

Response of Breeding Birds to Spring and Fall Prescribed Burning in Dry Forest Habitat Types of the Intermountain West

Across the Intermountain West, recent management efforts have focused on the use of thinning and prescribed burning to restore dry forest habitat types, such as ponderosa pine and Douglas-fir, to known historical conditions through the reduction of downed woody debris, understory growth, and high tree densities. How forest birds respond to thinning has been relatively well studied; on the other hand, the effects of prescribed burning on breeding forest avifauna has not. This factsheet therefore addresses the response of breeding birds to controlled burn prescriptions in dry forests of the Intermountain West. Traditionally, fall prescribed burns have been used to restore dry forest habitat types. More recently, spring prescribed burns have been introduced to reduce fuel loads prior to subsequent treatment with fall prescribed burns. This factsheet therefore summarizes research conducted in northeast Oregon designed to evaluate the relative effects of

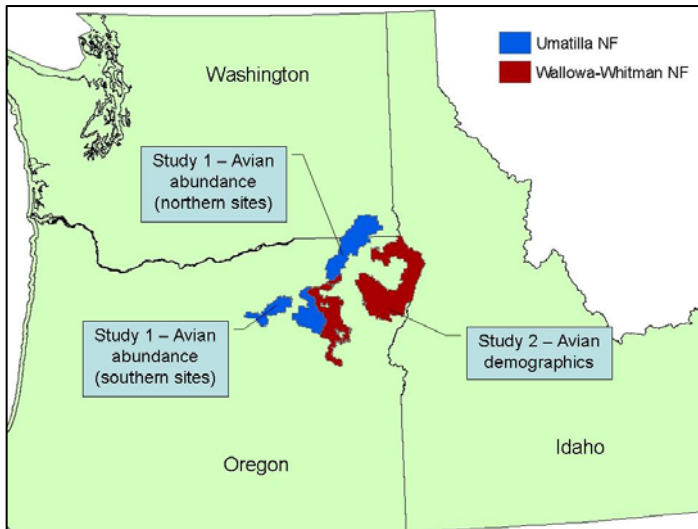


Figure 1. Map of study site locations.

both spring and fall prescribed burns on forest songbirds breeding in ponderosa pine and Douglas-fir forests. Few previous studies have compared the effects of spring versus fall prescribed burns on wildlife populations. In particular, the potential impact of spring prescribed burns on breeding forest birds has not been evaluated in the Intermountain West. This research is especially important because spring burns, although part of the historical fire regime (e.g., fires used by Native Americans, small-scale fires ignited by lightning strikes), may not have been widespread nor an integral component as is the case with fall season fires. Moreover, spring burns can potentially destroy active nests of early season ground-nesting birds. The short-term responses (i.e., 1–2 years postfire) of breeding forest birds to both spring and fall prescribed burns were evaluated through two different studies, conducted at two different locations in the Blue Mountains, northeast Oregon. The first study (1998–2000) assessed differences in avian abundance following prescribed fire treatments and occurred on the Walla Walla and North Fork John Day Ranger Districts (RD) of the Umatilla National Forest. The second study (2003–2004) assessed differences in nesting success and productivity of ground- and low-shrub nesting forest birds following prescribed fire treatments and occurred on the Pine RD of the Wallowa-Whitman National Forest (Figure 1).

Response of birds to spring and fall prescribed burning – effects on avian abundance and community composition

To examine the effects of spring and fall prescribed burning on breeding bird communities, pre- and post-treatment data were collected on 12 study plots located on the Umatilla National Forest. Spring burns occurred during mid-May 1999 on the North Fork John Day RD, near Ukiah; fall burns occurred during mid-October 1999 on the Walla Walla RD, near Tollgate. For both seasons, two study plots were treated with prescribed burns and four were left untreated as controls. Pre- (1998) and post-treatment (1999–2000) data were collected in all 12 study plots and consisted of sampling the breeding bird community using standard fixed-radius point counts, and intensively measuring vegetation characteristics. Forest habitat types ranged from ponderosa pine in the southern region (spring burns) to mixed Douglas-fir / grand fir in the northern region (fall burns).

Using repeated measures analysis of variance, only one species (dusky flycatcher) on the North Fork John Day RD exhibited a significant interaction effect between treatment (burn vs. control) and year (1998, 1999, 2000) – suggesting a possible short-term positive response to spring burning. Aside from the dusky flycatcher, no additional response of



Figure 2. Hand-held drip-torches were one of the methods used to ignite prescription burns; another included aerial ignition via helicopter. Photo by Allyson Turner.



Figure 3. The dusky flycatcher, a common shrub-nester in the Intermountain West, was a target species in this research. Photo by Rex Sallabanks.

any bird species to either spring or fall prescribed burns was detected. Overall, no differences between treatment and control sites were found for either season of burn. Using t-tests to compare treatments and controls, and pre- vs. post-treatment data, vegetation also responded little to prescribed burning. No differences in vegetation in spring or fall burn study plots could be attributed to prescribed burning.

The general lack of effects on avian abundance and community composition as a result of spring or fall burning found in this study suggested one of three things: (1) there was only a minimal effect of prescribed burning on forest birds and vegetation structure; (2) there was insufficient statistical power to detect an effect due to small sample sizes; or (3) effects were not immediately (1–2 years) expressed, whereas more long-term (3–10 years) changes were still possible. Future research should involve larger sample sizes and be conducted over longer time periods to address these possibilities. In addition, nest monitoring should be an important inclusion of future work since this would allow the potential impacts of spring burning on nest survivorship to be assessed. While this initial study suggested a lack of effect of prescribed burning on breeding bird assemblages, more research is urgently needed. A follow-up study (see below) was designed to address some of these recommendations.

Response of birds to spring and fall prescribed burning – effects on nesting success and avian productivity

To further examine the effects of spring and fall burns on breeding forest birds in the Intermountain West, nest success was measured following spring and fall prescribed burns on the Pine RD of the Wallowa-Whitman National Forest, near the town of Halfway, in 2003–2004. Nest success is the probability of a nest fledging at least one young, and can be a more robust indicator of habitat quality than measures of abundance *per se*. This second study was therefore designed to examine differences in nest success for three target species of relatively common ground- and low-shrub nesting forest birds (dark-eyed junco, dusky flycatcher, and chipping sparrow) among burn treatments. The preferred nest sites of these species, generally <5 m high, made them likely to be reliable indicators of any changes in understory structure and composition resulting from prescribed burning.

The close geographic proximity of both spring and fall burns, as well as controls, allowed for direct comparison of the effects of the two burn seasons on nest success. Twelve study plots were established within warm, dry Douglas-fir habitat types. Ponderosa pine forest was the dominant cover type within these forests. Four study plots each, all approximately 36 ha in size, were distributed among spring burns, fall burns, and controls. All burns were conducted in 2002 with spring burns occurring in mid-late April and fall burns in mid-late October (Figure 4). Study plots were embedded within larger burn units that ranged in size from 160–640 ha, and were located within forests characterized by varying management histories.

Nests were located using standardized nest-searching methods. Nest contents (i.e., number of eggs and the age, condition, and number of nestlings) were checked every 3–5 days. A nest was considered successful if ≥ 1 nestling fledged, and depredated if the contents (eggs or nestlings) or the nest was destroyed (or disappeared) prior to the estimated fledging date.

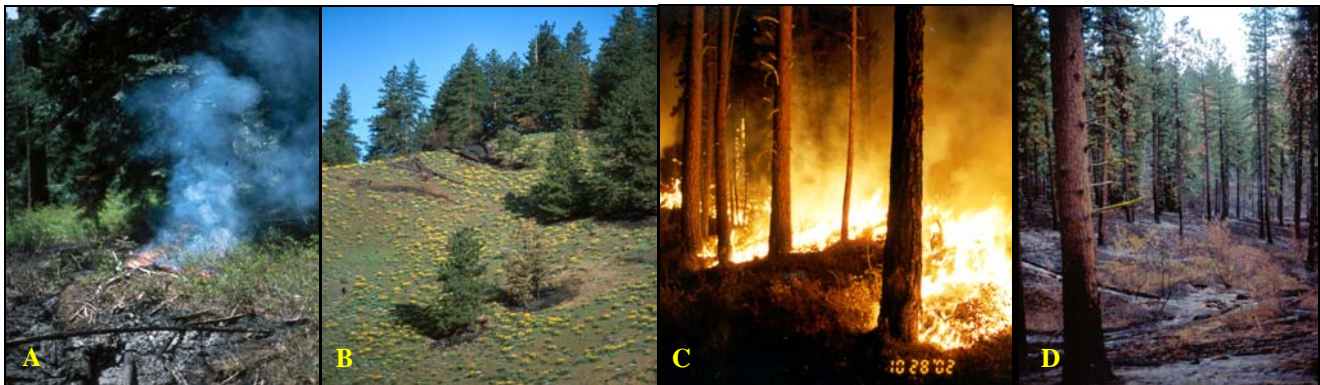


Figure 4. Spring prescribed burns, which were conducted in April 2002 (A), were of very low intensity. As is typical of spring burns, much of the burn unit did not burn (B) due to moisture levels and patches of snow. Fall prescribed burns, which were conducted in October 2002, were typically very hot (C) and resulted in large patches of burned vegetation (D). Despite the differences in fire severity between seasons, there were relatively few differences in vegetative structure among treatments in the year following burning. Photos by Craig Fosdick (A, B, D) and Sparky Lisle (C).

Statistical analyses indicated that nest success differed among prescribed burn treatments for both the dark-eyed junco and dusky flycatcher, but not for the chipping sparrow (Table 1). For the dark-eyed junco, nest success was greatest in spring burns compared with either fall burns or controls, but did not differ between fall burns and controls (Table 1). For the dusky flycatcher, nest success was greater in both spring and fall burns compared with controls, but did not differ between spring and fall burns (Table 1). There were no statistical differences in nest success among treatments when all three species were considered collectively, nor were there any differences in productivity (no. of young fledged per nest) for species among treatments.

Bird Species	Season of Prescribed Burn		
	Spring	Fall	Control
Dark-eyed Junco	50	15	19
Dusky Flycatcher	55	47	15
Chipping Sparrow	37	66	23

Spring burn treatments, at least within the range of size of the burns studied here, had no apparent adverse impacts on nest success for the three species examined. Moreover, spring burns apparently provided the best breeding habitat, among the treatments examined, for both the dark-eyed junco and dusky flycatcher. The apparent lack of detrimental effects of spring burns on nest success is also suggested by the fact that nest success was greatest in spring burns when all nests ($n = 304$) of all species for which nests were found ($n = 22$) were considered collectively. When all nests were considered regardless of species, spring burns contained the highest percentage of successful nests, and the lowest percentage of failed nests (Figure 5).

Since spring burns were conducted on study plots during the year prior to which nest-searching and monitoring efforts occurred, the potential for spring fires to directly burn nests of early-season nesters could not be assessed. Thus, artificial nests ($n = 9$; Figure 6) were placed in two additional forest units selected for treatment with spring prescribed burns in 2004, 1–2 days prior to burning. Nests were placed on the ground to simulate dark-eyed junco nests, and were spaced at densities (~200-m intervals) approximating real dark-eyed junco nests. One forest stand was burned by drip-torch, the other by helicopter. Results of this experiment suggested that the potential for spring prescribed burns to cause direct nest

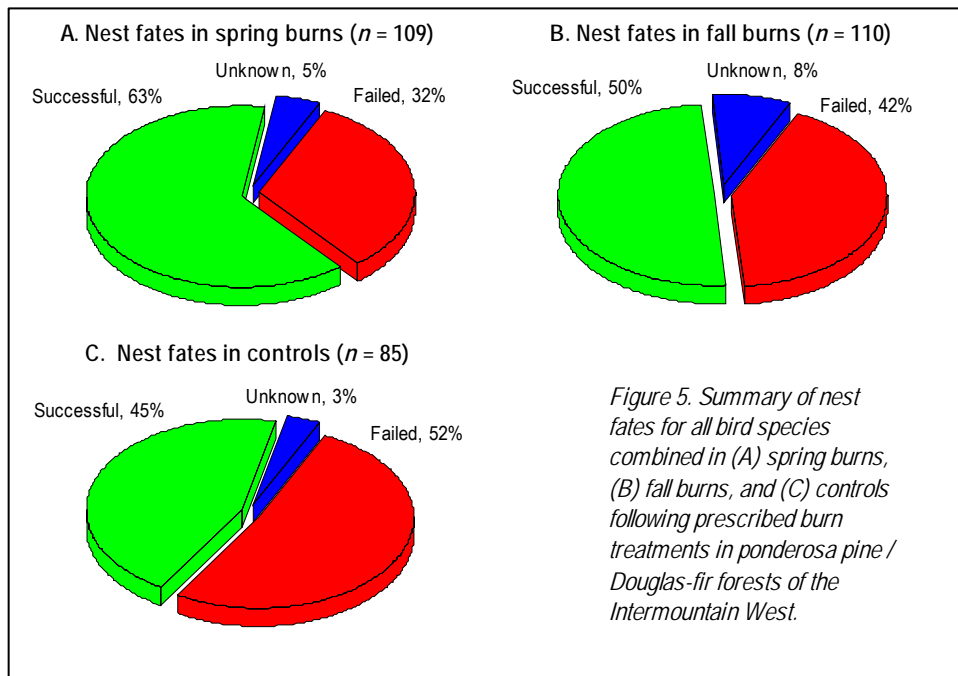


Figure 5. Summary of nest fates for all bird species combined in (A) spring burns, (B) fall burns, and (C) controls following prescribed burn treatments in ponderosa pine / Douglas-fir forests of the Intermountain West.

mortality of ground-nesting forest birds may differ according to how burns are administered. Spring burns administered by helicopter appeared to be more patchy than those administered by drip-torch, and resulted in lower mortality of artificial nests (22%) compared with spring burns administered by drip-torch (44%). However, no statistical comparisons were made due to lack of replication.

Results from the artificial nest experiment indicated that spring burning can result in immediate and direct mortality of ground nests. For real nests, therefore, spring burns that coincide with the nesting period could negatively impact

nest success for ground-nesting birds. However, because relatively few ground-nesting species begin nesting prior to leaf-out across the Intermountain West, spring burns administered prior to leaf-out have little risk of destroying active nests (with the possible exception of those of the dark-eyed junco). It is therefore recommended that wildlife biologists and forest managers implement spring prescribed burns prior to vegetation leaf-out.

Conclusions

Considered collectively, results from this research suggest that neither spring nor fall prescribed burns adversely affected breeding songbirds, either in terms of abundance or demographics. For the bird species, forest habitat types, and geographic areas included in this work, the apparent lack of changes in both avian community composition and nest success following spring burns indicates that spring prescribed burns do not have significant negative impacts on breeding forest songbirds. As a result, it is recommended that spring prescribed burns be employed as a management tool, in

conjunction with fall burns, to restore dry forest habitat types to historical structure and composition throughout the Intermountain West. Although prescribed spring burns may have detrimental effects on some ground-nesting forest birds by causing direct nest mortality, any impacts are likely to be limited to a small subset of the avian community. To further minimize these effects, spring prescribed burns should only be administered *prior* to vegetation leaf-out in the local area. In some cases, wildlife biologists and forest managers should consider that short-term losses of relatively abundant, early-nesting species, such as the dark-eyed junco, may be a necessary trade-off for the effective restoration of dry forests. Such trade-offs may be further justified if populations of dry forest associates, such as the flammulated owl, white-headed woodpecker, and pygmy nuthatch, ultimately benefit from such restoration efforts. Further research and monitoring is needed to better understand the effects of prescribed burning on all species of forest avifauna, as well as to determine if species considered to be historically abundant in dry forest habitat types recolonize and increase in number after restoration has been achieved. Because the scope of the work summarized in this factsheet was primarily confined to changes in understory vegetation and effects on forest songbirds, the potential for prescribed burns to affect snag densities and associated cavity-nesting species should be a high priority.

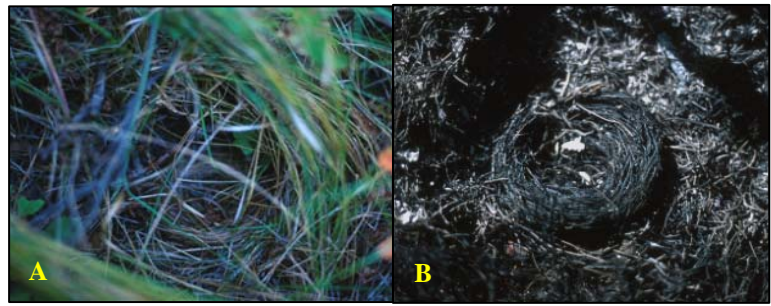


Figure 6. Artificial nests were used to assess likelihood of direct mortality to spring burns. Nests were placed on the ground in sites similar to those selected by the dark-eyed junco (A), such as under fallen branches, grasses, and forbs. More artificial nests were destroyed (B) in burns administered by drip-torch than by helicopter. Photos by Craig Fosdick.

Suggested Further Reading

Fosdick, C. R. 2005. Bird-habitat relationships and the effects of spring versus fall prescribed burning on forest birds in the Blue Mountains, northeastern Oregon. Unpublished M.S. thesis, Boise State University, Idaho. 221 p.

Sallabanks, R., B. G. Marcot, R. A. Riggs, E. B. Arnett, and C. A. Mehl. 2001. Wildlife of Eastside (interior) forests and woodlands. Pages 213–238 *in* Wildlife-habitat relationships in Oregon and Washington. (D. H. Johnson and T. A. O'Neil, manage. dirs.). Oregon State Univ. Press, Corvallis, OR. 736 p.

Sallabanks, R., R. A. Riggs, and L. E. Cobb. 2002. Bird use of forest structural classes in grand fir forests of the Blue Mountains, Oregon. *Forest Science* 48:311–321.

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