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ILLINOIS NATURAL HISTORY SURVEY

Performance Report

Annual Job Progress Report

W-87-R-5

Section of Wildlife Research

Cooperative Forest Wildlife Research

Biology, Ecology, and Management of Deer
in the Chicago Metropolitan Area

1 July 1983 through 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 Research

Sub-Project VII-D: Biology, Ecology, and Management of Deer in the Chicago Metropolitan Area

This is a progress report covering job segment W-87-R-5, Sub-Project VII-D; the final report will be forthcoming at the end of the current 3-year segment to conclude on 30 June 1986.

Study No. 104-1: Life History and Ecology of an Urban Deer Herd

Study Objectives:

1. To determine distribution of white-tailed deer in Cook, DePage, Kane, and Lake counties, Illinois.
2. To quantify demographic parameters of selected herds.
3. To estimate relative densities of selected herds.
4. To determine the health and condition of individual deer, and to assess relative quality among herds.

Study No. 104-2: Deer Range Evaluation for Metropolitan Northeastern Illinois

Study Objectives:

1. To identify and quantify present and potential habitable deer range in northeastern Illinois.
2. To assess impacts of deer on vegetation and other resources.

Study No. 104-3: Management Strategies and Implementation of Experimental Control of Urban Deer

Study Objectives:

1. To design, implement, and evaluate alternative strategies for management and control of urban deer.
2. To determine population characteristics of herds that may be used as indicators as to whether a herd needs to be controlled.
3. To determine numbers and timing of deer reduction necessary to manipulate population size (i.e. to increase, to stabilize, or to reduce herd size).
4. To predict the consequences if control levels are not achieved.
5. To determine the economics of alternative control techniques.

Study No. 104-4: Data Base Management, Analysis, and Reporting on Urban Deer Research

Study Objectives:

1. To compile, organize, and manage for access and preservation the array of data resulting from the urban deer study.
2. To integrate project generated data into a comprehensive system of data base management.
3. To generate reports and scientific and professional manuscripts for publication and news releases for local and statewide distribution.

(a) Activity

Overview of Project Initiation

Initial efforts of project personnel were concentrated on detailed planning and scheduling, selecting and ordering equipment for capture and marking, transportation, data

processing, postmortem analyses, and vegetation studies. Various contractual services were located and evaluated as to whether they would be of value to our program.

A field office was established in northwest Cook County at the New Division Maintenance Headquarters, Cook County Forest Preserve District. Numerous advantages were associated with this site. The Cook County Forest Preserve District (CCFPD) is an active cooperator in the urban deer research program. Office space and a separate equipment/necropsy room, including electrical utilities, were offered gratis by the CCFPD. The facility is fenced, has an on-site employee living within the compound, and has space adjacent for the disposal of salvaged deer carcasses. The CCFPD personnel that presently work out of the New Division headquarters have been highly cooperative in supporting our activities. The field office mailing address and telephone number are:

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

The 4-county study area is too large for across-the-board intensive research. Consequently, we spent considerable time traveling within the study area searching for representative sites that would be suitable for first year research. Our objective was to select the most promising areas, initiate first year field work, then expand as desired during subsequent years. The Ned Brown Preserve (Busse Woods) and forest preserve lands adjacent to the Des Plaines River were the most suitable areas

for field work during the first year. Both areas are under CCFPD jurisdiction and located in northern Cook county. Each supports large deer herds that are seriously impacting forest vegetation as evidenced by clearly visible browse lines.

Personal contacts with individuals and agencies during the first few months have proved invaluable. Little can be accomplished in northeastern Illinois without permission and support from public agencies. A large measure of our first year accomplishments can be attributed to the efforts of key individuals who provided procedural advice and frequently "sheparded" our requests through their systems.

The following sections contain examples of data that we are presently collecting. In this first report, we present these sections as pieces, with limited emphasis on demonstrating interrelationships. Because of the preliminary status of this study, we have stressed descriptions and evidence of sample size rather than statistical analyses and discussions. Discussions identify the appropriate PR Job and Objective numbers so that readers may better visualize the application of these data to specific project objectives.

Postmortem examinations (104-1:2,4; 104-3:2; 104-4:1,2,3)

We received excellent cooperation from public agencies in locating deer mortalities. Much of our time was spent collecting deer carcasses and performing postmortem examinations. Two-hundred seventy-seven deer carcasses, or parts of carcasses, were examined between 1 November 1983 and 30 June 1984. The primary cause of mortality was from deer-vehicle collisions.

Other causes of death included malnutrition, accidents, illegal shooting, dogs, and animals collected for scientific purposes.

The importance of data on physical condition, mortality, and numerous physiological and population parameters, warrants the large amount of time that was spent collecting and processing animals (estimated at a minimum of 4 hours per deer). Data collected during postmortem examinations (Appendix A) form the basis for evaluating potential variability in health and demography among deer herds. The degree of variability among herds will define the need for site-specific management.

Capture and marking activities (104-1:1,2,4; 104-2:1; 104-3:2,3,4; 104-4:1,2,3)

Deer were captured with cannon nets (Hawkins et al. 1968). Trapping techniques differed somewhat from those used on the INHS Allerton Park deer study because of the large numbers of deer and their habituation to human disturbance. Although pre-baiting was necessary, capture equipment (nets, launchers, and rockets) was set up at the time of capture. This was critical because of the potential for vandalism. Multiple captures were made on the same site on numerous occasions. The acrid odor of discharged rockets and the various scents and ground disturbance associated with the handling of deer were not sufficient to deter some animals from coming to the bait.

Deer were marked in 1 of 3 ways. Strips of colored streamer material riveted to plastic tags were placed on both ears of each captured buck. Most of the does captured received neck collars of hard plastic having highly visible identification numbers

of light-reflecting tape. Thirteen does captured near the Des Plaines River were instrumented with radio-collars. In addition, all deer were tagged with paired metal ear-tags.

One hundred-thirteen deer were captured using cannon nets during December 1983-April 1984 (Table 1). The capture total included 102 individuals marked and released, 7 recaptures, 3 subadults collected for nutrition research, and 1 adult not released due to injury. Capture related mortality was less than 1% (1/110). We believe the capture program to have been highly successful.

No significant movements have been detected among the 13 radio-collared does. Each has stayed in the general area of capture with no evidence of dispersal. One mortality was recorded. The remains of the first radio-collared doe were located in an isolated corner of a landfill; the hide had been cut with a knife and meat stripped from the skeleton suggesting that it had been poached.

Aerial surveys (104-1:1,2,3; 104-2:1; 104-3:2; 104-4:1,2,3)

Aerial counts of white-tailed deer on CCFPD lands were made between 27 December 1983 and 13 January 1984. Counts should be regarded as minimum numbers of deer on a given site because some indeterminable percentage of deer is not observed during any survey. Also, the Des Plaines River adjacent to O'Hare International Airport, consisting of 18.6 km of prime deer habitat, could not be surveyed because of conflict with air traffic.

One thousand five hundred and ten deer were counted during aerial surveys (Table 2). Deer were observed in all CCFPD divisions (Fig. 1); counts were highly variable among areas. Minimum densities for small segments of forest preserves ranged from 0 to 49 deer/km (0 to 123 deer/mile). Highest densities were recorded on the Des Plaines River and in the Ned Brown Preserve north of Rt. 72 (Busse Woods). The highly urbanized areas of the Calumet Division contained few deer.

We also ranked larger areas by relative densities (Table 3). As expected, deer densities on the Des Plaines River and the Ned Brown Preserves ranked highest. The fewest deer/area were observed in the Calumet Division, Deer Grove/Baker's Lake area, North Branch Division, and the Morton Arboretum (DuPage County).

Condition and health evaluation (104-1:2,4; 104-2:2; 104-3:1,2,3,4; 104-4:1,2,3)

Evaluations of physical condition and health of ungulates have been extensively described in deer literature. White-tailed deer operate on age and sex dependent seasonal cycles that confound determination of nutritional status. No single model now available adequately accounts all the variability resulting from differences due to sex, age, and season.

A cooperative study of white-tailed deer nutrition was established with Dr. Bruce Watkins, animal nutritionist at the Brookfield Zoo. This study incorporates the original project objectives, but offers the advantage of utilizing a higher level of expertise in nutritional assessment. Briefly, we are examining techniques used to evaluate condition at 3 levels. The

first level includes techniques that can be collected from live animals: 1) factors of blood chemistry, 2) physical measurements, and 3) whole body weight. The second level, postmortem evaluations, combines the techniques of level 1 with internal evaluations including the: 1) kidney fat index, 2) fat content of femur marrow, 3) fat content of mandibular marrow, and 4) Kistner evaluation of fat deposition. The third level incorporates levels 1 and 2 with whole body composition analyses. The latter will provide a basis for evaluating how well live animal and/or postmortem indices predict body composition.

Live animal evaluations were collected from 102 deer captured and released for population studies (n=102) and from 22 deer collected during April. Live animal and postmortem evaluations were performed on all mortalities (see Appendix A for sample sizes). In coming segments, subadult deer, the most sensitive age-class to nutritional stress, will be collected during the peak (late fall) and ebb (late winter) periods of physical conditions to facilitate comparisons using techniques of levels 1, 2, and 3.

We are cooperating with Dr. Paul Grimstead, University of Notre Dame, on studies of encephalitis transmission. Blood sera taken from deer in the Chicago metropolitan area showed a relatively high incidence of positive titers for Jamestown Canyon virus, a member of the California encephalitis serogroup (pers. commun. P. Grimstead).

Tissues (n=260) have been collected and will in the near future be submitted to Dr. Susan Wood, analytical chemist, INHS,

for analyses of heavy metals, pesticides and PCB's. Lung, liver and kidney samples have been preserved in formalin for histopathological analyses. Results from these studies will be summarized in the FY85 annual report.

Reproductive performance (104-1:2,4; 104-3:2,3,4; 104-4:1,2,3)

Factors of reproductive performance can strongly influence herd dynamics. Fetal counts, measurements, and sex determination, taken from carcasses of females during February-May, provide useful data on age-specific fecundity and fetal sex ratios (Harder 1980:31). In addition, birth and conception chronologies can be estimated from fetal measurements.

The ages of 51 sets of fetuses were estimated by comparing measurements and morphological development with established growth curves (Armstrong 1950, Larson and Taber, 1980:148). A breeding season chronology was determined from the frequency distribution of estimated dates of conception (Fig. 2). Assuming that this chronology represents fall breeding in northeast Illinois, we estimated that: 1) first conceptions occurred between 6 and 10 November 1983, 2) the peak (mode) of breeding was 1-5 December, and 3) last conceptions were recorded during 20-24 January 1984. The length of the breeding season was almost 3 months, although most (77%) deer conceived prior to mid-December. Preliminary analyses suggest that the timing of conceptions differed substantially between adult and subadult does (Fig. 3).

Parturition (fawning period) of white-tailed deer in northeastern Illinois was estimated by adding 200 days (i.e.

gestation) to individual dates of conception. We recognized that gestation rates can vary from 195 to 212 days (Hall, 1978:50), but feel that such variance will not signficantly alter the accuracy of an estimated schedule of births. The fawning period in northeast Illinois should: 1) begin during 27-31 May, 2) peak near 20-24 June, and 3) terminate around 8-12 August.

Age-specific fecundity is a sensitive index of population quality (Table 4). Fecundity should respond positively to substantial changes in the level of nutrition (Verme 1969). Our data support this trend. On forest preserves with high density deer herds that have severely reduced the vegetative understory by over-browsing, such as Busse Woods and the Des Plaines River, we observed a relatively low ratio of fetuses/adult female (1.2 and 1.4, n=31), minimal reproduction by yearlings (0.4, n=10), and no pregnancies among fawns (0, N=15). Contrastingly, in northwest Cook County where agricultural crops are common, adult females averaged 2.3 fetuses/doe, and 2 of 6 fawns conceived. Deer from highly urbanized Cook County exhibited lower reproductive rates than deer from DuPage, Lake, and Kane-McHenry counties (Table 5).

Fetal sex ratios of white-tailed deer are typically skewed in favor of male births. Verme (1965 and 1969) noted fetal sex ratios that were highly skewed toward males when animals were nutritionally stressed. Fetal sex ratios from deer collected in northeast Illinois also indicate a highly skewed sex ratio (Tables 4 and 5). Interpretation of these data will become more important as sample size increases.

Age structure of the urban deer herd

Knowledge of the age distribution of females in a deer herd is important for modeling population dynamics. Among hunted populations in Illinois, few deer survive to 5 years (Calhoun and Loomis 1974). One might expect that non-hunted deer herds in Cook, DuPage, Lake, and Kane counties would have an older age structure than in hunted areas. Also, the longevity of some individual deer, whether by chance or learned behavior, should approach the maximum life span of the species.

Lower mandibles were removed from all carcasses. The left side of each mandible was saved for reference and for aging by wear and replacement (Larson and Taber 1980:153-54). A primary incisor was removed from each right mandible of adult deer ($\geq$2 years), cleaned, and sent to a commercial laboratory for sectioning and aging by counting cementum annuli (Erickson et al. 1970, see discussion of Roseberry 1980:75-76).

We have recently received the results of the cementum annuli analyses but have not had sufficent time to fully explore the implications of those data. However it is noteworthy that 27% (20/75) of deer $\geq$2 years were $\geq$5-years-old. The ages of 2 female deer were estimated at 12 and 14 years. Although these results are preliminary, they lend credence to the hypothesis that urban deer herds in northeast Illinois, have older age structures than are found in hunted populations.

Deer-vehicle collisions (104-1:1; 104-2:1,2; 104-3:1,4,5; 104-4:1,2,3)

Frequency of deer-vehicle collisions can be a useful index for evaluating abundance and the effectiveness of management programs. However, it is important to recognize inherent biases and limitations in the sources of such records. We have considered 5 potential sources of data for quantifying factors of deer-vehicle collisions, these include the: 1) Illinois Department of Conservation (IDOC), 2) insurance companies, 3) highway and tollway maintenance departments, 4) records of road-killed deer collected by our study (INHS), and 5) city, county, and state police departments.

The IDOC regional office maintains records of deer-vehicle collisions only if the carcass is claimed for consumption. The accuracy of this information is dependent on descriptions provided by the individual claiming the carcass. In many cases, the carcass is claimed by an individual not involved in the accident. Other factors that may contribute to variation in the frequency of reports to the IDOC include changes in public awareness of the reporting procedures, and, the current willingness of the public to comply with regulations. The IDOC deer-vehicle collision records should be used to augment other records where feasible, but not as a primary source for evaluating accident trends among years.

Insurance companies would be an excellent source of data if their records could be accessed. Our preliminary investigations have been negative primarily because deer-vehicle collisions are

not compiled in a manner that can be used for our needs (pers. commun. G. Burger), and because of a general lack of cooperation exhibited by insurance companies (pers. commun. F. Loomis). If available, insurance records would favor late model vehicles and accidents where substantial vehicle damage and injuries to humans were incurred. Although biased, these data should be a suitable index for evaluating accident trends among years.

State highway and tollway maintenance departments may be good sources of data on deer-vehicle accidents if collection systems were standardized and cooperation was sustained at comparable levels over long periods of time (Pederson and Clark, 1984, unpubl. PR Job Comp. Rep. W63-R(SI)-25).

Records of carcasses collected by the INHS urban deer study are inadequate for use in accident trend evaluations. The effectiveness and intensity of our carcass-collecting efforts varied substantially depending on our workload and other jobs. This variability will continue; ultimately, INHS collection of carcasses will be terminated. These records offer no long term data base, an essential factor for evaluating trends in abundance.

At this time, we believe that accident reports maintained by city, county, and state police departments represent the most useful data for determining trends in deer-vehicle collision in northeast Illinois. Reports are standardized, relatively accessible, and are saved for extended periods of time. Similar to insurance company records, police accident reports are biased in favor of collisions with greater vehicle damage making an

absolute number of collisions indeterminable. However, this deficiency should not influence trend evaluations provided the proportion of non-reported to reported accidents remains relatively consistent among years.

We tested the feasibility of accessing accident records of 4 local police departments. Procedures for accessing traffic accident records varied among police departments. One department indicated that it has never recorded a deer-vehicle accident. A second was reluctant to let us review all files, but was willing to have their personnel select deer-vehicle accidents for our review (these data are not included in this report). The remaining 2 police departments, Hoffman Estates and Bartlett, both active cooperators in our carcass collection program, provided accident report files for INHS perusal.

Traffic accidents are recorded on standard forms that appear to be universal among police agencies. Perusal is simplified because of a block on the form indicating the type of accident (includes a category for animal caused accidents). Consequently, each form does not have to be read in its entirety. The following information was recorded from each deer-vehicle accident report: 1) date, 2) time of day, 3) day of week, 4) number of human injuries/fatalities, 5) location, 6) name and phone number of the driver, and 7) disposition of the deer carcass.

Police agencies have expressed concern regarding contacts with the drivers. Our need for contacting the drivers was to determine the cost of vehicle repairs. To circumvent this

problem, the Bartlett police department volunteered services of their dispatchers to do telephone contacts. To facilitate their efforts, we prepared a questionaire that will simplify and standardize this procedure, thereby enhancing probability of cooperation.

We examined accident records for 1978 through June 1984. We believe this 6.5-year-period sufficient for evaluating annual trends in the number of accidents (Fig. 4). We recognized that these are preliminary analyses based on limited samples. However, the pattern of a rapid rise in accidents during 1983-84 was interesting. Ultimately, we will attempt to identify factors influencing variability in the number of deer-vehicle accidents. In a rapidly changing urban environment, factors other than increased deer numbers, such as traffic volume, average vehicle speed, changes in available habitat, and varying deer behavior, may contribute substantially to trends in the number of accidents.

Other studies have shown pronounced seasonality in the frequency of deer-vehicle accidents (Pils and Martin 1979). Our results support a similar pattern (Fig. 5). Highest frequency of accidents occurred during the fall breeding season (see Fig. 2 for conception chronology of white-tailed deer in northeast Illinois).

Deer-caused damage to plantings (104-1:1,3,4; 104-2:1,2; 104-3:1,4; 104-4:1,2,3)

We have been locating sources of information on deer-caused damage to aesthetic and commercial plantings. The IDOC provided

copies of damage reports (unpubl. reports, S. Garrow, J. Langbein). Complaintants were recontacted for additional information. County planning departments provided lists of nurseries, orchards, and golf courses. We have sent press-releases to media in which we request help from the public in identifying areas where deer have caused damage to plantings (Appendix B). Presently, we have divided these sources of information by type; individual records of damage will be cross-referenced, by type and keywords, onto computer files:

I. Aesthetic plantings/landscaping/collections

   A. Homeowners
   B. Golf courses and country clubs
   C. Public recreation facilities
   D. Scientific collections
   E. Cemetaries, churches and schools

II. Commercial interests

   A. Nurseries
   B. Orchards
   C. Farm crops

Three types of damage to vegetation have been reported. Browsing damage occurs primarily during winter, concurrent with the period of greatest nutritional stress. During fall, bucks strip velvet from their antlers and they mark sites by thrashing selected shrubs and small trees. This activity frequently kills the woody plant by destroying the cambium layer. Deer hoofprints on rain-softened putting greens have caused minor damage on several golf courses.

Effect of deer on forest vegetation (104-1:4; 104-2:1,2; 104-3:4; 104-4:1,2,3)

Deer herds at sustained high density can produce adverse, long-term impacts on forest vegetation. The primary effect is a reduction of foliar and stem biomass in the understory. High pressure is placed on the more palatable plant species, thereby altering vegetative composition and retarding forest succession. Populations of small and medium-sized mammals, birds, and amphibian/reptiles can be negatively affected by losses of vegetative cover. The ecological interrelationships among life forms in an urban forest are complex; overbrowsing by deer is a perturbation that impacts these relationships.

To measure the effect of deer browsing on selected CCFPD sites, three 20 X 50-m deer-proof exclosures were constructed. Transect lines were permanently staked, within the exclosures and on adjacent control plots, using rebar. We will be measuring vegetative growth twice annually, during late winter (stems) and in late summer prior to leaf drop (foliage). During this first year, other field activities took priority over late winter measurements. We presently are conducting our late summer sampling of vegetation. First year regeneration appears to be minimal.

During the second year of research, we will map areas by cover types. Vertical structure of foliage will be measured and used as an indicator of deer browsing intensity.

Selective collecting (104-1:2,4; 104-3:1,2,3,5; 104-4:1,2,3)

Primary objectives for collecting deer during April were to quantify reproductive status immediately prior to parturition, to evaluate post-winter physical condition, and to increase the sample size of specimens collected for toxicology and pathology studies. A secondary objective was to determine the effectiveness of selective shooting as a possible means of population control in areas with relatively high deer densities.

Authorizations from the IDOC and the CCFPD were required to collect deer on Forest Preserve land. The IDOC (Loomis, Forest Wildl. Program Supervisor) admended the scientific collecting permit (W-4023) of J.H. Witham, prescribing the maximum number of deer to be taken from specific sites. The CCFPD (Eisenbeis, Superintendent of Conservation) issued written authorization to collect those numbers of deer, for scientific purposes, on Forest Preserve land.

Forest Preserve police were advised of proposed collection activities via the Superintendent of Conservation. Contact with Forest Preserve police, confirming authorization, was made by the INHS 3 days prior to the first collecting activity. Police departments of villages adjacent to collecting sites, and CCFPD Maintenance Division Superintendents with juristiction for those sites, were also notified in advance. At the request of the CCFPD police, arrangements were made to contact the Cook County Police radio dispatcher when personnel doing the shooting entered and left specific areas.

Twenty-two deer were collected during three nights (Table 6). As expected, the time interval between kills varied. Factors influencing the time interval between kills included deer activity patterns (moving, foraging, bedded), experience and coordination among individuals in the shooting vehicle (1 driver with spotlight, 1 observer with spotlight, 2 shooters), and increased wariness of deer that had been previously spotlighted.

All deer were shot in the head or neck with 0.22 caliber Long Rifle hollow point bullets. Animals hit squarely in the head/neck area dropped immediately to the ground, although, a second shot from close range was frequently used to expedite death. All shots were fired at stationary animals at distances estimated at $\leq$50 m. Blood samples were successfully taken from 19 of 22 deer. On 23 April, carcasses were transported to a central location in Busse Woods to be evicerated. Carcasses and eviscera were then transported to the INHS field office in Hoffman Estates. Deer taken on 24 and 26 April were transported directly to the INHS field office for processing. All carcasses were buried in a disposal site on CCFPD property.

We demonstrated, under special conditions, that deer can be efficiently collected using a scoped 0.22 rifle and spotlights. The special conditions included: 1) a high density herd, 2) animals habituated to vehicles, 3) a heavily wooded area that inhibited long distance flight of a bullet, 4) an area where public access could be restricted, and 5) reasons for choosing not to use large caliber rifles or shotguns. Expert and experienced marksmen are essential.

Data base management

A minimum of 3 computer systems will be used to store data collected during the Urban Deer Study. We currently have used an Apple IIe minicomputer and the main frame Cyber at the University of Illinois, Champaign. Arrangements have been made to use the INHS PRIME system during the second year of reseach.

An Apple IIe minicomputer is located in the field office. During the past year the Apple IIe word processing program has been used extensively for producing letters of correspondence and data sheets. Data files that did not require complex statistical manipulation were stored on the Apple IIe. Bookends, a bibliographic management system, was used to manipulate and store citations accumulated during literature searches. To date, temporary assistants using the University of Illinois libraries have entered over 1,000 deer-related citations. Copies of these files have been made available for use by both the Urban Deer Project and the Allerton Deer Study. Larger sets of data have been entered on the Cyber system. These files included data collected during necropsies and initial blood chemistry analyses.

We have been preparing to use the INHS PRIME system for relating urban deer populations to habitat quality, impacts on vegetation, and highway collisions. The preparation involved in applying this system to our northeastern Illinois study area is much greater than originally anticipated. Base maps on the PRIME system were not of sufficient detail for project needs. We are presently tracing selected details (i.e. major roads, forest preserves, water) from 7.5 min. USGS topographic maps onto mylar

sheets. Tracing is considered necessary because changes in humidity cause the topographic map paper to shrink and/or expand (pers. commun. C. Treworgy). The tracing process is tedious because of the large number of maps (N=55) required to include all of the study area. Ultimately, mylar tracings will be digitized onto the PRIME system by a temporary assistant in Champaign.

Reporting on deer research

Project personnel discussed objectives and accomplishments of the Urban Deer Study with a variety of media and special interest groups. We have contributed information for newspaper articles in the Chicago Tribune (1), Daily Herald (4), Lake Geneva Chronicle (1), Lerner publications (1), and the Outdoor Notebook (2). Three interviews were conducted for television media; Chicago channels 5, 7, and 9 participated in an unsuccessful capture session. Project-related questions were answered during telephone interviews for WIND and WBBM radio stations. Seminars were presented for the Auroraland Bowhunters (Chelsvig), Barrington Natural Historical Society (Witham), McHenry County Conservation District (Witham), and the INHS-IDOC PR meeting (Witham). Four quarterly reports and one annual report have been prepared.

(b) Target Date for Achievement:

Final Report due 30 September 1986.

(c) Date of Accomplishment: On Schedule.

(d) Significant Deviations: None.

(e) Remarks: None.

(f) Recommendations: None at this time.

(g) Cost: Federal $114,728; State $38,243; Total $152,971.

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Table 1. Sex, age, and location of white-tailed deer captured in northeastern Illinois during December 1983-April 1984. [a]

Area	Male			Female			Unk
	Fawn	Yrling.	Adult	Fawn	Yrling.	Adult	
Ned Brown (Busse Woods)	23	3	8	10	3	17	1
Des Plaines River	11	2	2	6	6	12	1

[a] Includes animals captured and released (N=102), 1 trap mortality, and 3 deer collected for nutrition studies.

Table 2. Numbers of deer observed on Cook County Forest Preserves during winter aerial flights, 27 December 1983 - 13 January 1984.

Location [c]	Number of deer [b] counted	Relative Density [a] Deer/km.	Deer/mile
SAG VALLEY			
E. of Willow Spr. Rd.	41	6.6	16.4
W. of Willow Spr. Rd.	71	8.2	20.4
Tampier Slough	24	6.5	16.2
McGinnis Slough	22	7.7	19.3
PALOS			
W. of Willow Spr. Rd.	78	8.4	21.0
E. of Willow Spr. Rd.	113	10.5	26.3
Black Partridge	0	0	0
SALT CREEK			
Bemis Wds, S of 31st	13	3.2	8.1
W. of 17th, btwn 31st/22nd	11	6.5	16.2
Miller Meadows.....			
Brookfield Zoo area	0	0	0
S. of Ogden Ave.....			
Lake Ida	23	11.4	28.4
NED BROWN			
N of Higgins	258	42.6	106.6
S of Higgins	35	6.1	15.3
DEER GROVE	8	1.2	3.1
PAUL DOUGLAS	20	4.0	10.0
BAKERS LAKE	0	0	0
TINLEY CREEK			
N of 151st St	19	1.6	4.0
Btwn 179th & 167th	9	2.9	7.2
131st S to Volmer	34	1.7	4.2
NEW DIVISION			
Poplar Crk W of Sutton	23	4.7	11.6
Poplar Crk E of Sutton	12	1.1	2.8
Spr Lake			
S Dundee, N Higgins	40	6.1	15.3
N Dundee to County line	27	3.1	7.8
Crabtree	37	8.2	20.4

Cont.

Table 2 - Cont.-2

Location [c]	Number of deer [b] counted	Relative Density [a] Deer/km.	Deer/mile
CALUMET			
Eggers Grove	0	0	0
Burnham Woods	0	0	0
Beaubien	0	0	0
S Calumet Sag Channel	3	0.7	1.8
Dan Ryan	0	0	0
Calumet Playfield	0	0	0
Sand Ridge Nat. Center	0	0	0
DES PLAINES			
Golf N to Central	28	37.3	93.3
Central N to Lake	130	49.1	122.6
Lake N to Palatine	24	12.3	30.8
Palatine N to Dundee	80	24.8	62.2
Dundee to Lake/Cook	58	35.2	87.9
NORTH BRANCH			
N of Oakton	6	2.6	6.5
S of Oakton	1	0.3	0.7
SKOKIE			
Tri State S to Voltz (west area)	35	7.4	18.5
Dundee to Lake/Cook	20	5.6	13.9
Dundee to Tower	37	11.1	27.8
Willow to Tower	37	15.4	38.5
Willow to N Branch	25	2.7	6.6
THORN CREEK			
N/NW of Glenwood Rd	35	3.1	7.8
N Lincoln, S Glenwood	13	3.8	9.4
S of Lincoln	25	4.6	11.4
Plum Crk	13	3.1	7.7
OTHER			
MORTON ARBORETUM	8	1.4	3.4
THE GROVE	9		
OTHER	15 (est.)		

[a] Area calculations were determined from Cook County Forest Preserve maps issued to the general public. When more precise maps are obtained, density values will be changed to reflect more precise determination of area.

[b] Counts from aerial surveys are minimum numbers of deer in a given area. They do not reflect absolute numbers because an indeterminable percentage of deer are not observed during a survey.

[c] Des Plaines Division S of Golf Rd. and Indian Boundary Division (18.6 km of deer habitat) were not surveyed because of repeated conflict with air traffic at O'Hare International Airport.

Table 3. Ranking of deer herds in the Cook County Forest Preserve District, based on relative densities determined from minimum counts made during winter aerial flights, 27 December 1983 to 13 January 1984.

Rank	Location	Relative Density [a]
1.	Des Plaines River	++
2.	Ned Brown Preserve	++++++++++++++++++++++++++++++
3.	Palos Division	++++++++++
4.	Sag Valley Division	+++++++++
5.	Skokie Division	++++++++
6.	Salt Creek Division	+++++
7.	Paul Douglas Preserve	+++++
8.	New Division	+++++
9.	Thorn Creek Division	++++
10.	Tinley Creek Division	++
11.	Morton Arboretum [b]	++
12.	North Branch Division	++
13.	Deer Grove/Bakers Lake	+
14.	Calumet Division	+

[a] 2 deer/mile = (+).

[b] DuPage County.

Table 4. Reproductive performance of female white-tailed deer in Cook County.

Age class by area	N	Number of fetuses 0	1	2	3	Fetuses/N	Fetal sex M	F	M/M+F
NW Cook									
1 yr.	6	4	2	0	0	0.3	2	0	1.00
2 yrs.	2	2	0	0	0	0			
> 2 yrs.	6	0	0	4	2	2.3	8	6	0.57
Ned Brown									
1 yr.	9	9	0	0	0	0			
2 yrs.	5	3	2	0	0	0.4	2	0	1.00
> 2 yrs.	13	2	7	4	0	1.2	8	5	0.62
Des Plaines									
1 yr.	6	6	0	0	0	0			
2 yrs.	5	3	2	0	0	0.4	2	0	1.00
> 2 yrs.	18	1	9	7	1	1.4	14	7	0.67
Skokie									
1 yr.	4	3	1	0	0	0.2	1	0	1.00
2 yrs.	0								
> 2 yrs.	0								
Salt Crk.									
1 yr.	0								
2 yrs.	0								
> 2 yrs.	0								
Palos/Sag									
1 yr.	1	0	1	0	0	1.0	1	0	1.00
2 yrs.	1	1	0	0	0	0			
> 2 yrs.	1	1	0	0	0	0			
Tinley & Thorn Crk.									
1 yr.	3	3	0	0	0	0			
2 yrs.	0								
> 2 yrs.	2	0	0	1	1	2.5	3	0	1.00

Table 5. Reproductive performance of female white-tailed deer in Cook, DePage, Kane-McHenry, and Lake counties.

Age class by area	N	Number of fetuses 0	1	2	3	Fetuses/N	Fetal sex M	F	M/M+F
Cook									
1 yr.	29	25	4	0	0	0.1	4	0	1.00
2 yrs.	13	9	4	0	0	0.3	4	0	1.00
> 2 yrs.	40	4	16	16	4	1.5	42	18	0.70
DuPage Co.									
1 yr.	2	1	1	0	0	0.5	1	0	1.00
2 yrs.	3	0	2	1	0	1.3	3	0	1.00
> 2 yrs.	1	0	0	1	0	2.0	2	0	1.00
Kane and McHenry Co.									
1 yr.	0								
2 yrs.	2	2	0	0	0	0			
> 2 yrs.	1	0	0	1	0	2.0	2	0	1.00
Lake Co.									
1 yr.	2	1	1	0	0	0.5	1	0	1.00
2 yrs.	4	4	0	0	0	0			
> 2 yrs.	4	1	0	2	1	1.8	5	2	0.71
Totals for NE Illinois									
1 yr.	33	27	6	0	0	0.2	6	0	1.00
2 yrs.	22	15	6	1	0	0.4	7	0	1.00
> 2 yrs.	46	5	16	20	5	1.5	51	20	0.72

Table 6. Sex and age of white-tailed deer taken by selective shooting on Cook County Forest Preserves during April 1984.

Location	Female			Male	TOTAL
	< 1 yr.	Yearling	≥ 2 yrs.	< 1 yr.	
Ned Brown Preserve (Busse Woods)	2	1	7	0	10
Des Plaines River	2	0	8	2	12

Figure Legends

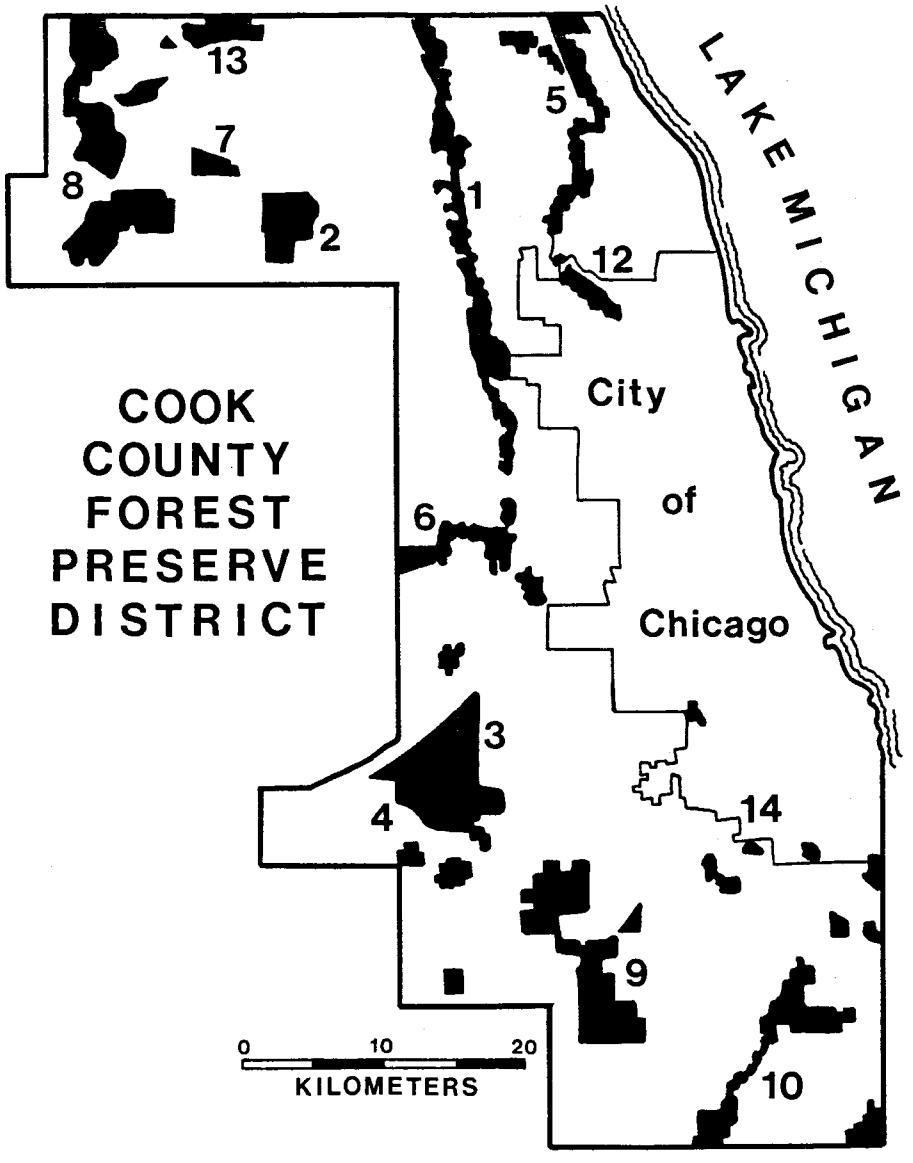
Fig. 1. Location of Forest Preserves in Cook County. Numbers correspond to areas listed in Table 3.

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. Cummulative 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.



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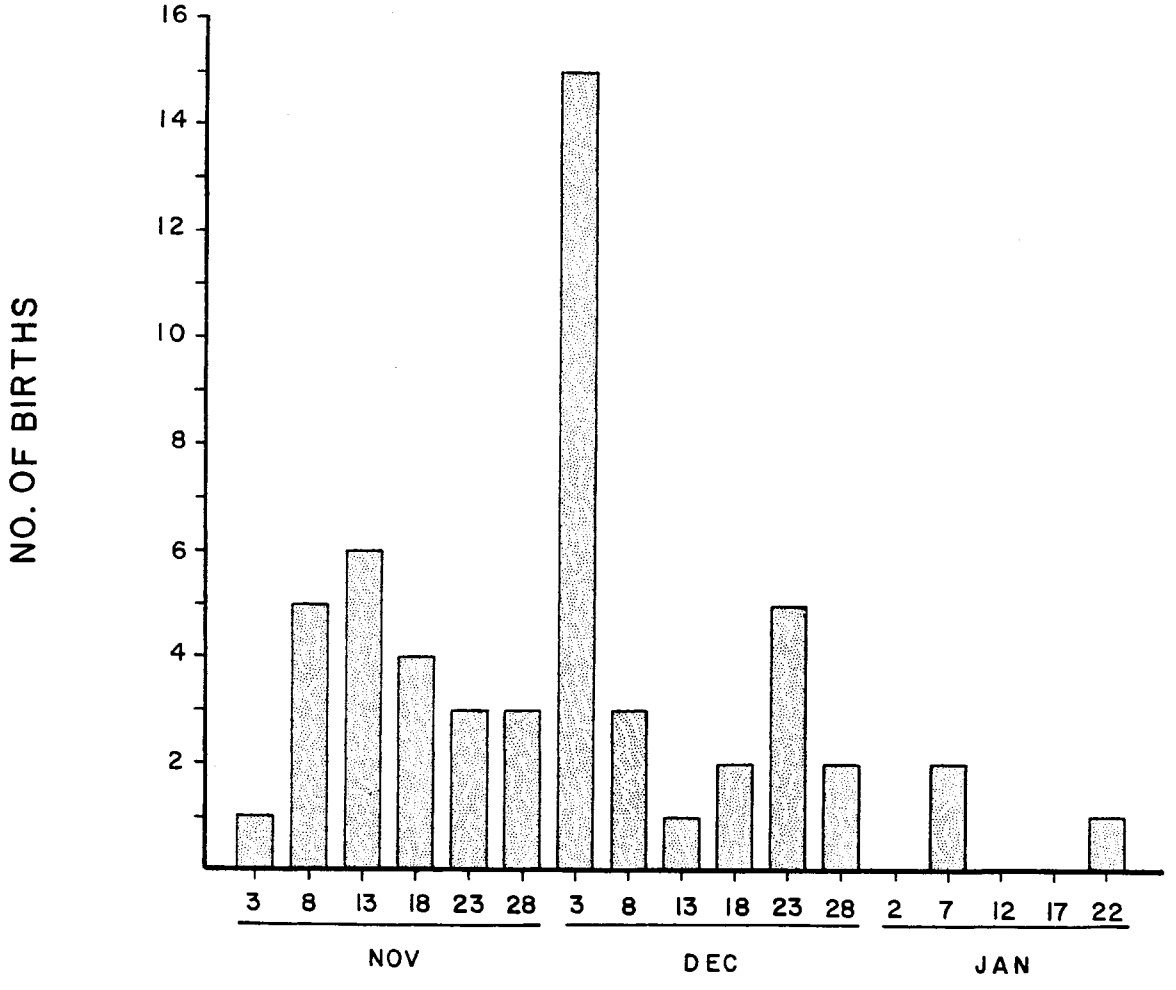

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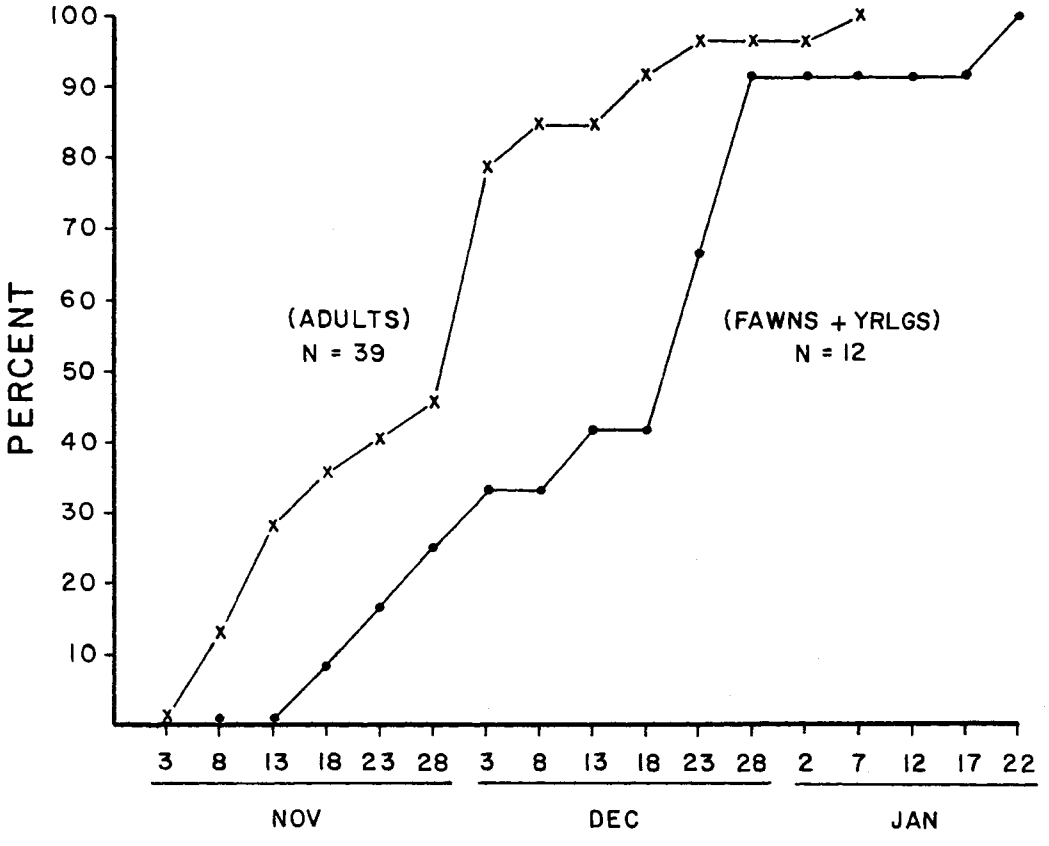

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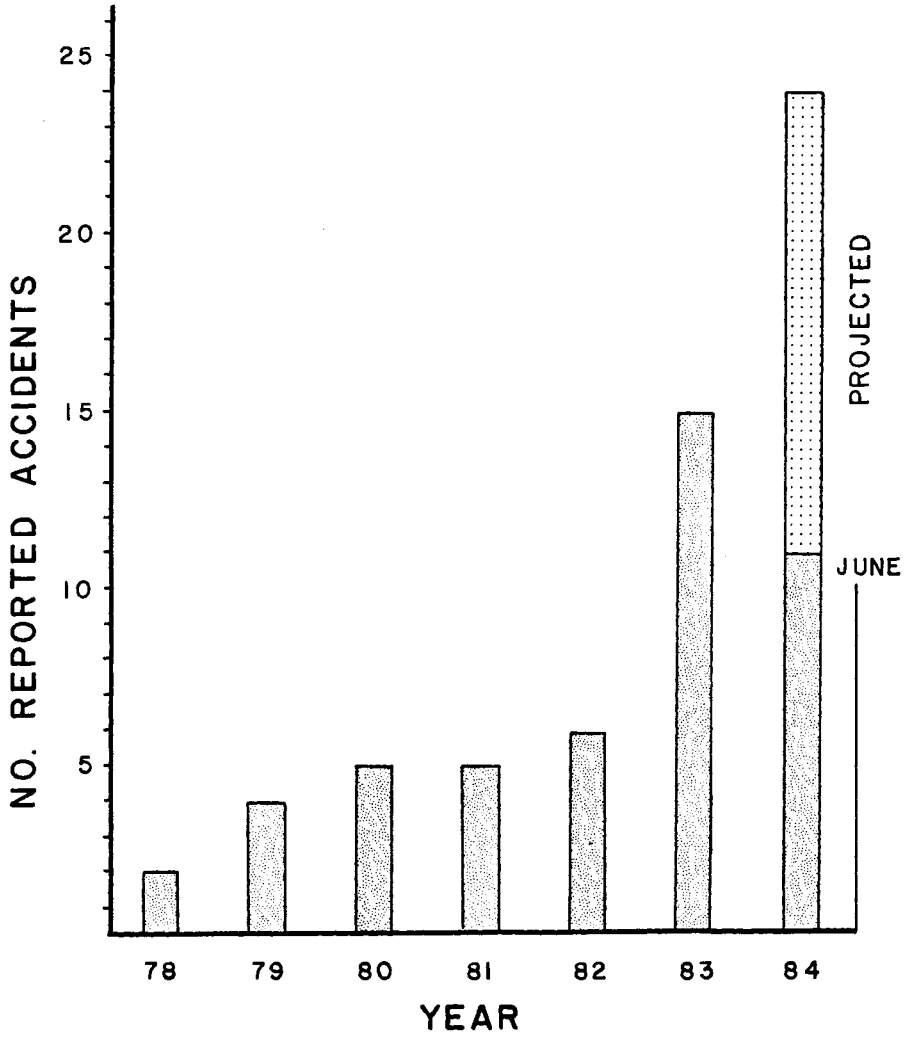

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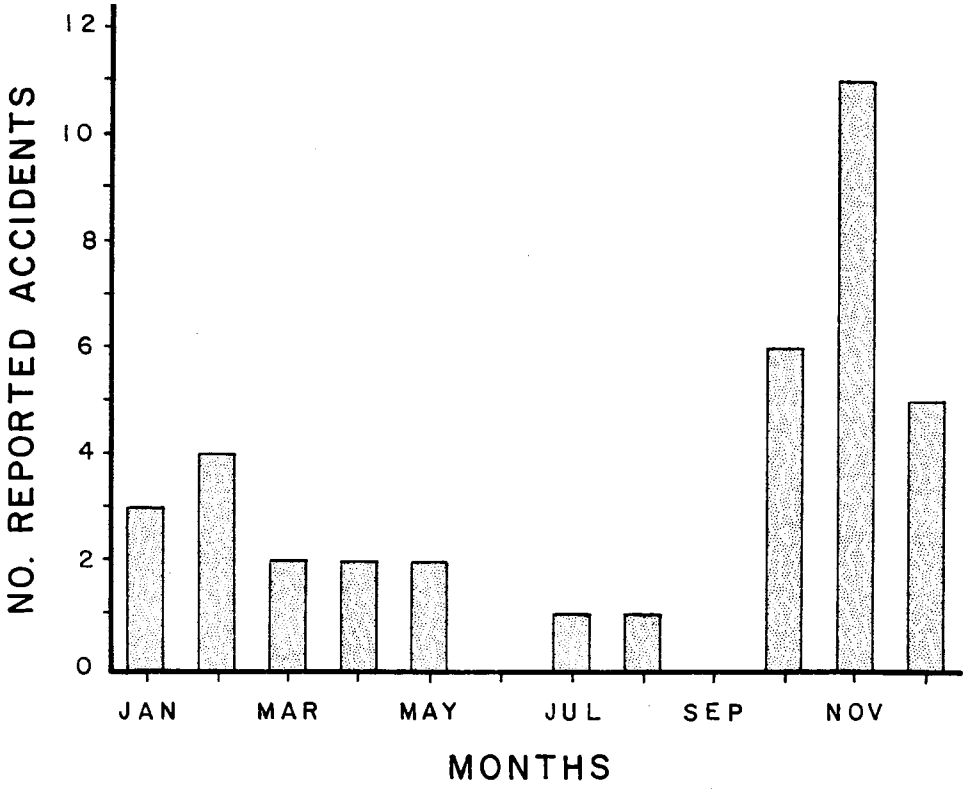


Fig. 5. Frequency of reported deer-vehicle collisions by month for Hoffman Estates and Bartlett Police Departments during 1978-1983.

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.

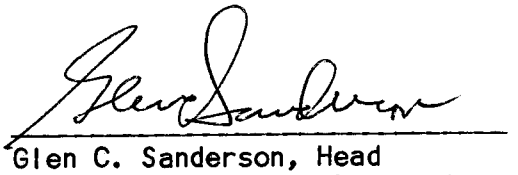
As part of a 3 year comprehensive deer research program, biologists are requesting help in identifying areas in Cook, DuPage, Kane, and Lake counties, where residents are sustaining deer-related damage to ornamental plantings and crops. All records will be entered into a computer which will produce a 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

Prepared by:

James H. Witham
Assistant Wildlife Ecologist

Approved by:



Glen C. Sanderson, Head
Section of Wildlife Research
Illinois Natural History Survey

Date: 30 September 1984