°CurrentClimate

Koss, Zachary D. ***Current Climate: Adaptive Approaches to Communicating Minnesota's Climate Challenges through Graphic Design***

Abstract

Climate change is one of the most complex challenges facing our planet and species. The sheer number of challenges it creates to can be overwhelming. The communication about issues caused by climate change is often too complex or too general to be understood by people in a meaningful way. This project addresses these issues by creating adaptive approaches to communicating such climate challenges through the use of accessible and provocative graphic design. The graphics are made accessible by focusing on localized issues. The graphics are informed and influenced by climate science, global warming literature, qualitative interviews with designers, and a survey of existing climate change focused graphic design. The project utilizes action research and iterative design methods. Along with this research, the interviews with practicing graphic designers shaped the scope of the project to be more specific and focused on Minnesota climate issues. The graphics were reviewed and refined through several iterations, which resulted in a poster series that helps bridge the gap between graphic design and climate science. Through dissemination at a public gallery exhibition the graphics received positive feedback and comments. Understanding climate change can be made easier by communicating relevant issues through the use of provocative graphics.

Acknowledgments

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Chapter I: Introduction

Climate change is one of most important and complex problems facing both our planet and species. Rising global temperatures, extreme weather events and rising sea levels are just a few of the problems occurring as a result of a changing climate. Despite a 97% scientific consensus that it is occurring, there are still people who deny its existence (NASA, 2018). For those who do agree with the science the issue has become too convoluted to understand or inspire action.

There are a variety of reasons the issue of climate change has become so complicated. One reason is the long-term nature of the problem. People may understand these issues are occurring but do not have the ability to comprehend the time scale they take place on. Humans' inability to comprehend future consequences over short-term rewards or consequences is sometimes referred to as *Hyperbolic discounting* (Revesz & Shahabian, 2010, p.17). This term is also used to describe the difficulty of understanding climate change. While climate challenges may currently affect people, they may be unable to comprehend their long-term ramifications in a meaningful way.

Further complicating the communication of climate change is its evolution into a partisan political issue in the United States. It has become an issue used to declare political position on the right and left. To add to these political complexities, governmental agencies responsible for reporting climate change, such as The Environmental Protection Agency (EPA), have begun changing their policies or denying climate science based on the party leadership. Visiting certain pages of the EPA website often results in a broken page, with a message indicating that a "Page is being updated." This is because EPA's current administration have completely removed all information pertaining to climate change and have yet to update it (Niiler, 2018).

The science behind climate change can also seem esoteric. This perceived complexity of climate science and how it is communicated can leave audiences aware of issues in general, but not in ways relevant to them or their communities.

Reasons such as these make it evident that climate change must be communicated in a different manner. When this information is presented in a more specific way, audiences can consider it in relation to their own lives. The NASA climate website surmises a reasonable approach here:

> While climate change is a global issue, it is felt on a local scale. Cities and municipalities are therefore at the frontline of adaptation. In the absence of national or international climate policy direction, cities and local communities around the world have been focusing on solving their own climate problems. (NASA, 2018)

Purpose of the Project

The purpose of this project is to generate adaptive approaches to communicating climate change in Minnesota using graphic design. This project aims to simplify the complexities of explaining climate change by selecting Minnesota-relevant issues and designing a poster series representing these issues. These posters are designed in an accessible, yet provocative fashion to engage and inform viewers. The human mind often seeks information from external stimuli, like posters. Therefore, posters hold great communicative potential. As designer Ellen Lupton (2015) states, “Posters and other images can trigger emotional responses like those provoked by living beings. Images beseech us with their sorrow, wisdom, or erotic charm” (p. 20). The posters will additionally serve as an informational resource for local climate challenges.

Minnesota residents are the intended audience for this project. The posters are designed to communicate to the general public in the state and not a specific demographic or individuals

of a particular political ideology. It should be noted that climate challenges do not cease at state lines. While this project focuses on the state of Minnesota, its content is also relevant to the entire upper Midwest.

Objectives

The four main objectives for this project are as follows:

Objective 1. Research climate change, interview practicing graphic designers and review existing graphic design approaches to communicating climate change.

Objective 2. Create a poster series that illustrates Minnesota's climate challenges through accessible, yet provocative aesthetics.

Objective 3. Publicly exhibit poster series and research findings with potential for the continuation of the project.

Objective 4. Create an interactive website to supplement the poster series with additional information about each climate challenge depicted.

Definition of Terms

The following section defines and describes some terms that are specific to this report.

Adaptation. Adapting to the issue of climate changes already occurring (NASA, 2018).

Climate challenges. Issues caused by climate change.

Deniers. Individuals that deny climate change is occurring.

Hyperbolic discounting. The tendency for people to increasingly choose a smaller-sooner reward over a larger-later reward as the delay occurs sooner rather than later in time (Revesz & Shahabian, 2010).

Mitigation. Reducing emissions and stabilizing the levels of heat-trapping greenhouse gases in the atmosphere (NASA, 2018).

Proof of concept. Evidence, typically derived from an experiment or pilot project, which demonstrates that a design concept is feasible.

Assumptions

For this project, the following assumptions exist:

1. The relevance of subject matter to audiences.
2. Maintaining cohesive aesthetics through poster series.
3. The audience has some understanding of climate change.

Limitations

For this project, the following limitations exist:

1. The scope is specific to Minnesota.
2. The interview sample is limited.
3. Dissemination of the final graphics is limited to gallery exhibition and website.

Chapter II: Related Work and Influences

Initial research for this project began in the Spring of 2017 as part of course work for DES-800: Design Seminar II. The focus of the project, at that time, was political dissent graphics. Portions of the historical information accrued during this stage went on to directly inform the final outcomes of this project, such as using posters as the medium for dissemination, and specific design influences, like Milton Glaser. This chapter begins with a brief history of poster design as it relates to this project and focuses on the various uses of posters as propaganda. This is followed by a review of climate science resources like NASA, World Resources Institute, National Geographic, and the World Preservation Foundation. Then there is a review of the graphic influences on this project. Each influence is described contextually with respect to its potential assets and limitations, following with an analysis of its viability to communicate climate challenges. Specifically, this section begins with an analysis of Milton Glaser's, "It's not warming, it's dying campaign". Next, is a review of the Green Patriot poster series, and the design studio Catalog tree. Finishing off this section is an overview of a Climate change primer infographic series by Twin Cities based designer Jaime Chismar Seebacher.

Poster History

Posters comprise the main graphic component of this project and were selected as the vehicle for information delivery due to their timelessness, versatility, and political relevance. Posters have the potential to be powerful in the public sphere as they gain attention and can distribute information to a wide audience (Carter, 2008, p.3). Posters have long been used as a tool for propaganda, dissent and public service. Some design historians claim propaganda posters, now a few centuries old, can be traced back to political cartoons during the French Revolution (Timmers, 2003, p. 102).

Propaganda posters as we know today started to take shape around World War I with the use of them as recruitment tools for the "Great War." The best example of this would be James Montgomery Flagg's iconic "I Want You" army recruitment poster featuring an illustration of Uncle Sam. This form of propaganda poster design for military recruitment continued to be used in the west during World War II and beyond (Barnicoat, 1972, p. 222).

Beyond the United States and in communist countries such as China and the Soviet Union, posters have been continually used as powerful tools to promote political agendas. The Soviet Union has a long history of using propaganda posters. During the Russian revolution (in 1917), simple graphics were used on posters to garner support and make people literate. As Timmers (2003) explained, "From its earliest days, Soviet Russia initiated programs of propaganda which were designed to elicit support for the revolution in a massive country populated by a largely illiterate, peasant people… in 'reading huts', peasants were taught to read with political posters" (p. 102).

Outside the context of wars, the most historically relevant resource related to this project was the work of the WPA's (Works Progress Administration) Poster Division. This division created a wide variety of posters. As Carter (2008) described:

> The WPA poster division was charged with producing posters to raise awareness and promote a wide range of programs, activities, and behaviors that the Roosevelt administration believed would improve people's lives: community involvement, accessible education, good health and hygiene, a strong work ethic, cultural outings, sports, domestic travel, and conservation of natural resources. (p. 3)

The biggest asset of this extensive project was its large production and long duration. The Poster Division of the WPA lasted from 1930 to 1943 and had offices in 18 states.

Approximately 500 artists were hired to create more than 35,000 designs, which resulted in the production and distribution of around two million posters (Carter, 2008, p. 3). The wide variety of issues addressed in this vast body of work still remains relevant to both contemporary designers and the general public.

Climate Science Resources

Scientific research began by reviewing the science behind climate change. This initial research cycle returned an abundance of information. The most comprehensive resource found on climate change is NASA's site, *Global Climate Change: Vital Signs of the Planet (2018)*. This web resource features all of the data, science, graphs and images needed to understand climate change, including a detailed section focused on solutions. The solution section of the website features an article on mitigation and adaptation.

This particular section proposes that the appropriate response to climate change involves two approaches: mitigation and adaptation. Mitigation involves the reduction and stabilization of greenhouse gases in our atmosphere that cause climate change. Adaptation involves adjusting and adapting to the current and future effects of climate change (NASA, 2018). This concept of adaptation as a solution to climate change informed this project due to the fact that climate challenges are global but are experienced on a local level. By focusing on local issues, this project aids in the adaptation of understanding climate issues in an accessible way.

A survey of existing climate change focused graphics was also conducted. The most successful of which depicted data and facts in effective ways. The World Resources Institute, a nonprofit dedicated to sustainable living, has an interactive graphic (Figure 1) titled, "Explore the World's Greenhouse Gas Emissions" that depicts different country's emission amounts and

what each is comprised of (Levin, 2017). The interactive elements of the graphic allow users to gain a better understanding of the role that different nations play in this global issue.

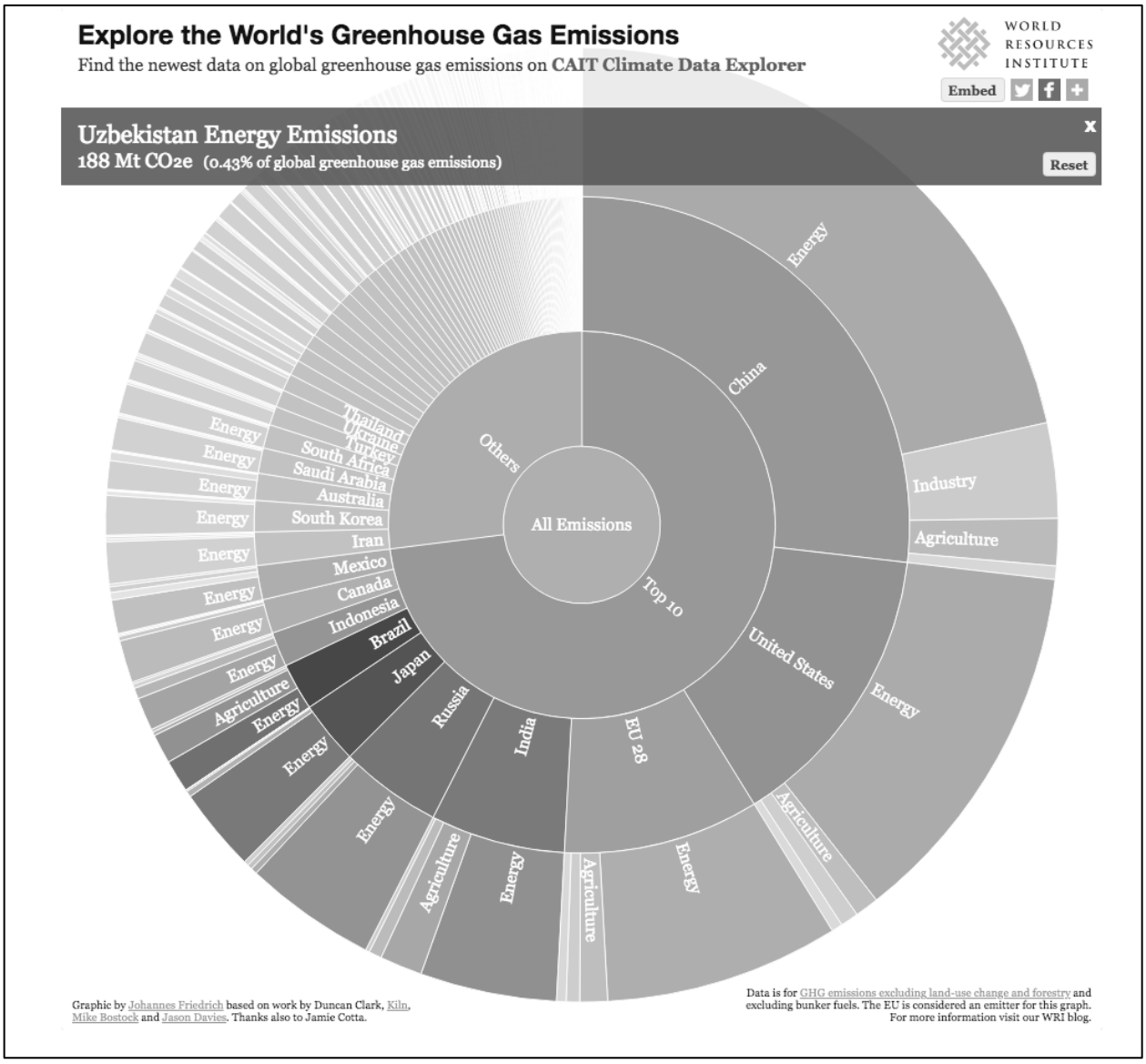

Figure 1. "Explore the World's Greenhouse Gas Emissions" interactive graphic by Johannes Friedrich for World Resources Institute. (http://www.wri.org/blog/2017/04/climate-science-explained-10-graphics). Copyright by World Resources Institute. Reprinted with Permission.

Another example of an effective climate graphic is National Geographic's predictive maps that illustrate the effects of a diminishing shoreline after all of the ice caps have melted

(Treat, 2017). Familiarity makes these map graphics effective by providing the user with a focused location that is instantly recognizable. Additionally, the amount of detail included in the maps showcases the data behind each location portrayed.

The World Preservation Foundation is a non-profit organization founded in 2010 with the objective of educating the public on the causes of climate change and other natural disasters. Their website is an interactive resource on the environmental and humanitarian issues caused by climate change such as: water and food security, climate refugees and biodiversity loss. Each issue is presented in a clear manner and includes a submenu containing the following sections: Introduction, problem, cause, timeline, solution. The strength of the information presented is its overall legibility and simplicity suited to large audiences (World Preservation Foundation, 2016).

Other graphic solutions are less successful due to focusing on issues too general to be effective. Rising sea levels are commonly portrayed, but the effects of them are not. Also, a general image search for climate change or global warming will yield a variety of imagery featuring polar bears and penguins. These species are used commonly as general symbols for climate change but are abstracted by the fact that both animals live in remote areas sparsely populated by humans.

Graphic Influences

The following section is a review of the graphic influences on this project.

It's not warming, it's dying. Milton Glaser is graphic designs elder statesmen and one of the world's most well-known designers. Beyond his pop-graphics, his work has often been political. Glaser once stated that, "Dissent, when at its best, is fueled by empathy and the idea that other people matter. If somebody is hurt or victimized, we are all hurt or victimized. It is

necessary for dissent to be expressed. It has to be expressed, because to protect democracy, it's the only hope we have" (Glaser, 2005).

Glaser's 2014 campaign focused on global warming is a strong example of his recent dissent inspired work. "It's not Warming, it's Dying," was a project intended to raise awareness on climate change (Treggiden, 2016). The main graphic for the campaign is a circle with a green to black gradient from bottom to the top, which is meant to illustrate the transition of our planet from being filled with life to total death.

While the campaign and graphics are simple and overall comprehensible, they are overly general. The project also seems to have ceased or stopped altogether because the website is no longer active, and its corresponding social media presence has been dormant for over three years.

Green Patriot Posters. The *Green Patriot Posters (2008-2016)* campaign focused on the promotion of building a sustainable economy in the United states. Posters were commissioned from leaders in design such as Shepard Fairey and Geoff McFetridge. Concepts were shared and voted on through an online community designed specifically for the project. The top voted posters were disseminated through various mediums including print, web, ads and licensing. This was eventually published as a poster book and traveling exhibition and featured at the Walker Art Center in Minneapolis in 2011(Bowman, 2011).

The success of this project lies is its far-reaching scope. By utilizing a variety of well-known design leaders, the series is visually diverse and developed a large audience. While the posters and range of the project were successful, the overly general nature of the posters leaves opportunities for other approaches graphically.

Catalog Tree. This European design studio started in 2001 and is known for its infographics and unique graphic data systems. According to their website, they are, "Highly

interested in self-organising systems they believe in 'Form Equals Behaviour'. Experimental tool-making, programming, typography and the visualization of quantitative data are part of their daily routine" (Catalogtree, 2014).

Their information design work obscures data in interesting ways, forcing the user to engage with graphics in a way that creates a memorable experience. Specifically, the 2015 poster, "Clean Water/Sanitation" which is part of the United Nations (UN) sustainable development goals portrays the percentage of population with no access to clean water supplies (Figure 2). It shows a distorted globe with countries depicted by color to show which countries are the most in need of clean water.

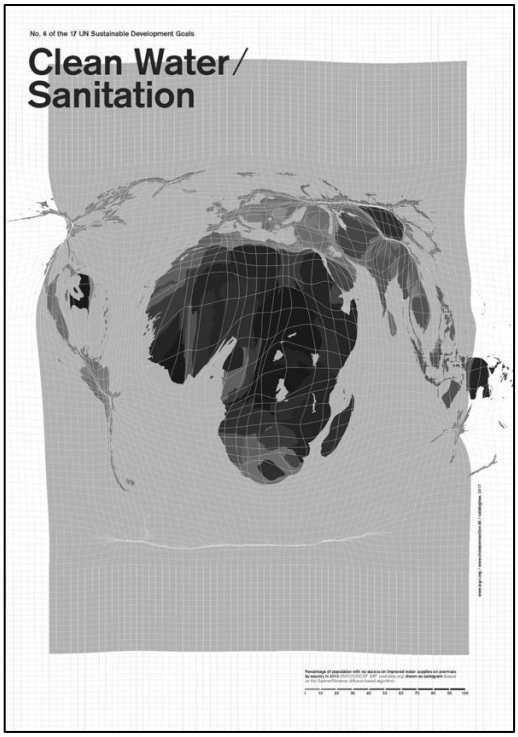

Figure 2. "Clean Water/Sanitation" by Catalog Tree. (http://www.catalogtree.net/water/). Copyright 2015 Catalog Tree. Reprinted with Permission.

While Catalog Tree's information graphics are presented in an engaging way, their work may be too data focused as the images are not immediately understood or all that user friendly.

Their efficacy largely depends on a fixed context that allows users to interact with the posters directly.

Climate change primer. The most relevant resource to this project was an infographic series created for Minnesota Public Radio News by designer Jaime Chismar Seebacher. This comprehensive series of colorful infographics was used for a climate change primer article (Figure 3). The infographics depict several climate related issues in Minnesota, such as the increase in ragweed allergy season, increase in heavy rainfall, and the increasing distribution of Lyme disease in the state (Chismar-Seebacher, 2015).

This series largest attribute is the vast range of issues it covers. Each issue is depicted with clarity through accessible and informative infographics. Each infographic is simple enough to be easily understood, but also provides additional information on the issues represented. The color palettes reflect each issue being represented. Issues related to temperature use a warm palette of yellows, reds and oranges, for example. For issues involving precipitation or winter, a cool palette of blue, indigo, and purple is applied.

While this infographic series is certainly accessible and informative for an online article, its effectiveness may be limited to an informational context only. The infographics provide an excellent source of visual information but may not inspire any action on the part of the viewer. This presents opportunities to illustrate these issues in a more provocative manner.

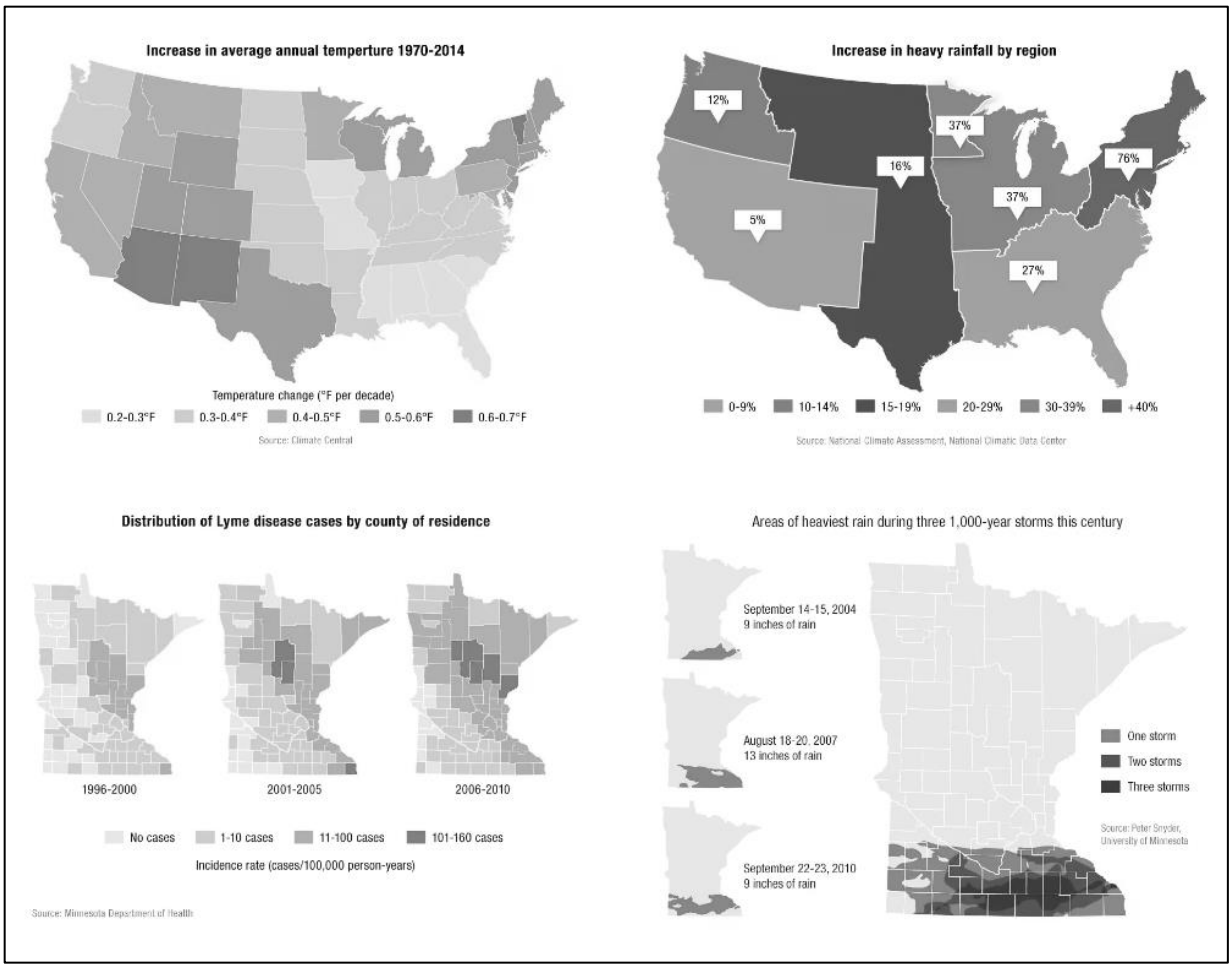

Figure 3. Selected infographics from "*MPR News-Climate Change Primer*" by Jaime Chismar Seebacher. (https://superdeluxedesign.com/project/climate-change-in-minnesota-23-signs/). Copyright 2016 by Jaime Chismar Seebacher. Reprinted with permission.

Chapter III: Design Methodology

The following chapter defines the methods employed for the research and design of this project. This includes the methodology, materials, participant selection, and the project analysis procedure.

Methodology

The methods developed for this project are based on action research and iterative design methods. These specific methods allowed for the scope and focus of the project to evolve as it was conducted. Such an approach calls for action research, as Peter Reason and Hilary Bradbury (2005) explain:

> A participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities. (p. 1)

Through exploration during research, a thorough understanding of the problem is gained and then potential solutions to the problem can be designed. This provides an appropriate framework for a cyclical or iterative approach to the both the research and design of this project.

General issues and graphics. To gain a comprehensive understanding of the larger problem of climate change as it relates to this project, general climate science resources were researched and reviewed. Additionally, the designer researcher conducted a review of related graphic design projects. From this research the first iteration of preliminary graphics was created.

Preliminary graphics. Initial graphic concepts for the project were generated during and after initial research. Graphic concepts were created in conjunction with research to synthesize research results. An iterative approach was utilized to establish proof of concept for graphics through trial rounds. These preliminary concepts were experimental in nature and sketched out in an analog environment. The first iteration began by sketching out graphic depictions of general climate change concepts such as sea level rising and human activity causing increases in carbon emissions (Figure 4). Upon review of initial concepts, a second iteration of graphics were generated digitally for refinement and dissemination purposes (Figure 5).

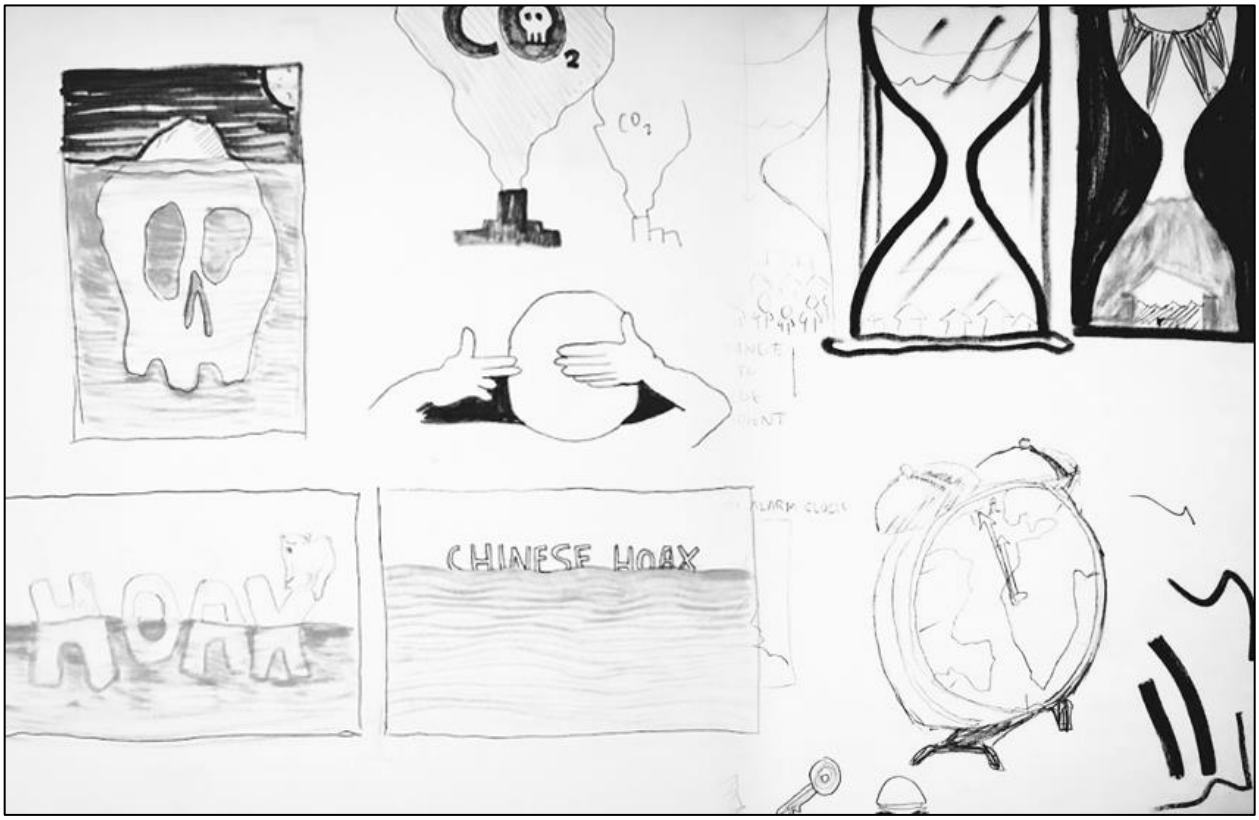

Figure 4. First iteration: Example of graphic sketches.

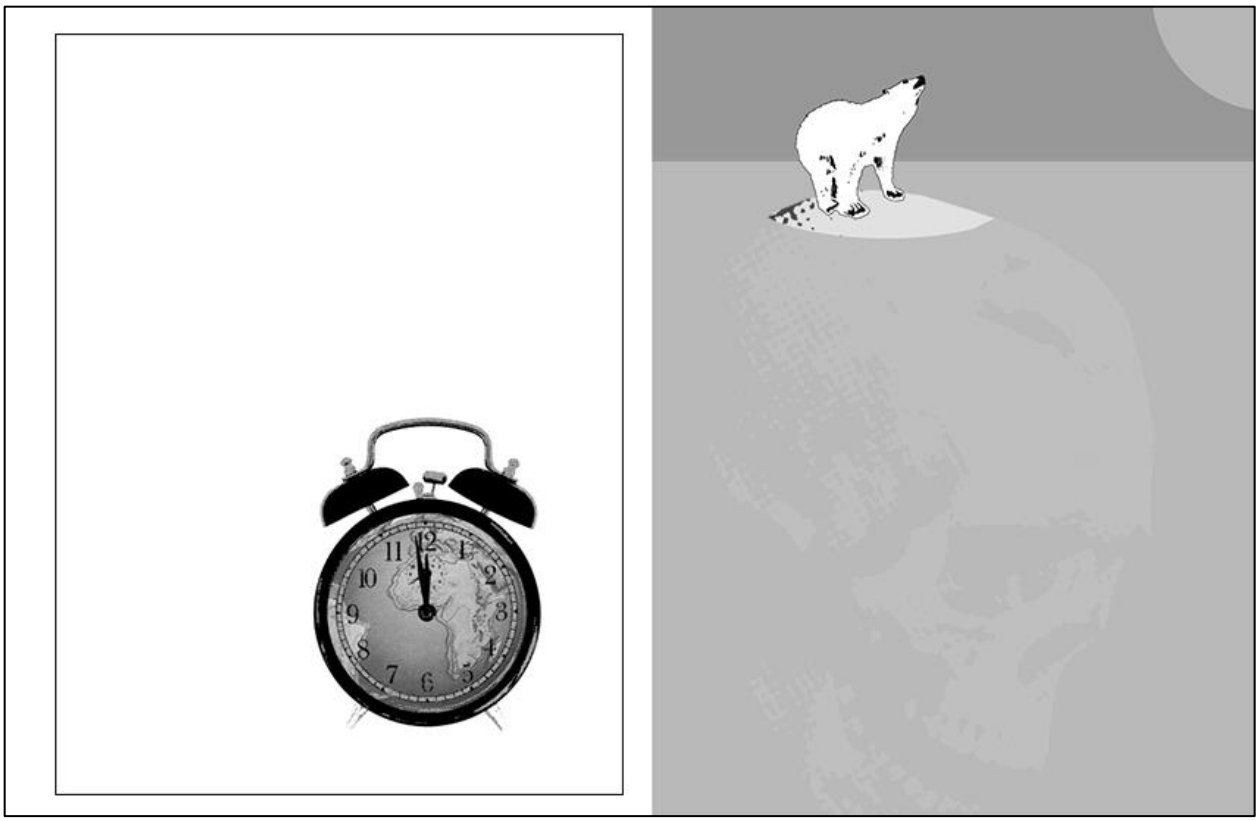

Figure 5. Second iteration: Digital concepts for preliminary graphics.

Qualitative interviews. Interviews with practicing graphic designers were conducted using qualitative methods (see Appendix A). The interviews were flexible and utilized a semi-structured approach. This allowed the researcher-participant interactions to be more conversational and allow for thorough interpretation of the interview results. Rosalind Edwards and Janet Holland (2013) explain the importance of this approach:

> As human interaction and negotiation is seen as the basis for the creation and understanding of social life in interpretive approaches, it is the interaction of the participants in the interview situation – the researcher and the researched – that creates knowledge. (p.17)

These interviews provided knowledge on the field of graphic design as it related to political issues, and the individual approaches of the participant-designers. The results of these interviews directly informed the subsequent research cycles and graphic iterations.

Participant selection. Telephone interviews were conducted with practicing graphic designers to supplement research and aid in the creation of graphics. Interview requests were sent to 10 designers, and a total three interviews were conducted. The interviews took place in late 2017.

Each participant was a volunteer and was contacted via email prior to the phone interview. Participants were selected based on their design experience and their personal and professional relationship to the designer researcher. Each interview consisted of approximately 20 questions, beginning with general questions about their personal design practice and concluded with more specific questions related to climate change (see Appendix A). Selected portions of the interview results are included in Chapter IV.

Each designer was located in a different part of the United States. One is in western Wisconsin, another is located in Chicago, and, lastly, one is in California. Each had different levels of experience working in the design field: two of them have been practicing designers for 10-15 years, while one has been a practicing designer for more than 25 years.

The interviews were recorded for data analysis and future reference. The interviews were proposed to and upon review exempted by the University of Wisconsin-Stout Institutional Review Board.

Local issues and graphics. Following the interviews, the scope of research was refined and limited to climate challenges specific to the State of Minnesota. Because of this, predominantly local organizations were utilized within Minnesota. These local organizations

were identified by their public image and web presence. A review of graphics relating to Minnesota related climate challenges was then conducted. This local research and review helped to inform the final graphics for the project. Further details are included in Chapter IV.

Final graphics and website. The stage of the project was informed by local research on Minnesota organizations, design principles, and reached over the course of several iterations. The addition of design principles to this stage of the process helped inform the final poster graphics.

One such principle is the "Rule of Thirds," also known as the *golden grid rule,* is a technique that divides a composition into thirds. It creates an asymmetry which results in more unique and appealing designs (Lidwell, Holden, & Butler, 2015, p. 208).

The use of color was also thoroughly explored during this project. Color can be used to get a viewer's attention, categorize design elements, and illustrate meaning. The color guidelines such as the numbers of colors, color combinations, saturation and symbolism were all considered for this project (Lidwell et al., 2015, p. 48). Further details on the use of color can be found for each graphic in the Final Graphics section of Chapter IV.

Dissemination. Research results, poster designs and the web component were displayed for the public in a gallery exhibition.

Materials

General research was conducted using online resources, the results of which were cataloged using Google docs software.

Preliminary graphic concepts were generated using analog tools such as pen, graphite and paper. Refined iterations took Further graphic concepts and final poster graphics were generated using Adobe Photoshop© and Illustrator© software.

The web component of this project was created using the Wordpress Content Management System framework with a theme allowing for easy updates and functionality in both desktop and mobile environments.

Qualitative interviews were conducted via telephone and recorded using Google voice application in MP3 file format.

Project Analysis Procedure

Information collected from the qualitative interviews and sources were reviewed and analyzed. Interview responses helped inform the final stage of research and graphic concept creation.

To refine the graphic iterations throughout the project, sketches and preliminary concepts were reviewed and critiqued by the thesis committee. This feedback informed further graphic iterations. During final graphic iterations, weekly reviews informed subsequent weeks to include new updates, edits and refinements.

Chapter IV: Results

The following section contains an overview of the projects results. This chapter is divided into the following sections: Preliminary graphics, interview results, Minnesota issues, final graphics, website, and concludes with dissemination.

Preliminary Graphics

Initial graphic iterations were generated in conjunction with the first research phase. Visual exploration of general research findings began with these concepts in mind. One preliminary graphic depicts an altered human evolution stage to call attention to rising sea levels. A figure on the right side of the composition shows a human with his hands above his head to suggest drowning and surrender. A sweeping solid block of the color cyan overlays the evolution graphic to show a steady increase of water level (Figure 6).

A typographically focused concept depicted the word Crap with the degree symbol to reference increasing temperatures and to illustrate the predicament facing our species (Figure 7). This concept eventually inspired the logo for the overall project.

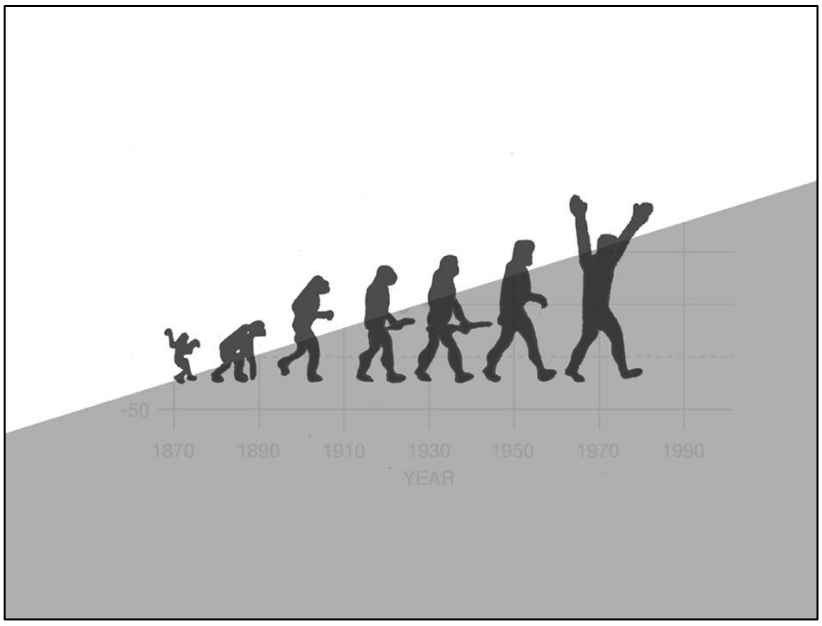

Figure 6. Preliminary graphic concept: Human Evolution.

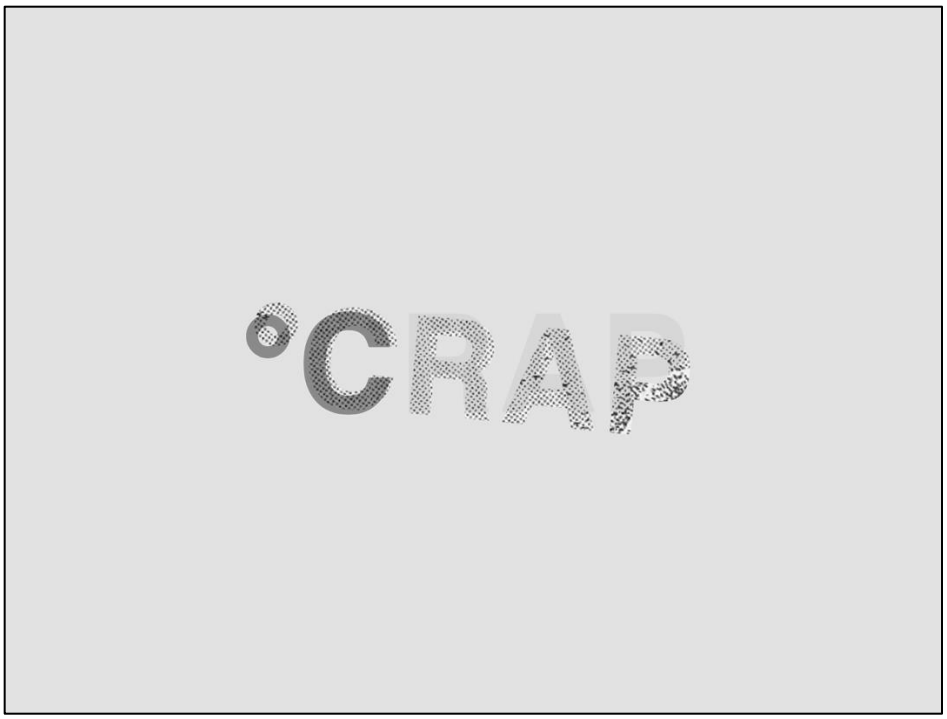

Figure 7. Preliminary graphic concept: °CRAP.

Another preliminary graphic shows a small polar bear on top of a melting iceberg. Upon closer inspection, however, the portion of the iceberg under water is actually a human skull. This was meant to satirize the use of polar bears so frequently depicted in related work, while pointing to the larger issue of our own species under threat of extinction (Figure 8).

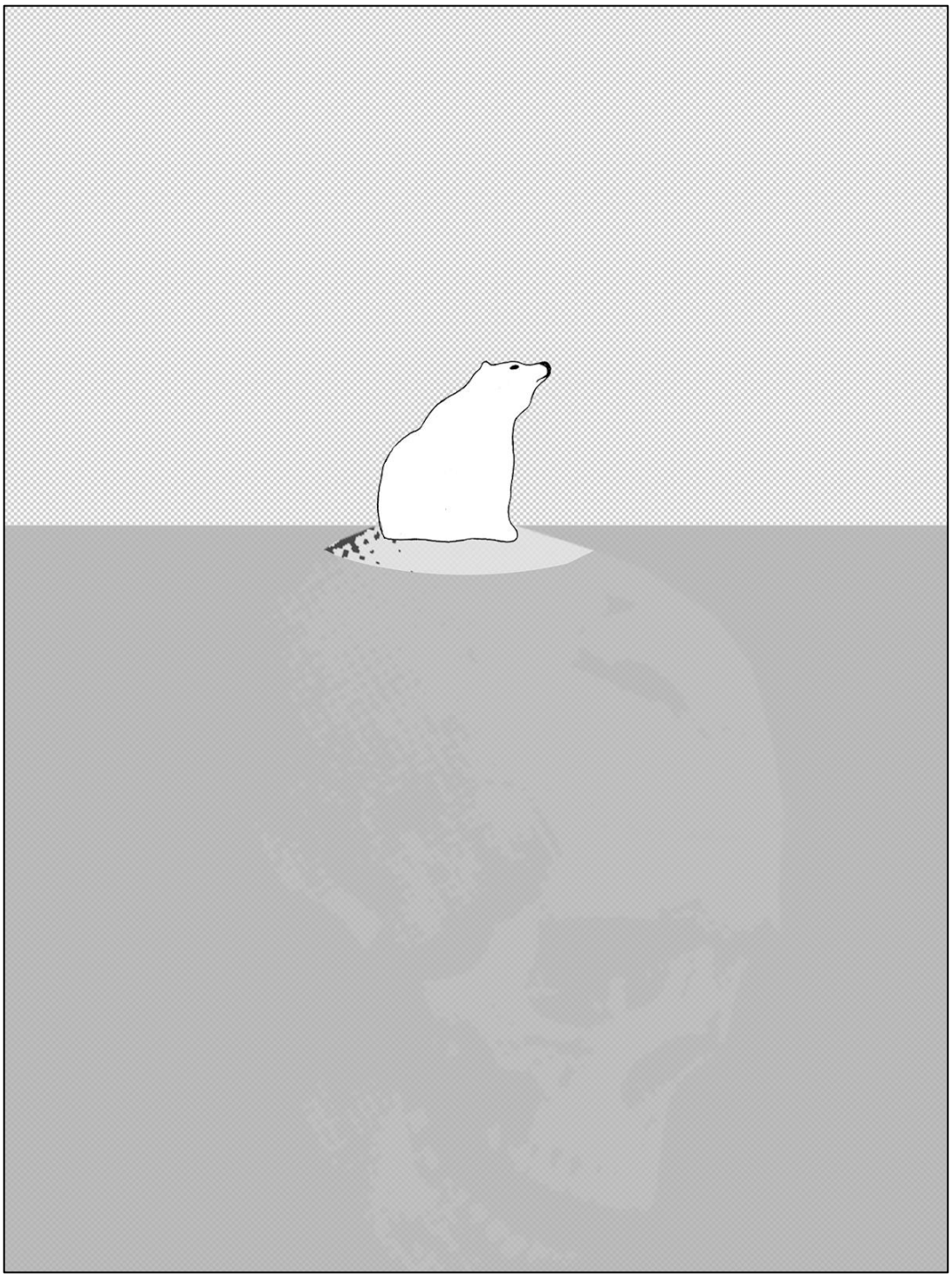

Figure 8. Preliminary graphic concept: Polar Bear Iceberg.

Another concept shows an alarm clock with its hands nearing midnight, but its face is a globe to illustrate the time-sensitive nature of climate change (Figure 9).

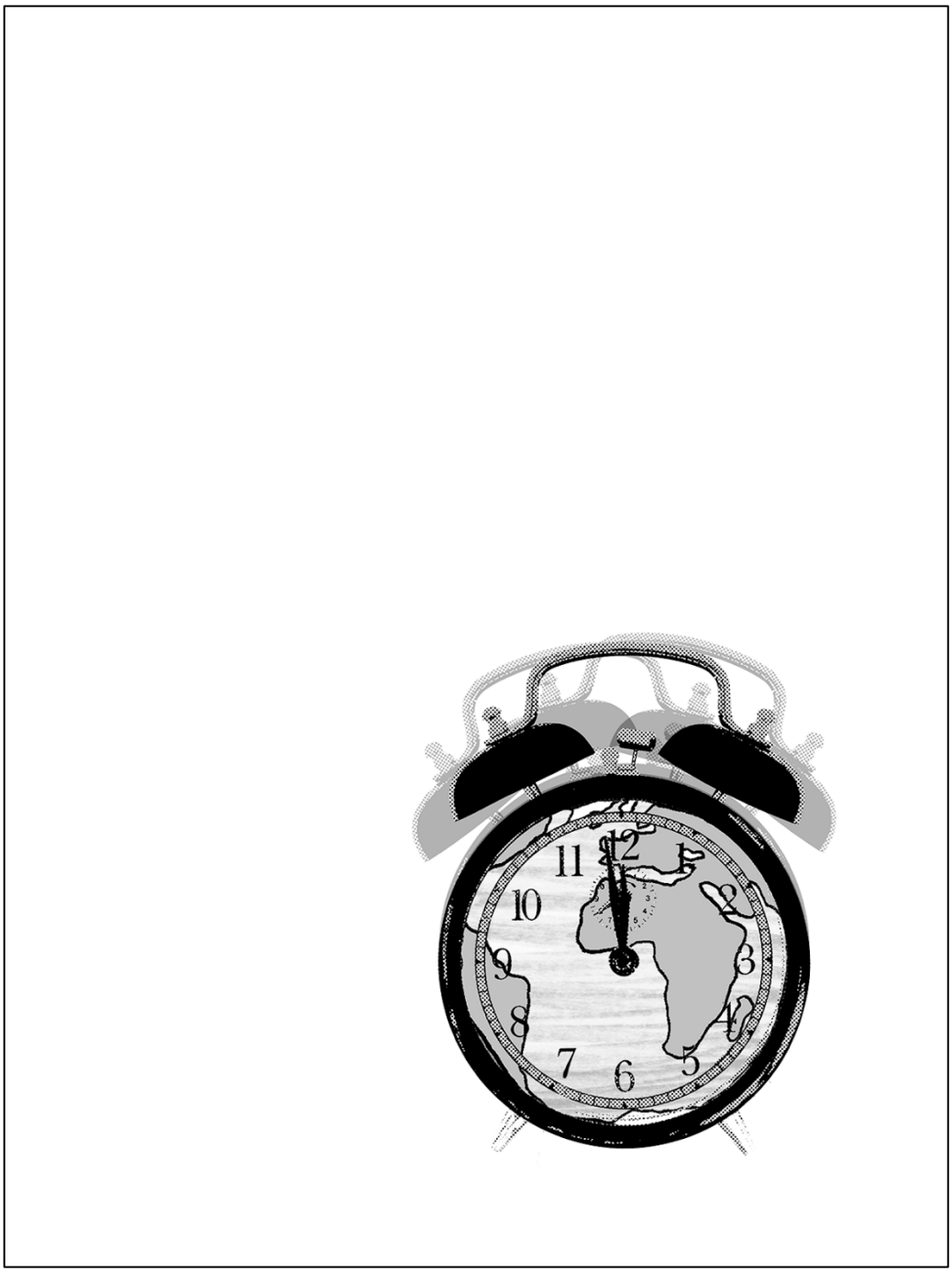

Figure 9. Preliminary graphic concept: Midnight Hour.

A caused-based concept depicts a dysfunctional pattern of human behavior that contributes to climate change. The pattern is comprised of hamburgers, car keys and a power cable. It is meant to illustrate the excess of human consumption (Figure 10).

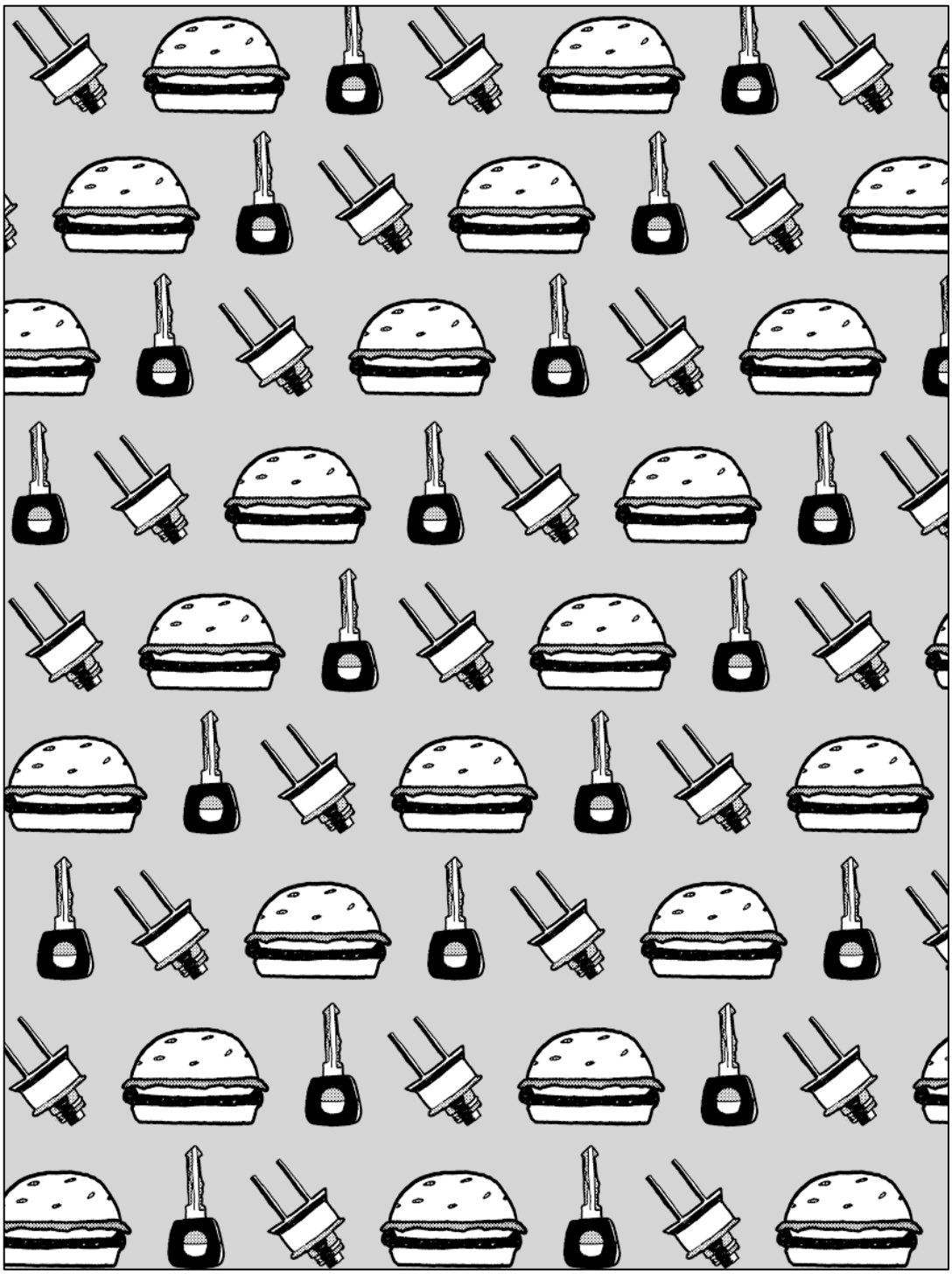

Figure 10. Preliminary graphic concept: Consumption Patterns.

In summary, these preliminary concepts had the potential to be effective individually, however, they lacked the visual and conceptual cohesion to be part of a series. Despite these

inconsistencies, this first iteration of graphics explored general climate change related concepts that went on to inform the final graphics. The success of these preliminary concepts is found in certain themes that began to emerge, such as the sense of a world in transition. Aesthetically, they established the use of bright colors, bold graphics and sequential imagery. Proof of concept was established by these preliminary concepts.

Interview Results

Beyond general demographic information, the questions progressed and became more specific to this project and the research it involved. The question, "*Do graphic designers have a responsibility to contribute to political movements?"* returned some of the most valuable responses. One response was that designers do not have a responsibility to work politically, but that this type of work should be in their skill set, or repertoire. Designers have an overall "human responsibility" to assist social and political causes and hopefully they can use this to find meaning in the workplace (M. Rohl, personal communication, October 31, 2017).

Another responded that they felt it was their responsibility to design and synthesize complex political issues into simpler concepts for the purposes of general communication. This designer had experience designing lobbying materials for political causes in Wisconsin in the past (A. Murphy, personal communication, October 31, 2017).

While all three designers did not have design experience directly involved with climate change, each had experience designing for issues of sustainability or waste reduction. One designed and developed a community tool sharing service to eliminate waste and redundancies for power tools (J. Welch, personal communication, October 31, 2017).

Another interviewee had direct involvement with both Target and Apple's sustainability team to focus on improving the supply chain and creating a positive feedback loop as it pertained

to their corporate sustainability objectives (A. Murphy, personal communication, October 31, 2017).

The answers to the question, "*Do you believe that graphic design can inform and inspire people to act on climate change?"* were the most informative. Each interviewee responded that it was certainly possible for graphic design to inform and inspire people to act on climate change. One responded that in order to spread the truth, you must first simplify the message and make it easily shareable. Another response was that content must match the context or audience, otherwise the right message cannot get through.

Speaking with other designers about their processes, design practice, and climate change provided valuable insight into how different designers approach these types of issues. The most prominent theme was the fact that the context of design determines its effectiveness. If the message is not accessible and relevant to its audience, then it likely proves to be ineffective. This led to a more refined research phase and creation of graphics focused Minnesota's current climate challenges.

Minnesota Issues

The last stage of research and final iteration of the project focused on the effects of climate change in Minnesota. Most of the resources came from local organizations such as the Minnesota Department of Health, the City of Minneapolis and the Minnesota Department of Natural Resources.

The most beneficial resource during this stage was an article which listed 23 local effects of climate change currently occurring in Minnesota. Along with issue relevant facts, each list item included data and infographics (Kolyer et al., 2015). The featured infographics by Jaime Chismar Seebacher were the most relevant local graphics for the project (see Chapter II for more

details). This article eventually led to further resources, including information and organizations, while the format helped establish an initial list of issues to design from.

A list of 10 issues were selected based on their relationship to the State of Minnesota and its cultural identity. The issues were as follows:

1. Precipitation severity events have increased.
2. Winters are warmer.
3. Growing season is longer.
4. Allergy season is longer.
5. Lyme disease is spreading.
6. Trees are migrating or dying off.
7. Moose population is declining.
8. Loons are losing breeding grounds.
9. Fish population decline (walleye and lake/water food chain).
10. Climate refugees move north.

Each issue began with a fact, data, or graph as a visual starting point. Familiar or relevant imagery was then used to illustrate the issue in an accessible manner. The creation of graphics was an iterative process with weekly graphic concepts being uploaded to an online folder for review with advisor over the course of approximately 12 weeks.

Final Graphics

Each final graphic illustrates an individual issue, while adding to a comprehensive whole. General themes include: a state in transition, unexpected changes to the natural world, and effects on our everyday lives. Visual components employed throughout the series include the state shape, animals synonymous with the state, gradients and vertically increasing imagery to

show a state transition. Familiar imagery is shown to increase accessibility of each poster. Each graphic contains a simple focal point image and corresponding colors to draw the viewer in. From there, the viewer can come closer to discern meaning from the image and read the title and facts included at the bottom of each poster. The typographic solutions employ a minimalist aesthetic to keep the focus on the formal elements. Helvetica typeface is used for the titles due to its legibility and recognizability. Courier New typeface is used to illustrate the facts and science behind each issue. The titles for each issue are simplified to increase the chance of immediate comprehension by the viewer. Each poster has three to four facts which provide enough information without overwhelming the viewer with extraneous data. While the typography is a secondary element of the composition, it is a crucial component to the posters. The titles and facts complete the experience for the viewer by providing the data and facts that the graphics are based on. This allows the viewer to see that these graphics are based on climate science and not merely illustrating opinions.

Working through many weeks of graphic iterations, the final list of issues was curated from ten to seven issues. Three of the concepts were not successful and largely did not fit with the series as a whole. The issue of winters being warmer resulted in concepts too similar to the increase in natural disasters. The issues of a longer growing season and climate refugees moving north were too difficult to convey in an accessible manner.

The following section contains the individual details of each poster in the series individually to elucidate the data and details that comprise them.

The poster *Lyme Disease Spreads* (Figure 11), was selected based on the designer-researcher's personal experience with the issue. The primary source of information for this graphic was drawn from the 2012 annual report for the Minnesota Department of Health's

Infectious Disease Epidemiology, Prevention, and Control Division (IDEPC) Division. This report features a section on vector-borne diseases, which includes Lyme and West Nile Virus. Included in this section is a graph showing the geographically increasing range by county of Lyme disease in Minnesota from 1996 through 2010 ("2012 Annual Report…", 2013).

This graph was used as a starting point for graphic exploration. The outline of the state and increasingly concentrated areas of color provided ample ideas to draw from. Additionally, the symptoms and causes of Lyme disease provided further ideas to explore. One preliminary concept depicts ticks on top of the state. Another shows the main physical symptom of the disease, a target shaped rash, on top of the counties in the state with the most reported cases (Figure 12). The target concepts were deemed ineffective due to other associations, such as the Target logo (a Minnesota retail chain) and the relative obscurity of this symptom to the general public.

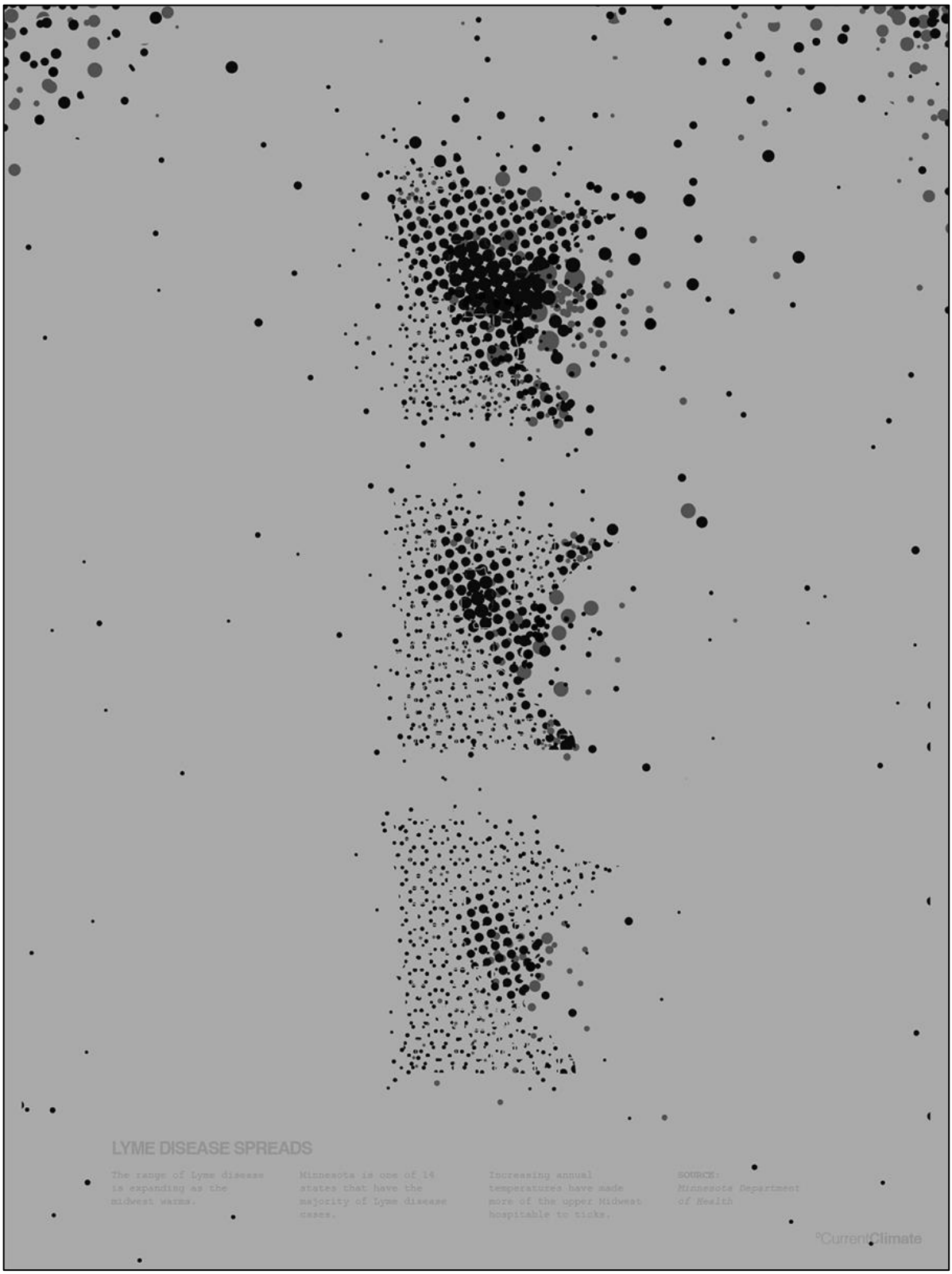

Figure 11. Lyme Disease Spreads final graphic.

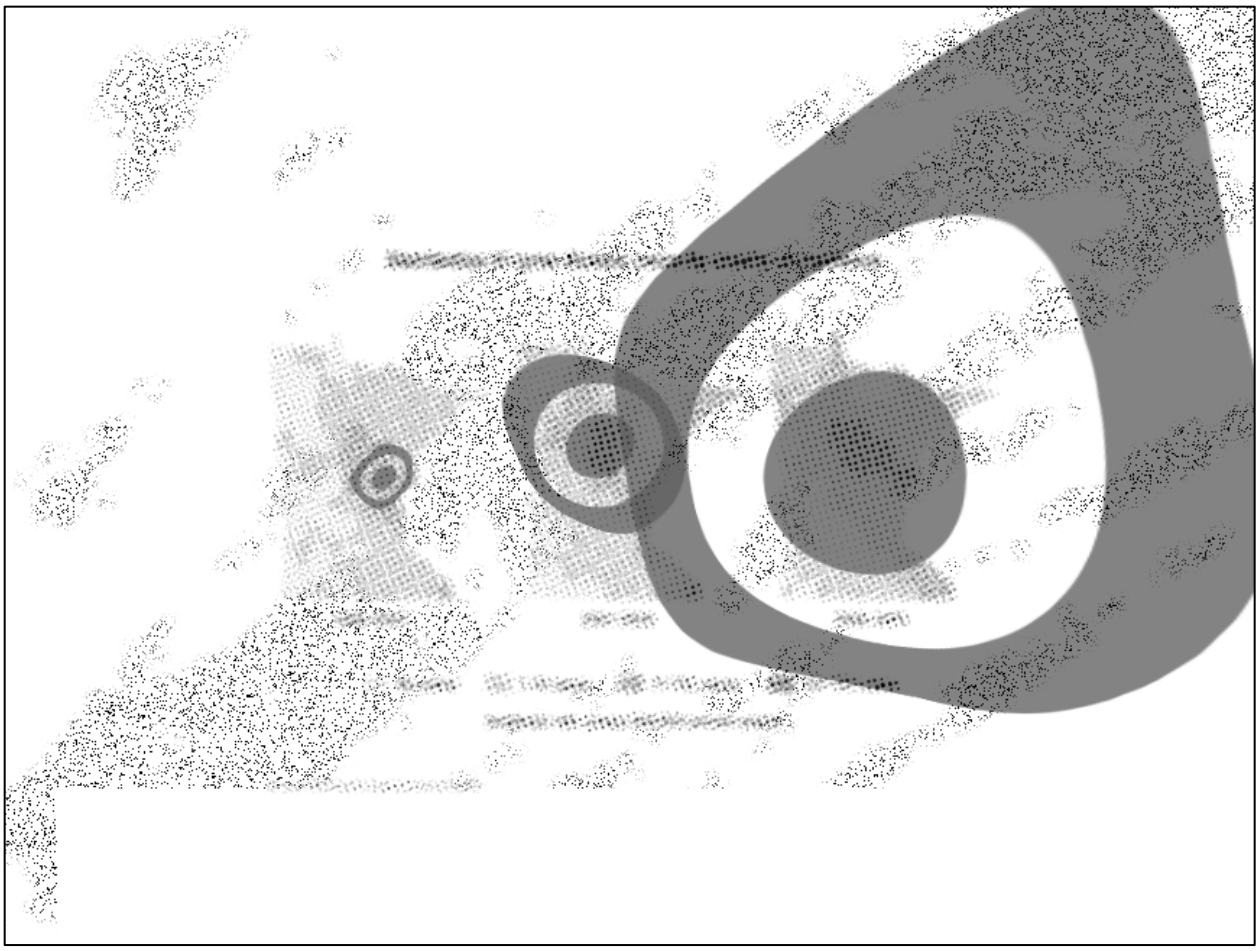

Figure 12. Lyme Disease Spreads preliminary concept.

Through multiple iterations, the concept evolved into a version based on the original graph but shown vertically to illustrate the increasing range of the disease in the state. Through the use of halftone pattern and scale, the increasing dots represent the increasing amount of ticks, which are the main cause of Lyme disease. The surrounding edge of the poster is also covered in increasing dots to evoke an invasive association with the graphic. The background tone used represents human skin tone, while the muted red of the typography references the rash referenced in earlier concepts. It includes three facts about the increase of Lyme disease in Minnesota.

Moose Declining (Figure 13), is a graphic depicting the declining population of a species integral to the Minnesota identity. The Minnesota Department of Natural Resources 2011 report,

"Moose Research and Management Plan" was the primary data source for this poster. The report contains a variety of data and predictions on why the moose population may be declining in the state. Climate change is one of the main factors considered in the report. It also contains an illustrative graph depicting the declining range of Moose in Northern Minnesota between 1965 and 2010 (p.14). This provided a starting point for graphic iterations.

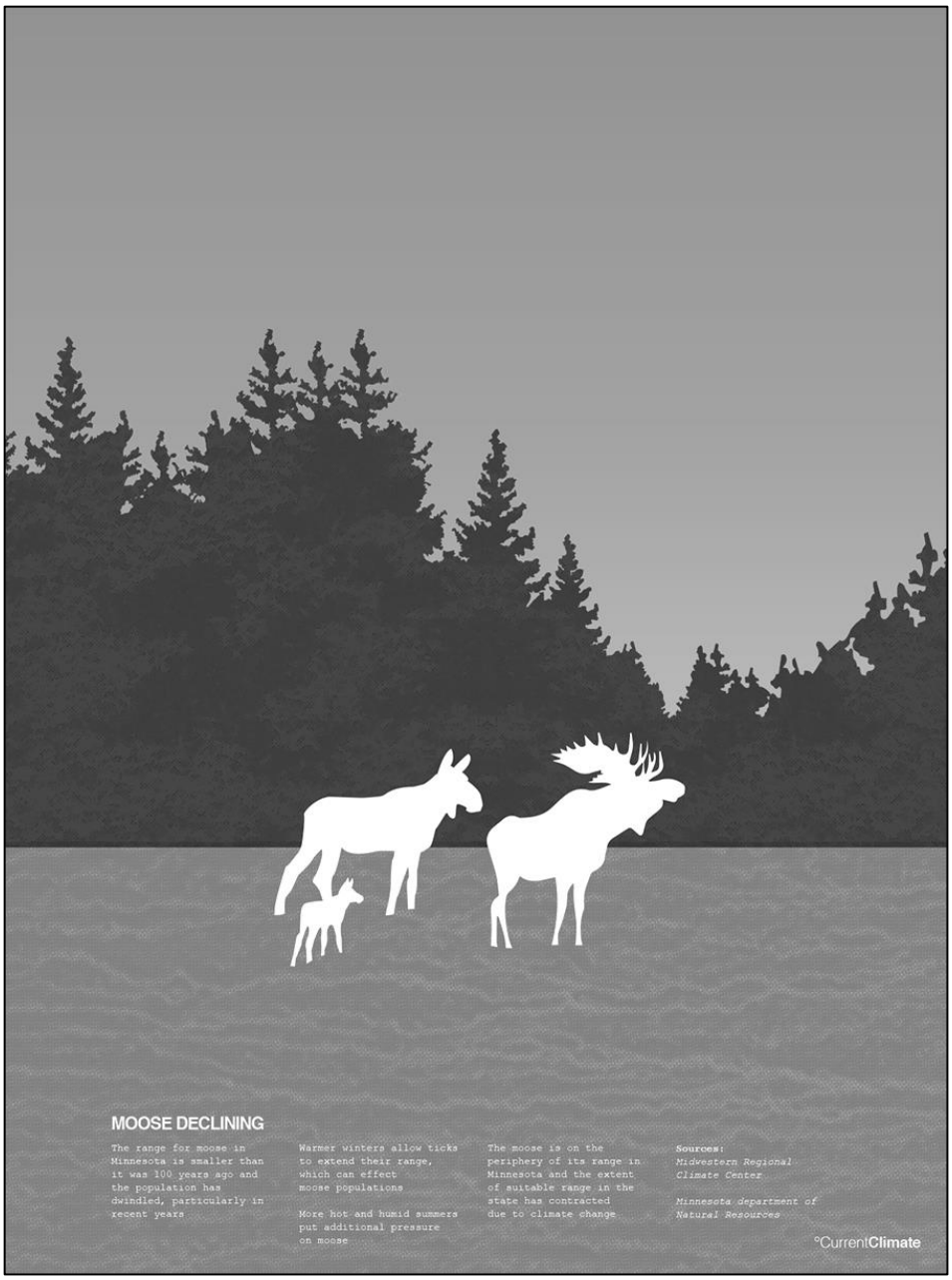

Figure 13. Moose Declining final graphic.

Preliminary concepts employed various imagery associated with moose, such as hoof prints and silhouettes of the animal (Figure 14). These initial concepts based on the graph were unsuccessful in that the graphic elements never integrated with the data as a background. The one element used in the final graphic was the silhouette of the moose due to its meaning and recognizability. Through various iterations, the graphic took on a "paint-by-numbers" aesthetic where the moose was depicted in a simplified graphic version of its natural habitat, but it was the only part of the composition without color. While conceptually promising, the idea was too difficult to convey while also remaining visually consistent with the rest of the posters.

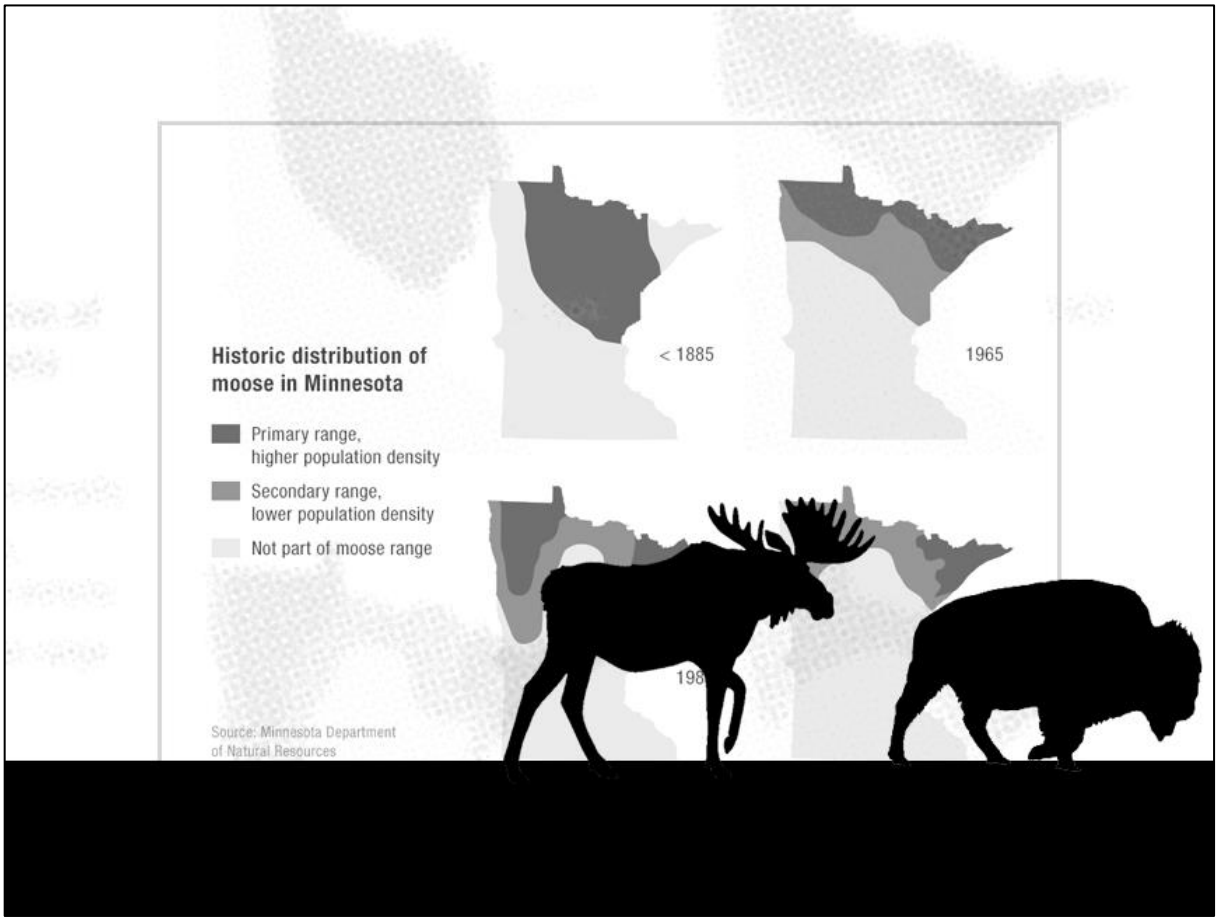

Figure 14. Moose Declining preliminary concept.

Further iterations simplified the habitat behind the moose and the inclusion of two additional moose to imply the idea of a family in danger. The moose are all white in a colorful scene; this symbolizes the disappearance of the species. The scale of the moose is also slightly skewed to appear smaller than usual in relation to their natural surroundings, which hints at the shrinking of their population. The orange gradient in the background represents a sunset and suggests a sun setting on the species in the state. Four facts about the Minnesota moose population declining are also included on the poster.

More Natural Disasters (Figure 15), was chosen based on the annual increase of precipitation severity events in Minnesota. It also utilizes the general concept of water levels rising due to climate change. While one data source for this graphic was a Minnesota Department of Natural resources report, "Historic Mega-Rain Events in Minnesota", it is largely focused on natural disasters and extreme weather events. The concept of a house being covered with water sequentially was established during initial iterations and then refined following a review of natural disaster graphs and data (Figure 16).

The final iteration is a simple line graphic of a house repeated three times in a vertical format. Each house is covered with increasingly more water. The house represents a typical American suburban house and also suggests the threat climate change poses on the American Dream. The water is represented by scribbled blue crayon that covers image of the house and eventually submerges it. Blue was used as a simple reference to the color of water. Together the house and water create a coloring book aesthetic which is an intentional acknowledgement of the multigenerational nature of the issue. Three facts about the increasing natural disasters are included at the bottom of the poster.

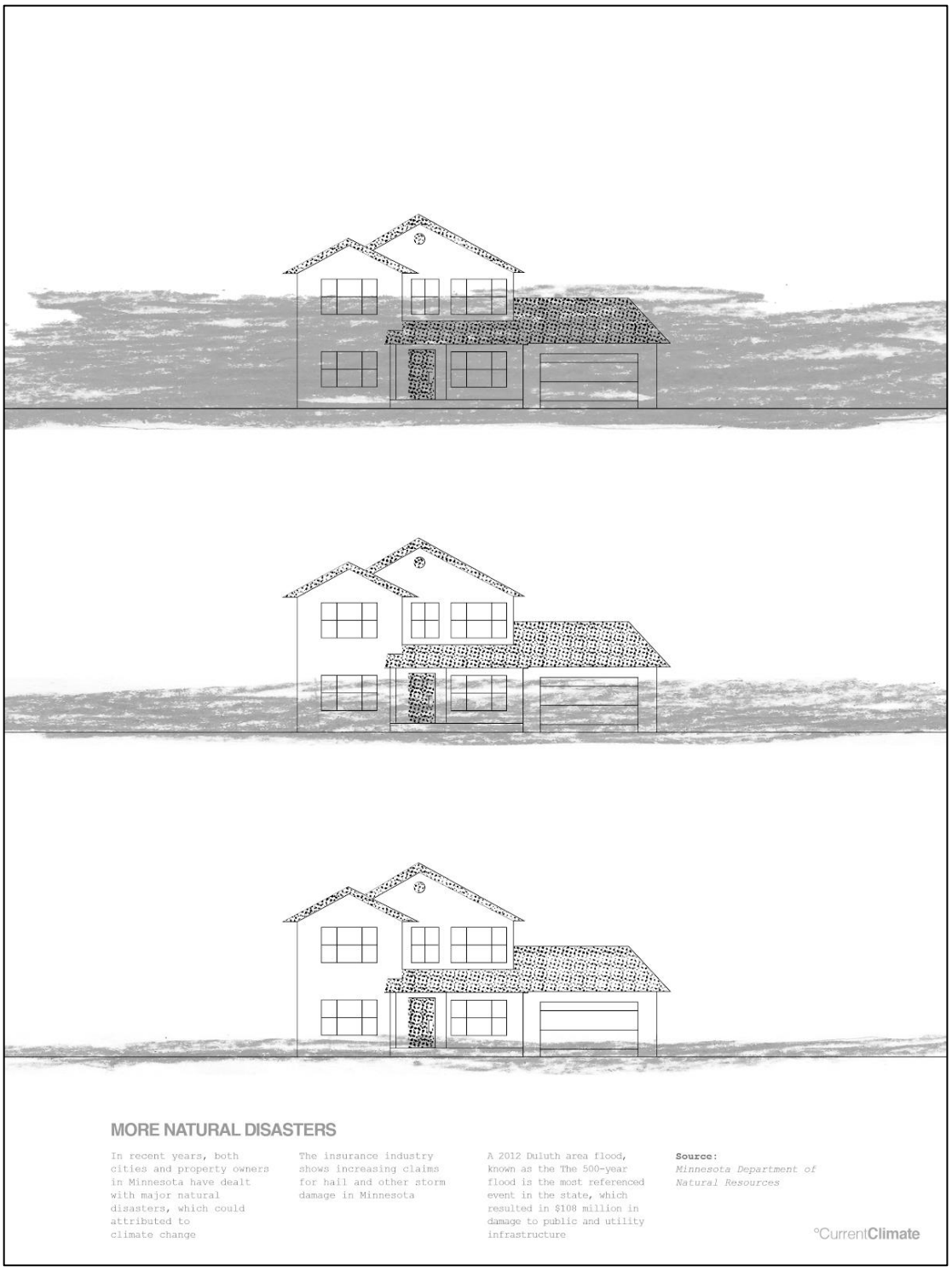

Figure 15. More Natural Disasters final graphic.

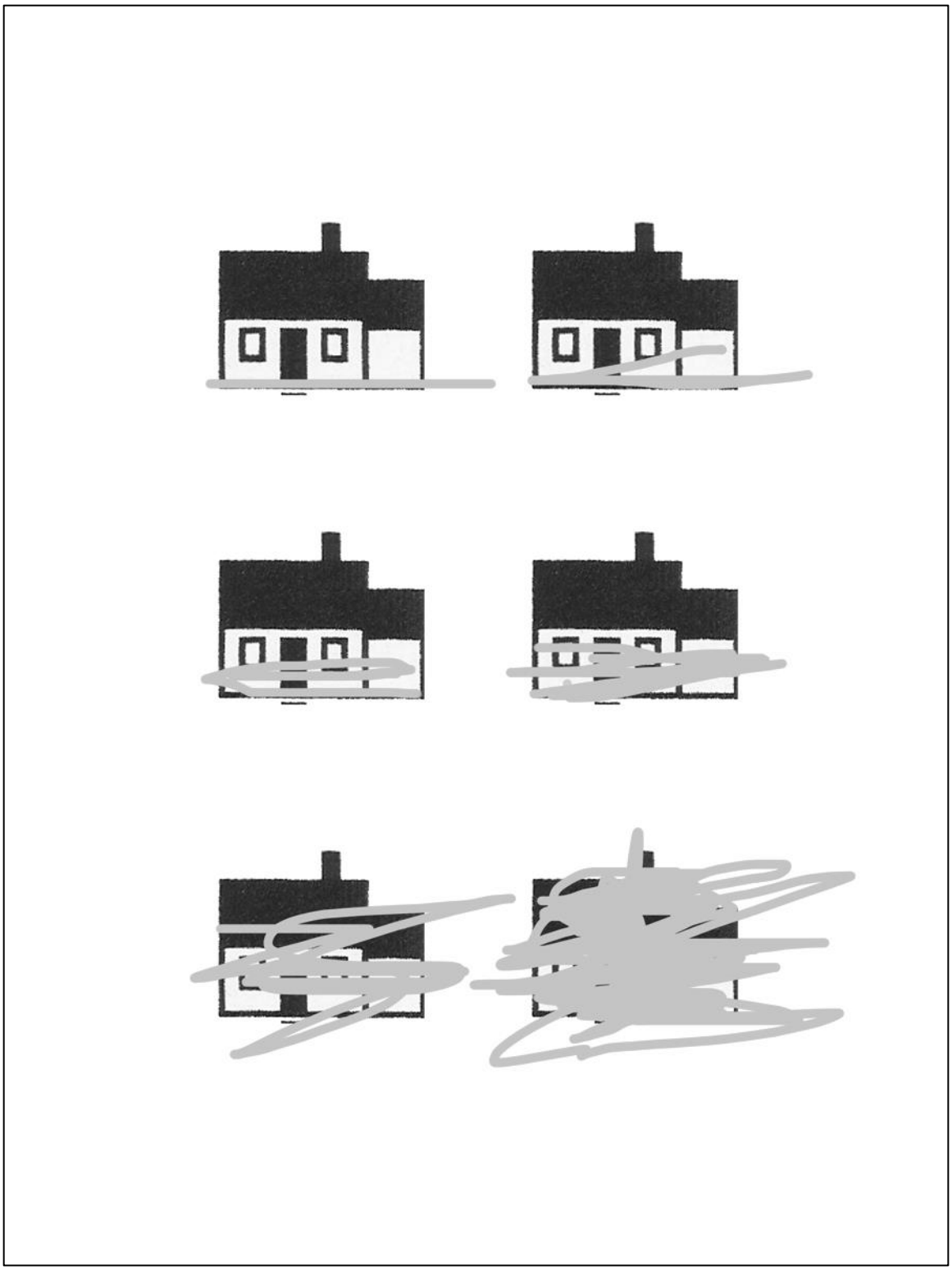

Figure 16. More Natural Disasters preliminary concept.

Walleye at Risk (Figure 17), was chosen based on the recent decision to limit walleye fishing on certain lakes in the State of Minnesota. This graphic shows the threat that climate change poses to the state fish- a key part of the Minnesota identity. An indirect victim of climate challenges, these fish are at risk due to their food chain being affected. The Cisco or Tullibee is a cold-water fish and a key component of the walleye diet ("Will lake warming in Minnesota," n.d.). This species is currently being affected by increasing water temperatures in Minnesota lakes.

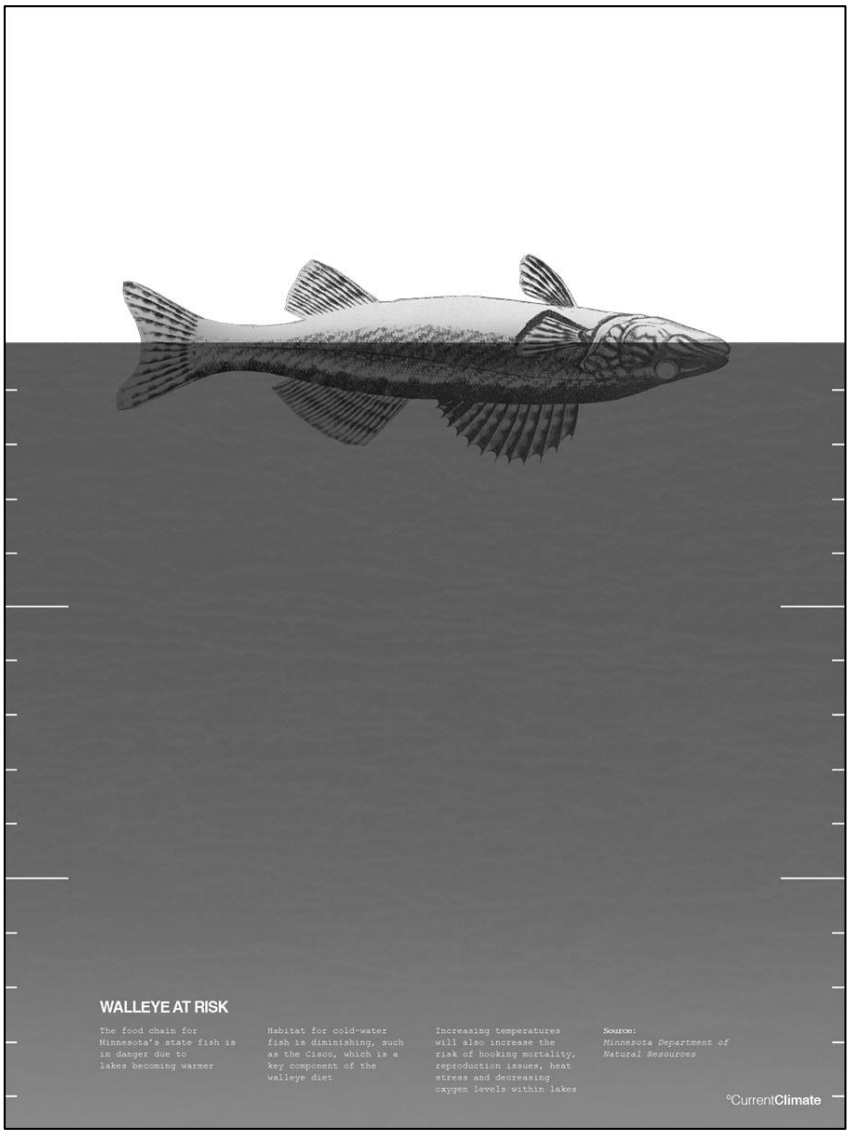

Figure 17. Walleye at Risk final graphic.

Preliminary concepts for this graphic established the main components quickly and much of it remained unchanged in the final iteration (Figure 18). The focal point for the final graphic is an upside-down walleye, which is a simple visual device to indicate its death and the overall threat that climate challenges pose to the fish. The water depicted is a gradient of reddish pink that fades into blue. This illustrates the increasing water temperature and its effect on fish at the bottom of lakes and ultimately to those higher up in the water and on the food chain. Another graphic component included is horizontal lines found on a thermometer. These were placed on both sides of the composition to visually reinforce the temperature sensitive nature of the issue. Three facts about walleye at risk are also included on the poster.

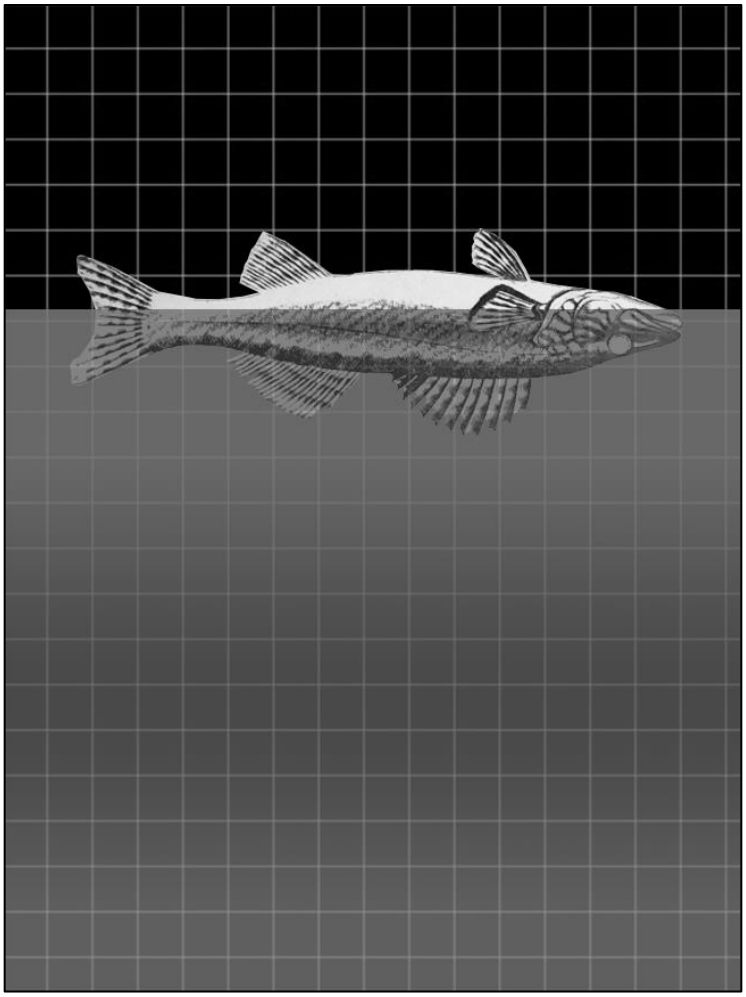

Figure 18. Walleye at Risk preliminary concept.

Allergy Season Lengthens (Figure 19), was chosen based on the allergy season growing longer due to climate change. Air quality degradation causes allergies to increase. This issue currently affects many people and trends indicate this will affect more in the future. The main data source for this graphic a graphic depicting the increase in days of the allergy season (Kolyer et al., 2015).

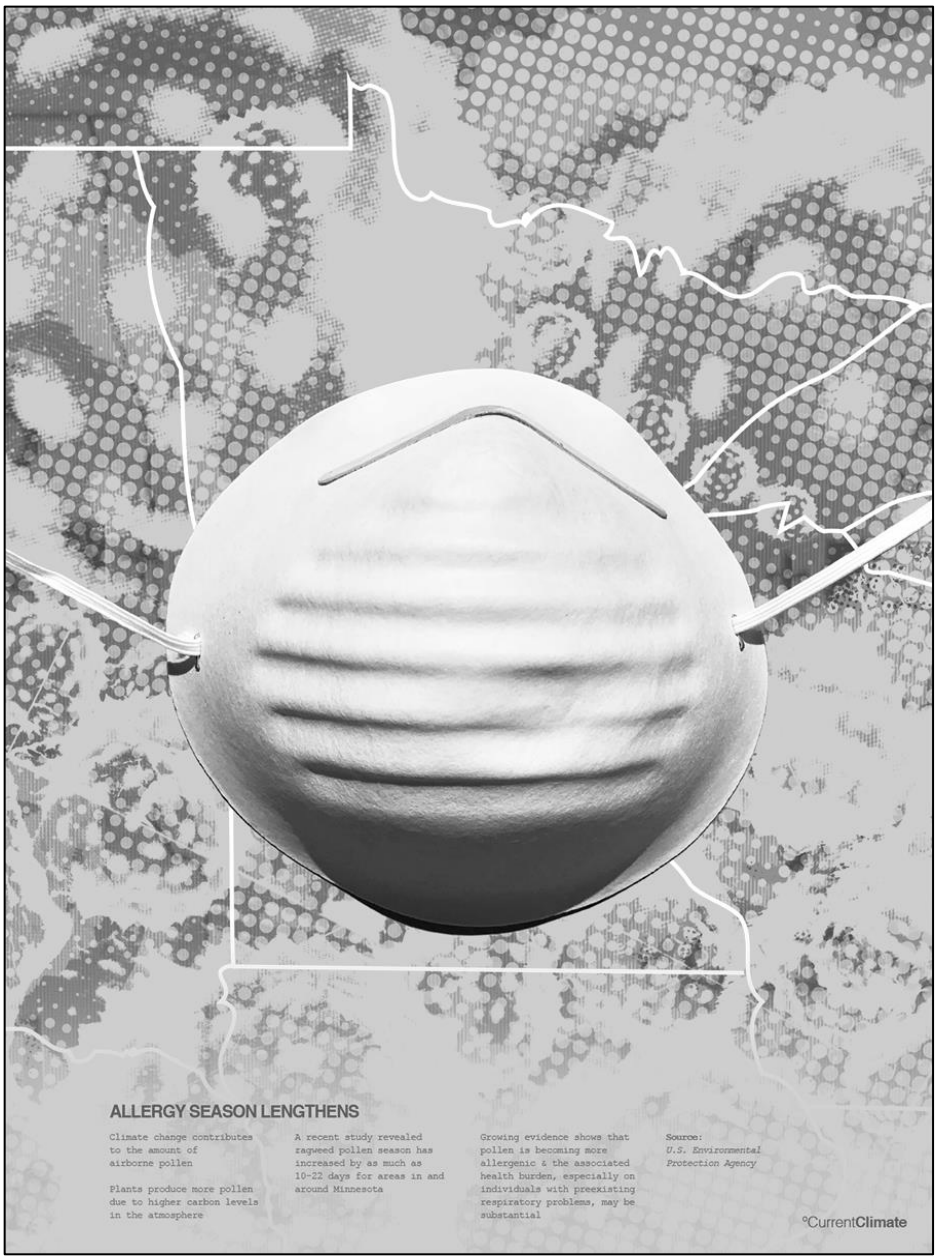

Figure 19. Allergy Season Lengthens final graphic.

Preliminary concepts for this graphic included direct references to the graph by showing dots of increasing size throughout the State of Minnesota (Figure 20). The simple mask image is the main component of the graphic and was established in early concepts. An image of mask was established as the focal point over several iterations. The background of the poster evolved from the image of a graph depicting increasing allergies to different graphic patterns representing pollen and an outline of Minnesota.

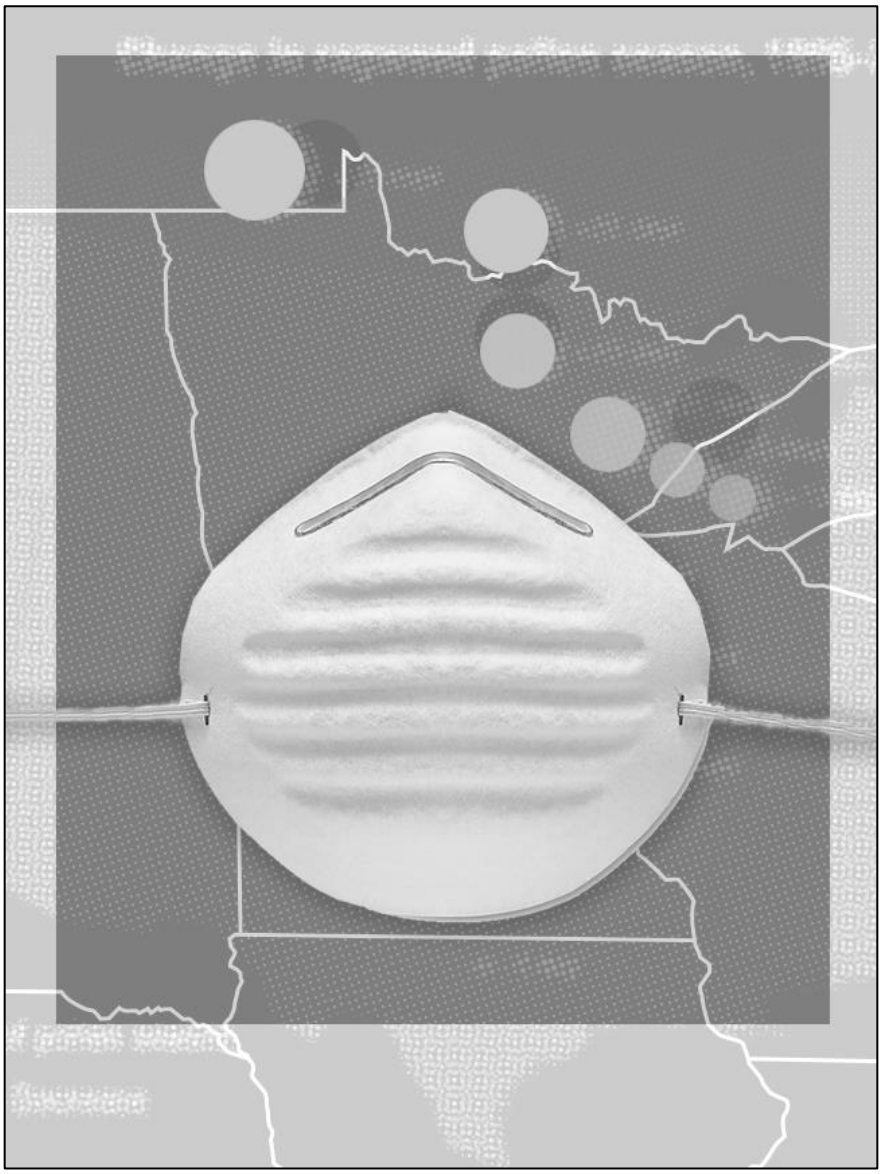

Figure 20. Allergy Season Lengthens preliminary concept.

The final graphic shows a simple photographic image of a mask resting on top of a complex background of distorted yellow halftones, which are a collage of microscopic images of pollen grains from ragweed plants; the most common cause of airborne allergies. Their spiky shape is somewhat threatening and the sheer amount of them is visually intense. This is designed to overwhelm the eye with color, shape and abundance. The use of yellow is a direct reference to pollen, while the green it contrasts with was employed to represent ragweed plants. Four facts on the allergy season lengthening are included at the bottom of the poster.

Uncommon Loon (Figure 21), as the name indicates, refers to the potential population decrease of the Minnesota State Bird due to climate change. This was chosen based on the bird's iconic status in the state. The main data source for this was the Audubon Society of Minnesota. Their study and featured article on the topic stated that, "While the bird may be able to keep pace with the rapidly changing world, it looks all but certain that Minnesota will lose its iconic loons in summer by the end of the century." Also included in this article was an interactive graphic depicting the changing summer and winter ranges for the bird projected from 2020 through 2080 (2014, September 18).

Preliminary concepts included variations of a loon and the state outline (Figure 22). Another concept shows a loon silhouette in a lake at sunset with large typography displayed on the water. These early concepts established the core components of the final graphic.

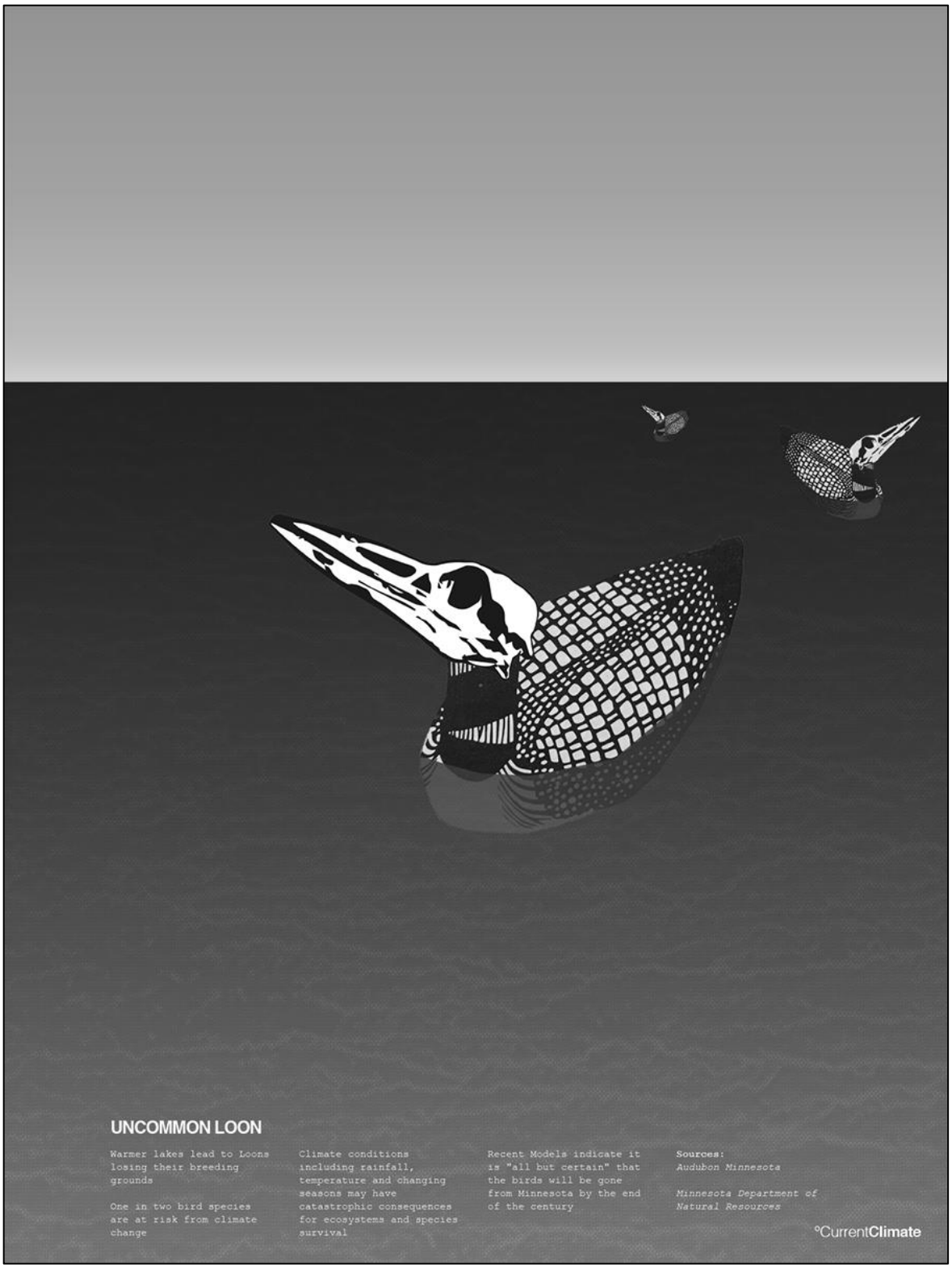

Figure 21. Uncommon Loon final graphic.

The final graphic depicts three loons in the water at sunset. Instead of heads, the loons have high contrast black and white skulls which are immediately noticeable. This is meant to capture the viewer's attention immediately and explicitly. A yellow to orange gradient sunset is utilized again as a reference to the sun setting on this species in the state, as well as a general representation of transition. Four facts about loons are included at the bottom of the poster.

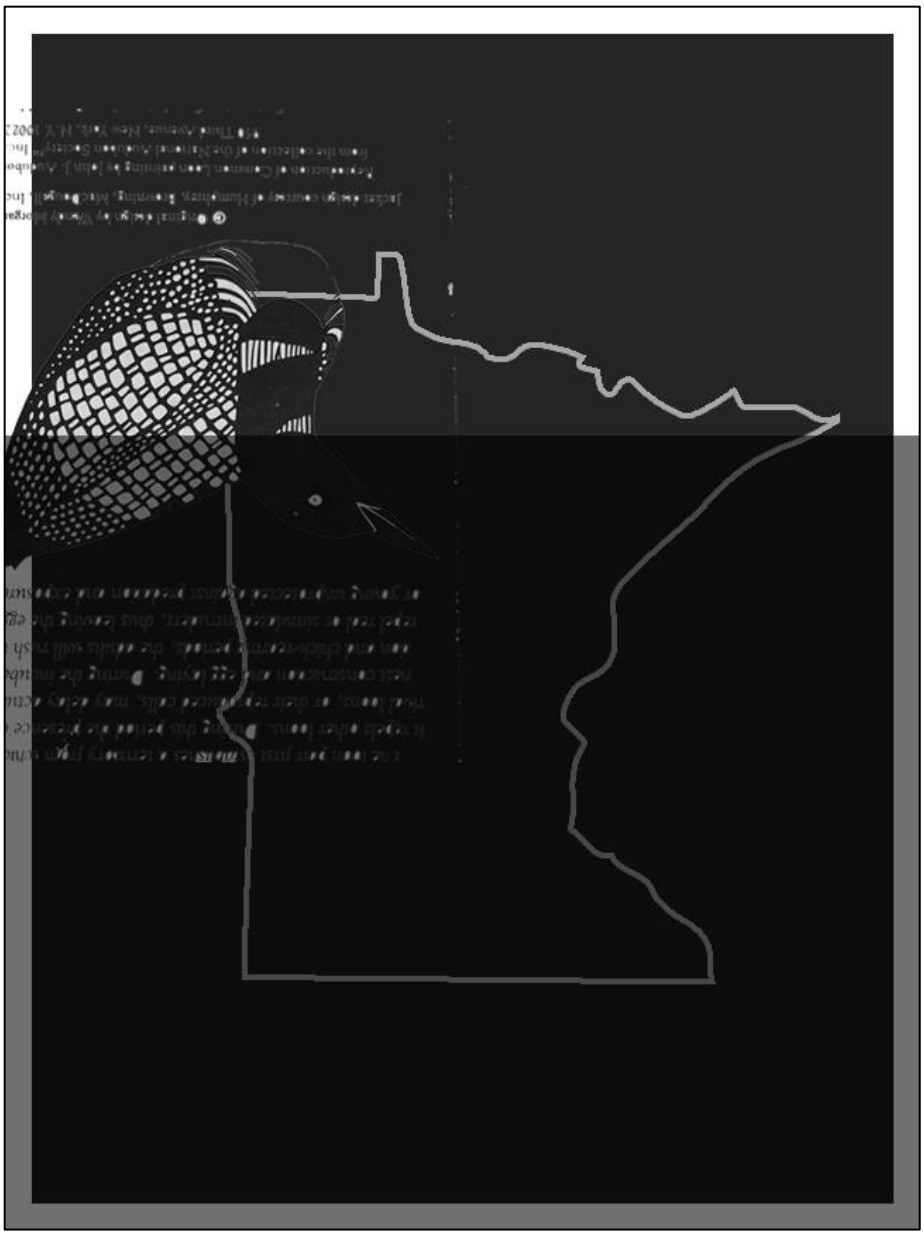

Figure 22. Uncommon Loon preliminary concept.

Maples Moving North (Figure 23), shows the migration of tree species such as the maple moving north and dominating other native tree species of those areas over time. The Northwoods region, common to the upper Midwest, consists of pines and other coniferous trees that are potentially under threat due to rising temperatures making northern areas more hospitable to maples. The main data source for this graphic was a graphic done by the Minnesota Department of Natural resources and Minnesota Pollution control agency which shows images of the "Trees Likely to Thrive in Minnesota's Changing Climate" (Figure 24).

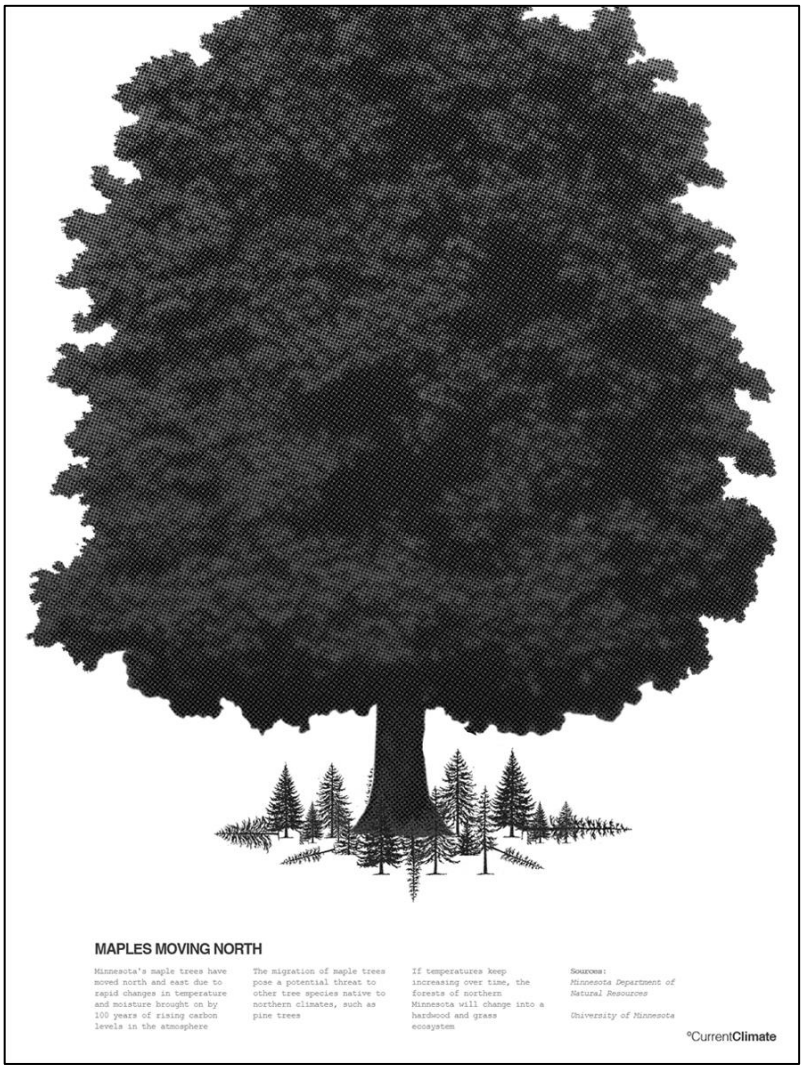

Figure 23. Maples Moving North final graphic.

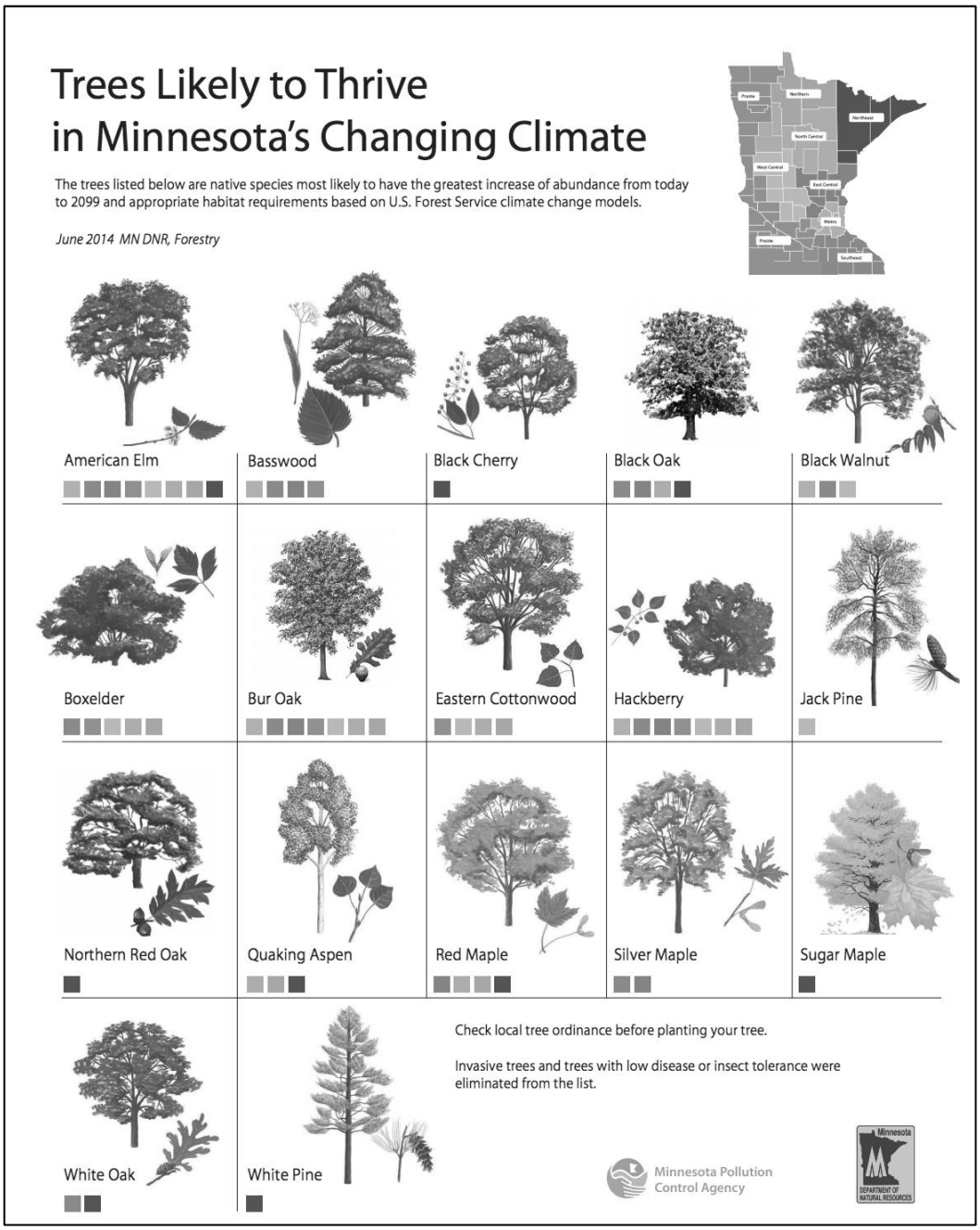

Figure 24. "Trees Likely to Thrive in Minnesota's Changing Climate" by the Minnesota Department of Natural resources and Minnesota Pollution Control Agency. (https://www.pca.state.mn.us/sites/default/files/trees_likely_to_thrive.pdf). Copyright 2014.

Preliminary concepts for this graphic showed several stages of transition where maples eventually dominate pine trees over time (Figure 25). Another concept shows a modified maple

leaf with an arrow for its top portion pointing upward or north. While this had potential it too closely resembled the Canadian flag. Further iterations explored simplified concept approach with fewer trees.

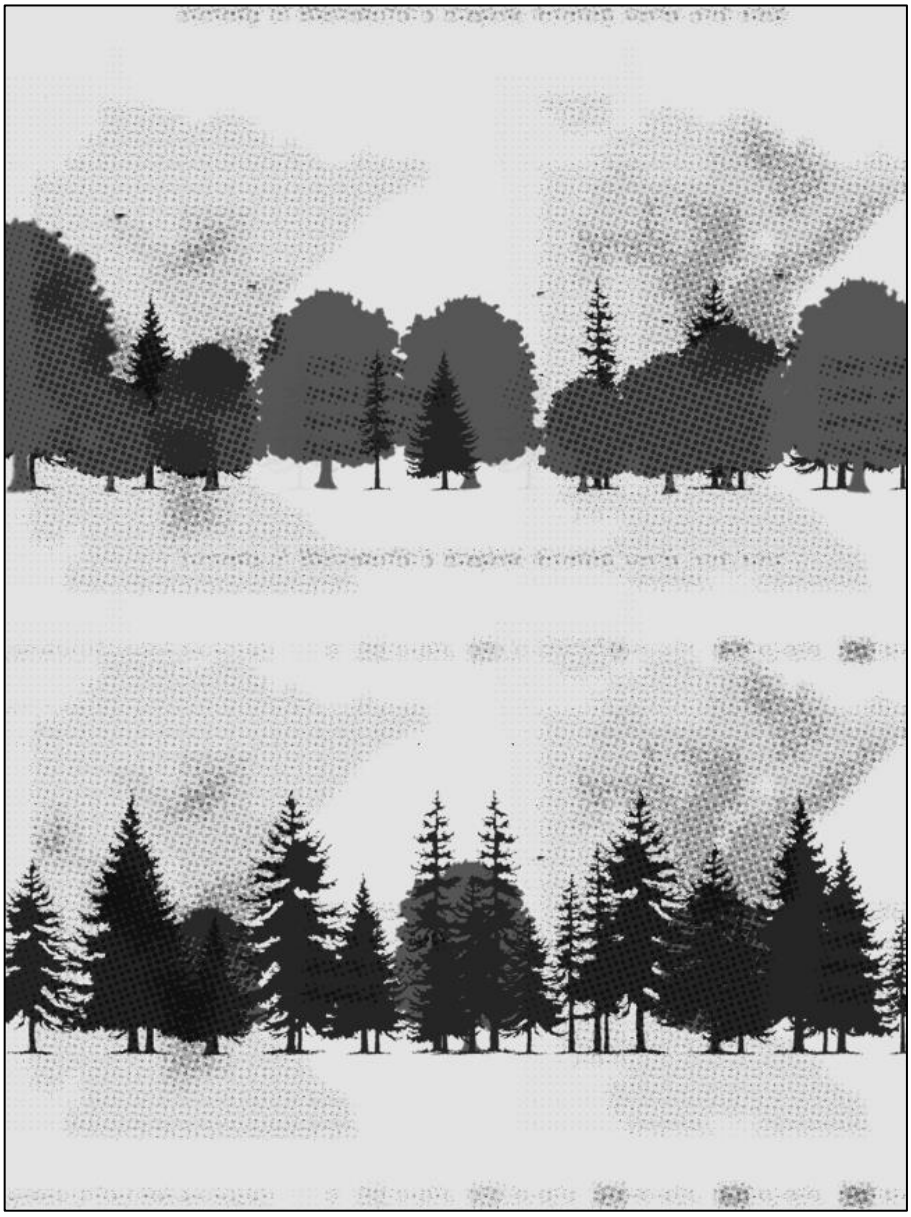

Figure 25. Maples Moving North preliminary concept.

The final graphic shows a single, large maple tree standing victorious over a group of smaller pine trees. Some of these pine trees lie on their side to indicate that they have died or

have been knocked over. This distortion of scale illustrates the takeover of the Northwoods by species like maples. Using a gradient, the maple tree is green at the bottom and transitions to red at the top. The green represents pines, while the red is used as a color synonymous with maples. A simple white background allows the contrast of the image to come through and catch the attention of the viewer. Three facts at the bottom of the poster are included to provide more information on the migration of trees.

Website

In addition to the graphic series, a web component was created to serve as a supplemental resource for viewers. The website currentclimate.zachkoss.com includes additional information, data, resources, and visual assets to provide insight into the process behind the project. The homepage is a scrolling image gallery showing a detail of each poster graphic displayed in a vertical scrolling format (Figure 26). Each detail links to an individual page for each graphic in the series. These pages each contain an image gallery, which is comprised of the final poster graphic, source material and preliminary concepts for the graphic (Figure 27). Additional textual information is displayed below the gallery, including facts and links to the source materials used for each graphic. This website provides further information for viewers interested in learning more, especially in a gallery environment.

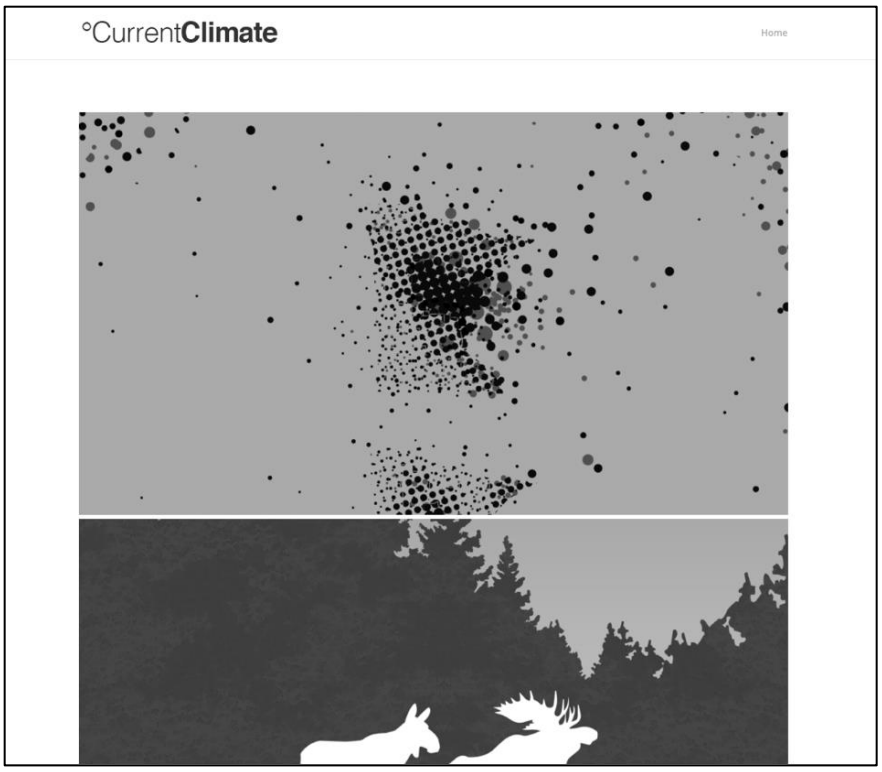

Figure 26. Detail of website homepage.

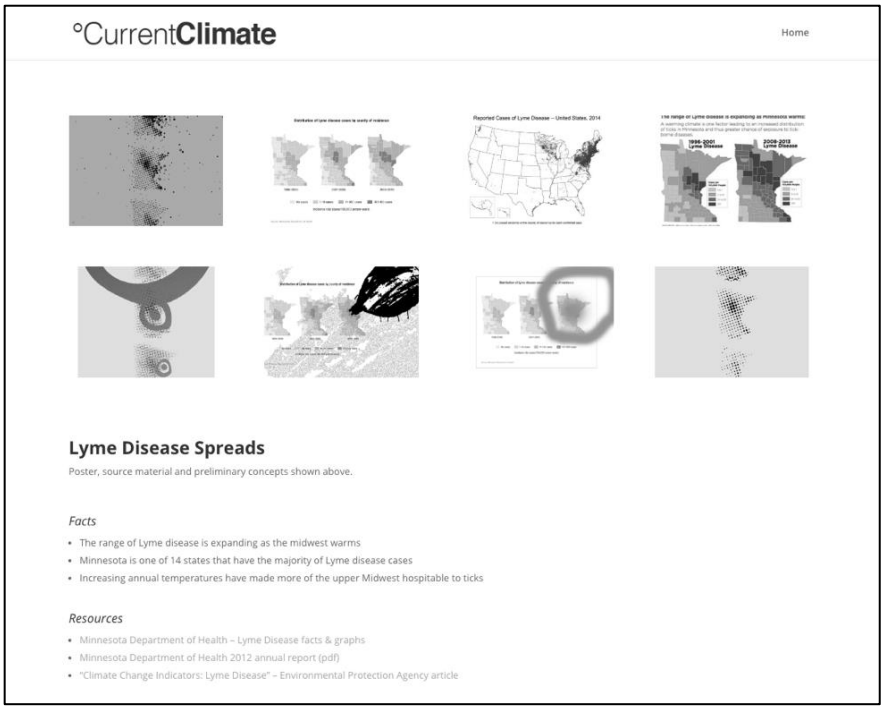

Figure 27. Detail of individual Issue page/gallery on website.

Dissemination

In April of 2018 the poster series was displayed publicly as part of a group exhibition titled, *MFA in Design Creative Thesis Projects: Path, Politics & Story*. The posters were printed, framed and displayed in vertical 18" x 24" format. The posters were arranged and displayed based on their compositions and colors to achieve a balanced experience for the viewers. To complete the experience, the website was available for use on a large monitor in direct proximity to the posters along with a printed project statement.

The exhibition provided an opportunity for the public to interact with and experience the graphic series (Figures 28-29). The closing reception had approximately 50 people in attendance. Conversational feedback included compliments on the colors and overall poster concepts. One viewer critiqued the typography, requesting that it be made larger and more legible on each poster. The most telling conversations seemed to revolve around the specific climate challenge issues addressed by the graphics. This was a successful indication that the posters resonated with viewers and generated conversations based on the local issues depicted.

Figure 28. Audience interacting with posters during exhibition.

Figure 29. Audience interacting with posters during exhibition.

Chapter V: Conclusions and Implications

This section contains conclusions on the project, opportunities for further inquiry, and potential implications for the field of graphic design. Since an iterative approach was used for this project there are many potential future outcomes for this project. Following an overview of the project, these outcomes will be explained.

This project aimed to generate adaptive approaches to communicating climate change in Minnesota through the use of graphics. These graphics were created with a local (Minnesota) audience in mind. Action research provided a flexible framework and iterative design process for the creative research project. Research on general climate science provided a starting point for the project. These findings led to research on past and current graphic approaches to communicating climate change and its associated effects. The first iterations of graphics were created in conjunction with the aforementioned research. These sketches and preliminary concepts were created to visually represent research findings, and to begin the overall design process.

Interviews with three practicing graphic designers were conducted to gain general information on different approaches to designing for political issues. Though these yielded general results, these interviews provide valuable insight into to the project. The results of these interviews helped refine the scope of further research to focus on climate challenges facing the state of Minnesota.

Research was then conducted on the effects of climate change in Minnesota. Through these findings a list of pertinent issues was selected, and several graphic iterations of each issue were created to achieve the best results. Through these iterations, the graphics were made accessible by using familiar imagery and facts that were easily understood. Additionally, the

graphics were also made provocatively by showing such imagery in a new way. Over the course of several months these iterations resulted in a graphic series consisting of seven posters and a supplemental website to provide additional information. The graphic series and website were disseminated to the public at a group gallery exhibition.

Opportunities for Further Inquiry and Future Outcomes

The iterative approach provides ample room for future research opportunities. Further research on other climate challenges facing Minnesota could provide a more comprehensive approach to further graphic solutions. This could occur following future research and collaborations with local organizations such as the Minnesota Department of Natural Resources, Minnesota Department of Health, Audubon Minnesota, or the Minnesota Sierra Club. This would increase the depth of the project and assist in disseminating it to a larger audience. There is also the potential to display the graphic series in a more relevant context and displayed for a Minnesota audience. Area states such as Wisconsin, Iowa and North and South Dakota could also potentially benefit from displaying the poster series.

In addition to collaborating with local organizations, interviews with climate scientists and specialists within this field could further inform research opportunities. This additional influence beyond design would help validate the topics selected and further inform design solutions with relevant scientific data. Ultimately, it could help close any gaps between the science and aesthetics of the project.

Additionally, an enhanced web experience could improve understanding of the project beyond a gallery context. This would include more interaction between the printed posters and website by integrating poster specific QR codes and links. Other enhancements could take the

form of providing users with additional climate resources, surveys, and data that inform and enable them to take action on climate change in their own communities.

Implications for the Field of Design

This project provides an iterative framework for designers to create graphics that communicate the issues their local communities face. It shows the importance of employing both general and specific research to inform design decisions. It also highlights the need to design for a specific context and use aesthetics to simplify complex issues for a variety of audiences.

Pairing data-based research with an iterative design process can result in effective and persuasive visual communication. While the precise future of *Current Climate* has yet to be determined, there are certainly opportunities for the project to evolve. Climate change is not going away, and graphic design can help communicate its challenges to a larger audience by making it relevant to their local communities.

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Appendix: Interview Questions

Interview questions

The following questions are part of the research for Current Climate, a thesis project for the MFA in Design and UW-Stout. Information and data gathered through this interview will help inform graphics and a provide insight into the role that graphic design can play within political movements, specifically Climate change

Your participation in this study is entirely voluntary. You may choose not to participate without any adverse consequences to you.

This interview will be minimal risk. You have the option to waive questions or retract any statements as needed. Please feel free to pass or move on from any questions as needed.
Your cooperation and participation is greatly appreciated. Let's get started!

Questions:

Where do you work?

What city is it located in?

How long have you been a practicing designer?

Why do you think you do design?

What's your favorite type of project to work on? Why?

What role does process play in your design practice?

Do you consider your work political? If so, how did you get into it?

Do you feel graphic designers have a responsibility to contribute to political movements?

What makes successful graphic dissent?

What are you favorite examples of political designs or designers?

What ethical considerations must be made when creating political graphics?

What role does persuasion play in a political context?

Does any of your work pertain to climate change directly or indirectly?

What's a good example of someone designing for climate change?

Do you think graphics inform and inspire people to act on Climate change?

Why do you think climate change has become a political issue?

Do you feel that policy or laws alone will change it or is it up to citizens/consumers?

Or a combination?

Do you consider climate change on a daily basis?

What are easy wins/low hanging fruit to minimize climate impact?

Can you think of simple steps people can take to combat climate change?

What can individuals due to combat climate change?

What's the biggest barrier to participating in climate activism? How can design impact this?