PRODUCTION NOTE

University of Illinois at Urbana-Champaign Library Large-scale Digitization Project, 2007.
ILLINOIS
NATURAL HISTORY SURVEY

Section of Wildlife Research

Performance Report
Annual Job Progress Report
Illinois Forest Game Investigations
W-87-R-5

1 July 1983 - 30 June 1984
Performance Report
Annual
Job Progress Report

State: Illinois
Project Number: W-87-R-5
Project Type: Research
Project Title: Cooperative Forest Wildlife
Sub-project VII: Illinois Deer Investigations
Period Covered: 1 July 1983 - 30 June 1984

This Performance Report covering study segment W-87-R-5 contains completion reports for Study VII-A, Job 101.1, and Study VII-B, Job 102.1, and reports of progress for all remaining jobs active during the R-5 segment.

Study No. VII-A; Title: Landscape Heterogeneity and Deer Abundance.
Study Objectives:

1. To define those landscape characteristics that determine seasonal distribution and abundance of deer.

2. For the northern 2/3 of Illinois, to provide the Department of Conservation with a county-by-county listing of sites used by deer in winter, with appropriate descriptions of plant communities and human impacts that affect deer.

Job No. 101.1; Title: Landscape heterogeneity and deer abundance.
Objectives: (Same as listed under Study Objectives).

(a) Activity:

Early studies of deer concentration areas in North America relied on the proximity of food and cover (Webb 1940) and on general forest cover type to delineate areas used by deer in winter (Christensen 1962). In later years, more detailed analyses identified use of feeding areas
separate from sheltering areas in winter as distinct from joint feeding-sheltering areas used during the remaining months (Telfer 1967, Hout 1974). Recent studies have focused on key habitat qualities, including microclimate, night and day bedding activity, feeding, escape cover, and mobility during the winter months (Ozoga and Gysel 1972, Drolet 1976, Stocker and Gilbert 1977, and Moen 1980).

The occurrence of deer concentrations in Illinois has been recognized since the early 1950's. Plestch (1954) and Zwank (1974) documented seasonal movements of deer to and from traditional wintering areas in Illinois and Missouri, respectively.

The use of discriminant analyses has recently been applied to the problem of identifying characteristics of winter habitat of white-tailed deer. In central Ontario, principal component analysis and discriminant function analysis were utilized to determine the effects of lake side cottage development on winter deer habitat (Armstrong et al. 1983). Weber (1979) used discriminant analysis to classify forested areas in northern New Hampshire, locating four habitat variables to correctly classify 93% of forested areas as winter deer yards or areas not used by deer in winter.

The objective of the analysis reported here was to determine the landscape characteristics important to the establishment of winter concentration areas in the intensively farmed region of east central Illinois.
Methods

The study was conducted in Champaign, Macon, and Platt counties in east central Illinois. Aerial surveys were conducted in these counties each of the past 3 winters to determine the presence or absence of deer (see previous Job Progress Reports).

Radiotelemetry data from the Platt County Study Area (PCSA) demonstrated that an area of about 10 km² (4 mi²) was adequate to incorporate the winter ranges of nearly all deer using that concentration area.

Six winter concentration areas and six non-concentration areas 4 mi² in size were selected. The non-concentration areas were selected on the basis of having what appeared to be adequate forest cover to support deer in winter; aerial censuses and ground checks on snow confirmed that these areas contained almost no deer in midwinter.

A total of 41 variables (Table 1) were measured for each of the 12 study areas. The analysis of forest cover, road/highway distances, and other cover types was primarily conducted with aerial stereo-photo pairs viewed through a Wild model ST-4 mirror stereoscope. The area of each land cover type was computed directly from the aerial photos using an Apple II Plus computer equipped with an Apple Graphics Tablet and Graphics Tablet Software. The use of the graphics tablet allowed measurement of the cover types while viewing with the stereoscope, thus enhancing the ability to differentiate cover types and compute acreage.
In conjunction with the aerial photo analysis, most recent USGS topographic maps, county plat books, and ground surveys were employed to assess recent changes in land cover. Linear distance of roadways was also calculated using the graphics tablet.

The variable "% total forest in county" was determined by dividing the total forest cover determined in the above analysis by the acres in each county (Roberts 1982). Areas designated as refuge were determined by measuring acreage of designated refuges, Robert Allerton Park, for example, and by measuring other refuges determined through landowner interviews on each study area. Occupied dwellings were also surveyed at this time with the aid of recent USGS topographic maps.

An index of changes in topography was calculated by counting the number of 10-foot interval contour lines crossed on diagonal lines positioned across the center of each area drawn on a USGS topographic map. Total topographic relief was also calculated.

An index of interspersion was calculated using a modification of the method described by Baxter and Wolfe (1972). Changes from forest to open cover types were calculated as edges intersected along the diagonals used to determine topography changes. Changes from both diagonals were totaled to arrive at a single index (I).

Statistical analyses were performed on the CDC Cyber and IBM computer systems at the University of Illinois, using SAS discriminant analysis procedures (Ray 1982).
Results

The data for the 12 study areas were subjected to principal component analysis (PCA) in an effort to first reduce the number of variables. The correlation matrix and simplification of certain variables reduced the number of variables to 10. These variables were then subjected to a stepwise discriminant function analysis (STEPDISC), with significance levels to enter and to stay in the analysis both set at 0.25. The STEPDISC procedure selects a subset of the quantitative variables to produce a discrimination model using forward selection, backward elimination, and stepwise selection. Stepwise selection begins with no variables in the model. As the analysis progresses through each step, if a variable already in the model falls to meet the criterion to stay, the worst such variable is removed. Otherwise, the variable that contributes most to the discriminatory power of the model is entered. After all variables meet the criterion to stay and no others meet the criterion to enter, the selection process stops.

The first execution of this procedure yielded two discriminatory variables; area of refuge and area of upland hardwoods with crown closure >50%, with the value of refuge contributing most heavily to the model's discriminatory power (Table 2). Because of the emphasis on area of refuge, this analysis was repeated with the variable for area of refuge removed. This analysis revealed the importance of upland hardwood, >50% crown closure, but also yielded the
shrub-old field variable as a good discriminator between groups.

In order to determine the linear combination of the quantitative variables, a canonical discriminant analysis (CANDISC) was performed. Given the classification variable (in this analysis, TYPE) and the quantitative variables, the CANDISC procedure derives canonical variables (linear combinations of the quantitative variables), as well as between class variation and scores of the discriminant function.

The values for each variable, the discriminant scores, and the canonical discriminant function are shown in Table 2. This function correctly classified 11 of 12, or 91.7%, of the study areas into the correct group (winter concentration area vs. non-concentration area). The misclassified area, Trelease Woods, a natural area owned and used for research by the University of Illinois, is unusual in that it is a small, relatively isolated woodlot, only 44 ha, surrounded completely by urban areas and crop fields. Yet, Trelease has supported 5–10 deer each winter at least since 1978.

The total canonical structure is shown in Table 3. The values can be viewed as the correlation between each of the variables listed and the discriminant score. Refuge area, area of upland forest with >50% crown closure, and area of shrub-old field are shown to be highly correlated with the discrimination. The two indices of human disturbance—
number of occupied houses and kilometers of light duty roads—were shown to be negatively correlated with the discriminant score; however their effects were minimal in determining the presence or absence of wintering deer. The correlation of the interspersion index, although positive, was also relatively low. The results of this analysis are in agreement with the results of the stepwise analysis. Table 4 shows the probability (posterior) that each area was correctly classified into the correct grouping. With the exception of Trelease Woods, it can be noted that these probabilities are 100% or close to it.

Thus, the preliminary stepwise discriminant analysis of 12 selected areas indicated that the area of refuge, area of upland hardwoods with >50% crown closure, and area of shrub-old field habitat are probably discriminators of winter deer concentration areas in central Illinois. As additional areas are surveyed and the sample size increased, analyses will be continued and the results more critically evaluated.

Winter Concentrations of Deer Throughout the State

Under project W-87-R-2,3,4, 56 Illinois counties were initially surveyed to determine locations of wintering deer. Rechecks in many of these counties using expanded sources of information turned up additional wintering sites. A final tabulation of characteristics for each known wintering site has been completed for Deer Region 1 and is well advanced in Deer Region 2. An example of the data provided for each
area is shown in Table 5 for a site in Whiteside County. The complete listing of sites will be presented under job No. 101.2 in the next annual report (30 September 1985).

(b) Target Date for Achievement: 30 September 1984
(c) Date of Accomplishment: On Schedule.
(d) Significant Deviations: None.
(e) Remarks: None.
(f) Recommendations:

The classification of deer wintering concentration sites in central Illinois must be expanded to include the remaining regions of west-central Illinois and northern Illinois. Four counties—Marshall and Putnam in west-central Illinois and Stevenson and Winnebago in northern Illinois—have been surveyed for wintering sites using aerial surveillance. Wintering sites in these counties will be paired with areas devoid of deer and tested for discrimination using the same variables used to distinguish concentration areas in central Illinois.

The importance of refuge, as we use the term, implies more than simply a denial of hunting opportunities; it means restricting and controlling the location and numbers of people who would visit the area. All six concentration areas studied in the preliminary analysis featured a high proportion of the wooded area in refuge; Trelease Woods is surrounded by a 4- to 6-ft high fence! The relative isolation of the concentration areas from the public emphasizes the necessity of offering deer a respite from harassment during the winter months.
The importance of availability of upland woody cover to wintering deer is amplified by the scarcity of such sites in central Illinois. Bottomland forests are much more common in central Illinois, but because of the typical regime of winter and early spring floods, deer do not use bottomlands regularly. Unfortunately, upland forests have since settlement been vulnerable to clearing for agriculture, highways, and houses, with many destroyed in recent years. For deer to survive in counties with limited forest cover, existing upland forests that provide refuge from hunting and other harassment must be preserved. We are presently locating and describing such areas throughout central and northern Illinois. We will also identify suitable areas of habitat where refuges do not now exist but could conceivably benefit local deer herds. It is possible that an experimental program of deer refuge management will be suggested in future reports.

(g) Costs: Federal - $36,713; State - $12,238; Total - $48,951

LITERATURE CITED


Job No. 101.2; Title: Data analysis and reporting.

Objectives: To analyze the data previously collected and to provide the Illinois Department of Conservation with an appraisal of deer range for central and northern Illinois.

(a) Activity: This job was not active during the R-5 segment.

(b) Target Date for Achievement: 30 September 1985.

(c) Date of Accomplishment: On Schedule.

(d) Significant Deviations: None.

(e) Remarks: None.

(f) Recommendations: None.

(g) Costs: None.
Study No. VII-B; Title: Population Dynamics of the Illinois Deer Herd
--Past History, Current Status, and Future Management Options.

Study Objectives:

1. To evaluate deer herd dynamics using available harvest information.

2. To determine the impact of crop harvests and weather on the deer harvest.

3. To define regional boundaries ecologically for deer and make recommendations based on herd dynamics.

4. To simulate herd dynamics under various harvest strategies.

5. To provide the Department of Conservation with management strategies for regional deer herds based on life history, seasonal requirements, and harvest strategies.

Job. No. 102.1; Title: Deer harvest analysis.

Objectives: To evaluate deer herd dynamics based on sex and age compositions of past harvests, to determine the effects of crop harvest chronology and weather on harvest, and to provide the DOC with computer programs which compile, analyze, and present deer harvest information in a usable form.

(a) Activity:

Deer Harvest Analysis

Personnel of the Illinois Department of Conservation have collected information on deer harvests since the first modern shotgun deer season in 1957. Successful hunters have been required to bring their deer to a check station where sex, estimated age, and location of kill were recorded.
Although sex and age of the deer harvest is biased by hunter selectivity, differential vulnerability of sex-age classes, and incorrect aging (Roseberry 1980), the data can be useful in evaluating trends in the deer herd and in providing initial inputs for simulations. At present, deer harvest data are entered into computerized data management systems by DOC employees in Springfield at the conclusion of each hunting season. We receive a magnetic tape containing records for individual deer. The number of potential hunters in each county, as indicated by the number of permits issued, are entered into the data base at the Natural History Survey. We anticipate that in due time DOC personnel currently unfamiliar with the computer procedure will assume responsibility for the deer harvest analyses. Guidelines outlining the procedures for the analysis have recently been written and should simplify this transition (Table 6). Fortran programs (Tables 7, 8, and 9) were written for tallying numbers of deer by sex and age classes on the Cyber 175 computer on the campus of the University of Illinois to provide summaries of the raw harvest and hunter data for further analysis. A final Fortran program (Table 10) was written which produces summary output on county, regional, statewide, and special areas bases. The outputs are preserved on tape and include harvest by sex and age, total harvest, number of hunters, hunter success ratios (proportion of hunters harvesting a deer), time specific and reconstructed mortality rates, and a predicted deer herd size for the following year.
The predicted deer population size is calculated using a simulation model similar to one implemented in Pennsylvania (see Lang and Wood 1976 for details of that analysis and its limitations), but modified to fit the "any deer" harvest regulations in Illinois. The modified model uses estimates of mortality and recruitment derived from harvest data in 1 year to predict the size of the deer population the following year. The "any deer" season in Illinois allowed us to directly estimate the number of females rather than use the adult female to adult male ratios to estimate the number of females as was done by Lang and Wood. In addition, we average three estimates of mortality rather than using only the reduction rate method described by those workers. To test the ability of our estimates to forecast herd size the following year, we regressed the predicted number of deer and the number of shotgun permits issued on the actual harvest on county, regional, and statewide bases and found that in most counties where adequate data are available, the equations accurately predicted harvest (Table 11). These equations were also used to estimate the number of hunters required to attain desired levels of harvest. By inputing the predicted herd size and the desired number of deer to be harvested, we can obtain reasonable estimates of the numbers of hunters required to attain the desired levels of harvest. The harvest model can be used to estimate the numbers of deer which need to be removed to attain desired herd trends.
(i.e., stable, increasing, or decreasing). Recruitment (yearlings alive in June/adult) is used as a guideline for the harvest rate. For example, if stable populations are desired, harvest should approximate recruitment. This method, however, has serious limitations. Recruitment is only crudely estimated because fawn to doe ratios in the harvest are biased by differential vulnerability of sex-age classes. In addition, because reproductive success varies with age of the doe, combining yearling and adult females in the estimates of recruitment may result in serious inaccuracies. These problems cannot be adequately addressed using only harvest data, but require supplemental field data.

Retrieval System for Results of Deer Harvest Analyses

The results of analyses performed on the mainframe computer at the University of Illinois are not readily accessible to DOC personnel. Apple II+ microcomputers were purchased in June 1982 to provide better staff access to the deer data. All available deer harvest and population information was transferred to and saved on, floppy discs as text files accessible through the microcomputer. "User friendly" Interactive programs were written in Applesoft Basic (Tables 12, 13, 14, and 15) to provide rapid access to these data in the form of tables and graphs (Nixon et al. 1983, see Table 16 for recent addition).
Factors Affecting the Annual Harvest of White-Tailed Deer

A common explanation given by wildlife biologists for unexpected levels of harvest of deer is that conditions during the hunt, most notably weather, were unusual (Fobes 1943; Thorton 1970; Loomis et al. 1981; Gladfelter 1983). Few studies however, have quantified the effects of weather factors on rates of daily and annual harvest of deer.

Illinois instituted an any-deer shotgun season for a limited number of counties in 1957. The season has consisted of a 3-day segment in November and a 3-day segment in December for a total of 6 days for all years but 1967. The latter year had a continuous 6-day season. Consistent regulations facilitate evaluation of conditions affecting the number of deer harvested. Variables considered to potentially affect daily harvest of deer included the number of hunters, the estimated number of deer, day of the season, proportion of the corn harvested, severity of the previous winter, and weather conditions during the season. County data were grouped into regions because low harvests in many counties led to highly variable deer population estimates. Separate analyses were performed for Regions 1, 3, 5, and 8. The data used for rainfall and snow cover were an average of data from 3 different sites in each region (National Weather Records Center). Rainfall at these sites was measured at hourly intervals and therefore could be allocated to periods during which the hunter was in the field.
Weather variables (temperature, wind chill, wind speed, visibility, and humidity) less susceptible to local variations, and recorded at 3-hour intervals, were obtained from the major weather reporting stations closest to the center of each region. The purpose was to determine which weather factors affected the daily and annual harvest of deer. To reduce the problem of correlated variables, we ran a principal components analysis (PCA) on the original set of independent variables prior to doing a multiple regression analysis. The PCA resulted in a new set of uncorrelated variables each of which was a linear combination of the original variables (Cooley and Lohnes 1971). Stepwise multiple regression was then performed on the resultant factor scores for each day of the hunt to determine the effect of conditions during any single day on harvest. To determine the effect of conditions during a particular day on total harvest during a season, we performed a PCA on daily conditions during an entire shotgun deer season. Multiple regression was then performed using factor scores for each season as independent variables and total deer kill during a season as the dependent variable.

As might be expected, day of the season strongly affected harvest. Principal components in which day of the season had a high loading, consistently had a negative relationship with harvest, regardless of the other variables with high loadings (Table 17). This indicated that harvest declined as the season progressed. Potential for harvest
(number of hunters and predicted deer population) and stage of corn harvest had a consistent positive effect on daily harvest. Conditions less consistent among regions, but apparently of importance to daily harvest, were rainfall (amount and duration), comfort conditions (temperature and windchill), and the severity of the previous winter (snowfall and temperature deviation from normal). Rainfall and cold conditions had a negative effect on daily harvest, whereas severe conditions the previous winter had a positive effect. Thus, we can expect the greatest daily harvests under conditions where there are high densities of both deer and hunters and little standing corn. The latter provides a refuge to the deer making them less vulnerable to harvest. Rain or severe conditions (low wind chill and temperature) not only affect the number of hunters in the field (Curtis 1971), but the activity of the deer (Banaslak 1961; Progulske and Duerre 1964) thereby reducing the number of deer harvested. The positive relationship between a severe previous winter and harvest of deer was unexpected given the opposite relationship observed in the northern range of the whitetail (Severinghaus 1947; Verme 1964; Verme and Ozoga 1971; Langenau and Lerg 1976). In most parts of Illinois, however, the winters are rarely severe, and the density of deer is seldom high enough to impact food resources. Agricultural crops make up a high percentage of the diet (Nixon et al. 1970) and in most years are abundantly available. Rongstad and Tester (1969) found home ranges
decreased with snow depth. Perhaps a more pronounced tendency to concentrate on refuges with less movement during severe winters resulted in lower mortality due to poaching, roadkills, and other factors.

The regression of daily conditions on total annual harvest resulted in fewer significant relationships than did the analysis described above. Total statewide harvest was most strongly related to potential for harvest (available deer) and stage of corn harvest (Table 18). Although daily weather variables loaded high for some of the significant factors in the regression, the relationships were not consistent among the regions and in several instances were probably superfluous. These results suggest that although weather conditions can have significant effects on harvest during a single day, they tend to "average out" statewide over the split 6-day arrival season. Poor and particularly good harvests during a single day are apparently compensated for on subsequent days.

(b) Target Date for Achievement:


(c) Date of Accomplishment: On Schedule.

(d) Significant Deviations: None.

(e) Remarks: None.

(f) Recommendations: The system of registering all deer legally harvested in Illinois since the first season opened in 1957 provides an invaluable data base for evaluating herd trends and making adjustments in harvest rates. Because deer are
managed with the use of a county system for allocation of permits, harvest data should continue to be taken individually for each county open to shotgun deer hunting. Efforts should be made, however, to improve the quality of the data, especially the age data. Although the harvest data are useful in the management of the deer herd in Illinois, relying only on harvest data limits the analyses, which can be performed, that are useful to management. Field data, most importantly fall and spring fawn-to-doe ratios, are required before precise models can be used, and before recommendations for harvest rates be made with any confidence. In addition, other indices of population trends (i.e., road kill information) would be useful in substantiating the results of the harvest analysis and increasing the precision and confidence with which regional deer herds are managed.

(g) Cost: Federal - $18,356; State - $6,119; Total - $24,475.

LITERATURE CITED


Fobes, C. 1945. Weather and the kill of white-tailed deer in Maine. J. Wildl. Manage. 9:76-78.


Job No. 102.2; Title: Regional analysis of the Illinois deer harvests.

Objectives: To determine the landscape characteristics most affecting harvest of deer in Illinois and to evaluate current regional boundaries.

(a) Activity:

Except for hunter quotas, similar hunting regulations have been imposed for all counties in Illinois. This procedure has worked well in the past and has allowed deer to increase in numbers and expand their range. However, hunter success rates, deer kill, and requests for permits vary greatly among the counties. As a result, different harvest regulations may be desirable for different parts of the state at some time in the future. Grouping of counties according to factors most affecting deer abundance and harvest could facilitate the development of more appropriate management schemes. Cluster analysis, a technique whereby a set of data (landscape and deer herd characteristics) is assessed to determine if groupings exist among observations (counties), will be used (Everitt 1980). Unfortunately, with this analysis, the variables most important in the separation of counties can not be determined. It is important, therefore, that we include only variables relevant to harvest of deer. Preliminary analyses were
performed to determine which variables most strongly affected harvest of deer in Illinois. To avoid potential loss of important variables due to high correlations, we ran a principal components analysis (PCA) on the original set of independent variables (Table 19) after they had been standardized for differences in county size. The PCA resulted in a new set of uncorrelated variables each of which was a linear combination of the original variables. Stepwise multiple regression was performed using the component scores for each county as independent variables and the number of deer harvested per ha of woodland as the independent variable.

Five components were significant in the regression (Table 20). Counties with cover associations including large amounts of forest, small grain crops, and hay tended to have larger harvests of deer, whereas urban counties with large human populations and intensively farmed counties with much land in corn and soybeans had lower harvests.

(b) Target Date for Achievement:


(c) Date of Accomplishment: On Schedule.

(d) Significant Deviations: None.

(e) Remarks: None.

(f) Recommendations: None.

(g) Cost: Federal $18,356; State - $6,119; Total - $24,475.
LITERATURE CITED


Job No. 102.3; Title: Population dynamics of the Illinois deer herd --history, current status, and future management options.

Objectives: To develop management strategies for regional deer herds.

(a) Activity: This job was not active during the R-5 segment.
(b) Target Date for Achievement: 30 September 1986.
(c) Date of Accomplishment: On Schedule.
(d) Significant Deviations: None.
(e) Remarks: None.
(f) Recommendations: None.
(g) Cost: None.
Study No. VII-C; Title: Life History and Ecology of Deer in Intensively Farmed Landscapes.

Study Objectives:
1. To determine sex and age specific natality and mortality.
2. To determine daily, seasonal, and annual movements of deer as they relate to crop phenology, weather, and hunting pressure.
3. To evaluate the role of nutrition (digestible energy, protein, and minerals) relative to seasonal dispersion of deer in natural and cultivated plant communities.
4. To determine the importance of refuges to deer population dynamics in intensively farmed landscapes.
5. To construct population models that mimic deer population dynamics in intensively farmed landscapes.

Job No. 103.1; Title: Life history and ecology of deer in intensively farmed landscapes.

Objectives: (Same as Study Objectives).

(a) Activity:

The Study Area

The Platt County Study Area (PCSA) of 2,912 ha (7,191 A.) includes 655 ha of refuge and 2,257 ha open to hunting (Fig. 1). Croplands, mostly corn and soybeans but also including forage crops (alfalfa and red clover), cover about 60% and pastures 5% of the total area. The remaining 35% is woodland in various stages of succession. Bottomland forests, predominantly silver maple (Acer saccharum) on frequently flooded areas, or mixed forests of silver maple, sycamore (Platanus occidentalis), green ash (Fraxinus
and cottonwood (*Populus deltoides*) on the better drained sites, occupy about 15% of the area. Early successional forests of hawthorn (*Crataegus* spp.), sassafras (*Sassafras albidum*), osage orange (*Maclura pomifera*), honey locust (*Gleditsia triacanthos*), and shingle oak (*Quercus umbricaria*) cover about 11% of the uplands. More mature forests of oaks (*Quercus alba*, *Q. velutina*, and *Q. rubra*) and hickories (*Carya ovalis*, *C. ovata*, *C. tomentosa*, and *C. cordiformis*) dominate the remaining 9% of the uplands.

Forest cover on the study area encompasses much more (35%) area than is typical of Platt County or east-central Illinois (generally less than 5%) but appears to be representative of the habitat on areas used in both summer and winter by deer in this general region. The combination of extensive forest cover and sanctuary are seen as important factors favoring winter deer concentration.

**Deer Captures**

As of 30 June 1984, we have captured 224 individual deer a total of 290 times. Rocket nets have provided multiple captures whereas drop nets take single individuals. Deer have been marked with ear streamers (males - 69 fawns, 10 yearlings, 3 adults; females - 3 fawns), thermoplastic collars bearing reflective symbols (males - 3 fawns, 1 yearling; females - 42 fawns, 11 yearlings, 14 adults), and radio collars (males - 14 fawns, 9 yearlings, 10 adults; females - 19 fawns, 9 yearlings, 25 adults). All captured deer have also been marked with metal ear tags.
Radio tracking, as outlined in previous annual reports, was continued during this segment. Radio tracking is providing data on sex and age specific natality and mortality rates, dispersal, and use of natural and agricultural habitats as affected by seasons, farming schedules, weather, and hunting. In addition, radio tracking allows us to investigate social behaviors that affect dispersion, dispersal, and harvest success, such as: (1) mother:young relationships after their first year together; (2) dispersion patterns of adult males; and (3) characteristics of sites selected by yearling and adult females for parturition and fidelity to these sites in subsequent years.

Population Levels

The sizes of deer herds of east-central Illinois are still growing, and those on the PCSA are growing faster than those of either Platt County or Region 5 as a whole (Table 21). The rates of herd growth, if continued, suggest a doubling of fall densities in about 5 years at the PCSA, 6-7 years for Platt County, and 10 years for Region 5 as a whole.

The high rate of increase indicated for deer on the PCSA is due to lower than average mortality rates. Estimates of pre-hunt densities have been made for the PCSA for the past 3 years (Table 22), and the mortality rates of both sexes have been below those estimated from harvested deer from Region 5 as a whole (Hansen, unpublished data, this study). Simulation modeling of the age structure of
the PCSA herd indicates that a stable population will not be achieved unless 35-40% of the doe population dies or is lost to dispersal each year.

Fawns continue to be under represented in the deer harvest and in known mortalities on the PCSA (Table 23). Apparently a protectionist attitude by the public during the closed season (particularly June-October), the reluctance of many hunters to shoot fawns, and possibly fawn behavior have combined to protect many fawns. Yearlings and adults are dying at rates higher than their suspected abundance in the population because movements and reduced wariness of both sexes during the breeding season increase their likelihood of death. Male fawns are almost totally excluded from breeding activities whereas female fawns that undergo estrus do so after most of the deer hunting is over. On the PCSA, male fawns and yearling females appear least vulnerable and yearling males most vulnerable to death (Table 23).

Clearly, the refuge portion of the study area offers protection to many of the older females from accidents and hunting. In 1983, fall densities approached 1 deer per 15 acres of forest, a level where excessive use of woody vegetation may be expected during winter, particularly if the weather is severe.

Dispersal and Dispersion

In order to construct realistic models of the PCSA deer herd, we need to quantify the degree of egress and Ingress occurring each year. Egress is relatively easy to measure,
using marked deer to measure dispersal. Thus far fawn males are the most likely to disperse, but, after they reach 1.5 years, males are the most sedentary members of the population (Table 24). For females, dispersal movements continue into adulthood, but with a diminishing frequency. Adult females are more likely to migrate in and out of wintering areas each year than to leave a site and never return. On the PCSA, these dispersals mean a decline in numbers of about 55% each spring, a rate that, without Ingress, would lead to a rapid decline in fall densities. Because the population is increasing, deer must be ingressing onto the PCSA each spring.

Measuring the extent of this Ingress to the PCSA has proven to be difficult. We are using several techniques to determine Ingress including: (1) Using change-in-ratio of marked:unmarked deer observed in mid-to-late spring observations of deer compared to observations made in early spring before dispersal begins. As all Ingressing deer are unmarked, fewer marked deer should be seen late in the spring. Thus far this technique has not been successful because we do not see many deer after leaf out; (2) Using our simulated age structure and spotlight counts of yearling and older deer (marked and unmarked) to calculate a pre-hunt population estimate. The difference between this estimate and the pre-fawning density plus the fawn crop less mortality should give a crude estimate of Ingress. We plan to test this technique in the fall of 1984; (3) Marking deer
on other wintering sites in the Sangamon River basin. We have not attempted to mark many deer away from the PCSA, because of time limitations and a desire to mark as many deer as possible on the principal study area. We have marked 9 deer on an area located 3 km north of the north boundary of the PCSA. Three of these deer were killed before their spring dispersal. Of the remaining 6, 2 male fawns dispersed, both away from the PCSA, and the remaining 4 adult deer exhibited migratory behavior, moving away from and back to the area where they were marked. We plan to mark a few more deer both north and south of the PCSA in 1984-1985.

In addition to migrating behavior, we must recognize that the dispersion of deer changes seasonally. In midwinter deer concentrate in the core of a wintering area. As soon as the weather moderates, many deer move out from the core area. In late spring, they migrate to peripheral parts of the PCSA or disperse away from the area. This movement of deer away from a core area is indicated by results of the spotlight censuses. Counts in the spring of 1984 indicated about a 45% decline in numbers of yearling and older females from the fall 1983 counts (Table 25). Some of this decline in numbers is due to dispersal off the area but also includes deer that moved to sites not accessible to spotlighting. This movement pattern was confirmed by radio marked deer and also by drive counts on two areas peripheral to the PCSA. These peripheral areas
contain no deer in midwinter; in July 1984, one area held at least 3 yearling and older females and the second at least 6 deer (4 males, 2 females). Thus our spotlight counts, when used to estimate numbers, may reflect densities for areas accessible to spotlighting, but not necessarily for the entire PCSA.

The seasonal change in dispersion of deer is also evident in the results of drive censuses, conducted twice each season on 454 acres of the PCSA (Table 26). Much of the driven area lies in the core of the winter range. These drive counts show a decline of about 50% in summer over winter counts in upland sites. Some of this decline relates to dispersal behavior (deer left the PCSA) but some deer merely occupy different portions of the PCSA in winter and summer.

Deer Condition

During the period of 24 January to 30 March 1984, we obtained blood samples from 37 deer captured on the PCSA. Sera from these deer are now being analyzed for levels of blood urea nitrogen, nonesterified fatty acids, isoleucine, leucine, and triiodothyronine, all parameters of energy and protein levels in deer diets. Exposure to disease or trauma will be indexed by haptoglobin levels. Chest girths and hind foot measurements were also taken on fawns and yearlings captured in winter to further help assess the physical condition of deer wintering on the PCSA (Table 27).
Job No. 103.2; Title: Data analysis and reporting.

Objectives: To analyze the data collected during this study and to provide the Department of Conservation with models of population dynamics, seasonal movement patterns, and use of plant communities by deer in Illinois.

(a) Activity: This job was not active during the R-5 segment.
(b) Target Date for Achievement: 30 September 1986.
(c) Date of Accomplishment: On Schedule.
(d) Significant Deviations: None.
(e) Remarks: None.
(f) Recommendations: None.
(g) Cost: None.
Table 1. List of variables used in the analysis of winter concentration areas vs. non-concentration areas.

<table>
<thead>
<tr>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of refuge</td>
</tr>
<tr>
<td>Total forested area</td>
</tr>
<tr>
<td>% of total forest in county</td>
</tr>
<tr>
<td>Area of hardwoods, &gt;50% crown closure</td>
</tr>
<tr>
<td>Area of hardwoods, &gt;50% crown closure, upland</td>
</tr>
<tr>
<td>Area of hardwoods, &gt;50% crown closure, bottomland</td>
</tr>
<tr>
<td>Area of hardwoods, &gt;50% crown closure, upland, &gt;50 years old, wooded</td>
</tr>
<tr>
<td>Area of hardwoods, &gt;50% crown closure, upland, &gt;50 years old, pastured</td>
</tr>
<tr>
<td>Area of hardwoods, &gt;50% crown closure, upland, &lt;50 years old, wooded</td>
</tr>
<tr>
<td>Area of hardwoods, &gt;50% crown closure, upland, &lt;50 years old, pastured</td>
</tr>
<tr>
<td>Area of hardwoods, &gt;50% crown closure, bottomland, &gt;50 years old, wooded</td>
</tr>
<tr>
<td>Area of hardwoods, &gt;50% crown closure, bottomland, &gt;50 years old, pastured</td>
</tr>
<tr>
<td>Area of hardwoods, &gt;50% crown closure, bottomland, &lt;50 years old, wooded</td>
</tr>
<tr>
<td>Area of hardwoods, &gt;50% crown closure, bottomland, &lt;50 years old, pastured</td>
</tr>
<tr>
<td>Area of hardwoods, &lt;50% crown closure</td>
</tr>
<tr>
<td>Area of hardwoods, &lt;50% crown closure, upland</td>
</tr>
<tr>
<td>Area of hardwoods, &lt;50% crown closure, bottomland</td>
</tr>
<tr>
<td>Area of hardwoods, &lt;50% crown closure, upland, &gt;50 years old, wooded</td>
</tr>
<tr>
<td>Area of hardwoods, &lt;50% crown closure, upland, &gt;50 years old, pastured</td>
</tr>
<tr>
<td>Area of hardwoods, &lt;50% crown closure, upland, &lt;50 years old, wooded</td>
</tr>
<tr>
<td>Area of hardwoods, &lt;50% crown closure, upland, &lt;50 years old, pastured</td>
</tr>
<tr>
<td>Area of hardwoods, &lt;50% crown closure, bottomland, &gt;50 years old, wooded</td>
</tr>
<tr>
<td>Area of hardwoods, &lt;50% crown closure, bottomland, &gt;50 years old, pastured</td>
</tr>
</tbody>
</table>

cont.
Table 1 -cont.-2

| Area of hardwoods, <50% crown closure, bottomland, <50 years old, wooded |
| Area of hardwoods, <50% crown closure, bottomland, <50 years old, pastured |
| Area of shrub-oldfield |
| Area of cropland |
| Area of conifers |
| Area of pasture/grasslands |
| Number of occupied houses |
| Linear distance of unimproved roads |
| Linear distance of light duty roads |
| Linear distance of secondary highways |
| Linear distance of primary highways |
| Linear distance of interstate highways |
| Number of 10' contour lines, NE-SW orientation |
| Number of 10' contour lines, NW-SE orientation |
| Total topographic relief (feet) |
| Interspersion index |
Table 2. Variable values, discriminant scores, and the discriminant function for each of the 12 areas used in the analysis, based on a 4 square mile subsample of each area.

<table>
<thead>
<tr>
<th>Area</th>
<th>T</th>
<th>R</th>
<th>H6</th>
<th>H7</th>
<th>H17</th>
<th>H18</th>
<th>S</th>
<th>H</th>
<th>L</th>
<th>I</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friends Creek</td>
<td>1</td>
<td>258</td>
<td>162</td>
<td>104</td>
<td>15</td>
<td>5</td>
<td>20</td>
<td>14</td>
<td>2</td>
<td>23</td>
<td>3.4844</td>
</tr>
<tr>
<td>Lodge Park</td>
<td>1</td>
<td>128</td>
<td>74</td>
<td>105</td>
<td>16</td>
<td>0</td>
<td>2</td>
<td>32</td>
<td>15</td>
<td>26</td>
<td>1.2269</td>
</tr>
<tr>
<td>Allerton Park</td>
<td>1</td>
<td>265</td>
<td>230</td>
<td>119</td>
<td>18</td>
<td>11</td>
<td>13</td>
<td>8</td>
<td>8</td>
<td>11</td>
<td>1.7754</td>
</tr>
<tr>
<td>Trelease Woods</td>
<td>1</td>
<td>44</td>
<td>47</td>
<td>0</td>
<td>15</td>
<td>0</td>
<td>26</td>
<td>58</td>
<td>13</td>
<td>10</td>
<td>-0.2092*</td>
</tr>
<tr>
<td>Mahomet Area</td>
<td>1</td>
<td>156</td>
<td>99</td>
<td>14</td>
<td>25</td>
<td>0</td>
<td>37</td>
<td>101</td>
<td>24</td>
<td>18</td>
<td>2.9976</td>
</tr>
<tr>
<td>Homer Lake</td>
<td>1</td>
<td>169</td>
<td>39</td>
<td>65</td>
<td>94</td>
<td>23</td>
<td>56</td>
<td>24</td>
<td>14</td>
<td>20</td>
<td>2.3160</td>
</tr>
<tr>
<td>Atwood Area</td>
<td>2</td>
<td>30</td>
<td>37</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>12</td>
<td>12</td>
<td>16</td>
<td>7</td>
<td>-1.1381</td>
</tr>
<tr>
<td>White's Area</td>
<td>2</td>
<td>11</td>
<td>76</td>
<td>82</td>
<td>6</td>
<td>0</td>
<td>7</td>
<td>34</td>
<td>15</td>
<td>27</td>
<td>-2.5992</td>
</tr>
<tr>
<td>Goose Creek</td>
<td>2</td>
<td>0</td>
<td>57</td>
<td>5</td>
<td>14</td>
<td>0</td>
<td>3</td>
<td>16</td>
<td>14</td>
<td>23</td>
<td>-2.1423</td>
</tr>
<tr>
<td>Spring Lake</td>
<td>2</td>
<td>0</td>
<td>21</td>
<td>59</td>
<td>4</td>
<td>0</td>
<td>14</td>
<td>176</td>
<td>19</td>
<td>20</td>
<td>-1.8863</td>
</tr>
<tr>
<td>Sidney North</td>
<td>2</td>
<td>0</td>
<td>19</td>
<td>56</td>
<td>4</td>
<td>0</td>
<td>11</td>
<td>23</td>
<td>12</td>
<td>6</td>
<td>-2.1102</td>
</tr>
<tr>
<td>Sangamon Southwest</td>
<td>2</td>
<td>0</td>
<td>66</td>
<td>66</td>
<td>40</td>
<td>3</td>
<td>16</td>
<td>18</td>
<td>11</td>
<td>11</td>
<td>-1.7149</td>
</tr>
</tbody>
</table>

CORRECT CLASSIFICATION = 91.7%
Discriminant Score >0 = Concentration Area
Discriminant Score <0 = Non-concentration Area
* = Misclassified Area

cont.
Table 2 -cont.-2

Canonical Discriminant Function:

Discriminant Score = 3.0787(R) + -0.6653(H6) + -0.1639(H7) + 1.0502(H17) +
-1.3722(H18) + 0.1512(S) + 0.1325(H) + -0.0686(L) +
-0.0512(I)

T = 1 = concentration area, 2 = non-concentration area
R = hectares of refuge
H6 = hectares of hardwood upland forest, >50% crown closure
H7 = hectares of hardwood bottomland forest, >50% crown closure
H17 = hectares of hardwood upland forest, <50% crown closure
H18 = hectares of hardwood bottomland forest, <50% crown closure
S = hectares of shrub-oldfield
H = number of occupied houses
L = kilometers of light duty roads
I = Interspersion index
Table 3. List of variables and canonical correlations for each of the 9 quantitative variables used in the canonical discriminant analysis.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Canonical Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hectares of refuge</td>
<td>0.9209</td>
</tr>
<tr>
<td>Hectares of hardwood upland forest, &gt;50% crown closure</td>
<td>0.5836</td>
</tr>
<tr>
<td>Hectares of hardwood bottomland forest, &gt;50% crown closure</td>
<td>0.3124</td>
</tr>
<tr>
<td>Hectares of hardwood upland forest, &lt;50% crown closure</td>
<td>0.4164</td>
</tr>
<tr>
<td>Hectares of hardwood bottomland forest, &lt;50% crown closure</td>
<td>0.4960</td>
</tr>
<tr>
<td>Hectares of shrub-oldfield</td>
<td>0.5693</td>
</tr>
<tr>
<td>Number of occupied houses</td>
<td>-0.0822</td>
</tr>
<tr>
<td>Kilometers of light duty roads</td>
<td>-0.1954</td>
</tr>
<tr>
<td>Interspersion index</td>
<td>0.1804</td>
</tr>
</tbody>
</table>
Table 4. Posterior probabilities of correct classification of each of the 12 areas included in the analysis.

<table>
<thead>
<tr>
<th>Area</th>
<th>Probability of Correct Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friends Creek</td>
<td>1.0000</td>
</tr>
<tr>
<td>Lodge Park</td>
<td>.9913</td>
</tr>
<tr>
<td>Allerton Park</td>
<td>.9990</td>
</tr>
<tr>
<td>Trelease Woods*</td>
<td>.3082</td>
</tr>
<tr>
<td>Mahomet Area</td>
<td>1.0000</td>
</tr>
<tr>
<td>Homer Lake</td>
<td>.9999</td>
</tr>
<tr>
<td>Atwood Area</td>
<td>.9878</td>
</tr>
<tr>
<td>White's Area</td>
<td>1.0000</td>
</tr>
<tr>
<td>Goose Creek</td>
<td>.9997</td>
</tr>
<tr>
<td>Spring Lake</td>
<td>.9993</td>
</tr>
<tr>
<td>Sidney North</td>
<td>.9997</td>
</tr>
<tr>
<td>Sangamon Southwest</td>
<td>.9987</td>
</tr>
</tbody>
</table>

* - misclassified area
Table 5. Description of a deer concentration area in Whiteside County.

<table>
<thead>
<tr>
<th>Area Name: Whiteside One</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topographic Quadrangle:  Morrison</td>
</tr>
</tbody>
</table>

Center of conc. area - principal forested area - Legal description: Secs. E. half 31, S. half 32, N. half 6, N. half 5; T. 21 N.; R. 5 E.

Deer population estimates: 80 - 100+

Ownership: Public land (Morrison-Rockwood St. Park) - 44.5%; Private land 63.5%

Threats: Proximity of Morrison and human encroachment

Hunting Status: No hunting in St. Park; variable hunting pressure on private land

Livestock/dairy operation present? (y or n): Pasturing of wooded acres is common. Forage crops readily available.

Total acres (4 sq. miles) = 2,560 or 1,036 ha.

Forested acres: 696.3 represents 3.8% of total forest in county.

<table>
<thead>
<tr>
<th>Total Forested Area:</th>
<th>ha</th>
<th>acres</th>
<th>% of sample plot (4 sq.ml.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;50% Crown closure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upland 50+ years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pastured</td>
<td>209.8</td>
<td>518.4</td>
<td>20.2</td>
</tr>
<tr>
<td>nonpastured</td>
<td>88.4</td>
<td>218.4</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>121.4</td>
<td>300.0</td>
<td>11.7</td>
</tr>
<tr>
<td>Upland &lt;50 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nonpastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottomland 50+ years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nonpastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottomland &lt;50 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nonpastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50% Crown closure</td>
<td>72.0</td>
<td>177.9</td>
<td>6.9</td>
</tr>
<tr>
<td>Upland 50+ years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nonpastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upland &lt;50 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nonpastured</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cont.
Table 5 - Cont.-2

<table>
<thead>
<tr>
<th>Total Forested Area (cont.):</th>
<th>ha</th>
<th>acres</th>
<th>% of sample plot (4 sq.ml.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50% Crown closure (cont.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottomland 50+ years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nonpastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottomland &lt;50 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nonpastured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shrub-Oldfield, &lt;25 years</td>
<td>70.8</td>
<td>174.9</td>
<td>6.8</td>
</tr>
<tr>
<td>Brushland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cropland</td>
<td>595.4</td>
<td>1471.3</td>
<td>57.5</td>
</tr>
<tr>
<td>Conifers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pasture/Grassland</td>
<td>61.8</td>
<td>152.7</td>
<td>6.0</td>
</tr>
<tr>
<td>Other: Lake</td>
<td>25.7</td>
<td>63.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>

**Human Disturbance Categories:**

- Occupied dwellings: 8
- Linear distance, unimproved roads: 3.86 km
- Linear distance, light duty roads: 0.77 km
- Linear distance, secondary highways: 3.60 km
- Linear distance, primary highways: 0.00 km
- Linear distance, Interstate highway: 0.00 km

**Topography:** (in ft.)

- # of contours NE transect: 82
- # of contours NW transect: 78
- Total relief in area: 90

**Comments:**

Morrison-Rockwood State Park is the core of this wintering area. (1140 acres) The large refuge and the mixed farming in the area should provide deer with adequate nutrition and winter protection for the future.
Table 6. Procedures for the analysis of deer harvest data.

The deer kill data are received on an IBM labelled magnetic tape written at 6250 BPI (density), taken to the tape room in the Digital Computing Laboratory (DCL) and stored on a permanent rack. To read the information from the tape onto a local file the following commands are made from a Cyber terminal:

```
LABEL(TAPE3,CV=EB,NT,D=6250,QN=1,PO=R,F=L,LB=KL,SI=CONDER,
VSN=CONDER-C253)
```

The only values which will vary annually are the values for SI, which is the tape name and VSN which is the tape name and rack number, both of which are given when the tape is stored at DCL. Depending on the time of day, a response to the LABEL command may take as long as 25-30 minutes or as short as 1 minute. Once the response is received (NT5 IS ASSIGNED....) type:

```
GRAB,DEBLOCK
```

This command loads a program which then reads the desired data from the tape and stores it in a local file. The response "REVERT DBLOCK.." indicates you are ready to enter the following command:

```
DEBLOCK(TAPE=TAPE3,DISK=DUCK,RECSIZE=114,BF=10)
```

"DUCK" is the name of the local file into which the appropriate raw data are to be written. It can be any name <= 7 characters long. The deblock procedure may take several minutes. When complete, the raw harvest data should be stored in the local file "DUCK". The tape should then be dismounted by typing:

```
RETURN, TAPE3
```

The analyses can now be performed on the data. The raw data are first summarized and stored in 5 files using the program HARF. Data should already be stored in these files from previous years and saved as Cyber disk files. These files are named the following:

- SUM1 = harvest breakdown by county
- SUM2 = " " region
- TOT = " " statewide
- REF1 = " " by special area
- REF2 = " " all special areas combined

Example procedure
```
GET, HARF
FTN, I=HARF,L=O
GET, SUM1,SUM2,TOT,REF1,REF2
```

cont.
Table 6 -cont.-2

Load previous years data
  SKIPE1, SUM1
  SKIPE1, SUM2
  SKIPE1, TOT
  SKIPE1, REF1
  SKIPE1, REF2
  LGO, DUCK
  PACK, SUM1
  PACK, SUM2
  PACK, TOT
  PACK, REF1
  PACK, REF2

Position files at the end of information
Execute the program
Removes end of file indicators from files

Each file (SUM1-REF2) should then be replaced with the statement:
  REPLACE, SUM1

The next step involves further breakdown of the files described above. In some cases the age and/or sex of harvested deer are not recorded on field sheets. This results in unknown data which nevertheless may be an important component of the harvest. The program RATIOM computes the sex and age ratios of the known-aged deer and assigns the unknown deer to sex-age categories in a proportion similar to that of the known sex-age kill. Five output files are created which are modifications of the original 5 files.

  TOTPC replaces SUM1
  TOTPR replaces SUM2
  TOTPS replaces TOT
  REFUGE replaces REF1
  TOTREF replaces REF2

Example Run

GET, RATIOM Load program and data
GET, TOTPC, TOTPS, TOTPR, REFUGE, TOTREF files
FTN, I = RATIOM, L = 0
SKIPE1, TOTPC
SKIPE1, TOTPR
SKIPE1, TOTPS
SKIPE1, REFUGE
SKIPE1, TOTREF
LGO Position files at end of data
Execute the program
PACK, TOTPC
PACK, TOTPR
PACK, TOTPS
PACK, REFUGE Remove end of file indicators
PACK, TOTREF

cont.
Table 6 -cont.-3

Each of these files (TOTPC-TOTREF) should be saved with the command:

REPLACE, TOTPC

The final part of the preliminary analyses involves rearranging the data so that all years of data for each county, region, and refuge are listed in sequence. The five files described above (TOTPC, TOTPR, TOTPS, REFUGE, TOTREF) plus a file with the number of permits issued for each county (DEA) are used as input files in the program SORTM. The output files include the following:

- **KILLC**: Kill and number of hunters by county
- **KILLR**: region
- **KILLS**: statewide
- **KILLRF**: by special area
- **KILLTR**: for all special areas

Example:

GET, DEA, TOTPC, TOTPR, TOTPS, REFUGE, TOTREF

FTN, I=SORTM, L=0

LGO

Then save the 5 output files (KILLC-KILLTR)

The analysis of the deer harvest data is done using the program DEERP, which reads data from the files KILLC, KILLR, KILLS, KILLRF, and KILLTR one file at a time and produces output including mortality rates, hunter success ratios, and predicted populations. These data are used as input in the Applesoft programs.

Example:

FTN, I=DEERP, L=0

LGO, KILLC

This results in a file (TAPE7) containing the output from the harvest analysis on a county basis. A similar procedure with the other input files should be done to obtain data on a regional, statewide and special areas basis.
Table 7. Fortran program which performs the first summary of the "raw" deer harvest data.

PROGRAM HARVEST(INPUT, OUTPUT, TAPE5=INPUT, SUM1, SUM2, SUM3, REF1
1, REF2, TOT, TAPE6=SUM1, TAPE7=SUM2, TAPE8=SUM3, TAPE9=REF1, TAPE10=
1REF2, TAPE11=TOT)
INTEGER DEER(3,6,120), RDEER(3,6,10), TDEER(3,6)
INTEGER TREF(3,6), TOTD(3,6)

C
C *************** C
C INITIALIZE VARIABLES
C DEER=NUMBER OF DEER BY COUNTY, SEX, AND AGE
C RDEER=NUMBER OF DEER BY REGION, SEX AND AGE
C TDEER=NUMBER OF DEER BY SEX AND AGE- ALL COUNTIES SUMMED
C TOTD=NUMBER OF DEER BY SEX AND AGE-ALL COUNTIES + REFUGES
C TREF=NUMBER OF DEER BY SEX AND AGE-TOTAL REFUGE KILL
C *************** C

DO 5 I=1,120
DO5 J=1,6
DO5 K=1,3
DEER(K,J,I)=0
5 CONTINUE
DO10 I=1,10
DO10 J=1,6
DO10 K=1,3
RDEER(K,J,I)=0
10 CONTINUE
DO11 J=1,6
DO11 K=1,3
TDEER(K,J)=0
TOTD(K,J)=0
TREF(K,J)=0
11 CONTINUE
C READ HARVEST INFORMATION
C IC=COUNTY
C IR=REGION
C IDT=DATE OF KILL
C IY=YEAR
C ISEX=SEX OF DEER
C IAGE=AGE OF DEER
15 READ(5,100) IY, IC, IR, IDT, ISEX, IAGE
100 FORMAT(13X,12,6X,13,12,16,38X,R1,12)
C CHECK FOR END OF DATA
IF(EOF(5).NE.O)GOTO20
C COMBINE POPE SOUTH AND POPE NORTH
IF(IC.EQ.116) IC=76
C
cont.
COMBINE CRAB ORCHARD 1ST AND 2ND

ASSIGN COUNTIES TO REGIONS

ASSIGN NUMERIC VALUE TO SEX

ADD DEER TO SEX AND AGE CLASS

TEST FOR ERRORS IN COUNTY CODE INPUT

ADD DEER TO COUNTY KILL

ADD DEER TO REGION KILL

ADD DEER TO TOTAL REFUGE KILL

cont.
Table 7 - cont.-3

C ADD DEER TO TOTAL KILL EXCLUDING REFUGES
17 TDEER(L,J) = TDEER(L,J) + 1
GOTO31
9 PRINT16, IC
16 FORMAT("","A COUNTY IS INCORRECTLY CODED AS",1X,13)
C ADD DEER TO TOTAL KILL INCLUDING REFUGES
31 TOTD(L,J) = TOTD(L,J) + 1
GOTO15
20 DO50 I = 1, 102
C DO NOT WRITE IF KILL IS 0
IF(DEER(1,1,I).NE.0.OR.DEER(1,2,I).NE.0)GOTO54
IF(DEER(2,1,I).EQ.0.AND.DEER(2,2,I).EQ.0)GOTO50
C WRITE COUNTY DEER KILL
54 WRITE(6,21) I, IY, ((DEER(K,LM,I),LM=1,6),K=1,3)
21 FORMAT(13,12,18(14))
50 CONTINUE
D051 I = 103, 120
C DO NOT WRITE IF HARVEST IS 0
IF(DEER(1,1,I).NE.0.OR.DEER(1,2,I).NE.0)GOTO 85
IF(DEER(2,1,I).EQ.0.AND.DEER(2,2,I).EQ.0)GOTO 51
C WRITE REFUGE DEER KILL
85 WRITE(9,89) I, IY, ((DEER(K,LM,I),LM=1,6),K=1,3)
89 FORMAT(13,12,18(14))
51 CONTINUE
D075 I = 1, 8
C DO NOT WRITE IF HARVEST IS 0
IF(RDEER(1,1,I).NE.0.OR.RDEER(1,2,I).NE.0)GOTO 77
IF(RDEER(2,1,I).EQ.0.AND.RDEER(2,2,I).EQ.0)GOTO 75
77 WRITE(7,22) I, IY, ((RDEER(K,LM,I),LM=1,6),K=1,3)
22 FORMAT(13,12,18(14))
75 CONTINUE
WRITE(8,83) I, IY, ((TDEER(K,LM),LM=1,6),K=1,3)
WRITE(11,83) I, IY, ((TOTD(K,LM),LM=1,6),K=1,3)
WRITE(10,83) I, IY, ((TREF(K,LM),LM=1,6),K=1,3)
83 FORMAT(13,12,18(14))
STOP
END
cont.
Table 8. Fortran program which calculates age and sex ratios and assigns unknown age-sex deer to categories.

```
PROGRAM RATIOS(INPUT,OUTPUT,SUM1,SUM2,TOT,REF1,REF2,TOTPC,TOTPR,
1 TOTPS,REFUGE,TOTREF,TAPE5=SUM1,TAPE10=TOTPC,TAPE6=SUM2,TAPE11= 
1 TOTPR,TAPE7=TOT,TAPE12=TOTPS,TAPE8=REF1,TAPE13=REFUGE,TAPE9= 
1 REF2,TAPE14=TOTREF)
COMMON YG,YR,TW,TH,A,U,YGF,YRF,TWF,THF,AF,UF,UJ,UY,UTW,UTH,UA,
1 UU,K,MN,I,J
C
C ********************************************
C SUM1=DATA FILE WITH DEER GUN HARVEST BY COUNTY
C SUM2=DATA FILE WITH DEER GUN HARVEST BY REGION
C TOT=DATA FILE WITH DEER GUN HARVEST- ENTIRE STATE INCLUDING REFUGES
C TOTPC=FILE CREATED - TOTAL ANIMALS DYING BY SEX AND AGE
C TOTPR=FILE CREATED- TOTAL ANIMALS DYING BY SEX AND AGE-REGION
C TOTPS=FILE CREATED- TOTAL ANIMALS DYING BY SEX AND AGE-STATE
C REFUGE OUTPUT FILE WITH HARVEST BY REFUGE
C TOTREF OUTPUT FILE WITH TOTAL REFUGE HARVEST
C I= COUNTY OR REGION
C J= YEAR
C YG=# FAWN MALES
C YR=#1 1/2 YEAR MALES
C TW=# 2 1/2 YEAR MALES
C TH=# 3 1/2 YEAR MALES
C A=# 4 1/2 YEAR MALES
C U=# UNKNOWN AGE MALES
C YGF=# FAWN FEMALES
C YRF=# 1 1/2 YEAR FEMALES
C TWF=# 2 1/2 YEAR FEMALES
C THF=# 3 1/2 YEAR FEMALES
C AF=# 4 1/2+ YEAR FEMALES
C UF=# UNKNOWN AGE FEMALES
C UJ=# UNKNOWN SEX FAWNS
C UY=# UNKNOWN SEX 1 1/2 YEAR OLDS
C UTW=# UNKNOWN SEX 2 1/2 YEAR OLDS
C UTH=# UNKNOWN SEX 3 1/2 YEAR OLDS
C UA=# UNKNOWN SEX 4 1/2+ YEAR OLDS
C UU=# UNKNOWN SEX AND AGE
C ********************************************
C
C READ YEAR TO BE ANALYZED
READ(5,7)IYR
7 FORMAT(2X,12)
C READ SHOTGUN KILL BY COUNTY
10 READ(5,20)I,J,YG,YR,TW,TH,A,U,YGF,YRF,TWF,THF,AF,UF,UJ,UY,UTW,UTH,
1UA,UU
20 FORMAT(13,12,18(F4.0))
C CHECK FOR END OF FILE
```

Cont.
Table 8 -cont.-2

C SKIP DATA NOT IN TIME SPAN REQUESTED
IF(IYR.NE.J)G0T010
C SET TAPE NUMBERS FOR WRITE STATEMENTS IN SUBROUTINE
MN=10
CALL PROPOR
CONTINUE
G0T010

C READ GUN KILL BY REGION
25 READ(6,20)I,J,YG,YR,TW,TH,A,U,YGF,YRF,TWF,THF,AF,UF,UJ,UY,
1UTW,UTH,UA,UU
IF(EOF(6).NE.0)G0T030
C SKIP YEARS NOT REQUESTED
IF(J.NE.IYR)G0T025
C SET TAPE NUMBERS FOR WRITE STATEMENTS IN SUBROUTINE
MN=11
CALL PROPOR
G0T025

C READ SHOTGUN HARVEST - ENTIRE STATE INCLUDING REFUGES
30 READ(7,20)I,J,YG,YR,TW,TH,A,U,YGF,YRF,TWF,THF,AF,UF,UJ,UY,UTW,
1UTH,UA,UU
C CHECK FOR END OF FILE
IF(EOF(7).NE.0)G0T040
IF(J.NE.IYR)G0T030
I=90
C SET TAPE NUMBERS FOR WRITE STATEMENTS IN SUBROUTINE
MN=12
CALL PROPOR
G0T030

C READ SHOTGUN HARVEST FOR INDIVIDUAL REFUGES
40 READ(8,20)I,J,YG,YR,TW,TH,A,U,YGF,YRF,TWF,THF,AF,UF,UJ,
1UY,UTW,UTH,UA,UU
C CHECK FOR END OF FILE
IF(EOF(8).NE.0)G0T050
IF(J.NE.IYR)G0T040
C SET TAPE NUMBER FOR WRITE STATEMENT
MN=13
CALL PROPOR
G0T040

C READ SHOTGUN HARVEST FOR ALL REFUGES COMBINED
50 READ(9,20)I,J,YG,YR,TW,TH,A,U,YGF,YRF,TWF,THF,AF,UF,UJ,
1UY,UTW,UTH,UA,UU
C CHECK FOR END OF FILE
IF(EOF(9).NE.0)G0T070
IF(J.NE.IYR)G0T050
I=90
C SET TAPE NUMBER FOR WRITE STATEMENT
MN=14
CALL PROPOR
Table 8 -cont.-3

GOTO 50
70 STOP
END

SUBROUTINE PROPOR
COMMON YG, YR, TW, TH, A, U, YGF, YRF, TWF, THF, AF, UF, UJ, UY, UTW, UTH,
1UA, UU, K, MN, I, J

C
C
C ELLOWELL PROPORT PROPORT OF FAWNS THAT ARE MALES
C ERYLINGS THAT ARE MALES
C 2 1/2 YEAR OLDS THAT ARE MALES
C 3 1/2 YEAR OLDS THAT ARE MALES
C 4 1/2+ YEAR OLDS THAT ARE MALES
C AWN MALES/TOTAL GUN HARVEST
C AWN MALES/TOTAL GUN HARVEST
C 1/2 MALE/TOTAL GUN HARVEST
C 3 1/2 MALES/TOTAL GUN HARVEST
C 4 1/2+ MALES/TOTAL GUN HARVEST
C AWN MALES/TOTAL MALES HARVESTED
C AWN MALES/TOTAL MALES HARVESTED
C 1/2 MALES/TOTAL MALES HARVESTED
C 3 1/2 MALES/TOTAL MALES HARVESTED
C 4 1/2+ MALES/TOTAL MALES HARVESTED
C AWN MALES/TOTAL FEMALES HARVESTED
C AWN MALES/TOTAL FEMALES HARVESTED
C 1/2 FEMALES/TOTAL FEMALES HARVESTED
C 3 1/2 FEMALES/TOTAL FEMALES HARVESTED
C 4 1/2+ FEMALES/TOTAL FEMALES HARVESTED
C TOTAL FAWNS/TOTAL FEMALES GREATER THAN 1.5 YEARS OLD
C TOTAL FAWNS/TOTAL FEMALES GREATER THAN 1.5 YEARS OLD
C TOTAL FAWNS/YEARLING FEMALES PLUS 2.5+ FEMALES X 2
C TOTAL FAWN MALES
C TOTAL YEARLING MALES
C TOTAL 2 1/2 YEAR OLD MALES
C TOTAL 3 1/2 YEAR OLD MALES
C TOTAL FAWN FEMALES
C TOTAL YEARLING FEMALES
C TOTAL 2 1/2 YEAR OLD FEMALES
C TOTAL 3 1/2 YEAR OLD FEMALES
C TOTAL 4 1/2 YEAR OLD FEMALES

C
C
C
Table 8 -cont.-4

C SUM SEX AND AGE CATEGORIES
TOT=YG+YR+TW+TH+A
TOTF=YGF+YRF+TWF+THF+AF
TOTAL=TOT+TOTF
IF(TOTAL.EQ.0)GOTO15
C INITIALIZE VARIABLES AT 0
PM=0
PYGM=0
PYRM=0
PTWM=0
PTHM=0
PAM=0
PJ=0
PY=0
PTW=0
PTH=0
PA=0
PJF=0
PYF=0
PTWF=0
PTHF=0
PAF=0
PJV=0
PYR=0
PT2=0
PT3=0
PO=0
 PJWF=0
PYRF=0
PT2F=0
PT3F=0
POF=0
Y=0
YE=0
T=0
TE=0
AD=0
YF=0
YEF=0
TF=0
TEF=0
ADF=0
PFAF=0
PFFAF=0
PFYAF=0
C CALCULATE PROPORTION MALES IN EACH AGE CATEGORY
C IF DENOMINATOR IS 0, SET VARIABLE AT 1.999-MISSING VALUE INDICATOR
PM=TOT/TOTAL

Cont.
Table 8 -cont.-5

1 IF(YGF.EQ.0.AND.YG.EQ.0)GOTO7
2 PYGM=YG/(YGF+YG)
3 PFAF=(YGF+YG)/(YRF+TWF+THF+AF)
4 PFFAF=YGF/(YRF+TWF+THF+AF)
5 PFYAF=(YGF+YG)/(YRF+(TWF+THF+AF)*2.)
6 GOT031
7 PYGM=1.999
31 IF(YRF.EQ.0.AND.YR.EQ.0)GOTO8
32 PYRM=YR/(YR+YRF)
8 GOT032
33 PYRM=1.999
32 IF(TWF.EQ.0.AND.TW.EQ.0)GOTO9
33 PTWM=TW/(TW+TWF)
9 GOT033
34 PTWM=1.999
33 IF(THF.EQ.O.AND.TH.EQ.O)GOTO11
34 PTHM=TH/(TH+THF)
11 GOT034
35 PTHM=1.999
34 IF(AF.EQ.O.AND.A.EQ.O)GOTO12
35 PAM=A/(A+AF)
12 GOT036
36 PAM=1.999
C CALCULATE PROPORTION EACH AGE CLASS IS OF THE TOTAL
36 PJ=YG/TOTAL
37 PY=YR/TOTAL
38 PTW=TW/TOTAL
39 PTH=TH/TOTAL
40 PA=A/TOTAL
41 PJF=YGF/TOTAL
42 PYF=YRF/TOTAL
43 PTWF=TWF/TOTAL
44 PTHF=THF/TOTAL
45 PAF=AF/TOTAL
C CALCULATE PROPORTION EACH AGE CLASS IS OF TOTAL-SEXES SEPERATE
40 IF(TOT.EQ.O)GOTO15
41 PJV=YG/TOT
42 PYR=YR/TOT
43 PT2=TW/TOT
44 PT3=TH/TOT
45 PO=A/TOT
46 IF(TOTF.EQ.O)GOTO15
47 PJVF=YGF/TOTF
48 PYRF=YRF/TOTF
49 PT2F=TWF/TOTF
50 PT3F=THF/TOTF
51 POF=AF/TOTF
C CALCULATE TOTAL DEER IN EACH SEX AND AGE CLASS- UNKNOWNS INCLUDED

Cont.
Table 8 -cont.-

\[
\begin{align*}
KY &= YG + PJ*U + PYGM*UJ + PJ*UU \\
KYE &= YR + PYR*U + PYRM*UY + PY*UU \\
KT &= TW + PT2*U + PTWM*UTW + PTW*UU \\
KTE &= TH + PT3*U + PTHM*UTH + PTH*UU \\
KAD &= A + PO*U + PAM*UA + PA*UU \\
KYF &= YGF + PJVF*UF + (UJ - PYGM*UJ) + PJF*UU \\
KYEF &= YRF + PYRF*UF + (UY - PYRM*UY) + PYF*UU \\
KTF &= TWF + PT2F*UF + (UTW - PTWM*UTW) + PTWF*UU \\
KTEF &= THF + PT3F*UF + (UTH - PTHM*UTH) + PTHF*UU \\
KADF &= AF + POF*UF + (UA - PAM*UA) + PAF*UU \\
\end{align*}
\]

WRITE(MN,110)J,KY,KYE,KT,KTE,KAD,KYF,KYEF,KTF,KTEF,KADF

110 FORMAT(13,12,1016)
15 RETURN
END
Table 9. Fortran program which arranges the summarized harvest and the number of hunters into a form suitable for the harvest analysis.

```fortran
PROGRAM SORTM(INPUT, OUTPUT, DEA, TOTPC, TOTPR, TOTPS, REFUGE, TOTREF,
                KILLC, KILLR, KILLS, KILLRF, KILLTR, TAPE5 = DEA, TAPE6 = TOTPC, TAPE7 =
                1TOTPR, TAPE8 = TOTPS, TAPE9 = KILLC, TAPE10 = KILLR, TAPE11 = KILLS, TAPE12 =
                1REFUGE, TAPE13 = TOTREF, TAPE14 = KILLRF, TAPE15 = KILLTR)
    INTEGER IH(120,27), IHR(8,27), IHS(27), Y(120,27), YE(120,27),
            T(120,27), TE(120,27), A(120,27), YF(120,27), YEF(120,27), TF(120,27),
            TEF(120,27), AF(120,27), IHRF(27)
C READ FIRST RECORD OF DEA
C
IZ=1Z-1956
C INITIALIZE VARIABLES
K=1
2 DO50 I=1,120
    DO50 J=1,IZ
    Y(I,J)=0
    YE(I,J)=0
    T(I,J)=0
    TE(I,J)=0
    A(I,J)=0
    YF(I,J)=0
    YEF(I,J)=0
    TF(I,J)=0
    TEF(I,J)=0
    AF(I,J)=0
50 CONTINUE
    IF(K.EQ.2)GOT045
    DO51 I=1,102
    DO51 J=1,IZ
    IH(I,J)=0
51 CONTINUE
    DO75 I=1,8
    DO75 J=1,IZ
    IHR(I,J)=0
75 CONTINUE
    DO80 J=1,IZ
    IHS(J)=0
    IHRF(J)=0
80 CONTINUE
C ******************************************************************************
C DEA=INPUT FILE WITH # OF HUNTERS
C TOTPC=INPUT FILE WITH HARVEST BY COUNTY
C TOTPR=INPUT FILE WITH HARVEST BY REGION
C TOTPS=INPUT FILE WITH STATEWIDE HARVEST
C REFUGE=INPUT FILE WITH HARVEST BY REFUGE
C TOTREF=INPUT FILE WITH REFUGE HARVEST TOTALED
C KILLC=OUTPUT FILE WITH SORTED KILL BY COUNTY
C Cont.
```
Table 9 -Cont.-2

C KILLRF=OUTPUT FILE WITH SORTED KILL BY REFUGE
C KILLTR=OUTPUT FILE WITH REFUGE TOTAL
C Y=# OF FAWN MALES HARVESTED
C YE=# OF YEARLING MALES HARVESTED
C T=# OF 2.5 YEAR OLD MALES HARVESTED
C TE=# OF 3.5 YEAR OLD MALES HARVESTED
C A=# OF 4.5+ YEAR OLD MALES HARVESTED
C YF=# OF FAWN FEMALES HARVESTED
C YEF=# OF YEARLING FEMALES HARVESTED
C TF=# OF 2.5 YEAR OLD FEMALES HARVESTED
C TEF=# OF 3.5 YEAR OLD FEMALES HARVESTED
C AF=# OF 4.5+ YEAR OLD FEMALES HARVESTED
C K= FLAG
C IH=# OF HUNTERS BY COUNTY AND REFUGES
C IHR=# OF HUNTERS BY REGION
C IHS=# OF HUNTERS STATEWIDE
C IHFR=# OF HUNTERS ON ALL REFUGES
C SKIP READING # OF HUNTERS IF THIS HAS ALREADY BEEN DONE
IF(K.EQ.2)GOTO45
C # OF HUNTERS FROM DEA
5 READ(5,10)N,J,IH(N,J-56)
10 FORMAT(13,12,1X,15)
IF(EOF(5).NE.O)GOTO15
C SUM HUNTERS INTO REGIONS
IF(N.EQ.4.OR.N.EQ.8.OR.N.EQ.43.OR.N.EQ.56.OR.N.EQ.71.OR.
1N.EQ.89.OR.N.EQ.98.OR.N.EQ.101)IHR(1,J-56)=IHR(1,J-56)+
1IH(N,J-56)
IF(N.EQ.6.OR.N.EQ.19.OR.N.EQ.27.OR.N.EQ.32.OR.N.EQ.37.OR.
1N.EQ.38.OR.N.EQ.46.OR.N.EQ.47.OR.N.EQ.50.OR.N.EQ.52.OR.N.E
1Q.53.OR.N.EQ.57.OR.N.EQ.88.OR.N.EQ.99)IHR(2,J-56)=IHR(2,J-56)
1+IH(N,J-56)
IF(N.EQ.29.OR.N.EQ.34.OR.N.EQ.36.OR.N.EQ.48.OR.N.EQ.55.OR.N.
1EQ.62.OR.N.EQ.63.OR.N.EQ.66.OR.N.EQ.72.OR.N.EQ.78.OR.N.EQ.81.
10R.N.EQ.85.OR.N.EQ.90.OR.N.EQ.94.OR.N.EQ.102)IHR(3,J-56)=IHR
1(3,J-56)+IH(N,J-56)
1IF(N.EQ.1.OR.N.EQ.7.OR.N.EQ.9.OR.N.EQ.31.OR.N.EQ.42
1.OR.N.EQ.59.OR.N.EQ.69.OR.N.EQ.75.OR.N.EQ.86)IHR(4,J-56)=
1IHR(4,J-56)+IH(N,J-56)
1IF(N.EQ.10.OR.N.EQ.11.OR.N.EQ.20.OR.N.EQ.54.OR.N.EQ.58.OR.N.
1EQ.65.OR.N.EQ.70.OR.N.EQ.74.OR.N.EQ.84)IHR(5,J-56)=IHR(5,J-56)+
1IH(N,J-56)
1IF(N.EQ.12.OR.N.EQ.15.OR.N.EQ.17.OR.N.EQ.18.OR.N.EQ.21.OR.N.EQ.
123.OR.N.EQ.24.OR.N.EQ.40.OR.N.EQ.51.OR.N.EQ.80.OR.N.EQ.92.OR.
1N.EQ.93)IHR(6,J-56)=IHR(6,J-56)+IH(N,J-56)
128.OR.N.EQ.33.OR.N.EQ.41.OR.N.EQ.60.OR.N.EQ.61.OR.N.EQ.67.OR.N.EQ.
168.OR.N.EQ.73.OR.N.EQ.79.OR.N.EQ.82.OR.N.EQ.87.OR.N.EQ.95.OR.N.EQ.
196.OR.N.EQ.97)IHR(7,J-56)=IHR(7,J-56)+IH(N,J-56)

Cont.
Table 9 -Cont.-3

IF(N.EQ.2.OR.N.EQ.30.OR.N.EQ.35.OR.N.EQ.39.OR.N.EQ.44.OR.N.EQ.64.
10.R.N.EQ.76.OR.N.EQ.77.OR.N.EQ.83.OR.N.EQ.91.OR.N.EQ.100)IHR
18(J-56)=IHR(8,J-56)+IH(N,J-56)
IF(N.GE.110.AND.N.LT.121)IHRF(J-56)=IHRF(J-56)+IH(N,J-56)
IHS(J-56)=IHS(J-56)+IH(N,J-56)
GOT05
C READ HARVEST BY COUNTY
15 READ(6,20)I,J,Y(I,J-56),YE(I,J-56),T(I,J-56),TE(I,J-56),A(I,J-56),
1YF(I,J-56),YEF(I,J-56),TF(I,J-56),TEF(I,J-56),AF(I,J-56)
20 FORMAT(13,12,1016)
C CHECK FOR END OF DATA
IF(EOF(6).NE.O)GOT025
GOT015
25 D0301=1,102
D030 J=1,IZ
IT=Y(I,J)+YE(I,J)+T(I,J)+YF(I,J)+YEF(I,J)+TF(I,J)
C IF NO HARVEST, DO NOT WRITE
IF(IT.EQ.0)GOTO30
WRITE(9,35)I,(J+56),Y(I,J),YE(I,J),T(I,J),TE(I,J),A(I,J),YF(I,J),
1YEF(I,J),TF(I,J),TEF(I,J),AF(I,J),IHR(I,J)
35 FORMAT(13,12,1015,16)
30 CONTINUE
K=K+1
C REINITIALIZE
IF(K.EQ.2)GOT02
C READ HARVEST BY REGION
45 READ(7,20)I,J,Y(I,J-56),YE(I,J-56),T(I,J-56),TE(I,J-56),A(I,J-56),
1YF(I,J-56),YEF(I,J-56),TF(I,J-56),TEF(I,J-56),AF(I,J-56)
C CHECK FOR END OF DATA
IF(EOF(7).NE.O)GOT040
GOT045
40 D055 I=1,8
D055 J=1,IZ
IV=Y(I,J)+YE(I,J)+YF(I,J)+YEF(I,J)
C DO NOT WRITE IF HARVEST IS 0
IF(IV.EQ.0)GOTO55
WRITE(10,35)I,(J+56),Y(I,J),YE(I,J),T(I,J),TE(I,J),A(I,J),YF(I,J),
1YEF(I,J),TF(I,J),TEF(I,J),AF(I,J),IHR(I,J)
55 CONTINUE
C READ STATEWIDE HARVEST
70 READ(8,20)I,J,Y(I,J-56),YE(I,J-56),T(I,J-56),TE(I,J-56),A(I,J-56),
1YF(I,J-56),YEF(I,J-56),TF(I,J-56),TEF(I,J-56),AF(I,J-56)
IF(EOF(8).NE.O)GOTO65
WRITE(11,35)I,J,Y(I,J-56),YE(I,J-56),T(I,J-56),TE(I,J-56),A(I,J-56),
1IHS(J-56)
GOT070
C READ HARVEST BY REFUGE
Cont.
Table 9 - Cont.-4

65 READ(12,20) I,J,Y(I,J-56),YE(I,J-56),T(I,J-56),TE(I,J-56),A(I,J-156),YF(I,J-56),YEF(I,J-56),TF(I,J-56),TEF(I,J-56),AF(I,J-56)
   IF(EOF(12).NE.0)GOTO 95
GOTO 65
95 D092 I=110,120
   DO 92 J=1,IZ
      IT=Y(I,J)+YE(I,J)+YF(I,J)+YEF(I,J)
   C DO NOT WRITE IF HARVEST IS 0
      IF(IT.EQ.0)GOTO92
      WRITE(14,35) I,(J+56),Y(I,J),YE(I,J),T(I,J),TE(I,J),A(I,J),YF(I,J),YEF(I,J),TF(I,J),TEF(I,J),AF(I,J),IH(I,J)
   92 CONTINUE
   C READ HARVEST IN ALL REFUGES
85 READ(13,20) I,J,Y(I,J-56),YE(I,J-56),T(I,J-56),TE(I,J-56),A(I,J-156),YF(I,J-56),YEF(I,J-56),TF(I,J-56),TEF(I,J-56),AF(I,J-56)
   IF(EOF(13).NE.0)GOTO 66
   WRITE(15,35) I,(J+56),Y(I,J-56),YE(I,J-56),T(I,J-56),TE(I,J-56),A(I,J-156),YF(I,J-56),YEF(I,J-56),TF(I,J-56),TEF(I,J-56),AF(I,J-156),IHRF(J-56)
   GOTO85
66 STOP
END
Table 10. Fortran program used to calculate hunter success ratios, mortality rates, and predicted population size on a county, regional, statewide and special areas basis.

```fortran
PROGRAM DEERPO(TAPE5,OUTPUT,TAPE7,TAPE8)
DIMENSION Y(50),YE(50),T(50),TE(50),AD(50),YF(50),YEF(50),
  TF(50),TEF(50),ADF(50),DEATH(50),DEATHF(50),DIEALL(50),
  DIEALLF(50),AARR(50),AARRF(50),TRRM(50),TRRF(50),T1(50),
  T2(50),T3(50),T4(50),FT1(50),FT2(50),FT3(50),FT4(50),
  S(50),FS(50),SURYM(50),SURYF(50),SURJVM(50),BTP2(50),CTP2(50),
  SURJVF(50),SUR(50),SURF(50),IHUNT(50),TOTP(50),SUC(50)
C
C ******************************************************
C Y=# OF FAWN MALES
C YE=# OF YEARLING MALES
C T=# OF 21/2 YEAR OLD MALES
C TE=# OF 3 1/2 YEAR OLD MALES
C AD=# OF 4 1/2+ YEAR OLD MALES
C YF=# OF FAWN FEMALES
C YEF=# OF YEARLING FEMALES
C TF=# OF 2 1/2 YEAR OLD FEMALES
C TEF=# OF 3 1/2 YEAR OLD FEMALES
C ADF=# OF 4 1/2+ YEAR OLD FEMALES
C DEATH=AVERAGE MORTALITY OF MALES 1 1/2+- LIFE TABLE METHOD
C DEATHF=AVERAGE MORTALITY OF FEMALES 1 1/2+- LIFE TABLE METHOD
C DIEALL=AVERAGE MORTALITY OF MALES 0.5+- LIFE TABLE METHOD
C DIEALLF=AVERAGE MORTALITY OF FEMALES 0.5+- LIFE TABLE METHOD
C AARR=AVERAGE ANNUAL REDUCTION RATES- MALES 1.5+- LANG & WOOD
C AARRF=AVERAGE ANNUAL REDUCTION RATES- FEMALES 1.5+- LANG & WOOD METHOD
C TRRM=AVERAGE ANNUAL REDUCTION RATES- MALES 0.5+- LANG & WOOD METHOD
C TRRF=AVERAGE ANNUAL REDUCTION RATES- FEMALES 0.5+- LANG & WOOD METHOD
C T1=SUM OF MALES IN AGE CLASSES 0.5+
C T2=SUM OF MALES IN AGE CLASSES 1.5+
C T3=SUM OF MALES IN AGE CLASSES 2.5+
C T4=SUM OF MALES IN AGE CLASSES 3.5+
C FT1=SUM OF FEMALES IN AGE CLASSES 0.5+
C FT2=SUM OF FEMALES IN AGE CLASSES 1.5+
C FT3=SUM OF FEMALES IN AGE CLASSES 2.5+
C FT4=SUM OF FEMALES IN AGE CLASSES 3.5+
C S=AVERAGE MORTALITY OF MALES 1.5+- RECONSTRUCTION METHOD
C FS=AVERAGE MORTALITY OF FEMALES 1.5+- RECONSTRUCTION METHOD
C SURYM=MORTALITY OF YEARLING MALES- RECONSTRUCTION METHOD
C SURYF=MORTALITY OF YEARLING FEMALES- RECONSTRUCTION METHOD
C SURJVM=MORTALITY OF FAWN MALES- RECONSTRUCTION METHOD
C SURJVF=MORTALITY OF FAWN FEMALES- RECONSTRUCTION METHOD
C SUR= AVERAGE MORTALITY- MALES 0.5+- RECONSTRUCTION METHOD
C SURF= AVERAGE MORTALITY- FEMALES 0.5+- RECONSTRUCTION METHOD
C TOTP= TOTAL DEER HARVEST
C SUC= HUNTER SUCCESS RATIO
C
C ******************************************************
```

Cont.
Table 10 -Cont.-2

C XAAR= AVERAGE MORTALITY- 1.5+ MALES
C YAAR= AVERAGE MORTALITY- 0.5+ MALES
C XAARF= AVERAGE MORTALITY-1.5+ FEMALES
C YAAF= AVERAGE MORTALITY- 0.5+ FEMALES
C PFA= FEMALE:MALE RATIO
C RR= RECRUITMENT RATE- FAWNS/1.5+ FEMALES
C ANTP1= TOTAL NUMBER OF ANTLERLESS DEER IN HARVEST
C AMP1= MALE POPULATION YEAR 1- 1.5+
C BMP1= MALE POPULATION YEAR 1- 0.5+
C AFP1= FEMALE POPULATION YEAR 1- 1.5+= AMP1 X PFA
C BFP1= FEMALE POPULATION YEAR 1-0.5+
C CFP1= FEMALE POPULATION YEAR 1-0.5+= BMP1 X PFA
C FMP1= MALE FAWN POPULATION YEAR 1
C AMS= ADULT MALE SURVIVAL
C FMS= FAWN MALE SURVIVAL
C TMS= TOTAL MALE SURVIVAL
C BMS= TOTAL MALE SURVIVAL
C AFS,BFS,CFS= DIFFERENT ESTIMATES OF FEMALE SURVIVAL
C EREC,BREC,CREC= DIFFERENT ESTIMATES FOR YEAR 2 RECRUITMENT
C TP2,BTP2,CTP2= DIFFERENT ESTIMATES FOR POPULATION SIZE IN YEAR 2
C FRT=PROPORTION OF KILL THAT ARE FAWNS
C YRT=PROPORTION OF KILL THAT ARE YEARLINGS
C TRT=PROPORTION OF KILL THAT ARE 2.5 YEARS OLD
C THRRT=PROPORTION OF KILL THAT ARE 3.5 YEARS OLD
C ART=PROPORTION OF KILL THAT ARE 4.5+ YEARS OLD
C FMRT=PROPORTION OF MALE KILL THAT ARE FAWNS
C YMRT=PROPORTION OF MALE KILL THAT ARE YEARLINGS
C TMRT=PROPORTION OF MALE KILL THAT ARE 2.5 YEARS OLD
C THMRT=PROPORTION OF MALE KILL THAT ARE 3.5 YEARS OLD
C ADMRT=PROPORTION OF MALE KILL THAT ARE 4.5+ YEARS OLD
C FFRT=PROPORTION OF FEMALE KILL THAT ARE FAWNS
C YFRT=PROPORTION OF FEMALE KILL THAT ARE YEARLINGS
C TFRT=PROPORTION OF FEMALE KILL THAT ARE 2.5 YEARS OLD
C THFRT=PROPORTION OF FEMALE KILL THAT ARE 3.5 YEARS OLD
C ADFRT=PROPORTION OF FEMALE KILL THAT ARE 4.5+ YEARS OLD
C
C ND=0
C READ FIRST AND LAST YEARS OF DATA TO BE ANALYSED- IF ON A COUNTY
C BASIS JB=1; IF ON A REGIONAL BASIS JB=2; IF ON A STATEWIDE BASIS
C JB=3; IF ON A SPECIAL AREAS BASIS JB=4
C READ(5,5)N, JR, JB
C 5 FORMAT(212,11)
C INITIALIZE JP DEPENDING ON WHETHER A COUNTY, REGION OR STATE
C ANALYSIS IS REQUIRED
C JP=102
C IF(JB.EQ.2)JP=8
C IF(JB.EQ.3)JP=90

Cont.
Table 10 -Cont.-3

IF(JB.EQ.4)JP=120
C TRANSFORM N AND JR
IPD=N
N=N-56
K=N-1
JR=JR-56
JG=JR-1
JZ=JR-4
LA=1
LB=2
LC=3
IQ=200
C INITIALIZE VARIABLES
13 DO40 J=1,50
AARR(J)=0
DEATH(J)=0
AARRF(J)=0
DEATHF(J)=0
TRRM(J)=0
TRRF(J)=0
DIEALL(J)=0
DIEALLF(J)=0
Y(J)=0
YE(J)=0
T(J)=0
TE(J)=0
AD(J)=0
YF(J)=0
YEF(J)=0
TF(J)=0
TEF(J)=0
ADF(J)=0
TRRM(J)=0
TRRF(J)=0
T1(J)=0
T2(J)=0
T3(J)=0
T4(J)=0
FT1(J)=0
FT2(J)=0
FT3(J)=0
FT4(J)=0
S(J)=0
FS(J)=0
SURYM(J)=0
SURYF(J)=0
SUR(J)=0
SURF(J)=0

Cont.
Table 10 -Cont.-4

SURJVM(J)=0
SURJVF(J)=0
SURJVF(J)=0
IHUNT(J)=0
TOTP(J)=0
SUC(J)=0
BTP2(J)=0
CTP2(J)=0
40 CONTINUE

C READ # DEER IN SEX AND AGE CLASSES AND NUMBER OF HUNTERS
10 READ(5,12) IR, IY, Y(IY-56), YE(IY-56), T(IY-56), TE(IY-56), AD(IY-56),
   YF(IY-56), YEF(IY-56), TF(IY-56), TEF(IY-56), ADF(IY-56), IHUNT(IY-56)
12 FORMAT(13,12,10F5.0,16)
   IY=IY-56
   IF(IY.LT.JZ)GOTO 132
   WRITE(7,112) IR, (IY+56), Y(IY), YE(IY), T(IY), TE(IY), AD(IY), YF(IY),
   YEF(IY), TF(IY), TEF(IY), ADF(IY)
112 FORMAT(I3,,I2,10,,F5.0)
C TEST FOR END OF LOCATION DATA
132 IF(IY.EQ.JR) ND=1
C SUM DEER IN VARIOUS COMBINATIONS FOR RECONSTRUCTION ANALYSIS
T1(IY)=Y(IY)+YE(IY)+T(IY)+TE(IY)+AD(IY)
T2(IY)=YE(IY)+T(IY)+TE(IY)+AD(IY)
T3(IY)=T(IY)+TE(IY)+AD(IY)
T4(IY)=TE(IY)+AD(IY)
FT1(IY)=YF(IY)+YEF(IY)+TF(IY)+TEF(IY)+ADF(IY)
FT2(IY)=YEF(IY)+TF(IY)+TEF(IY)+ADF(IY)
FT3(IY)=TF(IY)+TEF(IY)+ADF(IY)
FT4(IY)=TEF(IY)+ADF(IY)
TOTP(IY)=FT1(IY)+T1(IY)
IF(TOTP(IY).EQ.O)GOTO 128
FRT=(Y(IY)+YF(IY))/TOTP(IY)
YRT=(YE(IY)+YEF(IY))/TOTP(IY)
TRT=(T(IY)+TF(IY))/TOTP(IY)
THRT=(TE(IY)+TEF(IY))/TOTP(IY)
ART=(AD(IY)+ADF(IY))/TOTP(IY)
IF(T1(IY).EQ.O.OR.FT1(IY).EQ.O)GOTO 42
FMRT=Y(IY)/T1(IY)
FFRT=YF(IY)/FT1(IY)
YMRT=YE(IY)/T1(IY)
YFRT=YEF(IY)/FT1(IY)
TMRT=T(IY)/T1(IY)
TFRT=TF(IY)/FT1(IY)
THMRT=TE(IY)/T1(IY)
THFRT=TEF(IY)/FT1(IY)
ADMRT=AD(IY)/T1(IY)
ADFRT=ADF(IY)/FT1(IY)
IF(IY.LT.JZ)GOTO 42

Cont.
WRITE(7,113)FRT,YRT,TRT,THRT,ART
113 FORMAT(4(F5.3,"",F5.3)
WRITE(7,114)FMRT,FFRT,YMRT,YFRT,TMRT,TFRT,THMRT,THFRT,ADMRT,ADFRT
114 FORMAT(9(F5.3,"",F5.3)
GOT042
128 IF(IY.LT.JZ)GOTO 42
WRITE(7,115)
115 FORMAT(4(5X,""))
WRITE(7,116)
116 FORMAT(9(5X,""))
C CALCULATE HUNTER SUCCESS RATIOS
42 IF(IHUNT(IY).EQ.0)GOT049
SUC(IY)=TOTP(IY)/IHUNT(IY)
49 IF(Y(IY).EQ.0.OR.YE(IY).EQ.0.OR.T(IY).EQ.0)GOT050
IF(YF(IY).EQ.0.OR.YEF(IY).EQ.0.OR.TF(IY).EQ.0)GOT050
C CALCULATE AVERAGE ANNUAL REDUCTION RATE-MALES GE 1.5 YEARS-LANG
AARR(IY)=(YE(IY)-TE(IY))/((YE(IY)+T(IY)+TE(IY))
C CALCULATE REDUCTION RATE-FEMALES GE 1.5 YEARS LANG&WOOD METHOD
AARRF(IY)=(YEF(IY)-TEF(IY))/((YEF(IY)+TF(IY)+TEF(IY))
C CALCULATE REDUCTION RATE-MALES 0.5+ YEARS-LANG&WOOD METHOD
TRRM(IY)=(Y(IY)-TE(IY))/((Y(IY)+YE(IY)+T(IY)+TE(IY))
C CALCULATE REDUCTION RATE-FEMALES 0.5+ YEARS LANG&WOOD METHOD
TRRF(IY)=(YF(IY)-TEF(IY))/((YF(IY)+YEF(IY)+TF(IY)+TEF(IY))
C NUMBER OF MALES AND FEMALES 1.5+ DYING DURING PERIOD
DEAD=YE(IY)+T(IY)+TE(IY)+AD(IY)
DEADF=YEF(IY)+TF(IY)+TEF(IY)+ADF(IY)
C NUMBER OF MALES AND FEMALES 0.5+ DYING DURING PERIOD
DEAD1=Y(IY)+DEAD
DEADF1=YF(IY)+DEADF
C LIFE TABLE CALCULATIONS
C NUMBER OF EACH AGE CLASS OF MALES 1.5+ DYING (OUT OF 1000)
DY=YE(IY)/DEAD*1000
DTW=T(IY)/DEAD*1000
DTH=TE(IY)/DEAD*1000
DA=AD(IY)/DEAD*1000
C NUMBER OF EACH AGE CLASS OF MALES 0.5+ DYING (OUT OF 1000)
DJ=Y(IY)/DEAD1*1000
DY1=YE(IY)/DEAD1*1000
DTW1=T(IY)/DEAD1*1000
DTH1=TE(IY)/DEAD1*1000
DA1=AD(IY)/DEAD1*1000
C NUMBER OF EACH AGE CLASS OF FEMALES 1.5+ DYING (OUT OF 1000)
DYF=YEF(IY)/DEADF*1000
DTWF=TF(IY)/DEADF*1000
DTHF=TEF(IY)/DEADF*1000
DAF=ADF(IY)/DEADF*1000
C NUMBER OF EACH AGE CLASS OF FEMALES 0.5+ DYING (OUT OF 1000)
DJF=YF(IY)/DEADF1*1000

Cont.
DY1F = YEF(IY)/DEAD1F*1000
DTW1F = TF(IY)/DEAD1F*1000
DTH1F = TEF(IY)/DEAD1F*1000
DA1F = ADF(IY)/DEAD1F*1000

C NUMBER SURVIVING AT BEGINNING OF PERIOD- MALES 1.5+ (OUT OF 1000)
SY = 1000 - DY
STW = SY - DTW
STH = STW - DTH
SA = STH - DA
TS = SY + STW + STH + SA + 1000

C AVERAGE MORTALITY RATE- MALES 1.5 YEARS AND OLDER
DEATH(IY) = 1000/T

C NUMBER SURVIVING AT BEGINNING OF PERIOD- MALES 0.5+ (OUT OF 1000)
SJ = 1000 - DJ
SY1 = SJ - DY1
STW1 = SY1 - DTW1
STH1 = STW1 - DTH1
SA1 = STH1 - DA1
TS1 = SJ + SY1 + STW1 + STH1 + SA1 + 1000

C AVERAGE MORTALITY RATE- MALES 0.5 YEARS AND OLDER
DIEALL(IY) = 1000/T0

C NUMBER SURVIVING AT BEGINNING OF PERIOD- FEMALES 1.5+ (OUT OF 1000)
SYF = 1000 - DYF
STWF = SYF - DTWF
STHF = STWF - DTHF
SAF = STHF - DAF
TSF = SYF + STWF + STHF + SAF + 1000

C AVERAGE MORTALITY RATE- FEMALES 1.5 YEARS AND OLDER
DEATHF(IY) = 1000/T1

C NUMBER SURVIVING AT BEGINNING OF PERIOD- FEMALES 0.5+ (OUT OF 1000)
SJF = 1000 - DJF
SY1F = SJF - DY1F
STW1F = SY1F - DTW1F
STH1F = STW1F - DTH1F
SA1F = STH1F - DA1F
TS1F = SJF + SY1F + STW1F + STH1F + SA1F + 1000

C AVERAGE MORTALITY RATE- FEMALES 0.5 YEARS AND OLDER
DIEALLF(IY) = 1000/T1F

C TEST TO SEE IF AT END OF REGIONAL DATA FOR TIME PERIOD REQUESTED
C IF NOT READ NEXT RECORD; IF SO REINITIALIZE ND
50 IF(ND.NE.1)GOTO10
ND = 0

C CALCULATE SURVIVAL FOR MALES AND FEMALES 1.5 YEARS AND OLDER
75 DO20 I = N,JR
IF(I.LT.4)GOTO20
IF(T2(I-3).EQ.0.OR.T3(I-2).EQ.0.OR.T4(I-1).EQ.0)GOTO20
ST = T2(I-3) + T3(I-2) + T4(I-1) + AD(I)
FST = FT2(I-3) + FT3(I-2) + FT4(I-1) + ADF(I)

Cont.
Table 10 -Cont.-7

IF(ST.EQ.0.OR.FST.EQ.0)GOTO20
S(1)=T2(1-3)/(ST/.8)
FS(I)=FT2(1-3)/(FST/.8)

C CALCULATE YEARLING MALE AND FEMALE SURVIVAL
TYM=YE(I-3)+T(I-2)+TE(I-1)+AD(I)
TYF=YEF(I-3)+TF(I-2)+TEF(I-1)+ADF(I)
SURYM(I)=YE(I-3)/(TMY/.8)
SURYF(I)=YEF(I-3)/(TYF/.8)

20 CONTINUE

C CALCULATE MEAN SURVIVAL FOR MALES AND FEMALES 0.5 YEARS AND OLDER
D030 J=N,JR
IF(I.LT.5)GOTO30
IF(T1(1-4).EQ.0.OR.T2(1-3).EQ.0.OR.T3(I-2).EQ.0.OR.T4(I-1).EQ.0)GOTO30
AM=T1(1-4)+T2(1-3)+T3(I-2)+T4(I-1)+AD(I)
AF=FT1(1-4)+FT2(1-3)+FT3(I-2)+FT4(I-1)+ADF(I)
IF(AM.EQ.0.OR.AF.EQ.0)GOTO30
SUR(I)=T1(I-4)/(AM/.8)
SURF(I)=FT1(I-4)/(AF/.8)

30 CONTINUE

JF=JZ-1
DO 83 I=JF,JR
IF(TOTP(1+1).EQ.0)GOTO32
IF((1+5).GT.JR)GOTO 22
WRITE(7,55)IR,(1+57),SUR(1+5),SURF(1+5),SURYM(I+4),SURYF(1+4),
SURJVM(I+5),SURJVF(I+5)
55 FORMAT(13,,,,,,,,12,6,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
XAARF=(AARRF(1)+FS(I)+DEATHF(1))/3.

C SUM NUMBER OF ADULT FEMALES AND ADULT MALES
TFA=YEF(I)+TF(I)+TEF(I)+ADF(I)
TTFA=TFA+YF(I)
TMA=YE(I)+T(I)+TE(I)+AD(I)
TTMA=TMA+Y(I)

C FEMALE ADULT TO MALE ADULT RATIO
IF(TMA.EQ.0.OR.YEF(I).EQ.0.OR.TFA.EQ.0)GOT023
PFA=YE(I)/TMA/(YEF(I)/TFA)*.82

C FEMALE FAWN TO FEMALE ADULT RATIO
PFF=YF(I)/TFA

C MALE FAWN TO FEMALE ADULT RATIO
PMF=Y(I)/TFA

C CALCULATE RECRUITMENT RATE
RR=PFF+PMF

C TOTAL ANTLERLESS POPULATION
ANTP1=TFA+Y(I)+YF(I)

C PROPORTION MALE FAWNS IN ANTLERLESS POPULATION
PMFH=Y(I)/ANTP1

C ADULT MALE POPULATION YEAR 1
AMP1=TMA/XAAR
BMP1=TTMA/YAAR

C ADULT FEMALE POPULATION YEAR 1
AFP1=AMP1*PFA
BFP1=TTFA/YAAF
CFP1=BMP1*PFA

C MALE FAWN POPULATION YEAR 1
FMP1=AFP1*PMF

C ADULT MALE SURVIVAL
AMS=AMP1-TMA

C MALE FAWN SURVIVAL
FMS=FMP1-Y(I)

C TOTAL MALE SURVIVAL
TMS=AMS+FMS

BMS=BMP1-TTMA

C TOTAL ANTLERLESS DEER YEAR 1
TA1=AFP1+AFP1*RR

C FEMALE SURVIVAL
AFS=TA1-ANTP1-FMS
BFS=BFP1-TTFA

C ESTIMATED RECRUITMENT FOR YEAR 2
EREC=AFS*RR
BEREC=BFS*RR
CEREC=CFS*RR

C TOTAL POPULATION YEAR 2
TP2=EREC+AFS+FMS+AMS
BTP2(I)=BEREC+BMS+BFS
Table 10 - Cont.

\[ CTP2(I) = \text{CEREC} + \text{BMS} + \text{CFS} \]

IF(I.EQ.JR) \text{GOTO} 63

WRITE(7,58) IR,(I+57), TOTP(I+1), BTP2(I), CTP2(I), IHUNT(I+1),
\text{1SUC(I+1)}

58 FORMAT(13,"",12,"",3(F8.1,""),16,"",F5.3)
\text{GOTO} 66

63 WRITE(7,64) IR,(I+57), BTP2(I), CTP2(I)
64 FORMAT(13,"",12,"",16,"",F5.3)
\text{GOTO} 66

23 IF(TOTP(I+1).EQ.0.AND.I.NE.(JR+1)) \text{GOTO} 83
23 IF(TOTP(I+1).EQ.0) \text{GOTO} 110
23 IF(IHUNT(I+1).EQ.0.OR.SUC(1+1).EQ.0) \text{GOTO} 105

WRITE(7,59) IR,(I+57), TOTP(I+1), IHUNT(I+1), SUC(I+1)

59 FORMAT(13,"",12,"",2(8X,""),16,"",F5.3)
\text{GOTO} 66

105 IF(TOTP(I+1).EQ.0) \text{GOTO} 110
105 WRITE(7,69) IR,(I+57), TOTP(I+1)
69 FORMAT(13,"",12,4("",5X))
\text{GOTO} 66

110 WRITE(7,60) IR,(I+57)
60 FORMAT(13,"",12,5("",3X))

66 IF(I.NE.(JR-1)) \text{GOTO} 83

M1=2
IF(BTP2(I).EQ.0.OR.BTP2(I-1).EQ.0) M1=3
IF(BTP2(I).GT.BTP2(I-1)) M1=1
M2=2
IF(BTP2(I-1).EQ.0.OR.BTP2(I-2).EQ.0) M2=3
IF(BTP2(I-1).GT.BTP2(I-2)) M2=1
M3=2
IF(BTP2(I-2).EQ.0.OR.BTP2(I-3).EQ.0) M3=3
IF(BTP2(I-2).GT.BTP2(I-3)) M3=1
L1=2
IF(CTP2(I).EQ.0.OR.CTP2(I-1).EQ.0) L1=3
IF(CTP2(I).GT.CTP2(I-1)) L1=1
L2=2
IF(CTP2(I-1).EQ.0.OR.CTP2(I-2).EQ.0) L2=3
IF(CTP2(I-1).GT.CTP2(I-2)) L2=1
L3=2
IF(CTP2(I-2).EQ.0.OR.CTP2(I-3).EQ.0) L3=3
IF(CTP2(I-2).GT.CTP2(I-3)) L3=1
I1=2
IF(TOTP(I+1).GT.TOTP(I)) I1=1
I2=2
IF(TOTP(I).GT.TOTP(I-1)) I2=1
I3=2
IF(TOTP(I-1).GT.TOTP(I-2)) I3=1
J1=2
IF(SUC(I+1).GT.SUC(I)) J1=1

Cont.
Table 10 -Cont.-10

J2=2
IF(SUC(I).GT.SUC(I-1))J2=1
J3=2
IF(SUC(I-1).GT.SUC(I-2))J3=1
IF(BTP2(I).EQ.0.OR.CTP2(I).EQ.0)GOTO 390
WRITE(8,400)IR,(I+57),TOTP(I+1),BTP2(I),CTP2(I),IHUNT(I+1),
1SUC(I+1),M1,M2,M3,L1,L2,L3,I1,I2,I3,J1,J2,J3
GOTO83
390 WRITE(8,405)IR,(I+57),TOTP(I+1),IHUNT(I+1),SUC(I+1),I1,I2,I3,
1J1,J2,J3
400 FORMAT(13,"","",12,"","",3(F8.1,"",""),16,"","",F5.3,12("","",I1))
405 FORMAT(13,"","",12,"","",F8.1,"","",2(8X,""),16,"","",F5.3,6("","",1X),
16("","",I1))
83 CONTINUE
IF(IR.NE.JP)GOTO13
STOP
END
Table 11. Predicted and actual harvest of white-tailed deer in Adams County based on the equation \( Y = -201.4 + 0.339H + 0.133P \) where \( H \) = the number of hunters and \( P \) = the predicted deer population; \( r^2=0.90 \).

<table>
<thead>
<tr>
<th>Year</th>
<th>Predicted Harvest</th>
<th>Actual Harvest</th>
<th>% Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>288</td>
<td>272</td>
<td>6</td>
</tr>
<tr>
<td>1971</td>
<td>303</td>
<td>344</td>
<td>-12</td>
</tr>
<tr>
<td>1972</td>
<td>356</td>
<td>324</td>
<td>10</td>
</tr>
<tr>
<td>1973</td>
<td>364</td>
<td>470</td>
<td>-22</td>
</tr>
<tr>
<td>1974</td>
<td>418</td>
<td>407</td>
<td>3</td>
</tr>
<tr>
<td>1975</td>
<td>565</td>
<td>499</td>
<td>14</td>
</tr>
<tr>
<td>1976</td>
<td>583</td>
<td>494</td>
<td>17</td>
</tr>
<tr>
<td>1977</td>
<td>588</td>
<td>527</td>
<td>12</td>
</tr>
<tr>
<td>1978</td>
<td>604</td>
<td>665</td>
<td>-9</td>
</tr>
<tr>
<td>1979</td>
<td>730</td>
<td>717</td>
<td>2</td>
</tr>
<tr>
<td>1980</td>
<td>769</td>
<td>816</td>
<td>-6</td>
</tr>
<tr>
<td>1981</td>
<td>828</td>
<td>782</td>
<td>6</td>
</tr>
<tr>
<td>1982</td>
<td>844</td>
<td>784</td>
<td>8</td>
</tr>
<tr>
<td>1983</td>
<td>859</td>
<td>998</td>
<td>-14</td>
</tr>
</tbody>
</table>
Table 12. Introductory program for retrieval of deer harvest data on the Apple II+ microcomputer.

10 HOME
20 D$ = "": REM CTRL D
30 VTAB 9: HTAB 4: FOR X = 1 TO 28: PRINT "*";: NEXT
40 VTAB 10: HTAB 4: PRINT "*"; INVERSE: PRINT SPC( 3);"ILLINOIS DEER HARVEST "; NORMAL: PRINT "*
50 HTAB 4: PRINT "*"; INVERSE: PRINT SPC( 2);"BREAKDOWN AND AND ANALYSIS"; NORMAL: PRINT "*
60 HTAB 4: PRINT "*"; INVERSE: PRINT SPC( 8);"VERSION 1"; SPC( 9); normal: PRINT "*
70 VTAB 13: HTAB 4: FOR X = 1 TO 28: PRINT "*";: NEXT
80 PRINT: PRINT: HTAB 6: PRINT "CREATED FOR THE ILLINOIS"
90 HTAB 5: PRINT "DEPARTMENT OF CONSERVATION"
100 HTAB 10: PRINT "BY LONNIE HANSEN"
110 VTAB 22: PRINT "PRESS ANY KEY TO CONTINUE": GET E$: HOME
120 PRINT "THIS IS A USER FRIENDLY PROGRAM"
130 PRINT: PRINT "YOU WILL BE ASKED QUESTIONS": PRINT "ABOUT THE DATA DESIRED"
140 PRINT: PRINT "ANSWER THE QUESTION ASKED": PRINT "AND IF REQUESTED, HIT RETURN"
150 VTAB 20: PRINT "HIT ANY KEY TO CONTINUE"
160 GET E$: HOME
170 PRINT "THE PROGRAM DISK HAS THREE MAIN"
180 PRINT "PROGRAMS, ONE FOR CREATION OF"
190 PRINT "GRAPHS, ONE FOR TABLES AND ONE"
200 PRINT "FOR COUNTY TRENDS"
210 PRINT: PRINT "DUE TO THEIR SIZE, THEY HAVE TO"
220 PRINT "BE RUN SEPARATELY"
230 VTAB 20: PRINT "PRESS ANY KEY TO CONTINUE"
240 GET E$: HOME
250 PRINT "WOULD YOU LIKE GRAPHS,TABLES OR": PRINT "COUNTY TRENDS? (G/T/C)": GET E$
260 IF E$ = "G" GOTO 290
270 IF E$ = "C" GOTO 300
280 PRINT: PRINT D$:"RUN PROG1,D1"
290 PRINT: PRINT D$:"RUN PROG,D1"
300 PRINT: PRINT D$:"RUN TRENDPG,D1"
310 END
Table 13. Applesoft program for drawing graphs of deer harvest data.

```plaintext
4 HIMEM:34040:REM LOAD GRAPHTRIX SCREEN DUMP PROGRAM
5 PRINT CHR$(4); "LOAD GRTX DUMP"
7 POKE 34328,2:REM HIGH RESOLUTION GRAPHICS PAGE 2
10 POKE 34327,3:REM FULL PAGE PRINTED COPY:GOSUB 2200
20 P$ = "N"
30 HOME
40 PRINT "WHAT IS THE MOST RECENT YEAR FOR WHICH"
50 PRINT "YOU HAVE DEER HARVEST DATA ON DISK?"
60 INPUT G
70 K = G: IF G > 1900 THEN K = G - 1900:JL = K - 55
80 IF K < 81 GOTO 40
90 PRINT : DIM KL(JL), HR(JL), SC(JL), P3(JL), P2(JL), Y(JL), X(JL), VC(JL)
100 IF P$ = "Y" THEN GOTO 110
110 HGR2 : PRINT
120 PRINT "TYPE C IF YOU WANT A COUNTY ANALYSIS"
130 PRINT "R IF A REGIONAL ANALYSIS OR S IF"
140 PRINT "YOU WANT A STATEWIDE ANALYSIS"
150 GET TY$: PRINT
160 IF TY$ < > "C" AND TY$ < > "R" AND TY$ < > "S" GOTO 110
170 IF TY$ = "R" GOTO 220
180 IF TY$ = "S" GOTO 250
190 PRINT "WHICH COUNTY WOULD YOU LIKE?": INPUT IC$
200 PRINT : PRINT "INSERT APPROPRIATE COUNTY DISK"
210 GET H$: PRINT : GOTO 300
220 PRINT "INSERT DISK LABELED REGION"
230 PRINT "IN DRIVE 2 AND TYPE THE"
240 PRINT "REGION NUMBER YOU WOULD LIKE": GET IK$: IC$ = "REGION " + IK$:PRINT : GOTO 300
250 PRINT "INSERT DISK LABELED STATEWIDE"
260 PRINT "IN DRIVE 2 AND HIT ANY KEY"
270 GET H$: PRINT
280 IC$ = "STATEWIDE"
290 REM READ HARVEST DATA FROM DISKETTE
300 D$ = "": REM CTRL D
310 PRINT D$;"OPEN";IC$
320 PRINT D$;"READ";IC$
330 INPUT X
340 N = K - (X - 1901)
350 M = N + 1
360 PG = X - 1901
370 INPUT D,D,D,D
380 GOSUB 2340
390 IF B < 78 GOTO 380
400 GOSUB 2380
410 IF B < 78 GOTO 400
420 GOSUB 2340
430 IF B < K GOTO 420
```

Cont.
Table 13 -Cont.-2

440 GOSUB 2380
450 IF B < K GOTO 440
460 INPUT D,B,KL(B - PG),P2(B - PG),P3(B - PG),HR(B - PG),SC(B - PG)
470 PRINT D$;"CLOSE"
480 HGR2 : PRINT : PRINT CHR$ (1);3
490 PRINT "GRAPH MENU": NORMAL
500 PRINT CHR$ (1);0
510 PRINT
520 PRINT "1. DEER KILL"
530 PRINT "2. NUMBER OF HUNTERS"
540 PRINT "3. HUNTER SUCCESS"
550 PRINT "4. PREDICTED POPULATION"
560 PRINT
570 PRINT "TYPE THE NUMBER OF"
580 PRINT "THE GRAPH YOU WANT"
590 INPUT GN
600 IF GN = 2 GOTO 780
610 IF GN = 3 GOTO 920
620 IF GN = 4 GOTO 1040
630 GOSUB 2030
640 GOSUB 1830
650 VTAB 6: PRINT "D": PRINT "E": PRINT "E": PRINT "R"
660 VTAB 12: PRINT "K": PRINT "I": PRINT "L": PRINT "L"
670 PRINT CHR$ (1);3: VTAB 2: HTAB 10: PRINT "DEER KILL -":
   HTAB 10:PRINT IC$
680 PRINT CHR$ (1);0
690 XP = 0: GOSUB 1920
700 FOR I = 1 TO N
710 IF KL(I) = 0 GOTO 740
720 Y(I) = KL(I);X(I) = BZ * I + 49
730 GOSUB 1180:XP = XP + 1
740 NEXT I
750 GOSUB 1250
760 GOSUB 2080
770 END
780 HGR2
790 GOSUB 2030
800 GOSUB 1830
810 VTAB 6: PRINT ":": VTAB 8: PRINT "O": PRINT "F": VTAB 11:
   PRINT "H":PRINT "U": PRINT "N": PRINT "E": PRINT 
   "R":PRINT "S"
820 PRINT CHR$ (1);3: VTAB 2: HTAB 10: PRINT "DEER HUNTERS -":
   HTAB 10:PRINT IC$
830 GOSUB 1920:XP = 0
840 FOR I = 1 TO N
850 IF HR(I) = 0 THEN GOTO 880
860 Y(I) = HR(I);X(I) = BZ * I + 49
870 GOSUB 1180:XP = XP + 1

Cont.
Table 13 -Cont.-3

880 NEXT
890 GOSUB 1250
900 GOSUB 2080
910 END
920 HGR2 : GOSUB 2030
930 GOSUB 1830
940 VTAB 6: PRINT "#:" VTAB 8: PRINT "S": PRINT "U": PRINT "C": PRINT "C": PRINT "E": PRINT "S": PRINT "S"
950 PRINT CHR$(1); 3: VTAB 2: HTAB 10: PRINT "HUNTER SUCCESS -": HTAB 10: PRINT IC$
960 XP = 0: GOSUB 1920
970 FOR I = 1 TO N
980 IF SC(I) = 0 GOTO 1010
990 Y(I) = SC(I) * 100:X(I) = BZ * I + 49
1000 GOSUB 1180: XP = XP + 1
1010 NEXT
1020 G = 1: GOSUB 1250: G = 0: GOSUB 2080
1030 END
1040 HGR2 : GOSUB 2030
1050 GOSUB 1830
1060 VTAB 6: PRINT "#": VTAB 8: PRINT "O": PRINT "F": VTAB 11: PRINT "D": PRINT "E": PRINT "E": PRINT "R"
1070 PRINT IC$
1080 FOR I = 1 TO N
1090 IF P3(I) = 0 GOTO 1140
1100 P3(I) = INT (P3(I) + .5)
1110 Y(I) = P3(I): X(I) = BZ * I + 49
1120 GOSUB 1180: XP = XP + 1
1130 NEXT
1140 GOSUB 1250
1150 GOSUB 2080
1160 END
1170 IF I = 1 OR XP = 0 GOTO 1230
1180 IF Y(I) < H GOTO 1210
1190 H = Y(I): GOTO 1240
1200 IF Y(I) > L GOTO 1240
1210 L = Y(I): GOTO 1240
1220 L = Y(I): H = Y(I)
1230 RETURN
1240 DF = H - L: ZG = 144 / DF
1250 FOR I = 1 TO N
1260 IF Y(I) = 0 GOTO 1290
1270 IF Y(I) = 0 OR Y(I + 1) = 0 GOTO 1330
1280 Y(I) = (H - Y(I)) * ZG + 12
1290 NEXT
1300 FOR I = 1 TO (N - 1)
1310 IF Y(I) = 0 OR Y(I + 1) = 0 GOTO 1330
1320 H PLOT X(I), Y(I) TO X(I + 1), Y(I + 1)

Cont.
Table 13 -Cont.-4

1330 NEXT
1340 IF G = 1 GOTO 1370
1350 PQ = INT (DF / 9 + 0.5)
1360 GOTO 1380
1370 PQ = INT (DF / 9 * 10 + 0.5) / 10
1380 RB = 2
1390 FOR I = 1 TO 9
1400 VTAB RB: IF I = 1 GOTO 1420
1410 H = H - PQ
1420 IF H > = 0 AND H < 10 THEN ZM = 6
1430 IF H > = 10 AND H < 100 THEN ZM = 5
1440 IF H > = 100 AND H < 1000 THEN ZM = 4
1450 IF H > = 1000 AND H < 10000 THEN ZM = 3
1460 IF H > = 10000 AND H < = 100000 THEN ZM = 2
1470 IF ZM = 6 AND G = 1 THEN ZM = 4
1480 IF ZM = 5 AND G = 1 THEN ZM = 3
1490 PRINT SPC(ZM);H: VTAB RB: HTAB 8: PRINT "-";
1500 RB = RB + 2
1510 NEXT
1520 VTAB 19:CM = 8: PRINT CHR$(1);1
1530 FOR I = 1 TO N
1540 HTAB CM: PRINT "S";
1550 CM = CM + 1
1560 NEXT
1570 PRINT CHR$(1);2
1580 PZ = INT (N / 3 + .5)
1590 VTAB 21;V = 9
1600 FOR I = 1 TO PZ
1610 IF I = 1 AND Y(I) = 0 GOTO 1640
1620 HTAB (V): PRINT "R";
1630 V = V + 3: GOTO 1670
1640 V = V + 1
1650 HTAB (V): PRINT "R";
1660 V = V + 3
1670 NEXT I
1680 PRINT CHR$(1);0
1690 VTAB 22;V = 8:HC = PG - 54
1700 FOR I = 1 TO PZ
1710 IF I = 1 AND Y(I) = 0 GOTO 1740
1720 HTAB (V): PRINT (HC + 55);
1730 V = V + 3:HC = HC + 3: GOTO 1770
1740 V = V + 1:HC = HC + 1
1750 HTAB (V): PRINT (HC + 55);
1760 V = V + 3:HC = HC + 3
1770 NEXT
1780 VTAB 23: HTAB 15: PRINT "YEAR"
1790 IF E$ = "N" GOTO 1810
1800 PRINT : PRINT D$;"BSAVE";FL$;",A$4000,L$2000,D1"

Cont.
Table 13 -Cont.-5

1810 PRINT "HIT ANY KEY TO CONTINUE"
1820 GET E$: RETURN
1830 TD = 120
1840 IF N >= 10 AND N < 15 THEN TD = 160
1850 IF N >= 15 AND N < 20 THEN TD = 200
1860 IF N >= 20 AND N < 26 THEN TD = 240
1870 IF N > 25 THEN TD = 279
1880 HPL0T 49,8 TO 49,160 TO TD,160
1890 BZ = 7:ZP = BZ
1900 IF BZ * N < = 115 THEN ZP = BZ * 2
1910 RETURN
1920 FOR I = 1 TO N
1930 Y(I) = 0:X(I) = 0
1940 NEXT
1950 RETURN
1960 CALL ADRS
1970 POKE 216,0
1980 PRINT CHR$ (15) + CHR$ (2)
1990 PRINT CHR$ (1);0
2000 PRINT CHR$ (15) + CHR$ (15)
2010 PRINT CHR$ (15) + CHR$ (4)
2020 RETURN
2030 PRINT : PRINT "WOULD YOU LIKE A PRINTED": PRINT "COPY? (Y/N)";
GET E$: HGR2
2040 IF E$ = "N" GOTO 2070
2050 PRINT : PRINT "WHAT DO YOU WANT THE FILE NAMED?": INPUT FL$:HGR2
2060 PRINT : PRINT "PLACE BLANK DISK IN DRIVE 1": PRINT "AND HIT ANY KEY": GET J$: HGR2
2070 RETURN
2080 HGR2 : PRINT : PRINT "WOULD YOU LIKE": PRINT "ANOTHER GRAPH? (Y/N)";
GET F$
2090 IF F$ = "N" GOTO 2110
2100 GOTO 480
2110 PRINT : PRINT "WOULD YOU LIKE GRAPHS": PRINT "FROM ANOTHER REGION OR COUNTY? (Y/N)";
GET P$
2120 IF P$ = "N" GOTO 2140
2130 GOTO 100
2140 PRINT : PRINT "WOULD YOU LIKE SOME": PRINT "TABLES OF HARVEST DATA? (Y/N)";
GET E$
2150 IF E$ = "N" GOTO 2190
2160 PRINT CHR$ (16): HGR2
2170 PRINT "HOLD THE CTRL KEY DOWN": PRINT "AND PRESS THE RESET BUTTON"
2180 PRINT : PRINT "THEN TYPE": INVERSE : PRINT "RUN PROG1,D1":NORMAL
2190 END
2200 HGR2 : REM LOAD TOOL KIT HI RES CHARACTER GENERATOR

Cont.
Table 13 -Cont.-6

2210 ADRS = 0
2220 PRINT CHR$ (4);"BLOAD RBOOT,D1": CALL 520
2230 A = 3
2240 ADRS = USR (0),"HRCG"
2250 IF ADRS < = 0 THEN ADRS = ADRS + 65536
2260 CS = ADRS - 768 * A: HIMEM: CS
2270 CH = INT (CS / 256):CL = CS - 256 * CH
2280 POKE ADRS + 7,CL: POKE ADRS + 8,CH: REM LOAD FONTS
2290 PRINT CHR$ (4);"BLOAD MUSH.SET";",A";CS
2300 PRINT CHR$ (4);"BLOAD GRAPHIC.SET";",A";CS + 768
2310 PRINT CHR$ (4);"BLOAD OUTLINE.SET";",A";CS + 2 * 768
2320 GOSUB 1960
2330 RETURN
2340 INPUT D,B,D,D,D,D,D,D,D,D
2350 INPUT D,D,D,D,D
2360 INPUT D,D,D,D,D,D,D,D,D
2370 RETURN
2380 INPUT D,D,D,D,D,D,D,D
2390 INPUT D,B,KL(B - PG),P2(B - PG),P3(B - PG),HR(B - PG),SC(B - PG)
2400 RETURN
Table 14. Applesoft program which creates tables showing deer harvest data.

10 REM ***********************
20 REM
30 REM WT DATA USED TO ESTIMATE HUNTER QUOTAS
40 REM CT INTERCEPT OF REGRESSION
50 REM XH SLOPE FOR # OF HUNTERS
60 REM XP SLOPE FOR POPULATION ESTIMATE
70 REM DR DEER KILL BY SEX, AGE AND YEAR
80 REM HR NUMBER OF HUNTERS
90 REM MO RECONSTRUCTED MORTALITY RATES
100 REM P2 AND P3 PREDICTED DEER POPULATION
110 REM SC % OF THE HUNTERS SUCCESSFUL
120 REM KL TOTAL DEER KILL
130 REM IC$ REGION,COUNTY OR STATEWIDE DESIGNATION
140 REM SR SEX RATIOS
150 REM AG AGE RATIOS
160 REM X FIRST YEAR SEASON OPEN IN PARTICULAR AREA
170 REM ***********************
180 HOME
190 T$ = "N": REM YES OR NO FOR PRINTED COPY
200 Z = 100: REM FOR FUTURE DIVISIONS
210 PRINT "WHAT IS THE MOST RECENT YEAR FOR WHICH"
220 PRINT "YOU HAVE DEER HARVEST DATA ON DISK?"
230 PRINT "TYPE THE YEAR THEN PRESS RETURN"
240 INPUT G
250 IF G < 1981 THEN GOTO 210
270 DIM DR(10,JL),SR(5,JL),AG(5,JL),MO(6,JL),KL(JL),HR(JL),SC(JL),
P3(JL),P2(JL),PD(10,JL),AM(JL),XT(10,JL),AF(JL)
280 PRINT "TYPE C IF YOU WANT A COUNTY OR SPECIAL": PRINT
"AREAS ANALYSIS"
290 PRINT "R IF A REGIONAL ANALYSIS OR S IF"
300 PRINT "YOU WANT A STATEWIDE ANALYSIS": GET TY$: PRINT
310 IF TY$ < > "C" AND TY$ < > "R" AND TY$ < > "S" THEN GOTO 280
320 IF TY$ = "R" GOTO 380
330 IF TY$ = "S" GOTO 410
340 PRINT "WICH COUNTY OR SPECIAL AREA": PRINT "WOULD YOU LIKE"
350 INPUT IC$
360 PRINT : PRINT "INSERT APPROPRIATE DISK"
370 PRINT "IN DRIVE 2 AND HIT ANY KEY": GET H$: PRINT : GOTO 450
380 PRINT "INSERT DISK LABELED REGION"
390 PRINT "IN DRIVE 2 AND TYPE THE"
400 PRINT "REGION NUMBER YOU WOULD LIKE": GET IK$: IC$ = "REGION " + IK$: PRINT : GOTO 450
410 PRINT "INSERT DISK LABELED STATEWIDE"
420 PRINT "IN DRIVE 2 AND HIT ANY KEY": GET H$: PRINT
430 IC$ = "STATEWIDE"
440 REM READ DATA FROM DISKETTE

Cont.
Table 14 -Cont.-2

450 D$ = "": REM CTRL D
460 PRINT D$;"OPEN"; IC$;","D1"
470 PRINT D$;"READ"; IC$
480 INPUT X: REM 1ST YEAR OPEN TO SHOTGUN HUNTING
490 N = K - (X - 1901)
500 M = N + 1: IL = N - 2
510 H = X - 1955
520 PG = X - 1901
530 INPUT WT, CT, XH, XP
540 GOSUB 4570
550 IF B < 78 GOTO 540
560 GOSUB 4610
570 IF B < 78 GOTO 560
580 GOSUB 4570
590 IF B < K GOTO 580
600 GOSUB 4610
610 IF B < K GOTO 600: REM TESTS FOR LAST YEAR
620 INPUT D, B, KL(B - PG), P2(B - PG), P3(B - PG), HR(B - PG),
     SC(B - PG)
630 PRINT D$;"CLOSE"
640 REM CALCULATE SEX AND AGE RATIOS
650 FOR I = 1 TO N
660 IF KL(I) = 0 GOTO 780
670 IF DR(6,1) + DR(1,1) = 0 GOTO 690
680 SR(1,1) = DR(1,1) / (DR(6,1) + DR(1,1))
690 IF DR(2,1) + DR(7,1) = 0 GOTO 710
700 SR(2,1) = DR(2,1) / (DR(2,1) + DR(7,1))
710 IF DR(3,1) + DR(8,1) = 0 GOTO 730
720 SR(3,1) = DR(3,1) / (DR(3,1) + DR(8,1))
730 IF DR(4,1) + DR(5,1) + DR(9,1) + DR(10,1) = 0 GOTO 770
740 SR(4,1) = (DR(4,1) + DR(5,1)) / (DR(4,1) + DR(5,1) + DR(9,1)
     + DR(10,1))
750 AF(1) = DR(6,1) + DR(7,1) + DR(8,1) + DR(9,1) + DR(10,1)
760 AM(1) = DR(1,1) + DR(2,1) + DR(3,1) + DR(4,1) + DR(5,1)
770 SR(5,1) = (DR(1,1) + DR(2,1) + DR(3,1) + DR(4,1) + DR(5,1))
     /KL(1)
780 NEXT
790 HOME : GOSUB 3410: REM MENU SUBROUTINE
800 IF B% = 6 GOTO 2420: REM B% IS CODE FOR TYPE OF TABLE DESIRED
810 GOSUB 3640: REM YEARS OF DATA REQUIRED
820 ON B% GOTO 830, 1240, 1550, 1930
830 Z$ = "MALES"; T = 1; S = 5; R = 1: REM VARIABLES FOR DESIGNATING
     SUBSCRIPTS FOR DR
840 GOSUB 2970: REM TABLE HEADINGS
850 IF R = 1 GOTO 870
860 GOSUB 2930: REM CONTINUE WHEN READY SUBROUTINE
870 Z$ = "FEMALES"; T = 6; S = 10; R = 1
880 IF I - J < 10 GOTO 900

Cont.
Table 14 -Cont.-3

890 PRINT CHR$(12)
900 GOSUB 2970: IF R = 1 GOTO 920
910 GOSUB 2930
920 IF B% < > 7 THEN GOSUB 3300: REM RETURN TO MENU OR PRODUCE
   GRAPHS SUBROUTINE
930 HOME: IF T$ = "N" GOTO 950
940 PRINT : PRINT
950 INVERSE: PRINT IC$; SPC(3); "AGE STRUCTURE - % OF TOTAL": NORMAL
960 GOSUB 3890: REM SEPERATION LINE
970 HTAB 8: PRINT "0.5 1.5 2.5 3.5 4.5+
980 GOSUB 3890
990 R = 1
1000 FOR P = J TO I
1010 IF AG(1,P) = 0 AND AG(2,P) = 0 AND AG(3,P) = 0 GOTO 1160
1020 PRINT "19"; P + PG;
1030 FOR F = 1 TO 5
1040 T = INT (AG(F,P) * Z + .5): REM ROUND OFF AGE RATIOS
1050 T% = 6: REM DETERMINE SPACING FOR TABLE
1060 IF T = 100 THEN T% = 4
1070 IF T > 9 AND T < 100 THEN T% = 5
1080 IF F = 1 GOTO 1110: REM DIFFERENT SPACING FOR 1ST VALUE
1090 PRINT SPC(T%); T;
1100 GOTO 1120
1110 PRINT SPC(T% - 1); T;
1120 NEXT
1130 PRINT: GOSUB 3890
1140 IF T$ = "Y" GOTO 1160
1150 GOSUB 2900
1160 NEXT
1170 IF T$ = "Y" GOTO 1210
1180 GOSUB 3780
1190 IF T$ = "N" GOTO 1230
1200 GOTO 930: REM PRINTED COPY REQUESTED SO RETURN TO
   TABLE FORMATION
1210 PRINT D$; "PR#0"
1220 T$ = "N"
1230 IF B% < > 7 THEN GOSUB 3300
1240 HOME: IF T$ = "N" GOTO 1260
1250 PRINT: PRINT
1260 INVERSE: PRINT IC$; SPC(3); "SEX RATIO - % MALES": NORMAL
1270 GOSUB 3890
1280 HTAB 9: PRINT "0.5 1.5 2.5 3.5+ TOTAL"
1290 GOSUB 3890
1300 R = 1
1310 FOR P = J TO I
1320 IF SR(1,P) = 0 AND SR(2,P) = 0 AND SR(3,P) = 0 GOTO 1470
1330 PRINT "19"; P + PG;
1340 FOR F = 1 TO 5

Cont.
Table 14 -Cont.-4

1350 T = INT (SR(F,P) * Z + .5): REM ROUND OFF SEX RATIO
1360 T% = 5
1370 IF T = 100 THEN T% = 4
1380 IF T < 10 THEN T% = 6
1390 IF F = 1 GOTO 1420
1400 PRINT SPC( T%);T;
1410 GOTO 1430
1420 PRINT SPC( T% - 1);T;
1430 NEXT
1440 PRINT : GOSUB 3890
1450 IF T$ = "Y" GOTO 1470
1460 GOSUB 2900
1470 NEXT
1480 IF T$ = "Y" GOTO 1520
1490 GOSUB 3780
1500 IF T$ = "N" GOTO 1540
1510 GOTO 1240
1520 PRINT D$;"PR#0"
1530 T$ = "N"
1540 IF B% < 8 THEN GOSUB 3300
1550 HOME : HTAB 5
1560 IF T$ = "N" GOTO 1580
1570 PRINT : PRINT : PRINT INVERSE : PRINT IC$; PRINT "RECONSTRUCTED MORTALITY RATES"
- %": NORMAL
1590 GOSUB 3890
1600 HTAB 13: PRINT "MALES"; SPC( 12);"FEMALES"
1610 GOSUB 3890
1620 HTAB 7: PRINT "0.5 1.5 0.5+ 0.5 1.5 0.5+"
1630 GOSUB 3890
1640 R = 1
1650 FOR P = J TO I
1660 IF MO(1,P) = 0 AND MO(2,P) = 0 AND MO(3,P) = 0 AND MO(5,P) = 0 GOTO 1790
1670 PRINT "19";P + PG;
1680 FOR F = 1 TO 6
1690 T = INT (MO(F,P) / .8 * Z + .5): REM MORTALITY RATES CORRECTED AND ROUNDED OFF
1700 T% = 4
1710 IF T = 100 THEN T% = 3
1720 IF T < 10 THEN T% = 5
1730 IF F = 1 GOTO 1760
1740 PRINT SPC( T%);T;
1750 GOTO 1770
1760 PRINT SPC( T% - 1);T;
1770 NEXT
1780 PRINT : GOTO 1810
1790 PRINT "19";P + PG;

Cont.
Table 14 -Cont.-5

1800 PRINT "DATA INSUFFICIENT TO CALCULATE"
1810 GOSUB 3890
1820 IF T$ = "Y" GOTO 1840
1830 GOSUB 2900
1840 NEXT
1850 IF T$ = "Y" GOTO 1900
1860 GOSUB 3780
1870 IF T$ = "N" GOTO 1920
1880 GOTO 1550
1890 GOSUB 2930
1900 PRINT D$;"PR#0"
1910 T$ = "N"
1920 IF R$ < Goto 7 THEN GOSUB 3300
1930 HOME: IF T$ = "N" GOTO 1950
1940 PRINT: PRINT: PRINT
1950 INVERSE: PRINT IC$; SPC(5);"DEER HARVEST ANALYSIS": NORMAL
1960 GOSUB 3890
1970 HTAB 23: PRINT ";"
1980 HTAB 8: PRINT "DEER # OF SUM- PREDICTED HERD"
1990 HTAB 8: PRINT "KILL HUNTERS CESS POP 1 POP 2"
2000 GOSUB 3890
2010 R = 1
2020 FOR P = J TO I
2030 IF KL(P) = 0 AND HR(P) = 0 AND SC(P) = 0 AND P2(P) = 0
2040 AND P3(P) = 0 GOTO 2040 T% = 4: REM CALCULATE
2050 SPACING FOR TABLE
2060 IF KL(P) < 10 THEN T% = 6
2070 IF KL(P) > 9 AND KL(P) < 100 THEN T% = 5
2080 IF KL(P) > 999 AND KL(P) < 10000 THEN T% = 3
2090 IF KL(P) > 9999 THEN T% = 2
2100 S% = 4
2110 IF HR(P) < 10 THEN S% = 7
2120 IF HR(P) > 9 AND HR(P) < 100 THEN S% = 6
2130 IF HR(P) > 99 AND HR(P) < 1000 THEN S% = 5
2140 IF HR(P) > 9999 AND HR(P) < 10000 THEN S% = 3
2150 IF HR(P) > 99999 THEN S% = 2
2160 T = INT (SC(P) * Z + .5)
2170 V% = 2
2180 L = INT (P2(P) + .5)
2190 R% = 4
2200 IF L < 100 THEN R% = 6
2210 IF L > 99 AND L < 1000 THEN R% = 5
2220 IF L > 9999 AND L < 100000 THEN R% = 3
2230 IF L > 99999 THEN R% = 2
2240 W = INT (P3(P) + .5)
2250 L% = 4
2260 IF W < 100 THEN L% = 6

Cont.
Table 14 -Cont.-6

2270 IF W > 99 AND W < 1000 THEN L% = 5
2280 IF W > 9999 AND W < 100000 THEN L% = 3
2290 IF W > 99999 THEN L% = 2
2300 PRINT "19";P + PG; SPC( T%);KL(P); SPC( S%);HR(P);
   SPC(V%);T;SPC(R%);L; SPC( L%);W
2310 GOSUB 3890
2320 IF T% = "Y" GOTO 2340
2330 GOSUB 2900
2340 NEXT
2350 IF T% = "Y" GOTO 2390
2360 GOSUB 3780
2370 IF T$ = "N" GOTO 2410
2380 GOTO 1930
2390 PRINT D$;"PR#0"
2400 T$ = "N"
2410 IF B% < > 7 THEN GOSUB 3300
2420 HOME : PRINT : PRINT KL(N);" DEER WERE HARVESTED BY":
   PRINT HR(N);" HUNTERS IN ";G
2430 IF WT < > 3 GOTO 2620: REM ESTIMATE WITH REGRESSION
2440 PRINT : PRINT "BECAUSE OF LOW HARVEST OR": PRINT "POOR
   DATA FIT, HUNTER QUOTAS": PRINT "CAN ONLY BE APPROXIMATED"
2450 PRINT : GOSUB 2750
2460 HX = 0: FOR J = IL TO N
2470 HX = HX + HR(J) / KL(J)
2480 NEXT
2490 CC = HX / 3: REM AVERAGE NUMBER OF HUNTERS PER DEER
   KILLED DURING LAST 3 YEARS
2500 IF WT < > 3 GOTO 2510: GOSUB 2750
2510 TH = INT (CC * DE + .5): REM ROUND OFF # OF HUNTERS
   REQUIRED TO KILL DESIRED # OF DEER
2520 IF Z$ = "I" GOTO 2560
2530 IF Z$ = "S" GOTO 2580
2540 ZZ$ = "DECREASE":HA = HR(N) - TH: GOSUB 2800
2550 GOSUB 3300
2560 HA = HR(N) + TH:ZZ$ = "INCREASE": GOSUB 2800
2570 GOSUB 3300
2580 HA = INT (CC * KL(N) + .5)
2590 PRINT : PRINT "TO MAINTAIN THE SAME HARVEST LEVEL,":
   PRINT "YOU WOULD HAVE TO ALLOCATE ";HA;" PERMITS"
2600 GOSUB 3300
2610 END
2620 GOSUB 2750
2630 IF Z$ = "I" GOTO 2680
2640 IF Z$ = "S" GOTO 2710
2650 DK = KL(N) - DE: GOSUB 2820
2660 ZZ$ = "DECREASE":TH = HR(N) - HA: GOSUB 2800
2670 GOTO 2700
2680 DK = KL(N) + DE: GOSUB 2820

Cont.
Table 14 -Cont.-7

2690 ZZ$ = "INCREASE": TH = HA - HR(N): GOSUB 2800
2700 GOSUB 3300
2710 DK = KL(N): GOSUB 2820
2720 PRINT "TO MAINTAIN THE SAME HARVEST LEVEL,":
    PRINT "YOU WOULD HAVE TO ALLOCATE ";HA;" PERMITS"
2730 GOSUB 3300
2740 END
2750 PRINT "WOULD YOU LIKE TO INCREASE, DECREASE OR":
    PRINT "MAINTAIN THE SAME HARVEST LEVEL? (I/D/S)"
2760 GET Z$
2770 IF Z$ = "S" GOTO 2790
2780 PRINT "BY HOW MANY DEER?": INPUT DE
2790 RETURN
2800 PRINT "TO ";ZZ$;" THE DEER HARVEST BY ";DE:
    PRINT "DEER, YOU WOULD HAVE TO ";ZZ$;" THE": PRINT
    "NUMBER OF HUNTERS BY ";TH;" TO ";HA
2810 RETURN
2820 IF WT = 2 GOTO 2850
2830 IF P2(N + 1) = 0 GOTO 2440
2840 HA = INT ((DK - CT - XP * P2(N + 1)) / XH + .5): RETURN:
    REM # OF HUNTERS REQUIRED TO KILL DK # OF DEER
2850 IF P3(N + 1) = 0 GOTO 2880
2860 HA = INT ((DK - CT - XP * P3(N + 1)) / XH + .5)
2870 RETURN
2880 PRINT "BECAUSE THE POPULATION COULD NOT": PRINT
    "BE PREDICTED FOR NEXT YEAR, HUNTER": PRINT "QUOTAS
    COULD ONLY BE APPROXIMATED": GOTO 2460
2890 RETURN
2900 IF R = 7 GOTO 2930: REM SUBROUTINE TO REINITIALIZE R
2910 R = R + 1
2920 RETURN
2930 PRINT
2940 R = 1
2950 PRINT "HIT ANY KEY WHEN YOU ARE": PRINT "READY TO CONTINUE"
2960 GET A$: PRINT : RETURN
2970 HOME: REM SUBROUTINE FOR PRINTING HEADINGS OF TABLES
2980 IF T$ = "N" GOTO 3000
2990 PRINT "POSS": PRINT
3000 INVERSE: VTAB 2: HTAB 2: PRINT IC$;" - "; SPC(2);Z$: NORMAL
3010 GOSUB 3890
3020 HTAB 17: PRINT "YEARS OF AGE"
3030 GOSUB 3890
3040 HTAB 8: PRINT "0.5 1.5 2.5 3.5 4.5+"
3050 GOSUB 3890
3060 FOR P = J TO I
3070 IF DR(T,P) = 0 AND DR(T + 1,P) = 0 AND DR(T + 2,P) = 0
    AND DR(T + 3,P) = 0 GOTO 3220
3080 PRINT "19";P + PG;

Cont.
Table 14 -Cont.-8

3090 FOR F = T TO S
3100 T% = 3
3110 IF DR(F,P) < 10 THEN T% = 6
3120 IF DR(F,P) > = 10 AND DR(F,P) < 100 THEN T% = 5
3130 IF DR(F,P) > = 100 AND DR(F,P) < 1000 THEN T% = 4
3140 IF F = 1 OR F = 6 GOTO 3170
3150 PRINT SPC( T%);DR(F,P);
3160 GOTO 3180
3170 PRINT SPC( T% - 1);DR(F,P);
3180 NEXT
3190 PRINT : GOSUB 3890
3200 IF T$ = "Y" GOTO 3220
3210 GOSUB 2900
3220 NEXT
3230 IF T$ = "Y" GOTO 3270
3240 GOSUB 3780
3250 IF T$ = "N" GOTO 3290
3260 GOTO 2970
3270 PRINT D$;"PR#0"
3280 T$ = "N"
3290 RETURN
3300 PRINT : REM SUBROUTINE- RETURN TO MENU
3310 PRINT "WOULD YOU LIKE TO GO"
3320 PRINT "BACK TO THE MENU? TYPE Y OR N."; GET A$
3330 IF A$ < > "Y" AND A$ < > "N" THEN GOTO 3300
3340 IF A$ = "Y" GOTO 3380
3350 PRINT : PRINT "WOULD YOU LIKE SOME GRAPHS? (Y/N)"
3360 GET A$: IF A$ = "N" GOTO 3400
3370 PRINT : PRINT D$;"RUN PROG,D1"
3380 HOME
3390 GOTO 790
3400 END
3410 PRINT : PRINT "DEER KILL DATA FROM ";X;" TO ";G; PRINT 
"ARE AVAILABLE!": PRINT : REM SUBROUTINE FOR PRINTING MENU
3420 PRINT "*****************************************************"
3430 INVERSE : PRINT "* MENU FOR DEER HARVEST BREAKDOWN *": NORMAL
3440 PRINT "*****************************************************"
3450 PRINT
3460 PRINT "1. KILL BY SEX AND AGE"
3470 PRINT "2. AGE RATIOS"
3480 PRINT "3. SEX RATIOS"
3490 PRINT "4. MORTALITY RATES"
3500 PRINT "5. DEER HARVEST ANALYSIS"
3510 PRINT "6. SET HUNTER QUOTAS"
3520 PRINT "7. SUMMARY SHEET"
3530 PRINT "8. ALL OF THE ABOVE"
3540 PRINT "9. SELECT ANOTHER COUNTY OR REGION"
3550 PRINT "10. QUIT"
Table 14 -Cont.-

3560 PRINT
3570 PRINT "CHOOSE ONE OF THE ABOVE"
3580 PRINT "AND ENTER THE NUMBER": GET B%
3590 IF B% = 10 GOTO 2740
3600 PRINT
3610 IF B% = 9 THEN GOTO 280
3620 IF B% = 7 GOTO 3940
3630 RETURN
3640 PRINT "DO YOU WANT MORE THAN ONE YEAR'S DATA?": GET A$
3650 PRINT: PRINT "Y/N"
3660 IF A$ = "Y" GOTO 3720
3670 PRINT "WHICH YEAR WOULD YOU LIKE?": INPUT A
3680 IF B% = 5 GOTO 3760
3690 IF A < X OR A > (K + 1900) THEN GOSUB 3840
3700 J = A - X + 1: L = J
3710 GOTO 820
3720 PRINT "TYPE THE FIRST AND LAST YEARS OF DATA"
3730 PRINT "YOU NEED, SEPERATED BY A COMMA": PRINT "AND"
3740 IF B% = 5 GOTO 3800
3750 IF A < X OR A > G OR B < X OR B > G THEN GOSUB 3870
3760 J = A - X + 1: L = J + B - A
3770 RETURN
3780 PRINT : REM PRINT REQUEST SUBROUTINE
3790 PRINT "WOULD YOU LIKE A PRINTED COPY?"
3800 PRINT "TYPE Y OR N": GET T$
3810 IF T$ < > "Y" THEN RETURN
3820 PRINT : PRINT D$;"PR#1"
3830 RETURN
3840 PRINT "DATA NOT AVAILABLE, TRY AGAIN": REM ERROR SUBROUTINE
3850 GOTO 3670
3860 RETURN
3870 PRINT "DATA NOT AVAILABLE, TRY AGAIN": GOTO 3720
3880 RETURN
3890 IF T$ = "Y" GOTO 3920
3900 FOR PT = 1 TO 40: PRINT "-";: NEXT
3910 RETURN
3920 PRINT "--------------------------------------"
3930 RETURN
3940 INPUT "WHAT YEAR WOULD YOU LIKE?"; CZ
3950 IF CZ < X OR CZ > G GOTO 3940
3960 CX = CZ - X + 1
3970 HOME
3980 INVERSE: HTAB 2: PRINT "SUMMARY SHEET FOR "; CZ; " - "; IC$:
3990 NORMAL: PRINT
3990 HTAB 13: PRINT ";": SPC(11); ";": SPC(9); "; OF"
4000 PRINT "AGE BUCKS BUCKS DOES DOES TOTAL TOTAL"
4010 P$(1) = "0.5": P$(2) = "1.5": P$(3) = "2.5": P$(4) = "3.5": P$(5)
Table 14 -Cont.-10

= "4.5": T = 1: S = 5
4020 J = 6: FOR I = 1 TO 5
4030 XT(J,CX) = DR(I,CX) + DR(J,CX)
4040 J = J + 1: NEXT
4050 AU = INT (SR(5,CX) * 100 + .5)
4060 VTAB 5: J = 6
4070 FOR I = T TO S
4080 AR = INT (PD(I,CX) * 100 + .5)
4090 GOSUB 4290
4100 PRINT P$(I); SPC(GD); DR(I,CX); SPC(FD); AR; SPC(2)
4110 AR = INT (PD(J,CX) * 100 + .5)
4120 AS = INT (AG(I,CX) * 100 + .5)
4130 GOSUB 4510: GOSUB 4390
4140 PRINT SPC(GD); DR(J,CX); SPC(FD); AR; SPC(QD); XT(J,CX);
SPC(QC); AS; J = J + 1: PRINT "--------------

4150 NEXT
4160 HTAB 10: INVERSE: PRINT "SEX MAKEUP OF KILL": NORMAL
4170 HTAB 8: PRINT AM(CX); "BUCKS"; SPC(3); AU; ";% BUCKS"
4180 GI = 100 - AU
4190 HTAB 8: PRINT AF(CX); "DOES"; SPC(3); GI; ";% DOES"
4200 PRINT "TOTAL KILL=": KL(CX)
4210 PRINT "NUMBER OF HUNTERS="; HR(CX)
4220 RL = SC(CX) * 100
4230 PRINT "% OF HUNTERS SUCCESSFUL="; RL
4240 IF T$ = "Y" GOTO 4260
4250 GOSUB 3780: IF T$ = "Y" GOTO 3970
4260 PRINT D$; "PR#0"
4270 PRINT "WOULD YOU LIKE ANOTHER YEAR?": INPUT TD$:
IF TD$ = "Y" GOTO 3940
4280 HOME: GOSUB 3300
4290 GOSUB 4490: KP = 4: GD = 1
4300 FOR JC = 1 TO 3
4310 IF DR(1,CX) = 0 THEN GD = 4
4320 IF DR(1,CX) > = PC AND DR(1,CX) < GC THEN GD = KP
4330 GOSUB 4500: KP = KP - 1: NEXT
4340 GOSUB 4490: KP = 4: FD = 2: FOR JC = 1 TO 2
4350 IF AR = 0 THEN FD = 4
4360 IF AR > = PC AND AR < GC THEN FD = KP
4370 GOSUB 4500: KP = KP - 1: NEXT
4380 RETURN
4390 GOSUB 4490
4400 QD = 2: KP = 6: FOR JC = 1 TO 3
4410 IF XT(J,CX) = 0 THEN QD = 5
4420 IF XT(J,CX) > = PC AND XT(J,CX) < GC THEN QD = KP
4430 GOSUB 4500: KP = KP - 1: NEXT
4440 GOSUB 4490
4450 KP = 4: QC = 2: FOR JC = 1 TO 2

Cont.
Table 14 -Cont.-11

4460 IF AS = 0 THEN QC = 4
4470 IF AS >= PC AND AS < GC THEN QC = KP
4480 GOSUB 4500: KP = KP - 1: NEXT: RETURN
4490 PC = 1: GC = 10: RETURN
4500 PC = PC * 10: GC = GC * 10: RETURN
4510 GOSUB 4490: KP = 5: GD = 2
4520 FOR JC = 1 TO 3
4530 IF DR(J,CX) = 0 THEN GD = 5
4540 IF DR(J,CX) >= PC AND DR(J,CX) < GC THEN GD = KP
4550 GOSUB 4500: KP = KP - 1: NEXT
4560 GOSUB 4340: RETURN
4570 INPUT D,B,DR(1,B - PG),DR(2,B - PG),DR(3,B - PG),
     DR(4,B - PG),DR(5,B - PG),DR(6,B - PG),DR(7,B - PG),
     DR(8,B - PG),DR(9,B - PG),DR(10,B - PG)
4580 INPUT AG(1,B - PG),AG(2,B - PG),AG(3,B - PG),AG(4,B - PG),
     AG(5,B - PG)
4590 INPUT PD(1,B - PG),PD(2,B - PG),PD(6,B - PG),PD(2,B - PG),
     PD(7,B - PG),PD(3,B - PG),PD(8,B - PG),PD(4,B - PG),
     PD(9,B - PG),PD(5,B - PG),PD(10,B - PG)
4600 RETURN
4610 INPUT D,B,MO(3,B - PG),MO(6,B - PG),MO(2,B - PG),
     MO(5,B - PG),MO(1,B - PG),MO(4,B - PG)
4620 INPUT D,B,KL(B - PG),P2(B - PG),P3(B - PG),HR(B - PG),SC(B - PG)
4630 RETURN
Table 15. Applesoft program which presents a summary of trends in harvest, the number of hunters and the predicted deer population for all counties.

10 D$ = ""
20 T = 1
30 DIM KL(102), P1(102), HT(102), SC(102), E1$(102), E2$(102),
    D1$(102), D2$(102), D3$(102), T1$(102), T2$(102), T3$(102),
    S1$(102),
    S2$(102), S3$(102), C$(102)
40 DATA ADAMS, ALEXANDER, BOND, BOONE, BROWN, BUREAU, CALHOUN, CARROLL,
    CASS, CHAMPAIGN, CHRISTIAN, CLARK, CLAY, CLINTON, COLES, CRAWFORD,
    CUMBERLAND, DEKALB, DEWITT, DOUGLASS, EDGAR, EDWARDS, EFFINGHAM,
    FAYETTE, FORD, FRANKLIN, FULTON
50 DATA GALLATIN, GREENE, GRUNDY, HAMILTON, HANCOCK, HARDIN, HENDERSON,
    HENRY, IROQUOIS, JACKSON, JASPER, JEFFERSON, JERSEY, JODAVIESS, JOHNSON,
    KANKAKEE, KENDALL, KNOX, LASALLE, LAWRENCE, LEE, LIVINGSTON, LOGAN,
    MCDONOUGH, MCHENRY, MCLEAN, MACON, MACOUPIN
60 DATA MADISON, MARION, MARSHALL, MASON, MASSAC, MENARD, MERCER, MONROE,
    MONTGOMERY, MORGAN, MOULTRIE, OGLE, PEORIA, PERRY, PIATT, PIKE, POPE,
    PULASKI, PUTNAM, RANDOLPH, RICHLAND, ROCK ISLAND, STCLAIR, SALINE,
    SANGAMON, SCHUYLER, SCOTT, SHELBY
70 DATA STARK, STEPHENSON, TAZEWELL, UNION, VERMILION, WABASH, WARREN,
    WASHINGTON, WAYNE, WHITE, WHITESIDE, WILL, WILLIAMSON, WINEBAGO,
    WOODFORD
80 FOR I = 1 TO 102
90 IF I = 16 OR I = 22 OR I = 45 OR I = 49 GOTO 110
100 READ C$(I)
110 NEXT
120 HOME : PRINT "INSERT REGION, STATEWIDE DISK IN": PRINT "DRIVE 2 AND HIT ANY KEY": GET H$
130 PRINT : PRINT D$; "OPEN TRENDS, D1"
140 PRINT : PRINT D$; "READ TRENDS"
150 FOR I = 1 TO 102
160 IF I = 16 OR I = 22 OR I = 45 OR I = 49 GOTO 180
170 INPUT CO, Y, KL(CO), P1(CO), P2, HT(CO), SC(CO), E1$(CO), E2$(CO),
    E3$(CO), D1$(CO), D2$(CO), D3$(CO), T1$(CO), T2$(CO), T3$(CO),
    S1$(CO), S2$(CO), S3$(CO)
180 NEXT
190 PRINT D$; "CLOSE"
200 HOME : PRINT D$; "PR#3"
210 PRINT CHR$(12); PRINT SPC(27); "COUNTY HERD TRENDS FOR 19"; Y
220 PRINT: GOSUB 600
230 FOR I = 1 TO 102
240 IF I = 16 OR I = 22 OR I = 45 OR I = 49 GOTO 270
250 IF I < > 14 AND I < > 30 AND I < > 46 AND I < > 62 AND
    I < > 78 AND I < > 94 THEN GOSUB 660: GOTO 270
260 PRINT : PRINT "HIT ANY KEY TO CONTINUE": GET H$: PRINT
    CHR$(12); GOSUB 600: GOSUB 660
270 NEXT
280 GOTO 380

Cont.
Table 15 -Cont.-2

290 PRINT SPC(27);"COUNTY HERD TRENDS FOR 19"; Y: PRINT
300 GOSUB 600
310 FOR I = 1 TO 102
320 IF I = 16 OR I = 22 OR I = 45 OR I = 49 GOTO 370
330 IF I < > 54 GOTO 360
340 FOR J = 1 TO 10: PRINT: NEXT
350 GOSUB 600
360 GOSUB 770
370 NEXT: GOTO 390
380 PRINT: PRINT "HIT ANY KEY TO CONTINUE": GET HS: PRINT
390 PRINT D$;"PR#3": PRINT CHR$(12)
400 IF T = 2 GOTO 460
410 PRINT "WOULD YOU LIKE A PRINTED COPY": GET HS
420 IF HS = "N" GOTO 480
430 PRINT
440 PRINT "MAKE SURE PAPER IS AT TOP OF FORM": PRINT
450 PRINT "HIT ANY KEY": GET HS: PRINT "PR#1": PRINT CHR$(27); T = 2: GOTO 290
460 PRINT "WOULD YOU LIKE TO RUN TRENDS AGAIN?(Y/N)";
470 GET HS: IF HS <> "Y" GOTO 480
480 PRINT "WOULD YOU LIKE TABLES?": GET HS
490 IF HS = "N" GOTO 520
500 PRINT: PRINT CHR$(26); T = 1: GOTO 210
510 PRINT "WOULD YOU LIKE TABLES?": GET HS
520 PRINT: PRINT CHR$(26); "RUN PROG1,D1"
530 IF HS = "N" GOTO 560
540 PRINT: PRINT CHR$(26); T = 1: GOTO 210
550 PRINT: PRINT D$; "RUN PROG,D1"
560 END
570 Q$ = "on"
580 IF VS = "2" THEN Q$ = "Y"
590 RETURN
600 FOR J = 1 TO 78: PRINT "-"; NEXT : PRINT "-"
610 PRINT SPC(32); "TRENDS"; SPC(12); "TRENDS"; SPC(15); "TRENDS"
620 PRINT SPC(14); "# OF"; SPC(13); "80 81 82"; SPC(5); "%";
630 PRINT "SUCCESS 80 81 82"; SPC(2); "ESTIMATED 80 81 82"
640 FOR J = 1 TO 78: PRINT "-"; NEXT : PRINT "-"
650 RETURN
660 VS = T1$(1): GOSUB 570: T1$(1) = Q$
670 VS = T2$(1): GOSUB 570: T2$(1) = Q$
680 VS = T3$(1): GOSUB 570: T3$(1) = Q$
690 VS = S1$(1): GOSUB 570: S1$(1) = Q$
700 VS = S2$(1): GOSUB 570: S2$(1) = Q$

Cont.
Table 15 - Cont.-3

```
710 V$ = S3$(I): GOSUB 570: S3$(1) = Q$
720 V$ = E1$(I): GOSUB 570: E1$(I) = Q$
730 V$ = E2$(I): GOSUB 570: E2$(I) = Q$
740 V$ = E3$(I): GOSUB 570: E3$(I) = Q$
750 SC(1) = INT (SC(1) * 100 + .5)
760 P1(1) = INT (P1(1) + .5)
770 PRINT C$(I);
780 Z = 16
790 IF HT(1) >= 1000 THEN Z = 15
800 HTAB (Z): PRINT HT(1);  
810 Z = 5
820 IF KL(I) > 9 AND KL(I) < 100 THEN Z = 7
830 IF KL(I) > = 100 AND KL(I) < 1000 THEN Z = 6
840 PRINT SPC(Z); KL(I); SPC(5); T3$(I); SPC(2); T2$(I);
     SPC(2); T1$(I); SPC(4); SC(I); SPC(5); S3$(I); SPC(2); S2$(I);
     SPC(2); S1$(I);
850 IF P1(I) = 0 GOTO 910
860 Z = 6
870 P1(1) = INT (P1(1) + .5)
880 IF P1(I) < 100 THEN Z = 7
890 IF P1(I) > = 1000 THEN Z = 5
900 PRINT SPC(Z); P1(1); SPC(5); E3$(I); SPC(2); E2$(I);
     SPC(2); E1$(I): GOTO 920
910 PRINT SPC(6);"---"; SPC(5);"-"; SPC(2);"-"; SPC(2);"-"
920 RETURN
```
Table 16. County deer harvest, hunter success rates, and estimated populations in 1983 and trends for each of these from 1980 through 1983. (d = decline, I = increase)

<table>
<thead>
<tr>
<th>County</th>
<th># of Hunters</th>
<th>Harvest 81</th>
<th>Harvest 82</th>
<th>Harvest 83</th>
<th>% Success 81</th>
<th>% Success 82</th>
<th>% Success 83</th>
<th>Estimated Population 81</th>
<th>Estimated Population 82</th>
<th>Estimated Population 83</th>
<th>Trends 80</th>
<th>Trends 81</th>
<th>Trends 82</th>
<th>Trends 83</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adams</td>
<td>2326</td>
<td>998</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>43</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>d</td>
<td>d</td>
<td>d</td>
<td>d</td>
</tr>
<tr>
<td>Alexander</td>
<td>966</td>
<td>217</td>
<td>d</td>
<td>d</td>
<td>l</td>
<td>23</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>d</td>
<td>d</td>
<td>d</td>
<td>d</td>
</tr>
<tr>
<td>Bond</td>
<td>449</td>
<td>121</td>
<td>I</td>
<td>d</td>
<td>l</td>
<td>27</td>
<td>I</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Boone</td>
<td>234</td>
<td>55</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>24</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Brown</td>
<td>1434</td>
<td>577</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>40</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Bureau</td>
<td>1506</td>
<td>427</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>28</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>l</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Calhoun</td>
<td>945</td>
<td>243</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>26</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Carroll</td>
<td>1669</td>
<td>592</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>36</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>d</td>
<td>d</td>
<td>d</td>
</tr>
<tr>
<td>Cass</td>
<td>800</td>
<td>258</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>32</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Champaign</td>
<td>224</td>
<td>67</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>30</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>I</td>
<td>d</td>
<td>l</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Christian</td>
<td>305</td>
<td>86</td>
<td>d</td>
<td>I</td>
<td>d</td>
<td>28</td>
<td>d</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Clark</td>
<td>541</td>
<td>204</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>38</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Clay</td>
<td>576</td>
<td>162</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>28</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Clinton</td>
<td>1005</td>
<td>236</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>24</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Coles</td>
<td>279</td>
<td>74</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>27</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>l</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Crawford</td>
<td>449</td>
<td>161</td>
<td>d</td>
<td>I</td>
<td>d</td>
<td>36</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>d</td>
<td>d</td>
<td>d</td>
</tr>
<tr>
<td>Cumberland</td>
<td>452</td>
<td>149</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>33</td>
<td>I</td>
<td>l</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Dekalb</td>
<td>278</td>
<td>91</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>33</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Dewitt</td>
<td>259</td>
<td>93</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>36</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Douglas</td>
<td>224</td>
<td>51</td>
<td>d</td>
<td>I</td>
<td>d</td>
<td>23</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Edgar</td>
<td>310</td>
<td>120</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>39</td>
<td>I</td>
<td>l</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Edwards</td>
<td>259</td>
<td>94</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>36</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Effingham</td>
<td>527</td>
<td>141</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>27</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Fayette</td>
<td>1169</td>
<td>419</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>36</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Ford</td>
<td>121</td>
<td>39</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>32</td>
<td>I</td>
<td>l</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Franklin</td>
<td>606</td>
<td>152</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>25</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Fulton</td>
<td>1587</td>
<td>539</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>34</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>d</td>
<td>d</td>
<td>d</td>
</tr>
<tr>
<td>Gallatin</td>
<td>757</td>
<td>187</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>25</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>d</td>
<td>d</td>
</tr>
<tr>
<td>Greene</td>
<td>732</td>
<td>270</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>37</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Grundy</td>
<td>421</td>
<td>117</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>28</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Hamilton</td>
<td>826</td>
<td>235</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>28</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Hancock</td>
<td>1973</td>
<td>764</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>39</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Hardin</td>
<td>1221</td>
<td>294</td>
<td>d</td>
<td>d</td>
<td>l</td>
<td>24</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Henderson</td>
<td>1220</td>
<td>341</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>28</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>d</td>
<td>d</td>
</tr>
<tr>
<td>Henry</td>
<td>665</td>
<td>171</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>26</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Iroquois</td>
<td>435</td>
<td>178</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>41</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Jackson</td>
<td>2091</td>
<td>689</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>33</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Jasper</td>
<td>668</td>
<td>281</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>42</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Jefferson</td>
<td>943</td>
<td>296</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>31</td>
<td>d</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Jersey</td>
<td>505</td>
<td>97</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>19</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Jo Daviess</td>
<td>2604</td>
<td>1077</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>41</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Johnson</td>
<td>1561</td>
<td>495</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>32</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>d</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Kankakee</td>
<td>220</td>
<td>43</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>20</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Kendall</td>
<td>206</td>
<td>51</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>25</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Knox</td>
<td>1231</td>
<td>452</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>37</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Lasalle</td>
<td>815</td>
<td>216</td>
<td>d</td>
<td>I</td>
<td>l</td>
<td>27</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Lawrence</td>
<td>326</td>
<td>128</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>39</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Lee</td>
<td>780</td>
<td>244</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>31</td>
<td>I</td>
<td>l</td>
<td>I</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Livingston</td>
<td>385</td>
<td>123</td>
<td>I</td>
<td>I</td>
<td>l</td>
<td>32</td>
<td>I</td>
<td>d</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
</tbody>
</table>

Cont.
<table>
<thead>
<tr>
<th>County</th>
<th># of Hunters</th>
<th>Harvest 80</th>
<th>Harvest 81</th>
<th>Harvest 82</th>
<th>% Harvest 80</th>
<th>% Harvest 81</th>
<th>% Harvest 82</th>
<th>Success 80</th>
<th>Success 81</th>
<th>Success 82</th>
<th>Estimated Population 80</th>
<th>Estimated Population 81</th>
<th>Estimated Population 82</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logan</td>
<td>243</td>
<td>107</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>44</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>170</td>
<td>1</td>
<td>l</td>
<td>d</td>
</tr>
<tr>
<td>McDonough</td>
<td>1026</td>
<td>347</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>34</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>791</td>
<td>d</td>
<td>l</td>
<td>d</td>
</tr>
<tr>
<td>McHenry</td>
<td>574</td>
<td>136</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>24</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>440</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>McLean</td>
<td>405</td>
<td>156</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>39</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>378</td>
<td>d</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Macon</td>
<td>166</td>
<td>35</td>
<td>d</td>
<td>d</td>
<td>l</td>
<td>21</td>
<td>d</td>
<td>l</td>
<td>d</td>
<td>96</td>
<td>l</td>
<td>l</td>
<td>d</td>
</tr>
<tr>
<td>Macoupin</td>
<td>897</td>
<td>262</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>29</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>674</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Madison</td>
<td>400</td>
<td>82</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>20</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Marion</td>
<td>769</td>
<td>214</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>28</td>
<td>d</td>
<td>l</td>
<td>d</td>
<td>556</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Marshall</td>
<td>941</td>
<td>215</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>23</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>546</td>
<td>d</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Mason</td>
<td>670</td>
<td>188</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>28</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>605</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Massac</td>
<td>323</td>
<td>48</td>
<td>d</td>
<td>l</td>
<td>d</td>
<td>15</td>
<td>d</td>
<td>d</td>
<td>d</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Menard</td>
<td>463</td>
<td>138</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>30</td>
<td>l</td>
<td>d</td>
<td>d</td>
<td>352</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Mercer</td>
<td>1310</td>
<td>472</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>36</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>974</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Monroe</td>
<td>1281</td>
<td>353</td>
<td>l</td>
<td>d</td>
<td>d</td>
<td>28</td>
<td>l</td>
<td>d</td>
<td>d</td>
<td>1442</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Montgomery</td>
<td>614</td>
<td>199</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>32</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>1647</td>
<td>d</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Morgan</td>
<td>555</td>
<td>199</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>36</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>508</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Moultrie</td>
<td>257</td>
<td>80</td>
<td>l</td>
<td>l</td>
<td>d</td>
<td>31</td>
<td>l</td>
<td>l</td>
<td>d</td>
<td>207</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Ogle</td>
<td>981</td>
<td>362</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>37</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>807</td>
<td>d</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Peoria</td>
<td>849</td>
<td>262</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>31</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>613</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Perry</td>
<td>999</td>
<td>368</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>37</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>744</td>
<td>d</td>
<td>l</td>
<td>d</td>
</tr>
<tr>
<td>Platt</td>
<td>213</td>
<td>71</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>33</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>161</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Pike</td>
<td>2452</td>
<td>1123</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>46</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>2848</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Pope</td>
<td>4385</td>
<td>846</td>
<td>d</td>
<td>d</td>
<td>l</td>
<td>19</td>
<td>d</td>
<td>d</td>
<td>l</td>
<td>1586</td>
<td>d</td>
<td>d</td>
<td>d</td>
</tr>
<tr>
<td>Pulaski</td>
<td>512</td>
<td>164</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>32</td>
<td>d</td>
<td>d</td>
<td>l</td>
<td>417</td>
<td>d</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Putnam</td>
<td>567</td>
<td>185</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>33</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>355</td>
<td>l</td>
<td>l</td>
<td>d</td>
</tr>
<tr>
<td>Randolph</td>
<td>1691</td>
<td>547</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>32</td>
<td>d</td>
<td>l</td>
<td>d</td>
<td>1713</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Richland</td>
<td>336</td>
<td>122</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>36</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>160</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Rock Island</td>
<td>973</td>
<td>338</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>35</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>560</td>
<td>d</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>St. Clair</td>
<td>699</td>
<td>222</td>
<td>d</td>
<td>d</td>
<td>l</td>
<td>32</td>
<td>d</td>
<td>d</td>
<td>d</td>
<td>593</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Saline</td>
<td>1077</td>
<td>211</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>20</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>633</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Sangamon</td>
<td>449</td>
<td>129</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>29</td>
<td>d</td>
<td>d</td>
<td>l</td>
<td>258</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Schuyler</td>
<td>1244</td>
<td>493</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>40</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>964</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Scott</td>
<td>498</td>
<td>164</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>33</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>347</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Shelby</td>
<td>781</td>
<td>265</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>34</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>725</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Stark</td>
<td>304</td>
<td>67</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>22</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>156</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Stephenson</td>
<td>732</td>
<td>325</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>44</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>477</td>
<td>d</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Tazewell</td>
<td>513</td>
<td>150</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>29</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>376</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Union</td>
<td>1897</td>
<td>469</td>
<td>d</td>
<td>d</td>
<td>d</td>
<td>25</td>
<td>d</td>
<td>d</td>
<td>l</td>
<td>1581</td>
<td>d</td>
<td>d</td>
<td>d</td>
</tr>
<tr>
<td>Vermilion</td>
<td>276</td>
<td>73</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>26</td>
<td>d</td>
<td>l</td>
<td>d</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Wabash</td>
<td>213</td>
<td>68</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>32</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>245</td>
<td>d</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Warren</td>
<td>466</td>
<td>170</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>37</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>312</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Washington</td>
<td>1137</td>
<td>390</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>34</td>
<td>d</td>
<td>l</td>
<td>l</td>
<td>1242</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Wayne</td>
<td>547</td>
<td>159</td>
<td>d</td>
<td>l</td>
<td>d</td>
<td>29</td>
<td>d</td>
<td>l</td>
<td>d</td>
<td>486</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>White</td>
<td>384</td>
<td>118</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>31</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>255</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Whiteside</td>
<td>1055</td>
<td>307</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>29</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>477</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Will</td>
<td>231</td>
<td>48</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>21</td>
<td>l</td>
<td>d</td>
<td>l</td>
<td>88</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Williamson</td>
<td>1430</td>
<td>296</td>
<td>d</td>
<td>d</td>
<td>d</td>
<td>21</td>
<td>d</td>
<td>d</td>
<td>l</td>
<td>838</td>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Winnebago</td>
<td>829</td>
<td>232</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>28</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>447</td>
<td>d</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>Woodford</td>
<td>664</td>
<td>205</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>31</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>563</td>
<td>d</td>
<td>l</td>
<td>l</td>
</tr>
</tbody>
</table>
Table 17. Results of regression analysis on principal components for daily harvest of deer in four regions in Illinois.

<table>
<thead>
<tr>
<th>Region</th>
<th>Factor</th>
<th>Regression Coefficient</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8- Low potential for harvest (predicted population and number of hunters), late corn harvest, late in season</td>
<td>-80.86</td>
<td>24.65</td>
</tr>
<tr>
<td></td>
<td>2- Late in season, cold and snow on ground</td>
<td>-33.75</td>
<td>21.14</td>
</tr>
<tr>
<td></td>
<td>3- Low potential for harvest (predicted population), mild previous winter</td>
<td>-37.16</td>
<td>23.69</td>
</tr>
<tr>
<td></td>
<td>r2=0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6- Early corn harvest, low potential for harvest (number of hunters), windy</td>
<td>39.49</td>
<td>13.99</td>
</tr>
<tr>
<td>3</td>
<td>2- Warm, low humidity, high visibility</td>
<td>103.00</td>
<td>46.28</td>
</tr>
<tr>
<td></td>
<td>6- Early in season, windy, cloudy</td>
<td>112.82</td>
<td>26.80</td>
</tr>
<tr>
<td></td>
<td>4- High rainfall</td>
<td>-67.22</td>
<td>21.04</td>
</tr>
<tr>
<td></td>
<td>r2=0.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7- Late in season, early corn harvest, windy</td>
<td>-87.82</td>
<td>17.67</td>
</tr>
<tr>
<td></td>
<td>11- Late in season, mild with snow cover</td>
<td>-102.77</td>
<td>13.56</td>
</tr>
<tr>
<td></td>
<td>3- High potential for harvest (predicted population and number of hunters), high rainfall</td>
<td>31.02</td>
<td>8.26</td>
</tr>
<tr>
<td></td>
<td>5- Early corn harvest, mild previous winter</td>
<td>40.75</td>
<td>8.57</td>
</tr>
<tr>
<td>5</td>
<td>2- High potential for harvest (predicted population and number of hunters), severe previous winter</td>
<td>18.46</td>
<td>65.60</td>
</tr>
<tr>
<td></td>
<td>r2=0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7- Late in season, early corn harvest, snow on ground</td>
<td>-11.91</td>
<td>11.36</td>
</tr>
<tr>
<td></td>
<td>10- Early corn harvest, high potential for harvest (number of hunters)</td>
<td>-122.49</td>
<td>33.22</td>
</tr>
<tr>
<td>8</td>
<td>8- Late in season</td>
<td>299.91</td>
<td>26.49</td>
</tr>
<tr>
<td></td>
<td>1- High rainfall</td>
<td>-99.91</td>
<td>18.22</td>
</tr>
<tr>
<td></td>
<td>r2=0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5- Low potential for harvest (predicted population), windy</td>
<td>-77.96</td>
<td>14.50</td>
</tr>
<tr>
<td></td>
<td>7- High potential for harvest (predicted population), snow on ground</td>
<td>70.28</td>
<td>9.22</td>
</tr>
<tr>
<td></td>
<td>11- Low cloud cover, high humidity</td>
<td>178.54</td>
<td>22.61</td>
</tr>
<tr>
<td></td>
<td>8- Late in season</td>
<td>101.21</td>
<td>9.13</td>
</tr>
</tbody>
</table>
Table 18. Results of the regression analysis on principal components for annual harvest of deer in four regions of Illinois.

<table>
<thead>
<tr>
<th>Region</th>
<th>Factor</th>
<th>Regression Coefficient</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10- Potential for harvest high (number of hunters), windy day 2, calm day 3, low visibility day 4</td>
<td>147.28</td>
<td>4.66</td>
</tr>
<tr>
<td></td>
<td>1- Mild and no snow on last 3 days of the season, warm previous winter</td>
<td>-44.91</td>
<td>3.66</td>
</tr>
<tr>
<td></td>
<td>7- Late corn harvest, low potential for harvest (predicted population), calm on days 1 and 2, low rain day 4</td>
<td>-89.20</td>
<td>4.57</td>
</tr>
<tr>
<td>3</td>
<td>3- High potential for harvest (predicted population and number of hunters), humid and low visibility on day 1, windy day 6, heavy snow previous winter</td>
<td>257.22</td>
<td>7.47*</td>
</tr>
<tr>
<td></td>
<td>4- Early corn harvest, clear, dry, low humidity on day 1, windy day 4</td>
<td>217.16</td>
<td>7.19*</td>
</tr>
<tr>
<td>5</td>
<td>4- High potential for harvest (predicted population and number of hunters), early corn harvest, cloudy day 3, heavy snow previous winter</td>
<td>73.25</td>
<td>18.07**</td>
</tr>
<tr>
<td>8</td>
<td>10- Calm on days 1 and 2, low cloud cover on day 2, dry day 6</td>
<td>297.64</td>
<td>4.08</td>
</tr>
<tr>
<td></td>
<td>3- Late corn harvest, high potential for harvest (number of hunters), rain on day 1, clear on day 3</td>
<td>-140.75</td>
<td>4.24</td>
</tr>
</tbody>
</table>
Table 19. Mean and standard errors of the variables used in the regression on principal components (n=98).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human population a</td>
<td>49372.4</td>
<td>6364.5</td>
</tr>
<tr>
<td>Hectares in:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest b</td>
<td>20641.4</td>
<td>10803.2</td>
</tr>
<tr>
<td>Corn c</td>
<td>42265.0</td>
<td>3081.8</td>
</tr>
<tr>
<td>Soybeans c</td>
<td>33069.1</td>
<td>2300.4</td>
</tr>
<tr>
<td>Small grain (oats, wheat barley) c</td>
<td>5101.2</td>
<td>447.0</td>
</tr>
<tr>
<td>Hay c</td>
<td>4126.3</td>
<td>374.9</td>
</tr>
<tr>
<td>Other (pasture, farmstead, idle land, etc.) c</td>
<td>21225.5</td>
<td>1234.6</td>
</tr>
<tr>
<td>County size d</td>
<td>140353.6</td>
<td>5969.9</td>
</tr>
<tr>
<td>Urban area d</td>
<td>6095.6</td>
<td>809.1</td>
</tr>
<tr>
<td>Rural area d</td>
<td>135187.3</td>
<td>5613.3</td>
</tr>
<tr>
<td>Area in state and federal roads d</td>
<td>2859.8</td>
<td>142.7</td>
</tr>
<tr>
<td>Deer harvest e</td>
<td>252.9</td>
<td>20.7</td>
</tr>
</tbody>
</table>

aU.S. Census Bureau 1980 census
bPeter Roberts, Illinois Department of Conservation
c1979 Illinois agricultural statistics, Illinois Cooperative Crop Reporting Service, IL Dept. Agriculture
dLands Unsuitable for Mining Project, IL Natural History Survey
eDeer harvest statistics, Illinois Department of Conservation
Table 20. Results of the regression on principal components with deer kill as the dependent variable (n=98)

<table>
<thead>
<tr>
<th>Component</th>
<th>Regression Coefficient</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>2- Low amounts of forested and other land, large amounts of corn and urban area, human population high</td>
<td>-0.00081</td>
<td>81.30**</td>
</tr>
<tr>
<td>3- Large amounts of corn and soybeans, little urban area and human populations low</td>
<td>-0.00034</td>
<td>13.04**</td>
</tr>
<tr>
<td>4- Relatively little corn, soybeans and hay</td>
<td>-0.00046</td>
<td>12.68**</td>
</tr>
<tr>
<td>1- Large amounts of forest, farmland, soy beans small grain, hay, other, rural land, state and federal roads</td>
<td>0.00016</td>
<td>14.48**</td>
</tr>
<tr>
<td>5- Little forest, large amounts of small grain and hay</td>
<td>-0.00059</td>
<td>12.95**</td>
</tr>
</tbody>
</table>

** p< 0.01

<table>
<thead>
<tr>
<th>Year</th>
<th>Post-hunt Aerial Counts</th>
<th>Minimum Known Present</th>
<th>Pre-Hunt Kill</th>
<th>Estimated Population</th>
<th>Pre-Hunt Kill</th>
<th>Estimated Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>82</td>
<td>48</td>
<td>100</td>
<td>584</td>
<td>2,357</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>124</td>
<td>43</td>
<td>113</td>
<td>606</td>
<td>1,985</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>135</td>
<td>56</td>
<td>101</td>
<td>716</td>
<td>2,169</td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>146</td>
<td>72</td>
<td>161</td>
<td>811</td>
<td>3,130</td>
<td></td>
</tr>
</tbody>
</table>

Rate of Increase

<table>
<thead>
<tr>
<th>%</th>
<th>19</th>
<th>14</th>
<th>16</th>
<th>11</th>
<th>10</th>
</tr>
</thead>
</table>

Platt County Study Area

Platt County

Region 5 Pre-Hunt Estimated Population

Aerial Counts Minimum Known Present Pre-Hunt Kill Estimated Population Pre-Hunt Kill Estimated Population
Table 22. Estimated pre-hunt deer populations and known fall deaths on the Platt County Study Area, 1981-1983.

<table>
<thead>
<tr>
<th></th>
<th>Fall 1981</th>
<th>Fall 1982</th>
<th>Fall 1983</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimatea</td>
<td>Estimateb</td>
<td>Estimatea</td>
</tr>
<tr>
<td>ESTIMATE</td>
<td>106</td>
<td>132</td>
<td>170</td>
</tr>
<tr>
<td>KNOWN</td>
<td>27</td>
<td>27</td>
<td>37</td>
</tr>
<tr>
<td>% of Est. Fall Pop.</td>
<td>25</td>
<td>20</td>
<td>22</td>
</tr>
</tbody>
</table>

Aerial counts in late fall plus known fall deaths.

Calculated from simulated fall sex and age structure and the number of yearling-adult females calculated from spotlight counts of radio marked females.
Table 23. Age structure per 100 deer for deer shot in Region 5, those dying on the PCSA, and a simulation based on birth and death rates found on the PCSA.

<table>
<thead>
<tr>
<th>Source</th>
<th>Fawns</th>
<th>Fawns</th>
<th>Fawns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Total</td>
</tr>
<tr>
<td>Region 5 Gun Harvests (N = 1322)</td>
<td>34</td>
<td>38</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>31</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>32</td>
<td>31</td>
</tr>
<tr>
<td>Platt County Study Area Mortalities (N = 84)</td>
<td>21</td>
<td>29</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>16</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>45</td>
<td>31</td>
</tr>
<tr>
<td>Simulation PCSA Per 100 Deer</td>
<td>46</td>
<td>44</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>30</td>
<td>27</td>
</tr>
</tbody>
</table>

* Includes fawns of unknown sex.
Table 24. Dispersal tendencies of marked deer by sex and age class on the PCSA.

<table>
<thead>
<tr>
<th>Age Marked</th>
<th>Sex</th>
<th>Number Marked</th>
<th>Known to Have left PCSA</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fawn</td>
<td>Male</td>
<td>52</td>
<td>36</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>47</td>
<td>27</td>
<td>57</td>
</tr>
<tr>
<td>Yearling</td>
<td>Male</td>
<td>9</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>13</td>
<td>5</td>
<td>38</td>
</tr>
<tr>
<td>Adult</td>
<td>Male</td>
<td>13</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>23</td>
<td>7</td>
<td>30</td>
</tr>
</tbody>
</table>
Table 25. Number of deer seen along a 21.3-km spotlight route on the PCSA during fall 1983 and spring 1984.

<table>
<thead>
<tr>
<th>Date</th>
<th>Adult Males</th>
<th>Yearling Males</th>
<th>Yearling and Adult Females</th>
<th>Fawns</th>
<th>Total</th>
<th>Yearling-adult Females Lincoln Index Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Available</td>
</tr>
<tr>
<td>9-28-83</td>
<td>2</td>
<td>1</td>
<td>21</td>
<td>22</td>
<td>46</td>
<td>19</td>
</tr>
<tr>
<td>10-4-83</td>
<td>1</td>
<td>5</td>
<td>13</td>
<td>18</td>
<td>37</td>
<td>19</td>
</tr>
<tr>
<td>10-10-83</td>
<td>1</td>
<td>1</td>
<td>13</td>
<td>20</td>
<td>35</td>
<td>19</td>
</tr>
<tr>
<td>10-17-83</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td>12</td>
<td>23</td>
<td>19</td>
</tr>
<tr>
<td>10-24-83</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>14</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>11-1-83</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>6</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>11-21-83</td>
<td>2</td>
<td>2</td>
<td>9</td>
<td>12</td>
<td>25</td>
<td>19</td>
</tr>
<tr>
<td>11-30-83</td>
<td>2</td>
<td>0</td>
<td>7</td>
<td>8</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-13-84</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>11</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>4-19-84</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>4-24-84</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>11</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>5-11-84</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>13</td>
<td>21</td>
<td>14</td>
</tr>
<tr>
<td>5-8-84</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>9</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>5-15-84</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>7</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>5-23-84</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>13</td>
<td>26</td>
<td>14</td>
</tr>
<tr>
<td>5-31-84</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>2</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 26. Seasonal drive counts of deer conducted on selected areas in the major forest types on the PCSA.

<table>
<thead>
<tr>
<th>Area (Ha)</th>
<th>Winter</th>
<th></th>
<th>Spring</th>
<th></th>
<th>Summer</th>
<th></th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. Deer per Drive 10 ha</td>
<td>No. Deer per Drive 10 ha</td>
<td>No. Deer per Drive 10 ha</td>
<td>No. Deer per Drive 10 ha</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Succ. (upland)</td>
<td>31.5</td>
<td>16</td>
<td>2.3</td>
<td>8</td>
<td>0.95</td>
<td>11</td>
<td>1.1</td>
</tr>
<tr>
<td>Later Succ. (Upland)</td>
<td>55.2</td>
<td>27</td>
<td>1.4</td>
<td>20</td>
<td>0.6</td>
<td>19</td>
<td>0.6</td>
</tr>
<tr>
<td>Mature (Upland)</td>
<td>33.5</td>
<td>17</td>
<td>0.7</td>
<td>4</td>
<td>0.1</td>
<td>12</td>
<td>0.5</td>
</tr>
<tr>
<td>Bottoms (Mature)</td>
<td>44.7</td>
<td>14</td>
<td>0.1</td>
<td>Flooded</td>
<td>9</td>
<td>0.4</td>
<td>8</td>
</tr>
<tr>
<td>Mixed (Plantations, early Succ.)</td>
<td>19.0</td>
<td>5</td>
<td>4.2</td>
<td>5</td>
<td>3.9</td>
<td>6</td>
<td>1.8</td>
</tr>
</tbody>
</table>
Table 27. Chest girth and hind foot measurements of fawns and yearlings captured on the PCSA between January and March, 1984.

<table>
<thead>
<tr>
<th>Year Class</th>
<th>Chest Girth (cm)</th>
<th></th>
<th></th>
<th>Hind Leg (cm)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Fawns</td>
<td>N</td>
<td>Mean</td>
<td>S.D.</td>
<td>N</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>80.7</td>
<td>4.2</td>
<td>12</td>
<td>75.0</td>
<td>6.1</td>
</tr>
<tr>
<td>Yearlings</td>
<td>5</td>
<td>91.1</td>
<td>3.3</td>
<td>3</td>
<td>90.7</td>
<td>3.1</td>
</tr>
</tbody>
</table>
Figure I. Location of the Piatt County Study Area in relation to Deer Region 5 and Piatt County.

7,191 acres
Cropland = 60%
Woodland = 35%
Pasture = 5%
LPTSPL Version 3.0(104) running on SPIN3 under AMOS/L Version 1.1A(68)

File DSK2:URBDR.LST[50,4] printed on Tuesday, September 11, 1984 09:43:37 AM
Forms: NORMAL
Fig. 1. Location of Forest Preserves in Cook County. Numbers correspond to areas listed in Table 3.
Fig. 2. Conception chronology of white-tailed deer in northeastern Illinois (N=51 sets of fetuses). Histogram depicts the onset, termination, and peak of the breeding season.
Fig. 3. Cumulative frequencies of conceptions based on 51 sets of fetuses of white-tailed deer in northeastern Illinois. Subadults (N=12, fawns and yearlings) conceived later than adults (N=39).
Fig. 4. Annual number of deer-vehicle collisions recorded by Hoffman Estates and Bartlett Police Departments during 1978-1983. Total deer-vehicle collisions for 1984 are projected by multiplying the number (N=11) of accidents recorded during January-June 1984, by the ratio of the total number of accidents (N=15) in 1983, divided by accidents (N=7) reported during January-June 1983 (i.e. 11 X 15/7 = projected number of accidents in 1984).
Fig. 5. Frequency of reported deer-vehicle collisions by month for Hoffman Estates and Bartlett Police Departments during 1978-1983.
Appendix A. Types of data collected from 277 white-tailed deer carcasses between 1 November 1983 and 30 June 1984.

Date and specific location
County
  Cook (n=225)
  DuPage (n=14)
  Kane-McHenry (n=8)
  Lake (n=30)

Sex and age
  Wear and replacement (all deer)
  Cementum annuli counts for adults (n=96)

Measurements
  Linear (total, tail, hind foot, ear, shoulder, girth, femur)
  Weight (whole body, heart, gastronemius)

Reproduction (tracts, fetuses, pregnant/lactating)

Toxicology samples (n=260)
  Pesticides and PCB's (fat, brain, hair samples)
  Heavy metals (muscle, liver, kidney samples)

Diseases and parasites
  Histopathology (n=160), (lung, liver, kidney samples)
  Feces (n=229)

Condition evaluations
  Kistner technique (n=178)
  Kidney fat index (n=219)
  Femur and mandibular marrow (n>225)

Cause of mortality

Other
  Watkins-Brookfield Zoo
    Thyroids
    Gastronemius
Appendix B. Press release sent to selected media requesting information on deer-caused damage to aesthetic and commercial plantings.

State biologists are currently studying deer herds in northeastern Illinois. In recent years, deer numbers have greatly increased simultaneous to a loss of suitable habitat due to urban development. The close proximity of large numbers of deer and people has resulted in a substantial rise in the frequency of browsing and antler-rubbing damage to homeowners ornamental shrubs, trees and gardens. Complaints from commercial nurseries, arboretums, country clubs and farmers have also increased.

As part of a 3 year comprehensive deer research program, biologists are requesting help in identifying areas in Cook, DuPage, Kane, and Lake counties, where residents are sustaining deer-related damage to ornamental plantings and crops. All records will be entered into a computer which will produce a detailed map that will help biologists to classify areas by the type and intensity of losses. If you have sustained damage caused by deer browsing or antler rubbing, please contact:

Illinois Natural History Survey
Rt. 4, Box 178
Elgin, IL 60120
(312) 289-7620