prbo

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Title: Plumas-Lassen Area Study Module on Landbird Abundance, Distribution, and Habitat Relationships in Burned Areas.

Identification number: 4355-01-01

Identification of Related Studies: "Fire and Fuels Management, Landscape Dynamics, and Fish and Wildlife Resources: Study Design for Integrated Research in the Plumas and Lassen National Forests"

Problem Reference

The Record of Decision (ROD) for the Sierra Nevada Forest Plan Amendment directs the Forest Service to maintain and restore old forest conditions that provide crucial habitat for a number of plant and animal species. Certain taxa are emphasized in this strategy because of their presumed dependence on old forest habitat attributes. Simultaneously, the Forest Service is taking steps to reduce risks of large and severe fire by removing vegetation and reducing fuel loads in overstocked forests. Striking a balanced approach to achieving these potentially competing goals is a significant challenge to effectively accomplish the various desired outcomes of forest management.

Forest Service management practices, primarily in the form of timber harvest, fire suppression, and post fire management will result in changes in habitat quantity and structure across the study area in the coming years. By monitoring the populations of a suite of landbird species we will be able to measure the effectiveness of management actions in achieving a sustainable and ecologically functional forest ecosystem. Specifically, we are interested in determining the response of landbirds to management practices intended to produce forests with larger trees and higher canopy cover along with more open-canopy, smaller size class forest with reduced ladder and ground fuels.

Because large, infrequent disturbances are responsible for long-lasting changes in forest structure and composition (Foster et al. 1998), they are recognized as a critical element of bird community dynamics (Brawn et al. 2001). In many regions of western North America, fires burn with considerable spatial and temporal variability (Agee 1993), creating complex mosaics of vegetation patches. In these systems, changes in bird abundance are often linked to post-fire vegetation characteristics and landscape composition (Saab et al. 2002, Huff et al. 2005, Smucker et al. 2005).

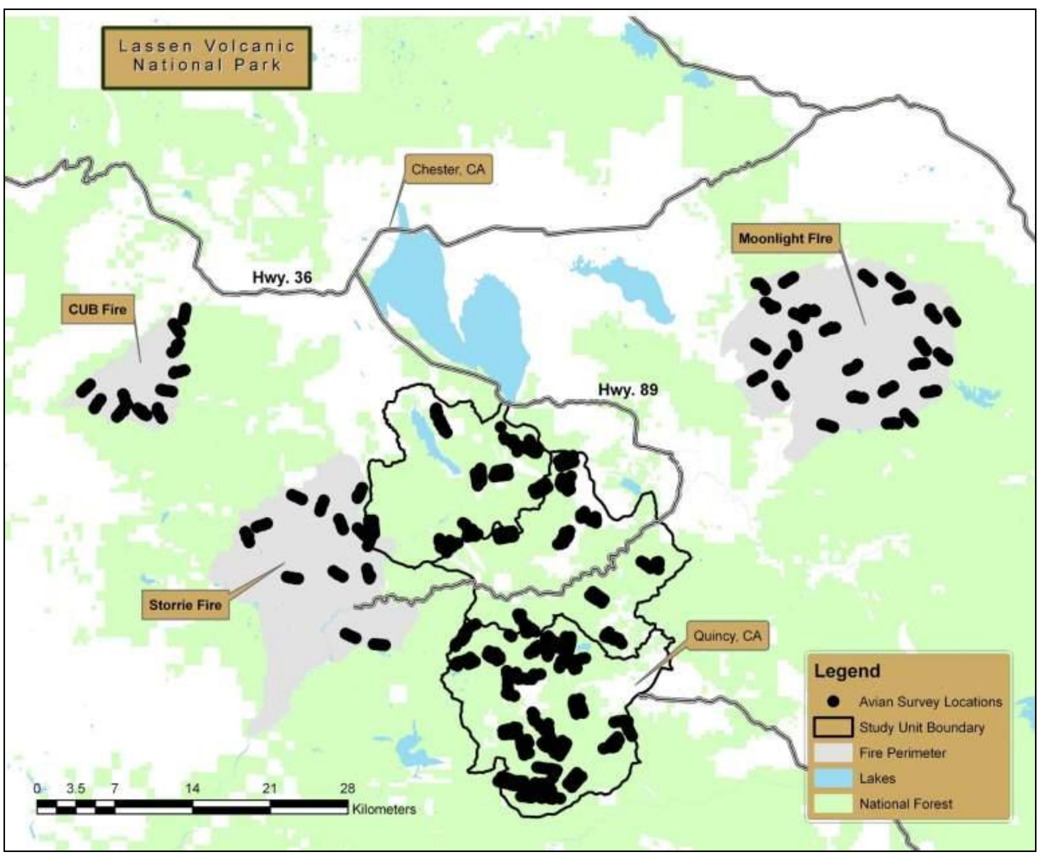
In addition to fire suppression, there are a number of management activities that influence post-fire vegetation characteristics and landscape composition. These activities include salvage-logging, the mechanical mastication and/or herbicidal treatments to reduce broadleaf shrubs, and planting of conifer species that are favored by forestry. As a result, management activities may have profound influences on post-fire conditions- locally and across the landscape.

The primary objective of this study is to assess the influence of post-fire conditions on spatial and temporal variation in bird abundance, and to use this information to guide forest management practices that can maintain forest ecosystems across multiple spatial scales.

Study Area

The location of the study is the western slope of the northern Sierra Nevada, including portions of the Plumas and Lassen National Forests in Plumas and Tehama Counties (Figure 1).

Figure 1. The location of PRBO study sites in the Plumas-Lassen study area in 2009.



Study area and sampling design

Fires. Beginning in 2009 we will focus our sampling on three fires: the Storrie Fire which burned in the fall of 2000, the Moonlight Fire which burned in the Fall of 2007, and the Cub Fire which burned in the Summer of 2008. Each of these fires burned at similar elevations and through primarily mixed conifer and true fir vegetation communities but with varying levels of intensity patterns.

Sampling frame. From this area, we will restrict our sampling frame to areas of Forest Service property and slopes below 40% to allow for passage on foot (Figure 2).

Study plot locations. Within the restricted sampling frame, we will generate random transect starting points with a minimum of 1500 meters between each starting point. For each fire the number of starting points generated will be four to six more than the number of transects we anticipate sampling. Extra points will be generated in case transects can not be established at some of the random points selected (e.g. small fragment surrounded by areas outside the sampling frame). We will sample approximately 12 transects in the Cub fire, 14 in the Storrie, and 26 in the Moonlight. The sample size was based on proportion each fire comprised of the total sampling area once inaccessible areas were removed from the sampling frame (e.g. private land and slopes over 40%) and the heterogeneity in burn severity. We chose to weigh the sampling in order to ensure the relatively small Cub fire had adequate sampling to cover its greater spatial heterogeneity in fire intensity.

Data collection

Bird abundance. We will establish 5 variable radius point count stations approximately down the center line of a 1000m long transect. At each point, we will measure bird abundance using standardize point count surveys (Ralph et al. 1993). Surveys will be conducted in the first four hours after sunrise and will not occur in weather conditions that significantly reduce detectability or bird activity (e.g. rain, wind>15kph, fog).

Cavity-nest density. The density of cavity-nests will be quantified following the methodology outlined by (Dudley and Saab 2003). We will use the center line from the point count transect and the area within 100m of it to establish a 20 ha (1 x 0.2 km) cavity searching plot. Within this plot, surveyors will search the entire area for nest cavities. Once a cavity is located, occupancy will by determined by observing the cavity for a minimum of two 20-minute visits. At the end of this period, the status of the cavity will be recorded as: 0 - no activity observed, 1 – birds entering or leaving cavity but nesting status unconfirmed, 2 – nesting confirmed based on observation of food delivery, fecal sack carry, or nestlings. If activity is still unclear a third visit may be conducted.

Cavity-nest characteristics. For each cavity-nest we will record height of the cavity; height of the tree; diameter at breast height; tree species (if possible); whether the tree is living or, if dead, the decay class; aspect; and slope. Additionally, on each transect we will identify approximately 30 random trees that have no sign of cavity use and measure these same characteristics.

Fire severity. At each plot, we will quantify fire severity using the Composite Burn Index (CBI) from available GIS layers. For all three fires, CBI was mapped at a 90m diameter resolution (Miller and Thode 2007). Across each plot, we will summarize this information by calculating the mean and variance in fire severity.

Post-fire vegetation characteristics. We will measure vegetation characteristics across a 50 m radius plot centered at each point count location following the protocol outlined in the original PLAS bird module plan (Burnett et al. 2005). On these plots we will measure shrub cover, live tree cover, and herbaceous cover as well as the relative cover of each species in the shrub and tree layers as well as basal area of live trees. Vegetative cover will be quantified through ocular estimates.

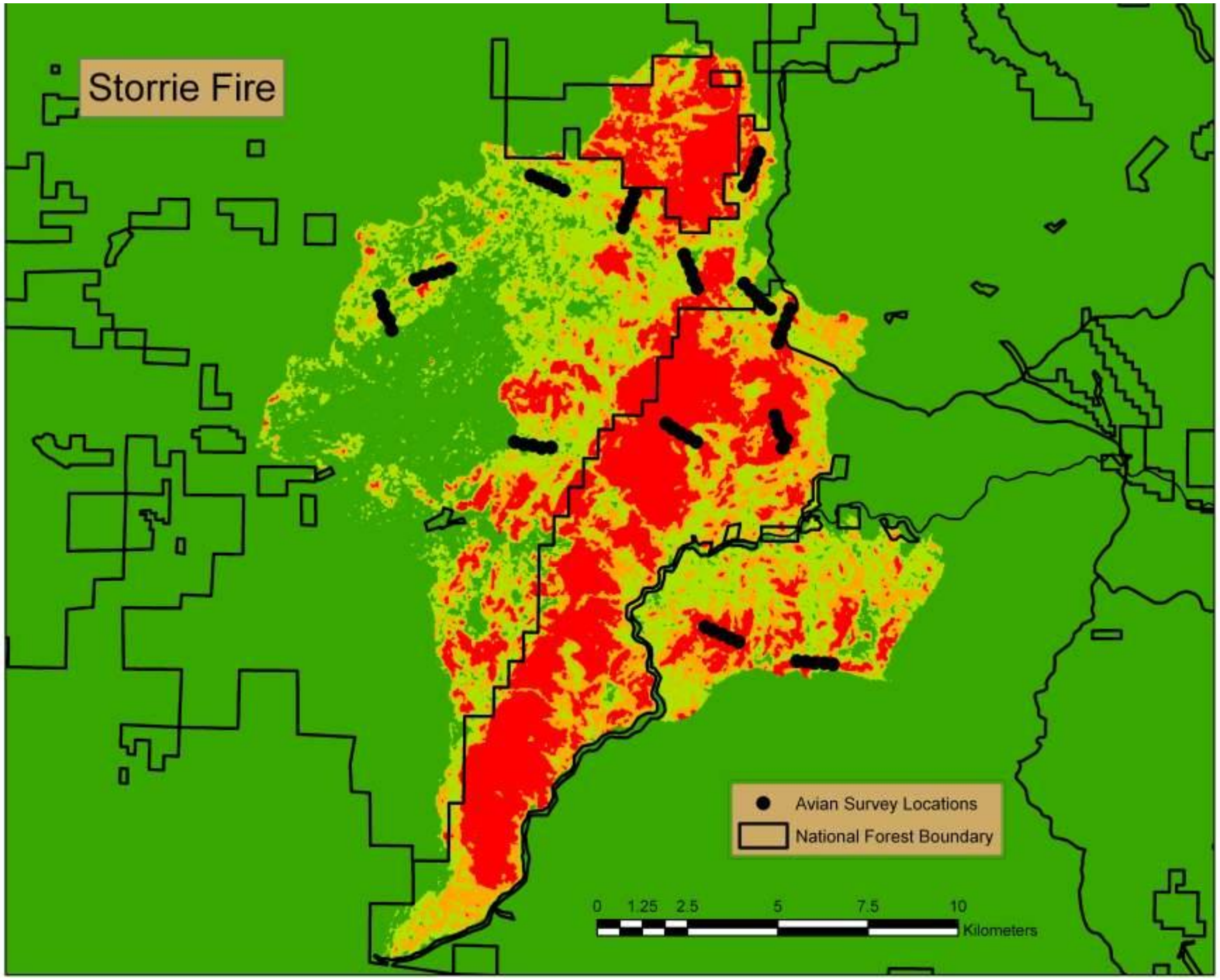
Statistical analysis

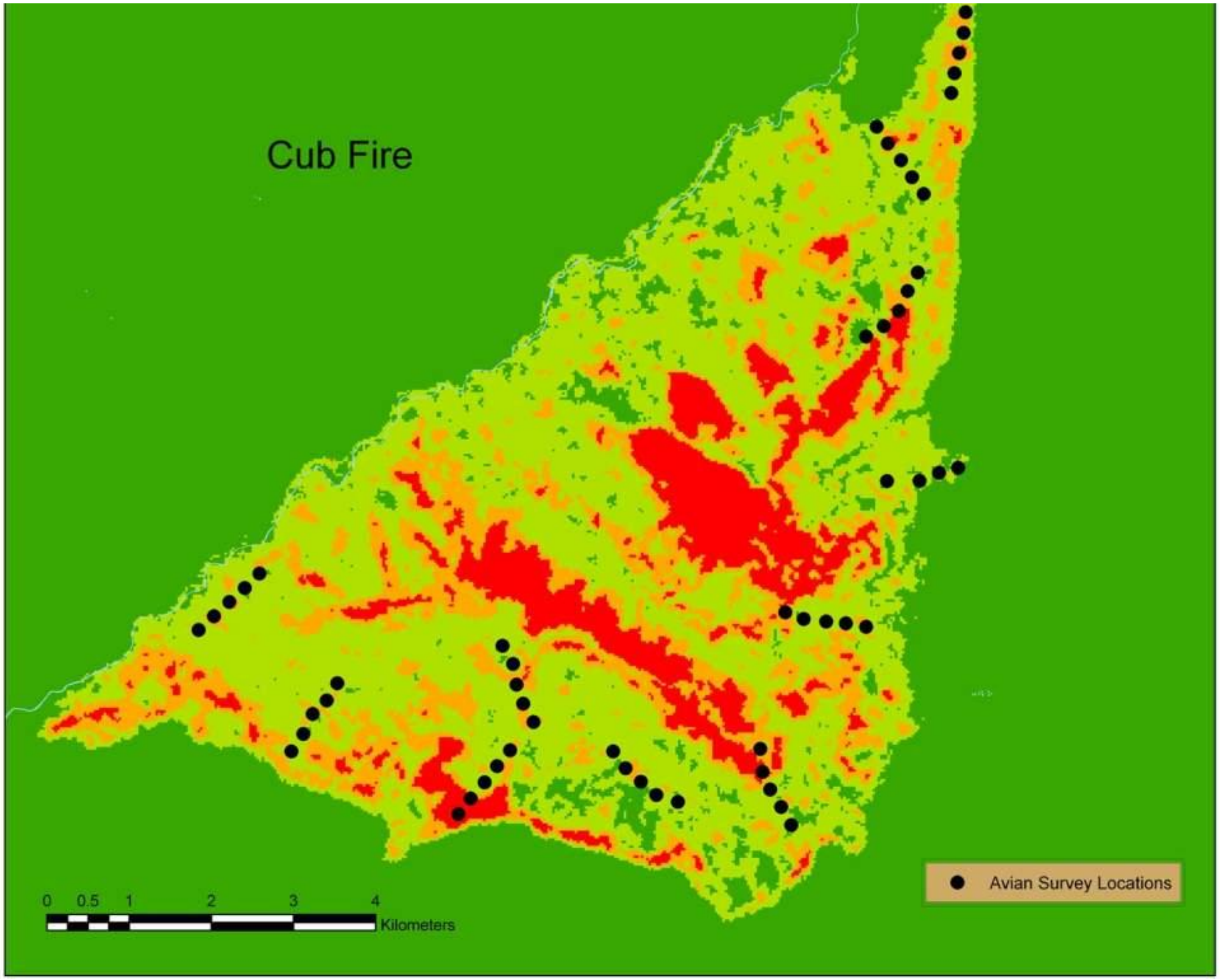
Our sampling is designed to achieve two objectives. First, we will evaluate the degree to which spatial variation in bird abundance and cavity-nest density within the three fires are associated with post-fire vegetation characteristics, fire severity and heterogeneity. These analyses will use both local and landscape predictor variables to understand spatial variation within fires. Second, we will establish baseline data and a monitoring framework for understanding how bird abundance and cavity-nest density change through time including following post-fire management (e.g. salvage, mastication).

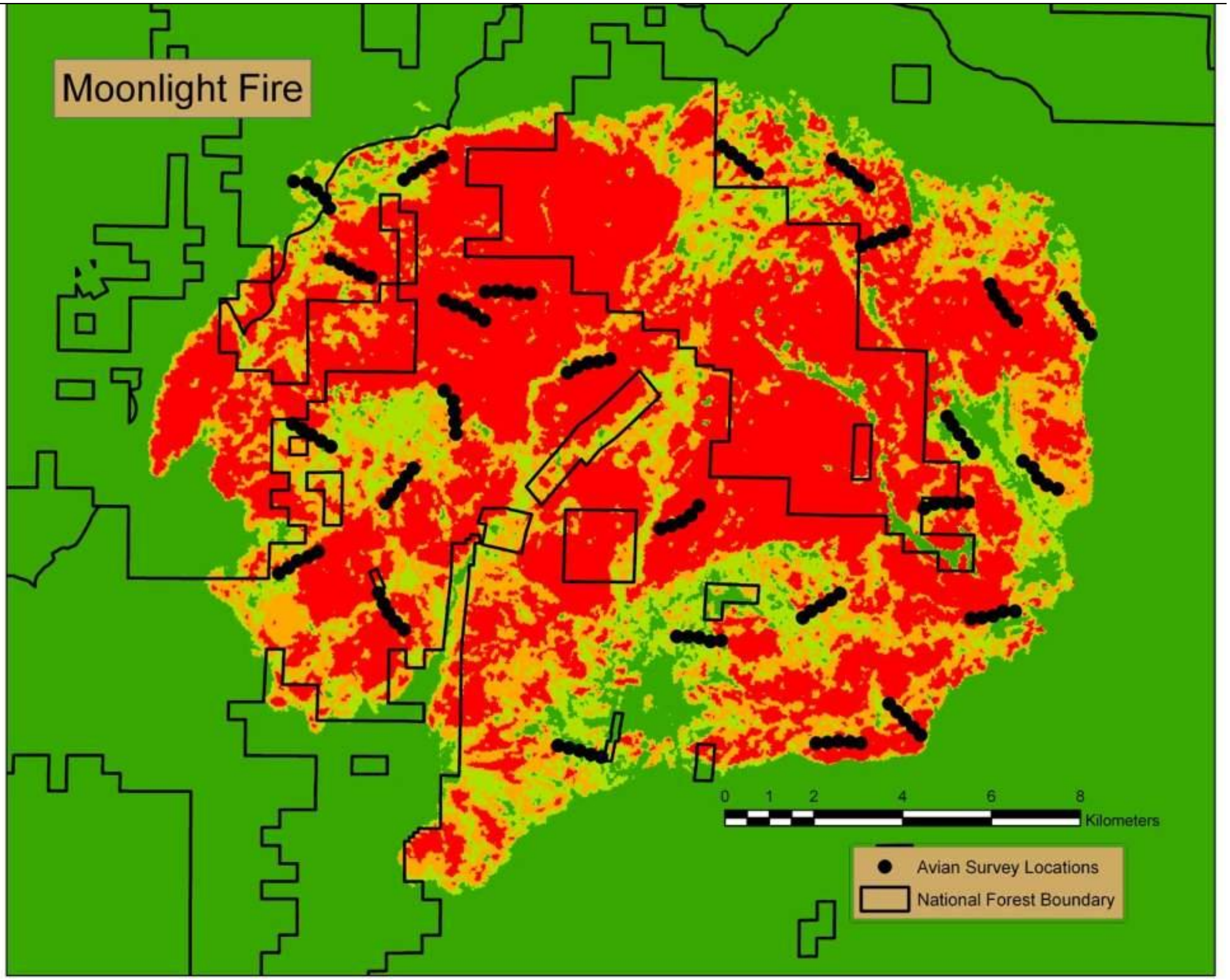
Spatial variation within fires. To understand spatial variation in bird abundance within fires, we will use available data from these areas areas (Vestra vegetation maps, CBI fire severity, LiDAR, etc.) to determine the effect of landscape scale patterns on the abundance and distribution of a suite of the more commonly occurring landbird species.

Management and Disturbance Regimes.
Finally, our existing and ongoing sampling of areas that have not recently been effected by wildfire within the Plumas-Lassen study area (Burnett et al. 2005) will allow for comparison of the distribution and abundance of avian species within several different intensities of fire and unburned forest. We will be able to compare the abundance of species within mechanically treated areas, prescribed fires, and wildfires in order to better understand the ability of mechanical treatments to provide habitat for disturbance dependent species. Additionally, monitoring within post-fire habitat will provide an understanding of the abundance patterns of those species associated with more mature forest conditions within areas affected by fire in the past decade.

Figure 2. The location of point count and cavity nest search transects in Storrie, Cub, and Moonlight fires within the Plumas and Lassen National Forests. Map colors refer to composite burn index fire severity rating (red= high, dark green=none).




Cub Fire
Avian Survey Locations
0 0.5 1 2 3 4
Kilometers


Moonlight Fire
0 1 2 4 6 8
Kilometers
Avian Survey Locations
National Forest Boundary

Personnel
One person can survey 1 transect per day and there are approximately 34 count days per season. We will survey approximately 60 transects across the three fire areas. This will require 4 people for 3 months.

Table 2. Anticipated annual survey effort and personnel needed to conduct PLAS avian monitoring.

Transects Surveyed	Visit per Transect	Count Days Per Person	Persons Needed
60	2	30	4

Quality Assurance and Control

All field personnel hired will have previous experience conducting avian field work and are provided with a audio recordings of the songs and calls of all birds of the Northern Sierra Nevada. Once they arrive on site they undergo an intensive three week training workshop in landbird identification and distance estimation prior to beginning surveys. Each observer must past a field test of double observer point counting with a field crew leader before they are allowed to begin official surveys. The field supervisor will regularly test and calibrate personnel on these techniques throughout the field season.

All point count data will be entered into online accessed databases at the California Avian Data Center. All other data (e.g. vegetation surveys) will be entered into existing PRBO FoxPro databases and regularly backed up onto PRBO servers. Field crews will have access to computers at the field station(s) so data can be entered the same day they are collected. Paper records will be digitally archive at PRBO after entered data has been proofed.

Data Management and Archiving

The principle investigators for this study module will manage all data. Online access to data summaries will be available within 3 months of data being proofed on the California Avian Data Center for use by local managers and other interested parties.

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