

A CONCEPTUAL FRAMEWORK FOR INVESTIGATING THE SAGEBRUSH-STEPPE: AN INTERDISCIPLINARY, SOCIAL-ECOLOGICAL APPROACH

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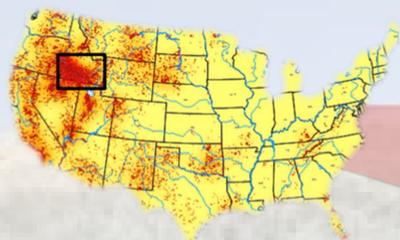
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Locations of fires larger than 120 ha from 1970-2007 throughout the United States.

Box: team research area.

Source: Bureau of Land Management.



Juniper encroaching from high to low elevations.

Source: A. Bentley Brymer



Cheatgrass (*Bromus tectorum*) invading sagebrush-steppe habitat in southwestern Idaho.

Source: A. Bentley Brymer



Greater Sage-Grouse (*Centrocercus urophasianus*), a candidate species for listing under the Endangered Species Act.

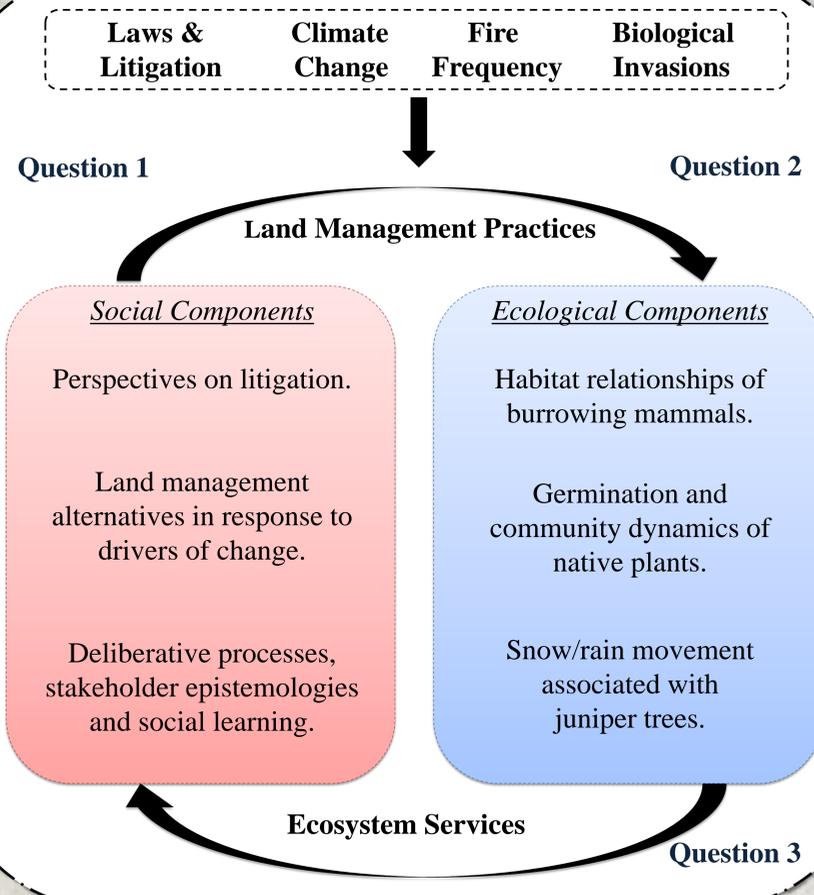
Source: gerritvyn.photoshelter.com



Livestock in southwestern Idaho are viewed as both damaging and helpful for habitat restoration efforts by various stakeholder groups.

Source: idahofarmbureau.blogspot.com

- 1. Which social and ecological characteristics of the sagebrush-steppe do diverse stakeholders believe enhance or reduce individual well-being?**
- Understand stakeholders' perceptions of individual well-being.
 - Identify significant services and benefits individuals derive from the sagebrush-steppe that they believe foster their well-being.
 - Elucidate perspectives of burrowing mammals, biological invasions and juniper ecophysiology
 - Quantitative survey data analyzed for correlations between desired characteristics of the sagebrush-steppe and stakeholder demographics.
 - Qualitative interview data analyzed for themes of views on litigation.



- 2. How do land management practices - coupled with social and ecological drivers of change - influence sagebrush-steppe characteristics over time?**
- Conceptualize a system dynamics model with data from interviews, surveys and scientific literature.
 - Formulate model with stakeholders during two workshops, including deliberation of land management alternatives.
 - Synthesize social and ecological data to parameterize model feedbacks between land use alternatives and the responses of various ecological components.
 - Implement model to produce a range of scenarios highlighting potential changes in social and ecological characteristics.

Abstract:

Western U.S. sagebrush-steppe is a dynamic and tightly linked social-ecological system (SES) where land management decisions affect the provisioning of ecosystem services. In turn, ecosystem services support conditions for individual well-being. We suggest that to adequately understand the dynamics of the sagebrush-steppe SES, we must understand both the social-ecological feedbacks as well as the philosophical assumptions that drive land management decisions. It is critical to empower stakeholders through deliberative processes and to understand how interactions between knowledge systems might promote better management. *The overarching objectives of our interdisciplinary research and outreach project are 1) to use multiple sources of knowledge and data while collaboratively conceptualizing, formulating and running a system dynamics model with diverse stakeholders, and 2) to understand how interactions among knowledge systems influence stakeholders and planning processes associated with public land management.*

We seek to clarify our understanding of potential future states of the sagebrush-steppe SES in southern Idaho by working with stakeholders in a deliberative, participatory system dynamics modeling process.

We will conduct literature reviews, surveys, semi-structured interviews, and workshops with stakeholders who live and work in southwestern Idaho. Additionally, we will conduct novel disciplinary research on social learning, litigation, burrowing mammals, seed germination of native and non-native grasses, and rain/snow dynamics of juniper. Qualitative synthesis and system dynamics modeling will be employed to integrate information and data to effectively answer our research questions.

- 3. What do stakeholders perceive as trade-offs or synergies that develop as a result of modeled interactions between land management practices, drivers of change, ecosystem services and individual well-being?**
- Continue deliberation of model output with stakeholders to identify potential trade-offs and synergies in terms of the reported characteristics that enhance or reduce individual well-being.
 - Understand how a diverse range of stakeholders will respond to and cope with potential social-ecological changes.
 - Mixed methods: qualitative, workshop-dialogue data analyzed for themes of trade-offs and synergies; sensitivity analyses with quantitative model data.

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