# An Evaluation of Wildlife Mortality Resulting from Aerial Ignition Prescribed Burning

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*Abstract:* Wildlife mortality resulting from aerial ignition prescribed burning was evaluated in the Lower Coastal Plain of South Carolina. Observers took census of animals leaving the burn to confirm that representative species and densities were present in the study area. Based on the low mortality observed during a systematic post-fire survey, it was concluded that aerial ignition prescribed burning did not cause significant direct mortality to wildlife.

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Wildlife professionals generally agree on the benefits to wildlife from prescribed burning in the Southeast. Very few are familiar with the technique of aerial ignition prescribed burning or its immediate effects on wildlife, however.

As a forest management tool, aerial ignition prescribed burning has several advantages which will likely increase its use in the future. In hazard reduction burning, not only do the versatility and speed of the technique allow maximum use of good burning weather, but there are also significant savings in time and manpower (Thompson 1981). Aerial ignition also has potential application in backfiring and "burning-out" of wildfires and in site preparation burning (Sain 1979).

One of the most significant differences between conventional, drip torch-ignited, prescribed burning and aerial ignition prescribed burning is the distribution of fire within the woodland. Whereas conventional burning utilizes linear backing, flanking, and head fires, aerial burning produces numerous spot fires which converge in a relatively short time. This results in large acre-

ages burning simultaneously and it is this distribution of fire and possible problems of escape that prompted this study on the immediate effect of aerial burning on wildlife.

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## Methods

The 90-ha study area is located within Union Camp Corporation's Palmetto Bluff tract in the Lower Coastal Plain of South Carolina. Major habitat types include a 40-ha, 20-year-old slash (*Pinus elliottii*) plantation; a 44-ha, uneven aged, mixed pine-hardwood forest; and 6-ha of hardwood drains and ponds. Understory vegetation on the upland sites consisted primarily of gallberry (*Ilex glabra*), wax myrtle (*Myrica cerifera*), grasses, and hardwood sprouts. Dwarf palmetto (*Sabal minor*) and wax myrtle were the predominant components of the understory on lower elevations.

Prescribed burning had been conducted 2 years prior to the study; however, a good burn was not obtained. At the time of the study, the fuel mass was estimated by Union Camp personnel to be approximately 3400 kg/ha in the pine plantations and on the mixed pine-hardwood sites. Adjacent compartments to the north, south, and west were burned 1 month before the study in an attempt to concentrate wildlife in the cover that remained in the study area. Saltmarsh bounded the area on the east.

Aside from the diversity of habitat types present, the study area was chosen because of the road system which surrounds it. The width and straightness of roads facilitated wildlife observation and census taking.

Aerial ignition was accomplished using a Bell 47-D heilcopter equipped with a Pacific Forest Research Centre (PFRC) Mark II AID dispenser manufactured by Premo Plastics Engineering Ltd. (Victoria, B.C.). Aerial ignition devices (AIDs) are constructed of 2 spheres of high impact polystyrene. Each 3.2 cm-diameter ball contains approximately 3 g of potassium permanganate which is activated by 1 ml of an aqueous ethylene glycol solution injected into the AID. The exothermic chemical reaction results in flaming combustion of the AID 20–90 sec. after injection and release by the dispenser.

For use in this hazard reduction burn, Union Camp Corporation personnel determined that AID spacing on a 20-m grid pattern was desirable since a wider grid would have created larger, hotter head fires and a smaller grid would have unnecessarily increased the cost of materials. Burning commenced on 22 February 1982 at 0930 and ended at 1200 hours. During this

time, the temperature increased from 7 C to 13 C; humidity decreased from 62% to 19%; and winds averaged NW 19 kmph.

During burning, 24 observers were stationed on the 5.2-km perimeter road from 80 to 280 m apart, depending on road width and curves. Each observer had a tally sheet of wildlife species and was instructed to record all animals seen crossing the road between himself and the observer to his left. Two observers were placed within the study area to record observations of animal behavior in relation to the fire.

Post-fire wildlife mortality evaluation began at 1330 hours and was accomplished using 10 transect lines spaced 200 m apart with the beginning line being selected randomly. Transects were orientated perpendicular to the main axis of the study area, thereby intersecting all habitat types. Five-man observation crews canvassed 20-m widths along transects. One leader in each crew maintained a predetermined compass bearing, aligned observers, controlled the rate of movement, and insured that a thorough observation of the ground within the transect was made. The total area sampled was 10% of the study area.

## Results and Discussion

Observers on the perimeter of the study area recorded seeing the following animals during the prescribed burning; 33 white-tailed deer (*Odocoileus virginianus*), 1 eastern wild turkey (*Meleagris gallopavo*), 9 gray squirrels (*Sciurus carolinensis*), 1 cottontail rabbit (*Sylvilagus floridanus*), 9 bobwhite quail (*Colinus virginianus*), and 2 mice (species unknown). Of the 33 deer seen, 8 were observed going into the area being burned. Deer movement appeared to be more a response to the helicopter than to the fire.

While observers were being positioned on the perimeter road, a subadult male wild turkey was seen going into the study area. Immediately after the fire had burned through, an observer located within the compartment watched him walking on the burn. The turkey did not leave the study area during the fire; however, after seeing the observer he walked into the perimeter road and re-entered the study area 200 m from where he had exited. He exhibited no aversion to being in the recently burned area.

Sampling crews conducting the post-fire wildlife mortality evaluation noted the following live animals: 2 mud turtles (*Kinosternon subrubum*) and 2 feral hogs (*Sus scrofa*). One of the mud turtles had burrowed into the ground to a depth such that the edge of its carapace was just below ground level. The fire burned around him causing no apparent injury. Although it could not be determined whether the 2 feral hogs observed during the sampling had been within the study area during the burn, it was apparent that

they were not disturbed by the fire. They were seen rooting within 1 m of a small area that was still burning.

Only 1 vertebrate was found dead during the post-fire survey. A mud turtle located on a relatively dry site did not burrow in the ground as the one previously described and was apparently killed by the fire. The only other mortality noted by the sampling crews involved grasshoppers. Although not counted, numerous individuals were found. This corresponds to observations of Komarek (1969) of high grasshopper mortality under certain fire conditions.

Participants in the study agreed that, based on census results during the burn, sufficient variety and numbers of wildlife were present in the study area to validate the results of the post-fire mortality evaluation. Based on the low mortality observed, we concluded that properly executed aerial ignition prescribed burning in the Coastal Plain did not cause significant direct mortality to wildlife.

Where fire is a regular and frequent component of the environment, animals survive because of adaptations to this condition (Allee et al. 1949, Stoddard 1963, Handley 1969). Although the nature of the fire produced by aerial ignition differs from naturally occurring fires, this did not appear to affect their ability to survive.

## Literature Cited

Allee, W. C., A. E. Emerson, O. Park, T. Park, and K. P. Schmidt. 1949. Principles of animal ecology. W. P. Saunders Co., Philadelphia, Pa. 837pp.

Handley, C. O., Jr. 1969. Fire and mammals. Proc. Annu. Tall Timbers Fire Ecol. Conf. 9:151–159.

Komarek, E. E., Sr. 1969. Fire and animal behavior. Proc. Annu. Tall Timbers Fire Ecol. Conf. 9:160–207.

Sain, J. F. 1969. First year evaluation of aerial ignition for prescribed burning and wildfire control. For. Note 39, N.C. Div. of For. Resour., Raleigh. 9pp.

Stoddard, H. L., Sr. 1963. Bird habitat and fire. Proc. Annu. Tall Timbers Fire Ecol. Conf. 2:163–175.

Thompson, T. C. 1981. Evaluation and user's guide for the Pacific Forest Research Centre's Mark II Aerial Ignition System. For. Note 53, N.C. Div. of For. Resour., Raleigh. 11pp.