SBEADMR Monitoring project

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Goal: Provide science-based information to aid the GMUG in implementing adaptive management strategies in beetle impacted spruce-fir forests. Specifically the objectives of this project are to:

1) Develop and strengthen the relationship between NFS management and research
2) Gain a better understanding of spruce regeneration dynamics following disturbances (spruce beetle outbreaks, harvesting, and wildfire)
    a. Literature review on the status of our knowledge (led by CFRI: Kristen Pelz)
    b. Monitoring of pre/post salvage treatments
    c. Chronosequence study
3) Determine priority treatment areas across the landscape (GIS optimization)

Objective 1: Develop and strengthen the relationship between NFS management and research

Activities: Annual field trip and science reporting for stakeholders and NFS. Based on findings solicit input from stakeholders and NFS about future research questions/studies to implement.

Objective 2: Gain a better understanding of stand development (i.e. spruce regeneration) following disturbances (i.e. spruce beetle outbreaks, harvesting, and wildfire) and disturbance interactions (i.e. wildfire following harvesting)

a) Literature review: Conduct a thorough search of the literature and summarize. Convene a panel of experts on spruce-fir ecology and management to provide input and review manuscript. This will be a living document so we will continue to update new information as it comes forward. Kristen Pelz (CFRI) will lead this effort.

b) Monitoring salvage treatment areas
    a. Install permanent monitoring plots within untreated and areas to be salvaged across the GMUG. Variables to monitor will include:
        i. Forest structure
            1. Regeneration establishment (species, density)
            2. Tree size (diameter) and species
            3. Recent disturbance history (recent spruce beetle mortality)
        ii. Seed production
        iii. Ground disturbance
        iv. Microclimate (temperature/moisture)

b. Measure before treatment to ensure untreated and salvaged research plots are comparable. Then remeasure each plot post-treatment (each year).

While monitoring salvage treatment areas will provide information on the proposed project, results from these studies to inform adaptive management strategies will take time. One concern for only monitoring the pre- and post-treatment response is the time frame in which detectable, long-term changes will take. For instance, spruce seed crops vary from year to year and could impact regeneration success even though this is not a response to management activity. Furthermore, in order to expand our inference having plots distributed spatially (i.e. elevations, aspects, soil types) across the GMUG is needed. To address the inference and temporal issues, we also propose a chronosequence study approach. A chronosequence study will allow us to install monitoring plots in areas that have historically experienced spruce beetle outbreak and/or harvesting and provide information about the longer-term impacts of these disturbances.

c) Chronosequence survey-
    a. Install monitoring plots across a broad spatial extent of the GMUG forest. We also propose to install monitoring plots in spruce-fir forests that have experienced spruce beetle outbreak and/or harvesting on other National Forests across the southern portion of Region 2.
    b. We plan to focus on areas harvested or impacted by spruce beetle over the past 40 years.
    c. Variables to monitor will include:
        i. Forest structure
            1. Tree size (diameter), species, density

Objective 3: Determine priority treatment areas across the landscape (GIS optimization)

We will use existing spatial datasets (e.g. forest cover type) and a multi-objective, weighted optimization framework within a Geographic Information System (GIS) to compare the suitability of different areas of the GMUG landscape to maximize benefits and minimize impacts from treatments. A simple example would be an optimization that includes only fire risk mitigation and lynx habitat concerns at equal importance. In this scenario, treatments in areas that would significantly reduce fire risk for communities while not impacting critical habitat would be ranked as favorable sites to implement treatments. In contrast, sites where treatments would not reduce fire risk to communities and/or negatively impact critical lynx habitat will be ranked as undesirable sites for treatments. By weighting a variable more in the model framework it is possible to increase its importance in the landscape assessment. For example, if in the above example lynx habitat protection is deemed more important than reducing fire risk, then the habitat variable can be weighted to have a stronger influence on the final landscape suitability map. The optimization framework will incorporate many more variables than fire risk mitigation and lynx habitat protection, and we will work with all interest groups to develop a list of variables and their importance (weight) in the model. Because we will not have time to develop new GIS layers, the analysis will use existing data layers.

Timeline:

October 2014 to April 2015: Literature review; GIS optimization; Locate study sites for monitoring and chronosequence survey

Spring 2015: Annual meeting with stakeholders to present literature review (research gaps) and GIS optimization.

Summer 2015: Install and measure monitoring plots for salvage study and chronosequence survey

Fall 2015-Spring 2016: Analyze Summer 2015 data

Spring/Summer 2016: Annual meeting with stakeholders to present results from Summer 2015 research study. Field Trip to sites

Summer 2016: Remeasure monitoring plots on salvage study; Continue chronosequence survey.

Fall 2016-Spring 2017: Analyze Summer 2016 data; If enough data collected for chronosequence survey write a manuscript.

Budget

Most of the requested funding will be used to cover salaries (research associate to lead the project, 3 seasonal forestry technicians, co-PI Sibold's summer salary), travel for the time specified in the timeline, and field and lab equipment. Travel funds are needed to cover vehicle mileage, a vehicle during the field season, and per diem. RMRS will contribute salary for the scientist and a professional forester to help conduct fieldwork, analyze data, and prepare funding. RMRS and the CSU Biogeography Lab will also contribute some field equipment and lab resources and facilities. Also, equipment such as t-posts, tree tags, nails, etc, will need to be purchased to facilitate monitoring over time.