Slide 1: Beginning Slide

Good afternoon. Thank you for having me here today. I am honored to share my research in the area of feminist mapping as it applies to mapping risk.

Image Description: A collage displaying nine maps of social and environmental risk that utilize varying visualization strategies.

Slide 2: Outline

To begin, I will briefly introduce myself before outlining my work in feminist mapping. Finally, I will sketch out my three year plan before leaving you with my final thoughts.

Slide 3: Geographer and GIScientist

For those that I haven't met, my name is Meghan Kelly. I graduated in December 2020 from UW–Madison with PhD degree in geography and a minor in Gender and Women's Studies, specializing in feminist approaches to GIScience.

Image Description: A professional image of Meghan Kelly casually standing in the woods in her teaching blazer.

Slide 4: Dartmouth

I am currently a postdoctoral scholar at Dartmouth College in the Department of Geography working in the Critical Geospatial Analysis Lab. My position is research focused and I work one-on-one with a research assistant. In my short time at Dartmouth, I've developed and submitted two grant proposals on GeoAI and critical remote sensing. I am also a Co-PI for a grant proposal on Digital Borderlands that will be submitted this week with researchers at the University of Arizona and University at Albany. In summary, post-graduate research agenda is already in motion. I am prepared me to apply for and and manage my own grants, mentor students, and collaborate.

Image Description: A professional image of Meghan Kelly casually standing in the woods in her teaching blazer.

Slide 5: Data Journalism

Lastly, I am am a professional cartographer. Here's a snapshot of my digital portfolio. My work can be found in outlets like Rolling Stone, The Washington Post, Chicago Tribune, and Science Magazine. In these venues, I bring my research into practice by applying feminist mapping social and environmental risks.

Image Description: An collage displaying nineteen maps drawn from Meghan Kelly's digital portfolio. Map images range from global reference maps and city maps of Milwaukee and Madison to hand drawn maps of the Syrian border and three-dimensional conceptual models.

Slide 6: Motivation

Recent work in data feminism, design justice, and feminist digital geographies among other areas listed here has sparked renewed energy and motivation for feminist mapping. Feminism is not new to mapping, yet it remains an area of study often erased or niche in GIScience and critical GIS conversations. My dissertation and corresponding publications outline the past, present, and futures of feminist mapping as a transdisciplinary field.

Slide 7: Why feminist mapping?

This brings us to the question, why feminist mapping? Data, maps, and mapping technology are being used at unprecedented levels and are increasingly relevant in conversations of risk. These conversations range from climate change and wildfires in the West and flooding along the gulf of Mexico and east coast to COVID-19, land occupation, and the rise of racial injustice. While this map highlights these challenges within the US context, many of these conversations are international. A feminist approach to GIS and mapping is essential conversations of risk, particularly the visualization of risk.

Image Description: A map of the United States that is divided into six vertical strips. Each strip depicts its own thematic data including (from left to right): climate change and fires (Washington Post), Land-Grab Universities (High Country News), COVID-19 daily cases (New York Times), 2020 election (Washington Post), racial injustice (University of Virginia), and Indigenous land occupation (Native Land Digital).

Slide 8: Research question

That all being said, my motivating research question is:
How can feminist approach to geospatial data, map design, and mapping processes address critical challenges of our time?

Slide 9: Feminist Mapping Framework

The task of my dissertation was to uncover or recover feminist mapping as an established and necessary arena. I wanted to create a feminist mapping framework that draws on past and present feminist interventions and provides a starting point for students but also practicing mapmakers and community members. And so in my dissertation and resulting publications, I developed a feminist mapping framework consisting of seven feminist principles including consider power, context, pluralism, uncertainty, emotion and embodiment, binaries, and labor.

Image Description: A photo depicting a piece of paper that has a definition of feminist cartographies written out in handwriting. The definition is marked up and edited using another color of marker.

Slide 10: Content, form, and process

My feminist framework can then be applied across content (spatial data), form (map design), and processes (mapping workflows). These are three sites for feminist intervention and three opportunities for interrogating or explore risk.

Image Description: Three photos illustrating examples of content, form, and process. Content is depicted with a series of map icons. Form is depicted with a hand drawn sketch map of Syria. Process is depicted with a photo of a workshop space with people mapping around a table.

Slide 11: Power

We can take power as one example. In my work, I draw on Black feminist thinkers to examine intersecting systems of power that are baked within geospatial data, map design, and mapping processes. These are systems of power that simultaneously privilege and oppress. In terms of geospatial data, power

dynamics determine what "counts" as data and further influences how data is collected, who collected, and why it was collected. If we think of risk in terms of criminalization and incarceration, we know that data collection instruments that assess the supposed risk level of individuals are biased against people of color, particularly Black Americans as well as individuals from lower socio-economic classes. Data discrepancies expanded even further when we look at the data for Black women. Power further permeates through the design of maps and what is made visible, invisible, or hyper visible in the selection process. Further, power is evident in the mapping workflows and the distribution of labor. To save time, I won't go into detail with each principle, but I will be nodding back to this framework and these seven principles through my case study examples.

Image Description: A photo depicting a piece of paper that has a definition of feminist cartographies written out in handwriting. The definition is marked up and edited using another color of marker.

Slide 12: Feminist Mapping Publications
In this arena, I currently have 3 papers published based on dissertation work and one under review.

Slide 13: Future Feminist Mapping Publications
At Durham, I will continue to focus on journal publications. I have two remaining papers from my dissertation in preparation that are targeted for *Cartographica* and *Gender, Place and Culture*. I also have two feminist method papers in the works. At the end of my third year, I will turn my attention towards a book project on feminist mapping that expands my dissertation work. This book project will serve as a feminist toolkit for mapping that brings theory and practice together. I will apply for research funds like Leverhulme to support this project.

Slide 14: Intellectual Contribution
The first branch of my research, that I want to discuss today is my work on feminist mapping and borders where I examine risk in relationship to migration and border stories. This area complements and extends the work being done in the Politics-State-Space research cluster as well as the Centre for Borders Research.

Slide 15: Syrian Refugee Maps
If we take a look at the news, we often see maps like these. Both of these examples are pulled from the New York Times and depict the Syrian refugee crisis. The borders are solid black lines that feel static, permanent, and unexperienced. The displaced people and refugee camps are collapsed into red points or are merged into flow lines. The borders and the symbolization of refugees do not reflect refugee experiences and interactions with borders. Despite the literature on borders studies, the maps continue to fall into the territorial trap. Missing from both of these examples are individual bodies and their experiences of borders, geopolitical or otherwise.

Image description: Two maps depicting the displacement of Syrian refugees. The first shows refugee camps and concentrations of internal displacement primarily within Syria but also in its neighboring countries. The second shows the emigration of Syrian refugees to places like Turkey, Jordan, Lebanon, Iraq, Egypt, and other parts of North Africa.

Slide 16: Bivariate symbolization scheme
In my work on Syrian refugee border stories, I expand the cartographic language of borders to better reflect embodied and differential border experiences. I devised a bivariate symbolization scheme to

simultaneous encode the porosity of borders and the intensity of their corresponding experience.

Image description: Bivariate symbolization scheme that displays the intensity of experience along the x-axis and the porosity of experience along the y-axis.

Slide 17: Atlas Syria example
Drawing on a series of interviews with Syrian refugees and humanitarian workers, I then applied this symbolization scheme to geopolitical boundaries like the Syria border as well as…

Image description: A map of the Syrian border shown as a dotted line to represent the experience of the border, broadly defined.

Slide 18: Atlas body example
… non-traditional borders like the body (as seen in this example). In this example, Amal was physically hurt in one incident and so the border line is thick given the intensity of the experience and dashed because his bodily border was transgressed.

Image description: A box with a dashed border representing an individual body.

Slide 19: Atlas aggregated Map
I further aggregated experiences across borders. I created a small multiple display to simultaneously reflect similarity and difference across experiences of the same borders. Drawing on the words of Chandra Mohanty, I call this a display of connected difference. Together, these individual and aggregate maps produced a digital atlas of border stories as well as a peer reviewed paper.

Image description: A series of maps depicting 17 individual experiences or perspectives of the Syrian border. The lines are symbolized in experience (thick and thin) and porosity (solid or dashed).

Slide 20: Collectively Mapping Borders
After completing my atlas, I wanted to turn to a more participatory and collective process to re-envison the Syria's border. I asked mapmakers attending a conference poster session to sketch border symbols based on excerpts from my interviews with Syrian refugees. I then compiled the sketches into a mosaic of Syria's borders to challenge borders as solid black lines and embrace pluralistic approaches to the migration experience and related risks.

Image description: A hand-drawn, multi-author map of the Syria depicting the pluralistic and embodied experiences of the Syrian border.

Slide 21: Mobilities, Sovereignty, and Borders
Most recently, I am working in collaboration with Kate Coddington and Jill Williams on a new case study examining the US/Mexico border through public information campaigns. They have invited me to take part in an feminist visualization workshop series addressing the visualization of the US/Mexico border. We submitted a grant on Digital Borderlands this week to extend this project.

Image description: A screenshot of a website for the Mobilities, Sovereignty, Borders project.

Slide 22: Publications

In this area, I have published two papers and have promised two papers as a Co-PI on the Digital Borderlands grant.

Slide 23: Future Publications

Going forward in my career at Durham, I plan to continue and expand this trajectory. I will target prominent geography journals and research funding from ESRC and Leverhulme. I am also looking forward to vast collaboration opportunities with the Politics-State-Space research cluster and Center for Borders Research.

Slide 24: Feminist Mapping and Risk.

In addition to mapping risk through embodied migration stories, I have extensive experience applying my feminist framework to social and environmental dimensions of risk. I have collaborated with social scientists, physical scientists, and humanists as well as data journalists. I am a natural collaborator and see overlap particularly with the Urban Worlds and Sea Level, Ice and Climate Research Clusters.

Slide 25: Housing

As part of a feminist mapping collective, for example, I have applied my feminist framework to housing insecurity and risk of houselessness in major US cities, an issue that as been exasperated by Covid-19. In this example, I created a split symbol map to directly compare the number of vacant housing units on the left in purple to the number of houseless people on the right in green. I found that in every major city in the analysis, we could house houseless people at least two times over. In Phenoix, Arizona, for example, there are 43 vacant properties for every houseless person. This map draws on feminist principles like context and situated knowledge. We went to extensive lengths to demonstrate our data gaps and uncertainties in our annotations and metadata. We also situated the data within on-the-ground organizing efforts that have incorporate these data into their work. We further made sure this map was accessible to individuals with color vision impairment.

Image description: Two photos depicting the houselessness crisis in major American cities. The first, the map's icon legend, contains circles comparing the number of vacancies (left-side in blue) to the number of houseless people (right-side in green). The second, the map itself with accompanying explanation and context, depicts 1) the discrepancies between the number of vacancies and the number of houseless individuals in 25 US cities; 2) the percentage of severely cost-burdened households in the US; and 3) information about houseless activism in Denver, CO and Philadelphia, PA.

Slide 26: Norfolk

As part of the Climate Solutions desk at the Washington Post, I examined projected sea-level rise for Norfolk, Virginia, a US coastal city at risk of continued flooding due to climate change.

Image description: A map of the projected sea-level rise in Norfolk, VA, a US coastal city at risk of continued flooding due to climate change.

Slide 27: Norfolk Uncertainty

In this map, however, I wanted to convey uncertainty within the projected sea level rise data, so I paired it with a grounded dataset that outlines areas that have already experience repetitive flood loss. As such, you can see outliers of purple polygons that do not sync up with the models. This map examines flood risk by incorporating the feminist principle of uncertainty, which maintains that all data are partial.

Image description: A map of the projected sea-level rise in Norfolk, VA, a US coastal city at risk of continued flooding due to climate change along with areas that have seen repetitive flood loss despite being outside the projected flood zone.

Slide 28: Feminist Mapping Assessments

The next steps in this type of work is assessing the impacts of feminist visualization strategies. At UW–Madison, we developed an open source survey tool that pairs survey questions with an interactive map. The tool is designed for interaction logging, capturing details about how users interact with the map.

Slide 29: Humanizing Maps

In one study, we examine how the changes in symbolization impact how individuals engage with peopled data. We tested these 8 map styles displaying police shootings in Oakland, California and tracked how map users interacted with the map and asked questions about how they felt while exploring the underlying data. We found that the design decisions impacts user interaction as well as emotive engage. For example, people interacted the most with proportional symbol maps and the least with dot maps and felt the most negative about choropleth map, and the least negative about the icon maps. We are in the works for teasing out these relationship by coding participants' qualitative answers. All that being said, feminist design decisions that emphasize emotion and context provide new variables to be tested to help us understand risk and how individuals engage with visualizations of risk.

Image description: A series of 8 maps displaying police shootings in Oakland, CA. Each of the maps uses a different style to depict its data.

Slide 30: Publications

In addition to my public facing cartographic work, I have two MapStudy papers in preparation that are target towards CaGIS and IEEE Transactions on Visualization.

Slide 31: Future

Going forward at Durham, I want to continue my work on visualizing risk by collaborating with researchers across the department. Collaborative workshops would be a great venue for this. Second, I want to continue to assess feminist mapping interventions to further justify the need for feminist mapping techniques.

Slide 32: Pedagogical Workshops

This brings me to my final pillar of feminist mapping: my pedagogical contributions. I utilize workshops as a feminist method for map design because they slow down map production, fostering reflexive, intentional practice. Additionally, workshops provide a site for community collaboration and creativity, disrupting institutionalized norms and opening design possibilities. Today, I want to introduce my feminist icon design workshop.

Slide 33: Icon Workshops

In this workshop, I introduce participants to my feminist mapping framework. I then ask them to apply the framework to map icons like the ones displayed here. Participants begin with a single icon and then iteratively redesign the icon drawing inspiration from the feminist principles while recording their process.

Image description: A series of map icons from the Maki Icon Set.

Slide 34: Police

Participants redesigned icons like police. In this example, the participants redesigned the police icon from two perspectives that differ depending on who you are. The feminist principles of power and situated knowledge drive this design.

Image description: A photo of a hand-drawn icon that redesigns the police icon based upon power, situated knowledge, and individual perspective. The first redesign depicts the police officer with a skull as a threatening, prejudiced, evil, and cold encounters with police; the second depicts a shield with the letter P on it, representing protective, fair, good, and friendly encounters with police.

Slide 35: Icon Workshops

After completing 8 workshops, I've collected and analyzed hundreds of map icons using a visual content analysis and have challenged the notion of Universal icon sets. Instead, I argue for icon designs that are situated within context as well as systems of power and oppression. The feminist framework and collective spirit of the workshops has dramatically expanded the cartographic vocabulary exponentially and devised more inclusive icon sets.

Image description: 104 hand-drawn map icons intended to reimagine common map icons, including, but not limited to, restroom/bathroom, doctor/hospital, clothing store, and lodging.

Slide 36: Pedagogy

In terms of teaching, I taught the entire GIScience curriculum at UW–Madison, which included both online and in-person courses. Many of my contributions to curriculum development continue to be used by the current instructors and have also informed the broader development Madison's new professional masters program, a program similar to your applied Risk Masters. I've also taught and mentored in informal spaces like the UW–Madison Cartography Lab which is a research and production studio as well as a creative maker space. I supervised 15 undergraduate and graduate students and helped create an inclusive space.

Slide 37: Recognition and Publications

I received an award for my teaching in 2018 and I continue to post my teaching and workshop materials to my website for public use. I am also working a series of publications that incorporate my feminist framework into workshop designs.

Slide 38: Future

Going forward, I plan to continue using workshops as a method both in and outside of the classroom as a way to promote hands-on and creative thinking. Given my teaching experience, I know that I can jumped right into curriculum development within the Risk Masters program. I am particularly drawn the department's focus on decolonizing the curriculum. I have already begun this process in my own classroom.

Slide 39: 3-year Plan

Through my presentation today, I have outlined my research achievements and research plans for the next 3 years. This slide provides a comprehensive overview. As I've mentioned, my post-graduate research agenda is already in motion and I look forward to my continuing my career at a place like

Durham.

Slide 40: Summary

Finally, I want to summarize by saying that my feminist approach to geospatial data and GIScience is fundamental to visualizing social and environmental risk. As we expand our ways of thinking and addressing about risk, we need to expand and reenvison our approach to geospatial data, maps, and mapping processes. Perhaps, most succinctly, mapping needs feminist thought. As such, my feminist approach to research, methods, and pedagogy are essential to the Risk Master's Program.

Image Description: A map of the United States that is divided into six vertical strips. Each strip depicts its own thematic data including (from left to right): climate change and fires (Washington Post), Land-Grab Universities (High Country News), COVID-19 daily cases (New York Times), 2020 election (Washington Post), racial injustice (University of Virginia), and Indigenous land occupation (Native Land Digital).

Slide 41: Thank you!

Image Description: A collage displaying nine maps of social and environmental risk that utilize varying visualization strategies.