

**SUMMARY REVIEW AND APPROVAL FORM FOR RESEARCH PROJECTS**

**Grouse Ridge Forest**  
*College of Natural Resources*  
*Center for Forestry*  
*University of California, Berkeley*

<b><u>Review &amp; Approvals:</u></b>	<u>Date</u>
Research Stations Manager [York]	_____
Center Co-Director [Stewart]	_____
Center Co-Director [Stephens]	_____

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Please use a **DIFFERENT FONT** to fill out the proposal.

- 1) **GROUSE RIDGE PROJECT #** GR17-01RY
  
- 2) **PROJECT TITLE:** Managing for Recovery, Resistance, and Transition During Climatic Change.

3) **PROJECT DESCRIPTION:**  
 This project proposes to install four treatments at the stand level at Grouse Ridge Forest. The treatments represent the basic suite of plausible approaches that managers may take to address ongoing stresses in forests related to climatic change. It assumed that climatic stresses are most likely to occur in the form of 1) regeneration failures; 2) mortality related to drought stress; and 3) high severity fires. Our objective is to establish a study that, while placing the highest priority on long-term results (i.e. 50+ years), also has the capacity to produce study results within the next decade.

In this study, management for recovery is meant to have the objective, through silvicultural treatments, of preparing a forest to have the capacity to recover pre-disturbance structure and species composition following a disturbance related to climatic change (e.g. drought related mortality and high severity fire). It is expected that recovery take less than 50 years, which is roughly the time that Sierra Nevada forests have taken to regenerate and recruit sexually mature trees following disturbances in the past. It is also expected that some management intervention, such as salvage logging, site preparation, and planting could be part of the recovery process in order to enhance the rate of recovery. In general, management intensity (in terms of frequency and severity of treatment) for the objective of recovery is expected to be in between that of Resistance and the Control. This treatment is also thought to be most similar to the conventional approach to density management currently occurring in the Sierra Nevada on federal and some private lands.

Resistance, in the case of this study, means having the objective of preparing a forest to resist, without significant change to structure and composition, future disturbances related to climatic change. While some change following a future disturbance may occur, it is assumed that change will be small enough so that the fundamental structure and composition needed to sustainably resist future disturbances remain intact. In general,

management intensity is expected to be highest when compared to Recovery and Control treatments.

The Transition treatment represents the objective of actively transforming the composition of a forest into one that is better suited to a future climate. This treatment will replicate a disturbance that fundamentally changes the composition and structure of a forest, and the forest is unable to recover back to a forested structure without intervention. In other words, this treatment represents the possibility that the Resistance and Recovery treatments do not work in building overall resilience. The objective is to convert treated areas into species compositions that will develop into forested structures and provide some of the values that forests currently provide. This will occur through a process of forest removal, replanting, and cultural treatments. The primary experiment in the transition treatment is the planting of alternative tree species. The species to plant and the planting design will be addressed in a separate proposal. This proposal outlines the number and location of the areas that will be harvested to make this treatment possible.

The Control treatment, while an important element for an experimental design, also represents a common approach that is currently being used in the Sierra Nevada. Namely, doing nothing. This treatment will rely on long-term monitoring to assess this approach's effectiveness in resisting, recovering, or transitioning following disturbances. No treatments will occur in control areas.

4) **PROJECT PERSONNEL:**

**Principal Investigator (must have PI status with UC):**

Name: Rob York

Title: Adjunct Associate Professor of Forestry

Address: 4501 Blodgett Forest Road

e-mail: ryork@berkeley.edu

Tel: 530-333-4475

Signature: \_\_\_\_\_ Date: \_\_\_\_\_.

***The signature above signifies acceptance of the terms and agreements described in this proposal.***

**Other personnel:**

Please list all other personnel involved with this project (collaborators, graduate students, field personnel). Provide names and e-mail addresses.

This project is being submitted by a team of UCB faculty, managers, and ANR personnel who are involved with the network of Berkeley Forests. The team, which may expand in the future, currently includes:

Ken Somers, Ariel Thomson, Scott Stephens, Bill Stewart, Paolo D'Odorico, Kevin O'Hara, Brandon Collins, John Battles, Keith Gilles, Jodi Axelson, Matthew Potts, Steve Hart, Carlin Starrs, Rick Standiford, Susie Kocher, Ricky Satomi, and Jack Harvey (USFS).

5) **PAYMENT INFORMATION:**

Projects where use of Center for Forestry equipment, or significant staff time are expected must provide information on how payments will be made. Center for Forestry staff will provide an invoice to non-UC researchers plus an income chart string for intra-UC transfers. Rates are updated annually and can be provided prior to the field season. Method of payment must be given below:

Costs of initial study setup are proposed to be covered by Blodgett Forest revenue accounts, to be recovered from revenue associated with the timber harvest at Grouse Ridge that is linked to this study. It is expected that the structures created by this harvest, and the follow up regeneration activity will facilitate future grant-funded research. Study setup includes the following:

Re-mark of the treatment areas and associated flagging

Paint and flagging purchase to layout harvest

Administration of logging and log purchase contracts

Installation of control plots on forest service land

Harvest related erosion control work

Harvest residue disposal (i.e. pile burning)

Site preparation

Planting and associated seedling nursery costs

Vegetation control in subset of transition harvest areas (group selection openings)

Post-harvest plot measurements

6) **TIME FRAME**

Date project submitted: May 2017

Planned date for starting field work: June 5, 2017

Planned date of field work completion:  
(including removal of ALL field equipment)

The study will use the existing network of permanent plots at Grouse Ridge. These plots are designed to be in place long-term (i.e. many decades). The treatments are designed to be maintained with their current objectives (resistance, recovery, transition, control) in place until a change in the policy for use of Grouse Ridge occurs. The date of completion is therefore indefinite.

Date field sites can be released for other studies:  
See Above

Planned type and date of publication:  
(e.g. Forest Science, 2009 or Masters Thesis, 2010)

It is assumed that these treatments will set up a long-term study that can be leveraged by faculty and students in ESPM to conduct a wide variety of research. In the near-term, it is expected that an applied paper that demonstrates this approach to other landowners will be developed. Ideally, this would evolve from a Master of Forestry thesis.

7) **RESEARCH OBJECTIVE OR HYPOTHESES EXAMINED:**  
PLEASE BE AS COMPLETE AS POSSIBLE. ATTACH PAGES, IF NECESSARY

The objective of this long term study is to test different management alternatives for addressing impacts of climatic change on forests. A guiding principle of the study is that, while climatic effects on forests will be profound, there is uncertainty in how effects will occur and the management regime that will be best for mitigating effects. In Section 5 of Grouse Ridge, 3 treatments will be replicated 3 times at the stand scale (average stand size = 56 acres). The control treatments will be located adjacent to Section 5, on forest service land and on nearby Grouse Ridge land in Sections 1 and 7. The treatment prescriptions are as follows:

1. Resilience- thin to a residual basal area of 125 ft<sup>2</sup>/acre. Primarily focus removing smaller commercial sized trees to ensure equal spacing of high vigor individuals and clumps of trees. Also remove larger trees with poor vigor. Average diameter post-harvest will be greater than pre-harvest.
2. Resistance- thin to a residual basal area of 75 ft<sup>2</sup>/acre. Primarily focus on removing smaller commercial sized trees, ensuring increased growing space around larger trees or clumps of larger trees. Maximize species diversity of large trees.
3. Transition- thin similarly to Resistance above, plus locate group selections where clearfell harvesting will occur. Two 1 acre openings in each of the three transition blocks will be identified. These will be clearfelled and site prepared to create canopy gaps. Planting in 2017 or 2018 with species to be determined and reviewed under a separate proposal will occur. Four 0.5 acre and eight 0.25 acre gaps will be created in each of the transition blocks. This assumes a 90 year rotation and a 12 year harvest interval in the future. It also establishes an equal amount of area to 0.25, 0.5, and 1.0 acre gaps. The 0.25 and 0.5 acre gaps will be monitored for natural regeneration and opening size impacts. New gaps will be located in operationally feasible locations. Locations of high torching probability will be prioritized highly as well, followed by locations that are overrepresented by a single species. Edges of gaps will be at least 118 feet from each other and from plots in adjacent treatment blocks. 1.0 acre gaps will be circular in shape. 0.25 and 0.5 acre gaps shall not have the long axis more than twice the length of the short axis.
4. Control- three areas at least 20 acres in size will be located on nearby land. If located on forest service land, these areas will likely be administered with a Special Use Permit.

Post-harvest measurements of plots will document the actual change in structure and species composition that occurred as a result of the harvest. Follow up measurements of plots after 6 years will document short term changes in structure and composition. Follow up treatments will be designed to maintain the objectives of resilience, resistance, and transition. Ultimately, the primary treatment of interest will be a “natural” disturbance that is related to climate change. Following this disturbance, plots will be measured to assess the tradeoffs among the four treatments.

8) **SUMMARIZE MAIN AND INDEPENDENT VARIABLES, ANALYTICAL MODELS, TECHNIQUES, INSTRUMENTATION AND TREATMENTS USED, ETC.** If Chemicals, Insects, Fungi, Bacteria, Animals, Plants, Seeds, Toxic Materials, etc. are to be brought to the research station as part of the project, the amount, time, and location of use on the forest needs detailed specification (attach a detailed study plan if one has been prepared). Each Toxic Material must have a MSDS attached.

We expect the metrics of forest sustainability to change significantly over time. The baseline data will come from the 1/10<sup>th</sup> acre permanent plots that are currently installed. Stand structure and species composition will be measured at approximately a 6 year interval to track changes over time.

9) **DATA TO BE COLLECTED**

All of the measurements that occur on permanent plots, including species, height, height to crown base, dbh, % canopy, shrub cover and height, understory species presence, fuel loading (measured with Brown transects). In transition plots, survival and growth of seedlings will likely be measured. This will be covered in more detail in a separate proposal.

10) **FREQUENCY (OR SCHEDULE) OF MEASUREMENTS**

Post-harvest measurements of plots will occur within one year following harvest, then 6 years later.

11) **SAFETY PROTOCOL TO BE IMPLEMENTED**

The Center for Forestry is not responsible for ensuring safe handling of researchers' own equipment. However, it is required that appropriate documentation be provided to assure that appropriate safety measures will be in place when field work is done. Please provide a list of equipment or materials that will be used and any safe handling instructions that will be provided to users.

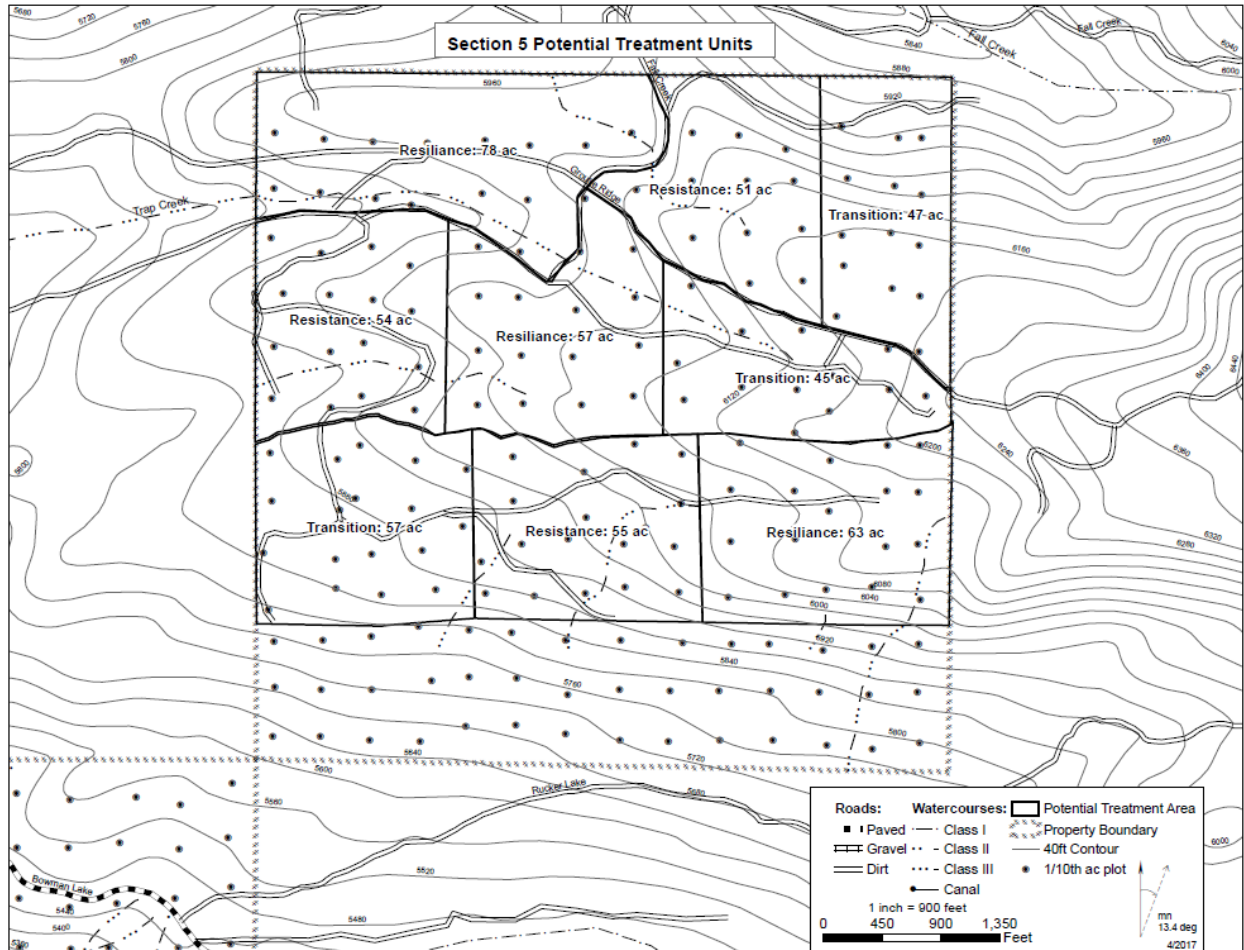
All work will be done by Center for Forestry professional staff. The proposed work is identical to the work that staff have done on University Forests for many years. Standard safety protocols will be used.

12) **COORDINATING REQUIREMENTS** (necessary relationships to other research projects, the annual timber sale, and forest management program at Russell). For larger area habitat-related or longer term longitudinal studies, this needs careful planning and consulting with the Research Station Manager to be sure the research is feasible and possible conflicts are resolved or mitigated.

Coordination among faculty and staff will be essential. Staff are the primary people who are conducting the work, with input from faculty to help guide the study. Currently, no other research projects exist at Grouse Ridge. Hence, while there are no other studies to potentially conflict with, this study should be reviewed carefully in terms of its potential to conflict with likely future research. It should also be assessed with respect to its potential to be expanded and replicated at the other Berkeley Forest sites.

13) **LOCATION OF ACTIVITY (ATTACH MAP, INCLUDE TEXT DESCRIPTIONS):**

Identify and list the number of plots, treatments, and other activities by Russell Compartment number. If desired study locations change, approval from the Research Station Manager must be obtained. This may require a new proposal review.



14) **USE OF FACILITIES:** For example, expected needs for station data base, GIS, housing, lab space, shop space, access to power, computers, phones, equipment, or support of technical staff. Center for Forestry has annually updated costs for these services. An initial estimate can be provided with project approval.

As noted above, this project is being supported by Center for Forestry and ESPM faculty.

15) **REQUESTED STATION SUPPORT:** Do you request any portion of the items listed in Item #14 to be subsidized (most service charges are designed to only partially offset actual station operating costs) by the Center for Forestry?

YES: XXX NO: \_\_\_\_\_

IF "YES" -- Please describe why you believe extra Center support is appropriate. Grouse Ridge is the newest addition to the Berkeley Forest network. Following planning meetings among management staff and faculty, there was consensus that harvests at Grouse Ridge be linked closely to research, as they are at Blodgett Forest. The study

design used at Grouse Ridge has potential to be expanded at other Berkeley Forest sites and at other collaborator sites. It is proposed that the Center for Forestry subsidize this project entirely, with the expectation that future research will be driven with grant-funded projects that leverage this initial study.

16) **PUBLICATION(S) / FACILITIES USE**

**Use of Grouse Ridge for research requires all users agree to adhere to the following guidelines.**

- 1) Any publication or presentation must acknowledge the University of California, Berkeley, Center for Forestry, Russell Research Station as a cooperator.
- 2) Center for Forestry staff will be provided by Principal Investigator a copy of all papers or reports (including conference proceedings), when published.
- 3) Principal Investigator will not expand this proposed research project nor add research personnel without prior approval from Forestry Center Co-Directors.
- 4) Unless arranged otherwise, the Principal Investigator agrees to remove all materials from field sites by the end of the project date.

**(Signature on the first page signifies acceptance of these conditions)**

17) **BERKELEY FORESTS RESEARCH WORKSHOP**

The Center for Forestry annually or semi-annually (depending on activity level of research) reviews active research projects. A mid-winter workshop is presented at Blodgett Forest Research Station for all researchers and interested parties, usually scheduled for late January or early February.

The annual workshop provides many benefits including:

- \*opportunity for undergraduate and graduate students to present their work
- \*communication of research ideas and results
- \*opportunities for collaboration
- \*enhancement of the intellectual life of our research community
- \*expansion of the research profile and potential of Russell Research Station
- \*information on new and proposed research projects
- \*an update on proposed management activities at Russell and other Center properties

All Researchers are asked to submit a brief ABSTRACT of research-in-progress, and are encouraged to make a 20 to 30 minute verbal presentation at the Workshop.

**AN ANNUAL REFUNDABLE FEE OF \$100 MAY BE CHARGED TO EACH ACTIVE RESEARCH PROJECT TO SUPPORT THIS WORKSHOP.** (Half the fee will be cancelled upon receipt of an abstract by the announced deadline – typically before December 31; the second half will be cancelled upon attendance at the Workshop.)

**X** I EXPECT TO SUBMIT AN ABSTRACT OF MY RESEARCH ANNUALLY UNTIL THE PROJECT IS COMPLETE.

**X** I AGREE TO MAKE EVERY EFFORT TO ATTEND THE ANNUAL RESEARCH WORKSHOP.

I UNDERSTAND MY PROJECT MAY BE CHARGED AN ANNUAL  
(REFUNDABLE) FEE OF \$100 FOR WORKSHOP SUPPORT.

**PLEASE SUBMIT THIS COMPLETED FORM IN ELECTRONIC FORMAT TO:**  
[ryork@berkeley.edu](mailto:ryork@berkeley.edu)



**ADDITIONAL INFORMATION ON LAST PAGE::**

Continued from Item #: