Birds and Burns Network
Prescribed Fire Vegetation Analysis 2002
Snags and Trees
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INTRODUCTION

In 2002 we collected information on snags and trees following the Birds and Burns Network vegetation protocol (http://www.rmrs.nau.edu/lab/4251/birdsnburns/) in eight western states: Arizona, Colorado, Idaho, Montana, New Mexico, Oregon, South Dakota, and Washington. In this report we provide density estimates of all snags, trees, and stumps, plus their confidence intervals (90 percent) and their standard errors. All these data represent snag, tree, and stump densities in both control and treatment units before prescribed burning has taken place.

METHODS

Snags were divided into two major categories: 1) wildlife snags; and 2) fuel snags. We defined wildlife snags as any standing dead tree with a diameter at breast height (dbh) $\geq$ 23 cm and $\geq$ 1.4 m in height. We defined fuel snags as any standing dead tree with a dbh ranging from 0.1 to 23 cm. Similarly, we divided live trees into these same two major categories: 1) wildlife trees (> 23 cm dbh); and 2) fuel trees (0.1 to < 23 cm dbh). In addition, we collected information on stump densities. We defined stumps as any natural or cut stump < 1.4 m in height and $\geq$ 15 cm at the top of its bole.

We further divided wildlife snags and trees into two size classes in our analysis: 1) all snags and trees $\geq$ 23 cm dbh; and 2) snags and trees $\geq$ 50.8 cm dbh. Fuel snags and trees were also broken down into six smaller size classes: 1) 0 to < 2.5 cm; 2) 2.5 to < 5 cm; 3) 5 to < 8 cm; 4) 8 to < 13 cm; 5) 13 to < 15 cm; and 6) 15 to < 23 cm dbh. This yielded a total of eight sizes classes for snags and trees and a singular size category for stumps.

We calculated densities snag, stump and tree densities at four levels. The first level was the regional level. We had three regions: southern, northern, and South Dakota. Data from the states of Arizona, Colorado, and New Mexico represent the southern region. Data from Idaho, Montana, Oregon, and Washington make up the northern region. We treated South Dakota as its own region.

Our second level of analysis was at the state level. Our third level of analysis was at the unit level. Among the eight states, we collected information from 34 individual units. A unit was defined as a landscape approximately 250 to 400 hectares. Units within each state were paired as a treatment and control unit. That is one would be burned, whereas the other would not. Our fourth level was at the stratum level. For this analysis we combined all data from each state into one of two strata: 1) open (< 40 percent canopy cover); and 2) closed ($\geq$ 40 percent canopy cover).

For each size class within each of these four levels, we then calculated densities using the nest tree and random point data combined. In addition, we separated nest tree data from random point data. We used t-tests within each level of inquiry to indicate whether any differences existed for snag, stump, and tree densities between nest tree and random points. All states collected both nest tree and random point data with the exception of Montana, which only collected random

point data in 2002. Only trees that contained woodpeckers or bluebirds were included in these analyses.

We considered snags $\geq$ 23 cm dbh as the most important habitat component for cavity-nesting birds in this study. Therefore, we were interested in obtaining the most precise estimates possible of snags in this size class. First, we evaluated various plot designs around nest trees to determine whether the cross pattern with the 50-m arms was the optimal plot shape and size to obtain the best estimates. To accomplish this, we compared precision estimates and sample sizes required using four different plot designs: 1) 50-m cross, 2) 25-m truncated cross, 3) 12.5 m truncated cross and 4) a 100-m straight section. All were centered on the nest tree.

Under the second approach we used a nested plot design. Maintaining the cross design with four 50-m arms, we then investigated the precision and independence of the smaller sampling units within each cross pattern. We did this for both nest tree and random points for each individual state. Using the cross pattern we calculated the means, standard deviations, sample sizes required using one of four patterns: 1) entire cross with 50 m arms (n = number of nest trees, 2) entire cross using each 50 m arm as the sampling unit (n = number of nest trees times four), 3) entire cross using the mean of each of four subsegments in concentric circles (n = number of nest trees times four), and 4) entire cross using the mean of each of two 25 m segments in concentric circles from the nest tree (n = number of nest trees times two). Figure 1 illustrates how sampling units were defined.

To test for the independence of adjacent sampling units we ran serial correlation tests. To do this we paired the first sampling unit at each point with the second sampling unit based on the mean snag density found with each unit. We then obtained a Pearson correlation coefficient between the first and second sampling units to see how much influence the first sampling unit had on the second. We assumed that sampling units with a Pearson correlation coefficient < 0.45 ($R^2 < 0.20$) were independent.

RESULTS

Regional Level

Snags and Stumps

Densities of wildlife snags (≥ 23 cm dbh) ranged from a low of 7.6 ± 1.2 (0.7) [± 90 C.I. (SE)] in the southern region to a high of 28.9 ± 7.5 (4.9) per hectare in South Dakota. Snag densities in the northern region averaged 10 + 1.2 (0.7) per hectare (Table 1). Large snags (> 50 cm dbh), however, were most abundant in the northern region (3.3 snags/ha + 0.6 [0.3]), followed by the southern region (2.5 snags/ha + 0.6 [0.3]), and then South Dakota (0.8 snags/ha + 0.4 [0.2]).

Fine fuel snags (0 to < 2.5 cm) were much higher in the northern region (53.4 snags/ha ± 13.2 [8]) compared to either the southern region (6.7 snags/ha ± 2.3 [1.4]) or South Dakota (8.7 snags/ha ± 6.6 [3.9]). This pattern was similar for fuel snags 2.5 to < 5 and fuel snags 5 to < 8 cm. South Dakota had the highest densities of fuel snags in the largest size class (15 to < 23 cm) with a mean of 34.2 ± 11.1 per hectare (6.6). This compared to only 8.8 ± 1.7 per hectare (1) in the northern region and 6.2 ± 1.8 per hectare (1.1) in the southern region. Stump densities were highest in South Dakota (81.9 stumps/ha + 22 [13.1]), followed by the southern region (50.3 stumps/ha ± 10 [6]), then the north (32.9 stumps/ha ± 4.7 [2.9]).

The southern region reported vegetation data for 43 nest trees and 162 random points. Comparisons of snag densities between nest and random points within the southern region revealed no differences in any categories (Table 1). Stump densities, however, were higher (mean difference = 27.6 stumps/ha) at nest trees (72.1 stumps/ha ± 23.8 [14.1]), compared to random points (44.5 stumps/ha ± 10.9 [6.6]) in this region.

In the northern region, vegetation was sampled around 121 nest trees and 142 random points. We observed no difference in wildlife snag (≥ 23 cm dbh) densities between point types in this region. Large snag (> 50 cm) densities, however, were higher around nest trees (4 snags/ha ± 1 [0.6]) compared to random points (2.7 snags/ha ± 0.7 [0.4]). By contrast, small snags (0 to < 2.5 cm and 2.5 to < 5 cm) were significantly higher at random points compared to nest trees. Large fuel snags (15 to < 23 cm) and stumps were also higher at random points compared to around nest trees in the northern region (Table 1).

In South Dakota, vegetation was sampled around 30 nest trees and 19 random points. Here we observed higher densities of large (15 to < 23 cm dbh) fuel snags around nest trees (47.1 snags/ha ± 16.7 [9.8]) compared to random points (13.8 snags/ha ± 7.6 [4.4]). This was also true for wildlife snags (≥ 23 cm dbh) where densities were about 4.5 times higher around nest trees (41.3 snags/ha ± 10.5 [6.2]) compared to random points (9.3 snags/ha ± 4.4 [2.5]). Stumps densities were also higher around nest trees. This pattern may have been a result of snags within clumps falling over more readily or firewood cutters focusing on these clumps for their fuelwood.

Trees (Regional)

Densities of wildlife trees (≥ 23 cm dbh) ranged from a low of 65.4 ± 16.8 (10) in South Dakota to a high of 146 ± 9.3 (5.6) per hectare in the southern region. Tree densities in the northern region averaged 109 ± 7.6 (4.6) per hectare (Table 2). South Dakota also had the lowest density of large (> 50 cm dbh) trees (2.3 trees/ha ± 1.2 [0.7]). Estimates of large trees in both the northern (19.8 trees/ha ± 1.7 [1.1]) and southern region (20.5 trees/ha ± 2 [1.2]) were similar.

Small (0 to < 2.5 cm dbh) fuel trees were more than twice as abundant in the northern region (170 trees/ha ± 45 [27.4]) and South Dakota (183 trees/ha ± 90 [53.7]) compared to the southern region (79.2 trees/ha ± 16.2 [9.8]). In all other fuel tree size classes (2.5 to < 23 cm dbh) the northern region consistently had the highest densities compared to the two other regions.

Similar to snags, comparisons of tree densities between nest and random points within the southern region revealed no statistical differences although the trend was consistent with higher tree densities surrounding nest trees in all eight size classes (Table 2).

In the northern region, we observed higher densities in the three largest (≥ 15 cm dbh) size classes of trees at random points compared to around nest trees (Table 2). We observed no difference in densities between nest tree and random points for fuel trees in the five smallest size classes.

Tree densities in South Dakota between point types were unique. Random points had significantly higher densities of trees in all size classes at random points compared to nest points (Table 2).

State Level

Snags and Stumps

Snags densities (> 23 cm dbh) among states ranged from a high of 28.9 ± 16.7 (9.8) snags per hectare in South Dakota to a low of 2.2 ± 0.5 (0.3) snags per hectare in Arizona (Table 3). Colorado had the second highest snag densities (18.4 ± 2.6 snags/ha [1.6]), followed by Oregon (11.5 ± 3.1 snags/ha [1.9]), Montana (10.9 ± 2.1 snags/ha [1.3]), Idaho (10.7 ± 2 snags/ha [1.2]), and then Washington (7.1 ± 1.6 snags/ha [1]). New Mexico had the second lowest snag densities (5.6 ± 1.6 snags/ha [1]) next to Arizona.

Large snags (> 50 cm dbh) were most abundant in Colorado (7.2 snags/ha ± 1.4 [0.8]), followed by Idaho (5.7 snags/ha ± 1.3 [0.8]) (Table 3). Idaho was unique, however, in that 53 percent of its wildlife snag (≥ 23 cm dbh) population was comprised of the large (> 50 cm dbh) snags. Colorado followed second with 39 percent of its wildlife snags comprised of the large snags. This was followed by Arizona (27 %), Washington (25 %), Oregon (23 %), New Mexico (14%), Montana (8%), and finally, South Dakota (3%).

Colorado (5.8 stumps/ha ± 2.2 [1.3]) and Idaho (5.6 stumps/ha ± 2.6 [1.5]) also had the lowest densities of stumps. By contrast, South Dakota had the highest stump density (81.9 stumps/ha ± 22 [13.1]), followed by Montana (81.6 stumps/ha ± 18.2 [10.9]) and then Arizona (79 stumps/ha ± 17 [10]).

Montana had the highest density (164 snags/ha ± 64 [38.1]) of small (0 to < 2.5) fuel snags (Table 3). Arizona had very low fuel snag densities (< 3.7 snags/ha) in all size classes relative to other states.

In our comparisons of snag densities between nest and random points, we observed that Arizona, Idaho, and South Dakota had significantly more snags around nest trees (Table 3). Although not statistically significant, we observed the same pattern in all other states except for New Mexico, where nests were primarily located in live oak trees with natural cavities. Only Washington and Idaho supported higher large (> 50 cm dbh) snag densities around nest trees compared to random points.

Trees (State)

Densities of wildlife trees (≥ 23 cm dbh) among states ranged from a low of 65.4 ± 16.8 (10) in South Dakota to a high of 227 ± 18 (10.6) trees per hectare in Montana (Table 3). Similar to snags, Colorado had the highest density (33.6 trees/ha ± 3.9 [2.3]) of large (>50 cm dbh) trees, followed by Idaho with 27.3 ± 3.3 (1.9) large trees per hectare. South Dakota had the lowest density of large trees (2.3 ± 1.2 trees/ha [0.7]).

Oregon had more than twice as many small trees as any of the other states (423 ± 153 trees/ha [92])(Table 4). South Dakota (183 ± 90 trees/ha [53.7]) and New Mexico (176 ± 67.3 trees/ha [39.9]) had the second highest densities of small (0 to < 2.5 cm dbh) fuel trees (Table 4). Idaho had the lowest with only 50.4 ± 17 trees/ha in this size class.

In our comparisons of wildlife tree densities (> 23 cm dbh) between nest tree and random points, we observed that tree densities at random points were significantly higher than at random points in Idaho, South Dakota, and Washington (Table 4). In Arizona, we observed the opposite pattern with tree densities higher around nest trees. Oregon and South Dakota had higher large (> 50 cm dbh) tree densities at random points compared to nest points. In Colorado we observed the opposite pattern.

Unit Level

Sample sizes by individual units were quite small the majority of the time and many results are inconclusive. Nevertheless, some differences were detected between point types within a unit. These are listed below.

Arizona

In 2002 Arizona had one treatment unit (KE) and two control units (MO and BE). Two nest trees were sampled on the MO unit, four on the BE unit, and 10 on the treatment unit identified as KE (Table 5). Forty random points were sampled on each of the KE and MO units. Ten random points were sampled on the BE unit. Ninety random points in all were sampled.

The BE unit had no fuel snags in the five smallest (0 to < 15 cm dbh) size classes at any of its 14 points and relatively low densities in the larger (> 15 cm dbh) size classes (Table 5). Densities in

the stump category were the highest of any on this unit (185 ± 48 stumps/ha [27]). The KE unit had a similar pattern, with very low densities (≤ 0.5 stems/ha) in all the fuel snag size classes (0 to < 23) and low densities in the wildlife snag categories. As with the BE unit, only stumps occurred in any numbers on the KE unit. The MO unit had higher densities (8.6 ± 4.9 snags/ha [2.9]) in the smallest (0 to < 2.5 cm dbh) fuel size classes, all of which were found at random points. Of the three units, the MO unit had the lowest stump densities. Only within the BE unit did we observe any differences in densities for snags (> 23 cm dbh) between nest and random points, where nest trees had higher densities (5 ± 2.4 snags/ha [1]) compared to random points (1.5 ± 1.2 snags/ha [0.7]).

Wildlife tree densities (≥ 23 cm dbh) were the highest (≥ 125 trees/ha) of any categories across all three units in Arizona (Table 6). The only other category that even approached this density was the smallest (0 to < 2.5 cm dbh) tree category on the MO unit (95 ± 18.5 trees/ha [11]).

In our comparisons of densities between points type, we observed higher tree densities at random points (43.4 ± 22.1 trees/ha [13.1]) on the KE unit compared to nest points (12.5 ± 9.7 trees/ha [5.3]) for trees in the smallest size class (0 to < 2.5 cm dbh). Only on the BE unit did we observe any differences in wildlife snag densities between points. Nest trees had about twice as many trees (193 ± 40.3 trees/ha [17.1]) as random points (98 ± 44 trees/ha [24]).

Colorado

Colorado had four units in 2002. It is undecided at this point which units will be paired with each other (G. Vos; pers. commun.) because of logistical concerns. Three nest trees were sampled on the DC, PB, and SCN units and four on the SCS unit for a total of 13 nest trees (Table 7). Five random points were sampled on each of the DC and PB units, 19 on the SCN unit and 18 on the SCS unit for a total of 47 random points.

The SCN (21.9 ± 4.7 snags/ha [2.7]) and SCS (21.4 ± 4.4 snags/ha [2.5]) units appeared to be most similar to each other in regards to wildlife snag (≥ 23 cm dbh) densities. The DC unit had an estimated 14.9 ± 10.9 (4) snags per hectare, where the PB unit had the lowest density of 8.1 ± 5 (2.6). On the DC unit, wildlife snag densities were about twice as high around nest trees (15.8 ± 2.4 snags/ha [0.8]) compared to random points (8 ± 5.4 snags/ha [2.6]). The pattern on the other units was similar, but statistically insignificant.

For wildlife trees (≥ 23 cm dbh) the SCN and SCS units again appeared to have the highest densities (Table 8). On the PB unit large (> 50 cm dbh) trees were more abundant around nest trees (68.3 ± 21.2 trees/ha [7.3]) compared to random points (40 ± 16.2 snags/ha [7.6]). On the SCN unit nest trees (272 ± 124 trees/ha [42.6]) supported higher densities of wildlife trees (≥ 23 cm dbh) compared to random points (150 ± 30.4 trees/ha [17.6]). On the SCS unit, large (15 to < 23 cm dbh) fuel trees were more abundant at random points (133 ± 54.3 trees/ha [54.3]) compared to nest trees (43.8 ± 14.7 trees/ha [6.3]).

Idaho

There were six units in Idaho in 2002. BH is the control unit for FC. DM is the control unit for PC and WM is the control unit for DO. Idaho had a total of 31 nests and 59 random points sampled. Table 9 shows how points were distributed among units. Wildlife snag densities were

highest (≥ 12.5 snags/ha) on the PC, BH, and DM units. Snag densities on the FC, WM, and DO units ranged from 6.9 to 7.8 snags per hectare.

The DO and PC units were the only landscapes where we observed significant differences between nest tree and random points for wildlife snags. Snags were more abundant around nest trees at both of these sites. All other units followed this pattern, but no others tested significantly. We observed no differences in any snag size classes between point types on the BH, DM, FC, and WM units.

The DM unit had the highest wildlife tree densities (126 ± 56 trees/ha [30.2]), followed by the PC unit (102.7 ± 26 trees/ha [14.3]). The WM unit appeared to have the lowest wildlife tree densities (35 ± 29.2 trees/ha [12.4]) but sample sizes were very small (n = 4).

In our comparison between point types, we observed higher wildlife tree (≥ 23 and > 50 cm dbh) densities at random points on the BH unit compared to nest trees (Table 10). On the FC unit fuel trees were more abundant at random points compared to nest trees in three size classes: 1) 5 to < 8 cm; 2) 13 to < 15 cm; and 3) 15 to < 23 cm dbh. On the PC unit we observed the opposite pattern with fuel trees in the 5 to < 8 cm and the 8 to < 13 cm dbh size classes more abundant at nest trees than at random points. We observed no differences in any tree size classes between points on the DM, DO, and WM units.

Montana

Only two units were sampled in Montana in 2002: Strawberry and Maupin. Twenty random points were sampled on each (Table 11). Only random point results are available because nest searching and monitoring will not begin until 2003.

The Maupin unit had higher fuel snag densities in all the smaller size classes (0 to < 8 cm dbh) and this pattern appeared similar throughout the fuel snag size classes (Table 11). This pattern reversed however for wildlife snags where the Strawberry unit had higher densities. Stump densities were also higher on the Strawberry unit.

For fuel trees the Maupin unit had more small trees than the Strawberry unit (Table 12). By contrast, the Strawberry unit had more large (15 to < 23 cm dbh) fuel trees than the Maupin unit.

New Mexico

There were only two units in New Mexico in 2002. The CP unit had ten nests and the LJ unit had four for a total of 14 nests. No random points were sampled on the CP unit, but 25 were sampled on the LJ unit.

Although not statistically different, New Mexico was unique in that wildlife snag (≥ 23 cm dbh) densities appeared higher at random points (6.1 ± 2.3 snags/ha [1.3]) compared to nest tree points (3.8 ± 2.9 snags/ha [1.3]) on the LJ unit (Table 13). For all other states we saw the opposite pattern although, again, not always statistically different. The New Mexico sites are unique because of their forest community type which is comprised of ponderosa pine and oak (Quercus spp). These live oak trees containing heartrot were used as nest trees.

On the LJ unit we observed differences in the two smallest fuel size classes (0 to < 5 cm dbh) for trees between random and nest tree points where tree densities were about five times higher at random points (Table 14).

Oregon

Oregon had a total of 40 nests and 31 random points sampled on four units in 2002. CS is the control unit for TS, and CN is the control unit for TN. Table 15 shows how nests and points were distributed. We observed only one difference between point types on the TN unit. This was for fuel snags in the smallest size class (0 to < 2.5) where random points (146 $\pm$ 75 snags/ha [43.2]) had about three times as many snags as nest trees (45.5 $\pm$ 22 snags/ha [12.2]). On the TS unit fuel snags (2.5 to < 5) were higher at random points. By contrast, large (15 to < 23 cm dbh) fuel snags and wildlife snags (> 23 cm dbh) were higher at nest trees on this same unit. We observed no differences in any snag size classes between points on the CN or CS units where sample sizes were small.

For wildlife trees on the TN unit we observed higher densities of large trees at random points (35.8 $\pm$ 6.4 trees/ha [3.7]) compared to nest trees (20.9 $\pm$ 6.8 trees/ha [3.7]) (Table 16). On the TS units tree densities were significantly higher for fuel snags in the three largest size classes: 1) 8 to < 13 cm; 2) 13 to < 15; and 3) 15 to < 23 cm dbh. We observed no differences in any snag size classes between points on the CN or CS units where sample sizes were small.

South Dakota

South Dakota had six units in 2002. On both the FC and RC units there was only one nest where the vegetation was sampled. The KH and RR units did not have any nest trees, whereas the ST1 had nine nests and the ST2 had 19. This made for a total of 30 nests (Table 17). The RC unit had the highest number (n = 8) of random points sampled. By contrast, the ST1 and ST2 units did not have any random points. The FC unit had five random points, the KH had two, and the RR had four, for a total of 19 random points. Only the FC and RC units had both nest and random points.

The ST1 and ST2 units had the highest wildlife snag densities (>39 snags/ha) (Table 17). These were all located at nest trees. By contrast they also had the lowest wildlife tree densities (< 17 trees/ha), which were but a fraction of tree densities estimated at other units (Table 18).

Washington

Washington had the highest number of nest trees sampled (n = 50). These were distributed among seven units with a low of five nest trees on the HR unit and a high of nine on the ZR unit. Table 19 shows how the nests were distributed. Only 12 random points were sampled for vegetation. All units except for the MT unit had at least one random point sampled. The highest number was three.

The FY unit which had six nests and three random points is the only unit where we detected any differences between point types. Here wildlife snag ($\geq$ 23 cm dbh) densities were higher at nest trees (6.7 $\pm$ 2 snags/ha [1.1]) than at random points (1.7 $\pm$ 4.8 snags/ha [1.7]). The only difference we observed for trees was on the HR unit where random points had higher densities

(125 ± 158 snags/ha [25]) of medium (8 to < 15 cm dbh) fuel snags compared to nest trees (40 ± 45.7 snags/ha [21.4]) (Table 20).

Stratum Level

Sample sizes for strata based on canopy cover within each unit were extremely low or even non-existent in some cases. Therefore, all data within each state were used in this analysis. Density estimates are for all points combined within each stratum and then separated by nest and random point within both the open and closed strata.

Arizona

Arizona had 49 points in the open stratum and 57 within the closed stratum (Table 21). Within the open stratum, only three points were nest trees and 46 were random points. Within the closed stratum 13 points were nests and 44 were random.

Between strata, we detected a difference in wildlife snags where densities were higher in the closed stratum (2.8 ± 0.7 snags/ha [0.4]) compared to the open stratum (1.5 ± 0.6 snags/ha [0.3]). The only other difference we detected was within the closed stratum. Again for wildlife snags, we observed that nests had higher densities (4.2 ± 1.3 snags/ha [0.7]) of wildlife snags than random points (2.3 ± 0.9 snags/ha [0.5]) within the closed stratum.

The situation for trees in Arizona was definitive. Both fuel and wildlife trees were significantly more abundant in the closed category compared to the open stratum (Table 22). The only difference within the open stratum was in the small (0 to < 2.5 cm dbh) tree size class where random points had higher densities (76.6 ± 21.8 snags/ha [13]) compared to nest trees (12.5 ± 21.1 snags/ha [7.2]). Small trees within the closed stratum between points revealed the same difference.

Colorado

All nests and random points within Colorado were in the closed stratum (Tables 3 and 4).

Idaho

Idaho had 54 points in the open stratum and 36 in the closed stratum (Table 23). Snag densities were significantly higher in the closed stratum for all size classes of snags except in the 13 to < 15 cm dbh category and the stump category. Within the open stratum only wildlife snags ≥ 23 and > 50 cm dbh differed between point types; nest trees had higher densities. Within the closed stratum the only difference we observed was for snags > 50 cm dbh.

Tree densities between strata in Idaho followed the same pattern as snags. That is, tree densities were significantly higher in the closed stratum in all tree size classes (Table 24). Within the open stratum we found higher tree densities at random points for fuel snags 8 to < 13 and fuel snags 15 to < 23 cm dbh compared to nest trees. Within the closed stratum we detected no differences in tree densities within any of the size classes.

Montana

All random points within Montana were in the closed stratum (Tables 3 and 4).

New Mexico

Only four points were located in an open stratum in New Mexico all of which were random points (Table 25). The closed stratum contained 35 points. With all points combined we detected differences in snag densities between the open and closed strata for three categories: 1) fuel snags 5 to < 8 cm dbh; 2) wildlife snags > 23 cm dbh; and 3) stumps. In all cases densities were higher in the closed category. Within the closed stratum we observed differences between nest and random points in two fuel snag size classes: 1) 5 to < 8; and 2) 8 to 13 cm dbh class.

Tree densities were higher for most size classes in the closed stratum compared to the open stratum in New Mexico (Table 26). Within the closed stratum we observed higher fuel tree densities at random points compared to nest trees for two size classes: 1) 13 to < 15; and 2) 15 to < 23 cm dbh) .

Oregon

Oregon had 43 points in the open stratum and 27 in the closed stratum (Table 27). One nest tree was unidentified in regards to stratum. Medium size (8 to < 13 cm dbh) fuel snags were more abundant in the closed stratum (29.2 $\pm$ 14.8 snags/ha [8.7]) of Oregon compared to the open stratum (11.3 $\pm$ 4.3 snags/ha [2.5]). Both categories (> 23 and > 50 cm dbh) of wildlife snags were also higher in the closed stratum in Oregon compared to the open stratum (Table 27).

Within the open stratum fuel snags in the smallest three size classes were all higher at random points compared to nest tees (Table 27). In the closed stratum large (15 to < 23 cm dbh) fuel snag densities were higher around nest trees compared to random points.

We observed no differences in tree densities between strata in any size classes in Oregon (Table 28). Within the open stratum random points had higher densities of trees than nest trees in three size classes: 1) 2.5 to < 5; 2) 5 to < 8; and 3) > 50 cm dbh. Within the closed stratum, we observed no differences between nest and random points in any tree size classes.

South Dakota

South Dakota had 31 points in the open stratum and 18 in the closed stratum (Table 29). Between strata densities were higher in the open stratum compared to the closed stratum in three categories: 1) 15 to < 23 cm dbh; 2) $\geq$ 23 cm dbh; and 3) stumps. Within the open stratum both wildlife snags (> 23 cm dbh) and stumps were significantly higher around nest trees compared to random points. We detected no differences with the closed stratum but only two nest trees were sampled.

For all size classes of trees in South Dakota, we observed a definitive pattern of higher densities within the closed stratum compared to the open stratum (Table 30). Within the open stratum we observed that random points (96.7 $\pm$ 24.3 snags/ha [8.3]; n = 3) had about seven times more wildlife trees ($\geq$ 23 cm dbh) compared to nest trees (13.6 $\pm$ 8.2 snags/ha [4.8]). We observed no differences between nest (n = 2) and random points with the closed stratum.

Washington

Washington had 17 points in the open stratum and 45 in the closed stratum (Table 31). Fuel snag densities in the two smallest sizes classes were higher in the closed stratum compared to the open stratum. Only two random points were sampled in the open stratum and we observed no differences in densities in any snag size classes between nest and random points with this stratum. Within the closed stratum, small fuel snags (0 to <8 cm dbh) were higher around nest trees compared to random points in all three size classes.

Tree densities in Washington were higher in the closed stratum for all tree size classes but two: 1) 13 to < 15; and 2) > 50 cm dbh (Table 32). Within the open stratum we observed higher wildlife tree densities between point types with conflicting results. This is likely due to the small sample size (n = 2) of random points within this stratum. Within the closed stratum wildlife tree (> 23 cm dbh) densities were higher at random points, while fuel snags in the 8 to < 13 and 13 to < 15 cm dbh classes were more abundant around nests.

Optimal Plot Size for Wildlife Snags (> 23 cm dbh)

Truncated plots around nest trees

In our analysis of truncated plot designs surrounding nest trees we observed that the cross design with 50-m arms most often gave the most precise estimate of snag densities (57% of the time) and also most often required the smallest number of samples to obtain our desired level of precision (i.e. to be within 20 percent of the true mean 90 percent of the time). This was true for Arizona, New Mexico, and Oregon, and Washington (Table 33). This was followed by the truncated cross with 12.5 m arms (South Dakota and Colorado), with a straight line transect centered on the nest giving the most precise estimate in Idaho.

Precision levels among plot designs varied within states. For example, in South Dakota the top ranking plot design (24.5 %) was only 1.1 more precise than the bottom ranking design (25.6 %). By contrast in Arizona where snags densities were relatively low, we observed a gain of 24 percent using the entire cross design (26 %) versus a truncated cross with 12.5 m arms (50 %). In New Mexico our precision levels increased by 15.7 percent between the same two plots designs.

One of the main objectives of our study was to maintain a standardized sampling protocol among all states. A second main objective was to obtain the most precise estimate possible of wildlife snags (≥ 23 cm dbh) at both nest and random points because of their importance to cavity-nesters. In our study nest trees are the limiting factor so the plot design that gave us the best densities estimates around nest trees, we chose to use for random points as well. As mentioned above, the entire cross design required the smallest number of nest trees needed to obtain our desired level of precision and gave the most precise estimate in the majority of our states. Therefore, we selected this design for the remainder of our plot analyses.

Optimal Sampling Unit for Wildlife snags (> 23 cm dbh)

Figure 1 illustrates the different nested sampling units we evaluated for precision and independence in our analysis of wildlife snags. All nested sampling units were part of the entire cross plot design.

In Arizona, using each 50-m arm of the cross as the sampling unit around nests increased our precision levels for wildlife snags (> 23 cm dbh) from 26 to 12.4 percent (Table 34). Statistical analysis (Pearson correlation test: r = 0.16) indicated these sampling units could be considered independent. By contrast, we observed little difference in precision levels among sampling units for random points.

Colorado was similar to Arizona in that use of the 50-m arms as our sampling unit around nest trees, rather than the entire cross, increased our precision levels from 35.2 to 16.7 percent (Table 35). Statistical analysis (Pearson correlation test: r = 0.33) indicated these sampling units could be considered independent although the 12.5 or 25 m lengths revealed units were serially correlated. Also similar to Arizona, we observed relatively little change in our precision performance for random points based on sampling unit size.

Fifty meter arms were also the best sampling unit for snags around nest trees for Idaho (Table 36). Precision levels changed from 27.3 for the entire cross to 13.3 when we used the 50-m arms of each plot as the sampling unit instead. Statistical analysis (Pearson correlation test: r = 0.14) indicated these sampling units could be considered independent. Using the 50-m arms for random points in Idaho changed our precision levels from 25.6 to 17.3 percent.

Montana did not have nest tree data in 2002. We observed only a small amount of gain form random plots in Montana from 19.5 for the entire cross to 17.1 percent for the 50-m arms (Table 37). Statistical analysis (Pearson correlation test: r = 0.09) indicated these sampling units could be considered independent.

We observed a dramatic increase in precision for our snags density estimates around nests in New Mexico when we used the 50-m arm as our sampling unit where our precision level went from 47 percent for the entire cross versus 22.4 percent for the 50-m arms (Table 38). Statistical analysis (Pearson correlation test: r = 0.12) indicated these sampling units could be considered independent. Unlike other states, we also realized a gain in precision for random points in New Mexico (from 37.5 to 26.1 percent) using the 50-m arms. Again, the 50-m arms gave us the best estimate. Likewise, our tests revealed independence of sampling units (Pearson correlation test: r = 0.31).

Oregon was unique among all states because of the high degree of serial correlation (Pearson correlation tests: $r \geq 0.46$) between all sampling units around nest trees (Table 39). That is, none of the nested sampling units were independent (Pearson correlation tests: $r \geq 0.46$) within the cross design making it necessary to use the entire cross design for our sampling unit. Oregon also required the highest number of nest trees to obtain our desire level of precision suggesting a high degree of variability for snags on this landscape (Table 33).

Precision levels for South Dakota revealed the same lack of independence we observed in Oregon (Table 40). Therefore, we would have to retain the entire cross design for our sampling unit around nest trees in South Dakota. For random points we also observed independence problems between adjacent sampling units using the 12.5 and 25 m units (Pearson correlation tests: $r \geq 0.53$). Using the 50-m arms for random points, however, changed our precision level

from 47.3 for the entire cross to 32.1. Independence was not a problem for these sampling units (Pearson correlation tests: r = 0.26).

The nested 50-m arms within the cross design was once again chosen as the optimal sampling unit for snag density estimates around nest trees in Washington (Table 41). Our precision levels for nest trees in this state went from 24.7 for the entire cross to 12.2 percent using the 50-m arms. Statistical analysis (Pearson correlation test: r = 0.20) indicated these sampling units could be considered independent. Precision levels for snags at random points was poor (51.8 to 66.6 percent) regardless of the sampling unit chosen; this was likely a reflection of the small sample size (n = 12). In addition, these random samples were taken across all units likely adding to the variability and hence the large number of samples required within this category.

Wildlife Use

Snags

The number of snags available and the number with new foraging signs among decay classes varied widely among all eight states (Table 42). South Dakota had an unusually large number of snags (n = 429) in decay class II that were available for foraging. Of these 249 exhibited signs of new foraging (58%). Arizona and New Mexico had the smallest number of snags available in all decay classes. Montana and New Mexico had the smallest number of snags with signs of new foraging. Montana was the only state lacking any snags in decay class III that exhibited signs of new foraging. Colorado, Montana, and New Mexico had relatively low percent use of snags for foraging relative to the other states.

Similar to new foraging signs, Colorado, Montana, and New Mexico had the lowest percentages of snags available having a new cavity among all states (Table 43). Although the number of snags available in Arizona was low, a relatively large proportion of these had new cavities. Decay class II showed the highest number of cavities within most states. This did not always translate into the highest percent use value for new cavities, however, which was shared equally by decay class III.

Just as one would expect, the percent use of available snags containing either an old or new cavity increased mainly in the more advanced decay classes (Table 44). Percent use of any age of cavity changed little, if at all, in decay class I in most states. South Dakota had the highest number of cavities (n = 101) in any of the states in its decay class II. Montana had the lowest overall percent use of any age of cavity.

Ponderosa pine (PIPO) was the most available snag species available in all eight states except for New Mexico (Table 45). In New Mexico, 41 QUGA snags were encountered, whereas 40 PIPO snags were encountered. PIPO snags had the highest number of snags exhibiting signs of new foraging in every state. Most often this also translated into the highest percent use value within a state except in Montana (POTR) and Washington (PICO) where small numbers in other species classes were available, and a large percentage were used. South Dakota and Arizona had the fewest (n = 2) species of snags available; Colorado and Washington had the most (n = 5). All but one snag in South Dakota was a PIPO, which made it unique among all states.

Ponderosa pine snags had the highest number of cavities of any species available that contained a new cavity. Due to low numbers of certain species available in each state, however, this did not always translate into the highest percent use (Table 46). South Dakota again had the highest number of new cavities (n = 47) all of which were in PIPO. Washington had one new cavity in a SASC.

As with decay classes (Table 43) we saw our percent use values increase for snag species available when we considered both new and old cavities (Table 47). Washington had some of the overall highest percent use values of all eight states. Again Montana and New Mexico had the lowest number of snags present containing a cavity.

Trees

The number of trees available for foraging (Table 48), compared to the number of snags available (Table 42), increased multiple times for every state except South Dakota (Table 48). Idaho and Arizona had two of the highest numbers, and percent use values, of trees with new foraging of any states. Hollow trees were rare and showed no foraging signs except in New Mexico.

The percent use of live trees with new cavities was extremely low in all states (Table 49). Indeed, Montana and South Dakota did not have any new cavities in live trees regardless of structure class. New Mexico had the highest number of live trees with new cavities, followed by Washington and Oregon.

New Mexico, followed by Washington, led the states in the number of both new and old cavities in live trees (Table 50). South Dakota did not have any cavities in any live trees. Montana only had one. Percent use was highest in New Mexico.

Colorado had the largest number (n = 8) of tree species available, followed by Washington (n = 6) and New Mexico (n = 6) (Table 51). South Dakota only had two tree species encountered. In most states, PIPO trees had the largest number of live trees with new foraging signs. Oregon was an exception with PICO trees showing more signs than PIPO.

The number and percentage of trees by species with a new cavity was extremely low (< 0.1) or non-existent (Table 52). New Mexico was the only exception with 4.2 percent of the QUGA live trees (n = 167) containing a new cavity. The percent for QUGA in New Mexico increased to 27.5 percent when both old and new cavities were considered (Table 53). Washington also had a relatively high number of cavities when both old and new ones were considered.

Table 1. Mean snag and stump densities per hectare ± 90% confidence interval (SE) and sample size for Birds and Burns study sites located in three geographic regions: southern, northern, and South Dakota.. Densities given for all points combined, and separated by nest and random points. Data collected in 2002.

	Snags and stumps per hectare ± 90% Confidence interval (SE)								
	Southern region: Arizona, Colorado, New Mexico. Checked.			Northern region: Idaho, Montana, Oregon, Washington			South Dakota		
Snag size class (cm)	Combined (n = 205)	Nest (n = 43)	Random (n = 162)	Combined (n = 263)	Nest (n = 121)	Random (n = 142)	Combined (n = 49)	Nest (n = 30)	Random (n = 19)
0 to < 2.5	6.7 ± 2.3 (1.4)	8.1 ± 4.7 (2.8)	6.3 ± 2.7 (1.6)	53.4 ± 13.2 (8)	21.4 ± 6.6** (4)	80.7 ± 23.1** (14)	8.7 ± 6.6 (3.9)	5 ± 3.1 (1.9)	14.5 ± 17 (9.8)
2.5 to < 5	8.5 ± 2.9 (1.7)	9.9 ± 4.5 (2.7)	8.2 ± 3.4 (2.1)	42.7 ± 9.5 (5.8)	25.8 ± 11.1** (6.7)	57 ± 14.7** (8.9)	3.8 ± 1.6 (1)	2.5 ± 1.6 (1)	5.9 ± 3.5 (2)
5 to < 8	12.2 ± 3 (2.4)	14.2 ± 8.6 (5.1)	11.7 ± 4.5 (2.7)	27.2 ± 6 (3.6)	24.2 ± 10.3 (6.3)	29.8 ± 6.7 (4)	7.4 ± 2.7 (1.6)	7.5 ± 3.8 (2.2)	7.2 ± 4.2 (2.4)
8 to < 13	10 ± 2.6 (1.6)	9 ± 5 (3)	10.3 ± 2.9 (1.8)	18.2 ± 3.8 (2.3)	15.5 ± 6.7 (4.1)	20.4 ± 4.1 (2.5)	15.8 ± 5.6 (3.3)	14.6 ± 6.7 (3.9)	17.8 ± 10.4 (6)
13 to < 15	3.6 ± 1.2 (0.7)	4.1 ± 2.3 (1.4)	3.5 ± 1.3 (0.8)	4.8 ± 1.3 (0.8)	5.3 ± 2.3 (1.4)	4.5 ± 1.3 (0.8)	9.7 ± 4.4 (2.6)	12.1 ± 6.7 (3.9)	5.9 ± 4.2 (2.4)
15 to < 23	6.2 ± 1.8 (1.1)	6.4 ± 2.7 (1.6)	6.2 ± 2.1 (1.3)	8.8 ± 1.7 (1)	6.8 ± 2.2* (1.3)	10.6 ± 2.4* (1.5)	34.2 ± 11.1 (6.6)	47.1 ± 16.7** (9.8)	13.8 ± 7.6** (4.4)
≥ 23	7.6 ± 1.2 (0.7)	9.8 ± 3.2 (1.9)	7 ± 1.2 (0.8)	10 ± 1.2 (0.7)	11.3 ± 2.1 (1.2)	9 ± 1.4 (0.8)	28.9 ± 7.5 (4.9)	41.3 ± 10.5** (6.2)	9.3 ± 4.4** (2.5)
≥50	2.5 ± 0.6 (0.3)	2.7 ± 1.3 (0.7)	2.5 ± 0.6 (0.4)	3.3 ± 0.6 (0.3)	4 ± 1* (0.6)	2.7 ± 0.7* (0.4)	0.8 ± 0.4 (0.2)	0.9 ± 0.6 (0.3)	0.5 ± 0.5 (0.3)
Stumps	50.3 ± 10 (6)	72.1 ± 23.8** (14.1)	44.5 ± 10.9* (6.6)	32.9 ± 4.7 (2.9)	25 ± 4.9** (2.9)	39.6 ± 7.7** (4.7)	81.9 ± 22 (13.1)	113 ± 30** (17.6)	32.9 ± 23.2** (13.4)

* Mean densities within a region differ between nest and random values $P < 0.10$.

** Mean densities within a region differ between nest and random values $P < 0.05$.

Table 2. Mean trees per hectare ± 90% confidence interval (SE) and sample size for Birds and Burns study sites located in three geographic regions: southern, northern, and South Dakota. Densities given for all points combined, and separated by nest and random points. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)								
	Southern region: Arizona, Colorado, New Mexico			Northern region: Idaho, Montana, Oregon, Washington			South Dakota		
Tree size class (cm)	Combined (n = 205)	Nest (n = 43)	Random (n = 162)	Combined (n = 263)	Nest (n = 121)	Random (n = 142)	Combined (n = 49)	Nest (n = 30)	Random (n = 19)
0 to < 2.5	79.2 ± 16.2 (9.8)	104.1 ± 54.9 (32.6)	72.6 ± 14.7 (8.9)	170 ± 45 (27.4)	169 + 65 (38.9)	171 ± 64 (38.5)	183 ± 90 (53.7)	82.1 ± 39.3* (23.2)	342 ± 220* (127)
2.5 to < 5	40.7 ± 11 (6.6)	69.2 ± 29.8 (17.7)	33.2 ± 11.3 (6.9)	174 ± 41 (25.3)	159 ± 46 (27.8)	186 ± 67 (40.4)	61.7 ± 50.7 (29.3)	11.3 ± 8.8* (5.2)	141 ± 126* (72.6)
5 to < 8	36 ± 9.1 (5.5)	60.2 ± 19.5 (11.6)	29.6 ± 10.2 (6.2)	137 ± 22 (13.5)	136 ± 30 (18.2)	137 ± 33 (19.7)	39 ± 23 (13.7)	9.2 ± 12.8** (7.5)	86.2 ± 53.8** (30.8)
8 to < 13	51.8 ± 10.7 (6.5)	71.8 ± 23 (13.7)	46.5 ± 12.1 (7.3)	121 ± 14 (8.6)	122 ± 23 (14)	120 ± 18 (10.7)	37.8 ± 16.2 (9.7)	12.5 ± 11.9** (7)	77.6 ± 33.6** (19.3)
13 to < 15	18.7 ± 3.3 (2)	25 ± 6.1 (3.7)	17.1 ± 3.8 (2.3)	38.8 ± 4.5 (2.8)	36.4 ± 7.2 (4.4)	40.8 ± 5.8 (3.5)	14 ± 6.7 (4)	2.9 ± 3** (1.8)	31.6 ± 14.9** (8.6)
15 to < 23	64.9 ± 8.9 (5.4)	74.7 ± 16.5 (9.8)	62.3 ± 10.4 (6.3)	84.4 ± 83 (5)	71.2 ± 11.3** (6.9)	95.7 ± 12** (7.1)	37.8 ± 16.4 (9.8)	24.5 ± 11.2** (6.6)	76.3 ± 36** (20.4)
≥ 23	146 ± 9.3 (5.6)	166 ± 17.3 (10.3)	140 ± 10.8 (6.5)	109 ± 7.6 (4.6)	82.1 ± 7.5** (4.5)	132 ± 11.6** (7)	65.4 ± 16.8 (10)	24.5 ± 15.1** (8.9)	130 ± 18** (10.4)
≥50	20.5 ± 2 (1.2)	27.6 ± 5.4 (3.2)	18.6 ± 2 (1.2)	19.8 ± 1.7 (1.1)	16.9 ± 2.4** (1.4)	22.2 ± 2.6** (1.6)	2.3 ± 1.2 (0.7)	0.3 ± 0.6** (0.3)	5.5 ± 2.6** (1.5)

* Mean densities within a region differ between nest and random values $P < 0.10$.

** Mean densities within a region differ between nest and random values $P < 0.05$.

Table 3. Mean snag and stump densities per hectare ± 90% confidence interval (SE) and sample size for Birds and Burns study sites located in the eight states. Densities given for all points combined, and separated by nest tree and random points. Nest tree information is only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% confidence interval (SE)								
	Arizona			Colorado			New Mexico		
Snag size class (cm)	Combined (n = 106)	Nest (n = 16)	Random (n = 90)	Combined (n = 60)	Nest (n = 13)	Random (n = 47)	Combined (n = 39)	Nest (n = 14)	Random (n = 25)
0 to < 2.5	3.7 ± 2.0 (1.2)	0.8 ± 1.4** (0.8)	4.2 ± 2.4** (1.4)	2.8 ± 2.1 (1.2)	2.9 ± 3.7 (2.1)	2.7 ± 2.5 (1.5)	21.1 ± 9.7 (5.8)	21.4 ±12.6 (7.1)	21 ± 14 (8.2)
2.5 to < 5	1.3 ± 0.8 (0.5)	0	1.5 ± 0.9 (0.6)	10.8 ± 4.1 (2.4)	12.5 ± 11.6 (6.5)	10.4 ± 4.3 (2.6)	24.7 ± 12.8 (7.6)	18.8 ± 8.3 (4.7)	28 ± 20 (11.6)
5 to < 8	0.5 ± 0.4 (0.2)	0.8 ± 1.4 (0.8)	0.4 ± 0.4 (0.2)	28.6 ± 9 (5.4)	41.3 ± 25.3 (14.2)	24.5 ± 9.4 (5.6)	19.6 ± 14.2 (8.4)	4.5 ± 5** (2.8)	28 ± 22* (12.9)
8 to < 13	0.2 ± 0.3 (0.2)	0	0.3 ± 0.3 (0.2)	25.6 ± 6.7 (3.9)	25 ± 14.5 (8.1)	25.3 ± 7.6 (4.5)	13.1 ± 6.5 (3.8)	4.5 ± 3.7** (2.1)	18 ± 9.7** (5.7)
13 to < 15	0.1 ± 0.2 (0.1)	0	0.1± 0.2 (0.1)	10.4 ± 3.6 (2.1)	10.6 ± 7.1 (4)	10.4 ± 4.2 (2.5)	2.6 ± 1.6 (0.9)	2.7 ± 2.5 (1.4)	2.5 ± 2.1 (1.3)
15 to < 23	0.7 ± 0.5 (0.3)	3.1 ± 3.2 (1.8)	0.3 ± 0.3 (0.2)	16 ± 5.3 (3.1)	9.6 ± 5.7 (3.2)	17.8 ± 6.6 (3.9)	6.1 ± 2.7 (1.6)	7.1 ± 6 (3.4)	5.5 ± 2.8 (1.6)
≥ 23	2.2 ± 0.5 (0.3)	4.2 ± 1.1** (0.6)	2.2 ± 0.5** (0.3)	18.4 ± 2.6 (1.6)	22.3 ± 7.9 (4.4)	17.3 ± 2.7 (1.6)	5.6 ± 1.6 (1)	4.6 ± 2.2 (1.2)	6.1 ± 2.3 (1.3)
≥50	0.6 ± 0.2 (0.1)	1.1 ± 0.8 (0.5)	0.6 ± 0.2 (0.1)	7.2 ± 1.4 (0.8)	6.7 ± 3.5 (1.9)	7.2 ± 1.4 (0.9)	0.8 ± 0.4 (0.2)	0.9 ± 0.6 (0.3)	0.7 ± 0.5 (0.3)
Stumps	79 ± 17 (10)	134 ± 49 (28)	69 ± 18 (11)	5.8 ± 2.2 (1.3)	12.5 ± 7.1* (4)	4.0 ± 1.8* (1.1)	40 ± 14.3 (8.5)	56 ± 31 (17.7)	31 ± 14.6 (8.5)

Table 3 (cont).

	Snags and stumps per hectare ± 90% confidence interval (SE)									
	Montana[1]	Idaho			Oregon			Washington		
Snag size class (cm)	Random (n = 40)	Combined (n = 90)	Nest (n = 31)	Random (n = 59)	Combined (n = 71)	Nest (n = 40)	Random (n = 31)	Combined (n = 62)	Nest (n = 50)	Random (n = 12)
0 to < 2.5	164 ± 64 (38.1)	21 ± 10.4 (6.3)	9.7 ± 7.5* (4.4)	26.9 ± 15.4* (9.2)	62.8 ± 23.5 (14.1)	30 ± 11.9** (7.1)	105 ± 50** (29.6)	18.6 ± 9.8 (5.9)	21.8 ± 12** (7.2)	5.2 ± 5.8** (3.2)
2.5 to < 5	92 ± 25.2 (15)	19.7 ± 12 (7.2)	7.3 ± 4.8* (2.8)	26.3 ± 18.1* (10.8)	57.4 ± 21.9 (13.2)	32.5 ± 16.6* (9.8)	89.5 ± 44* (26.5)	27.2 ± 18.9 (11.3)	32 ± 23.4* (14)	7.3 ± 6.5* (3.6)
5 to < 8	54 ± 11.1 (6.6)	9.6 ± 5.6 (3.4)	4.8 ± 4.4 (2.6)	12.1 ± 8.2 (4.9)	37.7 ± 11.9 (7.2)	32.8 ± 15.9 (9.4)	44 ± 18.8 (11.1)	24.2 ± 17.5 (10.5)	29.3 ± 21.6* (12.9)	3.1 ± 4* (2.2)
8 to < 13	42.5 ± 7.9 (4.7)	8.3 ± 3.4 (2.0)	6.5 ± 4.7 (2.8)	9.3 ± 4.6 (2.7)	18.3 ± 6.3 (3.8)	18.4 ± 8.6 (5.1)	18.1 ± 9.6 (5.6)	15.7 ± 11.9 (7.1)	18.8 ± 14.7* (8.8)	3.1 ± 0.4* (2.2)
13 to < 15	10.0 ± 3.5 (2.1)	1.7 ± 0.9 (0.6)	1.6 ± 2.1 (1.3)	1.7 ± 0.9 (0.6)	6 ± 2.3 (1.4)	6.9 ± 3.4 (2)	4.8 ± 3.3 (1.9)	5 ± 3.8 (2.3)	6.3 ± 4.7 (2.8)	0
15 to < 23	20 ± 6 (3.5)	6.3 ± 2.5 (1.5)	2.8 ± 2.4** (1.4)	8.1 ± 3.6** (2.1)	7.7 ± 2.9 (1.7)	9.7 ± 4.4 (2.6)	5.2 ± 3.3 (1.9)	6.9 ± 3.1 (1.9)	7 ± 3.7 (2.2)	6.3 ± 5.9 (3.3)
≥ 23	10.9 ± 2.1 (1.3)	10.7 ± 2 (1.2)	14.4 ± 3.9** (2.3)	8.7 ± 2.2** (1.3)	11.5 ± 3.1 (1.9)	13.4 ± 4.8 (2.8)	9 ± 3.7 (2.2)	7.1 ± 1.6 (1)	7.8 ± 2 (1.2)	4.4 ± 2.9 (1.6)
≥50	0.9 ± 0.6 (0.3)	5.7 ± 1.3 (0.8)	9 ± 2.6** (1.5)	4 ± 1.3** (0.8)	2.7 ± 1.1 (0.6)	2.6 ± 1.6 (0.9)	2.9 ± 1.4 (0.8)	1.9 ± 0.5 (0.3)	2.1 ± 0.6** (0.4)	0.8 ± 0.8** (0.5)
Stumps	81.6 ± 18.2 (10.9)	5.6 ± 2.6 (1.5)	6.5 ± 3.1 (1.8)	5.3 ± 3.6 (2.2)	38.1 ± 8 (4.8)	36.3 ± 10 (6)	40.5 ± 13.4 (7.9)	34.5 ± 8.5 (5.1)	27.6 ± 7.6** (4.5)	63.5 ± 2.2** (16.2)

* Mean densities within a state differ between nest and random values $P < 0.10$.

** Mean densities within a state differ between nest and random values $P < 0.05$.

[1] Nest data not available for 2002.

Table 3 (cont).

	South Dakota		
Snag size class (cm)	Combined (n = 49)	Nest (n = 30)	Random (n = 19)
0 to < 2.5	8.7 ± 6.6 (3.9)	5 ± 3.1 (1.9)	14.5 ± 17 (9.8)
2.5 to < 5	3.8 ± 1.6 (1)	2.5 ± 1.6 (1)	5.9 ± 3.5 (2)
5 to < 8	7.4 ± 2.7 (1.6)	7.5 ± 3.8 (2.2)	7.2 ± 4.2 (2.4)
8 to < 13	15.8 ± 5.6 (3.3)	14.6 ± 6.7 (3.9)	17.8 ± 10.4 (6)
13 to < 15	9.7 ± 4.4 (2.6)	12.1 ± 6.7 (3.9)	5.9 ± 4.2 (2.4)
15 to < 23	34.2 ± 11.1 (6.6)	47.1 ± 16.7** (9.8)	13.8 ± 7.6** (4.4)
≥ 23	28.9 ± 7.5 (4.9)	41.3 ± 10.5** (6.2)	9.3 ± 4.4** (2.5)
≥50	0.8 ± 0.4 (0.2)	0.9 ± 0.6 (0.3)	0.5 ± 0.5 (0.3)
Stumps	81.9 ± 22 (13.1)	113 ± 30** (17.6)	32.9 ± 23.2** (13.4)

** Mean densities differ between nest and random values $P < 0.05$.

Table 4. Mean tree densities per hectare ± 90% confidence interval (SE) and sample size for Birds and Burns study sites located in the eight. Densities given for all points combined, and separated by nest tree and random points. Nest tree information is only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)								
	Arizona			Colorado			New Mexico		
Tree size class (cm)	Combined (n = 106)	Nest (n = 16)	Random (n = 90)	Combined (n = 60)	Nest (n = 13)	Random (n = 47)	Combined (n = 39)	Nest (n = 14)	Random (n = 25)
0 to < 2.5	57.3 ± 12.2 (7.3)	12.5 ± 9.6** (5.5)	65.3 ± 13.8** (8.3)	55 ± 21.8 (13)	115 ± 82.7 (46.4)	38.3 ± 16.3 (9.7)	176 ± 67.3 (39.9)	198 ± 151 (85.2)	164 ± 70.9 (41.4)
2.5 to < 5	9.1 ± 2.9 (1.8)	18 ± 15.2 (8.7)	7.5 ± 2.3 (1.4)	27.9 ± 13.4 (8)	65.4 ± 59.3* (33.3)	17.6 ± 6.2* (3.7)	146 ± 44.3 (26.3)	131.3 ± 69.6 (39.3)	155 ± 60 (35.1)
5 to < 8	10.8 ± 4 (2.5)	19.5 ± 16.2 (9.2)	9.3 ± 4 (2.4)	22.5 ± 7.5 (4.5)	41.3 ± 21.4 (12)	17.3 ± 7.4 (4.4)	125 ± 37.8 (22.4)	124 ± 43.9 (24.8)	126 ± 56 (32.5)
8 to < 13	20.9 ± 5.8 (3.5)	25 ± 19 (10.8)	20.1 ± 6.2 (3.7)	35.6 ± 8.6 (5.1)	39.4 ± 15.3 (8.6)	34.6 ± 10.3 (6.2)	161 ± 42.2 (25)	155 ± 51.1 (28.9)	164 ± 61.5 (35.9)
13 to < 15	10.4 ± 3.1 (1.9)	20.3 ± 12 (6.8)	8.6 ± 3 (1.8)	18.5 ± 5 (2.9)	27.9 ± 12.4 (7)	16 ± 5.3 (3.2)	41.7 ± 11.2 (6.7)	27.7 ± 9* (5.1)	49.5 ± 16.7* (9.7)
15 to < 23	41.2 ± 8.7 (5.3)	74.2 ± 36.8* (21)	35.3 ± 7.9* (4.8)	70 ± 18.9 (11.4)	44.2 ± 10.3** (5.8)	76.9 ± 24.1** (14.4)	122 ± 21.4 (12.7)	104 ± 25.9 (14.6)	133 ± 30.6 (17.9)
≥ 23	131.6 ± 14.5 (8.7)	166.6 ± 34.8* (19.8)	125.4 ± 15.6* (9.5)	173 ± 14.7 (8.8)	198 ± 30.7 (17.2)	166 ± 16.9 (10.1)	142 ± 16.1 (9.5)	136 ± 20 (11.3)	146 ± 23.2 (13.6)
≥50	14.2 ± 2.1 (1.3)	18.8 ± 5.7 (3.3)	13.3 ± 2.4 (1.4)	33.6 ± 3.9 (2.3)	44.6 ± 13.1* (7.3)	30.5 ± 3.4* (2)	17.7 ± 3.4 (2)	21.8 ± 6 (3.4)	15.4 ± 4.1 (2.4)

* Mean densities within a state differ between nest and random values $P < 0.10$.

** Mean densities within a state differ between nest and random values $P < 0.05$.

Table 4 (cont).

	Tree per hectare ± 90% Confidence interval (SE)									
	Montana[1]	Idaho			Oregon			Washington		
Tree size class (cm)	Random (n = 40)	Combined (n = 90)	Nest (n = 31)	Random (n = 59)	Combined (n = 71)	Nest (n = 40)	Random (n = 31)	Combined (n = 62)	Nest (n = 50)	Random (n = 12)
0 to < 2.5	100 ± 40 (23.8)	50.4 ± 17 (10.2)	37.1 ± 14.5 (8.5)	57.4 ± 24.8 (14.9)	423 ± 153 (92)	368 ± 181 (107)	498 ± 270 (159)	95.2 ± 28.8 (17.3)	91.3 ± 33.6 (20.1)	111 ± 57.2 (31.9)
2.5 to < 5	71.6 ± 17.9 (10.7)	51.8 ± 14.6 (8.8)	37.1 ± 18.5 (10.9)	59.5 ± 20.1 (12)	432 ± 139 (83)	295 ± 121* (72)	609 ± 276* (162)	116 ± 32.5 (19.4)	123 ± 39.4 (23.5)	83.3 ± 37.8 (21)
5 to < 8	83.4 ± 18.6 (10.8)	45.6 ± 11.2 (6.8)	35.5 ± 15.4 (9.1)	50.8 ± 15.4 (9.2)	300 ± 65 (39)	230 ± 69** (40.8)	390 ± 117** (69)	114 ± 33.3 (19.9)	123 ± 40.6* (24.3)	72.9 ± 30.3* (16.8)
8 to < 13	125 ± 21.3 (12.9)	53.1 ± 10.9 (6.6)	42.7 ± 19.2 (11.3)	58.5 ± 13.6 (8.1)	210 ± 35.8 (21.5)	177 ± 46.5* (27.6)	252 ± 55.7* (32.8)	117 ± 30.4 (18.2)	127 ± 37.1** (22.2)	74 ± 24.1** (13.4)
13 to < 15	51.6 ± 10.2 (6.1)	16.3 ± 4.1 (2.5)	10.9 ± 6.2 (3.7)	19.1 ± 5.5 (3.3)	63.7 ± 11.2 (6.7)	55 ± 16.1 (9.6)	75 ± 15.1 (8.9)	34.7 ± 8.5 (5.1)	37.8 ± 10.1* (6.1)	21.9 ± 10.7* (6)
15 to < 23	154 ± 22.5 (13.3)	42.6 ± 9.6 (5.8)	27 ± 13.7** (8.1)	50.8 ± 12.7** (7.5)	118 ± 17.9 (10.8)	118 ± 24.5 (14.5)	119 ± 27.6 (16.3)	63.3 ± 10.9 (6.5)	62.3 ± 12.7 (7.6)	67.7 ± 20.2 (11.3)
≥ 23	227 ± 18 (10.6)	70.6 ± 9.2 (5.5)	56.9 ± 10.5** (6.2)	77.8 ± 12.7** (7.6)	116.1 ± 10 (5.8)	113 ± 14.4 (8.6)	120 ± 12.9 (7.6)	81.5 ± 9.7 (5.8)	72.9 ± 9.8** (5.8)	118 ± 23.7** (13.2)
≥50	15.3 ± 2.8 (1.6)	27.3 ± 3.3 (1.9)	26.6 ± 5.5 (3.2)	27.7 ± 4.1 (2.4)	17.5 ± 3.8 (2.2)	13.3 ± 4** (2.4)	23.1 ± 6.6** (3.9)	13.3 ± 2.2 (1.3)	13.9 ± 2.6 (1.6)	10.8 ± 3.7 (2)

* Mean densities within a state differ between nest and random values $P < 0.10$.

** Mean densities within a state differ between nest and random values $P < 0.05$.

[1] Nest data not available for 2002.

Table 4 (cont).

	South Dakota		
Tree size class (cm)	Combined (n = 49)	Nest (n = 30)	Random (n = 19)
0 to < 2.5	183 ± 90 (53.7)	82.1 ± 39.3* (23.2)	342 ± 220* (127)
2.5 to < 5	61.7 ± 50.7 (29.3)	11.3 ± 8.8* (5.2)	141 ± 126* (72.6)
5 to < 8	39 ± 23 (13.7)	9.2 ± 12.8** (7.5)	86.2 ± 53.8** (30.8)
8 to < 13	37.8 ± 16.2 (9.7)	12.5 ± 11.9** (7)	77.6 ± 33.6** (19.3)
13 to < 15	14 ± 6.7 (4)	2.9 ± 3** (1.8)	31.6 ± 14.9** (8.6)
15 to < 23	37.8 ± 16.4 (9.8)	24.5 ± 11.2** (6.6)	76.3 ± 36** (20.4)
≥ 23	65.4 ± 16.8 (10)	24.5 ± 15.1** (8.9)	130 ± 18** (10.4)
≥50	2.3 ± 1.2 (0.7)	0.3 ± 0.6** (0.3)	5.5 ± 2.6** (1.5)

Table 5. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Arizona. Densities given for all points combined, and separated by nest tree and random points. Nest tree information is only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% Confidence interval (SE)								
	BE			KE			MO		
Snag size class (cm)	Combined (n = 14)	Nest (n = 4)	Random (n = 10)	Combined (n = 50)	Nest (n = 10)	Random (n =40)	Combined (n = 42)	Nest (n = 2)	Random (n = 40)
0 to < 2.5	0	0	0	0.5 + 0.6 (0.4)	1.3 + 2.3 (1.3)	0.3 + 0.5 (0.3)	8.6 + 4.9 (2.9)	0	9.1 + 5.1 (3)
2.5 to < 5	0	0	0	0.3 + 0.4 (0.3)	0	0.3 + 0.5 (0.3)	3 + 1.9 (1.1)	0	3.1 + 1.9 (1.2)
5 to < 8	0	0	0	0.3 + 0.4 (0.3)	1.3 + 2.3 (1.3)	0	0.9 + 0.8 (0.5)	0	0.9 + 0.9 (0.5)
8 to < 13	0	0	0	0.3 + 0.4 (0.3)	0	0.3 + 0.5 (0.3)	0.3 + 0.5 (0.3)	0	0.3 + 0.5 (0.3)
13 to < 15	0	0	0	0.3 + 0.4 (0.3)	0	0.3 + 0.5 (0.3)	0	0	0
15 to < 23	1.8 + 3.2 (1.8)	6.3 + 14.7 6.3	0	0.3 + 0.4 (0.3)	1.3 + 2.3 (1.3)	0	0.9 + 0.8 (0.5)	6.3 + 40 (6.3)	0.6 + 0.7 (0.4)
≥ 23	2.5 + 1.2 (0.7)	5 + 2.4** (1)	1.5 + 1.2** (0.7)	2.5 + 0.7 (0.4)	3.5 + 1.6 (0.9)	2.2 + 0.7 (0.4)	1.8 + 0.8 (0.5)	6.3 + 7.9 (1.3)	1.6 + 0.8 (0.5)
≥50	0.4 + 0.6 (0.4)	0	0.5 ± 0.9 0.5	1.1 + 0.4 (0.3)	1.5 + 1.2 (0.7)	0.9 + 0.5 (0.3)	0.2 + 0.2 (0.1)	1.3 + 7.9 (1.3)	0.2 + 0.2 (0.1)
Stumps	185 + 48 (27)	166 + 75 (32)	193 + 67 (37)	100 + 26 (15)	118 + 67 (37)	95 + 29 (17)	20 + 16 (9.5)	156 + 986 (156)	13 + 11 (6.5)

* Mean densities within a unit differ between nest and random values $P < 0.10$.

** Mean densities within a unit differ between nest and random values $P < 0.05$.

Table 6. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Arizona. Densities given for all points combined, and separated by nest tree and random points. Nest tree information is only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)								
	BE			KE			MO		
Tree size class (cm)	Combined (n = 14)	Nest (n = 4)	Random (n = 10)	Combined (n = 50)	Nest (n = 10)	Random (n = 40)	Combined (n = 42)	Nest (n = 2)	Random (n = 40)
0 to < 2.5	15.2 ± 15.2 (6)	0	21.3 ± 14.1 (7.7)	37.3 ± 17.8 (10.7)	12.5 ± 9.7** (5.3)	43.4 ± 22.1** (13.1)	95 ± 18.5 (11)	37.5 ± 237 (37.5)	98 ± 19 (11.3)
2.5 to < 5	0.9 ± 1.6 (0.9)	0	1.3 ± 2.2 (1.3)	9.3 ± 5.5 (3.3)	23.8 ± 24.5 (13.4)	5.6 ± 3.9 (2.3)	11.6 ± 3.4 (2)	25 ± 78.9 (12.5)	10.9 ± 3.4 (2)
5 to < 8	1.8 ± 2.1 (1.2)	3.1 ± 7.4 (3.1)	1.3 ± 2.2 (1.3)	10.5 ± 7 (4.2)	18.8 ± 19.4 (10.6)	8.4 ± 7.7 (4.5)	14.3 ± 6.1 (3.7)	56.3 ± 355 (56.3)	12.2 ± 4.8 (2.9)
8 to < 13	5.4 ± 4.4 (2.5)	3.1 ± 7.4 (3.1)	6.3 ± 6.1 (3.4)	24 ± 10.2 (6.1)	31.3 ± 29 (15.8)	22.2 ± 11 (6.6)	22.3 ± 8.5 (5)	37.5 ± 237 (37.5)	21.6 ± 8.5 (5.1)
13 to < 15	5.4 ± 5.5 (3.1)	15.6 ± 22.1 (9.4)	1.3 ± 2.2 (1.3)	12.5 ± 5.5 (3.3)	16.3 ± 14.1 (7.7)	11.6 ± 6.1 (3.6)	9.5 ± 4.2 (2.5)	50 ± 237 (37.5)	7.5 ± 2.8 (1.7)
15 to < 23	26.8 ± 14.8 (8.4)	46.9 ± 55.5 (23.6)	18.8 ± 11.9 (6.5)	41.8 ± 12.9 (7.7)	58.8 ± 42.9 (23.4)	37.5 ± 13 (7.7)	45.2 ± 15.7 (9.3)	206 ± 434 (69)	37.2 ± 12.4 (7.4)
≥ 23	125 ± 37.3 (21.1)	193 ± 40.3** (17.1)	98 ± 44** (24)	128.2 ± 24 (14.3)	144 ± 50.7 (27.7)	124 ± 28 (16.6)	138 ± 20.6 (12.3)	230 ± 347 (55)	133 ± 20.6 (12.3)
≥50	18.9 ± 5.7 (3.2)	22.5 ± 17 (7.2)	17.5 ± 6.6 (3.6)	17.5 ± 3.8 (2.2)	19.5 ± 7.9 (4.3)	17 ± 4.4 (2.6)	8.6 ± 2.1 (1.3)	7.5 ± 15.8 (2.5)	8.6 ± 2.3 (1.3)

** Mean densities within a unit differ between nest and random values $P < 0.05$.

Table 7. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Colorado. Densities given for all points combined, and separated by nest tree and random points. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% Confidence interval (SE)					
	DC			PB		
Snag size class (cm)	Combined (n = 8)	Nest (n = 3)	Random (n = 5)	Combined (n = 8)	Nest (n = 3)	Random (n = 5)
0 to < 2.5	0	0	0	0	0	0
2.5 to < 5	7.8 ± 7.7 (4)	0	12.5 ± 11.9 (5.6)	12.5 ± 14.8 (7.8)	29.2 ± 53 (18.2)	2.5 ± 5.3 (2.5)
5 to < 8	21.9 ± 18.3 (9.7)	29.2 ± 32.2 (11)	17.5 ± 31.1 (14.6)	28.1 ± 27.5 (14.5)	75 ± 42 (14.4)	0
8 to < 13	35.9 ± 15.8 (8.3)	50 ± 36.5 (12.5)	27.5 ± 21.3 (10)	10.9 ± 11.4 (6)	16.7 ± 32.2 (11)	7.5 ± 16 (7.5)
13 to < 15	14.1 ± 11.4 (6)	16.7 ± 32.2 (11)	12.5 ± 16.9 (7.9)	6.3 ± 7.8 (4.1)	8.3 ± 24.3 (8.3)	5 ± 10.7 (5)
15 to < 23	12.5 ± 9 (4.7)	12.5 ± 0 (0)	12.5 ± 16.9 (7.9)	3.1 ± 3.9 (2)	0	5 ± 6.5 (3.1)
≥ 23	14.9 ± 10.9 (4)	15.8 ± 2.4** (0.8)	8 ± 5.4** (2.6)	8.1 ± 5 (2.6)	9.2 ± 19.9 (6.8)	7.5 ± 4.8 (2.2)
≥50	5 ± 3.3 (1.8)	8.3 ± 10.6 (3.6)	3 ± 3.1 1.5	2.8 ± 2.6 (1.4)	3.3 ± 9.7 (3.3)	2.5 ± 2.9 (1.4)
Stumps	7.8 ± 4.3 (2.3)	8.3 ± 12.2 (4.2)	7.5 ± 6.5 (3.1)	4.7 ± 6.2 (3.3)	12.5 ± 21.1 (7.2)	0

Table 7 (cont).

	Snags and stumps per hectare ± 90% Confidence interval (SE)					
	SCN			SCS		
Snag size class (cm)	Combined (n = 22)	Nest (n = 3)	Random (n = 19)	Combined (n = 22)	Nest (n = 4)	Random (n = 18)
0 to < 2.5	6.8 ± 5.4 (3.2)	8.3 ± 24.3 (8.3)	6.6 ± 6.1 (3.5)	0.6 ± 1 (0.6)	3.1 ± 7.4 (3.1)	0
2.5 to < 5	12.5 ± 6.9 (4)	25 ± 55.8 (19.1)	10.5 ± 6.5 (3.7)	9.7 ± 7.6 (4.4)	0	11.8 ± 9.2 (5.3)
5 to < 8	42.6 ± 19.2 (11.2)	62.5 ± 165 (56)	39.5 ± 18.1 (10.4)	15.9 ± 11.3 (6.6)	9.4 ± 22.1 (9.4)	17.4 ± 13.6 (7.8)
8 to < 13	29.5 ± 12.3 (7.1)	29.2 ± 85.2 (29.2)	29.6 ± 12.8 (7.4)	22.2 ± 11.8 (6.9)	9.4 ± 14.1 (5.9)	25 ± 14.3 (8.2)
13 to < 15	12.5 ± 5.3 (3.1)	8.3 ± 12.2 (4.2)	13.2 ± 6.1 (3.5)	8.5 ± 7.3 (4.2)	9.4 ± 22.1 (9.4)	8.3 ± 8.4 (4.8)
15 to < 23	14.8 ± 7.4 (4.3)	16.7 ± 32.2 (11)	14.5 ± 8.3 (4.8)	23.3 ± 11.9 (6.9)	9.4 ± 14.1 (5.9)	26.4 ± 14.4 (8.3)
≥ 23	21.9 ± 4.7 (2.7)	42.5 ± 34.5 (11.8)	18.7 ± 3.1 (1.8)	21.4 ± 4.4 (2.5)	21.9 ± 6.5 (2.8)	21.3 ± 5.3 (3.1)
≥50	7.8 ± 2.4 (1.4)	7.5 ± 21.9 (7.5)	7.9 ± 2.2 1.3	8.6 ± 2.3 (1.3)	7.5 ± 5.4 (2.3)	8.9 ± 2.7 (1.6)
Stumps	5.1 ± 2.7 (1.6)	12.5 + 21.1 (7.2)	3.9 + 2.4 (1.4)	6.3 + 4.9 (2.8)	15.6 ± 27.8 (11.8)	4.2 ± 3.9 (2.3)

* Mean densities within a state differ between nest and random values $P < 0.10$.

** Mean densities within a state differ between nest and random values $P < 0.05$.

Table 8. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Colorado. Densities given for all points combined, and separated by nest tree and random points. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)					
	DC			PB		
Tree size class (cm)	Combined (n = 8)	Nest (n = 3)	Random (n = 5)	Combined (n = 8)	Nest (n = 3)	Random (n =5)
0 to < 2.5	28.1 ± 29.6 (15.6)	45.8 ± 116 (39.7)	17.5 ± 24.7 (11.6)	18.8 ± 14.8 (7.8)	33.3 ± 43.9 (15)	10 ± 15.5 (7.3)
2.5 to < 5	12.5 ± 11.8 (6.3)	12.5 ± 36.5 (12.5)	12.5 ± 16.9 (7.9)	7.8 ± 7.7 (4)	16.7 ± 24.3 (8.3)	2.5 ± 5.3 (2.5)
5 to < 8	28.1 ± 20.4 (10.8)	37.5 ± 73 (25)	22.5 ± 22.9 (10.8)	14.1 ± 14.4 (7.6)	25 ± 55.8 (19.1)	7.5 ± 10.7 (5)
8 to < 13	37.5 ± 27.6 (14.6)	41.7 ± 60.8 (20.8)	35 ± 45.7 (21.4)	39.1 ± 25.8 (13.7)	58.3 ± 87.8 (30)	27.5 ± 27.2 (12.7)
13 to < 15	15.6 ± 7.4 (3.9)	20.8 ± 12.2 (4.2)	12.5 ± 11.9 (5.6)	26.6 ± 20.2 (10.7)	50 ± 63.2 (21.7)	12.5 ± 14.6 (6.8)
15 to < 23	34.4 ± 13.2 (7)	41.7 ± 32.2 (11)	30 ± 19.9 (9.4)	39.1 ± 17 (9)	45.8 ± 32.2 (11)	35 ± 28.5 (13.3)
≥ 23	136 ± 39.6 (20.9)	158.3 ± 94 (32.2)	122 ± 59.8 (28)	153 ± 27 (14.2)	162 ± 49.4 (16.9)	147 ± 45.8 (21.5)
≥50	37.5 ± 18.1 (9.5)	53.3 ± 51.5 (17.6)	28 ± 21.5 10.1	50.6 ± 13.8 (7.3)	68.3 ± 21.2** (7.3)	40 ± 16.2** (7.6)

Table 8 (cont).

	Trees ± 90% Confidence interval (SE)					
	SCN			SCS		
Tree size class (cm)	Combined (n = 22)	Nest (n = 3)	Random (n = 19)	Combined (n = 22)	Nest (n = 4)	Random (n = 18)
0 to < 2.5	59.7 ± 39.2 (22.8)	163 ± 365 (125)	43.4 ± 31 (17.9)	73.3 ± 45.3 (26.3)	194 ± 277 (118)	46.5 ± 28.7 (16.5)
2.5 to < 5	21.6 ± 13.2 (7.7)	70.8 ± 134 (45.8)	13.8 ± 7.4 (4.3)	47.2 ± 34 (19.8)	138 ± 238 (101)	27.1 ± 13.7 (7.9)
5 to < 8	14.8 ± 7.8 (4.6)	41.7 ± 53 (18.2)	10.5 ± 6.7 (3.9)	31.3 ± 17.4 (10.1)	56.3 ± 76.4 (32.5)	25.7 ± 17.7 (10.2)
8 to < 13	26.7 ± 12.6 (7.3)	33.3 ± 43.9 (15)	25.7 ± 14.3 (8.2)	42.6 ± 16.7 (9.7)	28.1 ± 14.1 (6)	45.8 ± 20.5 (11.7)
13 to < 15	15.3 ± 7.7 (4.4)	33.3 ± 48.7 (16.7)	12.5 ± 7.4 (4.3)	19.9 ± 9.3 (5.4)	12.5 ± 121 (5.1)	21.5 ± 11.4 (6.5)
15 to < 23	46.6 ± 18.5 (10.8)	45.8 ± 67.8 (23.2)	46.7 ± 21 (12.1)	117 ± 45.6 (26.5)	43.8 ± 14.7* (6.3)	133 ± 54.3* (54.3)
≥ 23	167 ± 31.5 (18.3)	272 ± 124* (42.6)	150 ± 30.4* (17.6)	200 ± 18.5 (10.8)	199 ± 33.7 (14.3)	201 ± 22.5 (12.9)
≥50	30.2 ± 5.3 (3.1)	18.3 ± 27.1 (9.3)	32.1 ± 5.4 3.1	29.3 ± 5 (2.9)	40 ± 27.6 (11.7)	26.9 ± 4 (2.3)

* Mean densities within a state differ between nest and random values $P < 0.10$.
** Mean densities within a state differ between nest and random values $P < 0.05$.

Table 9. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Idaho. Densities given for all points combined, and separated by nest tree and random points. Nest tree information is only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% Confidence interval (SE)								
	BH			DM			DO		
Snag size class (cm)	Combined (n = 25)	Nest (n = 5)	Random (n = 20)	Combined (n = 9)	Nest (n = 3)	Random (n = 6)	Combined (n = 13)	Nest (n = 7)	Random (n = 6)
0 to < 2.5	11.5 ± 12 (7)	0	14.4 ± 15 (8.7)	59.7 ± 86 (46)	4.2 ± 12.2 (4.2)	87.5 ± 137 (68.2)	12.5 ± 17.1 (9.6)	1.8 ± 3.5 (1.8)	25 ± 41.1 (20.4)
2.5 to < 5	5 ± 3.9 (2.3)	0	6.3 ± 4.8 (2.8)	22.2 ± 24.7 (13.3)	8.3 ± 24.3 (8.3)	29.2 ± 39.4 (19.5)	8.7 ± 10.2 (5.7)	1.8 ± 3.5 (1.8)	16.7 ± 24 (11.9)
5 to < 8	2.5 ± 2.8 (1.6)	0	3.1 ± 3.5 (2)	18.1 ± 16.5 (8.9)	20.8 ± 60.8 (20.8)	16.7 ± 20.2 (10)	6.7 ± 10.3 (5.8)	0	14.6 ± 24.7 (12.3)
8 to < 13	1.5 ± 1.4 (0.8)	0	1.9 ± 1.8 (1)	20.8 ± 19.4 (10.4)	16.7 ± 48.7 (16.7)	22.9 ± 28.7 (14.2)	8.7 ± 9.2 (5.2)	12.5 ± 17.6 (9)	4.2 ± 8.4 (4.2)
13 to < 15	2 ± 1.6 (0.9)	0	2.5 ± 2 (1.1)	1.4 ± 2.6 (1.4)	0	2.1 ± 4.2 (2.1)	0	0	0
15 to < 23	4 ± 2.9 (1.7)	0	5 ± 3.6 (2.1)	8.3 ± 11 (5.9)	8.3 ± 24.3 (1.3)	8.3 ± 16.8 (8.3)	1 ± 1.7 (1)	1.8 ± 3.5 (1.8)	0
≥ 23	14.4 ± 5.5 (3.2)	20 ± 21.3 (10)	13 ± 5.6 (3.3)	12.5 ± 7 (3.8)	19.2 ± 27.1 (9.3)	9.2 ± 6.5 (3.2)	6.9 ± 3.9 (2.2)	10.7 ± 6.8** (3.5)	2.5 ± 1.8** (0.9)
≥50	7.5 ± 3.5 (2)	13.5 ± 14.6 (6.8)	6 ± 3.2 (1.9)	7.2 ± 4.8 (2.6)	13.3 ± 17.6 (6)	4.2 ± 3.3 (1.7)	4.4 ± 2.7 (1.5)	7.9 ± 4** (2.1)	0.4 ± 0.9** (0.4)
Stumps	2 ± 2 (1.2)	7.5 ± 10.7 (5)	0.6 ± 1.1 (0.6)	4.2 ± 3.8 (2.1)	0	6.3 ± 5.6 (2.8)	1 ± 1.7 (1)	1.8 ± 3.5 (1.8)	0

Table 9 (cont).

	Snags and stumps per hectare ± 90% Confidence interval (SE)								
	FC			PC			WM		
Snag size class (cm)	Combined (n = 28)	Nest (n = 8)	Random (n = 20)	Combined (n = 11)	Nest (n = 5)	Random (n = 6)	Combined (n = 4)	Nest (n = 3)	Random (n = 1)
0 to < 2.5	22.3 ± 18.1 (10.6)	7.8 ± 11.8 (6.2)	28.1 ± 25.3 (14.6)	23.9 ± 20.6 (11.4)	40 ± 47.2 (22.2)	10.4 ± 16.5 (8.2)	3.1 ± 7.4 (3.1)	4.2 ± 12.1 (4.2)	0
2.5 to < 5	41.5 ± 37.5 (22)	7.8 ± 6.2 (3.3)	55 ± 52.6 (30.4)	15.9 ± 14.4 (7.9)	25 ± 30.4 (14.3)	8.3 ± 16.8 (8.3)	0	0	0
5 to < 8	15.2 ± 16.7 (9.8)	1.6 ± 2.9 (1.6)	20.6 ± 23.5 (13.6)	11.4 ± 7.8 (4.3)	15 ± 19.6 (9.2)	8.3 ± 4.2 (2.6)	0	0	0
8 to < 13	7.1 ± 6.4 (3.8)	0	10 ± 8.9 (5.2)	19.3 ± 13.1 (7.2)	12.5 ± 11.9 (5.6)	25 ± 37.5 (12.5)	0	0	0
13 to < 15	0.9 ± 1.1 (0.6)	0	1.3 ± 1.5 (0.9)	5.7 ± 6.4 (3.5)	10 ± 15.5 (7.3)	2.1 ± 4.2 (2.1)	0	0	0
15 to < 23	7.1 ± 4.6 (2.7)	3.1 ± 5.9 (3.1)	8.8 ± 6 (3.5)	15.9 ± 13.7 (7.6)	5 ± 10.6 (5)	25 ± 25.2 (12.5)	0	0	0
≥ 23	7.8 ± 2.4 (1.4)	11.6 ± 7 (3.7)	6.3 ± 2.1 (1.3)	13.9 ± 5.2 (2.9)	19 ± 10.5 (4.9)	9.6 ± 5 (2.5)	7.5 ± 8.3 (3.5)	9.2 ± 12.8 (4.4)	2.5
≥50	4 ± 1.3 (0.8)	4.7 ± 2.8 (1.5)	3.8 ± 1.6 0.9	6.4 ± 3.9 (2.2)	11.5 ± 7.6* (3.6)	2.1 ± 1.5* (0.8)	5.6 ± 6.5 (2.8)	6.7 ± 10.6 (3.6)	2.5
Stumps	4.9 ± 2.8 (1.6)	7.8 ± 6.2 (3.3)	3.8 ± 3.2 (1.8)	10.2 ± 8.5 (4.7)	7.5 ± 10.6 (5)	12.5 ± 15.9 (7.9)	40.6 ± 59.3 (25.2)	16.7 ± 32.2 (11)	112.5

* Mean densities within a unit differ between nest and random values $P < 0.10$.

** Mean densities within a unit differ between nest and random values $P < 0.05$.

Table 10. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Idaho. Densities given for all points combined, and separated by nest tree and random points. Nest tree information is only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% Confidence interval (SE)								
	BH			DM			DO		
Tree size class (cm)	Combined (n = 25)	Nest (n = 5)	Random (n = 20)	Combined (n = 9)	Nest (n = 3)	Random (n = 6)	Combined (n = 13)	Nest (n = 7)	Random (n = 6)
0 to < 2.5	28.5 ± 30.6 (17.9)	0	35.6 ± 38.4 (22.2)	142 ± 97.7 (52.5)	91.7 ± 43.8 (15)	167 ± 159 (78.8)	23.1 ± 19 (10.7)	10.7 ± 20.8 (10.7)	37.5 ± 37.9 (18.8)
2.5 to < 5	28.5 ± 27.4 (16)	0	35.6 ± 34.3 (19.8)	153 ± 89.1 (47.9)	133 ± 200 (68.6)	163 ± 135 (67.2)	26.9 ± 19.9 (11.1)	8.9 ± 17.4 (8.9)	47.9 ± 38.7 (19.2)
5 to < 8	21 ± 16.3 (9.5)	0	26.3 ± 20.1 (11.6)	101 ± 63.7 (34.3)	70.8 ± 106 (36.3)	117 ± 99 (49)	14.4 ± 11.8 (6.6)	5.4 ± 7.2 (3.7)	25 ± 26 (12.9)
8 to < 13	26 ± 13.6 (7.9)	0	32.5 ± 16.3 (9.4)	106 ± 60.1 (32.3)	91.7 ± 231 (79.2)	113 ± 70.6 (35.1)	31.7 ± 29.9 (16.8)	8.9 ± 7 (3.6)	58.3 ± 69.4 (34.4)
13 to < 15	8 ± 4.6 (2.7)	2.5 ± 5.3 (2.5)	9.4 ± 5.6 (3.3)	40.3 ± 20.8 (11.2)	37.5 ± 76 (26)	41.7 ± 25.7 (12.8)	8.6 ± 10.3 (5.7)	0	18.8 ± 23.2 (11.5)
15 to < 23	20.5 ± 10.8 (6.3)	0	25.6 ± 12.9 (7.4)	86.1 ± 48.8 (26.2)	70.8 ± 207 (70.8)	93.8 ± 49.8 (24.7)	25 ± 25.1 (14.1)	12.5 ± 10.6 (5.5)	39.6 ± 60.8 (30.2)
≥ 23	68 ± 15.5 (9)	33 ± 8.7** (4.1)	76.8 ± 17.9** (10.4)	126 ± 56 (30.2)	105 ± 99.4 (34)	136 ± 87.6 (43.4)	51.5 ± 20.3 (11.4)	50.7 ± 23.5 (12.1)	52.5 ± 43.6 (21.6)
≥50	32.6 ± 5.8 (3.4)	19 ± 6.2** (2.9)	36 ± 6.7** (3.9)	34.4 ± 13.1 (7)	43.3 ± 39.9 (13.6)	30 ± 16.7 (8.3)	26.5 ± 8.7 (4.9)	31.4 ± 15.7 (8.1)	20.8 ± 8.8 (4.4)

Table 10 (cont).

	Trees per hectare ± 90% Confidence interval (SE)								
	FC			PC			WM		
Tree size class (cm)	Combined (n = 28)	Nest (n = 8)	Random (n = 20)	Combined (n = 11)	Nest (n = 5)	Random (n = 6)	Combined (n = 4)	Nest (n = 3)	Random (n = 1)
0 to < 2.5	44.2 ± 33.7 (19.8)	31.3 ± 34 (18)	49.4 ± 46.6 (27)	70.5 ± 23.3 (12.9)	82.5 ± 45.1 (21.1)	60.4 ± 32.8 (16.3)	59.4 ± 50 (21.3)	45.8 ± 67.8 (23.2)	100
2.5 to < 5	41.5 ± 20.7 (12.1)	18.8 ± 17.9 (9.4)	50.6 ± 28.2 (16.3)	79.5 ± 31.7 (17.5)	92.5 ± 57.5 (27)	68.8 ± 48.5 (24.1)	46.9 ± 56.8 (24.1)	25 ± 42.1 (14.4)	112.5
5 to < 8	54.5 ± 21.1 (12.4)	28.1 ± 22.3* (11.8)	65 ± 28.2* (16.3)	81.8 ± 29.7 (16.4)	118 ± 42.6** (20)	52.1 ± 36.4** (18.1)	12.5 ± 12 (5.1)	12.5 ± 21.1 (7.2)	12.5
8 to < 13	56.3 ± 19.7 (11.6)	31.3 ± 32.5 (17.2)	66.3 ± 24.7 (14.3)	85.2 ± 26.5 (14.6)	113 ± 40.4* (19)	62.5 ± 35.6* (17.7)	62.5 ± 55 (23.4)	58.3 ± 95.1 (32.5)	75
13 to < 15	18.8 ± 8.5 (5)	7.8 ± 7.7* (4)	23.1 ± 11.6* (6.7)	19.3 ± 12.4 (6.8)	25 ± 25.3 (11.9)	14.6 ± 16.5 (8.2)	12.5 ± 12 (5.1)	8.3 ± 12.2 (4.2)	25
15 to < 23	47.3 ± 17.7 (10.4)	21.9 ± 17.7** (9.4)	57.5 ± 23.4** (13.5)	79.5 ± 27.9 (15.4)	67.5 ± 27.4 (12.9)	89.6 ± 53.8 (26.7)	6.3 ± 14.7 (6.3)	8.3 ± 24.4 (8.3)	0
≥ 23	56.6 ± 10.7 (6.3)	51.3 ± 20.7 (10.9)	58.8 ± 13.3 (7.7)	102.7 ± 26 (14.3)	79 ± 13.2 (6.2)	123 ± 47.4 (23.5)	35 ± 29.2 (12.4)	41.7 ± 43.2 (14.8)	15
≥50	17.9 ± 4.6 (2.8)	13.8 ± 7.5 (4)	19.5 ± 6 (3.5)	33.2 ± 12.3 (6.8)	32 ± 14.9 (7)	34.2 ± 23.4 (11.6)	31.3 ± 21.1 (9)	36.7 ± 29.6 (10.1)	15

* Mean densities within a unit differ between nest and random values $P < 0.10$.

** Mean densities within a unit differ between nest and random values $P < 0.05$.

Table 11. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Montana. Densities given for random points. Data collected in 2002.

	Snags and stumps per hectare ± 90% confidence interval (SE)	
	Strawberry	Maupin
Snag size class (cm)	Random[1] (n = 20)	Random[1] (n = 20)
0 to < 2.5	57.5 ± 31.2 (18.1)	270 ± 115 (66.7)
2.5 to < 5	57.5 ± 19.1 (11)	127 ± 45 (25.9)
5 to < 8	42.5 ± 12.5 (7.2)	65 ± 18.5 (10.7)
8 to < 13	36.9 ± 8.2 (4.8)	48.8 ± 14 (8.1)
13 to < 15	9.4 ± 5.1 (3)	10.6 ± 5.1 (2.9)
15 to < 23	16.9 ± 8.3 (4.8)	23.1 ± 9.1 (5.2)
≥ 23	12 ± 5.1 (1.8)	9.9 ± 3.1 (1.8)
≥50	1.5 ± 1 (0.6)	0.4 ± 0.4 (0.3)
Stumps	116 ± 26 (15.3)	47.5 ± 19.4 (11.2)

[1] Only random point data available for Strawberry and Maupin units.

Table 12. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Montana. Densities given for random points. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)	
	Strawberry	Maupin
Snag size class (cm)	Random[1] (n = 20)	Random[1] (n = 20)
0 to < 2.5	55 ± 31.9 (18.5)	144 ± 73 (42)
2.5 to < 5	70 ± 24.9 (14.4)	73 ± 28 (16.1)
5 to < 8	78.1 ± 30.5 (17.6)	88.8 ± 22 (12.7)
8 to < 13	138 ± 35.3 (20.4)	112 ± 27 (15.6)
13 to < 15	55 ± 13.5 (7.8)	48 ± 16.3 (9.4)
15 to < 23	176 ± 34.2 (20)	133 ± 29 (16.8)
≥ 23	235 ± 23.1 (13.3)	219 ± 29 (16.7)
≥50	16.3 ± 3.9 (2.3)	14.3 ± 4.1 (2.4)

[1] Only random point data available for Strawberry and Maupin units.

Table 13. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in New Mexico. Densities given for all points combined, and separated by nest tree and random points. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% Confidence interval (SE)			
	CP[1]	LJ		
Snag size class (cm)	Nest (n = 10)	Combined (n = 29)	Nest (n = 4)	Random (n =25)
0 to < 2.5	22.5 ± 17 (9.3)	20.7 ± 12.1 (7.1)	18.8 ± 25.5 (10.8)	21 ± 14 (8.2)
2.5 to < 5	21.3 ± 10.3 (5.6)	25.9 ± 17.1 (10.1)	12.5 ± 20.8 (8.8)	28 ± 19.8 (11.6)
5 to < 8	5 ± 7 (3.8)	24.6 ± 19 (11.2)	3.1 ± 7.4** (3.1)	28 ± 22** (12.9)
8 to < 13	3.8 ± 3.5 (1.9)	16.4 ± 8.5 (5)	6.3 ± 14.7 (6.3)	18 ± 9.7 (5.7)
13 to < 15	2.5 ± 3 (1.7)	2.6 ± 1.9 (1.1)	3.1 ± 7.4 (3.1)	2.5 ± 2.1 (1.3)
15 to < 23	7.5 ± 7.8 (4.2)	5.6 ± 2.7 (1.6)	6.3 ± 14.7 (6.3)	5.5 ± 2.8 (1.6)
≥ 23	5 ± 3.1 (1.7)	5.8 ± 2 (1.2)	3.8 ± 2.9 (1.3)	6.1 ± 2.3 (1.3)
≥50	1 ± 0.7 (0.4)	0.7 ± 0.5 (0.3)	0.6 ± 1.5 (0.6)	0.7 ± 0.5 (0.3)
Stumps	62.5 ± 44 (24.1)	32.3 ± 13 (7.6)	40.6 ± 38.7 (16.4)	31 ± 14.6 (8.5)

** Mean densities within a unit differ between nest and random values $P < 0.05$.
[1]Only nest tree data available for this site.

Table 14. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for New Mexico. Densities given for all points combined, and separated by nest tree and random points within the closed stratum[1]. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	All points combined (n = 39)		Open (n = 4)	Closed (n = 35)	
Tree size class (cm)	Open (n = 4)	Closed (n = 35)	Random[1] (n = 4)	Nests (n = 14)	Random (n = 21)
0 to < 2.5	34.4 ± 14.1** (6)	192 ± 74** (43.7)	34.4 ± 14.1 (6)	198 ± 151 (85.2)	188 ± 82 (47.6)
2.5 to < 5	18.8 ± 18.9** (8.1)	161 ± 47.9** (28.3)	18.8 ± 18.9 (8.1)	131 ± 70 (39.3)	181 ± 67.7 (39.3)
5 to < 8	6.3 ± 8.4** (3.6)	139 ± 40** (23.9)	6.3 ± 8.4 (3.6)	124 ± 44 (24.8)	148 ± 63 (36.7)
8 to < 13	15.6 ± 14.1** (6)	178 ± 44** (26.5)	15.6 ± 14.1 (6)	155 ± 52 (28.9)	192 ± 69 (39.9)
13 to < 15	6.3 ± 8.4** (3.6)	45.7 ± 12.1** (7.1)	6.3 ± 8.4 (3.6)	27.7 ± 9** (5.1)	57.7 ± 18.5** (10.7)
15 to < 23	53.1 ± 46.9** (20)	130 ± 22.6** (13.4)	53.1 ± 46.9 (20)	104 ± 26** (14.6)	148 ± 33** (19.4)
≥ 23	93.8 ± 45* (19.2)	148 ± 17* (10)	93.8 ± 45 (19.2)	136 ± 20 (11.3)	156 ± 25.6 (14.9)
≥50	21.3 ± 6.3** (6.9)	17.3 ± 3.5** (2.1)	21.3 ± 6.3 (6.9)	21.8 ± 5.9** (3.4)	14.3 ± 4.4** (2.5)

1 Only random points located within the open stratum.

* Mean densities within a stratum differ between nest and random values $P < 0.10$.

** Mean densities within a stratum differ between nest and random values $P < 0.05$.

Table 15. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Oregon. Densities given for all points combined, and separated by nest tree and random points. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% confidence interval (SE)					
	CN			TN		
Snag size class (cm)	Combined (n = 13)	Nest (n = 12)	Random (n = 1)	Combined (n = 31)	Nest (n = 11)	Random (n = 20)
0 to < 2.5	28.8 ± 23.9 (13.4)	31.3 ± 25.6 (14.3)	0	110 ± 50 (29.3)	45.5 ± 22** (12.2)	146 ± 75** (43.2)
2.5 to < 5	26 ± 18.6 (10.4)	28.1 ± 20 (11.1)	0	110 ± 46 (27.1)	78.4 ± 53.9 (29.7)	127 ± 67 (38.7)
5 to < 8	16.3 ± 14.2 (7.9)	17.7 ± 15.3 (8.5)	0	68.5 ± 23.9 (14.1)	77.3 ± 53 (28.9)	63.8 ± 26.8 (15.5)
8 to < 13	7.7 ± 7.4 (4.1)	8.3 ± 8 (4.4)	0	29 ± 13.1 (7.7)	34.1 ± 29.5 (16.3)	26.3 ± 14.1 (8.2)
13 to < 15	5.8 ± 5.4 (3)	6.3 ± 5.8 (3.3)	0	7.7 ± 4.1 (2.4)	8 ± 8.7 (4.8)	7.5 ± 4.8 (2.8)
15 to < 23	4.8 ± 4.8 (2.7)	5.2 ± 5.1 (2.9)	0	7.3 ± 4.3 (2.6)	8 ± 9.7 (5.4)	6.9 ± 4.8 (2.8)
≥ 23	7.7 ± 2.9 (1.6)	8.3 ± 2.9 (1.6)	0	14.5 ± 4.9 (2.9)	17.3 ± 11 (6.1)	13 ± 5.3 (3.1)
≥50	1.9 ± 1.3 (0.7)	2.1 ± 1.3 (0.7)	0	5 ± 2.2 (1.3)	6.4 ± 5.6 (3.1)	4.3 ± 1.9 (1.1)
Stumps	38.5 ± 13.7 (7.7)	34.4 ± 12.7 (7.1)	87.5	38.9 ± 14.3 (8.4)	45.5 + 28.5 (15.7)	35 + 17.4 (10)

Table 15 (cont).

	Snags and stumps per hectare ± 90% confidence interval (SE)					
	CS			TS		
Snag size class (cm)	Combined (n = 7)	Nest (n = 5)	Random (n = 2)	Combined (n = 20)	Nest (n = 12)	Random (n = 8)
0 to < 2.5	14.3 ± 20.1 (10.4)	17.5 ± 31.1 (14.6)	6.3 ± 39.4 (6.3)	28.1 ± 16.5 (9.5)	19.8 ± 25.1 (14)	40.6 ± 20.9 (11)
2.5 to < 5	7.1 ± 10.5 (5.4)	10 ± 15.5 (7.3)	0	14.4 ± 7.4 (4.3)	4.2 ± 4.2** (2.4)	29.7 ± 14.1** (7.4)
5 to < 8	12.5 ± 14 (7.2)	17.5 ± 19.9 (9.4)	0	12.5 ± 6.7 (3.8)	13.5 ± 10.9 (6)	10.9 ± 7 (3.7)
8 to < 13	8.9 ± 10.2 (5.3)	12.5 ± 14.6 (6.8)	0	11.9 ± 6.3 (3.7)	16.7 ± 9.7 (5.4)	4.7 ± 6.2** (3.3)
13 to < 15	3.6 ± 6.9 (3.6)	5 ± 10.7 (5)	0	4.4 ± 4.2 (2.5)	7.3 ± 7 (3.9)	0
15 to < 23	5.4 ± 7.2 (3.7)	7.5 ± 10.7 (5)	0	11.3 ± 6.9 (4)	16.7 ± 11.1* (6.2)	3.1 ± 3.9** (2)
≥ 23	14.6 ± 24.5 (12.6)	19.5 ± 37.6 (17.6)	2.5 ± 15.8 (2.5)	8.1 ± 3.8 (2.2)	12.5 ± 5.5** (3)	1.6 ± 0.8** (0.5)
≥50	0.7 ± 0.9 (0.5)	0.5 ± 1.1 (0.5)	1.3 ± 7.8 (1.3)	0.5 ± 0.4 (0.2)	0.6 ± 0.6 (0.3)	0.3 ± 0.6 (0.3)
Stumps	50 ± 28.5 (14.7)	50 ± 42.1 (19.8)	50 ± 158 (25)	32.5 + 14.7 (8.5)	24 ± 15.7 (8.8)	45.3 ± 31 (16.4)

* Mean densities within a state differ between nest and random values $P < 0.10$.

** Mean densities within a state differ between nest and random values $P < 0.05$.

Table 16. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Oregon. Densities given for all points combined, and separated by nest tree and random points. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)					
	CN			TN		
Tree size class (cm)	Combined (n = 13)	Nest (n = 12)	Random (n = 1)	Combined (n = 31)	Nest (n = 11)	Random (n = 20)
0 to < 2.5	283 ± 284 (159)	280 ± 310 (173)	325	516 ± 275 (162)	345 ± 224 (124)	610 ± 418 (242)
2.5 to < 5	336 ± 267 (150)	345 ± 292 (163)	225	629 ± 285 (168)	324 ± 261 (144)	796 ± 419 (242)
5 to < 8	266 ± 111 (62)	281 ± 118 (65.8)	87.5	393 ± 128 (75.3)	259 ± 163 (89.9)	467 ± 179 (104)
8 to < 13	200 ± 264 (47)	214 ± 87 (48.5)	25	227 ± 59 (34.5)	190 ± 103 (56.9)	247 ± 76 (43.8)
13 to < 15	52.9 ± 26.2 (14.7)	57.3 ± 27.4 (15.3)	0	76.1 ± 20 (11.7)	70.5 ± 46.5 (25.7)	79.2 ± 20.7 (12)
15 to < 23	97.1 ± 39 (21.7)	105 ± 39.3 (21.9)	0	118 ± 28 (16.6)	150 ± 48 (26.4)	101 ± 35.7 (20.6)
≥ 23	103 ± 21.1 (11.8)	108 ± 20.4 (11.3)	35	123.1 ± 15.5 (9.2)	108 ± 33.9 (18.7)	132 ± 16.7 (9.7)
≥50	9.8 ± 17.7 (5.5)	19.2 ± 10.3 (5.8)	0	30.5 ± 5.1 (3)	20.9 ± 6.8* (3.7)	35.8 ± 6.4* (3.7)

Table 16 (cont).

	Snags and stumps per hectare ± 90% confidence interval (SE)					
	CS			TS		
Snag size class (cm)	Combined (n = 7)	Nest (n = 5)	Random (n = 2)	Combined (n = 20)	Nest (n = 12)	Random (n = 8)
0 to < 2.5	184 ± 114 (58.5)	173 ± 142 (66.7)	213 ± 1026 (163)	468 ± 316 (183)	564 ± 541 (301)	326 ± 171 (90)
2.5 to < 5	107 ± 78 (40)	105 ± 121 (56.7)	113 ± 236 (37.5)	320 ± 147 (85)	306 ± 243 (135)	340 ± 143 (75.5)
5 to < 8	123 ± 91 (46.6)	123 ± 143 (67.5)	125 ± 79 (12.5)	250 ± 95 (55)	200 ± 153 (85)	325 ± 87 (45.7)
8 to < 13	125 ± 112 (57.6)	128 ± 178 (83.2)	119 ± 118 (18.8)	219 ± 71 (41.2)	147 ± 92** (51)	326 ± 97** (51.2)
13 to < 15	41.1 ± 33.4 (17.2)	50 ± 48.4 (22.7)	18.8 ± 118 (18.8)	57.7 ± 17.5 (10.1)	38.5 ± 24** (13.4)	86.5 ± 16.5** (8.7)
15 to < 23	118 ± 75.3 (38.8)	118 ± 120 (56.1)	119 ± 39 (6.3)	130 ± 37.3 (21.7)	96.9 ± 52.3** (29.1)	179 ± 48** (25)
≥ 23	133 ± 29 (14.9)	138 ± 40 (18.8)	120 ± 309 (30)	108 ± 20.3 (11.8)	113 ± 34 (19.1)	101 ± 15 (7.9)
≥50	5 ± 4.2 (2.2)	7 ± 5.4 (2.6)	0	1.8 ± 1.5 (0.9)	2.9 ± 2.6 (1.4)	0

* Mean densities within a unit differ between nest and random values $P < 0.10$.

Table 17. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in South Dakota. Densities given for all points combined, and separated by nest tree and random points. Nest tree information is only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% confidence interval (SE)									
	FC			KH[1]	RC			RR[1]	ST1[2]	ST2[2]
Snag size class (cm)	Combined (n = 6)	Nest (n = 1)	Random (n = 5)	Random (n = 2)	Combined (n = 9)	Nest (n = 1)	Random (n = 8)	Random (n = 4)	Nest (n = 9)	Nest (n = 19)
0 to < 2.5	6.3 ± 8.6 (4.3)	0	7.5 ± 10.7 (5)	93.8 ± 592 (93.8)	4.2 ± 5.4 (2.9)	25	1.6 ± 2.9 (1.6)	9.4 ± 14.1 (6)	4.2 ± 5.4 (2.9)	4.6 ± 4.1 (2.4)
2.5 to < 5	4.2 ± 8.4 (4.2)	0	5 ± 10.7 (5)	6.3 ± 39.4 (6.3)	5.6 ± 5.6 (3)	0	6.3 ± 6.3 (3.3)	6.3 ± 8.4 (3.6)	2.8 ± 3.4 (1.8)	2.6 ± 2.1 (1.2)
5 to < 8	4.2 ± 5.3 (2.6)	0	5 ± 10.5 (3.1)	12.5 ± 78.9 (12.5)	2.8 ± 3.4 (1.8)	0	3.1 ± 3.9 (2)	15.6 ± 18.4 (7.9)	8.3 ± 6.7 (3.6)	7.9 ± 5.3 (3.1)
8 to < 13	27.1 ± 31.5 (15.6)	0	32.5 ± 38.3 (17.9)	0	16.7 ± 11.6 (6.3)	37.5	14.1 ± 12.2 (6.4)	15.6 ± 27.9 (11.8)	22.2 ± 19.3 (10.4)	10.5 ± 6.1 (3.5)
13 to < 15	8.3 ± 12.5 (6.2)	0	10 ± 15.5 (7.3)	0	8.3 ± 6.7 (3.6)	25	6.3 ± 6.3 (3.3)	3.1 ± 7.4 (3.1)	19.4 ± 18.3 (9.8)	8.6 ± 7 (4.1)
15 to < 23	25 ± 23.4 (11.6)	0	30 ± 27.4 (12.9)	6.3 ± 39.4 (6.3)	16.7 ± 19.7 (10.6)	100	6.3 ± 4.4 (2.4)	12.5 ± 20.8 (8.8)	59.7 ± 32.8 (17.7)	40.8 ± 21.8 (12.6)
≥ 23	16.7 ± 13.8 (6.9)	10	18 ± 17.5 (8.2)	2.5 ± 15.8 (2.5)	5.8 ± 3.3 (1.8)	7.5	5.6 ± 3.8 (2)	9.4 ± 3.7 (1.6)	52.2 ± 17.2 (9.3)	39.6 ± 14.4 (8.3)
≥50	0.4 ± 0.9 (0.4)	0	0.5 ± 1.1 (0.5)	0	0	0	0	1.9 ± 2.8 (1.2)	1.9 ± 1.7 (0.9)	0.5 ± 0.6 (0.3)
Stumps	35.4 ± 52.2 (25.9)	163	10 ± 13.1 (6.1)	0	70.8 ± 46.2 (24.9)	100	67.2 ± 52.8 (27.9)	9.4 ± 14.1 (6)	72.2 ± 31 (16.6)	130 ± 44.7 (25.8)

[1] Only random point data available for the KH and RR sites.
[2] Only nest tree data available for the ST1 and ST2 sites.

Table 18. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in South Dakota. Densities given for all points combined, and separated by nest tree and random points. Nest tree information is only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)									
	FC			KH[1]	RC			RR[1]	ST1[2]	ST2[2]
Tree size class (cm)	Combined (n = 6)	Nest (n = 1)	Random (n = 5)	Random (n = 2)	Combined (n = 9)	Nest (n = 1)	Random (n = 8)	Random (n = 4)	Nest (n = 9)	Nest (n = 19)
0 to < 2.5	302 ± 255 (126)	300	303 ± 329 (155)	544 ± 2170 (344)	353 ± 474 (255)	413	345 ± 548 (289)	284 ± 121 (51.4)	107 ± 82.3 (44.3)	41.4 ± 34.1 (19.6)
2.5 to < 5	85.4 ± 72 (35.4)	112.5	80 ± 91 (42.9)	763 ± 4104 (650)	51.4 ± 42.3 (22.8)	100	45.3 ± 47.2 (24.9)	100 ± 80.6 (34.2)	6.9 ± 5.7 (3)	3.3 ± 5.7 (3.3)
5 to < 8	50 ± 52 (26)	25	55 ± 67 (31.3)	269 ± 1459 (231)	56.9 ± 44.4 (23.9)	225	35.9 ± 24.3 (12.8)	134 ± 201 (85.4)	2.8 ± 5.1 (2.8)	0
8 to < 13	62.5 ± 81.5 (40.6)	12.5	72.5 ± 103 (48.2)	144 ± 434 (69)	55.6 ± 35.3 (19)	188	39.1 ± 20.2 (10.7)	128 ± 127 (53.9)	19.4 ± 20.6 (11)	0
13 to < 15	29.2 ± 33.6 (16.7)	0	35 ± 40.8 (19.1)	0	23.6 ± 13.1 (7)	50	20.3 ± 13.4 (7.1)	65.6 ± 59.4 (25.2)	2.8 ± 3.4 (1.8)	0.7 ± 1.2 (0.7)
15 to < 23	81.3 ± 68.7 (34)	62.5	85 ± 88 (41.3)	12.5	65.3 ± 38.7 (20.8)	188	50 ± 30.4 (16)	150 ± 164.2 (69.8)	12.5 ± 6.7 (3.6)	2 ± 3.4 (2)
≥ 23	145 ± 55.5 (27.5)	195	135 ± 67 (31.4)	95 ± 63 (10)	139 ± 23 (12.4)	160	136 ± 26 (13.8)	129 ± 39 (16.5)	16.7 ± 15.3 (8.3)	12.1 ± 10.5 (6)
≥50	6.7 ± 4.9 (2.5)	0	8 ± 5.4 (2.6)	0	2.2 ± 2.3 (1.2)	0	2.5 ± 2.5 (1.3)	11.3 ± 10 (4.3)	1.1 ± 2.1 (1.1)	0

[1] Only random point data available for the KH and RR sites.

[2] Only nest tree data available for the ST1 and ST2 sites.

Table 19. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Washington. Densities given for all points combined, and separated by nest tree and random points. Nest tree information is only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% confidence interval (SE)								
	FY			HR			LK		
Snag size class (cm)	Combined (n = 9)	Nest (n = 6)	Random (n = 3)	Combined (n = 7)	Nest (n = 5)	Random (n = 2)	Combined (n = 10)	Nest (n = 7)	Random (n =3)
0 to < 2.5	1.4 ± 2.6 (1.4)	2.1 ± 4.1 (2.1)	0	7.1 ± 10.5 (5.4)	2.5 ± 5.3 (2.5)	18.8 ± 118 (18.8)	2.5 ± 3.1 (1.7)	1.8 ± 3.5 (1.8)	4.2 ± 12.1 (4.2)
2.5 to < 5	0	0	0	7.1 ± 7.3 (3.7)	7.5 ± 10.7 (5)	6.3 ± 39.4 (6.3)	6.3 ± 7.8 (4.3)	0	20.8 ± 32.2 (11)
5 to < 8	1.4 ± 2.6 (1.4)	2.1 ± 4.1 (2.1)	0	1.8 ± 3.5 (1.8)	2.5 ± 5.3 (2.5)	0	12.5 ± 7.6 (4.2)	14.3 ± 9.8 (5.1)	8.3 ± 24.4 (8.3)
8 to < 13	4.2 ± 5.5 (2.9)	2.1 ± 4.1 (2.1)	8.3 ± 24.4 (8.3)	1.8 ± 3.5 (1.8)	0	6.3 ± 39.4 (6.3)	3.8 ± 4.8 (2.7)	5.4 ± 7.2 (3.7)	0
13 to < 15	1.4 ± 2.6 (1.4)	2.1 ± 4.1 (2.1)	0	1.8 ± 3.5 (1.8)	2.5 ± 5.3 (2.5)	0	3.8 ± 6.8 (3.8)	5.4 ± 10.4 (5.4)	0
15 to < 23	2.8 ± 3.4 (1.8)	2.1 ± 4.1 (2.1)	4.2 ± 12.1 (4.2)	5.4 ± 5.1 (2.5)	2.5 ± 5.3 (2.5)	12.5	5 ± 5.1 (2.8)	7.1 ± 7.3 (3.7)	0
≥ 23	5 ± 2.2 (1.2)	6.7 ± 2* (1.1)	1.7 ± 4.8* (1.7)	6.1 ± 3.7 (2)	4 ± 1.3 (0.6)	11.3 ± 39.4 (6.3)	3.8 ± 2.2 (1.3)	4.6 ± 3.1 (1.6)	1.7 ± 4.8 (1.7)
≥50	1.9 ± 1.7 (0.9)	2.9 ± 2.4 (1.2)	0	2.1 ± 1.7 (0.9)	1.5 ± 2.1 (1)	3.8 ± 7.8 (1.3)	1 ± 0.7 (0.4)	1.4 ± 1 (0.5)	0
Stumps	75 ± 30.3 (16.3)	66.7 ± 39.3 (19.5)	91.7 ± 95 (32.5)	12.5 ± 5.3 (2.7)	12.5 ± 8.4 (3.9)	12.5	26.3 ± 14.6 (8)	19.6 ± 19 (9.8)	41.7 ± 32.2 (11)

Table 19 (cont)

	Snags and stumps per hectare ± 90% confidence interval (SE)									
	MT	RY			TD			ZR		
Snag size class (cm)	Nest[1] (n = 8)	Combined (n = 10)	Nest (n = 8)	Random (n = 2)	Combined (n = 8)	Nest (n = 7)	Random (n = 1)	Combined (n = 10)	Nest (n = 9)	Random (n = 1)
0 to < 2.5	76.6 ± 68.5 (36.2)	9 ± 8 (4.4)	9.7 ± 10.2 (5.4)	6.3 ± 39.4 (6.3)	15.6 ± 23.2 (12.2)	17.9 ± 26.9 (13.9)	0	23.8 ± 20 (10.9)	26.4 ± 22.1 (10.9)	0
2.5 to < 5	156 ± 142 (75)	5 ± 5.1 (2.8)	4.7 ± 6.2 (3.3)	6.3 ± 39.4 (6.3)	15.6 ± 26.4 (13.9)	17.9 ± 30.8 (15.9)	0	15 ± 11.7 (6.4)	16.7 ± 12.8 (6.9)	0
5 to < 8	144 ± 133 (70.5)	5 ± 5.1 (2.8)	4.7 ± 6.2 (3.3)	6.3 ± 39.4 (6.3)	9.4 ± 5.9 (3.1)	10.7 ± 6.4 (3.3)	0	7.5 ± 9.2 (5)	8.3 ± 10.3 (5.5)	0
8 to < 13	85.9 ± 93.8 (49.5)	3.8 ± 3.6 (2)	4.8 ± 4.4 (2.3)	0	17.2 ± 19.5 (10.3)	19.6 ± 22.4 (11.5)	0	2.5 ± 4.6 (2.5)	2.8 ± 5.1 (2.8)	0
13 to < 15	18.8 ± 26.1 (13.8)	0	0	0	12.5 ± 17.3 (9.1)	14.3 ± 20.1 (10.4)	0	0	0	0
15 to < 23	14.1 ± 13.7 (7.3)	5.1 ± 7 (3.8)	1.7 ± 3.1 (1.7)	18.8 ± 118 (18.8)	15.6 ± 19.9 (10.5)	17.9 ± 23 (11.8)	0	2.6 ± 3.1 (1.7)	2.9 ± 3.5 (1.9)	0
≥ 23	10.9 ± 5.6 (2.9)	7.8 ± 7.8 (4.3)	8.5 ± 10 (5.3)	5 ± 31.6 (5)	10.3 ± 7 (3.7)	11.8 ± 7.6 (3.9)	0	6.8 ± 2.5 (1.4)	6.4 ± 2.8 (1.5)	10
≥50	2.8 ± 2.6 (1.4)	1 ± 1.1 (0.6)	1.3 ± 1.3 (0.7)	0	2.2 ± 2.3 (1.2)	2.5 ± 2.6 (1.3)	0	2.3 ± 1.4 (0.8)	2.2 ± 1.7 (0.9)	2.5
Stumps	9.4 ± 8.6 (4.6)	51.5 ± 33 (18)	34.7 ± 23.2 (12.2)	119 ± 434 (68.8)	40.6 ± 25.2 (13.3)	33.9 ± 25.8 (13.3)	87.5	20 ± 11.4 (6.2)	20.8 ± 12.9 (6.9)	12.5

[1] Only nest tree data available for the MT site.

* Mean densities within a state differ between nest and random values $P < 0.10$.

Table 20. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for Birds and Burns study sites located in Washington. Densities given for all points combined, and separated by nest tree and random points. Nest tree information is only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)								
	FY			HR			LK		
Tree size class (cm)	Combined (n = 9)	Nest (n = 6)	Random (n = 3)	Combined (n = 7)	Nest (n = 5)	Random (n = 2)	Combined (n = 10)	Nest (n = 7)	Random (n = 3)
0 to < 2.5	86.1 ± 39.4 (21.2)	66.7 ± 50.6 (25.1)	125 ± 96.6 (33.1)	53.6 ± 72.8 (37.5)	12.5 ± 16.8 (7.9)	156 ± 750 (119)	22.5 ± 24.6 (13.4)	32.1 ± 35.5 (18.3)	0
2.5 to < 5	66.7 ± 42.4 (22.8)	54.2 ± 65.2 (32.4)	91.7 ± 67.7 (23.2)	58.9 ± 57.8 (29.7)	20 ± 31.1 (14.6)	156 ± 355 (56.3)	25 ± 26.7 (14.6)	32.1 ± 39.7 (20.4)	8.3 ± 24.4 (8.3)
5 to < 8	55.6 ± 33.5 (18.1)	45.8 ± 53.1 (26.4)	75 ± 36.5 (12.5)	55.4 ± 38.9 (20)	32.5 ± 33.3 (15.6)	113 ± 237 (37.5)	46.3 ± 29.7 (16.3)	60.7 ± 40.2 (20.7)	12.5 ± 36.5 (12.5)
8 to < 13	33.3 ± 29.8 (16)	35.4 ± 48.9 (24.2)	29.2 ± 32.2 (11)	64.3 ± 43.2 (22.2)	40 ± 45.7** (21.4)	125 ± 158** (25)	86.3 ± 55.1 (30.1)	102 ± 82 (42.2)	50 ± 36.5 (12.5)
13 to < 15	12.5 ± 11.6 (6.3)	10.4 ± 16.5 (8.2)	16.7 ± 32.1 (11)	23.2 ± 19.4 (10)	20 ± 27.4 (12.9)	31.3 ± 118 (18.8)	28.8 ± 14.9 (8.1)	32.1 ± 16.7 (8.6)	20.8 ± 60.9 (20.8)
15 to < 23	37.5 ± 20.5 (11)	27.1 ± 25.5 (12.7)	58.3 ± 53.1 (18.2)	60.7 ± 43.2 (22.2)	42.5 ± 58.1* (27.3)	106 ± 39.4* (6.3)	82.5 ± 23 (12.5)	87.5 ± 25.4 (13.1)	70.8 ± 95.1 (32.5)
≥ 23	109 ± 43.6 (23.4)	82.5 ± 45.7 (22.7)	163 ± 125 (42.9)	77.1 ± 39.2 (20.1)	65 ± 56.7 (26.6)	108 ± 79 (12.5)	91.5 ± 17.9 (9.7)	85 ± 23.7 (12.2)	107 ± 43.2 (14.8)
≥50	10.6 ± 5.8 (3.2)	10.8 ± 9.6 (4.7)	10 ± 8.4 (2.9)	12.9 ± 2.8 (1.5)	13 ± 4.3 (2)	12.5 ± 15.8 (2.5)	14.5 ± 7.3 (4)	17.1 ± 9.7 (5)	8.3 ± 17.6 (6)

Table 20 (cont).

	Trees per hectare ± 90% confidence interval (SE)									
	MT	RY			TD			ZR		
Tree size class (cm)	Nest[1] (n = 8)	Combined (n = 10)	Nest (n = 8)	Random (n = 2)	Combined (n = 8)	Nest (n = 7)	Random (n = 1)	Combined (n = 10)	Nest (n = 9)	Random (n = 1)
0 to < 2.5	156 ± 156 (82.4)	121 ± 52.8 (28.8)	89.1 ± 33.9 (17.9)	250 ± 553 (87.5)	184 ± 146 (76.9)	196 ± 170 (87.7)	100	58.8 ± 44.4 (24.2)	59.7 ± 50.4 (27.1)	50
2.5 to < 5	273 ± 180 (95.1)	92.5 ± 31.9 (17.4)	81.3 ± 26.4 (14)	137.5 ± 474 (75)	158 ± 111 (58.8)	177 ± 125 (64.3)	25	153 ± 96.6 (52.7)	160 ± 109 (58.4)	87.5
5 to < 8	327 ± 194 (103)	92.5 ± 44.4 (24.2)	84.4 ± 50 (26.4)	125 ± 474 (75)	102 ± 81.2 (42.9)	111 ± 94 (48.4)	37.5	134 ± 91.1 (49.7)	138 ± 103 (55.4)	100
8 to < 13	323 ± 147 (77.5)	86.3 ± 44.5 (24.3)	76.6 ± 55.6 (29.4)	125 ± 158 (25)	102 ± 50.7 (26.8)	102 ± 60.1 (30.9)	100	138 ± 97.5 (53.2)	147 ± 109 (58.5)	50
13 to < 15	81.3 ± 35.2 (18.6)	36.3 ± 31.2 (17)	37.5 ± 40.8 (21.5)	31.3 ± 39.4 (6.3)	29.7 ± 18.9 (10)	32.1 ± 21.8 (11.2)	12.5	33.8 ± 19.3 (10.5)	36.1 ± 21.4 (11.5)	12.5
15 to < 23	100 ± 33.8 (17.8)	61.3 ± 44.3 (24.2)	60.9 ± 58.1 (30.7)	62.5	62.5 ± 21.9 (11.6)	58.9 ± 24.7 (12.7)	87.5	42.5 ± 21.9 (12)	47.2 ± 22.9 (12.3)	0
≥ 23	60.6 ± 26.9 (14.2)	82 ± 14.3 (7.8)	83.1 ± 18.2 (9.6)	77.5 ± 78.9 (12.5)	74.4 ± 19.5 (10.3)	67.9 ± 17.9 (9.2)	120	71.5 ± 30.6 (16.7)	67.2 ± 33.6 (18)	110
≥50	7.5 ± 3.6 (1.9)	16 ± 8.1 (4.4)	18.1 ± 9.7 (5.1)	7.5 ± 47.4 (7.5)	15.6 ± 7.7 (4.1)	15.7 ± 9.1 (4.7)	15	15 ± 6.4 (3.5)	14.4 ± 7.2 (3.9)	20

[1] Only nest tree data available for the MT site.

* Mean densities within a state differ between nest and random values $P < 0.10$.

Table 21. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for Arizona. Densities given for all points combined, and separated by nest tree and random points within each stratum. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% confidence interval (SE)					
	All points combined (n = 106)		Open (n = 49)		Closed (n = 57)	
Snag size class (cm)	Open (n = 49)	Closed (n = 57)	Nests (n = 3)	Random (n = 46)	Nests (n = 13)	Random (n = 44)
0 to < 2.5	3.3 ± 2.8 (1.7)	3.9 ± 3 (1.8)	0	3.5 ± 3 (1.8)	1 ± 1.7 (1)	4.8 ± 3.8 (2.3)
2.5 to < 5	1.5 ± 1.5 (0.9)	1.1 ± 0.8 (0.5)	0	1.6 ± 1.6 (0.9)	0	1.4 ± 1 (0.6)
5 to < 8	0.3 ± 0.4 (0.3)	0.7 ± 0.6 (0.4)	4.2 ± 12.1 (4.2)	0	0	0.9 ± 0.8 (0.5)
8 to < 13	0.3 ± 0.4 (0.3)	0.2 ± 0.4 (0.2)	0	0.3 ± 0.4 (0.3)	0	0.3 ± 0.5 (0.3)
13 to < 15	0	0.2 ± 0.4 (0.2)	0	0	0	0.3 ± 0.5 (0.3)
15 to < 23	0.3 ± 0.4 (0.3)	1.1 ± 0.9 (0.6)	0	0.3 ± 0.4 (0.3)	3.8 ± 3.9 (2.2)	0.3 ± 0.5 (0.3)
≥ 23	1.5 ± 0.6** (0.3)	2.8 ± 0.7** (0.4)	4.2 ± 4.8 (1.7)	1.4 ± 0.5 (0.3)	4.2 ± 1.3** (0.7)	2.3 ± 0.9** (0.5)
≥50	0.5 ± 0.3 (0.2)	0.8 ± 0.4 (0.2)	0	0.5 ± 0.3 (0.2)	1.3 ± 1 (0.5)	0.6 ± 0.4 (0.2)
Stumps	71.9 ± 26.8 (16)	85.5 ± 23 (13.6)	204 ± 232 (79)	63 ± 26.3 (15.6)	118 ± 53 (29)	76 ± 26 (15.3)

* Mean densities within a stratum differ between nest and random values $P < 0.10$.

** Mean densities within a stratum differ between nest and random values $P < 0.05$.

Table 22. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for Arizona. Densities given for all points combined, and separated by nest tree and random points within each stratum. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)					
	All points combined (n = 106)		Open (n = 49)		Closed (n = 57)	
Tree size class (cm)	Open (n = 49)	Closed (n = 57)	Nests (n = 3)	Random (n = 46)	Nests (n = 13)	Random (n = 44)
0 to < 2.5	73 ± 20.7* (12.4)	43.9 ± 13.7* (8.2)	12.5 ± 21.1** (7.2)	76.6 ± 21.8** (13)	12.5 ± 11.8** (6.6)	53.4 ± 16.9** (10.1)
2.5 to < 5	5.4 ± 2.5** (1.5)	12.3 ± 5** (3)	4.2 ± 12.1 (4.2)	5.7 ± 2.7 (1.6)	21.2 ± 18.8 (10.5)	9.4 ± 3.9 (2.3)
5 to < 8	5.4 ± 3** (1.8)	15.6 ± 7.1** (4.2)	4.2 ± 12.1 (4.2)	5.4 ± 3.3 (1.9)	23.1 ± 19.8 (11.1)	13.4 ± 7.4 (4.4)
8 to < 13	11.5 ± 5.1** (3.1)	28.9 ± 9.7** (5.8)	4.2 ± 12.1 (4.2)	12 ± 5.4 (3.3)	29.8 ± 23.2 (13)	28.7 ± 11.3 (6.6)
13 to < 15	3.6 ± 2.8** (1.7)	16.2 ± 5** (3)	0	3.8 ± 3.1 (1.8)	25 ± 14 (7.9)	13.6 ± 5.1 (3)
15 to < 23	17.9 ± 7.2** (4.3)	61.2 ± 13.7** (8.2)	29.2 ± 84.8 (29.2)	19 ± 7.7 (4.5)	84.6 ± 43.6 (24.4)	52.3 ± 13.1 (7.8)
≥ 23	66.1 ± 11.9** (7.1)	188 ± 17.1** (10.3)	107 ± 218 (74.9)	67.8 ± 12.5 (7.4)	180 ± 32 (17.5)	186 ± 21 (12.6)
≥50	10.8 ± 2.7** (1.6)	17 ± 3.3** (1.9)	11.7 ± 17.5 (6)	11 ± 2.8 (1.7)	20.4 ± 6.7 (3.8)	15.8 ± 3.8 (2.3)

* Mean densities within a stratum differ between nest and random values $P < 0.10$.
** Mean densities within a state differ between nest and random values $P < 0.05$.

Table 23. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for Idaho. Densities given for all points combined, and separated by nest tree and random points within each stratum. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% confidence interval (SE)					
	All points combined (n = 90)		Open (n = 54)		Closed (n = 36)	
Snag size class (cm)	Open (n = 54)	Closed (n = 36)	Nests (n = 22)	Random (n = 32)	Nests (n = 9)	Random (n = 27)
0 to < 2.5	6.5 ± 3.1** (1.9)	42.7 ± 25.1** (14.8)	3.4 ± 32 (1.9)	8.6 ± 4.9 (2.9)	25 ± 25.4 (13.7)	48.8 ± 32.8 (19.2)
2.5 to < 5	6.3 ± 3.3* (2)	39.9 ± 29.3* (17.4)	3.4 ± 3.2 (1.9)	8.2 ± 5.3 (3.1)	16.7 ± 15 (8.1)	47.7 ± 39 (22.9)
5 to < 8	1.6 ± 1.1** (0.7)	21.5 ± 13.5** (8)	0	2.7 ± 1.9 (1.1)	16.7 ± 14.5 (7.8)	21.8 ± 17.7 (10.4)
8 to < 13	3.9 ± 3.3** (2)	14.9 ± 6.6** (3.9)	3.4 ± 5 (2.9)	4.3 ± 4.6 (2.7)	13.9 ± 11.2 (6.1)	16.7 ± 8.3 (4.9)
13 to < 15	0.7 ± 0.7 (0.4)	3.1 ± 2.1 (1.3)	0.6 ± 0.9 (0.6)	0.8 ± 0.9 (0.5)	4.2 ± 7.7 (4.2)	2.3 ± 1.6 (1)
15 to < 23	2.8 ± 1.9** (1.2)	11.5 ± 5.2** (3.1)	1.1 ± 2 (1.1)	3.9 ± 3.1 (1.8)	6.9 ± 6.9 (3.7)	12.5 ± 6.7 (3.9)
≥ 23	8.9 ± 2.2* (1.3)	13.4 ± 3.7* (2.2)	13.2 ± 4.8** (2.8)	5.9 ± 1.6** (0.9)	17.5 ± 7.7 (4.1)	12.5 ± 4.4 (2.6)
≥50	4.8 ± 1.4* (0.9)	7.2 ± 2.2* (1.3)	7.7 ± 3.2** (1.8)	2.7 ± 1** (0.6)	11.9 ± 4.9* (2.6)	6 ± 2.5* (1.5)
Stumps	6.5 ± 4 (2.4)	4.5 ± 2.3 (1.3)	5.7 ± 3.9 (2.3)	7 ± 6.5 (3.8)	8.3 ± 5.5 (2.9)	3.2 ± 2.5 (1.4)

* Mean densities within a stratum differ between nest and random values $P < 0.10$.

** Mean densities within a stratum differ between nest and random values $P < 0.05$.

Table 24. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for Idaho. Densities given for all points combined, and separated by nest tree and random points within each stratum. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)					
	All points combined (n = 90)		Open (n = 54)		Closed (n = 36)	
Tree size class (cm)	Open (n = 54)	Closed (n = 36)	Nests (n = 22)	Random (n = 32)	Nests (n = 9)	Random (n = 27)
0 to < 2.5	23.6 ± 8.1** (4.8)	90.8 ± 38.8** (23)	21.6 ± 11.9 (6.9)	25 ± 11.3 (6.7)	75 ± 36 (19.5)	96 ± 51.4 (30.1)
2.5 to < 5	28.5 ± 9.6** (5.8)	86.5 ± 31.5** (18.9)	20.5 ± 13.6 (7.9)	34 ± 13.6 (8)	77.8 ± 54 (29.2)	89.4 ± 40 (23.5)
5 to < 8	23.6 ± 7.9** (4.7)	78.5 ± 23.3** (13.8)	17.6 ± 11 (6.4)	27.7 ± 11.2 (6.6)	79.2 ± 39.8 (21.6)	78.2 ± 30 (17.2)
8 to < 13	30.6 ± 9** (5.4)	85.1 ± 21.9** (12.7)	19.3 ± 11.9* (6.9)	38.3 ± 12.7* (7.5)	100 ± 51 (27.6)	80.1 ± 25 (14.4)
13 to < 15	8.3 ± 3** (1.7)	29.2 ± 9** (5.3)	6.8 ± 4.2 (2.4)	9.4 ± 4.1 (2.4)	20.8 ± 20.1 (10.8)	31.9 ± 10.6 (6.2)
15 to < 23	24.3 ± 7.8** (4.7)	68.4 ± 19** (11.2)	10.8 ± 5.7** (3.3)	33.6 ± 12** (7.1)	66.7 ± 41.3 (22.1)	69 ± 22.7 (13.3)
≥ 23	48.7 ± 6.1** (3.6)	104 ± 17.8** (10.5)	43.6 ± 8.4 (4.8)	52.2 ± 8.7 (5.1)	89.4 ± 23.6 (12.6)	109 ± 22.9 (13.4)
≥50	23.9 ± 3.8** (2.3)	34.2 ± 6.2** (3.7)	23 ± 5.9 (3.5)	24.5 ± 5.1 (3)	35.6 ± 11.9 (6.4)	33.7 ± 7.6 (4.5)

* Mean densities within a stratum differ between nest and random values $P < 0.10$.
** Mean densities within a stratum differ between nest and random values $P < 0.05$.

Table 25. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for New Mexico. Densities given for all points combined, and separated by nest tree and random points within the closed stratum[1]. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	All points combined (n = 39)		Open (n = 4)	Closed (n = 35)	
Snag size class (cm)	Open (n = 4)	Closed (n = 35)	Random[1] (n = 4)	Nests (n = 14)	Random (n = 21)
0 to < 2.5	0	23.6 ± 10.6 (6.3)	0	21.4 ± 12.6 (7.1)	25 ± 16.4 (9.5)
2.5 to < 5	9.4 ± 14.1 (6)	26.4 ± 14.2 (8.4)	9.4 ± 14.1 (6)	18.8 ± 8.2 (4.7)	31.5 ± 23.6 (13.7)
5 to < 8	3.1 ± 7.1* (3.1)	21.4 ± 15.9* (9.4)	3.1 ± 7.1 (3.1)	4.5 ± 4.9* (2.8)	32.7 ± 26.1* (15.1)
8 to < 13	0	14.6 ± 7.1 (4.2)	0	4.5 ± 3.7** (2.1)	21.4 ± 11.3** (6.5)
13 to < 15	0	2.9 ± 1.7 (1)	0	2.7 ± 2.5 (1.4)	3 ± 2.5 (1.5)
15 to < 23	3.1 ± 7.4 (3.1)	6.4 ± 3 (1.7)	3.1 ± 7.4 (3.1)	7.1 ± 6.1 (3.4)	6 ± 3.2 (1.9)
≥ 23	2.5 ± 2.4** (1)	5.9 ± 1.8** (1.1)	2.5 ± 2.4 (1)	4.6 ± 2.2 (1.2)	6.8 ± 2.7 (1.6)
≥50	0	0.9 ± 0.4 (0.3)	0	0.9 ± 0.6 (0.3)	0.8 ± 0.7 (0.4)
Stumps	3.1 ± 7.4** (3.1)	44.3 ± 15.5** (9.2)	3.1 ± 7.4 (3.1)	56.3 ± 31.2 (17.7)	36.3 ± 16.8 (9.8)

1 Only random points located within the open stratum.

* Mean densities within a stratum differ between nest and random values $P < 0.10$.

** Mean densities within a stratum differ between nest and random values $P < 0.05$.

Table 26. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for New Mexico. Densities given for all points combined, and separated by nest tree and random points within the closed stratum[1]. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	All points combined (n = 39)		Open (n = 4)	Closed (n = 35)	
Tree size class (cm)	Open (n = 4)	Closed (n = 35)	Random[1] (n = 4)	Nests (n = 14)	Random (n = 21)
0 to < 2.5	34.4 ± 14.1** (6)	192 ± 74** (43.7)	34.4 ± 14.1 (6)	198 ± 151 (85.2)	188 ± 82 (47.6)
2.5 to < 5	18.8 ± 18.9** (8.1)	161 ± 47.9** (28.3)	18.8 ± 18.9 (8.1)	131 ± 70 (39.3)	181 ± 67.7 (39.3)
5 to < 8	6.3 ± 8.4** (3.6)	139 ± 40** (23.9)	6.3 ± 8.4 (3.6)	124 ± 44 (24.8)	148 ± 63 (36.7)
8 to < 13	15.6 ± 14.1** (6)	178 ± 44** (26.5)	15.6 ± 14.1 (6)	155 ± 52 (28.9)	192 ± 69 (39.9)
13 to < 15	6.3 ± 8.4** (3.6)	45.7 ± 12.1** (7.1)	6.3 ± 8.4 (3.6)	27.7 ± 9** (5.1)	57.7 ± 18.5** (10.7)
15 to < 23	53.1 ± 46.9** (20)	130 ± 22.6** (13.4)	53.1 ± 46.9 (20)	104 ± 26** (14.6)	148 ± 33** (19.4)
≥ 23	93.8 ± 45* (19.2)	148 ± 17* (10)	93.8 ± 45 (19.2)	136 ± 20 (11.3)	156 ± 25.6 (14.9)
≥50	21.3 ± 6.3** (6.9)	17.3 ± 3.5** (2.1)	21.3 ± 6.3 (6.9)	21.8 ± 5.9** (3.4)	14.3 ± 4.4** (2.5)

1 Only random points located within the open stratum.

* Mean densities within a stratum differ between nest and random values $P < 0.10$.

** Mean densities within a stratum differ between nest and random values $P < 0.05$.

Table 27. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for Oregon. Densities given for all points combined, and separated by nest tree and random points within each stratum. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% confidence interval (SE)					
	All points combined (n = 70)		Open (n = 43)		Closed (n = 27)	
Snag size class (cm)	Open (n = 43)	Closed (n = 27)	Nests (n = 20)	Random (n = 23)	Nests (n = 19)	Random (n = 8)
0 to < 2.5	65.3 ± 26.6 (15.8)	61.1 ± 47 (27.5)	28.8 ± 17.3** (10)	97 ± 46.2** (26.9)	32.9 ± 18.5 (10.7)	128 ± 168 (88.9)
2.5 to < 5	59 ± 30.8 (18.3)	56 ± 32.4 (19)	16.3 ± 12.6** (7.3)	96.2 ± 55** (32)	50 ± 32.4 (18.7)	70.3 ± 92 (48.5)
5 to < 8	28.8 ± 11.5 (6.8)	50.5 ± 25.8 (15.2)	15 ± 9** (5.2)	40.8 ± 19.7** (11.5)	49.3 ± 31.8 (18.3)	53.1 ± 55 (28.9)
8 to < 13	11.3 ± 4.3* (2.5)	29.2 ± 14.8* (8.7)	9.4 ± 4.4 (2.5)	13 ± 7.2 (4.2)	27.6 ± 17.5 (10.1)	32.8 ± 34.4 (18.1)
13 to < 15	4.4 ± 2.6 (1.6)	7.9 ± 4.5 (2.7)	3.1 ± 3.1 (1.8)	5.4 ± 4.3 (2.5)	9.9 ± 6.3 (3.7)	3.1 ± 3.9 (2)
15 to < 23	6.1 ± 2.7 (1.6)	9.7 ± 6.3 (3.7)	5.6 ± 3.3 (1.9)	6.5 ± 4.3 (2.5)	13.2 ± 8.6** (5)	1.6 ± 2.9** (1.6)
≥ 23	7.6 ± 2.2** (1.3)	18 ± 7.2** (4.2)	9.8 ± 3.7 (2.2)	5.7 ± 2.5 (1.5)	17.8 ± 9.3 (5.4)	18.4 ± 12.6 (6.6)
≥50	1.6 ± 0.7* (0.4)	4.5 ± 2.5* (1.5)	1.6 ± 1.1 (0.6)	1.6 ± 1 (0.6)	3.7 ± 3.2 (1.9)	6.6 ± 4.2 (2.3)
Stumps	41.4 ± 10.1 (6)	33.8 ± 14 (8.2)	44.4 ± 15.2 (8.8)	38.9 ± 14.2 (8.3)	28.9 ± 14.3 (8.2)	45.3 ± 38 (20)

* Mean densities within a stratum differ between nest and random values $P < 0.10$.

** Mean densities within a stratum differ between nest and random values $P < 0.05$.

Table 28. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for Oregon. Densities given for all points combined, and separated by nest tree and random points within each stratum. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)					
	All points combined (n = 70)		Open (n = 43)		Closed (n = 27)	
Tree size class (cm)	Open (n = 43)	Closed (n = 27)	Nests (n = 20)	Random (n = 23)	Nests (n = 19)	Random (n = 8)
0 to < 2.5	391 ± 154 (92)	501 ± 331 (194)	411 ± 322 (186)	373 ± 111 (65.1)	345 ± 213 (123)	872 ± 1130 (595)
2.5 to < 5	391 ± 130 (77)	525 ± 312 (183)	247 ± 148* (86)	517 ± 204* (119)	367 ± 220 (126)	900 ± 1030 (544)
5 to < 8	301 ± 92 (54.7)	316 ± 95 (55.8)	204 ± 95* (54.7)	385 ± 151* (88)	269 ± 111 (63.9)	428 ± 204 (108)
8 to < 13	215 ± 46 (27.4)	206 ± 61 (36)	173 ± 72 (41.5)	252 ± 61 (35.5)	187 ± 67 (38.9)	252 ± 153 (81.1)
13 to < 15	66.6 ± 13.4 (7.9)	58.8 ± 21.2 (12.4)	53.1 ± 19.3 (11.1)	78.3 ± 18.6 (10.8)	56.6 ± 29 (16.7)	64.1 ± 27.7 (14.6)
15 to < 23	116 ± 24.9 (14.8)	123 ± 27.4 (16)	113 ± 43.6 (25.2)	119 ± 30 (17.5)	124 ± 27 (16)	120 ± 77 (40.5)
≥ 23	108 ± 13 (7.8)	128 ± 15 (8.7)	96.8 ± 21.2 (12.5)	118 ± 16 (9.4)	129 ± 19.8 (11.4)	126 ± 22.9 (12.1)
≥50	17.6 ± 4.9 (3)	18.1 ± 6.1 (3.6)	11.8 ± 4.9* (2.8)	22.6 ± 8.2* (4.8)	15.5 ± 7 (4)	24.4 ± 13.7 (7.2)

* Mean densities within a stratum differ between nest and random values $P < 0.10$.

** Mean densities within a stratum differ between nest and random values $P < 0.05$.

Table 29. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for South Dakota. Densities given for all points combined, and separated by nest tree and random points within each stratum. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% confidence interval (SE)					
	All points combined (n = 49)		Open (n = 31)		Closed (n = 18)	
Snag size class (cm)	Open (n = 31)	Closed (n = 18)	Nests (n = 28)	Random (n = 3)	Nests (n = 2)	Random (n = 16)
0 to < 2.5	4 ± 2.9 (1.7)	16.7 ± 17.9 (10.3)	4.5 ± 3.1 (1.8)	0	12.5 ± 79 (12.5)	17.2 ± 20.3 (11.6)
2.5 to < 5	2.4 ± 1.6 (0.9)	6.3 ± 3.6 (2.1)	2.7 ± 1.7 (1)	0	0	7 ± 4 (2.3)
5 to < 8	7.3 ± 3.6 (2.2)	7.6 ± 4.4 (2.5)	8 ± 4 (2.3)	0	0	8.6 ± 4.8 (2.7)
8 to < 13	12.9 ± 6.4 (3.8)	20.8 ± 10.9 (6.2)	14.3 ± 7 (4.1)	0	18.8 ± 118 (18.8)	21.1 ± 11.9 (6.8)
13 to < 15	10.9 ± 6.5 (3.8)	7.6 ± 4.7 (2.7)	12.1 ± 7.2 (4.2)	0	12.5 ± 78.9 (12.5)	7 ± 4.9 (2.8)
15 to < 23	42.3 ± 16.2* (9.5)	20.1 ± 11.3* (6.5)	46.9 ± 17.3 (10.2)	0	50 ± 316 (50)	16.4 ± 8.6 (4.9)
≥ 23	39.6 ± 10.5** (6.2)	10.6 ± 4.4** (2.5)	43.7 ± 10.8** (6.4)	1.7 ± 4.8** (1.7)	8.8 ± 7.8 (1.3)	10.8 ± 5 (2.9)
≥50	0.9 ± 0.6 (0.3)	0.6 ± 0.5 (0.3)	1 ± 0.6 (0.4)	0	0	0.6 ± 0.7 (0.4)
Stumps	103 ± 30** (17.7)	45.1 ± 27.5** (15.8)	112 ± 32** (18.8)	25 ± 73** (25)	131 ± 197 (31.3)	34.4 ± 27.1 (15.5)

* Mean densities differ between points within the state or stratum $P < 0.10$.

** Mean densities differ between points within the state or stratum $P < 0.05$.

Table 30. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for South Dakota. Densities given for all points combined, and separated by nest tree and random points within each stratum. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)					
	All points combined (n = 49)		Open (n = 31)		Closed (n = 18)	
Tree size class (cm)	Open (n = 31)	Closed (n = 18)	Nests (n = 28)	Random (n = 3)	Nests (n = 2)	Random (n = 16)
0 to < 2.5	66.1 ± 31.7** (18.6)	384 ± 229** (132)	62.5 ± 33.9 (19.9)	100 ± 167 (57.7)	356 ± 355 (56.3)	388 ± 260 (148)
2.5 to < 5	8.9 ± 7.1* (4.3)	153 ± 132* (76)	4.5 ± 4.1 (2.4)	50 ± 97 (33.1)	106 ± 40 (6.3)	159 ± 150 (85.8)
5 to < 8	2.4 ± 2.5** (1.5)	102 ± 57** (32.7)	0.9 ± 1.5 (0.9)	16.7 ± 32.2 (11)	125 ± 631 (100)	99.2 ± 63 (35.7)
8 to < 13	8.9 ± 7** (4.1)	87.5 ± 36.5** (20.9)	6.3 ± 6.5 (3.8)	33.3 ± 64.4 (22)	100 ± 552 (87.5)	85.9 ± 39 (22.2)
13 to < 15	1.6 ± 1.3** (0.8)	35.4 ± 15.5** (8.9)	1.3 ± 1.3 (0.7)	4.2 ± 12.1 (4.2)	25 ± 158 (25)	36.7 ± 17 (9.7)
15 to < 23	5.6 ± 3.1** (1.8)	93.1 ± 37** (21.1)	5.4 ± 3.3 (2)	8.3 ± 12.2 (4.2)	125 ± 395 (62.5)	89.1 ± 40.3 (22.9)
≥ 23	21.6 ± 10.7** (6.3)	141 ± 18.7** (10.8)	13.6 ± 8.2** (4.8)	96.7 ± 24.3** (8.3)	178 ± 110 (17.5)	136 ± 20.4 (11.6)
≥50	0.3 ± 0.6** (0.3)	5.8 ± 2.6** (1.5)	0.4 ± 0.6 (0.4)	0	0	6.6 ± 2.9 (1.6)

** Mean densities within a state differ between nest and random values $P < 0.05$.

Table 31. Mean snag and stump densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for Washington. Densities given for all points combined, and separated by nest tree and random points within each stratum. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Snags and stumps per hectare ± 90% confidence interval (SE)					
	All points combined (n = 62)		Open (n = 17)		Closed (n = 45)	
Snag size class (cm)	Open (n = 17)	Closed (n = 45)	Nests (n = 15)	Random (n = 2)	Nests (n = 35)	Random (n = 10)
0 to < 2.5	3.7 ± 4.1** (2.3)	24.2 ± 13.2** (7.9)	3.3 ± 4.6 (2.6)	6.3 ± 39.4 (6.3)	29.6 ± 16.8** (9.9)	5 ± 7** (3.8)
2.5 to < 5	5.9 ± 7.3* (4.2)	35.3 ± 25.9* (15.4)	6.7 ± 8.3 (4.7)	0	42.9 ± 33.2* (19.7)	8.8 ± 7.6* (4.2)
5 to < 8	6.6 ± 5.3 (3.1)	30.8 ± 24.1 (14.3)	7.5 ± 6 (3.4)	0	38.6 ± 30.8* (18.2)	3.8 ± 4.8* (2.7)
8 to < 13	3.7 ± 3.6 (2.1)	20.3 ± 16.4 (9.7)	4.2 ± 4.1 (2.3)	0	25 ± 21 (12.4)	3.8 ± 4.8 (2.7)
13 to < 15	3.7 ± 4.5 (2.6)	5.6 ± 5 (3)	4.2 ± 5.1 (2.9)	0	7.1 ± 6.5 (3.8)	0
15 to < 23	4.4 ± 3.2 (1.8)	7.8 ± 4.2 (2.5)	5 ± 3.6 (2)	0	7.9 ± 5.1 (3)	7.5 ± 7 (3.8)
≥ 23	9.3 ± 4.6 (2.7)	6.2 ± 1.5 (0.9)	10.2 ± 5.1 (2.9)	2.5 ± 15.8 (2.5)	6.6 ± 1.8 (1)	4.8 ± 3.5 (1.9)
≥50	2.1 ± 0.9 (0.5)	1.8 ± 0.7 (0.4)	2.3 ± 1 (0.6)	0	2 ± 0.8 (0.5)	1 ± 1 (0.6)
Stumps	41.9 ± 22.9 (13.1)	31.7 ± 8.4 (5.0)	30.8 ± 18.6 (10.6)	125 ± 395 (62.5)	26.1 ± 8 (4.8)	51.3 ± 25.7 (14.1)

* Mean densities within a state differ between nest and random values $P < 0.10$.

** Mean densities within a state differ between nest and random values $P < 0.05$.

Table 32. Mean tree densities per hectare ± 90 % confidence interval (SE) and sample size for open and closed forest canopy strata for Washington. Densities given for all points combined, and separated by nest tree and random points within each stratum. Nest tree statistics are only for woodpecker and bluebird species. Data collected in 2002.

	Trees per hectare ± 90% confidence interval (SE)					
	All points combined (n = 62)		Open (n = 17)		Closed (n = 45)	
Tree size class (cm)	Open (n = 17)	Closed (n = 45)	Nests (n = 15)	Random (n = 2)	Nests (n = 35)	Random (n = 10)
0 to < 2.5	44.9 ± 22.3** (12.8)	114 ± 38** (22.7)	40 ± 20.5 (11.7)	81.3 ± 513 (81)	113 ± 47 (27.5)	118 ± 66 (36.3)
2.5 to < 5	52.2 ± 28.3** (16.2)	139 ± 43** (25.3)	55 ± 31.9 (18.1)	31.3 ± 198 (31.3)	153 ± 53 (31.6)	93.8 ± 42 (23.5)
5 to < 8	68.4 ± 39.9* (22.8)	131 ± 44* (25.8)	74.2 ± 44.9 (25.5)	25 ± 158 (25)	144 ± 55 (32.5)	82.5 ± 33.5 (18.5)
8 to < 13	72.1 ± 38.9* (22.2)	134 ± 39* (23.3)	73.3 ± 44.1 (25)	62.5 ± 236 (37.5)	150 ± 50** (29.1)	76.3 ± 28** (15.1)
13 to < 15	27.2 ± 16.2 (9.3)	37.5 ± 10.2 (6.1)	28.3 ± 18.3 (10.4)	18.8 ± 118 (18.8)	41.8 ± 12.5* (7.4)	22.5 ± 12.2* (6.7)
15 to < 23	44.9 ± 17.1* (9.8)	70.3 ± 13.3* (7.9)	45.8 ± 19.2 (10.9)	37.5 ± 158 (25)	69.3 ± 16.4 (9.7)	73.8 ± 22.2 (12.1)
≥ 23	55.6 ± 12.2** (7)	91 ± 12** (7)	51.3 ± 12.8** (7.2)	87.5 ± 15.5** (2.5)	82.1 ± 12.3** (7.3)	124 ± 28** (15.2)
≥50	10.3 ± 3.3 (1.9)	14.4 ± 2.8 (1.7)	11.3 ± 3.5* (2)	2.5 ± 15.8* (2.5)	15 ± 3.5 (2.1)	12.5 ± 3.7 (2)

* Mean densities within a stratum differ between nest and random values $P < 0.10$.
** Mean densities within a stratum differ between nest and random values $P < 0.05$.

Table 33. Estimated means, standard deviations, sample sizes, and precision levels of snag densities (≥ 23 cm dbh) surrounding nest trees in the seven locations involved in the Birds and Burn study in 2002. Data are arranged in decreasing order of precision given four different plot designs: 1) entire cross with 50-m arms, 2) truncated cross with 25-m arms, 3) truncated cross with 12.5 m arms, and 4) 100-m straight transect centered on nest trees. Figure 1 illustrates the four plot configurations for this analysis.

Location	Plot design	Total plot length (m)	Mean (snags/ha)	Standard deviation (snags/ha)	Current number of nest trees surveyed (N)	Estimated nest trees required (n)	Estimated transect length required (m)	Bound	Current level of precision (%)
BHSD	Cross_12.5 m arms	50	51.6	41.6	30	47	2334	12.87	24.9
BHSD	Entire cross	200	41.3	33.8	30	48	9621	10.46	25.3
BHSD	Straight	100	49	40.9	30	50	5004	12.66	25.8
BHSD	Cross_25 m arms	100	44.2	37.2	30	51	5088	11.51	26.0
GINM	Entire cross	200	4.6	4.6	14	77	15488	2.16	47.0
GINM	Straight	100	4.6	5	14	91	9149	2.35	51.1
GINM	Cross_25 m arms	100	4.6	5.4	14	107	10672	2.54	55.2
GINM	Cross_12.5 m arms	50	5.7	7.6	14	138	6884	3.57	62.7
KAAZ	Entire cross	200	4.2	2.5	16	27	5401	1.09	26.0
KAAZ	Straight	100	6.6	4.7	16	39	3865	2.05	31.1
KAAZ	Cross_25 m arms	100	4.1	3.8	16	65	6547	1.66	40.5
KAAZ	Cross_12.5 m arms	50	6.9	7.9	16	100	4995	3.45	50.0
OKWA	Entire cross	200	7.7	8	50	76	15179	1.90	24.6
OKWA	Straight	100	8.6	9.4	50	84	8400	2.23	25.9
OKWA	Cross_25 m arms	100	8.6	12.3	50	144	14382	2.92	33.9
OKWA	Cross_12.5 m arms	50	12.4	18.2	50	151	7573	4.32	34.8
PAID	Straight	100	18.4	15.8	31	53	5296	4.81	26.1
PAID	Entire cross	200	14.4	12.9	31	58	11528	3.93	27.3
PAID	Cross_25 m arms	100	17.4	19	31	86	8564	5.78	33.2
PAID	Cross_12.5 m arms	50	26.5	29.2	31	87	4360	8.89	33.5
SJCO	Cross_12.5 m arms	50	30.8	18	13	27	1338	8.84	28.7
SJCO	Cross_25 m arms	100	27.3	18.8	13	37	3714	9.23	33.8
SJCO	Entire cross	200	22.3	16	13	40	8064	7.85	35.2
SJCO	Straight	100	26.2	21.4	13	52	5225	10.51	40.1
SYOR	Entire cross	200	13.4	17.9	40	126	25182	4.75	35.5
SYOR	Cross_25 m arms	100	15	21.2	40	141	14094	5.63	37.5
SYOR	Straight	100	15.1	22.6	40	158	15806	6.00	39.8
SYOR	Cross_12.5 m arms	50	14.3	23.1	40	184	9206	6.14	42.9

Table 34. Estimated means, standard deviations, sample sizes, and precision levels of snag densities (≥ 23 cm dbh) at nest trees and random points in Arizona. Data are arranged in decreasing order of precision for both nest and random points using four nested plots designs within a cross pattern with arms 50 m long, 20 m wide. Pearson correlation coefficients obtained from serial correlation analysis testing for independence of adjacent sampling units. Independence values equal to one are assumed to be independent. Figure 1 illustrates the different plot designs. Data collected in 2002 following the Birds and Burn Prescribed Fire protocol.

Point type	Total plot length (m)	Mean (snags/ha)	Standard deviation (snags/ha)	Current number of samples (N)	Estimated sample size required (n)	Estimated transect length required (m)	Bound	Current level of precision (%)	Pearson correlation coefficient	R^2	Independence
Nest	4 x 50	4.2	2.5	64	25	1237	0.52	12.4	0.16	0.03	1
Nest	200	4.2	2.5	16	27	5401	1.09	26.0	N/A	N/A	1
Nest	4 x 25	4.2	3.8	32	59	5873	1.14	27.1	-0.15	0.02	1
Nest	4 x 12.5	4.2	6.4	64	64	3200	1.34	31.8	-0.25	0.06	1
Random	4 x 12.5	1.8	5.2	360	574	28677	0.45	25.2	0.11	0.01	1
Random	4 x 25	1.8	3.7	180	290	29038	0.46	25.4	0.10	0.01	1
Random	4 x 50	1.8	5.3	360	596	29791	0.46	25.7	0.02	0.00	1
Random	200	1.8	2.8	90	167	33339	0.49	27.2	N/A	N/A	1

Table 35. Estimated means, standard deviations, sample sizes, and precision levels of snag densities (≥ 23 cm dbh) at nest trees and random points in Colorado. Data are arranged in decreasing order of precision for both nest and random points using four nested plots designs within a cross pattern with arms 50 m long, 20 m wide. Pearson correlation coefficients obtained from serial correlation analysis testing for independence of adjacent sampling units. Independence values equal to one are assumed to be independent. Figure 1 illustrates the different plot designs. Data collected in 2002 following the Birds and Burn Prescribed Fire protocol.

Point type	Total plot length (m)	Mean (snags/ha)	Standard deviation (snags/ha)	Current number of samples (N)	Estimated sample size required (n)	Estimated transect length required (m)	Bound	Current level of precision (%)	Pearson correlation coefficient	R^2	Independence
Nest	4 x 50	22.3	16	52	36	1812	3.72	16.7	0.33	0.11	1
Nest	4 x 12.5	22.3	20.9	52	52	2600	4.86	21.8	0.50	0.25	0
Nest	4 x 25	22.3	17.6	26	45	4532	5.89	26.4	0.76	0.58	0
Nest	200	22.3	16	13	40	8064	7.85	35.2	N/A	N/A	1
Random	4 x 12.5	17.3	16.8	188	65	3240	2.03	11.7	0.34	0.12	1
Random	4 x 50	17.3	18.2	186	76	3803	2.21	12.8	0.10	0.01	1
Random	4 x 25	17.3	13.9	94	44	4447	2.38	13.8	0.24	0.06	1
Random	200	17.3	10.9	47	28	5602	2.67	15.4	N/A	N/A	1

Table 36. Estimated means, standard deviations, sample sizes, and precision levels of snag densities (≥ 23 cm dbh) at nest trees and random points in Idaho. Data are arranged in decreasing order of precision for both nest and random points using four nested plots designs within a cross pattern with arms 50 m long, 20 m wide. Pearson correlation coefficients obtained from serial correlation analysis testing for independence of adjacent sampling units. Independence values equal to one are assumed to be independent. Figure 1 illustrates the different plot designs. Data collected in 2002 following the Birds and Burn Prescribed Fire protocol.

Point type	Total plot length (m)	Mean (snags/ha)	Standard deviation (snags/ha)	Current number of samples (N)	Estimated sample size required (n)	Estimated transect length required (m)	Bound	Current level of precision (%)	Pearson correlation coefficient	R^2	Independence
Nest	4 x 50	14.4	12.9	124	55	2748	1.92	13.3	0.14	0.02	1
Nest	4 x 12.5	14.4	19.7	124	124	6200	2.93	20.3	0.37	0.14	1
Nest	4 x 25	14.4	15.5	62	81	8088	3.29	22.8	0.47	0.22	0
Nest	200	14.4	12.9	31	58	11528	3.93	27.3	N/A	N/A	1
Random	4 x 50	8.6	13.8	236	177	8848	1.49	17.3	0.40	0.16	1
Random	4 x 12.5	8.6	15.2	236	215	10734	1.64	19.1	0.47	0.22	0
Random	4 x 25	8.6	13.4	118	167	16705	2.05	23.8	0.14	0.02	1
Random	200	8.6	10.1	59	96	19279	2.20	25.6	N/A	N/A	1

Table 37. Estimated means, standard deviations, sample sizes, and precision levels of snag densities (≥ 23 cm dbh) at random points in Montana. Data are arranged in decreasing order of precision using four nested plots designs within a cross pattern with arms 50 m long, 20 m wide. Pearson correlation coefficients obtained from serial correlation analysis testing for independence of adjacent sampling units. Independence values equal to one are assumed to be independent. Figure 1 illustrates the different plot designs. Data collected in 2002 following the Birds and Burn Prescribed Fire protocol.

Point type	Total plot length (m)	Mean (snags/ha)	Standard deviation (snags/ha)	Current number of samples (N)	Estimated sample size required (n)	Estimated transect length required (m)	Bound	Current level of precision (%)	Pearson correlation coefficient	R^2	Independence
Random	4 x 50	10.9	14.2	160	117	5832	1.86	17.1	0.09	0.01	1
Random	4 x 12.5	10.9	14.6	160	123	6165	1.91	17.6	0.15	0.02	1
Random	4 x 25	10.9	10.97	80	70	6978	2.04	18.7	0.04	0.00	1
Random	200	10.9	8	40	38	7638	2.13	19.5	N/A	N/A	1

Table 38. Estimated means, standard deviations, sample sizes, and precision levels of snag densities (≥ 23 cm dbh) at nest trees and random points in New Mexico. Data are arranged in decreasing order of precision for both nest and random points using four nested plots designs within a cross pattern with arms 50 m long, 20 m wide. Pearson correlation coefficients obtained from serial correlation analysis testing for independence of adjacent sampling units. Independence values equal to one are assumed to be independent. Figure 1 illustrates the different plot designs. Data collected in 2002 following the Birds and Burn Prescribed Fire protocol.

Point type	Total plot length (m)	Mean (snags/ha)	Standard deviation (snags/ha)	Current number of samples (N)	Estimated sample size required (n)	Estimated transect length required (m)	Bound	Current level of precision (%)	Pearson correlation coefficient	R^2	Independence
Nest	4 x 50	4.6	4.6	56	70	3503	1.03	22.4	0.12	0.01	1
Nest	4 x 12.5	4.6	8.9	56	56	2800	1.99	43.3	0.08	0.01	1
Nest	4 x 25	4.6	6.2	28	131	13141	1.99	43.3	0.05	0.00	1
Nest	200	4.6	4.6	14	77	15488	2.16	47.0	N/A	N/A	1
Random	4 x 50	6.1	9.6	100	170	8521	1.59	26.1	0.31	0.10	1
Random	4 x 12.5	6.1	10.5	100	204	10206	1.74	28.6	0.33	0.11	1
Random	4 x 25	6.1	9.1	50	157	15666	2.16	35.4	0.09	0.01	1
Random	200	6.1	6.7	25	88	17597	2.29	37.5	N/A	N/A	1

Table 39. Estimated means, standard deviations, sample sizes, and precision levels of snag densities (≥ 23 cm dbh) at nest trees and random points in Oregon. Data are arranged in decreasing order of precision for both nest and random points using four nested plots designs within a cross pattern with arms 50 m long, 20 m wide. Pearson correlation coefficients obtained from serial correlation analysis testing for independence of adjacent sampling units. Independence values equal to one are assumed to be independent. Figure 1 illustrates the different plot designs. Data collected in 2002 following the Birds and Burn Prescribed Fire protocol.

Point type	Total plot length (m)	Mean (snags/ha)	Standard deviation (snags/ha)	Current number of samples (N)	Estimated sample size required (n)	Estimated transect length required (m)	Bound	Current level of precision (%)	Pearson correlation coefficient	R^2	Independence
Nest	4 x 50	13.4	17.9	160	122	6109	2.34	17.5	0.46	0.21	0
Nest	4 x 12.5	13.4	21.3	160	160	8000	2.79	20.8	0.68	0.46	0
Nest	4 x 25	13.4	19.3	80	145	14464	3.60	26.9	0.73	0.53	0
Nest	200	13.4	17.9	40	127	25302	4.77	35.6	N/A	N/A	1
Random	4 x 12.5	9	15.6	125	206	10324	2.31	25.7	0.55	0.30	0
Random	4 x 50	9	17.3	124	254	12697	2.58	28.6	0.31	0.10	1
Random	4 x 25	9	13.97	62	168	16799	2.96	32.9	0.55	0.30	0
Random	200	9	12.4	31	136	27269	3.77	41.9	N/A	N/A	1

Table 40. Estimated means, standard deviations, sample sizes, and precision levels of snag densities (≥ 23 cm dbh) at nest trees and random points in South Dakota. Data are arranged in decreasing order of precision for both nest and random points using four nested plots designs within a cross pattern with arms 50 m long, 20 m wide. Pearson correlation coefficients obtained from serial correlation analysis testing for independence of adjacent sampling units. Independence values equal to one are assumed to be independent. Figure 1 illustrates the different plot designs. Data collected in 2002 following the Birds and Burn Prescribed Fire protocol.

Point type	Total plot length (m)	Mean (snags/ha)	Standard deviation (snags/ha)	Current number of samples (N)	Estimated sample size required (n)	Estimated transect length required (m)	Bound	Current level of precision (%)	Pearson correlation coefficient	R^2	Independence
Nest	4 x 50	41.3	33.8	120	46	2307	5.12	12.4	0.47	0.22	0
Nest	4 x 12.5	41.3	39.4	120	120	6000	5.97	14.5	0.65	0.42	0
Nest	4 x 25	41.3	35.4	60	51	5129	7.64	18.5	0.82	0.67	0
Nest	200	41.3	33.8	30	48	9621	10.46	25.3	N/A	N/A	1
Random	4 x 12.5	9.3	13.5	76	145	7258	2.57	27.6	0.53	0.28	0
Random	4 x 50	9.3	15.7	76	196	9817	2.99	32.1	0.26	0.07	1
Random	4 x 25	9.3	11.98	38	118	11778	3.27	35.2	0.79	0.62	0
Random	200	9.3	11.1	19	106	21293	4.40	47.3	N/A	N/A	1

Table 41. Estimated means, standard deviations, sample sizes, and precision levels of snag densities (≥ 23 cm dbh) at nest trees and random points in Washington. Data are arranged in decreasing order of precision for both nest and random points using four nested plots designs within a cross pattern with arms 50 m long, 20 m wide. Pearson correlation coefficients obtained from serial correlation analysis testing for independence of adjacent sampling units. Independence values equal to one are assumed to be independent. Figure 1 illustrates the different plot designs. Data collected in 2002 following the Birds and Burn Prescribed Fire protocol.

Point type	Total plot length (m)	Mean (snags/ha)	Standard deviation (snags/ha)	Current number of samples (N)	Estimated sample size required (n)	Estimated transect length required (m)	Bound	Current level of precision (%)	Pearson correlation coefficient	R^2	Independence
Nest	4 x 50	7.7	8	200	74	3696	0.94	12.2	0.20	0.04	1
Nest	4 x 12.5	7.7	13	200	200	10000	1.52	19.8	0.29	0.08	1
Nest	4 x 25	7.7	10.1	100	126	12592	1.73	22.4	0.29	0.08	1
Nest	200	7.7	8	50	76	15233	1.90	24.7	N/A	N/A	1
Random	4 x 12.5	4.4	9.4	48	322	16102	2.28	51.8	0.20	0.04	1
Random	4 x 50	4.4	9.4	48	322	16102	2.28	51.8	0.14	0.02	1
Random	4 x 25	4.4	7.1	24	191	19057	2.48	56.4	0.33	0.11	1
Random	200	4.4	5.7	12	133	26646	2.93	66.6	N/A	N/A	1

Table 42. Number of snags available and the number and percentage showing signs of recent foraging by woodpeckers within the four decay classes[1] for each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

Location	Decay class	Number of snags with new foraging signs	Number of snags available	Percent use
Arizona	1	28	36	77.8
	2	12	17	70.6
	3	22	28	78.6
	4	9	12	75
Colorado	1	21	86	24.4
	2	60	190	31.6
	3	22	117	18.8
	4	3	51	5.9
Idaho	1	65	100	65.0
	2	124	184	67.4
	3	27	64	42.2
	4	5	37	13.5
Montana	1	26	87	29.9
	2	10	63	15.9
	3	0	17	0.0
	4	1	3	33.3
New Mexico	1	13	26	50.0
	2	9	33	27.3
	3	2	26	7.7
	4	0	2	0
Oregon	1	123	178	69.1
	2	92	117	78.6
	3	24	31	77.4
	4	0	0	0
South Dakota	1	41	54	75.9
	2	249	429	58.0
	3	34	69	49.3
	4	0	15	0
Washington	1	55	81	67.9
	2	30	53	56.6
	3	9	31	29.0
	4	4	9	44.4

[1] Snag decay class definitions: 1) snags that have recently died; 2) snags that show some evidence of decay, have lost some bark, branches and a portion of the top; 3) snags that have extensive decay (Bull et. al 1997); and 4) burnt snag; almost entire outer shell is case-hardened by fire.

Table 43. Number of snags available and the number and percentage having new cavities within the four decay classes[1] for each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

Location	Decay class	Number of snags with new cavities	Number of snags available	Percent use
Arizona	1	2	36	5.6
	2	6	17	35.3
	3	11	28	39.3
	4	3	12	25
Colorado	1	0	86	0.0
	2	3	190	1.6
	3	6	117	5.1
	4	1	51	2
Idaho	1	9	100	9.0
	2	18	184	9.8
	3	4	64	6.3
	4	2	37	5.4
Montana	1	1	87	1.1
	2	7	63	11.1
	3	0	17	0.0
	4	0	3	0
New Mexico	1	0	26	0.0
	2	1	33	3.0
	3	1	26	3.8
	4	0	2	0
Oregon	1	10	178	5.6
	2	17	117	14.5
	3	11	31	35.5
	4	0	0	0
South Dakota	1	4	54	7.4
	2	39	429	9.1
	3	2	69	2.9
	4	2	15	13.3
Washington	1	6	81	7.4
	2	14	53	26.4
	3	3	31	9.7
	4	0	9	0

[1] Snag decay class definitions: 1) snags that have recently died; 2) snags that show some evidence of decay, have lost some bark, branches and a portion of the top; 3) snags that have extensive decay (Bull et. al 1997); and 4) burnt snags; almost entire outer shell is case-hardened by fire.

Table 44. Number of snags available and the number and percentage having either old or new cavities within the three decay classes[1] for each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

Location	Decay class	Number of snags with either old or new cavities	Number of snags available	Percent use
Arizona	1	2	36	5.6
	2	11	17	64.7
	3	15	28	53.6
	4	6	12	50
Colorado	1	2	86	2.3
	2	31	190	16.3
	3	30	117	25.6
	4	7	51	13.7
Idaho	1	10	100	10.0
	2	34	184	18.5
	3	15	64	23.4
	4	5	37	13.5
Montana	1	1	87	1.1
	2	8	63	12.7
	3	1	17	5.9
	4	0	3	0
New Mexico	1	2	26	7.7
	2	9	33	27.3
	3	5	26	19.2
	4	0	2	0
Oregon	1	13	178	7.3
	2	27	117	23.1
	3	18	31	58.1
	4	0	0	0
South Dakota	1	4	54	7.4
	2	101	429	23.5
	3	13	69	18.8
	4	3	15	20
Washington	1	7	81	8.6
	2	28	53	52.8
	3	19	31	61.3
	4	0	9	0

[1] Snag decay class definitions: 1) snags that have recently died; 2) snags that show some evidence of decay, have lost some bark, branches and a portion of the top; 3) snags that have extensive decay (Bull et. al 1997); and 4) burnt snag; almost entire outer shell is case-hardened by fire.

Table 45. Number of snags available and the number and percentage showing signs of recent foraging by woodpeckers for tree species found within each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

Location	Four-letter species code	Number of snags with woodpecker foraging	Number of snags available	Percent use
Arizona	JUDE	1	4	25.0
	PIPO	70	89	78.7
Colorado	ABCO	4	23	17.4
	PIPO	97	317	30.6
	POTR	5	83	6.0
	PSME	0	4	0.0
	QUGA	0	18	0.0
Idaho	ABGR	3	6	50.0
	PIPO	155	249	62.2
	PSME	61	100	61.0
Montana	PICO	1	24	4.2
	PIPO	29	105	27.6
	POTR	4	7	57.1
	PSME	5	23	21.7
New Mexico	JUDE	0	6	0.0
	PIPO	23	40	57.5
	QUGA	2	41	4.9
Oregon	ABCO	36	54	66.7
	JUOC	0	1	0.0
	PICO	30	60	50.0
	PIPO	164	203	80.8
South Dakota	PIPO	324	567	57.1
	QUMA	0	1	0.0
Washington	PICO	5	7	71.4
	PIPO	63	114	55.3
	POTR	0	2	0.0
	PSME	30	45	66.7
	SASC	1	3	33.3

Table 46. Number of snags available and the number and percentage with new cavities for tree species found within each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

Location	Four-letter species code	Number of snags with new cavities	Number of snags available	Percent use
Arizona	JUDE	0	4	0.0
	PIPO	22	89	24.7
Colorado	ABCO	0	23	0.0
	PIPO	7	317	2.2
	POTR	2	83	2.4
	PSME	0	4	0.0
	QUGA	0	18	0.0
Idaho	ABGR	0	6	0.0
	PIPO	28	249	11.2
	PSME	3	100	3.0
Montana	PICO	0	24	0.0
	PIPO	4	105	3.8
	POTR	0	7	0.0
	PSME	5	23	21.7
New Mexico	JUDE	0	6	0.0
	PIPO	2	40	5.0
	QUGA	0	41	0.0
Oregon	ABCO	4	54	7.4
	JUOC	0	1	0.0
	PICO	6	60	10.0
	PIPO	24	203	11.8
South Dakota	PIPO	47	567	8.3
	QUMA	0	1	0.0
Washington	PICO	0	7	0.0
	PIPO	19	114	16.7
	POTR	1	2	50.0
	PSME	2	45	4.4
	SASC	1	3	33.3

Table 47. Number of snags available and the number and percentage with either new or old cavities for tree species found within each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

Location	Four-letter species code	Number of snags with new or old cavities	Number of snags available	Percent use
Arizona	JUDE	0	4	0.0
	PIPO	34	89	38.2
Colorado	ABCO	1	23	4.3
	PIPO	61	317	19.2
	POTR	7	83	8.4
	PSME	0	4	0.0
	QUGA	0	18	0.0
Idaho	ABGR	0	6	0.0
	PIPO	50	249	20.1
	PSME	9	100	9.0
Montana	PICO	0	24	0.0
	PIPO	5	105	4.8
	POTR	0	7	0.0
	PSME	7	23	30.4
New Mexico	JUDE	0	6	0.0
	PIPO	5	40	12.5
	QUGA	11	41	26.8
Oregon	ABCO	5	54	9.3
	JUOC	0	1	0.0
	PICO	7	60	11.7
	PIPO	39	203	19.2
South Dakota	PIPO	121	567	21.3
	QUMA	0	1	0.0
Washington	PICO	0	7	0.0
	PIPO	44	114	38.6
	POTR	1	2	50.0
	PSME	7	45	15.6
	SASC	2	3	66.7

Table 48. Number of trees available and the number and percentage showing signs of recent foraging by woodpeckers within the four structure classes[1] of live trees for each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

State	Tree structure class	Number of trees with new foraging signs	Number of trees available	Percent use
Arizona	1	153	2343	6.5
	2	88	412	21.4
	3	6	34	17.6
	4	0	1	0.0
Colorado	1	21	1903	1.1
	2	7	187	3.7
	3	0	0	0.0
	4	0	0	0.0
Idaho	1	114	888	12.8
	2	76	380	20.0
	3	2	5	40.0
	4	0	2	0.0
Montana	1	9	1417	0.6
	2	2	399	0.5
	3	0	0	0.0
	4	0	0	0.0
New Mexico	1	14	914	1.5
	2	10	161	6.2
	3	1	11	9.1
	4	6	27	22.2
Oregon	1	17	1404	1.2
	2	19	225	8.4
	3	2	4	50.0
	4	0	0	0.0
South Dakota	1	0	84	0.0
	2	29	557	5.2
	3	0	0	0.0
	4	0	0	0.0
Washington	1	9	646	1.4
	2	72	304	23.7
	3	7	57	12.3
	4	0	5	0.0

[1] Tree structure class definitions: 1) sound trees; 2) tree shows some evidence of decay (broken top/branch, fungi, fire scar, insect evidence); 3) broomed trees; 4) hollow trees (Bull et. al 1997).

Table 49. Number of trees available and the number and percentage having new cavities within the four structure classes[1] for each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

State	Tree structure class	Number of trees with new cavities	Number of trees available	Percent use
Arizona	1	1	2343	0.04
	2	0	412	0.0
	3	0	34	0.0
	4	0	1	0.0
Colorado	1	1	1903	0.1
	2	0	187	0.0
	3	0	0	0.0
	4	0	0	0.0
Idaho	1	1	888	0.1
	2	2	380	0.5
	3	0	5	0.0
	4	0	2	0.0
Montana	1	0	1417	0.0
	2	0	399	0.0
	3	0	0	0.0
	4	0	0	0.0
New Mexico	1	2	914	0.2
	2	4	161	2.5
	3	0	11	0.0
	4	2	27	7.4
Oregon	1	1	1404	0.1
	2	4	225	1.8
	3	0	4	0.0
	4	0	0	0.0
South Dakota	1	0	84	0.0
	2	0	557	0.0
	3	0	0	0.0
	4	0	0	0.0
Washington	1	2	646	0.3
	2	5	304	1.6
	3	0	57	0.0
	4	0	5	0.0

[1] Tree structure class definitions: 1) sound trees; 2) tree shows some evidence of decay (broken top/branch, fungi, fire scar, insect evidence); 3) broomed trees; 4) hollow trees (Bull et. al 1997).

Table 50. Number of trees available and the number and percentage having either old or new cavities within the four structure classes[1] for each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

State	Tree structure class	Number of trees with either old or new cavities	Number of trees available	Percent use
Arizona	1	1	2343	0.0
	2	3	412	0.7
	3	1	34	2.9
	4	0	1	0.0
Colorado	1	5	1903	0.3
	2	3	187	1.6
	3	0	0	0.0
	4	0	0	0.0
Idaho	1	1	888	0.1
	2	10	380	2.6
	3	0	5	0.0
	4	0	2	0.0
Montana	1	1	1417	0.1
	2	0	399	0.0
	3	0	0	0.0
	4	0	0	0.0
New Mexico	1	10	914	1.1
	2	23	161	14.3
	3	2	11	18.2
	4	14	27	51.9
Oregon	1	1	1404	0.1
	2	6	225	2.7
	3	0	4	0.0
	4	0	0	0.0
South Dakota	1	0	84	0.0
	2	0	557	0.0
	3	0	0	0.0
	4	0	0	0.0
Washington	1	3	646	0.5
	2	40	304	13.2
	3	0	57	0.0
	4	0	5	0.0

1 Tree structure class definitions: 1) sound trees; 2) tree shows some evidence of decay (broken top/branch, fungi, fire scar, insect evidence); 3) broomed trees; 4) hollow trees (Bull et. al 1997).

Table 51. Number of live trees available and the number and percentage showing signs of recent foraging by woodpeckers for tree species found within each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

Location	Four-letter species code	Number of trees with woodpecker foraging	Number of trees available	Percent use
Arizona	JUDE	0	31	0.0
	JUMO	0	5	0.0
	PIPO	247	2754	9
Colorado	ABCO	3	368	0.8
	JUSC	0	1	0.0
	PIEN	0	13	0.0
	PIPO	22	1288	1.7
	PIPU	0	3	0.0
	POTR	2	258	0.8
	PSME	1	122	0.8
	QUGA	0	37	0.0
Idaho	ABGR	2	6	33.3
	LAOC	0	1	0.0
	PICO	0	7	0.0
	PIPO	167	855	19.5
	PSME	23	405	5.7
Montana	PICO	0	100	0.0
	PIPO	2	1104	0.2
	POTR	8	24	33.3
	PSME	1	587	0.2
New Mexico	JUDE	0	208	0.0
	PIED	0	10	0.0
	PIPO	20	699	2.9
	PIST	0	1	0.0
	PSME	1	27	3.7
	QUGA	11	167	6.6
Oregon	ABCO	1	123	0.8
	JUOC	2	10	20
	PICO	20	365	5.5
	PILA	0	6	0.0
	PIPO	15	1157	1.3
South Dakota	PIPO	29	637	4.6
	QUMA	0	7	0.0
Washington	LAOC	0	5	0.0
	PICO	0	5	0.0
	PIPO	48	652	7.4
	POTR	3	5	60
	PSME	37	327	11.3
	SASC	0	7	0.0

Table 52. Number of live trees available and the number and percentage having new cavities for tree species found within each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

Location	Four-letter species code	Number of trees with new cavities	Number of trees available	Percent use
Arizona	JUDE	0	31	0.0
	JUMO	0	5	0.0
	PIPO	1	2754	0.04
Colorado	ABCO	0	368	0.0
	JUSC	0	1	0.0
	PIEN	0	13	0.0
	PIPO	0	1288	0.0
	PIPU	0	3	0.0
	POTR	1	258	0.4
	PSME	0	122	0.0
	QUGA	0	37	0.0
Idaho	ABGR	0	6	0.0
	LAOC	0	1	0.0
	PICO	0	7	0.0
	PIPO	3	855	0.4
	PSME	0	405	0.0
Montana	PICO	0	100	0.0
	PIPO	0	1104	0.0
	POTR	0	24	0.0
	PSME	0	587	0.0
New Mexico	JUDE	0	208	0.0
	PIED	0	10	0.0
	PIPO	1	699	0.1
	PIST	0	1	0.0
	PSME	0	27	0.0
	QUGA	7	167	4.2
Oregon	ABCO	0	123	0.0
	JUOC	0	10	0.0
	PICO	3	365	0.8
	PILA	0	6	0.0
	PIPO	2	1157	0.2
South Dakota	PIPO	0	637	0.0
	QUMA	0	7	0.0
Washington	LAOC	0	5	0.0
	PICO	0	5	0.0
	PIPO	5	652	0.8
	POTR	0	5	0.0
	PSME	2	327	0.6
	SASC	0	7	0.0

Table 53. Number of live trees available and the number and percentage having either new or old cavities for tree species found within each of the eight states involved with the Birds and Burns prescribed study. Data collected in 2002.

Location	Four-letter species code	Number of trees with new or old cavities	Number of trees available	Percent use
Arizona	JUDE	0	31	0.0
	JUMO	0	5	0.0
	PIPO	5	2754	0.18
Colorado	ABCO	0	368	0.0
	JUSC	0	1	0.0
	PIEN	0	13	0.0
	PIPO	3	1288	0.23
	PIPU	0	3	0.0
	POTR	4	258	1.6
	PSME	1	122	0.8
	QUGA	0	37	0.0
Idaho	ABGR	0	6	0.0
	LAOC	0	1	0.0
	PICO	0	7	0.0
	PIPO	9	855	1.1
	PSME	2	405	0.5
Montana	PICO	0	100	0.0
	PIPO	0	1104	0.0
	POTR	1	24	4.2
	PSME	0	587	0.0
New Mexico	JUDE	0	208	0.0
	PIED	0	10	0.0
	PIPO	2	699	0.29
	PIST	0	1	0.0
	PSME	1	27	3.7
	QUGA	46	167	27.5
Oregon	ABCO	0	123	0.0
	JUOC	0	10	0.0
	PICO	4	365	1.1
	PILA	0	6	0.0
	PIPO	3	1157	0.3
South Dakota	PIPO	0	637	0.0
	QUMA	0	7	0.0
Washington	LAOC	0	5	0.0
	PICO	0	5	0.0
	PIPO	35	652	5.4
	POTR	3	5	60
	PSME	5	327	1.5
	SASC	0	7	0.0

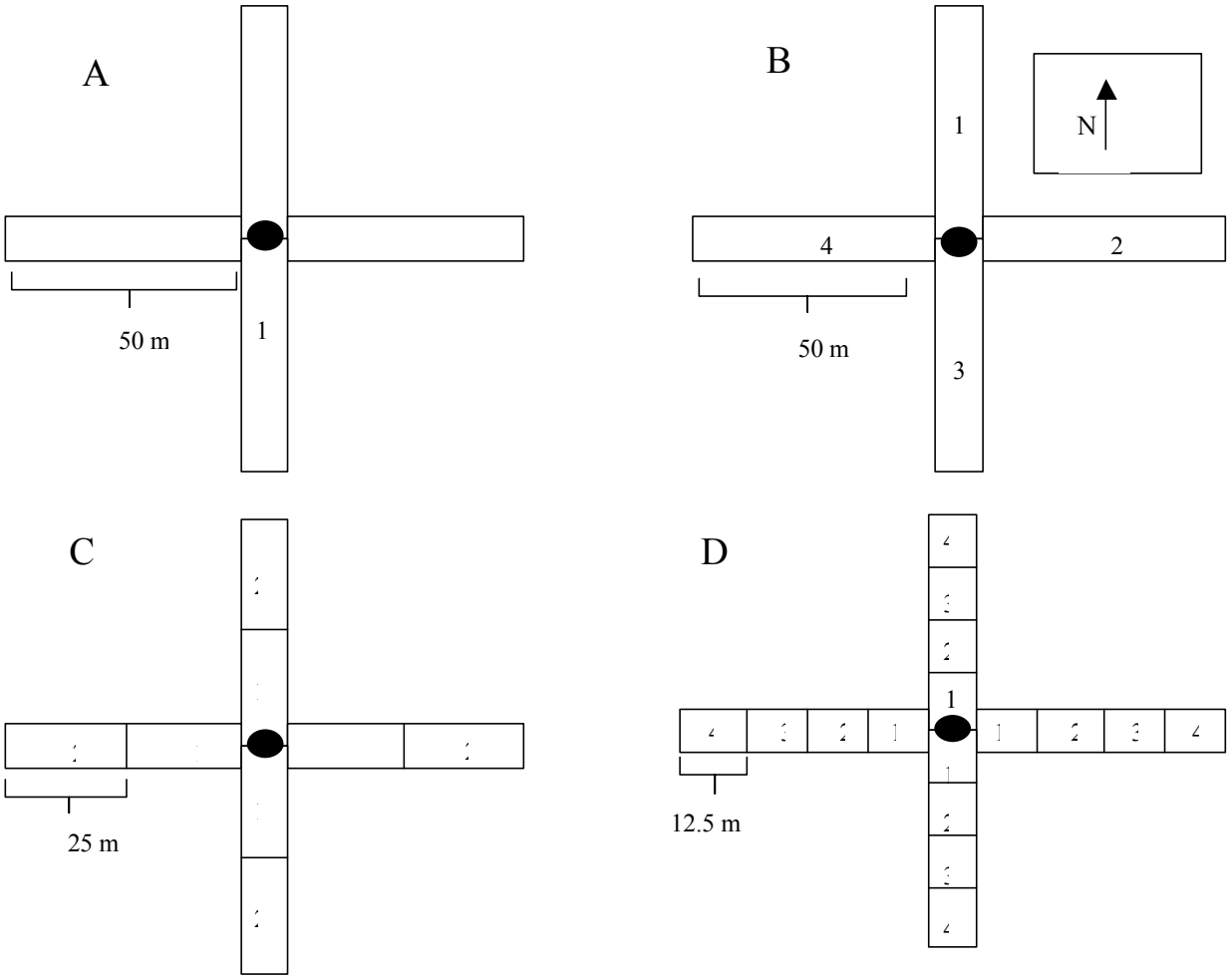

Figure 1. Four sample plot designs used to assess precision and independence of snag density (≥ 23 cm dbh) estimates nested within a 200-m cross design (A). Units containing a different number within each design were treated as individual sampling units. Units with the same number within each design were treated as one sampling unit with values averaged among the four azimuths. Plot designs used for data collected in 2002 from eight different states involved in the Birds and Burn Prescribed Fire Project.