Yellowstone National Park, established March 1st, 1872, has a rich history in the US with conservation and furthering research for generations to come. The idea of examining the increasing complexity of scientific knowledge derived from the National Park system and its connections to literary works originated from our backgrounds studying life and social sciences. In class we read the novel *Letters from Yellowstone* by Diane Smith which follows a young woman, Alex, working on botanical research in Yellowstone National Park. While conducting research, Alex interacts with a diverse group of individuals at the park such as military personnel, Alexander Craighead, who is advocating for no railroads as well as other scientists like Professor Philip Aber from the Smithsonian and Howard Merriam from the Agricultural State College of Montana. After reading, we were intrigued by the reflection of historical research and the actions of another character, Dr. Rutherford, who recorded and conveyed knowledge through indexing and mapmaking. Since we have cartographic skillsets within the team, we wanted to draw attention to how historical data and cartography ties into the modern world of geospatial sciences. We demonstrated these cartographic abilities through programs such as ArcGIS pro, which we used in our project, by identifying unrelated data such as critical habitat for the Canadian lynx and a digital elevation map and using it to provide a comprehensive and informative map. As a team, we also worked to find literary connections from the book *Letters from Yellowstone* in conjunction with research undertaken throughout the park from its founding to its current state, as well as looking towards famous naturalist and essayist John Muir to add context to why this research and fictional account are important to look at, tying everything together.

Utilizing the resources offered at Hale library was essential for looking at multiple streams of research. *Letters from Yellowstone* is a fictionalized account of a research team at the founding of Yellowstone but offers hints into past and modern research within the park using a writing style consisting of fictional letters detailing their adventures and research. We started our search with a team member meeting with Dr. Sara Kearns over spring break to discuss what databases to use and how to approach looking for certain subjects. Dr. Kearns's assistance allowed us to trust the databases that we

were using, confirm the reliability of sources if in cases of uncertainty, and feel confident in using the additional resources that the library offers for every student. The sites we identified during the meeting were the National Parks Datastore, the Wildlife & Ecology Studies Worldwide database available through Hale library, Biodiversity Heritage Library, and the John Muir digital archives available through the University of the Pacific. Following this, we designated an area of interest for each team member: historical research, modern research, connection from *Letters from Yellowstone* and John Muir. Each member would utilize the previously mentioned databases, in addition to Hale library to search for relevant material. The broad nature of our areas of interest required creative uses of keywords and knowledge of performing advanced searches to narrow down the material available to a manageable level. We also used quotes or passages from *Letters from Yellowstone* that added to research that has been conducted and that our team was looking at for this poster. Looking at past writings about Yellowstone helped contextualize some of the research that we were looking at—both the novel and research discuss geographical mapping.

During this research, much communication occurred through e-mail and Canvas, in addition to several Zoom discussions facilitated by our class. Our main method in determining the credibility of the source was through the database we discovered it from, and in the case of articles found through these databases, examination of the journal the article was published in. This was a challenge for us, since we lacked knowledge on how different journals were viewed in academia. After the project had finished, after discussion with Dr. Elizabeth Dodd we learned that if we were uncertain about a journal credibility, we could search for articles found outside of the Hale library system again, through Hale library were often peer-reviewed literature is explicitly stated. Our biggest challenge in researching our topic presented itself in searching for geospatial data. Geospatial datasets are available in the National Park Service Datastore, but we could not find the data necessary to complete a map. Specifically, we needed a boundary for Yellowstone National Park, and a digital elevation model. To solve this, we started searching for websites that contain geospatial data such as the U.S. Geological Survey and university

websites. We found information we needed on the Wyoming State Geological Survey website and examined the metadata of the files to ensure its credibility.

In the novel *Letters from Yellowstone,* there were multiple references to current and historical projects and problems that the park has faced, such as transportation, ecology, wildlife reintroduction, and cataloguing or mapping systems. Current research addresses many interactions in the biotic and abiotic communities, such as DNA being used to track microbial evolution and migration through hydrothermal systems both within the Yellowstone and other parks. It also focuses on using geographic information systems (GIS) to understand spatial relationships that are new and old to the park itself, such as wolf reintroduction or documentation of where plants and insects show up at the park. *Letters from Yellowstone* reemphasizes the importance of mapping systems when one of the characters, Dr. Rutherford, creates his own mapping system, allowing a complete indexation of plants and insects to be recorded by location to better understand the park. We also took a brief look at John Muir's own work, which encouraged the public opinion to be in favor for Yellowstone National Park. By analysing both literary and scientific works about Yellowstone, we can find how important it is to continue a legacy of research, both for science and for literature. It is important to be aware about what creative and scientific writing can add to research when combined.

Literary connections to Yellowstone Research

Luke Carney, Jessie Hovis, Audrey Poulson, Mikaela Jackson

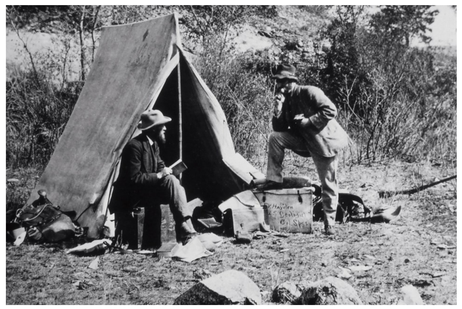
Introduction

Established March 1, 1872, Yellowstone National Park is a main area of wilderness in the modern United States. The novel "Letters from Yellow" explores early days of expedition and research within the national park system. To develop our understanding of this history and impact of research within Yellowstone national park and the impact of novelist in preserving history though story we examined parallels between the novel to the development of historical and modern research occurring within the National Park.

John Muir Connection

John Muir – The Yellowstone Park – A trip to the Great National Reservation in the Northwest. (October 19, 1885)

- Although most of his focuses were on Yosemite national park he mentions Yellowstone several times and has even wrote a few articles about Yellowstone.
- Calling Yellowstone, "…there is a region full of wonders, surpassing in wakeful, exciting interest any other region yet discovered on the face of the globe."
- He supports the Yellowstone national park being pulled away from the public claiming that even if such things would be allowed it wouldn't provide the human race any useful farmlands.
- He describes Yellowstone's nature and beauty comparing it to Yosemite national park. "..dashing streams with flowery banks, waterfalls and cascades of every form, some of them ranking with those of Yosemite in grandeur..."
- He sounds as though he's not only telling about Yellowstone, but having to convince others of its value in the world. His life isn't only about sharing it's also to protect and prevent the human society to mistreat the land it now calls home.
- Such actions can be found through his ventures fighting for Yosemite, but failing during a damming of one of their lakes due to a fire in a major city.



Letters from Yellowstone Research

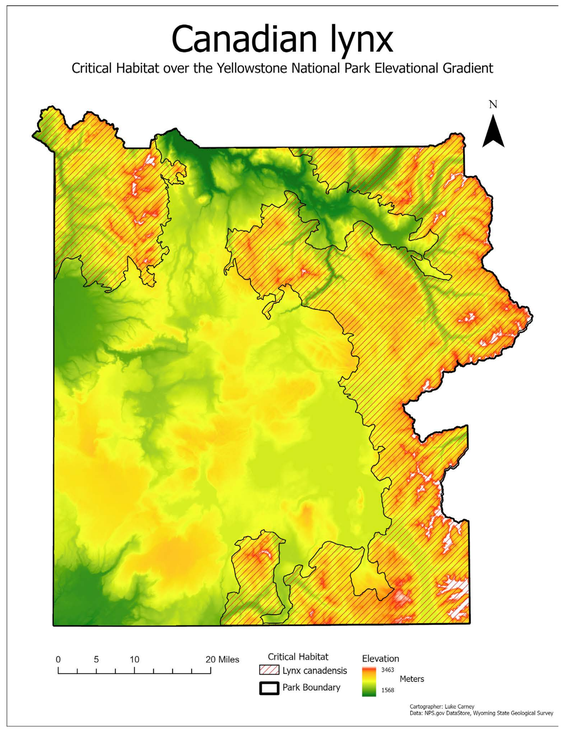
Yellowstone National Park was first established in 1872, but people have been in the Yellowstone region for over 11,000 years. European Americans first started exploring Yellowstone in the early 1800s. *Letters From Yellowstone* takes a historical fiction approach to this early establishment, touching on specimen collection, tourism, and conservation extensively.

“I have selected the nation’s park as a starting point for my investigations because it shelters a diversity of virtually undiscovered plant life..” (4).

“Thanks to a federal program of road construction, the Park is rapidly becoming overrun with tourists and other travelers—they say more than 10,000 last year alone!” (5).

“Since you left, the local rag has been afire with the news that the railroads are petitioning Congress for right-of-way passage through the park” (13).

“…Dr. Rutherford has developed an elaborative indexing system, which he has integrated into his botanical mapping system, providing a complex picture of the environment in which these plants and insects thrive” (135).



Geoprocessing and the examination of spatial interactions facilitated by geographic information systems allows for better examination of data as well as better ways to express information through digital mapmaking.

Historical Research

Yellowstone's history of science and major efforts in wildlife conservation play a significant role in what we know about the park today. Some of the first written information of the wildlife were found in journals and letters from early settlers. This brought new expeditions to explore and research Yellowstone in the late 1800s, some of which could tie into the research from *Letters From Yellowstone*. (4)

Lots of research consisted of the history of plants and the ecology of the native wildlife. One major project was the reintroduction of wolves into Yellowstone. After getting rid of the natural predators and the grey wolf becoming endangered, reintroducing them to the park helped balance deer and elk populations, the ecosystem, and restoring the grey wolf population. (5) Examples of other important research projects were done over the bison of Yellowstone, vegetation history, fossil forests, and many other important aspects of Yellowstone. This historical research is significant in what we know about Yellowstone today and its' modern research.

Modern Research

In the many years since it was established, research is still ongoing throughout Yellowstone, examining many of the unique aspects of the natural world present. Modern technology as drastically enhanced the ways we are able to examine and attempt to explain the world we live in. Methods in studying DNA, something that was not even discovered at the time of the novel is allowing scientist to track microbial migration through the genome across hydrothermal systems in Yellowstone and Great Boil Springs Nevada[1].

Lots of research into ecology/interactions between the biotic and abiotic (Fire as a driver of fungal diversity[2], Thermal sensitivity across forest vertical profiles[3]). Geographic information systems are an important tool in understanding spatial interactions, and many geospatial datasets are available through national park service, some of which use data consist of historical records, like we might expect to find from research like what was being conducted in Letters from Yellowstone.

“…Dr. Rutherford has developed an elaborative indexing system, which he has integrated into his botanical mapping system, providing a complex picture of the environment in which these plants and insects thrive” (135).

Discussion

Bringing in John Muir to this presentation helped bring more understanding to the public’s perception of nature at the time. *Letters from Yellowstone* furthers the historical look at nature while also tying that view to research and then adding nuance to research questions that modern scientists still look at today, like geoprocessing and wildlife introduction. Using different characters’ letters in the novel helps illustrate all the different avenues of research that Yellowstone National Park has taken and will take in the future. These connections are important to make because it allows for a wider perception of the systems that take place within a national park like Yellowstone.

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DataStore - Critical Habitat in NPS Units

Literary Connections to Yellowstone Research

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