BLUEBIRD PRODUCTIVITY AND MEDUSAHEAD CONTROL AT MURDERERS CREEK WILDLIFE MANAGEMENT AREA IN 1997

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In 1988 a study of western bluebirds (*Sialia mexicana*) and mountain bluebirds (*S. currucoides*) was begun in central Oregon to study potential effects of large-scale chemical treatment for control of grasshopper infestations. Recent environmental regulations restricted the extent of chemical control and the study evolved into a long-term investigation of bluebird reproduction and correlation with local weather and habitat types. In 1997 proposed chemical reduction of the invasive grass medusahead (*Taeniatherum caput-medusae*) on one of our study sites provided an opportunity to study potential effects of the treatment on the productivity of bluebirds. The hypothesis to be tested was that bluebird nest success rate and/or number of nestlings fledged would be lower in the treatment area than in the control area.

STUDY AREAS AND METHODS

Two adjacent study sites on the Murderers Creek Wildlife Management Area (WMA) in Grant County have been used in the bluebird project since 1990. These are "Murderers Creek" (MC) and "Chickenhouse Gulch" (CG) (Figure 1). In the fall of 1989, wooden nest boxes were placed at each site, either on juniper trees from which some of the branches had been removed or on wooden poles erected in rockjacks.

In 1992, the USDI Bureau of Land Management (BLM) and Oregon Department of Fish and Wildlife (ODFW) began treating parts of the WMA for medusahead control, and mapped 3 units which partially overlap our study sites (Figure 2). Part of MC was in the area proposed for treatment in 1997 with the herbicide glyphosate. Boxes in MC that were just outside the treatment area were temporarily closed to bluebirds by covering the entrance hole. Fifteen new boxes were placed inside the treatment area, to the east of the original site, bringing the total number of treatment boxes to 23. CG and boxes at the west and south edges of MC served as the non-treatments, for a total of 44 non-treatment boxes (Figure 3).

The sites were visited 6 times during the nesting season and once in the fall. On each visit, the contents of every nest box were examined, and adult birds entering each box or giving scolding calls during our box examination were noted. Data recorded for active nests were: species, nest stage (started or completed), number of eggs and incubation status (warm or cold, female remaining on eggs during examination), number and development stage of nestlings, and amount of droppings in the nest with feathered nestlings (0, small amount, large amount). Completed nests were classified as successful (i.e., at least one nestling fledged) or failed from abandonment, predation, or unknown cause. Successful nests were packed down, there was feather dandruff underneath, and there were droppings on top. The amount of droppings was recorded. Abandoned nests had dead, uninjured nestlings (number and development stage were recorded), or eggs that were cold and had been recorded as cold on the previous visit (abandoned eggs were broken and classified as undeveloped or partially developed). Evidence of predation included some of the following: dead nestlings with puncture wounds, blood, nestling feathers,

broken adult feathers, nest material pulled towards the entrance, or fresh scratches or marks of chewing around the entrance.

Observational diet samples were taken at a few nests with nestlings at least partially feathered. The observer sat 10 to 20 meters from the box and using 10 X binoculars identified items brought to the nestlings by the parent birds. Items were classified in one of 12 categories. A full sample consisted of 10 identified items, but partial samples were also recorded.

Density of grasshoppers was estimated during the mid-June visit, by the U. S. Department of Agriculture method (count grasshoppers leaving a visualized 1-foot-square plot as it is approached, repeat 18 times, and halve the resulting total, for an estimate of density per square meter).

Data from 1997 were only analyzed briefly at this time. Because of the small numbers of nests involved, data from all bluebirds were pooled for most of the descriptions of treatment versus non-treatment nests. Data from 1997 diet samples and grasshopper densities were not analyzed for this report.

RESULTS

Approximately 40 acres were sprayed with glyphosate at the rate of 16 ounces per acre in early May of 1997 (Scott Cooke, pers. comm. and "Murderer's Creek Treatment Notes"). The area sprayed was several patches of less than 10 acres each within the primary treatment area of Unit C and therefore also within the extended study site MC. Although the spray included a dye, our bluebird study crew had difficulty seeing where spraying had occurred because of the small acreage treated.

In the treatment area, there were 15 bluebird nests with at least one egg laid, including 7 western bluebird nests, 6 of mountain bluebird, and 2 of unknown bluebird (eggs laid and abandoned between our visits). In the non-treatment area, there were 25 bluebird nests with at least one egg laid, including 15 western bluebird nests, 7 of mountain bluebird, and 3 of unknown bluebird.

Average clutch size was slightly greater in the treatment than in the non-treatment area for both western bluebirds (5.0 versus 4.47) and mountain bluebirds (5.33 versus 5.14). The difference was due to the smaller number of apparently incomplete clutches (1 to 3 eggs laid and abandoned) in the non-treatment area.

The percentage of eggs that hatched was considerably greater in the treatment than in the non-treatment area (76% versus 54%). Further, the percentage of eggs laid that hatched and fledged was considerably greater in the treatment than in the non-treatment area (62% versus only 25%). There were 2 factors involved. First was that fewer of the nests were abandoned in the treatment than in the non-treatment area (20% versus 44%). Second, even the successful nests fledged a greater average number of nestlings in the treatment than in the non-treatment area (4.2 versus 3.5). The overall nest success was far greater in the treatment than in the non-treatment area (73% of all nests fledged versus only 32%).

DISCUSSION

Even though the number of nests may be too small for differences to be statistically significant, this preliminary look at the evidence indicates that in 1997 both western and mountain bluebirds had greater nest success and produced a higher average number of young in the area that was treated with herbicide than in the untreated area. However, this study did not control for another variable, namely the difference in treatment by controlled burning, between the areas. Unit C (which was partially treated with herbicide) was burned in the summer of 1996, and had also been burned in 1992, 1993, and 1994. Unit B (which includes most of our non-treatment nest boxes) has only been burned once, in 1993, and the rest of our non-treatment boxes were in areas that had not been burned since the BLM treatment of medusahead began. Since the herbicide spraying only occurred on about 40 acres, and occurred after some of the differences were already apparent, it is more likely that the differences in nest success and productivity were related to the burning of the larger unit than to the herbicide treatment. In the unburned areas, the medusahead seems to form a matted layer, which may make it difficult for the adult bluebirds to find crickets, grasshoppers, or other invertebrates fed to nestlings.

When the data from the entire bluebird study are analyzed, I will further investigate the relationship between medusahead burning and bluebird nest success and productivity. Since burning occurred in several years, it may be possible to pool data from several years that followed burning, which would provide greater power to the statistical analysis.

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