

INFLUENCE OF LAND USE ON MALLARD NEST STRUCTURE OCCUPANCY¹

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Abstract: We investigated the relationship between land use and mallard (*Anas platyrhynchos*) occupancy of single- and double-cylinder nest structures on a 658 km² (254 mi²) western Minnesota study area from 1997-1999. We used hierarchical logistic regression to spatiotemporally model structure occupancy as a function of land use, number of nearby structures, number of mallard pairs with access to the structure, size of the open-water area including the structure, and structure type. We fit models to data from 4 different sized buffers around each structure to investigate scale influences. Goodness of fit, predictive ability, and amount of reduced spatio-temporal correlation were similar for each buffer-size model. We made inferences using the 1.6 km radius buffer model because it produced the lowest deviance. The amount and attractiveness of nesting cover (i.e., as indexed by VOMs) within a buffer interacted with nest initiation period ($P = 0.003$). VOMs and nest occupancy were positively associated early in the nesting season, but the pattern reversed

later in the nesting season. Structure occupancy and area of open water around a structure were related quadratically ($P = 0.004$), with odds of a structure in median sized open-water areas being occupied increasing until the open-water area was ~16 ha. Year and nesting season period interacted ($P = 0.002$), reflecting different nest initiation phenology. Number of pairs with access to a structure had no effect on nest initiations ($P = 0.7$), perhaps due to our inability to account for within-season changes in pair numbers. Number of nearby structures ($P = 0.8$) was unrelated to initiation probability, but structure density was low (0.05/km²). We suspect that mallard settling patterns and an unmeasured temporal relationship between VOMs and numbers of pairs with access to structures produced the VOM by period interaction. Structures deployed in larger open water areas where surrounding residual upland cover is abundant can improve mallard nest success early in the nesting season when duckling survival is the greatest and can reduce hen mortality associated with nest destruction and re-nesting.