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Effects of a Prescribed Burn on Breeding Productivity of Dark-Eyed Juncos (*Junco hyemalis*) in Ponderosa Pine Forests

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A dark-eyed junco in the Chiricahua Mountains, AZ.

Dawn in a ponderosa forest is marked by silence. No people are awake and driving the dirt roads, no dogs are barking, not even the gentle breeze wants to whistle through the trees. In this silence you really start to listen, and suddenly you are bombarded by bird songs. A northern flicker gives its loud, piercing call. Pygmy nuthatches jump around the trees with their endless chatter of beeps, and robins sing from the tree tops. Then, under all of this song, you hear a quiet *chip, chip, chip*, much like a small stone hitting a rock. This is one of the many calls of the dark-eyed junco--the bird I was listening for.

I woke early and tuned my ears to the junco's song because I wanted to examine the effects of a low-intensity burn on its breeding productivity. Although prescribed burning is being used more often in Southwest ponderosa pine forests as a management treatment to reintroduce natural ecosystem cycles, there is limited knowledge on how this treatment affects bird populations. I wanted to contribute to this field of information.

Dark-eyed juncos are ground-nesting sparrows that breed in ponderosa pine forests in Flagstaff every summer. Since these birds are ground-nesters and eat primarily insects while breeding, I hypothesized that fire would have a positive effect on their breeding productivity (how many chicks successfully fledge from the nest) given the well-supported idea that fire increases understory vegetation growth. I reasoned that this increase in understory growth would create more nest sites with greater cover to help prevent predation and make a more suitable habitat for the insects and spiders juncos prey on.

To gather the data needed to determine how juncos are affected by prescribed burning, I needed to find junco nests. My crew and I searched for nests every three to five days in areas of forest that had been burned (treated) and left unburned (the control). We used cues, such as parent and nestling behavior, to locate these nests. Once found, we monitored the nests for a six-week period. We then determined the fate of the nest occupants (successful fledging or failure

with no fledglings), and the level of productivity of the successful birds. I also revisited the nests after the breading season to test for vegetative factors that may have affected the juncos' productivity.

After analyzing my data, I found a trend that suggests dark-eyed juncos had higher productivity in the control units, which is a finding contrary to my hypothesis. Juncos in the control units had more successful nests overall, lost fewer eggs and chicks throughout the breeding period, and the chicks had a higher percent chance of surviving the breeding season (50% in the burned areas and 77% in the control). They seemed to select areas, regardless of the treatment type, with more litter and coarse woody debris. Since the burned areas had significantly more bare ground, there were fewer areas of appropriate breeding habitat for the juncos.

The results of my study suggest that prescribed burns could have negative effects on dark-eyed junco populations by decreasing their breeding productivity. While juncos are a common species across the United States, decreases in their numbers could not only lead to an eventual decrease in populations of animals that prey on them, but could also serve as a model for other ground-nesting birds that might suffer from prescribed burning.

This study leads to the never-ending question: How do we best manage our forests? Is there a way to re-balance the ecology of the forest, allowing all flora and fauna to thrive in their habitats? With each study we come closer and closer to the answers to these questions, and hopefully this research will make a useful contribution.