate change, especially potential impacts of those in the North Central Region. Through analysis of newspaper articles, some common risks/perceptions from the Northwest Coast/Arctic region include: rising sea levels, coastal erosion, increase in storm frequency, species migration & extinction, damage to infrastructure, cultural loss, and community removal/encroachment. In the Southwest, observations include: severe drought, reduced snowpack, temperature extremes, inter-governmental conflict/water wars, “freak storms”, and species migration & extinction. In the plains region, including the great lakes, perspectives include drought/warmer temperatures, extreme weather/ seasonal variation, species migration, flooding, loss of forests, and an increase in mosquitoes and vector-borne disease. However, the literature does not describe Native American cereal crop producers’ perceptions of climate change variability, nor does it suggest what sorts of tools that native farmers would require to make better crop-planning decisions.

In collaboration with Useful to Usable (U2U): *Transforming Climate Variability and Change Information for Cereal Crop Producers* project, which seeks to “improve the resilience and profitability of farms in the corn-belt region amid variable climate change through the development and dissemination of improved decision support tools, resource materials, and training,” the aim of this research project is to answer four questions specific to native communities in the North Central Region:

1. **How do Native American producers make crop-planning decisions under uncertain climate projections?**
2. **What type of information do they need to make better decisions?**
3. **What are effective, and culturally appropriate, methods for disseminating usable knowledge to them and larger agricultural networks?**
4. **How does traditional ecological knowledge play a role in both perception and adaptation to climate change?**

### B. SPECIFIC PROCEDURES TO BE FOLLOWED

In order to gain an understanding of American Indian cereal crop producers’ crop-planning decisions, this research will employ a survey instrument to develop a culturally appropriate method of usable climate information dissemination. In collaboration with the U2U project, American Indian cereal crop producers will be surveyed to assess how and if climate change information is utilized in crop-planning, and to determine effective, and culturally appropriate, methods for disseminating usable climate knowledge. The U2U producer survey will be modified to be specific to tribal communities. Producers surveyed will be those identified as a member of a tribal nation within the 22 of the top corn/soybean producing watersheds of the North Central Region. Survey questions will address specific topics related to: types of farm practices used and timing of management decisions, influence of weather and climate information on decision making, weather and climate risk management strategies and beliefs, concerns and beliefs about climate change and its impact on Midwestern agriculture, influence of various groups and individuals on farm management practices, and the role of traditional ecological knowledge in farming practices.

The results of the survey data will be utilized by the U2U project to determine how information flows throughout the agricultural communities and identify effective means for disseminating climate information (U2U 2011) that is tribally specific with respect to traditional values. This will also ensure a diverse set of producer data for the overall U2U project while promoting intercultural understanding and awareness, as well as methods to assist in adaptation to crop-planning and natural resource management amidst climate variability and potential vulnerability.

### C. SUBJECTS TO BE INCLUDED

As American Indian communities are diverse, it is difficult to draw a random sample which would be representative of the entire geographic study area (Beauvais 1996). To reduce coverage error, a sample will be obtained that is representative of the geopolitical area. The benefit of non-probability is the clearer understanding of the impact of culture on social processes. A **maximum of 3000** American Indian cereal crop producers will be surveyed in a cross-sectional non-probability sample with a self-administered mail-in survey with an expected response rate of 40% in congruence with the expected response rate of the general U2U producer survey. *See attached tribal contact list for more information.*

### D. RECRUITMENT OF SUBJECTS AND OBTAINING INFORMED CONSENT

While limited AgCensus data is available for identifying American Indian cereal crop producers (U2U 2011), a snowball sampling method will be employed (Judd 1981). First, federally-recognized and state-recognized tribal governments, and tribal colleges if available, will be contacted by mail and phone calls to identify producers after each tribe's institutional review board (IRB) protocol has been met. **No data will be collected until each tribe's IRB protocol has been met.** An advance letter from Dr. Daniel Wildcat, an advisory member of the U2U project will also be sent to introduce the study. Second, from the names and addresses generated with the tribal agencies' assistance, contact will be made through phone calls, and members will be asked to suggest other members to contact, followed by continued iterations of the snowball method during the search timeframe. Finally, the survey and cover letter will be mailed to all potential respondents followed by a postcard, followed by two waves of surveys with cover letter. Great care must be taken within American Indian communities to emphasize respect when conducting surveys. Potential respondents will be informed that their participation in the study is essential for the success of the study because of their unique relationship to tribal culture and agrarian culture. The credibility of the research group will be expressed, as well as the knowledge that respondents' information is confidential, and that any information about the research project, except confidential information, can and will be explained fully upon request. A cover letter will address the potential respondents' rights and confidentiality, emphasizing how data is collected, how data will be used, the notification that **each survey is optional and the potential respondent may opt out at any time** and if possible, will be addressed with each of the respondent's traditional tribal greeting. As a researcher, I will also include my tribal affiliation, my clan, and my traditional greeting and acknowledgements in accordance with the indigenous values of honor, pride, and respect (Milk 2010). Please See attached sample of cover letter.

### E. PROCEDURES FOR PAYMENT OF SUBJECTS

There will be no payment of subjects.

### F. CONFIDENTIALITY

All personal and identifiable information gathered through phone calls notes and survey research will be kept confidential. All original surveys containing identifiable information will be kept in a locked storage cabinet and destroyed one year after completion of the research project. The private information will not be used for future research purposes.

### G. POTENTIAL RISKS TO SUBJECTS

The risk to subjects will be minimal. All information collected will be in survey form and will be kept confidential. Subjects will not be identified by name, address, income, etc. in final reporting of information.

### H. BENEFITS TO BE GAINED BY THE INDIVIDUAL AND/OR SOCIETY

This study will complement the collaboration of the U2U project and the Climate and Corn-based Cropping Systems CAP (CSCAP) by comparing how American Indian farmers utilize climate and crop-planning information in the North Central Region, which will lead to the development of decision support services to assist adaptation to the potential negative environmental and economic impacts of climate change. The knowledge generated will also contribute to the academic literature discussing perceptions of climate change in indigenous communities, as current information is nearly nonexistent, particularly information presented from an indigenous perspective. The information collected will also serve as a foundation for advancing the integration of native and western knowledge systems, potentially providing a method which is holistically compatible with both indigenous knowledge systems as well as western science.



#### I. INVESTIGATOR'S EVALUATION OF THE RISK-BENEFIT RATIO

As there will be minimal risk to subjects, the survey data is beneficial to the greater study.

#### J. WRITTEN INFORMED CONSENT FORM

Consent forms will not be used. A cover letters will precede the survey which outlines the participants right to confidentiality and right to opt out of the study.

#### K. WAIVER OF INFORMED CONSENT OR SIGNED CONSENT

A waiver of signed consent is requested, each question is addressed below:

a. *Does the research pose greater than minimal risk to subjects (greater than everyday activities)?*

**No, the research does not pose greater than minimal risk to the subjects.**

b. *Does a breach of confidentiality constitute the principal risk to subjects?*

**Yes. Measures will be taken to prevent breach of confidentiality.**

c. *Would the signed consent form be the only record linking the subject and the research?*

**No. A tracking number on the survey would link the subjects to the research.**

d. *Does the research include any activities that would require signed consent in a non-research context?*

**No.**

e. *Will you provide the subjects a written statement about the research?*

**Yes. The subjects WILL be provided a written statement (the cover letter) about the research which includes all the elements of the consent form without the signature lines.**

#### L. INTERNATIONAL RESEARCH

The study will not require research outside of the United States.

#### M. SELECTED LITERATURE

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#### **N. SUPPORTING DOCUMENTS**

- Project Overview
- Cover Letter
- U2U Survey (Draft)
- Postcard Text

Patrick Austin Freeland, Department of Forestry & Natural Resources, Purdue University

Research Proposal Overview



## Useful 2 Usable

### AMERICAN INDIAN CORN & SOYBEAN FARMER SURVEY

This project is supported by Agriculture and Food Research Initiative competitive grant no. **2011-68002-30220** from the USDA National Institute of Food and Agriculture.

Assessing Climate Variability & Change Information Perceptions of American Indian Cereal Crop Producers in the US Corn Belt

#### CONFIDENTIALITY

All personal and identifiable information gathered through phone calls, notes, and surveys, will be completely confidential. All original surveys containing identifiable information will be kept in a locked storage cabinet and destroyed one year after completion of this research project. The private information will not be used for future research purposes.

The risks to survey participants will be minimal. All information collected will be in survey form and will be kept confidential. Subjects will not be identified by name, address, income, etc. in final reporting of information.

Participation in the study by tribal members is completely voluntary. Each survey will be distributed with a cover letter which explains the right to confidentiality as well as the right to opt out of the study.

**ABSOLUTELY NO DATA WILL BE COLLECTED WITHOUT TRIBAL IRB APPROVAL.**



Useful to Usable (U2U): Transforming Climate Variability and Change Information for Cereal Crop Producers, is an integrated research and extension project working to improve farm resilience and profitability in the North Central Region by transforming existing climate information into usable knowledge for the agricultural community. Our goal is to help producers make better long-term plans on what, when and where to plant, and also how to manage crops for maximum yields and minimum environmental damage.

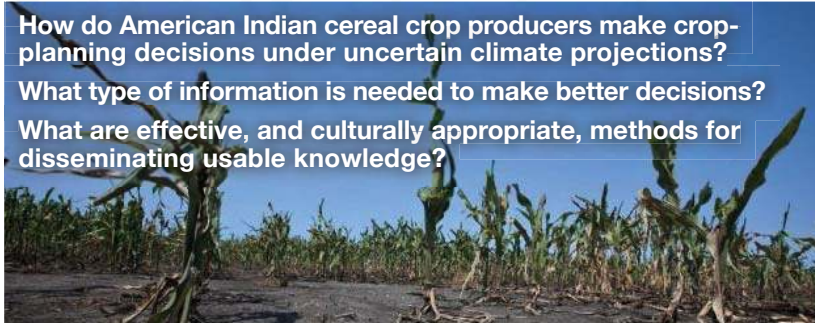


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**How do American Indian cereal crop producers make crop-planning decisions under uncertain climate projections?**

**What type of information is needed to make better decisions?**

**What are effective, and culturally appropriate, methods for disseminating usable knowledge?**



**THE CALL FOR A RESPONSE TO A CHANGING CLIMATE IN NATIVE COMMUNITIES EXTENDS BEYOND DEVELOPMENT OF CLIMATE CHANGE POLICY OR DECISION SUPPORT SERVICES. AN ANSWER WILL REQUIRE THE INTEGRATION OF BOTH WESTERN AND INDIGENOUS SCIENCE**

Climate change is expected to affect crop production, water balance, and other biophysical effects, the human dimensions are uncertain, especially in American Indian communities. Climate variability will impact the welfare of socio-economic groups differently, and projections from most economic studies indicate substantial losses from a doubling of CO<sub>2e</sub>. Cereal price changes as a result of climate change could lead to economic destabilization. Price-induced earnings changes can be a driver of poverty, particularly in that commodity price fluctuations as a result of climate change will institute a cost of living increase including higher food prices.

Within American Indian communities there exists a "red alert" to adapt to climate change. Intertribal councils and governing bodies such as the National Congress of American Indians (NCAI), Council on Utility Policy (COUP), and American Indian/ Alaska Native Climate

Change Working Group all have issued statements regarding the urgency to learn more about how climate change will affect native communities. The call for response to a changing climate in native communities extends beyond development of climate change policy or decision support services. An answer will require the integration of native and western epistemologies.

In collaboration with Useful to Usable (U2U): Transforming Climate Variability and Change Information for Cereal Crop Producers project, which seeks to improve the resilience and profitability of farms in the corn-belt region amid variable climate change through the development and dissemination of improved decision support tools, resource materials, and training, the aim of this research project is to understand how American Indian cereal crop producers perceive climate

change information to develop tools and resources to better prepare for climate variability.

#### **SPECIFIC PROCEDURES TO BE FOLLOWED**

In order to gain an understanding of American Indian cereal crop producers' crop-planning decisions, this research will employ a survey instrument to develop culturally appropriate methods of disseminating usable climate information dissemination. Producers surveyed will be those identified as a member of a tribal nation within 22 of the top corn/soybean producing watersheds of the North Central Region. Survey questions will address specific topics related to: types of farm practices used and timing of management decisions, influence of weather and climate information on decision making, weather and climate risk management strategies and beliefs, concerns and

beliefs about climate change and its impact on Midwestern agriculture, influence of various groups and individuals on farm management practices, and the role of traditional knowledge in farming practices

**The results of the survey data will be utilized by the U2U project to determine how information flows throughout agricultural communities and identify effective means for disseminating climate information that is tribally specific with respect to traditional values. This will ensure a diverse set of producer data for the overall U2U project while promoting inter-cultural understanding and awareness. methods to assist in adaptation to crop-planning and natural resource management amidst climate variability and potential vulnerability. Final reporting of information will be distributed to each participant, as well as tribal nations, with future opportunities for collaboration and outreach.**



## Useful 2 Usable

AMERICAN INDIAN CORN &  
SOYBEAN FARMER SURVEY

Assessing Climate Variability & Change  
Information Perceptions of American Indian  
Cereal Crop Producers in the US Corn Belt

Date  
Name  
Address Line 1  
Address Line 2

**DRAFT COPY**

[Insert Traditional Greeting]

Dear [Name of Potential Participant]

Heces Ce. My name is Patrick Austin Freeland, and I am Wind Clan of the Muscogee Creek Nation (Hvtvlke Mvskoke). [Local Tribal Government] and Purdue University are working collectively to understand the use and value of climate information in agricultural decision making to determine effective methods for delivering usable climate knowledge. With respect to the traditions of [Tribal Nation], your input is important so that we may develop culturally appropriate tools which are also practical for you as a cereal crop producer. **We would like to survey you about what sort of climate information and crop-planning tools you use, your adaptation strategies for potential changes in the future, and your perceptions of environmental changes that you may have experienced.** The goal is to determine how information flows throughout the agricultural community and identify effective, and culturally appropriate, means for assisting with climate information and decision-support services.

**If you would like to provide your input on agriculture and weather variability in the corn belt, we would like you to participate in this survey by completing the attached mail-in questionnaire.**

This study covers seven topical areas:

1. Types of farming practices used and timing of management decisions
2. Influence of weather and climate information on decision making
3. Weather and climate risk management strategies and belief
4. Concerns and beliefs about climate change and its impact on Midwestern agriculture
5. Influence of various groups and individuals on farm management practices
6. Impacts to traditional life-ways and/or impacts to tribal nations
7. The role of traditional ecological knowledge in perception and adaptation to climate change

Your feedback will help in understanding the type, and timing, of farm management decisions and how weather/ climate information can better serve Midwestern farmers. Also, with a clearer understanding of the needs of American Indian peoples from an indigenous perspective, decision support services can be adapted to be culturally appropriate, following the values of: Honor, Pride, and Respect.

**The questionnaires will be recorded and kept in a locked filing cabinet. Your responses and comments will be kept *completely confidential* and your comments will not be associated with your individual identity or farm. Please note that participation in this research is completely voluntary. It is with the utmost respect that your information is requested.**

**If you would like to provide input, please complete the survey and return to the address below. If there are any questions please feel free to contact me at any time at [pfreela@purdue.edu](mailto:pfreela@purdue.edu) or (816) 591-7441.**

[Traditional Thank You]

In Service and Friendship, Mvto

Patrick Austin Freeland

<http://drinet.hubzero.org/u2uproject>

**Please place the completed questionnaire in stamped return envelope provided and mail in as soon as possible.**

**[RETURN ADDRESS]**

**1** Considering the farmland that you use, please answer the following questions by circling either “yes” or “no.”

<b>1</b>	Over the past five years, have you experienced significant drought on the land you farm?	<b>Yes</b>	<b>No</b>
<b>2</b>	Over the past five years, have you had any problems with saturated soils or ponding on any of the land that you farm?	<b>Yes</b>	<b>No</b>
<b>3</b>	Do any creeks, streams, or rivers run through or along any of the land that you farm?	<b>Yes</b>	<b>No</b>
<b>4</b>	Over the past five years, have you experienced significant flooding (stream / river) on any of the land that you farm?	<b>Yes</b>	<b>No</b>

**2** The following are problems that some Corn Belt farmers have experienced over the past few years. How concerned are you about the following potential problems for your farm operation? (please circle one number on each line.)

		<b>Not Concerned</b>	<b>Slightly Concerned</b>	<b>Concerned</b>	<b>Very Concerned</b>
<b>a</b>	Increased flooding	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>b</b>	Longer dry periods and drought	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>c</b>	Increased weed pressure	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>d</b>	Increased insect pressure	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>e</b>	Higher incidence of crop disease	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>f</b>	More frequent extreme rains	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>g</b>	Increases in saturated soils and ponded water	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>h</b>	Increased heat stress on crops	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>i</b>	Increased loss of nutrients into waterways	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>j</b>	Increased soil erosion	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

- 3** In your farming operation, are the following practices and strategies currently used? If not, please indicate whether or not you are familiar with the practice.  
(Please check all that apply.)

	Currently Use	Familiar With, Not Used	Not Familiar With
<b>a</b> Grassed waterways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>b</b> Contour grass buffer strips	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>c</b> Filter strips of grass/trees next to waterways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>d</b> Field borders of grass/trees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>e</b> Windbreaks and shelter-belts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>f</b> Terraces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>g</b> Restored or constructed wetlands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>h</b> Whole/portions of crop fields converted to grass or trees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>i</b> Cover crops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>j</b> Reduced or constructed wetlands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>k</b> No-till	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>l</b> Diversified rotations that include small grains, forages, or other crops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>m</b> Nutrient management (e.g., testing soil, manure, and/or plant tissue to determine fertilizer rates)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>n</b> Integrated pest management (e.g., managed use of resistant varieties, scouting and considering pest thresholds before spraying)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>o</b> Irrigation efficiency best management practices (BMPs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>p</b> Use of control structures to drain and store water depending on crop needs and soil conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>q</b> Precision agriculture technology such as GPS, GIS, and variable rate technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>r</b> Canopy sensors for nitrogen deficiency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 4 In order to provide more timely weather information to corn producers, we are interested in when you typically carry out farming practices.

Please check **all of the months** in which you typically carry out the following practices related to **corn production**. If you do not typically carry out a practice, check "not applicable"

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	NOT APPLICABLE
a Apply anhydrous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b Apply liquid fertilizer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c Apply dry fertilizer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d Apply manure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e Irrigate corn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f Apply fungicides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g Apply insecticides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h Apply herbicides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i Till fields	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i Plant cover crops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 5 For each **decision** related to **corn production** listed below, please circle the **one primary month** in which you typically make that decision. If an activity is not part of your operation, circle "not applicable." (Please circle one number on each line)

I typically make decisions about the following in...	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	NOT APPLICABLE
a Crop rotation/field asgn.	1	2	3	4	5	6	7	8	9	10	11	12	13
b Seed purchases	1	2	3	4	5	6	7	8	9	10	11	12	13
c Seeding rate selection	1	2	3	4	5	6	7	8	9	10	11	12	13
d Fertilizer purchases	1	2	3	4	5	6	7	8	9	10	11	12	13
e Pesticide Purchases	1	2	3	4	5	6	7	8	9	10	11	12	13
f Propane Purchases	1	2	3	4	5	6	7	8	9	10	11	12	13
g Purchase Crop Insurance	1	2	3	4	5	6	7	8	9	10	11	12	13
h Fall tilling decisions	1	2	3	4	5	6	7	8	9	10	11	12	13
i Irrigation fuel purchases	1	2	3	4	5	6	7	8	9	10	11	12	13
j Use of cover crops	1	2	3	4	5	6	7	8	9	10	11	12	13



- 6** In general, how much do the following types of weather information influence your farm decisions?  
(Please circle one number on each line)

		No Influence	Low Influence	Moderate Influence	Strong Influence
<b>a</b>	Historical weather trends	1	2	3	4
<b>b</b>	Weather data for the past 12 months	1	2	3	4
<b>c</b>	Current weather conditions	1	2	3	4
<b>d</b>	1-7 day forecasts	1	2	3	4
<b>e</b>	8-14 day outlooks	1	2	3	4
<b>f</b>	Monthly or seasonal outlooks	1	2	3	4
<b>g</b>	Annual or seasonal outlooks	1	2	3	4

- 7** Do you use any of the following weather-related decision support resources? Note that these resources may be accessible via newsletters, websites, meetings, radio and other sources and they may not have the exact same name listed here. (Please circle one number on each line)

		Use	Don't Use	Not Familiar With
<b>a</b>	Crop disease forecast	1	2	3
<b>b</b>	Insect forecast	1	2	3
<b>c</b>	Evapotranspiration (ET) index	1	2	3
<b>d</b>	Growing degree day tools	1	2	3
<b>e</b>	Forage dry down index	1	2	3
<b>f</b>	Drought monitor/outlook	1	2	3
<b>g</b>	Satellite data/indices of water or soil nitrogen status	1	2	3
<b>h</b>	Farmers' Almanac	1	2	3
<b>i</b>	Traditional knowledge	1	2	3

- 8** Do you pay for any weather information (not including basic internet, satellite, or cable service fees)?  
(Please circle one number)

YES            1

NO             2

**9** For which of the following markets do you produce corn? (Check all that apply)

<b>a</b>	Commodity (sweetener, export, feed)	<input type="checkbox"/>
<b>b</b>	Ethanol	<input type="checkbox"/>
<b>c</b>	Livestock - silage	<input type="checkbox"/>
<b>d</b>	Specialty or value-added (including organic)	<input type="checkbox"/>
<b>e</b>	Seed	<input type="checkbox"/>
<b>f</b>	Other	<input type="checkbox"/>

**10** Listed below are activities you might do in your farm operation to manage for weather or climate related risks. Please check the boxes that best describe your plans to undertake these activities. (Please check all that apply)

		Not doing and don't plan to	Considering, but not doing	Doing as part of short-term risk management	Doing as part of long-term risk management
<b>a</b>	Purchase additional/adjust crop insurance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>b</b>	Intensify or expand current enterprises	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>c</b>	Add new technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>d</b>	Implement in-field conservation practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>e</b>	Implement edge-of-field conservation practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>f</b>	Sell or rent part of property	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>g</b>	Get a supplemental off-farm job (you or spouse)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>h</b>	Restructure cash flow and debt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>i</b>	Scale back operations (e.g. take land out of production, de-stocking)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>j</b>	Exit the industry / quit farming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 11** Suppose the following scenario were to happen in the near future:  
 Violent storms/extreme rain events will become more frequent, particularly in the spring  
 More extreme rain events will increase the likelihood of flooding and saturated soils  
 Periods between rains will become longer, increasing likelihood of drought  
 Changes in weather patterns will increase crop insect, weed, and disease problems

If you knew with certainty that the above conditions would occur, would use of the following practices and strategies on the cropland you farm decrease, increase, or stay the same?  
 (Please select one answer each for owned and rented land, if applicable)

Use of the following would...		Decrease	Stay Same	Increase	Don't Know
<b>a</b>	In-field structural conservation practices (e.g., grassed waterways, contour buffer strips, and terraces)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>b</b>	Cover Crops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>c</b>	Reduced tillage (e.g., strip, ridge, tillage)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>d</b>	No-till	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>e</b>	Diversified rotations (including small grains, forages or other crops)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>f</b>	Edge-of-field conservation practices (e.g., filter and buffer strips of grass and trees)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>g</b>	Nutrient management (e.g. determine fertilizer rates by testing soil, manure, and/or plant tissue)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>h</b>	Integrated pest management (e.g. managed use of resistant varieties, scouting and considering pest thresholds before spraying)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>i</b>	Subsurface "tile" or other drainage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>j</b>	Use of control structures to drain and store water depending on crop needs and soil conditions ("drainage water management," not just tile)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>k</b>	Irrigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>l</b>	Irrigation efficiency best management practices (BMP)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>m</b>	Canopy sensors for nitrogen deficiency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 12** If the above scenario were to occur, how confident are you that the practices and strategies currently used on the cropland you farm would maintain the long-term success of your farm operation? (Please circle one number on each line, if applicable)

		Not at all confident	Somewhat Confident	Confident	Very Confident
<b>a</b>	Current farming operation	1	2	3	4

- 13** There is increasing discussion about climate change and its potential impacts. Please select the statement that best reflects your beliefs about climate change. (Please circle one number.)

<b>a</b>	Climate change is occurring, and it is caused <u>mostly</u> by natural changes in the environment	<b>1</b>
<b>b</b>	Climate change is occurring, and it is caused <u>mostly</u> by human activities	<b>2</b>
<b>c</b>	Climate change is occurring, and it is caused more or less <u>equally</u> by natural changes in the environment and human activities	<b>3</b>
<b>d</b>	Climate change is <u>not</u> occurring	<b>4</b>
<b>e</b>	There is not sufficient evidence to know with certainty whether climate change is occurring or not	<b>5</b>

- 14** Given what you believe to be true about the potential impacts of climate change on agriculture in the Corn Belt, please provide your opinions on the following statements (Please circle one number on each line)

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Uncertain</b>	<b>Agree</b>	<b>Strongly Agree</b>
<b>a</b>	I have the knowledge and technical skill to deal with any weather-related threats to the viability of my farm operation	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>b</b>	I have the financial capacity to deal with any weather-related threats to the viability of my farm operation	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>c</b>	My farm operation will likely benefit from climate change	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>d</b>	There's too much uncertainty about the impacts of climate change to justify changing agricultural practices and strategies	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>e</b>	Climate change is not a big issue because human ingenuity will enable us to adapt to changes	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>f</b>	Crop insurance and other programs will protect the viability of my farm operation regardless of weather	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>g</b>	My farm operation will likely be <u>harm</u> ed by climate change	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>h</b>	I am concerned that available best management practice technologies are <u>not effective enough</u> to protect the land I farm from the impacts of climate change	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>i</b>	Traditional practices will be negatively affected by the impacts of climate change and my tribe will be forced to adapt	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

- 15** Organization, agencies, and individuals can do a number of things to prepare for or address potential changes in climate. Please provide your opinions on the following statements.  
(Please circle one number on each line)

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Uncertain</b>	<b>Agree</b>	<b>Strongly Agree</b>
<b>a</b>	Farmers should take additional steps to protect farmland from increased weather variability	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>b</b>	I should take additional steps to protect the land I farm from increased weather variability	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>c</b>	Seed companies should develop crop varieties adapted to increased weather variability	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>d</b>	University Extension should help farmers to prepare for increased weather variability	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>e</b>	Tribal, State, & Federal agencies should help farmers to prepare for increased weather variability	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>f</b>	Farm organizations (e.g. Farm Bureau, Corn Growers) should help farmers to prepare for increased weather variability	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>g</b>	Profitable markets for biomass should be developed to encourage planting of perennial crops on vulnerable land	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>h</b>	Profitable markets for carbon credits should be developed to encourage use of conservation tillage, cover crops, etc.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>i</b>	Profitable markets for small grains and other alternative crops should be developed to encourage diversified crop rotations	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>i</b>	Government should do more to reduce greenhouse gas emissions and other potential sources of climate change	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>k</b>	I should reduce greenhouse gas emissions from my farm operation	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>l</b>	It is important for farmers to adapt to climate change to ensure the long-term success of U.S. agriculture	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>m</b>	Changing my practices to cope with increasing climate variability is important for the long-term success of my farm	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>n</b>	Farmers should invest more in agricultural drainage systems to prepare for increased precipitation	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>o</b>	Farmers should invest more in irrigation systems to prepare for more frequent drought	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>p</b>	Farmers should adapt farming practices to mirror indigenous/traditional methods	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**16 Please indicate your level of agreement with each of the following statements.**

*(Please circle one number on each line)*

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Uncertain</b>	<b>Agree</b>	<b>Strongly Agree</b>
<b>a</b>	In the past 5 years, I have noticed more variable/unusual weather on my farm	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>b</b>	In the past 5 years, I have noticed more variable/unusual weather across the Corn Belt	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>c</b>	At least some land I farm has experienced significant soil erosion over the last five years	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>d</b>	The increased intensity of droughts, storms, and floods is a result of climate change	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>e</b>	I am willing to use seasonal climate forecasts to help me make decisions about agricultural practices	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>f</b>	Changes in weather patterns are hurting my farm operation	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>g</b>	Weather forecasts and information are not available when I need them to make crop related decisions	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>h</b>	I am confident in my ability to apply weather forecasts and information in my crop related decisions	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>i</b>	In the past, inaccurate weather information has negatively affected my farm operation	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>i</b>	Extreme weather events in recent years have affected my long-term management goals	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>k</b>	I am concerned about emissions of greenhouse gases from agricultural activities	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>l</b>	Nutrients and sediment from agriculture have negative impacts on water quality in my state	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>m</b>	In the past 5 years, have noticed changes in the amount of animals and/or insects on my farm	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**17 What information communication technologies do you access on a regular basis?**

*(Please check all that apply)*

<b>a</b>	Land Line Telephone / Dial-Up Modem	<input type="checkbox"/>
<b>b</b>	Cellular Phone Service	<input type="checkbox"/>
<b>c</b>	Hi-Speed Internet Access (Cable, DSL, Fiber, etc.) / 3G or 4G Cellphone service	<input type="checkbox"/>

- 18** People have different opinions about what makes a “good farmer.” Please rate the importance of the following items. (Please circle one number on each line)

<b>A good farmer is one who...</b>		<b>Not Important</b>	<b>Slightly Important</b>	<b>Somewhat Important</b>	<b>Impor- tant</b>	<b>Very Important</b>
<b>a</b>	has the highest yields per acre	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>b</b>	is willing to try new practices and approaches	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>c</b>	gets their crops planted first	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>d</b>	considers the health of streams that run through or along their land to be their responsibility	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>e</b>	minimizes soil erosion	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>f</b>	has the highest profit per acre	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>g</b>	has the most up-to-date equipment	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>h</b>	minimizes nutrient runoff into waterways	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>i</b>	uses the latest seed and chemical technology	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>j</b>	maximizes government payments	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>k</b>	thinks beyond their own farm to the social and ecological health of their watershed	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>l</b>	maintains or increases soil organic matter	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>m</b>	minimizes the use of pesticides	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>n</b>	manages for both profitability and minimization of environmental impact	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>o</b>	scouts before spraying for insects/ weeds/ disease	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>p</b>	manages their farm operation to reduce income volatility	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>q</b>	puts long-term conservation of farm resources before short-term profits	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>r</b>	respects tribal traditions when planting/harvesting	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>s</b>	works for the benefit of the tribe rather than for personal gain	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**19** Please indicate how influential the following groups and individuals are when you make decisions about agricultural practices and strategies. (Please circle one number on each line.)

	No Contact/ I don't talk to	No Influence	Slight Influence	Moderate Influence	Strong Influence
<b>a</b> Family	0	1	2	3	4
<b>b</b> Other Farmers	0	1	2	3	4
<b>c</b> Non-farming friends or neighbors	0	1	2	3	4
<b>d</b> Landlord/farm management firm	0	1	2	3	4
<b>e</b> Crop/livestock consultant	0	1	2	3	4
<b>f</b> Custom operator	0	1	2	3	4
<b>g</b> Seed dealer	0	1	2	3	4
<b>h</b> Farm chemical dealer (e.g. fertilizer, pesticides, etc.)	0	1	2	3	4
<b>i</b> Banker, insurance agent, or lawyer	0	1	2	3	4
<b>j</b> Farm organizations (e.g. Farm Bureau, Corn Growers, etc.)	0	1	2	3	4
<b>k</b> NRCS or county Soil & Water Conservation District Staff	0	1	2	3	4
<b>l</b> FSA office staff	0	1	2	3	4
<b>m</b> State Climatologist	0	1	2	3	4
<b>n</b> University Extension (e.g. local or campus staff, on-line, etc.)	0	1	2	3	4
<b>o</b> Conservation NGO staff (e.g. pheasants forever, etc.)	0	1	2	3	4
<b>p</b> State Department of Agriculture	0	1	2	3	4
<b>q</b> Tribal Government or Organization	0	1	2	3	4
<b>r</b> Inter-tribal Organizations (e.g. COUP, NCAI, etc.)	0	1	2	3	4

**20** Do you plan to retire from farming in the next 5 years? (Please circle one number)

YES	1
NO	2

**21** When you retire from farming, how likely is it that one of your children or another family member (child, in-law, nephew/niece) will take over? (Please circle one number)

Very Likely	Likely	Uncertain	Unlikely	Very Unlikely
1	2	3	4	5

Thank You for completing this survey!  
We appreciate your help. Please place the survey in the stamped return envelope provided and mail it as soon as possible.



## Draft Postcard Text

[Insert Date]

[Insert Traditional Greeting]

Dear [name of potential participant]

Heces Ce, my name is Patrick Austin Freeland, and I am Wind Clan of the Muscogee Creek Nation (Hvtvlke Mvskoke). [Local Tribal Government] and Purdue University are working collectively to understand the use and value of climate information in agricultural decision making to determine effective methods for delivering usable climate knowledge. To respect the traditions of [Tribal Nation], your input is important so that we may develop culturally appropriate tools, which are also practical for you as a cereal crop producer. **We would like to survey you about what sort of climate information and crop-planning tools you use, your adaptation strategies for potential changes in the future, and your perceptions of environmental changes that you may have experienced.** The goal is to determine how information flows throughout the agricultural community and identify effective, and culturally appropriate, means for assisting with climate information and decision-support services.

**The study involves seven topical areas:**

1. Types of farming practices used and timing of management decisions
2. Influence of weather and climate information on decision making
3. Weather and climate risk management strategies and beliefs
4. Concerns and beliefs about climate change and its impact on Midwestern agriculture
5. Influence of various groups and individuals on farm management practices
6. Impacts to traditional life-ways and/or impacts to tribal nations
7. The role of traditional ecological knowledge in perception and adaptation to climate change

Your feedback will help in understanding the type, and timing, of farm management decisions and how weather/climate information can better serve Midwestern farmers. Also, with a clearer understanding of the needs of American Indian peoples from an indigenous perspective, decision support services can be adapted to be culturally appropriate, following the values of: Honor, Pride, and Respect. **The questionnaires will be recorded and kept in a locked filing cabinet. Your responses and comments will be kept *completely confidential* and your comments will not be associated with your individual identity or farm. Please note that participation in this research is completely voluntary. It is with the utmost respect that your participation is requested.**

**If there are any questions, feel free to contact me at any time.**

[Insert Traditional Thank You]

In Service and Friendship, Mvto,

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[address]

## D. SCRIPT FOR “WHAT IS AN IRB?” VIDEO

Ethical considerations are paramount when dealing with tribal nations. The Belmont Report includes special considerations when dealing with research in American Indian/Alaska Native populations. While each tribe is supposed to review research and assess the beneficence and risk, in practice several tribes have neither a standing research ethics committee nor institutional review board (IRB). Describing the purpose and function of an IRB over the phone can be tedious and confusing. By utilizing a web-based presentation, tribal members and non-tribal members alike have access to this video which contains pertinent information which can be watched, re-played, and shared as desired. The video may also serve as a training tool for future native researchers interested in quickly understanding the design, purpose, and function of an IRB.

This appendix shows the script for the “What is and IRB?” video, created as a method to assist tribal professionals to better understand the role and purpose of an IRB as well as both the legal and ethical implications of free and informed consent. The video was recorded at the Purdue Native American and Educational Cultural Center, and edited in iMovie ‘09. It was submitted to the Purdue Department of Forestry and Natural Resources (FNR) and converted into Windows Media Player format for the FNR website, as well as the official YouTube channel for the College of Agriculture. By presenting an efficient multimedia presentation coupled with style and personal involvement, it allows potential participants, native and non-native alike, to gain a clearer understanding of the IRB process, while also matching a face to a name. It is, however, only a first step...

**The video is available on YouTube at *[tinyurl.com/whatisanirb](http://tinyurl.com/whatisanirb)***

SHOT 1 - IMAGES OF PRAIRIE (INDIAN COUNTRY)

A scene of prairie, relevant to Indian country

MONOLOGUE

What is an Institutional Review Board? Any time research is to be conducted in Indian Country, the research proposal must have the approval of the IRB, within both the institution, such as Purdue University, and also the tribe, or tribes, in which a study is to be conducted.

SHOT 2 - SLOWMO OF IRB PAPERS

Slow motion thumb-through of papers

MONOLOGUE

Proposing a plan of research to tribal nations can be difficult if an established research review protocol is not in place...

SHOT 3 - READING TRIBAL WEBSITE

Researcher looking at tribal websites on computers

MONOLOGUE

Tribal websites and online resources may be outdated, or the agencies which manage the information may have technical issues...

SHOT 4 - PHONE CONVERSATION

Researcher talking on the phone...

MONOLOGUE

Cold calls can be fruitless at times if a researcher is unable to establish a personal connection, or unaware of the arrangement of a tribes' particular offices...

SHOT 5 - VAST OPEN AREAS

A pan (maybe fly-over?) of a vast open areas where tribes are...

MONOLOGUE

Face-to-face communication, often idealized as the best way to work with folks in Indian Country can be difficult when working with multiple tribes, or a researcher working with a limited budget and other constraints which make travel difficult.

#### SHOT 6 - WHAT IS AN IRB?

Slide: What is an IRB?

##### MONOLOGUE

So what, then, is an IRB? Why does the role of the IRB have such significance and importance in Indian Country? How do tribal nations play a role in the research process?

#### SHOT 7

Title Slide & Byline

##### MONOLOGUE

Heces Ce, Estonko? Welcome to part 2 of 3 of Common Ground: Working for Consent and Compliance, "What is an IRB?" presented by Patrick Austin Freeland with support from Dr. Linda S Prokopy and the Natural Resources Social Science Laboratory at Purdue University, Department of Forestry and Natural Resources.

#### SHOT 8

Opener (Headshot)

##### MONOLOGUE

Back to the question, what is an IRB? An institutional review board is a committee which reviews, and determines whether or not any proposed research may be conducted within a particular institution. The committee, required by federal law (CFR ???) is comprised of local individuals which understand the context in which research is to be conducted. The committee focuses on how the research will affect participants, the type of research, and ultimately has the authority, or agency, to grant approval to the research.

#### SHOT 9

## Introduction Slide

## MONOLOGUE

Typically composed of three main concerns, and IRB will review (1) whether or not the risks of research is worth the burden, (2) whether or not the study design is beneficial to the people being studied and advances knowledge, and (3) whether or not the proposed research obtains consent for potential study participants.

## SHOT 10

## Risk/Burden Slide

## MONOLOGUE

All research has some degree of risk and burden. Whether it's the risk to individuals privacy, or the burden of filling out a survey, it is up to the IRB to determine if the risks and burdens associated with the proposed research ultimately benefits the community.

## SHOT 11

## Balance Slide

## MONOLOGUE

Understanding the study design can be useful to determine whether or not the proposed research has a balance which is acceptable to the community. Imbalance would be research that harms a community while offering virtually no benefit. Even if the harm to benefit ratio is balanced, the IRB may choose to reject the proposal as minimized harm should be the ultimate research ideal.

## SHOT 12

## Study Design

## MONOLOGUE

While an IRB or research review committee does not necessarily have the duties of a scientific review committee, it is important that any proposal reviewed contain the specific research methods, and that any section of the method be questionable, and can be

answered by the researcher if the IRB has any concerns or need for clarification.

#### SHOT 13 - OBTAINING CONSENT

##### Headshot

###### MONOLOGUE

A key part of the IRB review should be in identifying how the researcher intends to gain consent from individuals to be part of the study. This also includes detail on how the individuals privacy will be protected.

#### SHOT 14 - RESEARCH PROPOSALS

##### Research Proposal Slide

###### MONOLOGUE

While the idea of “human subjects” can seem cold and impersonal, it’s simply a standardized way of identifying that a particular study will involve people, even in something as simple as a survey. Research Proposals submitted to IRBs usually has 5 main parts. The first is an application, which contains basic categorical information, investigators, institutional information and more depending on what the IRB may require. The second part is the the research protocol, which specifically outlines the study design and how data will be obtained from individuals. The third part is usually sample documentation of how study participants will be give informed consent. The fourth part will be all materials which will accompany the study, as well as materials which will be utilized for recruitment into the study, and finally the proposal will include supporting materials such as letters of support, researcher qualifications, and other materials...

#### SHOT 15 - RESEARCHER QUALIFICATIONS

##### Researcher Qualifications

###### MONOLOGUE

Often times, a proposal will include documents that show that the researcher has completed ethics training, such as

the CITI training, or other qualifications. While some IRBs do not explicitly call for this, inclusion of credentials can be useful for tribal IRBs to quickly identify research which comes from reputable institutions, as most academic and research institutions absolutely require ethics training prior to proposing any research.

#### SHOT 16 - VOUCHER

Letters of support

##### MONOLOGUE

Other proposals may include testimony, letters of support, or other ways of vouching for the researcher. This is particularly important within tribal communities, as often times IRB training may not fully understand the context of American Indian and Alaska Native communities.

#### SHOT 17 - REVIEW

Review

##### MONOLOGUE

The review board may have questions about particular aspects of the research proposal, in which the researcher has the obligation to address any inconsistencies, questions, or vagaries which may make a particular section of a research proposal unclear. This can usually be accomplished with a phone call, or teleconference.

#### SHOT 18 - DELIBERATION

Shot of IRB asking questions, talking, and

##### MONOLOGUE

The board may have ethical concerns with the research, in which it is important for the committee to deliberate and understand the risks and benefits, the study design, and the consent and protection of potential study participants.

#### SHOT 19 - APPROVAL

Finally, once the IRB has addressed any and all concerns of the research and weighed the costs and benefits, the board will either approve or disapprove of the research. Should the board approve, a letter of support should be drafted which explicitly states that the board has reviewed, and accepted, the research proposal, and subsequently signed and submitted to the researcher so that research may begin.

SHOT 20 - RESEARCH PROCESS BEGINS

Researcher (handshake)

#### MONOLOGUE

The researcher, with the approval of the IRB, will begin to conduct research within the explicit confines of the study design, and should any modification be made to the study, must be approved first by the IRB. But the research process does not have to end here, this is also the first step in inter-institutional collaboration, please see the final video in this installment "Community Collaboration" for more information on how multiple institutions can further advance beneficial knowledge through community based collaborative research. Thank You for watching. In Service and Friendship, Mvto.



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