

Chequamegon Bay Area Community Climate Change Study Ashland, Bayfield, Red Cliff, Washburn

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Center for Rural Communities NORTHLAND COLLEGE

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Authors

Robin Kemkes, Faculty Research Associate at the Center for Rural Communities

Ana Tochterman, Director of Research Programs at the Center for Rural Communities

Brandon Hofstedt, Faculty Director of the Center for Rural Communities, Associate Professor of Sustainable Community Development

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Introduction

Rural communities face a range of climate change-related challenges. Understanding community values and levels of preparedness can help decision-makers prioritize adaptation and mitigation strategies. The purpose of this study is to assess community values and the ways in which ecological, social, economic, and cultural resources contribute to guality of life in the communities of Ashland, Bayfield, Red Cliff, and Washburn, Wisconsin. We report perceptions of climate change in the region, how future changes might impact quality of life, indicators of household- and community-level preparedness, and household preferences for community-level planning priorities. The report begins with a regional overview of the summary of findings from a household mail survey and key themes drawn from interviews with community members and stakeholders across the four communities. Thereafter, we report summary statistics from the household mail survey for each community.

Key findings

- The natural environment, particularly Lake Superior, close relationships, and small communities are the most valued aspects of living in the region.
- People have noticed changes in the winters and more frequent severe weather events.
- Top concerns are the warming of Lake Superior, severe weather events, the effect of pests on forests, and a variety of economic impacts.
- Communities are challenged by aging infrastructure, limited resources, and conflicting priorities.
- Climate change impacts are unpredictable and ambiguous, making them difficult to prioritize over other more immediate community needs.
- Interacting effects of development and climate change will put pressure on important resources such as water quality and wild rice.
- Local leaders would like more information about what to expect and how to prepare.
- There is a desire for more proactive discussion, collaboration, and long-term planning.
- Community members are committed to renewable energy and local food.

Methods

To conduct this study, the Center for Rural Communities (CRC) used a mixed methods approach: (1) a household mail survey, (2) interviews with experts and stakeholders, (3) community member interviews and mapping. We first mailed 5,000 survey questionnaires to households in zip codes 54806, 54814, and 54891, randomly selected by the private firm ListGiant. We received 1,084 completed questionnaires for a 22 percent response rate¹. The results are weighted by relevant demographic variables in each community using 2015 US Census ACS estimates; the final effective sample size is 1,055. Regional-level survey results are representative of the three zip codes with a margin of error of +/-3 percentage points.²

Of the survey respondents, 17 were selected and agreed to partake in a 45 minute in-person interview to provide more detailed information about climate change impacts and preparedness (4 from Ashland, 4 from Bayfield, 2 from Red Cliff, and 7 from Washburn). The semi-structured interviews explored topics such as what contributes to quality of life in the Chequamegon Bay region, seasonal recreational activities, and perceptions of climate change. As part of the interviews, participants indicated places where they engage in outdoor activities and places of cultural significance by drawing directly on laminated maps of Ashland and Bayfield counties. Those areas were then translated into a mapping program to produce the maps in this report. Additionally, 10 semi-structured interviews were conducted with purposively selected stakeholders and experts in positions at municipal, county, tribal, and federal levels, along with local business and community leaders. Interview topics included perceptions of climate change impacts and community preparedness.

¹ We received 1,123 questionnaires in total, however 39 were removed from the sample because they are located outside the geographic scope of the study, because the responses were incomplete, or due to contradictory responses indicating that there was confusion over the meaning of some of the questions in the survey.

² All results are reported as valid percentages of the total, 'No Answer' responses are not included in percent of total calculations.

Place Values

A majority of households in the Chequamegon Bay region place importance on the natural environment (78 percent); having family, friends, or roots in the area (58 percent); and opportunities for outdoor activities and recreation (51 percent) (Figure 1). Forty-two percent of households value the small communities in the area. These survey findings were echoed in the in-depth interviews with community members. For example, several participants described how 'nature', 'the outdoors', or 'scenery' contribute to their quality of life. Some (4/17) talked specifically about the importance of clean water, both surface and ground water, and many (8/17) named Lake Superior as being important. Others mentioned aspects of the natural environment such as clean air. wildlife, the forests, and seasons. Several participants described the importance of outdoor recreation, and how activities such as skiing, biking, and hiking contribute to their physical, mental, and spiritual health.

Another theme that emerged from the interviews with community members was the remoteness of the region, and having access to protected natural areas for solitude and peace and quiet. One participant remarked, "I think just all of nature here is just like so healing, and sometimes we tend to forget what a lovely gift, a blessing that that is."

The rural landscape and farming are also valuable aspects of living in the region, with seven of the interview participants describing the importance of gardening, gathering, and having access to local farmers. "A particular interest is subsistence, hunting and gathering stuff. The particular resources of wild rice, maple syrup, fish, game, in combination with the microclimate for [agriculture], just make this place kind of off the charts."

Over half of the interviewees talked about the strong sense of community and shared values in the region, and cited efforts toward living sustainably and organizing to protect the natural environment. Others mentioned close relationships, friendships, and family. One community member remarked, "I feel that the friendliness of the community, the close relationships that you have here, and the concern of the greater number of people in a small community, that they get involved and want to have a good community. They feel like they can have a voice. And I think that's important." Living near, or participating in, Native American culture, or having historical ties to the area were important to some, and others talked about how much they like the slow pace of life relative to more urban places.

In the community-level summary statistics reported in the following sections, the features of living here that are consistently valued by the most households are natural beauty, clean water, proximity to Lake Superior, rural landscapes, native species, and small communities.

"What are the things we really value in this place and let's keep reminding ourselves about those because those common ideas can help you cut through the other confusion and noise about [climate change] adaptation and should give you a north star." – Stakeholder interview As part of the interviews, participants were asked to identify places on a map of Ashland and Bayfield counties where they engage in outdoor activities throughout the seasons (Map 1 on pages 4 and 5), and to describe places that have personal significance or cultural importance to the region (Map 2 on page 6). Many people spend time in places that reflect the values they described in the interviews - on the water, along the shoreline and beaches, on public land. In sum, the inter-relationships between the natural environment and the community - a sense of place and a dedication to protecting nature and living sustainably - are the most highly valued aspects of living in the region, reported throughout both the household mail survey and the community member interviews.

Figure 1. Most valued aspects of living in the Chequamegon Bay region [Question: Please choose the top three aspects of living here that are most important to you.]



Map 1. Locations of seasonal activities

Note: Areas indicated on the maps are loose approximations of locations drawn by the interview participants.



"I like the exercise it gives me on a regular basis. I love being out particularly in the winter, in nature, in a really peaceful environment. Frequently I will stop as I ski or snowshoe, and sit and listen to the wind or the birds."

"Everything kind of slows down a bit."

"In the spring we make maple syrup. Didn't make any this year, it didn't run so I'm glad I didn't, but I always have. Thing about sap season is it isn't really necessarily about the sap, it's about the stories that are told around the pot."

"We grow a lot of our own vegetables, so we work at cleaning the yard in the spring."





"We go fishing around here. Sometimes when it's nice, we try to go fishing out of our canoes. We go walking around in some of the trails over here. Oh and then we go blueberry picking, usually in this area. And there's that brownstone trail over here, sometimes we hike that. And then sometimes we hike around Madeline Island."



"[Ricing is] just a great way to connect to nature and I think it's just amazing that you can get such amazing food from it, and it's something that's been going on in this region for thousands of years so that's pretty amazing too, to be able to participate in that. Yeah, there's not many better ways to feel connected to nature, I think, than doing that." Community member interview participants were asked: Are there any places that are of particular importance or significance for you, or that you think are important for the region?

"The Apostle Islands. They're big on my landscape. Within the Apostle Islands, particularly the sea caves area on the lakeshore by Meyers beach. It also may be the most beautiful part of the lakeshore with the caves and the forest and the beach. Beautiful beach."

"We came right at the end of the mine issue and who knows what would have happened had they put that mine in, but... I was concerned about some of the environmental effects of that and particularly, with regard to the Bad River Tribe and the wild rice and the slough."

"Well the water, but the spring water. I'd have to go along the Lake here, that's important. Well on the shore too, you know, but yeah...I mean, the whole shoreline basically."

"The Penokee Mountain range...This is where all water runs north. So this is an area, this whole area here, you know, leading all the way across, all the way across like that. There's Lake Superior at the bottom, and I have tremendous concern about all those headwaters up there."

"Definitely the forest here, that's pretty important. I like to be in the quiet and alone. And plus, I mean I love trees and everything, and we go there quite a bit. So for me, that's really important is just to be out in nature, learning more about the environment and just being surrounded."

"For sure the Lake, absolutely. Anywhere, the whole Lake. Well personally, that's important to me. And I think it's vital for the region."





Current Climate Change Impacts

In the interviews, we asked community members if they think climate change is happening, and if so, how do they know, and what changes have they noticed in the Chequamegon Bay region. All 17 participants answered 'Yes' to the question about whether climate change is happening. Almost all reported reading news about climate change impacts in other areas of the country and globally, and cited the scientific consensus on the topic. Many reported seeing effects in the region, although a few were hesitant to attribute weather changes to climate change, and some who have not lived in the area for long relied on what they've heard from others about how the seasons have changed. One participant remarked that they don't know if climate change is affecting this region, and another said that it's happening at a longer time scale and is not yet very noticeable here. We also asked stakeholders how climate change has affected this region and the work they do. The two climate change impacts reported most frequently by both community members and stakeholders are that (1) winters are changing and (2) storm events are getting worse.

Winters are changing

Most community members and stakeholders noted that winters are not as cold or harsh as they used to be and that they start later and go later. The most noticeable change in this regard is that the freeze up of the ice road has been very unpredictable. In fact, the first year-round operating season for the Madeline Island ferry was about 18 years ago, and since then, there have been six nearly year-round seasons that had never happened prior. This change has made the ice road a less dependable mode of travel and has increased the cost of living and disrupted transportation for those living on Madeline Island. Several respondents noted that the ice caves have not been accessible as often in the past few years, and some mentioned that later ice formation has made it more difficult for fishermen to get out on the Lake.

More variability in winter temperatures means that there is less snow, or that the snow doesn't stay on

the ground throughout the winter. One of the effects of milder winters is a larger population of deer. A community member remarked, "I know a farmer who said...winters are easier so [deer] don't die off as much so there's more of them so they're, you know, munching on peoples gardens more." Similarly, a stakeholder described how more intense deer browse is affecting the rates of growth in hardwood stands and shifting the composition of the forests in the area. Several stakeholders also noted that the warmer winters have changed frozen ground conditions, making it more difficult to harvest timber in areas with sensitive soil.

Although winters seem to be extending into the spring months, the variability in temperature has affected maple sugaring for some. One community member noted, "It seems like in the sugar season the lows at night seem to be higher than they have been. So it seems like a lot of times we get into a pattern where we're not getting much of a run because it's not freezing."

Storms are getting worse

Several community members remarked that there are more big snowstorms, big winds, and large, heavy rain events. Both stakeholders and community members reported noticing that weather patterns are more erratic. Almost every person we interviewed cited the rain and flooding in the summer of 2016 as an example of a climate change impact. A stakeholder explained, "We've obviously seen some very extreme weather events here, and as it's frequently said you can't say for certain that any particular extreme event is caused by climate change, it's also been pointed out that climate change basically contributes to all of them...for example we look at the storm we had in July 2016 I think that's certainly a harbinger of what's to come, and I think there's a significant likelihood that climate change contributed to that."

A few stakeholders described how these flooding events have overwhelmed wastewater systems and stormwater infrastructure, how cluverts and ditches have been washed out, and how strong wind and waves have eroded and damaged shorelines. One of the effects of the washouts is that gravel and sediment are transported downstream to spawning areas. Community members described how waves are coming off the Lake, how there are more washouts, and that Lakeshore Drive is closed more often.

Warming

Four community members remarked that summers seem hotter. A few also described how they have read about Lake Superior warming up, and one community member has noticed that the Bay is getting warmer because it's easier to swim when the water is not as cold. A stakeholder described how white fish and lake trout are spawning later into the season, likely because the Lake is taking longer to cool down.

Two community members have noticed changes in the fall, that the fall colors are later, muted, or just different, and that the season is shorter. A few people mentioned that there are more insects and pests, such as ticks, Asian beetles, and black flies, although this was not a prevalent theme.

"You can tell that the weather patterns are changing. Storms are getting worse. But we don't get the snow that we used to. And it's like fall and spring have shifted over a month, or two even, sometimes. So that we have snow in April and really nice weather for Thanksgiving, often. Not every year but for the past seven years or so, that's how it's gone." -Community member

"These, like, hundred year storms that happen every couple years. Yeah, it's not hard to see evidence of this. And you look at insects and where they're extending their range. Again, I'm not like a natural scientist so I don't pretend to be an expert on this but... it seems so obvious, yeah, that the ice caves are frozen less and any natural world phenomenon, it seems very apparent that this is happening, you know, including in our region." -Community member

Concerns About the Future

Climate change may threaten some of the most valued aspects of living in the region. In the mail survey, we asked respondents to indicate to what extent their quality of life would be impacted by expected changes in the area, or if an expected change would impact their quality of life to such an extent that they would leave the area. In the interviews, we asked community member if they are worried about future changes, and we asked stakeholders what potential changes present the greatest risk to the region. Some of the top concerns are related to water quality, both groundwater and in Chequamegon Bay, more severe weather events, economic impacts, population changes, and more insects and pests.

Shoreline integrity and water quality

If Lake Superior were to become polluted, 72 percent of the population would experience a decline in quality of life, and an additional 21 percent report that they would leave the area (Figure 4). Quality of life would also decline for residents if beaches are closed more often, shoreline erosion increases, or if there are fewer trout, whitefish, or steelhead in Lake Superior.

In the interviews, some community members talked about how the Lake might protect us from immediate changes. "I'm not too worried because we have this huge lake that is going to buffer the changes here... I mean I'm concerned in the long run that, you know, it will definitely be changing." However, others expressed concern over further warming of the Lake and water quality. A community member described how changes in the Lake might lead to other changes in the region. "I think as [Lake Superior] warms, it's going to change everything in the area. It's going to change weather, it's going to change the fish, the fisheries. Then we're going to see changes to the forests, trees. And that's a concern." Another community member is concerned about "how the water will be." A stakeholder described how decision-makers and the community need to be mindful of types of development that could cause runoff into the Lake because it will be more susceptible to algal blooms as it warms. Stakeholders also expressed concern over lake levels going up or down, which could devastate coastal wetlands and native fish species. There is also concern that lake level rise and more severe storm events will affect the shoreline. As one stakeholder described, "Our shore and our lake is our most valuable resource and asset so...if the rise is continuous we lose more and more, it's going to affect simple things like our parks, people's homes, and again, depending on what it is, our infrastructure, it will continue to be a threat to that, our water supply."

More frequent severe weather events

In addition to rising lake levels, there are concerns over more frequent heavy rains and flooding, and other severe weather events such as snowstorms and high winds. Some of the main concerns around flooding are stream health, agricultural soil washing away, and wastewater infrastructure continuing to be overwhelmed. There is also concern that, depending on the timing of flooding, that wild rice could be susceptible to drowning if it's in the sensitive floating leaf stage. Many people in the region depend on wild rice for subsistence

Flooding, along with other extreme weather events, has the potential to overwhelm emergency services. A stakeholder noted, "I would say our local jurisdictions are very well prepared for what they consider the normal risks but it's difficult to prepare for the unknown or for uncertainty." Stakeholders described how isolated rural communities are at risk of being cutoff, particularly those in low areas that are vulnerable to flooding, and how people who are in need of medical help are especially vulnerable. Furthermore, younger people or those who haven't lived in the region very long may not be as prepared for exteme weather events as others who have lived through such events and know how to prepare. There is a concern amongst stakeholders that households may not have a plan for how to deal with a power outage or how to cope if food is not readily accessible.

Figure 4. Changes with a negative impact on quality of life [Question: Consider the following potential changes related to the natural environment in our region. Fore each item, please indicate to what extent your quality of life would IMPROVE or DECLINE.]



Pests and insects

Although few interview paricipants have noticed changes in pests or insects thus far, 82 percent of survey respondents indicated that their quality of life would decline, with an additional 3 percent reporting that they would leave the area, if there were more ticks and pests. Furthermore, there is concern that an increase in insects and pests could affect forests in the region. An interviewee remarked, "But when I think about Lyme disease you know, or the forest dying because of some pest or disease, like that is like 'Woah' like, you know that strikes me as more crisis." A stakeholder described the risk to forests, "We've historically been protected from a lot of pests, diseases, and invasive species because we have these cold harsh winters that keep a lot of things out, so as our winters continue to get shorter and milder there's a lot of potential for new pests, new diseases, new interactions among all those kinds of things to start operating in our forests."

Regional economic impact

Several stakeholders pointed out the potential economic impacts of climate change in the region. Summer tourism might be affected if water quality declines or if beaches are closed more often, and winter tourism could slow if there is less snow or ice cover. Furthermore, the timber industry might continue to be affected if winter temperatures are variable. In addition to lost revenues from tourism and timber, there will likely be future costs in terms of repairing roads, streams, shorelines, trails, and beaches.

Population increase and indirect effects

Several interview respondents noted that they think our region will be less affected by climate change than others. Four community members expressed concern over this region becoming a climate refuge, with more people moving in. A majority of survey respondents indicated that their quality of life would decline if more people move to the area (Figure 4). In the

Figure 5. Changes with mixed impact on quality of life [Question: Consider the following potential changes related to the natural environment in our region. Fore each item, please indicate to what extent your quality of life would IMPROVE or DECLINE.]



interviews, community members described concerns about the small community feel changing and natural areas becoming more crowded. "As local cities in the area are being planned and thought about, I feel like we need to assume that there's gonna be a large flux of people coming up here. And make sure that the public natural space we have stays protected and that we're prepared to have the development happen the way we want it to."

A stakeholder pointed out that long-term climate change impacts in other locations may have indirect effects on households in the Chequamegon Bay region. For example, as coastal areas are adapting to rising sea levels and other regions of the country are dealing with drought and wildfires, there will be an increased burden on taxpayers, or public resources may be diverted toward those concerns. Similary, we may experience increases in food prices if there are long-term droughts in food producing regions.

Perceptions of community concern

When asked whether they think other people in the community are worried about climate change, almost all interview respondents indicated that they think others are concerned. Some said they hear people talking about the weather, in particular, "I mean [the guy] at the lumber yard was talking about the ice road, you know, and that was just kind of unsolicited and this came up. Um, so yeah I feel like its on people's minds." Some said it's not always out in the open, "I feel like people know in their hearts that things are changing and happening. So I feel like it's a topic that nobody wants to talk about overall, it's like the elephant in the room." And others expressed a general sense of worry in the community, "There's always... sort of vague worries about the Lake, you know, we have all this fresh water. Are people gonna come take this fresh water? Is the water gonna be okay to drink?"





Disruption "The sense that what we've come to know and appreciate is going to change. We have to prepare for that to try to mitigate it but there are going to be disruptions. Even just a nice long winter isn't going to happen all the time."

Distracting "It leads us down these rabbit holes where people are burning up all kinds of energy...trying to get their life greened up or buy their carbon credits online or whatever and not really making the connections on bigger picture stuff...building sustainable communities."

Optimistic "From the standpoint that if we each wanted to take responsibility for our own survival and our own being, keeping our environment clean where we live, it may have an impact."

What Can Communities Do

In the interviews, we asked community members what they think their community can do to address the effects of climate change, and we asked stakeholders what else the community could do to prepare for climate change. Three prevalent themes emerged from the responses: more information and collaboration; long-range planning; and sustainability initiatives.

Awareness, discussion, and collaboration

Over the past few years, natural resource departments and organizations in the region have developed specialized positions to begin baseline data collection, to formulate climate change adaptation plans, and to conduct outreach. However, stakeholders noted that municipal and county-level decision-makers need more information about what to expect in terms of climate change impacts and the risks of extreme weather events. A respondent noted, "The rainfall events are getting bigger, or more volume in shorter periods of time, aside from that, I don't really feel like I know what are we anticipating that we should be preparing for?" Another stakeholder commented, "I think that around here we're definitely not, most folks are not, concerned about access to water, or we're not concerned about it drying out, so there's really a lack of understanding of what kinds of things should we be preparing for?"

Others expressed a desire for more cross-border and cross-boundary collaboration within the region to prepare for and adapt to climate change, and for emergency response. In reference to the 2016 flood, a stakeholder remarked, "We need to be breaking down the borders and remembering that, boy we could've called people who aren't usually our partners, and I think that's some of the challenge even with our local jurisdictions." Another stakeholder noted the importance of incorporating tribal needs and concerns, "There's a lot to learn from people who've been on the landscape for a really long time." Community members expressed a desire for facilitating greater awareness and making information more accessible to the general public, not just for those who are already inclined toward seeking out information about climate change. There is also interest in bringing communities together to collaborate. "It'd be great if there was like a proactive discussion of...that perhaps would even be started locally...I mean what I could see is individual pockets like Washburn, Bayfield, or Ashland and then coming together, or even representatives to come together...this is what they're talking about over here so they're not...all these separate little pieces."

Long-range planning

Several stakeholders suggested that climate change impacts are not typically discussed on most planning committees and that communities should be thinking about impacts on infrastructure, economic industries, and emergency response. "For local governments to realize that this is something that's going to impact the people they serve, and the way they do business, that cascade effect of, you know, local businesses need to start thinking about how they're going to do it and on down." Another remarked, "Local governments have to develop a long-range plan and try to develop in line with what the county long-range plan is because the county has the overarching plan." Local leaders also talked about the need to take into account up-to-date rainfall prediction data when developing new infrastructure and when repairing roads from floods, such as putting in bigger culverts or bridges. Stakeholders talked about the importance of preparing to protect vulnerable populations as severe weather events become more frequent, "old, young, poor, needing medical attention, I think we have to plan to protect vulnerable people, that also includes tribal members who are tied to this place." A telephone alert system was mentioned as a priority.

Community members also mentioned planning for a higher population and being mindful of how we develop the lakeshore to avoid damage from storms.

Be a model for sustainabilty

A majority of community members and stakeholders described ways in which our communities can work toward greater sustainability, both for mitigating climate change and to prepare for and adapt to further impacts. Many respondents referenced the ongoing transition to renewable energy, solar in particular, as an example of how we are already working toward sustainability and suggested that we make it more widely accessible. Others mentioned the importance of energy efficiency and insulating homes. Some talked about making bike commuting easier. Several participants also emphasized the importance of sourcing local food, and gave examples such as schools growing their own food. "Just being stronger at the community level, teaching the next generation about traditional ways that are also...just it's good practice, good training for knowing how to live." Other sustainability efforts discussed include being mindful of stormwater run-off when planning for new projects or construction, and encouraging more rain gardens.

"I think we can...do our part to make our community as livable as we can, and be a model for a way of life that can exist, that doesn't have a huge impact on the environment." - Community member



Community Strengths

We asked stakeholders: What are the strengths of this region in terms of adapting? That is, what resources are available; or what are the strengths of the community?

Commitment to nature and the Lake

Several participants noted that this region has a committed citizenry of people who care deeply about the environment and appreciate it. Much of that commitment is centered around the Lake. "I think there really is a connection to Lake Superior that is a central focus point, the water and the Lake is so fundamental, it's such an important thing and people here use it in so many ways, fisherman are out on the Lake every day, people hunt, people ski, they use this resource, there's a strong connection to it and an appreciation, that's the greatest strength we have is that commitment to the Lake." A lot of people are civically engaged and there's an awareness of environmental issues. "People are getting informed and thinking about how to live sustainably and locally."

Rich in natural resources

Another theme that emerged is that this region has an abundance of water, protected land, and natural resources that will help buffer us from some of the climate change impacts that will be felt in other regions. For example, the fish in the Lake are self-sustaining native species, and we have a lot of public land and forested areas that are protected.

Self-reliance

Several stakeholders remarked on how there is an ethic of living simply and frugally, people know how to get by, and that serves us well. People who live outside of town are particularly skilled in this way, "because they're just a resilient people, they have generations of having lived where they lived." There is also a sense of self-reliance at the community level because "Our geographic isolation has enabled us to create systems that work." Along these same lines, another participant remarked, "In general I think we understand that we are kind of on our own in a lot of cases, so we've got to figure out how to take care of ourselves." Some of those community skills have emerged in building a local food movement and efforts toward locally sourced energy. There is also a strong appreciation for the response personnel who have shown to be committed, flexible, and adaptable as extreme weather events have challenged the region.

Collaboration

Although many stakeholders would like to see more cross-border collaboration, several described how the region is already moving in that direction. "We're starting to see ourselves more regionally and collaboratively, I really sense that, there's a lot more collaboration going on." Participants remarked on the information sharing that happens between agencies, and a history of partnership and collaboration, "Folks from national forests and park service have been working with tribal members in recent years to pay attention to traditional ecological knowledge." Finally, several stakeholders and community members referenced Northland College as an important resource for information.

Community Challenges

We asked stakeholders: What challenges exist for this region?

Aging infrastructure

Aging wastewater infrastructure is a challenge for municipalities, as is storm sewers that need to be able to handle larger capacities. A related challenge is that bureaucratic standards haven't kept up with the reality of larger storm events. For example, the federal government will only pay to replace storm sewers with sizes that are too small for current conditions.

Financial resources

Upgrading a wastewater treatment system or fixing all of the storm sewers is beyond the means of local municipalities. There are also limited funds locally for long-term planning, sustainability initiatives, and for emergency preparedness. Some stakeholders also described how there is less federal funding now for repair and restoration following a flooding event, for shoreline stabilization, or for climate change mitigation programs. Another participant anticipates that rural areas like ours will be far down the line in terms of priorities as big cities and ocean coasts consume national attention.

Priorities and planning

Because time, money, and staffing are tight for local governments, it can be difficult to prioritize and plan for climate change impacts, particularly because they tend to be unpredictable and long-term. There also seems to be a perceived tension between pressing economic needs in the region, that is, high poverty and unemployment rates, and investing in sustainability and climate change preparedness. For example, sometimes new regulations or ordnances that might reduce stormwater runoff would increase the cost of new development and pit the economy against the environment. Furthermore, low incomes inhibit some people from buying local food or investing in solar panels. However, one stakeholder remarked, "You know climate change is such a kind of amorphous threat, a lot of time money isn't prioritized for that, but there's awareness and desire to start now." With more frequent storm events, and threats to vulnerable populations and some of the region's key economic industries, it will be increasingly important to reconsider these trade-offs.

Resistance to change

One respondent put forward the idea that the qualities that are our strengths can also be some of our biggest challenges, that is, many people and communities are very independent and reluctant to ask for help. Another stakeholder remarked how there is often a resistance to change in the region, a fear of doing things differently. Finally, it will be important to bring climate change into community conversations and discussions in a non-polarizing way, as the topic is often politically divisive.



Chequamegon Bay Area Community Study 2018



Place Values

Survey respondents were asked what features of the place and what opportunities they value, and for what personal reasons they live in the Chequamegon Bay region. Understanding what is most important to people in the region can help decision-makers prioritize planning efforts. A majority of residents in Ashland indicate that the natural environment, and family, friends, or roots in the area are the most important overall aspects of living here (Figure 1A). A majority of residents feel like they belong here and that this is the perfect place for them (Figure 2A). Twenty-five percent of households in Ashland report that they are unable to move away from this area. Friends and family in the area and feeling supported by the community are the top three personal reasons for living here (Figure 3A). Features such as natural beauty, proximity to Lake Superior, clean water, the rural landscape, north woods species, summer recreation, and small communities are are also important to a majority of Ashland residents (Figure 4A).





Methods: Surveys were mailed to 2,395 randomly selected households in zip code 54806. 539 households responded for a 23% response rate. Results are weighted by education using 2015 US Census ACS estimates. Due to missing weight values, the final effective sample size is 533. The reported results are representative of households in the 54806 zip code with a +/-4 percentage point margin of error.

Figure 2A. We would like to know how much you like living in the Chequamegon Bay area. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Figure 3A. People live here for a variety of personal reasons. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Figure 4A. Some people live here because of the features of the place and the opportunities that are available. Please indicate to what extent you AGREE or DISAGREE with the following statements. I live here because...



Natural Environment



Recreation and Subsistence

Community Features



Strongly Agree Neutral

Quality of Life Impacts

Projected climate change impacts might affect how community members are able to interact with the environment and the natural features of the place which they value. We asked survey respondents to indicate if each potential change would improve their quality of life, or if their quality of life would decline. If their quality of life would decline to the point that they would leave the area, they could choose 'I would leave'. By quality of life we mean how individual or household needs are fulfilled in terms of livelihood, health, relationships, education and knowledge, and spiritual and cultural fulfillment. The changes with a negative impact on the greatest number of Ashland residents are Lake Superior becoming polluted, if there are more ticks, pests, and insects, and if forest fires are more common (Figure 5A). Other impacts such as fewer north woods species, more wind damage, closed beaches, and fewer fish would also have a negative impact on the majority of residents. Changes in the length and intensity of the seasons would have a mixed impact on the community.

Figure 5A. Consider the following potential changes related to the natural environment in our region. Fore each item, please indicate to what extent your quality of life would IMPROVE or DECLINE.



Changes with mixed impact on quality of life

Figure 5A cont.

Changes with a negative impact on quality of life



25

Household Preparedness

Factors influencing preparendess at the household level include economic resilience, such as diversified household income or access to resources during an emergency; social capital, or the ability to connect to a social network; environmental awareness of risks and impacts, such as the ability to monitor and evaluate changes in the natural environment; and physical infrastructure resilience, such as having appropriate shelter and transportation resources in an emergency or severe weather (see Singh-Peterson & Underhill, 2017). Households in Ashland are most prepared for an emergency in that they know when a weather advisory is in effect and they know who to call if they have an emergency (Figure 6A). In terms of physical infrastructure, they are able to keep their homes warm in the winter, they have shelter in case of severe weather, multiple routes to the places they need to go, adequate vehicles, and enough food stored to last a week. Households are most vulnerable to a prolonged power outage and the economic impacts of utility rates, property damage, or a family health problem.

Figure 6A. We would like to understand what resources are available to your household to help you avoid harm or to get through a difficult time. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Economic resilience

Social capital



Figure 6A cont.

Environmental awareness

- I am able to avoid exposure to ticks and other harmful insects
- I know how to find information about beach closures
- I know how to find information about the quality of my drinking water
- I know when a weather advisory is in effect



Physical infrastructure



Community Priorities and Prepare

The top three priorties for Ashland residents are jobs development, transportation infrastructure, and renewable energy (Figure 7A). A majority of Ashland residents are willing to conserve water if that is what the community needs (Figure 8A), suggesting that most people have the capacity to be flexible and supportive of the community during an emergency. Many residents also have confidence in community groups and other people in the community to help out in an emergency. Households are split in their perceptions of how well the local government is prepared for extreme events.

Figure 7A. We would like to know how your local government should prioritize efforts in the future. Please check the top three areas you think your community should focus on.



edness

Figure 8A. We would like to know how your local government and community respond to situations. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Perceptions of local government capacity

Perceptions of community capacity



Strongly Agree Disagree Strongly Disagree Strongly Disagree



Bayfield Chequamegon Bay Area Community Study 2018



Place Values

Survey respondents were asked what features of the place and what opportunities they value, and for what personal reasons they live in the Chequamegon Bay region. Understanding what is most important to people in the region can help decision-makers prioritize planning efforts. A majority of residents in Bayfield indicate that the natural environment, and outdoor activities and recreation are the most important overall aspects of living here (Figure 1B). A majority of residents feel that this is the perfect place for them, and they would feel sorry if they had to leave (Figure 2B). Twenty-one percent of households in Bayfield report that they are unable to move away from this area. Feeling supported by the community, friends in the area, and people being welcoming to others are the top three personal reasons for living here (Figure 3B). Features such as natural beauty, proximity to Lake Superior, the rural landscape, clean water, north woods species, summer recreation, public access to land, small communities, and local food producers are are also important to most Bayfield residents (Figure 4B).



Figure 1B. Please choose the top three aspects of living here that are most important to you.

Methods: Surveys were mailed to 653 Bayfield households in zip code 54814 (Red Cliff results are reported separately). 195 households responded for a 30% response rate. Results are weighted by education and race using 2015 US Census ACS estimates. Due to missing weight values the final effective sample size is 179. The reported results are representative of households in the 54814 zip code with a +/- 6 percentage point margin of error.

Figure 2B. We would like to know how much you like living in the Chequamegon Bay area. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Figure 3B. People live here for a variety of personal reasons. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Figure 4B. Some people live here because of the features of the place and the opportunities that are available. Please indicate to what extent you AGREE or DISAGREE with the following statements. I live here because...



Natural Environment



Recreation and Subsistence

Community Features





Quality of Life Impacts

Projected climate change impacts might affect how community members are able to interact with the environment and the natural features of the place which they value. We asked survey respondents to indicate if each potential change would improve their quality of life, or if their quality of life would decline. If their quality of life would decline to the point that they would leave the area, they could choose 'I would leave'. By quality of life we mean how individual or household needs are fulfilled in terms of livelihood, health, relationships, education and knowledge, and spiritual and cultural fulfillment. The changes with a negative impact on the greatest number of Bayfield residents are if Lake Superior becomes polluted, forest fires are more common, and there are fewer forested areas (Figure 5B). Other impacts such as fewer north woods species, fewer fish in the Lake, and more ticks and pests would also have a negative impact on the majority of residents. Changes in the length and intensity of the seasons and an increase in summer tourism would have a mixed impact on the community.

Figure 5B. Consider the following potential changes related to the natural environment in our region. Fore each item, please indicate to what extent your quality of life would IMPROVE or DECLINE.



Changes with mixed impact on quality of life

Figure 5B cont.

Changes with a negative impact on quality of life



Household Preparedness

Factors influencing preparendess at the household level include economic resilience, such as diversified household income or access to resources during an emergency; social capital, or the ability to connect to a social network; environmental awareness of risks and impacts, such as the ability to monitor and evaluate changes in the natural environment; and physical infrastructure resilience, such as having appropriate shelter and transportation resources in an emergency or severe weather (see Singh-Peterson & Underhill, 2017). Households in Bayfield are most prepared for an emergency in that they know when a weather advisory is in effect and they know who to call if they have an emergency (Figure 6B). In terms of physical infrastructure, they are able to keep their homes warm in the winter, they have adequate vehicles, shelter in case of severe weather, and enough food stored to last a week. Households are most vulnerable to a prolonged power outage, impassable roads, exposure to ticks, and the economic impacts of utility rates.

Figure 6B. We would like to understand what resources are available to your household to help you avoid harm or to get through a difficult time. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Economic resilience

Social capital



Figure 6B cont.

Environmental awareness

I am able to avoid exposure to ticks and other harmful insects

I know how to find information about beach closures

I know how to find information about the quality of my drinking water

I know when a weather advisory is in effect







Community Priorities and Prepare

The top three priorties for Bayfield residents are renewable energy, the natural environment, and jobs development (Figure 7B). A majority of Bayfield residents are willing to conserve water if that is what the community needs (Figure 8B), suggesting that most people have the capacity to be flexible and supportive of the community during an emergency. Many residents also have confidence in community groups and other people in the community to help out in an emergency. Households are split in their perceptions of how well the local government is prepared for extreme events, although a majority feel that their interests are represented by at least one local official and that their local leaders know how to respond to emergency situations.

Figure 7B. We would like to know how your local government should prioritize efforts in the future. Please check the top three areas you think your community should focus on.



edness

Figure 8B. We would like to know how your local government and community respond to situations. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Perceptions of local government capacity



Perceptions of community capacity

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

8%

12%

8%

11%

100%



Red Cliff Chequamegon Bay Area Community Study 2018



Place Values

Survey respondents were asked what features of the place and what opportunities they value, and for what personal reasons they live in the Chequamegon Bay region. Understanding what is most important to people in the region can help decision-makers prioritize planning efforts. A majority of the respondents in Red Cliff indicate that friends, family, and roots in the area, along with the natural environment are the most important overall reasons for living here (Figure IrC). A majority of respondents feel that they belong here, that this is area is the perfect place for them, and they would be sorry to leave (Figure 2RC). Twenty-one percent of respondents in Red Cliff report that they are unable to move away from this area. Having roots or ancestry here, having family here, and feeling supported by the community are the top personal reasons for living in the area (Figure 3RC). Features such as proximity to Lake Superior, Native American culture and heritage, native species, and small communities are also important to most Red Cliff respondents (Figure 4RC).

Figure 1RC. Please choose the top three aspects of living here that are most important to you.



Methods: Surveys were mailed to all 407 Red Cliff households in zip code 54814 (Bayfield results are reported separately). 25 households responded. Results are weighted by education using 2015 US Census ACS estimates and have a 16 percentage point margin of error. Given the small sample size, we are continuing to collect input from the Red Cliff community.

Red Cliff

Figure 2RC. We would like to know how much you like living in the Chequamegon Bay area. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Figure 3RC. People live here for a variety of personal reasons. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Figure 3. Some people live here because of the features of the place and the opportunities that are available. Please indicate to what extent you AGREE or DISAGREE with the following statements. I live here because...



Natural Environment

Recreation and Subsistence



Community Features



Agree

Strongly Disagree

Quality of Life Impacts

Projected climate change impacts might affect how community members are able to interact with the environment and the natural features of the place which they value. We asked survey respondents to indicate if each potential change would improve their quality of life, or if their quality of life would decline. If their quality of life would decline to the point that they would leave the area, they could choose 'I would leave'. By quality of life we mean how individual or household needs are fulfilled in terms of livelihood, health, relationships, education and knowledge, and spiritual and cultural fulfillment. The changes with a negative impact on the greatest number of Red Cliff respondents are if there are fewer north woods species, if there are fewer fish in Lake Superior, and if important cultural areas are damaged (Figure 5RC). Other impacts such as Lake Superior being polluted, more ticks and pests, more forest fires, and more flooding would also have a negative impact on the majority of respondents. Longer summers and an increase in summer tourism would have a mixed impact on the community.

Figure 5RC. Consider the following potential changes related to the natural environment in our region. Fore each item, please indicate to what extent your quality of life would IMPROVE or DECLINE.



Changes with mixed impact on quality of life

Figure 5RC cont.

Changes with a negative impact on quality of life



Household Preparedness

Factors influencing preparendess at the household level include economic resilience, such as diversified household income or access to resources during an emergency; social capital, or the ability to connect to a social network; environmental awareness of risks and impacts, such as the ability to monitor and evaluate changes in the natural environment; and physical infrastructure resilience, such as having appropriate shelter and transportation resources in an emergency or severe weather (see Singh-Peterson & Underhill, 2017). Respondent households in Red Cliff are most prepared for an emergency in that they know who to call if they have an emergency and they know when a weather advisory is in effect (Figure 6RC). In terms of physical infrastructure, they are able to keep their homes warm in the winter and cool in the summer, they have adequate shelter in case of severe weather, and enough food stored to last a week. Not all households have a vehicle adequate for most road conditions. Households are most vulnerable to the economic impacts of utility rates, a prolonged power outage, impassable roads, and exposure to ticks.

Figure 6RC. We would like to understand what resources are available to your household to help you avoid harm or to get through a difficult time. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Economic resilience

Social capital



Figure 6RC cont.

Environmental awareness



Physical infrastructure





Community Priorities and Prepare

The top three priorties for Red Cliff respondents are renewable energy, jobs development, and historical and cultural preservation (Figure 7RC). A majority of Red Cliff respondents agree that community groups in the area help people in need (Figure 8RC). Many residents also have confidence in other people in the community to help out in an emergency. Households are split in their perceptions of how well the local government is prepared for extreme events, and most are neutral or disagree that residents are receptive to new people moving in.

Figure 7RC. We would like to know how your local government should prioritize efforts in the future. Please check the top three areas you think your community should focus on.



edness

Figure 8RC. We would like to know how your local government and community respond to situations. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Perceptions of local government capacity

Perceptions of community capacity



Agree



Chequamegon Bay Area Community Study 2018



Place Values

Survey respondents were asked what features of the place and what opportunities they value, and for what personal reasons they live in the Chequamegon Bay region. Understanding what is most important to people in the region can help decision-makers prioritize planning efforts. A majority of residents in Washburn indicate that the natural environment, and outdoor activities and recreation are the most important overall aspects of living in the area (Figure 1W). A majority of residents would feel sorry if they had to leave, they feel like they belong here, and that the area is the perfect place for them (Figure 2W). Seventeen percent of households in Washburn report that they are unable to move away from this area. Feeling supported by the community, people being welcoming to others, and friend in the area are the top three personal reasons for living here (Figure 3W). Features such as natural beauty, clean water, proximity to Lake Superior, the rural landscape, north woods species, small communities, seasonal recreation, and public access to land are also important to most Washburn residents (Figure 4W).

Figure 1W. Please choose the top three aspects of living here that are most important to you.



Methods: Surveys were mailed to all 1,545 households in zip code 54891. 325 households responded for a 21% response rate. Results are weighted by age and education using 2015 US Census ACS estimates. Due to missing weight values the final effective sample size is 318. The reported results are representative of households in the 54891 zip code with a +/- 5 percentage point margin of error.

Washburn

Figure 2W. We would like to know how much you like living in the Chequamegon Bay area. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Figure 3W. People live here for a variety of personal reasons. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Figure 4W. Some people live here because of the features of the place and the opportunities that are available. Please indicate to what extent you AGREE or DISAGREE with the following statements. I live here because...



Natural Environment

Recreation and Subsistence



Community Features



Quality of Life Impacts

Projected climate change impacts might affect how community members are able to interact with the environment and the natural features of the place which they value. We asked survey respondents to indicate if each potential change would improve their quality of life, or if their quality of life would decline. If their quality of life would decline to the point that they would leave the area, they could choose 'I would leave'. By quality of life we mean how individual or household needs are fulfilled in terms of livelihood, health, relationships, education and knowledge, and spiritual and cultural fulfillment. The changes with a negative impact on the greatest number of Washburn residents are if Lake Superior becomes polluted, there are more ticks and pests, and if drought is more common (Figure 5W). Other impacts such as forest fires are more common, beaches are closed more often, fewer north woods species, and fewer forested areas would also have a negative impact on the majority of residents. Changes in the length and intensity of the seasons would have a mixed impact on the community.

Figure 5W. Consider the following potential changes related to the natural environment in our region. Fore each item, please indicate to what extent your quality of life would IMPROVE or DECLINE.



Changes with mixed impact on quality of life

Figure 5W cont.

Changes with a negative impact on quality of life



Household Preparedness

Factors influencing preparendess at the household level include economic resilience, such as diversified household income or access to resources during an emergency; social capital, or the ability to connect to a social network; environmental awareness of risks and impacts, such as the ability to monitor and evaluate changes in the natural environment; and physical infrastructure resilience, such as having appropriate shelter and transportation resources in an emergency or severe weather (see Singh-Peterson & Underhill, 2017). Households in Washburn are most prepared for an emergency in that they know when a weather advisory is in effect and they know who to call if they have an emergency (Figure 6W). In terms of physical infrastructure, they are able to keep their homes warm in the winter, they have adequate vehicles, shelter in case of severe weather, and enough food stored to last a week. Households are most vulnerable to a prolonged power outage, the economic impacts of utility rates, and exposure to ticks.

Figure 6W. We would like to understand what resources are available to your household to help you avoid harm or to get through a difficult time. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Economic resilience

Figure 6W cont.

Environmental awareness

- I am able to avoid exposure to ticks and other harmful insects
- I know how to find information about beach closures
- I know how to find information about the quality of my drinking water
- I know when a weather advisory is in effect



Physical infrastructure



Agree

Community Preparedness

The top three priorties for Washburn residents are renewable energy, jobs development, and the natural environment (Figure 7W). A majority of Washburn residents are willing to conserve water if that is what the community needs (Figure 8B), suggesting that most people have the capacity to be flexible and supportive of the community during an emergency. A majority of residents also have confidence in other people in the community and community groups to help out in an emergency. A majority of residents agree that their local leaders know how to respond in emergency situations and that their interests are represented by at least one local official. Fewer households agree that the local government provides enough information about water quality.

Figure 8W. We would like to know how your local government should prioritize efforts in the future. Please check the top three areas you think your community should focus on.



Figure 7W. We would like to know how your local government and community respond to situations. Please indicate to what extent you AGREE or DISAGREE with the following statements.



Perceptions of local government capacity

Perceptions of community capacity



Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Center for Rural Communities NORTHLAND COLLEGE

The Northland College Center for Rural Communities applies research-based solutions to social and economic challanges, partners with community members to build on local knowledge, and promotes the long-term health and vitality of rural communities in the north woods region. For more information, visit us at **northland.edu/crc**

CRC Staff

- **Brandon Hofstedt**, Faculty Director of the Center for Rural Communities, Associate Professor of Sustainable Community Development
- **Ana Tochterman**, Director of Research Programs at the Center for Rural Communities
- **Robin Kemkes**, Faculty Research Associate at the Center for Rural Communities

You can reach us at:

Center for Rural Communities Northland College 1411 Ellis Avenue Ashland, WI 54806 crc@northland.edu

Reference: Lila Singh-Peterson & Steven J. R. Underhill (2017) A multi-scalar, mixed methods framework for assessing rural communities' capacity for resilience, adaptation, and transformation, Communty Development, 48:1, 124-140.