

# Statistical Support of the Iowa DNR Wildlife Bureau Research Program

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**Duration:** August 2007 to December 2009  
**Funding Source(s):** Iowa Department of Natural Resources

## Goals and Objectives:

- Quantify landscape attributes associated with the bobwhite quail decline in southern Iowa
  - Estimate effects of harvest regulations on Iowa Canada goose population survival and harvest rates
  - Analyze Mississippi Flyway goose banding data to help inform the statistical design of the Flyway goose banding program
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## Progress:

Aerial photography for a random sample of 72 public land survey sections in Iowa's southern bobwhite range was obtained by Pociask (2003) from local or national USDA-NRCS offices for each selected section. Aerial photos for three time periods, the 1930s, 1960s, and 1980s, were collected for each section. Land use classifications were defined using categories most often reported in the literature as being meaningful to bobwhite. We reviewed and corrected the Pociask (2003) GIS shapefiles for accuracy and consistency and then used Fragstats software to investigate changes in composition and spatial attributes of the study area. Between 50% and 60% of the study area was invested in row crops between the 1930's and 1980's. Grasslands and woodlots made up the majority of the remaining area. Together, these three land use classes accounted for 95% of the landscape. Cropland showed a gradual increase from 53% in the 1930's to 61% in the 1980's, but we did not document a significant difference between average field size from the 1930's and 1980's. Grasslands decreased from 35% to 21% of the landscape from the 1930's to the 1980's, nearly a 40% reduction in total area, and there was an apparent trend for the gradual replacement of grassland habitat with crop fields and woodlots. Edge density at the landscape scale significantly increased, and subsequently decreased across the three time periods. These changes were on the order of 10-30%, which may be indicative of biological significance. Landscapes with considerable amounts of edge habitat, such as early successional habitats, are widely recognized as good bobwhite habitat.

We compiled banding and recovery data for Iowa Giant Canada geese banding between 1990 - 2007. Recoveries of harvested birds were coded as Des Moines, Iowa City/Cedar Rapids, or Rural based on the banding location of the bird. Banding and recovery data were used to calculate harvest rates for all combinations of periods (1990-1995, 1996-2000, 2001-2003, 2003-2007), zone (North, South) and age. Harvest rates for all cohorts consistently increased over time. North zone harvest rates increased from 8% to 13% and South zone from 5% to 10% during the 17 year period. There were no important differences in harvest rates between the two age classes. Survival rate models suggested no overall time trends in survival rates. Adult geese survival rates were slightly lower ( $P < 0.05$ ) in rural areas (0.636) than in urban areas (0.712). Data limitations prevented reliable statistical conclusions about differential survival rates between rural and urban juvenile geese. We also compiled band recovery data for states in the northern Mississippi Flyway, and used Program Mark to estimate annual survival and recovery rates. These estimates were then used with Program Band2 to calculate banding quotas necessary to achieve a desired precision for annual survival rates. We also initiated statistical power analyses to provide guidance of sample size requirements necessary to detect specified changes in age-specific harvest rates.

## Future Plans:

We suspect that molt migration behavior of unmated geese in the Flyway may be the cause of the poor performance of standard survival models, and we intend to construct custom survival models that are parameterized to accommodate this behavior and thereby improve our ability to estimate and compare survival rates among age classes and geographic regions. In addition, we plan to continue our Flyway scale analyses in cooperation with the Mississippi Flyway Canada Goose Technical Committee.