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Grazing Usage Over Time and Space in the Thunder Basin Ecoregion

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Abstract

National grasslands are public lands that have diverse and critical uses. They serve as wildlife habitat, contain mineral resources, and are used recreationally. The Thunder Basin National Grassland, located in the Powder River Basin of Wyoming, spans more than 500,000 acres and local ranchers rely on that acreage to feed their cattle. Effective management of these grazing lands is challenging because agency managers must balance multiple private and public objectives. Advancing rangeland policy requires an accurate understanding of previous grazing history. Even so, few long-term, quantitative records of grazing intensity on this land exist. To address this gap, we digitized physical records of four decades of grazing usage. We analyzed this data to examine variation in grazing intensity over time and space. We found that there was a steady increase in grazing intensity over time, but it fell dramatically in the early 2000s. This is an important observation that can help government agencies understand how various social and environmental factors impact grazing intensity. Application of this understanding can help create sustainable grassland policies.



BOISE STATE UNIVERSITY

Grazing Usage Over Time and Space in the Thunder Basin Ecoregion

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Introduction

The Thunder Basin Ecoregion (TBE) is located in the Powder River Basin of Wyoming and spans more than 500,000 acres. The United States Forest Service (USFS), the state of Wyoming, and private entities **all hold ownership** within this region. The TBE serves as a **critical resource**, as it provides land that local ranchers rely on to feed their livestock. However, the region's **complex social system**, displayed in Figure 2, can make effective land management challenging. Agency managers must create rangeland policy that can **balance federal, private, and public objectives**, while also keeping the sustainability of TBE in mind. Advancing policy and its implementation requires an **accurate interpretation** of previous grazing history. Even so, few long-term, quantitative records of grazing intensity on this land exist. This creates a gap in our understanding of how this environment will **react to adverse or changing conditions**.

Thunder Basin Ecoregion

- Legend**
- Allotments
- Pastures
- Ownership**
- Federal
- Private
- State
- Areas of Interest**
- Shared "Non-use" Allotment
- Allotment 1
- Allotment 2
- Allotment 3

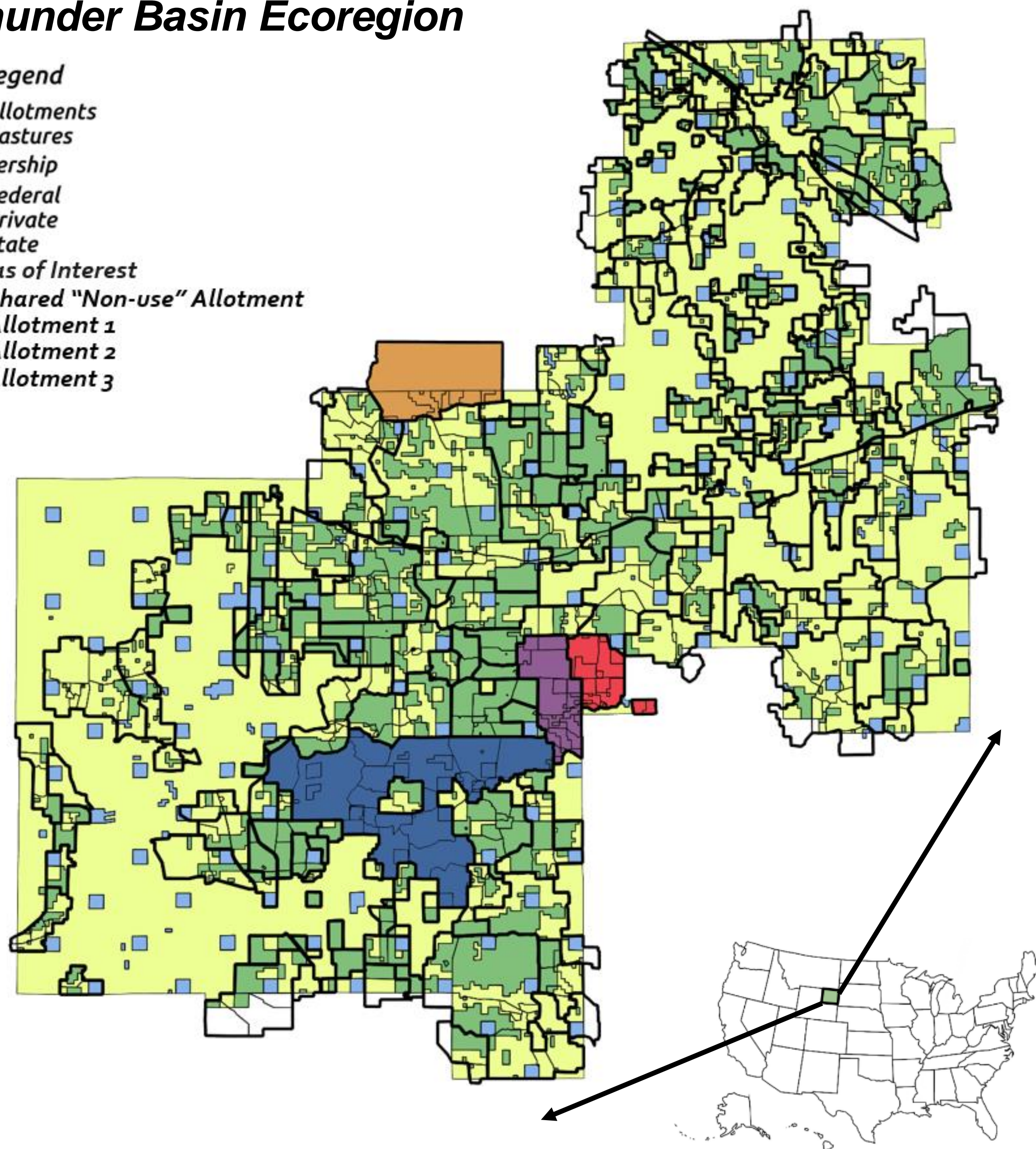
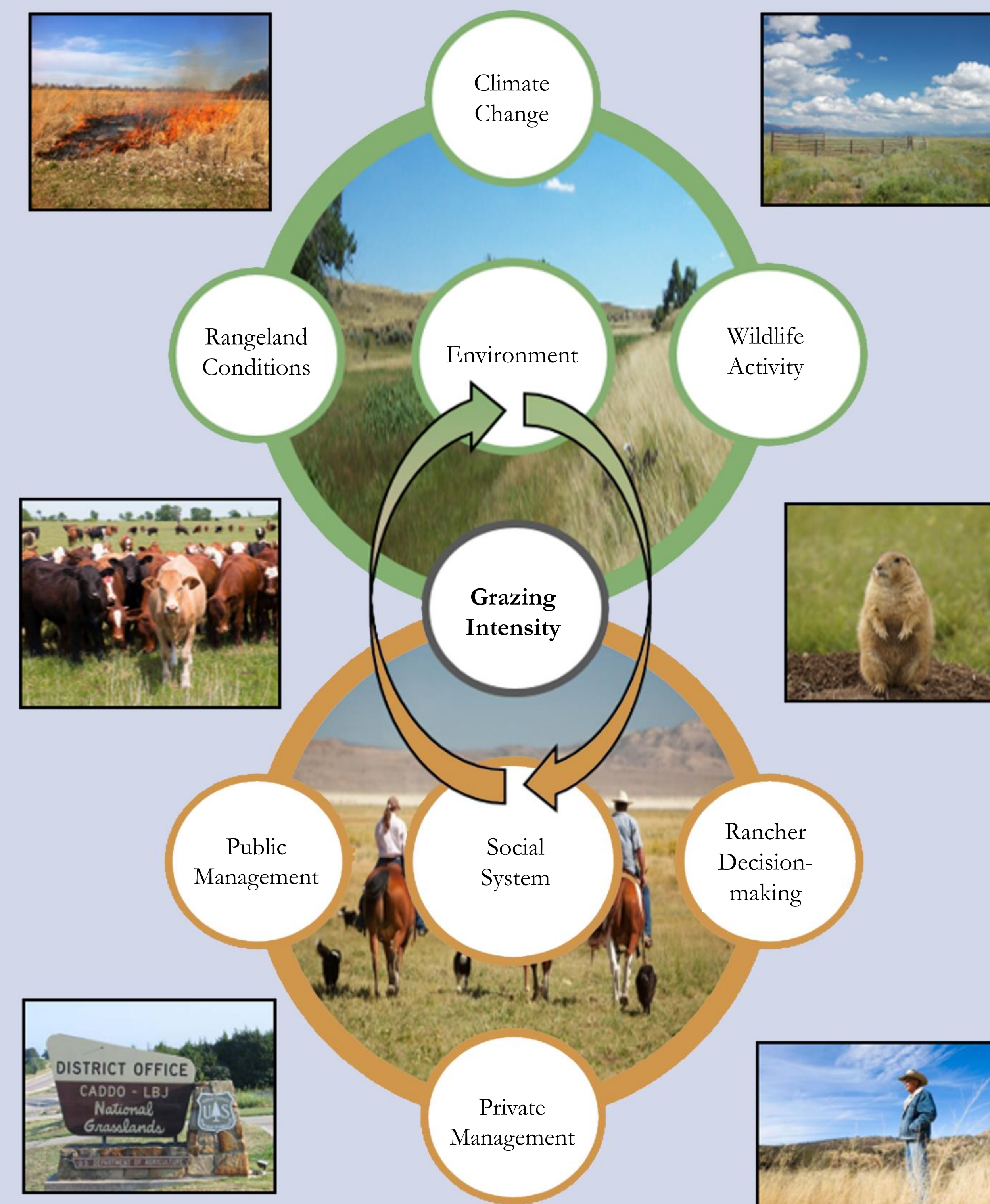


Figure 1. Map of the Thunder Basin Ecoregion

Methods

- I. Obtained **permission from the USFS** to digitize grazing records
- II. Chose allotments 1, 2, and 3 as areas of interest because they have been the most distinctly **affected by climate change and native species**
- III. Digitized physical records in entirety and entered digital records, which gathered roughly **four decades** of grazing data
- IV. Found that the owners of allotments 1 and 2 have a **shared "non-use" allotment** that functions as pasturage when their own land is experiencing strife
- V. Created a variable of **AUMs/acre**
- VI. Plotted AUMs/acre over time in the four areas of interest
- VII. Interpreted results with a **systems perspective**

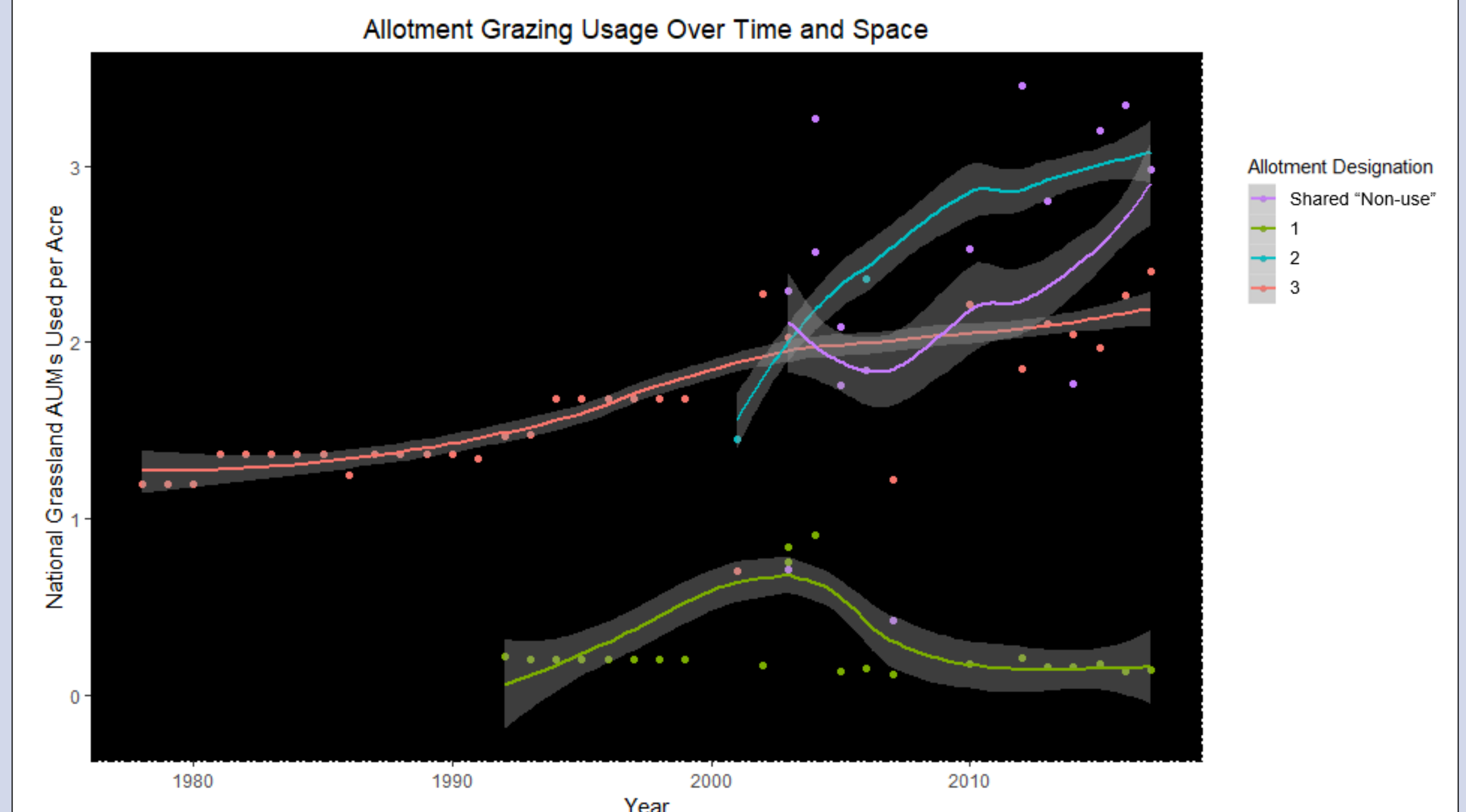


Movement of livestock year-round prevents overgrazing, and in turn protects the environment and the investments of ranchers. Drought and invasive native species can threaten the sustainability of the environment, create tension in TBE agencies, and negatively impact rancher livelihoods. Variance in grazing intensity can be an indicator of these adverse and beneficial interactions of the system.

Figure 2. Systems diagram displaying the interplay of social and environmental systems.

Results

The **Animal Unit Months (AUMs)** used per acre of land in Allotment 1 increased in the early 2000's, and then decreased after 2005. Allotment 2 experienced a sharp increase from 2000 to 2010. After 2010, its usage over space increased at a slower rate. Since the 1980's, Allotment 3 has steadily increased in the amount of AUMs used per acre. The shared "non-use" allotment's AUMs/acre decreased from 2004-2007, **increased until 2010**, levelled for a short time and has **increased since then**.



Implications and Future Research

The shared "non-use" allotment has experienced an overall increase in usage over the past 15 years. In this same timeframe, **drought severity and frequency has increased**. This implicates that grazing use could react as a function of drought. This observable connection is promising. We will be continue this research by digitizing the physical records of the remaining TBE allotments, and then analyzing grazing intensity of the entire system. When this baseline has been completed, we will be able to **compare fluctuations in grazing use to drought analytics**, as well as other social and environmental factors. Achieving a deeper understanding of the ecoregion can lead to **more effective rangeland policy** and thus, better **protect TBE's environmental resources**.