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the Big Cypress National Preserve

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EXECUTIVE SUMMARY

A 3-year research investigation of white-tailed deer (*Odocoileus virginianus*) populations in the prairie/tree island habitat of the Big Cypress National Preserve (hunted site--Stairsteps) and the Everglades National Park (protected site--upper Shark River Slough) was initiated in March 1989 to elucidate the biological potential of the herds as (1) a food resource (prey base) for the endangered Florida panther (*Felis concolor coryi*), and (2) a recreational resource for sport hunting. As of 30 June 1991, 216 (80%) of 275 deer "pursued" were captured by helicopter netgunning; helicopter time per capture averaged 0.65 h. Collectively, as of 30 June 1991, 187 radio-

instrumented deer had been entered into the sample herd, including 84 adults (39 males, 45 females), 15 yearlings (10 males, 5 females), and 88 fawns (48 males, 40 females). These 187 radio-instrumented deer were subsequently radio-located, by fixed-wing aircraft, a total of 8,706 times from the time of capture through 30 June 1991; visual sightings of the radio-instrumented deer were recorded for 34% of the radio-locations. Eighty (43%) of the 187 radio-instrumented deer were "alive and transmitting" as of 30 June 1991.

The sex/age structure of the 203 individual deer captured during 1989, 1990, and 1991 (through 30 Jun) was 107 males (43 adults, 12 yearlings, and 52 fawns) and 96 females (49 adults, 5 yearlings, and 42 fawns). The age structure of the adult female component (n=49) of the herd, unbiased by selective capture, was: 2 years, 29%; 3 years, 43%; and ≥ 4 years, 29%. The age structure of 2-, 3- and ≥ 4 -year-old females was 23%, 46%, and 31%, respectively, in nonhunted ENP (n=26), and 35%, 39%, and 26%, respectively, in hunted BCNP (n=23). These data preliminarily suggest that adult females in the BCNP/ENP, especially those in ENP, exhibit a relatively old (≥ 3 years) age profile.

Annual survival rates by age/sex cohort within the radio-instrumented BCNP/ENP herd during the 1990-91 biological year, which was characterized by dry conditions, were: fawns (n=30), 0.2933; yearlings (n=4), 0.7500; adult males (n=30), 0.7669; and adult females (n=35), 0.8265. Comparable survival rates during the 1989-90 biological year, which was characterized by drought conditions, were: fawns (n=17), 0.1403; yearlings (n=8), 1.000; adult males (n=16), 0.6188; and adult females (n=29), 0.6447.

Age and sex ignored, the annual survival rates of deer during 1990-91 were similar in the hunted BCNP herd (0.6366, n=47) and the nonhunted ENP herd (0.6059, n=48). In contrast, comparable survival rates in the BCNP and ENP herds during 1989-90 were 0.6111 (n=33) and 0.5236 (n=35), respectively. (Note: Legal hunting in the BCNP is restricted to males with 5-inch antlers.) Fawn survival, in both years, was substantively higher in the hunted BCNP herd (1989-90, 0.2188, n=8; 1990-91, 0.4375, n=16) than in the nonhunted ENP herd (1989-90, 0.0695, n=8; 1990-91, 0.1172, n=14). Similarly, annual survival rates of adult females were notably greater in the hunted BCNP herd (1989-90, 0.8081, n=15; 1990-91, 0.8789, n=18) than in the nonhunted ENP herd (1989-90, 0.4533, n=14; 1990-91, 0.7571, n=17). As expected, in both years, annual survival rate of adult males were substantively less in the hunted BCNP herd (1989-90, 0.3334, n=6; 1990-91, 0.6364, n=11) than in the nonhunted ENP herd (1989-90, 0.7778, n=9; 1990-91, 0.9091, n=16). Thus, in both 1989-90 and 1990-91, annual survival rates of

fawns and adult females were higher in the hunted BCNP than in the nonhunted ENP, whereas annual survival rates of adult males, as expected, were higher in the nonhunted ENP than in the hunted BCNP.

Seventy-seven (41%) of the 187 radio-instrumented deer died between 05 April 1989, the first date of radio-instrumented deer "at risk", and 30 June 1991. Of the 77 deaths, 33 (43%) were attributable to bobcat (*Felis rufus*) predation, 28 (36%) to undetermined causes, 8 (10%) to legal hunting (males only), 5 (6%) to illegal hunting, 2 (3%) to malnutrition, and 1 (1%) to panther predation. Of the 33 deer preyed upon by bobcats, 17 (51%) were male fawns, 10 (30%) were female fawns, 5 (15%) were adult females, and 1 (3%) was an adult male. Interestingly, the rate of fawn predation by bobcats was notably higher in ENP (65%) than in BCNP (45%).

Mean annual home ranges (minimum convex polygon), by age/sex cohort, for the combined BCNP/ENP herd in 1990 were: fawn females (n=9) 1.5 km²; fawn males (n=5) 1.3 km²; yearling females (n=1) 5.0 km²; yearling males (n=2) 3.5 km²; adult females (n=30) 4.2 km²; and adult males (n=29) 8.1 km².

A comparison of home ranges of adults between the BCNP (hunted) and ENP (nonhunted) herds revealed that mean annual home ranges were substantively larger in BCNP (females, 4.9 km²; males, 10.3 km²) than in ENP (females, 3.3 km²; males, 5.6 km²). Also, mean seasonal home ranges for adult deer (except for females in the summer/wet season) were greater in BCNP than ENP for all 3 seasons--winter/dry, summer/wet, and fall/hunting. Noteworthy was the increased seasonal movement of adult deer in BCNP during the fall/hunting season. Collectively, these patterns of spatial use by deer in the BCNP/ENP system revealed that both annual and seasonal home ranges of deer were larger in the hunted BCNP herd than in the nonhunted ENP herd. Assuming that the structure and quality of habitat is reasonably similar between the 2 areas, the larger home ranges of deer in the BCNP, in contrast to ENP, probably reflect a combined product of (1) human disturbance (principally hunting) in BCNP, and (2) a lower population density of deer in BCNP.

Three aerial censuses, conducted during summer 1990, fall 1990, and spring 1991 yielded estimated densities (adjusted for visibility bias) for the combined BCNP/ENP herd of 3.59, 1.98, and 6.27 deer/km², respectively. Estimated deer density was less in ENP than in BCNP in summer 1990 (2.33 vs. 5.11 deer/km²), but greater in ENP

than in BCNP in both fall 1990 (2.88 vs. 0.91 deer/km²) and spring 1991 (8.33 vs. 3.86 deer/km²).

In summary, productivity of the BCNP/ENP deer herd is low, but still equivalent to that documented for other stable herds in Florida. However, recruitment to the herd appears to be depressed by the low annual survivorship of fawns--14% in 1989-90, and 29% in 1990-91. Notably, the ENP (nonhunted) herd exhibited lower survival rates among fawns and adult females (7% and 45%, respectively, in 1989-90, and 12% and 76%, respectively, in 1990-91) than the BCNP (hunted) herd. In fact, the rates of annual survival for the nonhunted ENP herd, 0.5236 in 1989-90 and 0.6059 in 1990-91, are potentially indicative of a declining deer herd. Further, the ENP herd, in contrast to the BCNP herd, appears to exhibit both a higher population density and a relatively older age structure. Collectively, these findings suggest that the nonhunted ENP herd is at--or approaching--the carrying capacity of its range, and, consequently, is a less productive herd. And, importantly, the high level deer deaths attributable to bobcat predation (43%) evinces that the bobcat is a major factor in regulating deer abundance in this region of the Everglades system.

RESEARCH GOALS

This research study is designed to elucidate selected population characteristics of white-tailed deer in the Big Cypress National Preserve (BCNP)/Everglades National Park (ENP) for the purpose of determining the biological potential of the herd as (1) a food resource (prey base) for the endangered Florida panther, and (2) a recreational resource for sport hunting.

THE STUDY AREA

BCNP consists of approximately 240,000 ha of primarily cypress (*Taxodium distichum*), pine (*Pinus elliotti* var. *densa*), and marsh communities in southwest Florida. The climate of the region is driven by both tropical and temperate influences. Mean annual temperature is 23 C (74 F); mean monthly temperatures range from 14 C (57 F) in January to 28 C (83 F) in August (Duever et al. 1986). Mean annual rainfall for the region is 1,360 mm (53.54 inches) (Duever et al. 1986). The region has a distinct dry winter season (Nov-Apr) and a wet summer season (May-Oct). Generally, precipitation that falls during the wet season is insufficient to compensate for the annual water loss; hence, mild to severe drought conditions are not uncommon in BCNP/ENP. In this respect, the BCNP/ENP system was characterized by moderate droughts in 1989 and 1990. However, the system became moderately wet during the early summer of 1991 due to a combination of rainfall and man-controlled releases of water from the water-conservation areas of Upper Shark River Slough.

Topographically, the Big Cypress region is nearly flat, with a slight sloping (< 1 foot per mile [Duever et al. 1986]) toward the south and west. Within the 640,000-ha watershed of the Big Cypress Swamp, the sheet flow of water is southwest--toward the Ten Thousand Islands and Gulf of Mexico. In the wet season, the sheet flow inundates the low topographic plain; in the dry season, only sloughs are characterized by standing water.

The project study area is located within the contiguous wet prairie/mixed hardwood island habitat type (termed prairie/tree island in this report) that extends from the Stairsteps Unit, of BCNP southward into ENP. Encompassing about 200km², the area (excluding the "west Steps" site, which initially was included in the study area) is bounded on the north by Dr. Tiger Hammock, on the west by Lostmans Slough, on the east by the BCNP/ENP boundary, and on the south by Shark River Slough (Fig. 1).

The study area is comprised of 2 principal habitat types: wet prairie (prairie) and mixed hardwood islands (tree island). Duever et al. (1986) define wet prairie as that vegetation community characterized by 50-150 days of water inundation per year. Common plants of the wet prairie include maidencane (*Panicum hemitomon*), sand cordgrass (*Spartina bakeri*), sawgrass (*Cladium jamaicense*), muhly grass (*Muhlenbergia filipes*), beak rush (*Rhynchospora* spp.), spike rush (*Eleocharis* spp.), white water-lily (*Nymphaea odorata*), flag (*Sagittaria lancifolia*), and pickerel weed (*Pontederia lanceolata*) (Loveless 1959, Duever et al. 1986). The mixed hardwood islands, found on slightly elevated bedrock sites in the wet prairie, are characterized by a usually elongated shape, northeast-southwest orientation (axis), variable size (0.01-100.0 ha), closed dome canopy (<20 m in height), and shallow and short-term inundation, if any, by water. These hardwood islands contain a mixture of tropical and temperate plants (Long 1974). Common tree species include wax myrtle (*Myrica cerifera*), dahoon holly (*Ilex cassine*), willow (*Salix caroliniana*), redbay (*Persea borbonia*), elderberry (*Sambucus simpsonii*), cabbage palm (*Sabal palmetto*), strangler fig (*Ficus aurea*), and coco plum (*Chrysobalanus icaco*)--the latter being very susceptible to foliar damage by freezing temperatures e.g., December 1989 (Loveless 1959, Duever et al. 1986). The ground cover in the hardwood islands often is dominated by royal fern (*Osmunda regalis*), but also includes swamp fern (*Blechnum serrulatum*), blood-berry (*Rivina humilis*), greenbriar (*Smilax* spp.), and aster (*Aster caroliniensis*) (Loveless 1959, Wade et al. 1980).

SPECIFIC OBJECTIVES

This research investigation is designed to elucidate survival rates of age/sex cohorts, productivity/recruitment, spatial distributions, and habitat availability/use of white-tailed deer herds in the contiguous prairie/tree island habitat of BCNP (hunted population) and ENP (nonhunted population) for 3 annual cycles: April 89-March 90; April 90-March 91; and April 91-March 92.

RESEARCH DESIGN

The study design for the conduct of research on the population ecology of the BCNP/ENP deer herd centered on the use of radio-telemetry procedures as the most feasible means for evaluating mortality, recruitment, spatial distribution, and habitat use. This design was predicated on two basic assumptions: (1) deer could be captured in sufficient numbers; and (2) radio-instrumented animals could be

monitored accurately from fixed-wing aircraft (the latter dictated by the lack or near lack of access to the study site for the conduct of ground monitoring). Both assumptions were validated in 1989. Accordingly, to meet project objectives, the study plan was expanded to include the capture and radio-instrumentation of 30 fawns, and the maintenance of a radio-instrumented herd of approximately 50 adults (divided equally between sexes) in both 1990 and 1991.

METHODS

Capture Procedures

White-tailed deer were captured exclusively by helicopter-netgunning (Barrett et al. 1982), a technique recently used successfully to capture deer in "open" habitats in south Florida (Smith et al. 1988, 1989; Land 1987, 1989; Labisky et al. 1990_{a,b}). The netgun (CODA Enterprises, Inc., Mesa, AZ), powered by a .308 caliber blank, deploys a 12 x 12-ft² mesh net from 4 barrels via 4 cylindrical stainless-steel cylinder projectiles; the net, prior to deployment, is contained within a canister that is cradled within the spread of the 4 projectile barrels. The net is fired (forward and down) from the helicopter on deer (running) under pursuit; the net is normally deployed from an above-ground height of 3-4 m. The helicopter pursuit of any individual deer was restricted to a maximum of 3 minutes; if the deer was not captured within 3 minutes, the pursuit was terminated. (Note: Most deer were captured within 2 minutes after the initiation of pursuit.)

All captured deer were immediately blindfolded, physically restrained in the net, and then immobilized by securing the front and hind legs together with cord. Biological data recorded from each deer included: sex; age (Severinghaus 1949); neck and chest circumference (cm); hind foot and total body length (cm); body weight (kg); antler measurements for males--points (right and left), beam circumferences (mm), inside antler spread (cm), and beam lengths (cm); pregnancy/lactation status for females; tail-fat condition index (Stockle et al. 1978); and ectoparasite index. Blood smears (thick and thin) were also collected from a sample of fawns for subsequent blood parasite analyses. Each deer was marked with numbered No. 49 monel ear tags in both right and left ears, and a radio-transmitter/collar (150-152 MHz frequency range), equipped with motion-sensitive activity (2X signal pulse) and mortality (4X signal pulse) modes (Wildlife Materials, Inc., Carbondale, IL). Processing time averaged about 20 minutes

per animal (for a 2-person team), after which time the deer was released at the capture site.

Radio-telemetry Monitoring

The remote location of the study area (especially that portion in the Everglades, where ground access by vehicle is prohibited), the seasonally fluctuating hydroperiod, and the areal expanse of the study area essentially limit the obtainment of radio-locations of instrumented deer to aerial telemetric monitoring by fixed-wing aircraft, which, in turn, restricts monitoring to daylight hours. Given these logistical restrictions, a biological-clock regime was designed to obtain unbiased daylight monitoring data. To this end, the daylight hours were subdivided into 4 distinct periods: sunrise to 2 hours post-sunrise; 2 hours post-sunrise to mid-day; mid-day to 2 hours pre-sunset; and 2 hour pre-sunset to sunset. Accordingly, each radio-instrumented deer is located once each 5-day period, which yields 72 radio-locations per surviving animal per year; all radio-locations for any given animal are equally divided among the 4 daytime monitoring periods. Additionally, all radio-instrumented deer are monitored with respect to mortality on each radio-location flight, which equates to a minimum of 4 times every 5 days.

Each radio(deer)-location is sketched on a notepad, using topographic features, during the flight, and supplemented by the following information: date/time; habitat, including distance to, type and size of nearest hardwood island; behavioral activity; associations with other deer when applicable; and transmitter-signal characteristics (1X, 2X, or 4X pulse). Immediately after the completion of each flight, the sketched locations are verified by satellite photographs (scale = 1:26,000) of the study area, and then plotted on Universal Transverse Mercator (UTM) maps (scale = 1:24,000) to obtain empirical x and y coordinates. The coordinates for each radio-location are then both recorded on a data sheet and logged into a computer file.

(Note: Although most radio-instrumented deer occupied areal space within either the BCNP or ENP exclusively, some radio-instrumented deer, especially those that were captured near the boundary separating the 2 units, used space in both the BCNP and ENP. The latter deer were included in whichever unit $\geq 75\%$ of their radio-locations were obtained. Based on this criterion, 5 deer could not be assigned to either the BCNP or ENP herds; these included 1 adult male (BC8927) and 1 fawn male (BC9075) in the 1989-90 biological year, and 1 yearling male (BC9075) and 3 adult

males (BC8923, BC90118, BC90134) in the 1990-91 biological year. These "boundary" deer, which could not be assigned to a specific herd, were included in analyses in which location was not considered, but excluded from analyses in which location was considered.)

Mortality/Survival

Detection of death.--All radio-instrumented deer for which death was indicated by the emittance of the transmitter-mortality signal (4X pulse) were investigated upon occurrence (fixed-wing flight). This airborne investigation generally isolated one of 3 outcomes: (1) a false-mortality signal, which was usually detected by "buzzing" the site of radio-location, thereby disturbing the deer and reactivating the normal activity switch (1X pulse); (2) sighting the carcass of the dead radio-instrumented animal; or (3) failure to either sight the dead radio-instrumented animal or to verify a false-mortality signal. In the latter 2 instances, efforts were made to reach the site as soon as possible by helicopter (ENP) or by helicopter, airboat, or 4-wheel ATVs (BCNP) to verify death, and if verified, to determine cause and time of death as well as to recover the carcass, pending the usefulness of its condition, for subsequent necropsy.

Evaluating Causes of Death.--Field observations for each mortality were recorded on a mortality data sheet. Each carcass, as well as the area (habitat) surrounding the carcass, was photographed to establish a permanent photo file. Each carcass was examined for signs of predation (Wade and Bowns 1984), and evaluated with respect to condition parameters, disease, and ecto- and endoparasites (Stockle et al. 1978, Nettles 1981, Davidson and Nettles 1988). If available, the rumen contents, rumen, abomasum, heart, lungs, and trachea were collected and frozen for later analysis.

Predation was considered a possible cause of death when the carcass exhibited evidence of trauma. When evidence of trauma was present, the head, throat, and neck region of each dead deer was skinned and examined for puncture wounds (in trachea, cranium, and hide), subcutaneous hemorrhaging, and tissue damage (Cook et al. 1971, Garner et al. 1976, Epstein et al. 1983). Hemorrhaging, based on the presence of blood in the mouth, nares, or trachea, or on the neck, and/or froth in the trachea, indicated that the deer was alive at time of attack and was not scavenged (Cook et al. 1971, Hawthorne 1980). The relative amount of consumption and decomposition of the carcass also was used to differentiate predation from

scavenging (Bartush and Lewis 1981). Feeding pattern was also examined; feeding on the hindquarters with no marks on the rest of the carcass indicated probable scavenging, whereas feeding on the shoulders, neck, thoracic cavity, and hindquarters indicated possible predation.

The species responsible for predation was determined by sign on and surrounding the carcass. When tracks were present, the predatory species was identified by track size and shape (Wade and Bowns 1984); scat was collected also. Tracks and scat alone were not considered proof of predation, but were supporting evidence of other sign. Feline predators were considered if the carcass had been dragged, gutted, or covered (grass/leaves), or the hair plucked, and if sign such as mounds, scrapes, tracks, and scat were present (Hawthorne 1980; Robinette et al. 1959; Wade and Bowns 1984). Size, location, and distance between tooth marks, type of bone damage, and size of tracks and scrape were used to differentiate predation by bobcat and panther (Hawthorne 1980; Wade and Bowns 1984). A distance of 3.8-5.7 cm between upper canines and 2.8-4.7 cm between lower canines, and a canine puncture diameter >0.5 cm indicated panther predation, whereas a distance of 1.9-2.5 cm between canines, and a canine puncture diameter <0.3 cm indicated bobcat predation. The distance of reach for scraping litter to build mounds and cover the carcass was measured also; panthers have a maximum forelimb reach of 90 cm, whereas bobcats are restricted to a forelimb reach of 30-35cm. Extensive feeding and/or extensive carcass damage, including broken neck, leg and rib bones, were considered indicative of panther predation (Robinette et al. 1959). Multiple bite marks were indicative of a predator considerably smaller than its prey, thereby being unable to fell its prey with one bite, i.e., bobcat (Wade and Bowns 1984). When possible, kill sites and feeding sites were determined by the presence of mounds and draglines and the position of the carcass. Predation by alligators (*Alligator mississippiensis*), although not verified in this study to date, was considered when a deer carcass that exhibited traumatic injury was retrieved near "gator holes" or freshwater ponds (Epstein et al. 1983).

Survival analyses.--Annual survival rates of radio-instrumented deer were derived by the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the staggered entry of new radio-instrumented animals that were added to the sample population as the study progressed in calendar time (Pollock et al. 1989). Importantly, the product-limit estimator is sensitive to small sample sizes (<40) (Pollock et al. 1989).

The biological year for deer in the BCNP/ENP was designated to begin 01 April, at which time the peak of fawning season has been reached; thus, annual survival rates represent the 12-month period, 01 April-31 March.

Annual survival patterns were compared between the biological years, 1989-90 and 1990-91, by the "most robust" log-rank test (Pollock et al. 1989), which was applied to age/sex cohorts, individually and combined, and to individual age/sex cohorts by study site (BCNP vs. ENP). The formula for the log-rank test is:

$$\text{Chi-square} = \frac{[\sum d_{1j} - \sum (d_j r_{1j}/r_j)]^2}{[1/\sum (d_j r_{0j}/r_j) + 1/\sum (d_j r_{1j}/r_j)]^{-1}}$$

where r_{0j} = number at risk by month, year 1;
 d_{0j} = number of deaths by month, year 1;
 r_{1j} = number at risk by month, year 2;
 d_{1j} = number of deaths by month, year 2;
 r_j = total number at risk by month, years 1 and 2;
 d_j = total number of deaths by month, years 1 and 2.

(Note: No radio-instrumented animal was added to the sample herd prior to 7 days post-capture, the interval during which death from capture myopathy (Chalmers and Barrett 1982) was most probable. The 7-day interval represents a change from the 14-day interval previously used in this study. The reduction in the "capture myopathy" interval from 14 to 7 days post-capture was based on the reevaluation of all deaths, on a case-by-case basis, that occurred within 21 days post-capture.)

Home Range Analyses

Home ranges were calculated using the Spatial Ecology Analysis System (SEAS) personal computer software (J. Cary, Dep. Wildl. Ecol., Univ. Wisconsin, Madison). Both minimum convex polygon (MCP) (Mohr 1947) and harmonic mean [95% isopleth] (HM) (Dixon and Chapman 1980) methods were used to calculate home ranges for 80 radio-instrumented deer. Annual home ranges were based on individuals with ≥ 25 radio-locations, whereas seasonal home ranges were calculated for individuals with ≥ 15 radio-locations.

Population Censuses

Aerial censuses to determine deer density were conducted during 6-day periods in each of 3 predetermined seasons: spring/ dry season (Jan-May), summer/wet season (Jun-Sep), and fall/hunting season (Oct-Dec) (after Land 1989). Two census areas (Fig. 1), one each in BCNP and ENP, were flown by fixed-wing aircraft (Cessna 172) each day, starting 0.5 hr post-sunrise and ending prior to 2 hrs post-sunrise. Each census area contained 8 parallel transects on an east-west axis, located at 1 km intervals. The transects were flown, alternately, east-west and west-east, with the starting points being alternated among the 16 transects over the course of each 6-day census period. The visual delineation of the transect boundaries was modelled after Caughley (1977).

Transects were flown at a speed and altitude of 130 km/hr and 31 m, respectively. Census flights within each season were conducted by the same 2 rear-seat observers, who maintained either left or right positions within the aircraft throughout the 6 flights. The same pilot was common to all census flights, both within and among seasons. All observations of deer (number, sex, age) were reported to a recorder, who, from his position in the right front seat, also monitored flight altitude, flight speed, and start/stop locations for each transect.

Due to the more scattered distribution of radio-instrumented deer in the ENP site, the census area for ENP was slightly larger than for BCNP. Transect lengths were 5 km in BCNP and 6 km in ENP; transect width was established as 300 m (150 m on either side of the aircraft), as per the transect width-calibration procedures of Norton-Griffiths (1978). Thus, the census areas, which were designed to provide about 30% areal coverage, encompassed 36.5 km² in BCNP and 43.8 km² in ENP.

The censuses were originally designed to provide 2 estimates of deer density: a transect sample estimator, and a mark-reobservation (Petersen) estimator. However, the inability of observers to detect radio-collars (marks) on animals observed within the transect zone with confidence rendered the mark-reobservation estimator unusable. Initial concerns that the low flight altitude might affect deer behavior, thereby negatively biasing the census data, were unfounded as few animals appeared to run from the aircraft; thus, the 31 m altitude was maintained throughout all censuses.

Aerial surveys consistently underestimate ungulate population densities. Accordingly, the observability bias that contributes to this underestimation should be measured, and population estimates derived from transect counts adjusted appropriately (Caughley 1974). Observability bias in transect counts can be estimated by measuring the percentage of radio-instrumented animals that are seen in contiguous "test plots" of similar terrain and cover-types (Floyd et al. 1979). Population estimates are then adjusted by multiplying census results by the reciprocals of the observability coefficient (Floyd et al. 1979). In this study, observability coefficients were derived from the percentage of radio-locations for which the radio-instrumented deer was confirmed visually during normal monitoring activities within the sunrise to 2-hr post-sunrise period of each season during which censuses were conducted.

RESULTS/DISCUSSION

Capture Success/Study Sample

Sixty-five individual deer were captured by helicopter netgunning during 36.0 h of helicopter time in 1989, 86 deer (including 7 recaptures) during 58.7 h of helicopter time in 1990, and 65 deer (including 6 recaptures) during 43.7 h in 1991 (through 30 Jun) (Tables 1 and 2). Collectively, 216 (80%) of deer pursued were captured; the number of helicopter hours required to capture each animal averaged 0.65 h (Table 2).

Of the 203 individual deer captured from the initiation of the study through 30 June 1991, 5 (2%) died from capture-related injuries, 8 (4%) died within 7 days post-capture from probable capture myopathy (Chalmers and Barrett 1982), 1 escaped prior to the attachment of the radio-transmitter, 1 was released without a radio-transmitter due to symptoms of stress at capture, and 1 was released without a radio-transmitter due to an emergency situation. Thus, as of 30 June 1991, a total of 187 individual radio-instrumented deer had been entered into the study herd (Table 3). This radio-instrumented sample of 187 deer was comprised of 84 adults (39 males, 45 females), 15 yearlings (10 males, 5 females), and 88 fawns (48 males, 40 females); 95 deer (51%) were located in BCNP, and 92 (49%) in ENP (Table 3). The status of the 187 deer, as of 30 June 1991, was: censored (transmitter loss/failure), 30 (16%); dead, 77 (41%); and alive/transmitting, 80 (43%).

Age and Sex Structure

The sex/age structure of the 203 individual deer captured during 1989, 1990, and 1991 (through 30 Jun) was 107 males (43 adults, 12 yearlings, and 52 fawns) and 96 females (49 adults, 5 yearlings, and 42 fawns) (Table 3). The selective capture of deer employed in the study precludes an unbiased analysis of the sex and age structure of the population. However, the age structure of the adult female component of the herd should not reflect capture bias, and, thus, merits evaluation. The age profile among 49 adult (≥ 2 years in age) females was: 2 years, 29% ($n=14$); 3 years, 43% ($n=21$); and ≥ 4 years, 29% ($n=14$). Comparatively, the age profile among 143 adult females from 5 disjunct herds in Florida was: 2.5 years, 30%; 3.5 years, 25%; and ≥ 4.5 years, 45% (Richter and Labisky 1985). These data preliminarily suggest that adult females in the BCNP/ENP deer herd exhibit a slightly older (≥ 3 years) age structure than those other Florida herds. And, a comparison of the age structure of adult females in the ENP (nonhunted) and BCNP (hunted) herds revealed an older age profile in ENP--the age structure for 2-, 3- and ≥ 4 -year-olds being 23%, 46%, and 31%, respectively, in ENP ($n=26$), and 35%, 39%, and 26%, respectively, in BCNP ($n=23$).

Interestingly, the sex ratio among captured fawns, notably distorted toward males in 1989 (71% males, $n=14$), approached equity in 1990 (51% males, $n=37$) and 1991 (53% males, $n=43$) (Table 3). Sex ratios among fawns in the BCNP and ENP herds reflected the patterns exhibited within years.

Survival/Mortality

Survival rates were derived from the radio-instrumented herd using the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered entry" of radio-instrumented individuals added to the sample during the course of the investigation (Pollock et al. 1989) (Tables 4 and 5; Appendix A, Tables 1-9). Survival rates were greater in the 1990-91 biological year (01 April-31 March) than in the 1989-90 biological year for the combined BCNP/ENP herd and for all sex/age cohorts except yearlings (Table 4). Annual survival rates of radio-instrumented deer, sex and age ignored, in the combined BCNP/ENP herd were 0.5763 in 1989-90 ($n=70$) and 0.6108 in 1990-91 ($n=99$). In contrast, annual survival rates for radio-instrumented deer in a nonhunted herd in the eastern Everglades averaged 78% ($n=110$) during the 3 years, 1987-89 (Smith et al. 1990).

Annual survival rates by age/sex cohort within the radio-instrumented BCNP/ENP herd during the 1990-91 biological year were: fawns (n=30), 0.2933; yearlings (n=4), 0.7500; adult males (n=30), 0.7669; and adult females (n=35), 0.8265 (Table 4; Appendix A, Tables 2-5). Comparable survival rates during the 1989-90 biological year were: fawns (n=17), 0.1403; yearlings (n=8), 1.000; adult males (n=16), 0.6188; and adult females (n=29), 0.6447 (Table 4). Although survival rates tended to be higher in 1990-91 than in 1989-90 among all age/sex cohorts except yearlings, the difference was significant ($P < 0.05$) for adult females only (Table 4). Survival rates among the designated age/sex components of the BCNP/ENP herd were less than those reported for radio-instrumented deer in a nonhunted herd in the eastern Everglades during the 3 years, 1987-89: fawns (n=34), 56%; yearlings (n=27), 56%; adult males (n=20), 80%; adult females (n=29), 85% (Smith et al. 1990).

The survival of fawns in the BCNP/ENP herd, sex ignored, was 0.1403 for 1989-90 and 0.2933 for 1990-91 (Table 4). These survival rates were less than the estimated annual survival rates of 33%, 62%, and 45% reported for fawns in the eastern Everglades for the 3 years, 1987-89, respectively (Smith et al. 1990), and notably less than the >80% annual survival calculation for fawns in a central Illinois herd during the 5 years, 1981-86 (Nixon et al. 1991). Furthermore, the survival rate of fawns (n=35) captured in BCNP/ENP during 1991 was only 0.5281 during the first 3 months post-capture (Table 5), which was notably less than comparable survival rates of 1.0000 and 0.6602, for 1989-90 and 1990-91, respectively; however, these patterns of fawn survivorship during the 3-month post-capture interval did not differ ($P > 0.05$) between paired years (Table 5). These low survival rates of fawns in the BCNP/ENP suggest that fawn mortality is a depressant to recruitment.

Age and sex ignored, annual survival rates of deer were slightly higher in the hunted BCNP herd (0.6366, n=47) than in the nonhunted ENP herd (0.6059, n=48) during 1990-91, a pattern similar, although less pronounced, than that occurring in 1989-90 when the survival rates in the BCNP and ENP herds were 0.6111 (n=33) and 0.5236 (n=35), respectively (Table 4). (Note: Legal hunting in the BCNP is restricted to males with 5-inch antlers.) Fawn survival, in both years, was higher in the hunted BCNP herd (1989-90, 0.2188, n=8; 1990-91, 0.4375, n=16) than in the nonhunted ENP herd (1989-90, 0.0695, n=8; 1990-91, 0.1172, n=14) (Table 4). Similarly, annual survival rates of adult females were notably greater in the hunted BCNP herd (1989-90, 0.8081, n=15; 1990-91, 0.8789, n=18) than in the nonhunted ENP herd (1989-90, 0.4533, n=14; 1990-91, 0.7571, n=17).

Interestingly, the survival rate of adult females in the hunted BCNP herd, which averaged 0.8435 for 1989-90 and 1990-91, was similar to the rate of 0.813 reported for adult females in the hunted Bear Island Unit of BCNP during the 4 years, 1987-90 (Land 1991).

Annual survival rates of adult males were substantively less in the hunted BCNP herd (1989-90, 0.3334, n=6; 1990-91, 0.6364, n=11) than in the nonhunted ENP herd (1989-90, 0.7778, n=9; 1990-91, 0.9091, n=16) (Table 4). Notably, 10 (83%) of the 12 deaths among adult males that occurred in the BCNP/ENP herd in 1989-90 and 1990-91 were man-induced (hunting or poaching).

In summary, in both 1989-90 and 1990-91, annual survival rates of fawns and adult females were higher in the hunted BCNP than in the nonhunted ENP, whereas annual survival rates of adult males were higher, as expected, in the nonhunted ENP than in the hunted BCNP.

Mortality/Causes of Deaths

Seventy-seven (41%) of the 187 radio-instrumented deer died between 05 April 1989, the first date of radio-instrumented deer "at risk", and 30 June 1991 (Table 6; Appendix A, Table 10). Of the 77 deaths, 33 (43%) were attributable to bobcat (*Felis rufus*) predation, 28 (36%) to undetermined causes, 8 (10%) to legal hunting (males only), 5 (6%) to illegal hunting, 2 (3%) to malnutrition, and 1 (1%) to panther predation. Of the 33 deer preyed upon by bobcats, 17 (52%) were male fawns, 10 (30%) were female fawns, 5 (15%) were adult females, and 1 (3%) was an adult male. Interestingly, the rate of fawn predation by bobcats was notably higher in ENP (65%, or 17/26 fawn deaths) than in BCNP (45%, or 10/22 fawn deaths).

Predation on fawns by bobcats has been documented previously (Cook et al. 1971, Garner et al. 1976, Bartush and Lewis 1981, Epstein et al. 1985), but not of the magnitude (56%, or 27/48 fawn deaths) that has occurred in the BCNP/ENP herd. And, both notably and recently, the bobcat has been reported as a significant predator of yearling and adult deer in Florida. Labisky et al. (1991) observed that bobcats accounted for 14% of the deaths of radio-instrumented yearling and adult deer on the Osceola National Forest in north Florida during the 3 years, 1989-91. And importantly, Land (1991) reported that bobcats were responsible for 46% of the annual mortality of deer, principally yearling and adult females, in the Bear Island Unit of the Big Cypress National Preserve during the 4 years, 1987-90.

The occurrence of pinnacle rock, dense stands of sawgrass, and high water levels in the BCNP/ENP may both limit the mobility of deer and provide cover for the bobcat, which is an ambush predator (Kleiman and Eisenberg 1973). Seven yearling and adult deer were killed by bobcats in this study; 4 were ambushed from either dense cover or pinnacle rock, and 3, all adult females, were uniquely vulnerable--1 (BC8931) was emaciated, 1 (BC8919) was in the process of giving birth, and 1 (BC8959) was within a month of parturition. High bobcat density, low alternative prey availability, nutritional stress on deer, and coincident parturition cycles for both predator and prey are probable factors contributing to the high level of bobcat predation on deer in BCNP/ENP. Regardless of the ecological circumstances contributing to the rate of predation on deer by bobcats, the high losses of deer, particularly fawns, to bobcats appears to be a depressant to the recruitment of animals into the breeding population, thus regulating population abundance of deer in the BCNP/ENP.

Productivity

A minimum of 21 (62%) of 34 reproductively mature (≥ 2 years in age) females gave birth to at least a single fawn during the fawning season in 1990 (Table 8). The measures of fawning were similar in BCNP (63%, $n=10/16$) and ENP (61%, $n=11/18$). All adult females ($n=5$) captured in January 1990 were pregnant. Only singleton fawns were observed with the 21 radio-instrumented does in 1990, which equates to a minimum productivity rate of 0.62 fawns per breeding-age female. Comparatively, in 1989, 24 (96%) of 25 radio-instrumented does gave birth to at least a single fawn (Labisky et al. 1990a). Inasmuch as 2 of the 24 females were observed with twins, the minimum productivity rate for the BCNP/ENP herd in 1989 was 1.04 fawns per breeding-age female. The discrepancy in the measure of production between the 2 years lies in the fact that the 1989 estimate was derived primarily on evidence of lactation at the time of capture (principally April and May in 1989), whereas the 1990 estimate was derived principally from aerial observations of radio-instrumented females. Inherently, aerial observations underestimate fawn production for 2 reasons. First, some fawns simply will not be observed with their mothers due to the infrequency of aerial observations. Second, females often are not accompanied by their fawns during the first month following birth (Jackson et al. 1972), which allows neonatal mortality to occur undetected; the latter can lead to a significant underestimation of production in areas such as BCNP/ENP, where predation is a major factor.

Statewide, in Florida, rates of pregnancy among deer herds are low among fawns (14%) and relatively high among yearlings (93%) and adults (92%) (Richter and Labisky 1985). In the northern portion of the Everglades (Rotenberger Wildlife Management Area), the pregnancy rate among yearling and adult females averaged 96% (n=46) during the 4 years, 1978-81 (Richter and Labisky 1985). In the southwestern Everglades, the collective pregnancy rate for yearling and adult females from 5 sites (Bear Island, Raccoon Point, Fakahatchee Strand State Preserve, Florida Panther National Wildlife Refuge, and Collier Enterprises) averaged 87% (n=114) for the 6 years, 1984-1990 (Forrester 1991). Comparable rates of pregnancy in the eastern Everglades were 78% (n=18), 80% (n=15), and 79% (n=33) for 1987, 1988, and 1989, respectively (Smith et al. 1989, 1990), and 75% (n=12) for the 2 years, 1988-89 (Forrester and Wright 1989, Forrester 1990). In the BCNP/ENP study area, pregnancy rates among yearling and adult females were 96% (n=24) in 1989 (Labisky et al. 1990a), and (in Stairsteps), 75% (n=12) for the 2 years, 1988-89 (Forrester and Wright 1989, Forrester 1990). Thus, the pregnancy rate among reproductively mature females in the BCNP/ENP study site compares favorably with that from other locales in the Everglades system, and may exceed that in the eastern Everglades.

The number of fetuses per pregnant doe, derived by necropsy, for deer herds throughout Florida has been reported at 1.30 (Harlow and Jones 1965) and 1.28 (Richter and Labisky 1985). Comparatively, the number of fetuses per pregnant female within the Everglades system averaged 1.25 (n=48, 25% with twins) in the northern portion (Rotenberger WMA) (Richter and Labisky 1985), and 1.21 (n=112, 21% with twins) in the southwestern portion (Bear Island/ Raccoon Point/Fakahatchee State Preserve/Florida Panther NWR/Collier Enterprises) (Forrester 1991). In the BCNP/ENP, Labisky et al. (1990a) reported 1.14 fetuses per fecund female (n=14, 14% with twins) in 1989; in fact, 3 litters of triplets were observed on the study site in 1989. And, in the Stairsteps of BCNP, the number of fetuses per pregnant females averaged 1.44 (n=12, 44% with twins) and in 1988 and 1989; however, in the Everglades during the same years, the number of fetuses per pregnant doe averaged 1.00 (n=12, 0% with twins) (Forrester and Wright 1989, Forrester 1990). Interestingly, Smith et al. (1990) reported the occurrence only of singleton births in the eastern Everglades.

In conclusion, the productivity of females in the BCNP/ENP herd appears to equal or exceed that of herds throughout the Everglades system. Nonetheless, the productivity of deer in Florida is still substantially less than that reported for herds not only in the South but also throughout eastern North America (Richter and Labisky 1985).

Familial Units/Associations

As of 30 June 1991, a total of 15 family units, comprising 42 individual radio-instrumented deer, had been created in the BCNP/ENP study area as a result of selective capture (Table 7). Three family units have been eliminated and 11 altered by death and/or transmitter malfunction. In 1991, 3 and 4 family units were created and expanded, respectively: 3 doe-fawn units; 1 doe-doe-fawn unit; 2 doe-doe units; and 1 doe-doe-doe unit. Twelve family units, in which at least 1 member of the original unit is alive/transmitting, were extant and being monitored as of 30 June 1991.

Home Ranges

Mean annual home ranges (km^2), by age/sex cohort, calculated by MCP for the combined BCNP/ENP herd in 1990 were: fawn females ($n=9$) 1.5; fawn males ($n=5$) 1.3; yearling females ($n=1$) 5.0; yearling males ($n=2$) 3.5; adult females ($n=30$) 4.2; and adult males ($n=29$) 8.1 (Table 9). Thus, among adults, males exhibited larger home ranges than females, but among fawns, females exhibited slightly larger home ranges than males. The small sample size of yearlings precluded a comparison between sexes.

A comparison of home ranges of adults between the BCNP (hunted) and ENP (nonhunted) herds revealed that mean annual home ranges were substantively larger in BCNP than in ENP for all age/sex cohorts for which there was an adequate sample size, e.g., adult females in BCNP had larger home ranges than those in ENP (4.9 vs. 3.3 km^2) and adult males in BCNP had larger home ranges than their counterparts in ENP (10.3 vs. 5.6 km^2) (Table 10).

Mean seasonal home ranges for adult deer also were greater in BCNP than ENP for all seasons (with the exception of females during the summer/wet season, which may be an artifact of the small sample in ENP) (Table 11). Noteworthy is the increased seasonal movement of adult deer in BCNP in fall, which may be precipitated by the disturbance associated with hunting (Table 11). Home ranges of both adult males and females in the nonhunted ENP herd exhibited a marked decrease in size between the summer (prehunt) and

fall (hunting) season, whereas their counterparts in the hunted BCNP herd showed a slight expansion (females) or a slight decrease (males) in home range size (Table 11).

Adult males were the only age/sex cohort to expand their home ranges during the wet season (June-September), undoubtedly a reflection of increased movement during the rut (Table 12). Mean home range size during the wet season generally was constricted among other age/sex cohorts. In contrast, adult females exhibited the greatest expansion of their home ranges during the spring, probably a reflection of their need to locate adequate high quality food during pregnancy and lactation. Both male and female fawns showed a marked increase in the size of their home ranges in the fall/hunting season (October-December), which probably reflected increased mobility related to the waning dependence on their dams.

Mean annual home ranges calculated for 1990 were comparable to those reported for 1989 (Labisky et al. 1990a) for all age/sex cohorts with the exception of fawns (Table 13). In 1990, home ranges of fawns were substantively smaller than those reported in 1989; the smaller home ranges in 1990 possibly reflected a restriction on movements resulting from higher water levels in 1990.

Collectively, these patterns of spatial use by deer in the BCNP/ENP system reveal that both annual and seasonal home ranges of deer are larger in the BCNP herd (hunted) than in the ENP herd (nonhunted). Given the similarity in the structure and quality of habitat between the 2 areas, the larger home ranges of deer in the BCNP, in contrast to ENP, probably reflect a combined product of (1) human disturbance (principally hunting) in BCNP, and (2) a lower population density of deer in BCNP than in ENP (see Estimation of Population Density).

Estimation of Population Density

Four aerial censuses, conducted during summer 1990, fall 1990, spring 1991, and summer 1991, revealed that the observed deer density for the combined BCNP/ENP herd ranged from a low of 0.99 deer/km² in summer 1990 to a high of 3.11 deer/km² in spring 1991 (Tables 14-17). However, the number of deer observed per flight was reasonably consistent within seasons as indicated by the relatively low standard deviations. Observed deer density was greater in ENP than in BCNP in fall 1990 (1.70 vs. 0.65 deer/km²), spring 1991 (3.88 vs. 2.22 deer/km²), and summer 1991 (2.54 vs. 2.27/km²), and only slightly less in summer 1990 (0.84 vs. 1.17/km²) (Fig. 2).

Fawns tended to comprise a greater proportion of total deer observed during each census period in BCNP than in ENP. To illustrate, during the summer 1991 census, fawns comprised 11.9% of the deer observed in BCNP, but only 6.7% of the deer observed in ENP. Inasmuch as fawn visibility is not inherently greater in BCNP than in ENP (Appendix C, Tables 1-3), the number of fawns observed may indicate actual differences in productivity between the 2 sites. Preliminarily, these data suggest a substantive difference in the population dynamics of the herds in BCNP and ENP. First, the ENP (nonhunted) herd is characterized by higher population density than the BCNP (hunted) herd. Second, the ENP herd may currently exist at a density level that is closer to carrying capacity than the BCNP herd, and, accordingly, productivity may be less in ENP than in BCNP.

As observed deer density represents only a minimum density, actual deer density was estimated by multiplying the observed densities by the reciprocals of the observability coefficients (Floyd et al. 1979) (Appendix C). To illustrate, the early-morning visibility of the 17 radio-instrumented deer frequenting the BCNP census area during 1 June-30 September 1990 was 22.9% (Appendix C, Table 1). The observed density in BCNP during the summer census, 1.17 deer/km², was, thus, increased to 5.11 deer/km² (Table 14). (Note: Preliminary census figures for summer 1990 (Labisky et al. 1990b) have been refined by including the telemetry data from September 1990 in the calculation of the observability coefficient.) Differences in observability coefficients between BCNP and ENP tended to accentuate the disparity between the observed densities in each season (Fig. 3), i.e., "estimated" deer density was considerably greater in ENP than in BCNP in 2 of the 3 seasons for which observability coefficients were available.

Also noteworthy is the nearly 3-fold difference in observed deer density between BCNP (0.65 deer/km²) and ENP (1.70 deer/km²) during the fall/hunting season of 1990 (Table 15). There are several possible explanations for this disparity. First, concurrent radio-telemetry monitoring of deer movements on the BCNP study site revealed a tendency for adult males to move westward into dense pine/cypress cover at the onset of the hunting season. Thus, some deer normally within the prairie/tree island habitat may leave the area to other habitats on a seasonal basis. Second, some decrease in BCNP population density would occur during the hunting season due to the removal of deer, principally males, by legal and illegal hunting. To illustrate, 2 radio-instrumented bucks (BC8956 and BC8927) in the BCNP study area had been killed by hunting activities before the first day of the fall 1990 census (15 October). Third, deer may be less visible in BCNP due to hunting

disturbance. However, the fall 1990 observability coefficient (Appendix C, Table 2)) does not support this hypothesis; radio-instrumented deer in BCNP were actually slightly more visible than their counterparts in ENP during the fall/hunting season. (Note: The fall 1990 observability coefficient for BCNP males ≥ 1 yr, 61.1% (Appendix C, Table 2), is based primarily on 2 yearling males, BC8903 and BC9078. Neither of these "spike" bucks had legal antlers; thus, they may have remained more visible than adults because they were not pursued regularly by hunters. A larger sample of older males probably would have reduced the observability coefficient, and, accordingly, increased the adjusted density estimate for BCNP.)

These density estimates for the BCNP and ENP study sites are equal or exceed those previously reported for south Florida deer herds. Schortemeyer and McCown (1988) derived an estimate of 2.5-5.0 deer/km² for the same prairie/tree island region of BCNP. In Everglades Water Conservation Areas 2 and 3, Loveless (1959) obtained a density estimate of 2.2 deer/km², and, more recently, in the eastern portion of ENP, Smith et al. (1990) obtained a density estimate of 0.50 deer/km².

Census replicates in fall 1991 and spring 1992 will provide 2 complete years of census data, spanning summer 1990 through spring 1992. Although this additional data is necessary to develop a clear assessment of deer density in the BCNP/ENP study area, it seems likely that deer density is higher in ENP than in BCNP, possibly indicating that the ENP (nonhunted) herd exists closer to carrying capacity than the BCNP (hunted) herd.

HERD ASSESSMENT

Productivity of the BCNP/ENP deer herd is low, but still equivalent to that documented for other stable herds in Florida. However, recruitment to the herd appears to be depressed by the low annual survivorship of fawns--14% in 1989-90, and 29% in 1990-91. Notably, the ENP (nonhunted) herd exhibited lower survival rates among fawns and adult females (7% and 45%, respectively, in 1989-90, and 12% and 76%, respectively, in 1990-91) than the BCNP (hunted) herd. In fact, the rates of annual survival for the nonhunted ENP herd, 0.5236 in 1989-90 and 0.6059 in 1990-91, are potentially indicative of a declining herd (Fuller 1990). Further, the ENP herd, in contrast to the BCNP herd, appears to exhibit both a higher population density and a relatively older age structure. Collectively, these findings suggest that the nonhunted ENP herd is at--or approaching--the carrying capacity of its range, and, consequently, is a less

productive herd. And, importantly, the high level deer deaths attributable to bobcat predation (43%) evinces that the bobcat is a key factor in regulating deer abundance in this region of the Everglades system.

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Table 1. Statistics on deer captured by helicopter netgun and radio-instrumented on Big Cypress National Preserve (BCNP)/Everglades National Park (ENP), Florida, 28 March 1989-30 June 1991. Number of available transmitter-days and number of radio-locations are presented for each deer from date of capture through 30 June 1991.

Deer ID	Capture date	Capture location ^a	Sex	Age at capture (yrs)	Body weight (kg)	Radio frequency (collar-type) ^b	Exposure days/30 Jun 91 ^c	Radio-locations/30 Jun 91 ^d	Status: 30 Jun 91
BC8901	28 Mar 89	C(BCNP)	M	Fawn (89)	4.5	151.806(B)	269	45(12)	Dead:bobcat predation, 21 Dec 89
BC8902	28 Mar 89	C(BCNP)	F	>4	40.0	151.902(F)	824	153(65)	Alive/transmitting
BC8903	05 Apr 89	C(BCNP)	M	Fawn (89)	11.3	151.845(B)	816	152(32)	Alive/transmitting
BC8904	05 Apr 89	C(BCNP)	F	>4	35.8	151.853(F)	816	149(41)	Alive/transmitting
BC8905	05 Apr 89	C(BCNP)	F	1	31.3	151.863(F)	796	146(19)	Censored: 07 Jun 91; recaptured 26 Jun 91; alive/transmitting
BC8906	05 Apr 89	B(ENP)	F	>3	39.9	151.873(F)	309	42(04)	Censored: 08 Feb 90
BC8907	05 Apr 89	B(ENP)	M	2	34.5	151.748(E)	261	42(06)	Dead: undetermined cause, 21 Dec 89
BC8908	05 Apr 89	C(BCNP)	F	>2	34.0	151.931(F)	816	152(65)	Alive/transmitting
BC8909	05 Apr 89	C(BCNP)	M	Fawn (89)	15.4	151.825(B)	138	18(06)	Censored: 22 Aug 89; dead: legal kill, 01 Dec 90
BC8910	05 Apr 89	S(BCNP)	F	>3	36.3	151.950(F)	816	143(33)	Alive/transmitting
BC8911	05 Apr 89	S(BCNP)	M	Fawn (89)	11.8	151.885(B)	111	08(02)	Dead: undetermined cause, 25 Jul 89
BC8912	06 Apr 89	S(BCNP)	M	3	43.5	151.836(E)	214	24(06)	Dead: legal kill, 05 Nov 89
BC8913	06 Apr 89	C(BCNP)	M	3	43.5	151.794(E)	731	99(02)	Censored: 07 Nov 89; recaptured 16 Jul 90; alive/transmitting
BC8914	06 Apr 89	B(BCNP)	F	3	35.8	151.916(F)	815	151(59)	Alive/transmitting
BC8915	06 Apr 89	B(ENP)	M	2	43.1	151.971(E)	234	32(11)	Dead: illegal kill, 25 Nov 89
BC8916	06 Apr 89	B(ENP)	F	1	28.1	151.940(F)	409	68(17)	Dead: bobcat predation, 20 May 90
BC8917	06 Apr 89	C(BCNP)	M	1	28.1	151.880(E)	599	108(54)	Dead: legal kill, 26 Nov 90
BC8918	10 May 89	G(ENP)	F	5 ^e	42.2	151.909(F)	65	09(02)	Dead: undetermined cause, 13 Jul 89

Table 1. Continued, 2 of 9

Deer ID	Capture date	Capture location ^a	Sex	Age at capture (yrs)	Body weight (kg)	Radio frequency (collar-type) ^b	Exposure days/ 30 Jun 91 ^c	Radio-locations/ 30 Jun 91 ^d	Status: 30 Jun 91
BC8919	10 May 89	G(ENP)	F	>4	35.4	151.955(F)	311	52(35)	Dead: bobcat predation, 16 Mar 90
BC8920	10 May 89	G(ENP)	F	3 ^e	30.8	151.965(F)	07	00(00)	Dead: capture myopathy, 17 May 89
BC8921	10 May 89	G(ENP)	F	>3	41.7	151.985(F)	781	145(36)	Alive/transmitting
BC8922	10 May 89	B(ENP)	F	<3	40.8	151.998(F)	781	150(52)	Alive/transmitting
BC8923	10 May 89	B(ENP)	M	1	24.9	151.920(E)	451	77(33)	Censored: 04 Aug 90
BC8924	10 May 89	B(ENP)	M	Fawn (89)	13.6	151.813(B)	80	07(00)	Censored: 29 Jul 89
BC8925	10 May 89	G(ENP)	M	4/5	54.5	151.730(E)	748	139(41)	Censored: 28 May 91
BC8926	10 May 89	G(ENP)	F	>4	37.6	150.976(F)	661	134(39)	Dead: undetermined cause, 02 Mar 91
BC8927	10 May 89	G(ENP)	M	4	51.7	151.761(E)	493	89(13)	Dead: illegal kill, 15 Sep 90
BC8928	11 May 89	G(ENP)	M	Fawn (89)	9.5	151.830(B)	179	27(07)	Dead: bobcat predation, 05 Nov 89
BC8929	11 May 89	G(ENP)	M	Fawn (89)	7.8	151.857(B)	122	14(02)	Dead: bobcat predation, 10 Sep 89
BC8930	11 May 89	G(ENP)	F	4 ^e	27.2	151.065(F)	133	13(07)	Dead: undetermined cause, 20 Sep 89
BC8931	11 May 89	G(ENP)	F	3 ^e	27.2	151.651(F)	145	22(05)	Dead: bobcat predation, 03 Oct 89
BC8932	11 May 89	G(ENP)	M	Fawn (89)	11.3	151.867(B)	82	10(05)	Dead: undetermined cause, 01 Aug 89
BC8933	11 May 89	G(ENP)	M	3/4	63.5	151.775(E)	780	147(27)	Alive/transmitting
BC8934	11 May 89	G(ENP)	M	>5	65.8	151.890(E)	780	152(25)	Alive/transmitting
BC8935	11 May 89	S(BCNP)	F	Fawn (89)	11.8	151.896(B)	228	39(25)	Dead: undetermined cause, 25 Dec 89
BC8936	11 May 89	S(BCNP)	M	1	31.3	151.710(E)	780	149(56)	Alive/transmitting
BC8937	11 May 89	S(ENP)	F	2	35.8	151.736(F)	211	31(02)	Censored: 09 Dec 89
BC8938	11 May 89	S(BCNP)	F	5 ^e	33.1	151.757(F)	90	14(04)	Dead: undetermined cause, 09 Aug 89
BC8939	11 May 89	S(ENP)	F	1	29.0	151.781(F)	780	94(19)	Alive/transmitting
BC8940	28 Jun 89	C(BCNP)	M	3	52.6	151.596(E)	148	27(09)	Dead: legal kill, 22 Nov 89
BC8941	28 Jun 89	C(BCNP)	F	>5	38.1	151.692(F)	732	149(50)	Alive/transmitting

Table 1. Continued, 3 of 9.

Deer ID	Capture date	Capture location ^a	Sex	Age at capture (yrs)	Body weight (kg)	Radio frequency (collar-type) ^b	Exposure days/30 Jun 91 ^c	Radio-locations/30 Jun 91 ^d	Status: 30 Jun 91
BC8942	28 Jun 89	C(BCNP)	F	Fawn (89)	20.0	151.699(B)	47	12(02)	Censored: 14 Aug 89; dead: bobcat predation, 04 Apr 90
BC8943	28 Jun 89	G(ENP)	F	4 ^e	37.2	151.679(F)	90	16(12)	Dead: illegal kill, 25 Sep 89
BC8944	28 Jun 89	G(ENP)	M	Fawn (89)	21.8	151.542(E)	263	46(16)	Dead: panther predation, 17 Mar 90
BC8945	28 Jun 89	G(ENP)	F	>3	30.8	151.671(F)	732	142(77)	Alive/transmitting
BC8946	28 Jun 89	G(ENP)	M	>3	49.9	151.531(E)	732	144(41)	Alive/transmitting
BC8947	28 Jun 89	S(BCNP)	F	2/3	30.4	151.960(F)	732	141(45)	Alive/transmitting
BC8948	28 Jun 89	C(BCNP)	M	Fawn (89)	12.7	151.500(B)	126	27(01)	Censored: 02 Nov 89
BC8949	28 Jun 89	C(BCNP)	M	2/3	41.7	151.522(E)	123	22(10)	Dead: legal kill, 29 Oct 89
BC8950	29 Jun 89	C(BCNP)	F	Fawn (89)	19.5	151.554(B)	209	43(09)	Dead: undetermined cause, 23 Jan 90
BC8951	29 Jun 89	B(ENP)	F	Fawn (89)	12.2	151.452(B)	14	01(01)	Dead: undetermined cause, 12 Jul 89
BC8952	29 Jun 89	G(ENP)	M	3	42.2	151.512(E)	731	145(31)	Alive/transmitting
BC8953	29 Jun 89	G(ENP)	F	>3	34.9	151.663(F)	258	44(07)	Dead: undetermined cause, 14 Mar 90
BC8954	29 Jun 89	B(BCNP)	F	5 ^e	38.1	151.664(F)	121	22(15)	Dead: illegal kill, 28 Oct 89
BC8955	14 Aug 89	C(BCNP)	F	2.5	38.6	151.635(F)	685	138(34)	Alive/transmitting
BC8956	14 Aug 89	C(BCNP)	M	2.5	34.9	151.490(E)	390	76(12)	Dead: legal kill, 08 Sep 90
BC8957	14 Aug 89	C(BCNP)	M	5.5	68.0	151.482(E)	78	12(01)	Dead: legal kill, 30 Oct 89
BC8958	14 Aug 89	B(BCNP)	F	3.5	37.6	151.623(F)	685	138(53)	Alive/transmitting
BC8959	14 Aug 89	B(BCNP)	F	2.5	34.0	151.590(F)	517	103(76)	Dead: bobcat predation, 12 Jan 91
BC8960	14 Aug 89	B(BCNP)	M	3.5	44.4	151.471(E)	685	135(38)	Alive/transmitting
BC8961	14 Aug 89	G(ENP)	M	3.5	65.8	151.387(E)	685	137(24)	Alive/transmitting
BC8962	14 Aug 89	G(ENP)	F	1.5	25.9	151.965(F)	685	137(68)	Alive/transmitting
BC8963	14 Aug 89	G(ENP)	F	2.5	34.9	151.579(F)	685	147(37)	Alive/transmitting
BC8964	14 Aug 89	G(ENP)	F	5.5 ^e	39.9	151.569(F)	88	17(06)	Dead: undetermined cause, 10 Nov 89

Table 1. Continued, 4 of 9.

Deer ID	Capture date	Capture location ^a	Sex	Age at capture (yrs)	Body weight (kg)	Radio frequency (collar-type) ^b	Exposure days/ 30 Jun 91 ^c	Radio-locations/ 30 Jun 91 ^d	Status: 30 Jun 91
BC9065	06 Jan 90	C(BCNP)	F	>3	38.6	None	00	00(00)	Unknown
BC9066	06 Jan 90	C(BCNP)	F	1.5	40.4	151.065(F)	151	31(10)	Censored: 06 Jun 90
BC9067	06 Jan 90	C(BCNP)	F	>3	39.5	151.306(F)	540	119(66)	Alive/transmitting
BC9068	06 Jan 90	C(BCNP)	F	>2	34.5	151.980(F)	07	01(00)	Dead: capture myopathy, 13 Jan 90
BC9069	06 Jan 90	B(BCNP)	F	3	41.2	151.909(F)	499	99(75)	Censored: 20 May 91
BC9070	06 Jan 90	C(BCNP)	F	>3	42.2	151.992(F)	87	17(06)	Dead: bobcat predation, 03 Apr 90
BC9071	07 Jan 90	C(BCNP)	M	1.5	36.7	151.522(E)	05	00(00)	Dead: capture myopathy, 11 Jan 90
BC9072	07 Jan 90	G(ENP)	F	Fawn (89)	20.4	151.560(F)	354	68(37)	Censored: 27 Dec 90
BC9073	07 Jan 90	G(ENP)	M	Fawn (89)	17.2	151.971(E)	28	04(01)	Dead: undetermined cause, 03 Feb 90
BC9074	07 Jan 90	G(ENP)	M	>3	39.0	151.748(E)	12	03(01)	Dead: undetermined cause, 19 Jan 90
BC9075	07 Jan 90	B(ENP)	M	Fawn (89)	24.5	151.372(E)	153	29(08)	Dead: malnutrition 09 Jun 90
BC9076	09 Mar 90	C(BCNP)	M	Fawn (90)	8.5	151.452(B)	200	39(10)	Censored: 25 Sep 90
BC9077	09 Mar 90	C(BCNP)	M	3	35.4	151.748(E)	267	53(10)	Dead: legal kill, 01 Dec 90
BC9078	09 Mar 90	C(BCNP)	M	1	35.4	151.522(E)	478	102(52)	Alive/transmitting
BC9079	09 Mar 90	C(BCNP)	F	Fawn (90)	7.3	151.427(B)	233	47(07)	Censored: 27 Oct 90
BC9080	09 Mar 90	B(BCNP)	F	Fawn (90)	8.2	151.437(B)	88	19(12)	Dead: undetermined cause, 05 Jun 90
BC9081	09 Mar 90	B(BCNP)	F	3	34.0	151.757(F)	478	98(81)	Alive/transmitting
BC9082	09 Mar 90	G(ENP)	F	Fawn (90)	6.5	151.396(B)	130	25(05)	Dead: bobcat predation, 17 Jul 90
BC9083	10 Mar 90	C(BCNP)	F	Fawn (90)	4.5	151.608(B)	147	31(09)	Dead: undetermined cause ^f , 04 Aug 90
BC9084	10 Mar 90	C(BCNP)	M	Fawn (90)	9.2	151.415(B)	165	33(11)	Dead: illegal kill, 22 Aug 90
BC9085	10 Mar 90	C(BCNP)	M	Fawn (90)	8.2	151.806(B)	477	94(35)	Alive/transmitting
BC9086	10 Mar 90	B(BCNP)	F	Fawn (90)	7.1	151.699(B)	95	19(03)	Dead: undetermined cause, 12 Jun 90
BC9087	10 Mar 90	C(BCNP)	M	Fawn (90)	4.3	151.554(B)	477	95(15)	Alive/transmitting

Table 1. Continued, 5 of 9.

Deer ID	Capture date	Capture location ^a	Sex	Age at capture (yrs)	Body weight (kg)	Radio frequency (collar-type) ^b	Exposure days/30 Jun 91 ^c	Radio-locations/30 Jun 91 ^d	Status: 30 Jun 91
BC9088	10 Mar 90	G(ENP)	M	Fawn (90)	3.9	151.857(B)	23	05(00)	Dead: bobcat predation, 02 Apr 90
BC9089	10 Mar 90	G(ENP)	M	4	62.1	151.325(E)	165	32(07)	Censored: 23 Aug 90
BC9090	21 Mar 90	G(ENP)	M	Fawn (90)	10.4	151.830(B)	89	17(01)	Dead: bobcat predation, 17 Jun 90
BC9091	21 Mar 90	G(ENP)	M	>3	54.4	151.349(E)	467	97(19)	Alive/transmitting
BC9092	29 Mar 90	G(ENP)	F	Fawn (90)	12.7	None	00	00(00)	Deer escaped; not radio-instrumented
BC9093	29 Mar 90	G(ENP)	F	Fawn (90)	13.6	151.845(B)	204	41(08)	Dead: bobcat predation, 18 Oct 90
BC9094	29 Mar 90	C(BCNP)	F	Fawn (90)	6.9	151.825(B)	01	00(00)	Dead: capture myopathy 30 Mar 90
BC9095	29 Mar 90	C(BCNP)	F	Fawn (90)	7.8	151.111(B)	62	12(02)	Dead: bobcat predation, 30 May 90
BC9096	29 Mar 90	G(ENP)	M	4/5	53.5	None	00	00(00)	Dead: capture-related stress, 30 Mar 90
BC9097	30 Mar 90	G(ENP)	M	3	48.1	151.644(E)	45	09(01)	Dead: bobcat predation, 13 May 90
BC9098	06 Apr 90	C(BCNP)	M	Fawn (90)	10.0	151.500(B)	89	19(04)	Dead: bobcat predation, 03 Jul 90
BC9099	06 Apr 90	C(BCNP)	M	Fawn (90)	10.0	151.212(B)	297	62(15)	Censored: 28 Jan 91
BC90100	06 Apr 90	C(BCNP)	F	Fawn (90)	10.0	151.130(B)	13	02(00)	Dead: undetermined cause, 18 Apr 90
BC90101	08 Apr 90	C(BCNP)	F	Fawn (90)	8.2	151.231(B)	395	76(31)	Censored: 08 May 91
BC90102	08 Apr 90	C(BCNP)	M	Fawn (90)	8.6	151.039(B)	104	22(05)	Dead: bobcat predation, 21 Jul 90
BC90103	08 Apr 90	G(ENP)	F	Fawn (90)	10.9	151.169(B)	89	17(02)	Dead: undetermined cause, 05 Jul 90
BC90104	08 Apr 90	G(ENP)	F	Fawn (90)	9.1	150.312(B)	28	06(01)	Censored: 11 May 90
BC90105	08 Apr 90	G(ENP)	F	Fawn (90)	9.5	151.091(B)	316	63(21)	Dead: bobcat predation, 17 Feb 91
BC90106	08 Apr 90	G(ENP)	F	Fawn (90)	5.9	151.150(B)	104	22(06)	Censored: 21 Jul 90
BC90107	12 Apr 90	C(BCNP)	F	Fawn (90)	7.8	151.190(B)	445	90(36)	Alive/transmitting
BC90108	12 Apr 90	C(BCNP)	M	Fawn (90)	6.5	151.825(B)	61	12(03)	Dead: bobcat predation, 10 Jun 90
BC90109	13 Apr 90	G(ENP)	M	4	56.2	151.460(E)	444	91(36)	Alive/transmitting

Table 1. Continued, 6 of 9.

Deer ID	Capture date	Capture location ^a	Sex	Age at capture (yrs)	Body weight (kg)	Radio frequency (collar-type) ^b	Exposure days/30 Jun 91 ^c	Radio-locations/30 Jun 91 ^d	Status: 30 Jun 91
BC90110	21 Apr 90	G(ENP)	M	Fawn (90)	8.7	150.430(B)	78	14(01)	Dead: bobcat predation, 07 Jul 90
BC90111	21 Apr 90	G(ENP)	F	Fawn (90)	11.8	150.491(B)	184	37(10)	Censored: 22 Oct 90
BC90112	21 Apr 90	G(ENP)	M	Fawn (90)	14.5	150.371(B)	73	14(02)	Dead: bobcat predation, 02 Jul 90
BC90113	21 Apr 90	G(ENP)	M	Fawn (90)	8.6	150.391(B)	09	01(00)	Dead: bobcat predation, 29 Apr 90
BC90114	21 Apr 90	G(ENP)	F	Fawn (90)	17.2	150.452(B)	303	62(19)	Censored: 18 Feb 91
BC90115	29 Apr 90	G(ENP)	M	Fawn (90)	14.5	150.411(B)	57	10(01)	Dead: undetermined cause, 24 Jun 90
BC90116	29 Apr 90	G(ENP)	M	Fawn (90)	13.6	150.470(B)	35	07(01)	Dead: bobcat predation, 02 Jun 90
BC90117	29 Apr 90	C(BCNP)	M	Fawn (90)	8.9	150.350(B)	41	08(00)	Dead: bobcat predation, 08 Jun 90
BC90118	22 Jun 90	B(ENP)	M	3	47.2	151.332(E)	151	28(07)	Dead: legal kill, 19 Nov 90
BC90119	28 Jun 90	C(BCNP)	M	3	42.2	151.542(E)	368	73(21)	Alive/transmitting
BC90120	28 Jun 90	S(BCNP)	M	4	60.8	151.971(E)	368	73(23)	Alive/transmitting
BC90121	11 Jul 90	C(BCNP)	M	4	53.6	151.372(E)	354	69(09)	Alive/transmitting
BC90122	16 Jul 90	C(BCNP)	M	3	47.7	151.481(E)	350	68(17)	Alive/transmitting
BC90123	03 Aug 90	G(ENP)	F	2	32.7	150.250(F)	332	62(37)	Alive/transmitting
BC90124	03 Aug 90	G(ENP)	F	2.5	37.3	151.679(F)	332	65(31)	Alive/transmitting
BC90125	03 Aug 90	G(ENP)	F	2.5	33.6	151.663(F)	332	65(29)	Alive/transmitting
BC90126	14 Aug 90	S(BCNP)	M	3	60.0	None	00	00(00)	Dead: capture-related stress, 14 Aug 90
BC90127	15 Aug 90	G(ENP)	F	3.5	30.5	150.191(F)	92	16(05)	Censored: 15 Nov 90
BC90128	15 Aug 90	G(ENP)	M	3	46.4	150.870(E)	320	64(28)	Alive/transmitting
BC90129	15 Aug 90	G(ENP)	F	3.5	28.2	150.072(F)	320	63(52)	Alive/transmitting
BC90130	15 Aug 90	G(ENP)	M	3.5	50.5	151.595(E)	320	62(17)	Alive/transmitting
BC90131	15 Aug 90	B(BCNP)	F	3.5	37.3	150.210(F)	320	62(48)	Alive/transmitting
BC90132	16 Aug 90	C(BCNP)	M	2.5	46.4	150.750(E)	167	33(04)	Censored: 30 Jan 91
BC90133	16 Aug 90	C(BCNP)	M	3.5	40.0	151.569(E)	241	54(08)	Censored: 14 Apr 91
BC90134	16 Aug 90	B(BCNP)	M	4.5	51.8	150.730(E)	285	48(11)	Censored: 28 May 91
BC90135	16 Aug 90	B(BCNP)	F	2.5	29.1	150.290(F)	319	62(50)	Alive/transmitting
BC90136	16 Aug 90	G(ENP)	M	5.5	50.0	150.830(E)	120	22(08)	Censored: 14 Dec 90

Table 1. Continued, 7 of 9.

Deer ID	Capture date	Capture location ^a	Sex	Age at capture (yrs)	Body weight (kg)	Radio frequency (collar-type) ^b	Exposure days/30 Jun 91 ^c	Radio-locations/30 Jun 91 ^d	Status: 30 Jun 91
BC90137	16 Aug 90	G(ENP)	F	3.5	30.9	150.270(F)	54	10(04)	Dead: undetermined cause, 08 Oct 90
BC90138	16 Aug 90	G(ENP)	F	3.5	32.7	151.631(F)	319	63(40)	Alive/transmitting
BC90139	17 Aug 90	G(ENP)	F	5.5	46.4	150.131(F)	83	15(08)	Censored: 09 Nov 90
BC90140	17 Aug 90	G(ENP)	M	4.5	42.7	150.888(E)	318	61(21)	Alive/transmitting
BC90141	17 Aug 90	G(ENP)	F	5.5	28.6	150.148(F)	309	58(45)	Censored: 05 Jun 91; recaptured 13 Jun 91; alive/transmitting
BC91142	05 Mar 91	C(BCNP)	M	Fawn (91)	8.7	150.551(B)	118	22(13)	Alive/transmitting
BC91143	05 Mar 91	C(BCNP)	F	Fawn (91)	5.2	150.651(B)	84	18(03)	Dead: undetermined cause ^f , 07 Jun 91
BC91144	06 Mar 91	C(BCNP)	F	Fawn (91)	6.0	150.590(B)	22	04(01)	Dead: bobcat predation, 27 Mar 91
BC91145	06 Mar 91	C(BCNP)	F	Fawn (91)	3.6	151.885(B)	117	23(06)	Alive/transmitting
BC91146	06 Mar 91	C(BCNP)	M	Fawn (91)	6.1	151.001(B)	117	22(06)	Alive/transmitting
BC91147	06 Mar 91	C(BCNP)	M	Fawn (91)	9.1	150.631(B)	3	01(00)	Dead: capture myopathy, 08 Mar 91
BC91148	06 Mar 91	B(BCNP)	M	Fawn (91)	3.3	150.531(B)	5	00(00)	Dead: capture myopathy, 10 Mar 91
BC91149	06 Mar 91	C(BCNP)	M	Fawn (91)	7.2	150.669(B)	116	22(13)	Alive/transmitting
BC91150	07 Mar 91	C(BCNP)	M	Fawn (91)	6.4	151.250(B)	116	22(05)	Alive/transmitting
BC91151	07 Mar 91	C(BCNP)	M	Fawn (91)	8.0	151.857(B)	116	24(04)	Alive/transmitting
BC91152	07 Mar 91	G(ENP)	F	Fawn (91)	2.5	151.896(B)	91	19(08)	Dead: bobcat predation, 07 Jun 91
BC91153	08 Mar 91	G(ENP)	M	Fawn (91)	14.1	150.690(B)	115	21(05)	Alive/transmitting
BC91154	08 Mar 91	G(ENP)	F	Fawn (91)	5.2	150.569(B)	61	19(03)	Censored: 16 Jun 91
BC91155	09 Mar 91	C(BCNP)	F	Fawn (91)	5.0	150.932(B)	80	15(05)	Dead: undetermined cause, 29 May 91
BC91156	09 Mar 91	C(BCNP)	F	Fawn (91)	8.8	151.699(B)	8	01(00)	Dead: bobcat predation, 16 Mar 91
BC91157	09 Mar 91	C(BCNP)	M	Fawn (91)	3.6	150.910(B)	113	21(09)	Alive/transmitting
BC91158	09 Mar 91	C(BCNP)	M	Fawn (91)	5.1	151.437(B)	73	14(04)	Dead: undetermined cause, 21 May 91
BC91159	19 Mar 91	G(ENP)	F	Fawn (91)	7.0	150.951(B)	13	03(00)	Dead: undetermined cause, 31 Mar 91
BC91160	19 Mar 91	G(ENP)	F	Fawn (91)	3.1	150.611(B)	44	04(00)	Censored: 14 Apr 91

Table 1. Continued, 8 of 9.

Deer ID	Capture date	Capture location ^a	Sex	Age at capture (yrs)	Radio Body weight (kg)	frequency (collar-type) ^b	Exposure days/ 30 Jun 91 ^c	Radio-locations/ 30 Jun 91 ^d	Status: 30 Jun 91
BC91161	19 Mar 91	C(BCNP)	F	Fawn (91)	4.9	151.130(B)	70	13(01)	Dead: undetermined cause, 27 May 91
BC91162	20 Mar 91	G(ENP)	M	Fawn (91)	8.6	150.511(B)	50	11(02)	Dead: undetermined cause, 08 May 91
BC91163	20 Mar 91	G(ENP)	F	Fawn (91)	10.0	151.111(B)	103	19(05)	Alive/transmitting
BC91164	20 Mar 91	G(ENP)	M	Fawn (91)	5.0	151.415(B)	103	19(07)	Alive/transmitting
BC91165	21 Mar 91	G(ENP)	M	Fawn (91)	12.3	151.500(B)	83	16(02)	Dead: bobcat predation, 12 Jun 91
BC91166	21 Mar 91	G(ENP)	M	Fawn (91)	7.3	151.607(B)	2	00(00)	Dead: capture myopathy, 23 Mar 91
BC91167	21 Mar 91	G(ENP)	M	Fawn (91)	4.9	151.426(B)	102	18(05)	Alive/transmitting
BC91168	21 Mar 91	G(ENP)	F	Fawn (91)	9.0	150.631(B)	35	06(00)	Dead: bobcat predation, 24 Apr 91
BC91169	22 Mar 91	C(BCNP)	M	Fawn (91)	11.8	151.169(B)	101	20(07)	Alive/transmitting
BC91170	22 Mar 91	C(BCNP)	M	Fawn (91)	9.5	151.020(B)	64	12(03)	Dead: undetermined cause, 24 May 91
BC91171	22 Mar 91	B(BCNP)	M	Fawn (91)	6.4	151.699(B)	18	01(00)	Censored: 09 Apr 91
BC91172	22 Mar 91	G(ENP)	M	Fawn (91)	5.6	150.531(B)	68	13(01)	Dead: bobcat predation, 28 May 91
BC91173	23 Mar 91	C(BCNP)	M	Fawn (91)	10.9	151.825(B)	100	18(06)	Alive/transmitting
BC91174	23 Mar 91	C(BCNP)	M	Fawn (91)	7.4	150.391(B)	100	19(10)	Alive/transmitting
BC91175	12 Apr 91	G(ENP)	F	Fawn (91)	6.1	151.607(B)	79	13(04)	Alive/transmitting
BC91176	12 Apr 91	G(ENP)	M	Fawn (91)	13.2	150.590(B)	53	10(04)	Dead: Bobcat predation, 04 Jun 91
BC91177	12 Apr 91	G(ENP)	F	Fawn (91)	9.1	151.150(B)	52	10(04)	Dead: bobcat predation, 03 Jun 91
BC91178	12 Apr 91	G(ENP)	F	Fawn (91)	11.4	151.830(B)	77/1 ⁸	15(05)	Dead: malnutrition, 27 Jun 91
BC91179	12 Apr 91	G(ENP)	M	Fawn (91)	9.1	150.331(B)	5	00(00)	Dead: capture myopathy, 16 Apr 91
BC91180	13 Apr 91	C(BCNP)	F	Fawn (91)	9.1	150.312(B)	42	08(02)	Dead: bobcat predation, 24 May 91
BC91181	13 Apr 91	B(BCNP)	F	Fawn (91)	5.6	150.411(B)	49	09(04)	Dead: bobcat predation, 01 Jun 91
BC91182	14 Apr 91	G(ENP)	F	Fawn (91)	8.2	150.951(B)	10	02(00)	Censored: 24 Apr 91
BC91183	14 Apr 91	B(BCNP)	F	Fawn (91)	3.2	151.039(B)	78	13(09)	Alive/transmitting

Table 1. Continued, 9 of 9.

Deer ID	Capture date	Capture location ^a	Sex	Age at capture (yrs)	Body weight (kg)	Radio frequency (collar-type) ^b	Exposure days/ 30 Jun 91 ^c	Radio-locations/ 30 Jun 91 ^d	Status: 30 Jun 91
BC91184	07 Jun 91	C(BCNP)	M	1.5	34.1	None	00	00(00)	Dead: capture-related stress, 07 Jun 91
BC91185	07 Jun 91	C(BCNP)	M	1.5	35.5	151.615(E)	24	03(02)	Alive/transmitting
BC91186	07 Jun 91	C(BCNP)	M	1.5	35.5	151.759(E)	24	03(03)	Alive/transmitting
BC91187	07 Jun 91	C(BCNP)	M	2.5	53.6	151.652(E)	24	04(00)	Alive/transmitting
BC91188	11 Jun 91	C(BCNP)	M	1.5	34.5	151.953(E)	20	03(02)	Alive/transmitting
BC91189	11 Jun 91	C(BCNP)	M	1.5	38.2	151.746(E)	20	04(02)	Alive/transmitting
BC91190	11 Jun 91	C(BCNP)	M	1.5	36.4	151.444(E)	20	03(02)	Alive/transmitting
BC91191	13 Jun 91	B(BCNP)	M	2.5	44.5	151.879(E)	18	03(02)	Alive/transmitting
BC91192	13 Jun 91	G(ENP)	M	3.5	62.7	151.939(E)	18	02(01)	Alive/transmitting
BC91193	13 Jun 91	B(ENP)	M	4.5	49.1	151.489(E)	18	02(01)	Alive/transmitting
BC91194	18 Jun 91	B(BCNP)	M	1.5	30.9	150.711(E)	13	01(01)	Alive/transmitting
BC91195	18 Jun 91	G(ENP)	F	3.5	34.5	150.111(F)	13	01(01)	Alive/transmitting
BC91196	20 Jun 91	C(BCNP)	F	1.5	28.2	151.992(F)	11	01(01)	Alive/transmitting
BC91197	20 Jun 91	B(BCNP)	M	Fawn (91)	12.7	150.350(B)	11	01(01)	Alive/transmitting
BC91198	20 Jun 91	B(BCNP)	F	2.5	29.1	151.590(F)	11	01(01)	Alive/transmitting
BC91199	20 Jun 91	G(ENP)	M	4.5	56.4	150.810(E)	11	00(00)	Alive/transmitting
BC91200	26 Jun 91	G(ENP)	F	3.5	33.6	151.868(F)	4	00(00)	Alive/transmitting

^a Specific capture sites (C=Camp 107; S=Steps; B=Boundary; and G=Glades) within BCNP and ENP.

^b Collar-type: B = breakaway, fawn; F = fixed, permanent; E = expandable, permanent.

^c Number of transmitter days from capture through 30 June 1991.

^d Numerals within parentheses denote number of radio-locations for which animal was sighted.

^e Aged by examination of wear and replacement of teeth at time of death; age back-calculated to time of capture.

^f Cause of death is "undetermined" pending determination by necropsy.

^g Deer was recaptured and recollared on 26 Jun 91.

Table 2. Efficiency of capturing white-tailed deer by helicopter netgunning, Big Cypress National Preserve/Everglades National Park: 1989, 1990, and 1991 (through 30 June).

Dates	Capture efficiency			Capture-time efficiency	
	Number of deer for which capture was attempted	Number of deer captured	Percentage captured	Hours of helicopter time	Helicopter hours/captured deer
Mar 89	5	2	40	1.5	0.75 ^a
Apr	27	15	56	11.0	0.73 ^a
May	22	22	100	9.0	0.41 ^a
Jun	16	16	100	10.2	0.64 ^b
Aug	10	10	100	4.3	0.43 ^b
Subtotal/mean	80	65	81	36.0	0.55
Jan 90	13	13	100	7.1	0.55 ^b
Mar	29	23	79	20.0	0.87 ^b
Apr	25	22	88	12.9	0.59 ^b
Jun	3	3	100	3.2	1.07 ^b
Jul	4	3	75	3.8	1.27 ^b
Aug	28	22	79	11.7	0.53 ^b
Subtotal/mean	102	86	84	58.7	0.68
Feb 91	6	3	50	2.8	0.94 ^b
Mar	46	33	72	27.3	0.83 ^b
Apr	14	9	64	5.9	0.66 ^b
Jun	21	20	95	7.5	0.38 ^b
Subtotal/mean	87	65	75	43.7	0.67
Total	269	216	80	138.4	0.64

^a Non-selective capture of individuals.

^b Selective capture of individuals.

Table 3. Age and sex of white-tailed deer captured by helicopter netgunning, Big Cypress National Preserve/Everglades National Park, 28 March 1989-30 June 1991.

Location	Number of deer captured						Total
	<u>Adults</u>		<u>Yearlings</u>		<u>Fawns</u>		
	M	F	M	F	M	F	
1989							
BCNP	7	13 ^a	2	1	5	3	31
ENP	9	15 ^b	1	3	5	1	34
Subtotal	16	28	3	4	10	4	65 ^c
1990							
BCNP	8	8 ^d	2 ^e	1	10	8 ^f	37
ENP	14 ^g	9	0	0	9 ^h	10 ⁱ	42
Subtotal	22	17	2	1	19	18	79 ^j
1991							
BCNP	2	2	7 ^k	0	14 ^l	10	35
ENP	3	2	0	0	9 ^m	10	24
Subtotal	5	4	7	0	23	20	59 ⁿ
Total	43	49	12	5	52	42	203

^a Includes 1 adult female injured (dispatched) during capture operations.

^b Includes 1 adult female (BC8920) captured and radio-instrumented that subsequently died from capture myopathy.

^c Twenty-five (25) individuals captured and radio-instrumented in 1989 were alive/transmitting as of 30 June 1991.

^d Includes 1 adult female (BC9065) that was not radio-instrumented due to severe stress, and 1 (BC9068) that subsequently died from capture myopathy.

^e Includes 1 yearling male (BC9071) captured that subsequently died from capture myopathy.

^f Includes 1 female fawn (BC9094) captured that subsequently died from capture myopathy.

Table 3. Continued, 2 of 2.

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- g Includes 2 adult males that died from capture-related stress (BC9096, BC90126), 1 injured (dispatched) during capture operations, and 1 released uncollared due to an emergency situation.
 - h Includes 2 male fawns (BC9073, BC9075) born in 1989; these fawns, captured in January 1990, were approximately 10 months of age.
 - i Includes 1 female fawn (BC9072) born in 1989; this fawn, captured in January 1990, was approximately 10 months of age. Also included is 1 female fawn (BC9092), born in 1990, that escaped prior to the attachment of a radio-transmitter.
 - j Twenty-three (23) individuals captured and radio-instrumented in 1990 were alive/transmitting as of 30 June 1991.
 - k Includes 1 yearling male (BC91184) that died from capture-related stress.
 - l Includes 2 male fawns (BC91147, BC91148) that subsequently died from capture myopathy.
 - m Includes 2 male fawns (BC91166, BC91179) that subsequently died from capture myopathy.
 - n Thirty-two (32) individuals captured and radio-instrumented in 1991 were alive/transmitting as of 30 June 1991.

Table 4. Annual survival rates of radio-instrumented white-tailed deer in Big Cypress National Preserve (BCNP) and Everglades National Park (ENP), 01 April-31 March 1989-90 and 1990-91. Survival rates derived from the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered" entry of radio-instrumented animals captured during the course of the study (Pollock et al. 1989).

Age/Sex	BCNP (Hunted)	ENP (Nonhunted)	Combined Herd
1989-90			
Fawns ^a	0.2188(n=8)	0.0695(n=8)	0.1403(n=17) ^b
Yearlings ^a	1.0000(n=4)	1.0000(n=4)	1.0000(n=8)
Adults			
Females	0.8081(n=15)	0.4533(n=14)	0.6447(n=29)
Males	0.3334(n=6)	0.7778(n=9)	0.6188(n=16) ^c
Total Herd	0.6111(n=33)	0.5236(n=35)	0.5763(n=70) ^d
1990-91			
Fawns ^a	0.4375(n=16)	0.1172(n=14)	0.2933(n=30)
Yearlings ^{a,e}	N/A	N/A	0.7500(n= 4)
Adults			
Females	0.8789(n=18)	0.7571(n=17)	0.8265(n=35)
Males	0.6364(n=11)	0.9091(n=16)	0.7669(n=30) ^f
Total Herd	0.6366(n=47)	0.6059(n=48)	0.6108(n=99) ^{g,h}

^a Males and females combined

^b Includes 1 "boundary" deer (BC8975).

^c Includes 1 "boundary" deer (BC8927).

^d Includes 2 "boundary" deer (BC8927, BC8975).

^e Sample size inadequate to separate by location.

^f Includes 3 "boundary" deer (BC8923, BC90118, BC90134).

^g Includes 4 "boundary" deer (BC8923, BC8975, BC90118, BC90134).

^h The log-rank test was performed on all combinations (21) of survival rates paired by years (1989-90 and 1990-91), age and sex cohorts (fawns, yearlings, adult females and adult males), and locations (BCNP and ENP). Survival rates differed ($P < 0.05$) only for adult females in the combined herd between 1989-90 (0.6447, n=29) and 1990-91 (0.8265, n=35).

Table 5. Comparison of survival rates of radio-instrumented fawn white-tailed deer, sex ignored, in Big Cypress National Preserve/Everglades National Park for the 3-month period, 01 March-30 June, 1989, 1990, and 1991. Survival rates derived from the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered" entry of radio-instrumented animals captured during the course of the study (Pollock et al. 1989).

Month	Number at risk (r_j)	Number of deaths (d_j)	Number censored ^a	Number added	Survival (S_t) ^b
1989 (n=17)					
Mar	0	0	0	1	N/A
Apr	1	0	0	3	1.0000
May	4	0	0	5	1.0000
Jun	9	0	0	5	1.0000
1990 (n=30)					
Mar	0	0	0	13	N/A
Apr	13	1	0	17	0.9231
May	29	1	1	0	0.8913
Jun	27	7	0	0	0.6602
1991 (=35)					
Mar	0	0	0	27	N/A
Apr	27	1	2	7	0.9630
May	31	7	0	0	0.7456
Jun	24	7	1	1	0.5281

^a Number of deer for which radio-transmitter malfunctioned.

^b Survival rates of fawns, as determined by the log-rank test, did not differ ($P>0.05$) for the 3-month period between paired years (1989/90, 1990/91, and 1989/91).

Table 6. Causes of death of radio-instrumented white-tailed deer "at risk", Big Cypress National Preserve/Everglades National Park, 01 April 1989-30 June 1991.

Causes of death	Fawns		Yearlings		Adults		Total	
	No. ^a	%	No.	%	No.	%	No.	%
01 Apr 89-31 Mar 90								
Undetermined	6(3:3)	60	0	0	7(2:5)	44	13(5:8)	50
Bobcat predation	3(3:0)	30	0	0	2(0:2)	12	5(3:2)	19
Panther predation	1(1:0)	10	0	0	0	0	1(1:0)	4
Legal hunting	0	0	0	0	4(4:0)	25	4(4:0)	15
Illegal hunting	0	0	0	0	3(1:2)	19	3(1:2)	12
Malnutrition	0	0	0	0	0	0	0	0
Subtotal	10(7:3)	100	0	0	16(7:9)	100	26(14:12)	100
01 Apr 90-31 Mar 91								
Undetermined	7(2:5)	29	0	0	2(0:2)	18	9(2:7)	25
Bobcat predation	16(11:5)	67	0	0	4(1:3)	36	20(12:8)	55
Panther predation	0	0	0	0	0	0	0	0
Legal hunting	0	0	0	0	4(4:0)	36	4(4:0)	11
Illegal hunting	1(1:0)	4	0	0	1(1:0)	9	2(2:0)	6
Malnutrition	0	0	1(1:0)	100	0	0	1(1:0)	3
Subtotal	24(14:10)	100	1(1:0)	100	11(6:5)	99	36(21:15)	100
01 Apr 91-30 Jun 91								
Undetermined	6(3:3)	40	0	0	0	0	6(3:3)	40
Bobcat predation	8(3:5)	53	0	0	0	0	8(3:5)	53
Panther predation	0 0	0	0	0	0	0	0	0
Legal hunting	0 0	0	0	0	0	0	0	0
Illegal hunting	0 0	0	0	0	0	0	0	0
Malnutrition	1(0:1)	7	0	0	0	0	1(0:1)	7
Subtotal	15(6:9)	100	0	0	0	0	15(6:9)	100
Total	49(27:22)		1(1:0)		27(13:14)		77(41:36)	

^a Ratio indicates number of males: females.

Table 7. Family units consisting of 2 or more radio-instrumented deer as of 30 June 1991, Big Cypress National Preserve (BCNP) and Everglades National Park (ENP).

Family Unit	Site	Age ^a /Sex composition (Deer ID ^b)	Relationships	Status 30 June 91
1	BCNP	Adult[>3] female(BC8910) Yearling male(BC8936) Fawn male(BC8911)	BC8910 mother of BC8911, and probably BC8936. Home ranges of BC8911 and BC8936 exhibited overlap.	BC8911 died 25 Jul 89.
2	BCNP	Adult[>5]female(BC8941) Adult[>2]female(BC8955) Fawn male(BC8909) Adult[>2]female(BC91196) fawn.	BC8941 mother of BC8909 and possibly BC8955. BC91196 observed with BC8941 and unmarked	BC8909 censored 22 Aug 89; died 01 Dec 90.
3	BCNP	Adult[>4]female(BC8904) Yearling female(BC8905) Fawn male(BC8948)	Mother/yearling/fawn. BC8948 observed with twin.	BC8948 censored 02 Nov 89.
4	ENP	Adult[4]female(BC8930) Fawn male(BC8929)	Mother/fawn.	BC8929 died 09 Sep 89. BC8930 died 20 Sep 90.
5	BCNP	Adult[>2]female(BC8908) Yearling female(BC9066) Fawn male(BC90102)	BC8908 probable sibling of BC9066. BC9066 mother of BC90102.	BC9066 censored 05 Jun 90. BC90102 died 21 Jul 90.
6	BCNP	Fawn male(BC9098) Fawn female(BC90101)	Twin fawns of unmarked doe.	BC9098 died 03 Jul 90. BC90101 censored 08 May 91.

Table 7. Continued, 2 of 3.

Family Unit	Site	Age ^a /Sex composition (Deer ID ^b)	Relationships	Status 30 June 91
7	ENP	Adult[>3]female(BC8922) Fawn female(BC8951) Fawn male(BC91172)	Mother/twin fawns.	BC8951 died 12 Jul 89. BC91172 died 28 May 91.
8	BCNP	Adult[>3]female(BC8914) Adult[>3]female(BC8958) Fawn male(BC91197)	BC8914 and BC8958 probable siblings. BC91197 probable fawn of BC8914.	Unchanged.
9	BCNP	Adult[5]female(BC8954) Adult[>2]female(BC8959) Adult[>2]female(BC90135)	BC8954 possibly matriarch. BC8959 and BC90135 probable sib- lings.	BC8954 died 28 Oct 89. BC8959 died 12 Jan 91.
10	ENP	Adult[>3]female(BC8906) Yearling male(BC9075)	BC8906 probable mother of BC9075.	BC8906 censored 08 Feb 90. BC9075 died 09 Jun 90.
11	BCNP	Adult[3]female(BC9081) Fawn female(BC9080) Adult[>2]female(BC91198)	BC9081 mother of BC9080. BC9081 and BC90198 probable siblings.	BC9080 died 06 Jun 90.
12	ENP	Adult[>3]female(BC8945) Fawn male(BC8928) Fawn female(BC9072) Fawn male(BC9073) Adult[2](BC90124)	BC8945 matriarch and probable mother of BC8928, BC9072, and of BC9073--and possibly BC90124.	BC8928 died 05 Nov 89. BC9073 died 03 Feb 1990. BC9072 censored 27 Dec 90.

Table 7. Continued, 3 of 3.

Family Unit	Site	Age ^a /Sex composition (Deer ID ^b)	Relationships	Status 30 June 91
13	ENP	Adult[>5]female(BC90141) Adult[>3]female(BC90129)	Possible siblings, or BC90141 may be mother.	Unchanged.
14	BCNP	Adult[>3]female(BC9067) Fawn female(BC91174)	Mother/fawn.	Unchanged.
15	ENP	Adult[>3]female(BC91200) Fawn(BC91163)	Mother/fawn.	Unchanged.

^a Age [years] at time of capture.

^b Second 2 digits in deer ID denote year of capture.

Table 8. Fawn production by 34 reproductively mature (≥ 2 years) radio-instrumented female white-tailed deer during the January-April fawning season in 1990, and probable survival of their fawn(s) through 31 March 1991, Big Cypress National Preserve/Everglades National Park.

ID	Site	Age ^a	Production of fawn(s) ^b	Supplemental information	Survival of fawns(s) ^c	
					1 Jul 90	31 Mar 91
BC8902	BCNP	5.5	No			
BC8904	BCNP	5.5	Yes	Singleton	Yes	Unknown ^d
BC8905	BCNP	2.5	No			
BC8908	BCNP	3.5	Yes	Singleton	Yes	Unknown
BC8910	BCNP	4.5	Yes	Singleton	Yes	Yes
BC8914	BCNP	4.5	Yes	Singleton	Yes	Yes
BC8916	ENP	2.0	No	BC8916 killed by bobcat 20 May 90		
BC8921	ENP	4.5	No			
BC8922	ENP	4.5	Yes	Singleton	Yes	No
BC8926	ENP	5.5	Yes	Singleton	Yes	No
BC8939	ENP	2.5	Yes	Singleton	Yes	No
BC8941	BCNP	6.5	Yes	Singleton	Yes	Yes
BC8945	ENP	4.5	Yes	Singleton	Yes	No
BC8947	BCNP	4.5	No			
BC8955	BCNP	3.5	No			

Table 8. Continued, 2 of 3.

ID	Site	Age ^a	Production of fawn(s) ^b	Supplemental information	Survival of fawns(s) ^c	
					1 Jul 90	31 Mar 91
BC8958	BCNP	4.5	No			
BC8959	BCNP	3.5	Yes	Singleton	No	No
BC8962	ENP	2.0	Yes	Singleton	Yes	No
BC8963	ENP	3.5	No			
BC9066	BCNP	2.0	Yes	Singleton male BC90102, died 21 Jul 90	Yes	No
BC9067	BCNP	4.5	Yes	Singleton	No	No
BC9069	ENP	3.0	Yes	Singleton	Unknown	Unknown
BC9081	BCNP	4.5	Yes	Singleton female BC9080, died 6 Jun 90	No	No
BC90123	ENP	2.0	Unknown	BC90123 nonlactating, 03 Aug 90	No	No
BC90124	ENP	2.5	Yes	BC90124 exhibited recent lactation, 03 Aug 90	No	No
BC90125	ENP	2.5	Unknown	BC90125 nonlactating/ estrus, 03 Aug 90	No	No
BC90127	ENP	3.5	Unknown	BC90127 nonlactating/ estrus, 15 Aug 90	No	No
BC90129	ENP	3.5	Unknown	BC90129 nonlactating/ estrus, 15 Aug 90	No	No

Table 8. Continued, 3 of 3.

ID	Site	Age ^a	Production of fawn(s) ^b	Supplemental information	Survival of fawns(s) ^c	
					1 Jul 90	31 Mar 91
BC90131	BCNP	3.5	Yes	BC90131 lactating, 15 Aug 90	Yes	Yes
BC90135	BCNP	2.5	Unknown	BC90135 nonlactating/estrus, 16 Aug 90	No	No
BC90137	ENP	3.5	Yes	BC90137 lactating, 16 Aug 90	Yes	No
BC90138	ENP	3.5	Yes	BC90138 exhibited recent lactation, 16 Aug 90	Yes	No
BC90139	ENP	5.5	Yes	BC90139 exhibited recent lactation, 17 Aug 90	Yes	No
BC90141	ENP	5.5	Yes	BC90141 exhibited recent lactation, 17 Aug 90	Yes	No

^a Age at potential reproduction.

^b Production of fawn(s) as evidenced by lactation of doe at time of capture and/or observation of fawn(s) with doe at time of capture or during subsequent radio-locations of doe.

^c Survival of fawns based on either known death of radio-instrumented fawn(s), or absence of fawn(s) as evidenced by repeated observations of radio-instrumented does known to have produced fawns.

^c The designation of "Unknown" in this column denotes lack of confirmation of fawn survival, but implies probable death of fawn(s). Survival of fawns is maximum in that the frequency of twin/triplet births is unknown, and minimum in that some radio-instrumented does may have had fawns that were not observed during radio-location efforts.

Table 9. Mean annual home ranges (km²) of radio-instrumented deer in Big Cypress National Preserve/Everglades National Park, 01 January-31 December 1990. Home ranges, determined by minimum convex polygon (Mohr 1947) and harmonic mean (95% isopleth) (Dixon and Chapman 1980) methods, were derived from individuals with ≥ 25 radio-locations.

		Annual home range (km ²)	
	n ^a	Minimum convex polygon	Harmonic mean
FAWNS			
Females	9	1.5 ± 0.9 ^b	1.6 ± 1.0
Males	5	1.3 ± 0.5	1.8 ± 0.8
YEARLINGS			
Females	1	5.0	7.4
Males	2	3.5 ± 2.2	2.5 ± 1.2
ADULTS			
Females	30	4.2 ± 2.7	4.8 ± 3.7
Males	29	8.1 ± 5.6	9.7 ± 6.2

^a Sample size.

^b Arithmetic mean $\pm$ standard deviation.

Table 10. Mean annual home ranges (km²) for radio-instrumented deer in Big Cypress National Preserve/Everglades National Park, 01 January-31 December 1990. Home ranges, determined by the minimum convex polygon method (Mohr 1947), were derived from individuals with ≥ 25 radio-locations. Deer are grouped into 3 areal "pods": BCNP, ENP, or, for deer regularly using both park areas, Boundary.

	Annual home ranges (km ²)		
	BCNP	BOUNDARY ^a	ENP
FAWNS			
Females	1.8 $\pm$ 1.1 ^b (4) ^c	---	1.2 $\pm$ 0.6 (5)
Males	1.3 $\pm$ 0.5 (5)	---	---
YEARLINGS			
Females	---	---	5.0 (1)
Males	5.7 (1)	1.3 (1)	---
ADULTS			
Females	4.9 $\pm$ 2.4 (17)	---	3.3 $\pm$ 2.7 (14)
Males	10.3 $\pm$ 4.9 (12)	5.5 $\pm$ 1.5 (3)	5.6 ^d $\pm$ 3.7 (13)

^a Boundary animals (BC8923, BC9075, BC90118, BC90134) were those deer not having at least 75% of their locations in a single park area.

^b Arithmetic mean $\pm$ standard deviation.

^c Numbers in parentheses indicate sample sizes.

^d Excludes BC9091; otherwise mean home range size would be 7.0 km².

Table 11. Mean seasonal home ranges (km²) for radio-instrumented deer in Big Cypress National Preserve (BCNP) and Everglades National Park (ENP), 01 January-31 December 1990. Seasonal home ranges, determined by the minimum convex polygon (Mohr 1947) method, were derived from individuals ≥ 15 radio-locations. Yearlings are excluded from this analysis due to small sample sizes.

Seasonal home ranges (km ²)			
	Dry season 01 Jan-31 May	Wet season 01 Jun-30 Sep	Hunting season 01 Oct-31 Dec
BCNP FAWNS			
Females	0.6 $\pm$ 0.3 ^a (4) ^b	0.6 $\pm$ 0.3 (4)	1.8 $\pm$ 0.6 (2)
Males	0.7 $\pm$ 0.4 (4)	0.7 $\pm$ 0.4 (5)	0.9 $\pm$ 0.5 (3)
ENP FAWNS			
Females	1.2 (1)	0.5 $\pm$ 0.4 (4)	1.1 $\pm$ 0.5 (2)
Males	---	---	---
BCNP ADULTS			
Females	3.0 $\pm$ 1.7 (16)	1.8 $\pm$ 0.7 (14)	2.2 $\pm$ 1.3 (16)
Males	3.8 ^c $\pm$ 2.6 (5)	5.4 $\pm$ 3.8 (8)	4.2 $\pm$ 1.1 (13)
ENP ADULTS			
Females	2.1 $\pm$ 1.9 (8)	2.7 $\pm$ 2.1 (6)	1.4 $\pm$ 1.1 (12)
Males	1.7 $\pm$ 1.1 (9)	4.7 $\pm$ 2.5 (11)	1.8 $\pm$ 2.0 (13)

^a Arithmetic mean $\pm$ standard deviation.

^b Numbers in parentheses indicate sample sizes.

^c Excludes BC8927; otherwise mean home range size would be 5.2 km².

Table 12. Mean seasonal home ranges (km²) of radio-instrumented deer in Big Cypress National Preserve/Everglades National Park, 01 January-31 December 1990. Seasonal home ranges, determined by the minimum convex polygon method (Mohr 1947), were derived from individuals with ≥ 15 radio-locations.

	Seasonal home ranges (km ²)		
	Dry season 1 Jan-31 May	Wet season 1 Jun-30 Sep	Hunting season 1 Oct-31 Dec
FAWNS			
Females	0.7 $\pm$ 0.3 ^a (5) ^b	0.6 $\pm$ 0.4 (8)	1.5 $\pm$ 0.7 (4)
Males	0.7 $\pm$ 0.4 (4)	0.7 $\pm$ 0.4 (5)	0.9 $\pm$ 0.5 (3)
YEARLINGS			
Females	3.3 (1)	2.1 (1)	1.8 (1)
Male	1.5 $\pm$ 0.2 (2)	1.1 (1)	4.1 (1)
ADULTS			
Females	2.7 $\pm$ 1.8 (24)	2.1 $\pm$ 1.3 (20)	1.8 $\pm$ 1.3 (28)
Males	3.1 $\pm$ 3.0 (16)	5.1 $\pm$ 3.0 (20)	2.7 $\pm$ 2.6 (22)

^a Arithmetic mean $\pm$ standard deviation.

^b Numbers in parentheses indicate sample sizes.

Table 13. Comparison of mean annual home ranges (km²) of radio-instrumented deer in Big Cypress National Preserve/Everglades National Park, March-December 1989 and January-December 1990. Home ranges, determined by the minimum convex polygon method (Mohr 1947), were derived from individuals with ≥ 9 radio-locations in 1989 (Labisky et al. 1990a) and ≥ 25 radio-locations in 1990.

	Annual home range (km ²)	
	Mar-Dec 1989	Jan-Dec 1990
FAWNS		
Females	2.3 ^a (3) ^b	1.5 (9)
Males	3.9 (9)	1.3 (5)
YEARLINGS		
Females	4.2 (4)	5.0 (1)
Males	5.2 (3)	3.5 (2)
ADULTS		
Females	4.0 (26)	4.2 (30)
Males	7.5 (16)	8.1 (29)

^a Arithmetic mean.

^b Numbers in parentheses indicate sample sizes.

Table 14. Aerial census of white-tailed deer in Big Cypress National Preserve (BCNP) and Everglades National Park (ENP) during summer/wet season 1990.

Deer observed	BCNP ^a	ENP ^b	Both areas
25 Jun	25	10	35
26 Jun	14	11	25
27 Jun	11	6	17
07 Jul	8	13	21
08 Jul	16	18	34
09 Jul	7	12	19
Total	81	70	151
Mean/flight	13.50	11.67	25.17
SD	6.60	3.93	7.70

Deer density (deer/km ²)			
Observed	1.17	0.84	0.99
Estimated ^c	5.11	2.33	3.59

^a Each daily census conducted on 8, 5km x 300m transects.

^b Each daily census conducted on 8, 6km x 300m transects.

^c Estimated density = observed density divided by observability bias coefficient (see Appendix C).

Table 15. Aerial census of white-tailed deer in Big Cypress National Preserve (BCNP) and Everglades National Park (NPS) during fall/hunting season 1990.

Deer observed	BCNP ^a	ENP ^b	Both areas
15 Oct	8	9	17
16 Oct	6	30	36
17 Oct	7	17	24
23 Oct	5	25	30
24 Oct	13	31	44
29 Oct	6	29	35
Total	45	141	186
Mean/flight	7.50	23.50	31
SD	2.88	8.76	9.55
Deer density (deer/km ²)			
Observed	0.65	1.70	1.22
Estimated ^c	0.91	2.88	1.98

^a Each daily census conducted on 8, 5km x 300m transects.

^b Each daily census conducted on 8, 6km x 300m transects.

^c Estimated density = observed density divided by observability bias coefficient (see Appendix C).

Table 16. Aerial census of white-tailed deer in Big Cypress National Preserve (BCNP) and Everglades National Park (ENP) during spring/dry season 1991.

Deer observed	BCNP ^a	ENP ^b	Both areas
11 Mar	21	49	70
12 Mar	46	69	115
13 Mar	24	63	87
24 Mar	26	78	104
25 Mar	31	67	98
27 Mar	42	63	105
Total	190	389	579
Mean/flight	31.66	64.83	96.5
SD	10.17	9.52	15.91
Deer density (deer/km ²)			
Observed	2.22	3.88	3.11
Estimated ^c	3.86	8.33	6.27

^a Each daily census conducted on 8, 5km x 300m transects.

^b Each daily census conducted on 8, 6km x 300m transects.

^c Estimated density = observed density divided by observability bias coefficient (see Appendix C).

Table 17. Aerial census of white-tailed deer in Big Cypress National Preserve (BCNP) and Everglades National Park (ENP) during summer/wet season 1991.

Deer observed	BCNP ^a	ENP ^b	Both areas
26 Jun	11	21	32
27 Jun	29	24	53
28 Jun	38	24	62
1 Jul	11	44	55
2 Jul	39	54	93
3 Jul	32	41	73
Total	160	208	368
Mean/flight	26.67	34.67	61.33
SD	12.69	13.53	20.54
Deer density (deer/km ²)			
Observed	2.27	2.54	2.41
Estimated ^c	N/A	N/A	N/A

^a Each daily census conducted on 8, 5km x 300m transects.

^b Each daily census conducted on 8, 6km x 300m transects.

^c Observability bias data unavailable until end of summer/wet season 1991.

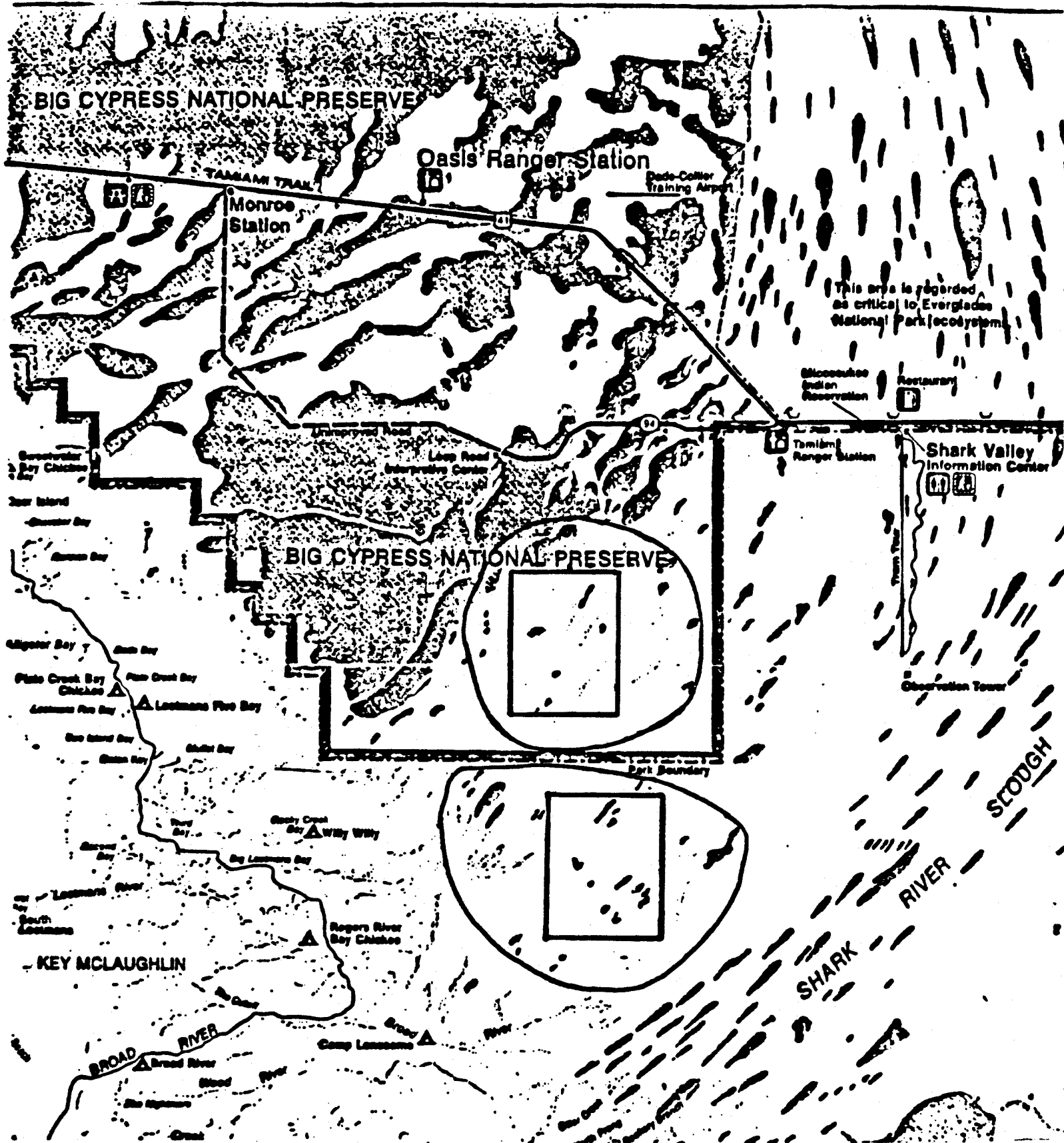


Figure 1. Location of the study sites within Big Cypress National Preserve (upper) and Everglades National Park (lower). Ovals indicate the general areas in which white-tailed deer were captured, radio-instrumented, and monitored between 28 March 1989-30 June 1991. Rectangles depict the tracts in which aerial censuses of deer were conducted in the summer/wet and fall/hunting seasons 1990 and spring/dry and summer/wet seasons 1991.

OBSERVED DEER DENSITY

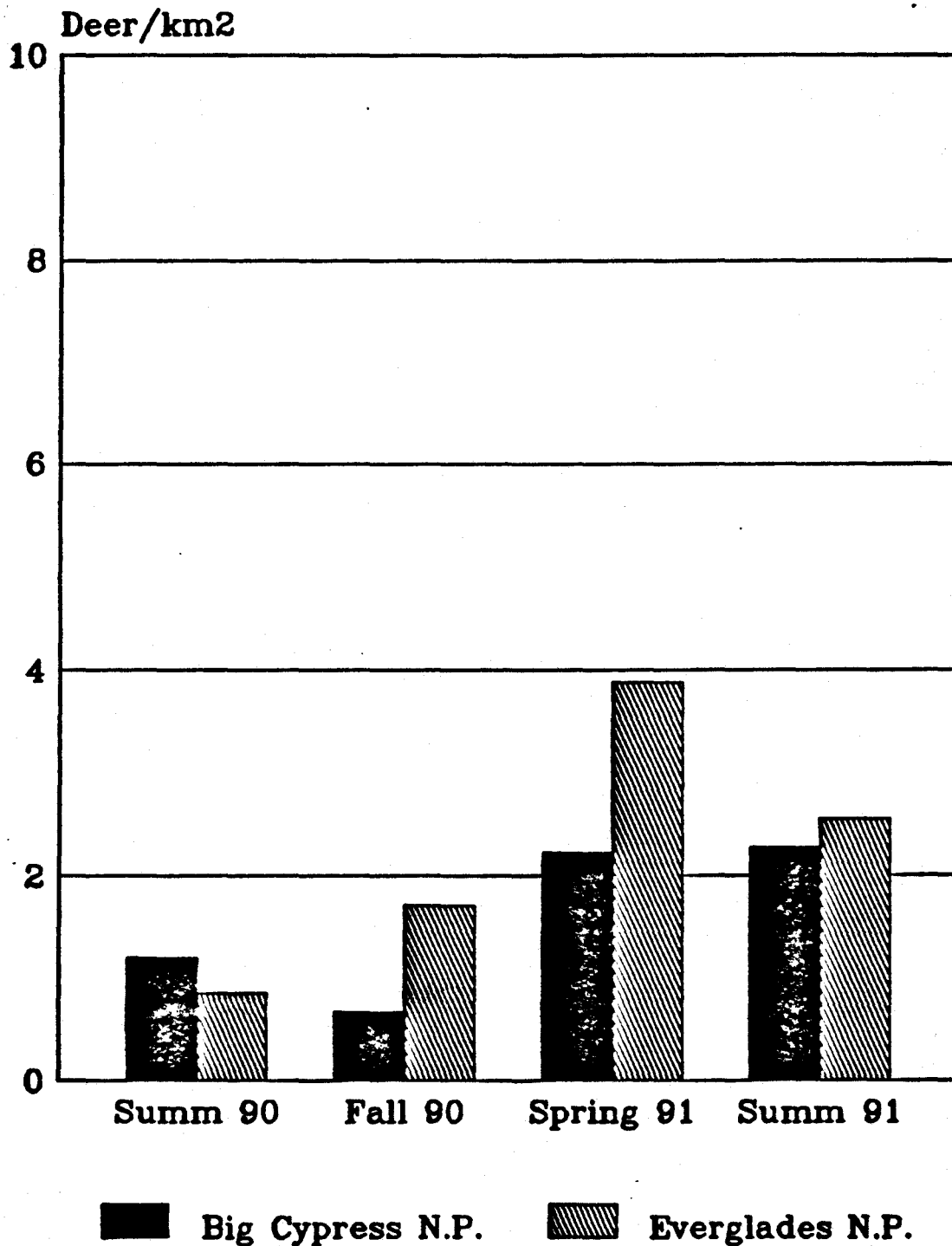


Figure 2. Observed deer densities in Big Cypress National Preserve and Everglades National Park as determined by aerial censuses conducted in summer and fall 1990, and in spring and summer 1991.

ESTIMATED DEER DENSITY

Adjusted for Observability Bias

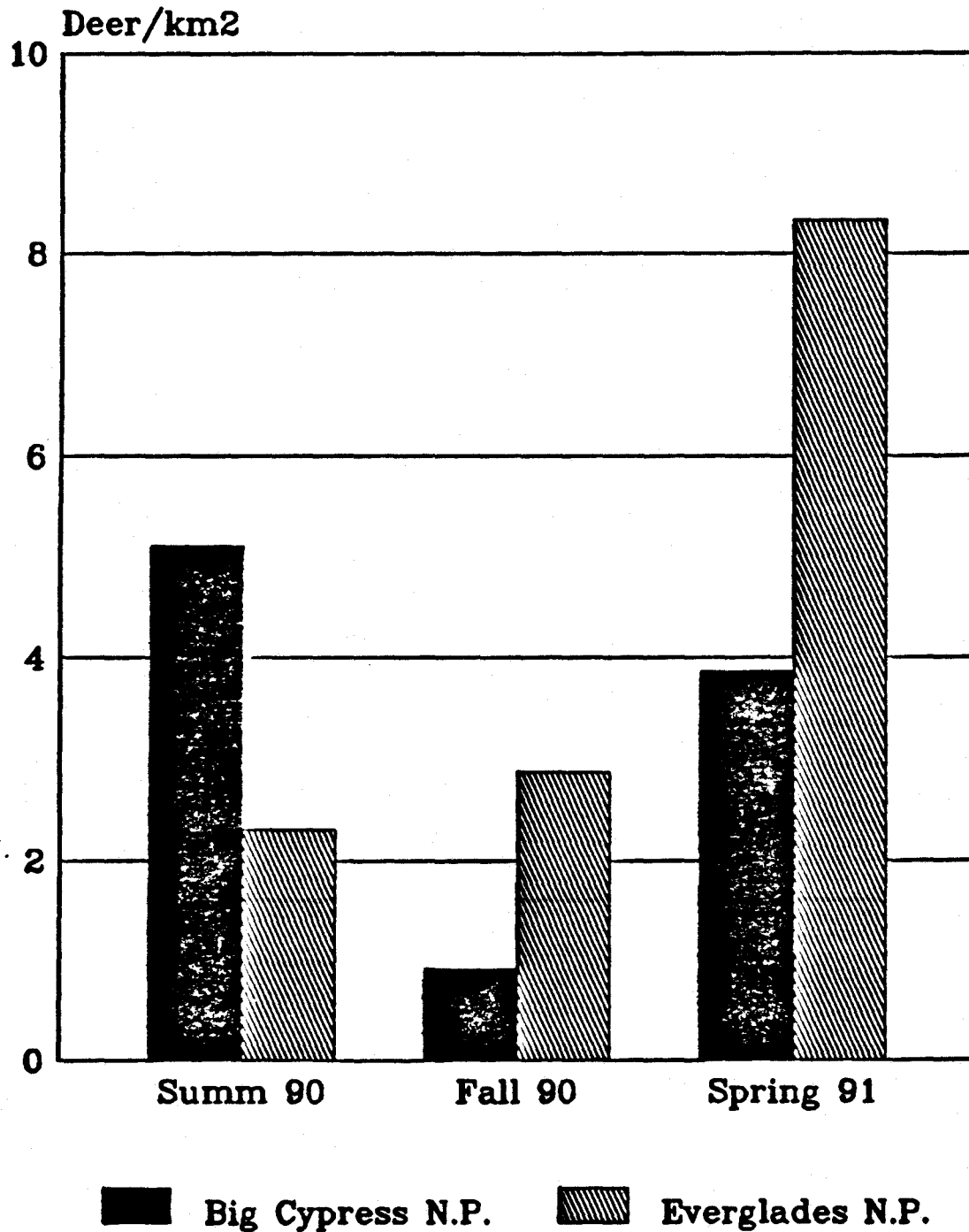


Figure 3. Estimated deer densities in Big Cypress National Preserve and Everglades National Park as determined by aerial censuses conducted in summer and fall 1990, and in spring and summer 1991. Estimated deer densities are derived by multiplying the observed deer densities (Fig. 2) by the reciprocal of the observability coefficients (Appendix C, Tables 1-3).

**APPENDIX A: SURVIVAL RATES AND MORTALITY OF RADIO-
INSTRUMENTED WHITE-TAILED DEER IN THE BIG CYPRESS
NATIONAL PRESERVE AND EVERGLADES NATIONAL PARK.**

**Tables 1-9. Survival rates, 01 April 1990-1 March
1991.**

**Table 10. Causes of death of radio-instrumented deer,
28 March 1989-30 June 1991.**

APPENDIX A, Table 1. Annual survival rate of radio-instrumented white-tailed deer (n=99), sex and age ignored, in Big Cypress National Preserve/Everglades National Park, 01 April 1990-31 March 1991. Survival rate derived from the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered" entry of radio-instrumented animals captured during the course of the study (Pollock et al. 1989).

Month	Number at risk (r_j)	Number of deaths (d_j)	Number censored ^a	Number added	Survival (S_t)
Apr 90	57	2	0	18	0.9649
May	73	3	1	0	0.9252
Jun	69	8	1	3	0.8180
Jul	63	6	1	3	0.7401
Aug	59	2	2	18	0.7150
Sep	73	2	1	0	0.6954
Oct	70	2	2	0	0.6755
Nov	66	2	2	0	0.6550
Dec	62	1	2	0	0.6445
Jan 91	59	1	2	0	0.6336
Feb	56	1	1	0	0.6223
Mar	54	1	0	27	0.6108

^a Number of deer for which radio-transmitter malfunctioned.

APPENDIX A, Table 2. Annual survival rate of radio-instrumented fawn (born in 1990) white-tailed deer (n=30), sex ignored, in Big Cypress National Preserve/Everglades National Park, 01 April 1990-31 March 1991. Survival rate derived from the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered" entry of radio-instrumented animals captured during the course of the study (Pollock et al. 1989).

Month	Number at risk (r_j)	Number of deaths (d_j)	Number censored ^a	Number added	Survival (S_t)
Apr 90	13	1	0	17	0.9231
May	29	1	1	0	0.8913
Jun	27	7	0	0	0.6602
Jul	20	6	1	0	0.4621
Aug	13	2	0	0	0.3910
Sep	11	0	1	0	0.3910
Oct	10	1	2	0	0.3519
Nov	7	0	0	0	0.3519
Dec	7	0	0	0	0.3519
Jan 91	7	0	1	0	0.3519
Feb	6	1	1	0	0.2933
Mar	4	0	0	27	0.2933

^a Number of deer for which radio-transmitter malfunctioned.

APPENDIX A, Table 3. Annual survival rate of radio-instrumented yearling (born in 1989) white-tailed deer (n=4), sex ignored, in Big Cypress National Preserve/Everglades National Park, 01 April 1990-31 March 1991. Survival rate derived from the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered" entry of radio-instrumented animals captured during the course of the study (Pollock et al. 1989).

Month	Number at risk (r_j)	Number of deaths (d_j)	Number censored ^a	Number added	Survival (S_t)
Apr 90	4	0	0	0	1.0000
May	4	0	0	0	1.0000
Jun	4	1	0	0	0.7500
Jul	3	0	0	0	0.7500
Aug	3	0	0	0	0.7500
Sep	3	0	0	0	0.7500
Oct	3	0	0	0	0.7500
Nov	3	0	0	0	0.7500
Dec	3	0	1	0	0.7500
Jan 91	2	0	0	0	0.7500
Feb	2	0	0	0	0.7500
Mar	2	0	0	0	0.7500

^a Number of deer for which radio-transmitter malfunctioned.

APPENDIX A, Table 4. Annual survival rate of radio-instrumented adult female (≤ 2 years) white-tailed deer ($n=35$) in Big Cypress National Preserve/Everglades National Park, 01 April 1990-31 March 1991. Survival rate derived from the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered" entry of radio-instrumented animals captured during the course of the study (Pollock et al. 1989).

Month	Number at risk (r_j)	Number of deaths (d_j)	Number censored ¹	Number added	Survival (S_t)
Apr 90	24	1	0	0	0.9583
May	23	1	0	0	0.9166
Jun	22	0	1	0	0.9166
Jul	21	0	0	0	0.9166
Aug	21	0	0	11	0.9166
Sep	32	0	0	0	0.9166
Oct	32	1	0	0	0.8878
Nov	31	0	2	0	0.8878
Dec	29	0	0	0	0.8878
Jan 91	29	1	0	0	0.8572
Feb	28	0	0	0	0.8572
Mar	28	1	0	0	0.8265

¹ Number of deer for which radio-transmitter malfunctioned.

APPENDIX A, Table 5. Annual survival rate of radio-instrumented adult male (≥ 2 years) white-tailed deer ($n=30$) in Big Cypress National Preserve/Everglades National Park, 01 April 1990-31 March 1991. Survival rate derived from the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered" entry of radio-instrumented animals captured during the course of the study (Pollock et al. 1989).

Month	Number at risk (r_j)	Number of deaths (d_j)	Number censored ^a	Number added	Survival (S_t)
Apr 90	16	0	0	1	1.0000
May	17	1	0	0	0.9412
Jun	16	0	0	3	0.9412
Jul	19	0	0	3	0.9412
Aug	22	0	2	7	0.9412
Sep	27	2(2) ^b	0	0	0.8715
Oct	25	0	0	0	0.8715
Nov	25	2(2)	0	0	0.8018
Dec	23	1(1)	1	0	0.7669
Jan 91	21	0	1	0	0.7669
Feb	20	0	0	0	0.7669
Mar	20	0	0	0	0.7669

^a Number of deer for which radio-transmitter malfunctioned.

^b Numerals within parentheses denote number of deer killed legally or illegally by hunters.

APPENDIX A, Table 6. Annual survival rate of radio-instrumented deer (n=47), sex and age ignored, in Big Cypress National Preserve, 01 April 1990-31 March 1991. Survival rate derived from the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered" entry of radio-instrumented animals captured during the course of the study (Pollock et al. 1989).

Month	Number at risk (r_i)	Number of deaths (d_i)	Number censored ^a	Number added	Survival (S_i)
Apr 90	32	1	0	7	0.9688
May	38	1	0	0	0.9433
Jun	37	4	1	1	0.8413
Jul	33	2	0	3	0.7903
Aug	34	2	0	4	0.7438
Sep	36	2	1	0	0.7024
Oct	33	0	1	0	0.7024
Nov	32	1	0	0	0.6805
Dec	31	1	0	0	0.6585
Jan 91	30	1	2	0	0.6366
Feb	27	0	0	0	0.6366
Mar	27	0	0	16	0.6366

^a Number of deer for which radio-transmitter malfunctioned.

APPENDIX A, Table 7. Annual survival rate of radio-instrumented deer (n=48), sex and age ignored, in Everglades National Park, 01 April 1990-31 March 1991. Survival rate derived from the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered" entry of radio-instrumented animals captured during the course of the study (Pollock et al. 1989).

Month	Number at risk (r_j)	Number of deaths (d_j)	Number censored ^a	Number added	Survival (S_t)
Apr 90	23	1	0	11	0.9565
May	33	2	1	0	0.8986
Jun	30	3	0	1	0.8087
Jul	28	4	1	0	0.6931
Aug	23	0	1	13	0.6931
Sep	35	0	0	0	0.6931
Oct	35	2	1	0	0.6535
Nov	32	0	2	0	0.6535
Dec	30	0	2	0	0.6535
Jan 91	28	0	0	0	0.6535
Feb	28	1	1	0	0.6302
Mar	26	1	0	11	0.6059

^a Number of deer for which radio-transmitter malfunctioned.

APPENDIX A, Table 8. Annual survival rates of radio-instrumented adult female (≥ 2 years) white-tailed deer in Big Cypress National Preserve (BCNP) and Everglades National Park (ENP), 01 April 1990-31 March 1991. Survival rates derived from the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered" entry of radio-instrumented animals captured during the course of the study (Pollock et al. 1989).

Month	Number at risk (r_j)	Number of deaths (d_j)	Number censored ^a	Number added	Survival (S_t)
BCNP (n=18)					
Apr 90	16	1	0	0	0.9375
May	15	0	0	0	0.9375
Jun	15	0	1	0	0.9375
Jul	14	0	0	0	0.9375
Aug	14	0	0	2	0.9375
Sep	16	0	0	0	0.9375
Oct	16	0	0	0	0.9375
Nov	16	0	0	0	0.9375
Dec	16	0	0	0	0.9375
Jan 91	16	1	0	0	0.8789
Feb	15	0	0	0	0.8789
Mar	15	0	0	0	0.8789

APPENDIX A, Table 8. Continued, 2 of 2.

Month	Number at risk (r_j)	Number of deaths (d_j)	Number censored ^a	Number added	Survival (S_t)
ENP (n=17)					
Apr 90	8	0	0	0	1.0000
May	8	1	0	0	0.8750
Jun	7	0	0	0	0.8750
Jul	7	0	0	0	0.8750
Aug	7	0	0	9	0.8750
Sep	16	0	0	0	0.8750
Oct	16	1	0	0	0.8203
Nov	15	0	2	0	0.8203
Dec	13	0	0	0	0.8203
Jan 91	13	0	0	0	0.8203
Feb	13	0	0	0	0.8203
Mar	13	1	0	0	0.7571

^a Number of deer for which radio-transmitter malfunctioned.

APPENDIX A, Table 9. Annual survival rates of radio-instrumented adult male (≥ 2 years) white-tailed deer in Big Cypress National Preserve (BCNP) and Everglades National Park (ENP), 01 April 1990-31 March 1991. Survival rates derived from the product-limit estimator procedure (Kaplan and Meier 1958), modified to allow for the "staggered" entry of radio-instrumented animals captured during the course of the study (Pollock et al. 1989).

Month	Number at risk (r_j)	Number of deaths (d_j)	Number censored ^a	Number added	Survival (S_t)
BCNP (n=11)					
Apr 90	5	0	0	0	1.0000
May	5	0	0	0	1.0000
Jun	5	0	0	1	1.0000
Jul	6	0	0	3	1.0000
Aug	9	0	0	2	1.0000
Sep	11	2(2) ^b	0	0	0.8182
Oct	9	0	0	0	0.8182
Nov	9	1(1)	0	0	0.7273
Dec	8	1(1)	0	0	0.6364
Jan 91	7	0	1	0	0.6364
Feb	6	0	0	0	0.6364
Mar	6	0	0	0	0.6364

APPENDIX A, Table 9. Continued, 2 of 2.

Month	Number at risk (r_j)	Number of deaths (d_j)	Number censored ^a	Number added	Survival (S_t)
ENP (n=16)					
Apr 90	10	0	0	1	1.0000
May	11	1	0	0	0.9091
Jun	10	0	0	1	0.9091
Jul	11	0	0	0	0.9091
Aug	11	0	1	4	0.9091
Sep	14	0	0	0	0.9091
Oct	14	0	0	0	0.9091
Nov	14	0	0	0	0.9091
Dec	14	0	1	0	0.9091
Jan 91	13	0	0	0	0.9091
Feb	13	0	0	0	0.9091
Mar	13	0	0	0	0.9091

^a Number of deer for which radio-transmitter malfunctioned.

^b Numerals within parentheses denote number of deer killed legally or illegally by hunters.

APPENDIX A, Table 10. Causes of death of radio-instrumented white-tailed deer, Big Cypress National Preserve (BCNP)/Everglades National Park (ENP), 17 May 1989-30 June 1991.

ID ^a	Sex	Age ^b	Site	Date of death	Habitat ^c	Cause of death
BC8920	F	3	ENP	17 May 89	PR	Capture myopathy
BC8951	F	Fawn	ENP	12 Jul 89	PR	Undetermined
BC8918	F	5	ENP	13 Jul 89	H	Undetermined
BC8911	M	Fawn	BCNP	25 Jul 89	PN	Undetermined
BC8932	M	Fawn	ENP	01 Aug 89	PR	Undetermined
BC8938	F	5	BCNP	09 Aug 89	C	Undetermined
BC8929	M	Fawn	ENP	10 Sep 89	H	Bobcat predation
BC8930	F	4	ENP	20 Sep 89	PR	Undetermined
BC8943	F	4	ENP	25 Sep 89	H	Illegal kill ^d
BC8931	F	3	ENP	03 Oct 89	H	Bobcat predation ^d
BC8954	F	5	BCNP	28 Oct 89	PR	Illegal kill
BC8949	M	2.5	BCNP	29 Oct 89	H	Legal kill
BC8957	M	5.5	BCNP	30 Oct 89	H	Legal kill
BC8928	M	Fawn	ENP	05 Nov 89	PR	Bobcat predation
BC8912	M	3.5	BCNP	05 Nov 89	PN	Legal kill
BC8964	F	5.5	ENP	10 Nov 89	PR	Undetermined
BC8940	M	3.5	BCNP	22 Nov 89	PR	Legal kill
BC8915	M	2.5	ENP	25 Nov 89	PR	Illegal kill
BC8901	M	Fawn	BCNP	21 Dec 89	PR	Bobcat predation
BC8907	M	2.5	ENP	21 Dec 89	H	Undetermined
BC8935	F	Fawn	BCNP	25 Dec 89	PR	Undetermined
BC9071	M	2	BCNP	11 Jan 90	S	Capture myopathy
BC9068	F	2	BCNP	13 Jan 90	S	Capture myopathy
BC9074	M	3	ENP	19 Jan 90	S	Undetermined
BC8950	F	Fawn	BCNP	23 Jan 90	PR	Undetermined
BC9073	M	Fawn	ENP	03 Feb 90	PR	Undetermined
BC8953	F	3	ENP	14 Mar 90	S	Undetermined
BC8919	F	4	ENP	16 Mar 90	PR	Bobcat predation
BC8944	M	Fawn	ENP	17 Mar 90	S	Panther predation
BC9094	F	Fawn	BCNP	30 Mar 90	PR	Capture myopathy
BC9088	M	Fawn	ENP	02 Apr 90	S	Bobcat predation
BC9070	F	3	BCNP	03 Apr 90	S	Bobcat predation
BC8942	F	1	BCNP	04 Apr 90	S	Bobcat predation ^e
BC90100	F	Fawn	BCNP	18 Apr 90	S	Undetermined
BC90113	M	Fawn	ENP	29 Apr 90	H	Bobcat predation
BC9097	M	3	ENP	13 May 90	S	Bobcat predation
BC8916	F	2	ENP	20 May 90	H	Bobcat predation
BC9095	M	Fawn	BCNP	30 May 90	H	Bobcat predation
BC90116	M	Fawn	ENP	02 Jun 90	W	Bobcat predation
BC9080	F	Fawn	BCNP	06 Jun 90	W	Undetermined
BC90117	M	Fawn	BCNP	08 Jun 90	PR	Bobcat predation
BC9075	M	1	ENP	09 Jun 90	H	Malnutrition ^f
BC90108	M	Fawn	BCNP	10 Jun 90	H	Bobcat predation
BC9086	F	Fawn	BCNP	12 Jun 90	H	Undetermined

APPENDIX A, Table 10. Continued, 2 of 3.

ID ^a	Sex	Age ^b	Site	Date of death	Habitat ^c	Cause of death
BC9090	M	Fawn	ENP	17 Jun 90	H	Bobcat predation
BC90115	M	Fawn	ENP	24 Jun 90	PR	Undetermined
BC90112	M	Fawn	ENP	02 Jul 90	W	Bobcat predation
BC9098	M	Fawn	BCNP	03 Jul 90	H	Bobcat predation
BC90103	F	Fawn	ENP	05 Jul 90	H	Undetermined
BC90110	M	Fawn	ENP	06 Jul 90	PR	Bobcat predation
BC9082	F	Fawn	ENP	17 Jul 90	H	Bobcat predation
BC90102	M	Fawn	BCNP	21 Jul 90	S	Bobcat predation
BC9083	F	Fawn	BCNP	04 Aug 90	H	Undetermined
BC9084	M	Fawn	BCNP	22 Aug 90	S	Illegal kill
BC8956	M	3.5	BCNP	08 Sep 90	--	Legal kill
BC8927	M	5.5	BCNP	15 Sep 90	H	Illegal kill
BC90137	F	3.5	ENP	08 Oct 90	H	Undetermined
BC9093	F	Fawn	ENP	18 Oct 90	W	Bobcat predation
BC90118	M	3.5	BCNP	19 Nov 90	PR	Legal kill
BC8917	M	3	BCNP	26 Nov 90	CPR	Legal kill
BC9077	M	3.5	BCNP	01 Dec 90	--	Legal kill
BC8909	M	2	BCNP	01 Dec 90	--	Legal kill ^e
BC8959	F	4	BCNP	12 Jan 91	PR	Bobcat predation
BC90105	F	Fawn	ENP	17 Feb 91	PR	Bobcat predation
BC8926	F	6	ENP	02 Mar 91	PR	Undetermined
BC91147	M	Fawn	BCNP	08 Mar 91	S	Capture myopathy
BC91148	M	Fawn	BCNP	10 Mar 91	PR	Capture myopathy
BC91156	F	Fawn	BCNP	16 Mar 91	S	Bobcat predation
BC91166	M	Fawn	ENP	23 Mar 91	H	Capture myopathy
BC91144	F	Fawn	BCNP	27 Mar 91	H	Bobcat predation
BC91159	F	Fawn	ENP	31 Mar 91	S	Undetermined
BC91179	M	Fawn	ENP	16 Apr 91	S	Capture myopathy
BC91168	F	Fawn	ENP	24 Apr 91	S	Bobcat predation
BC91162	M	Fawn	ENP	08 May 91	S	Undetermined
BC91158	M	Fawn	BCNP	21 May 91	PR	Undetermined
BC91180	F	Fawn	BCNP	24 May 91	H	Bobcat predation
BC91170	M	Fawn	BCNP	24 May 91	H	Undetermined
BC91161	F	Fawn	BCNP	27 May 91	H	Undetermined
BC91172	M	Fawn	ENP	28 May 91	H	Bobcat predation
BC91155	F	Fawn	BCNP	29 May 91	H	Undetermined
BC91181	F	Fawn	BCNP	01 Jun 91	H	Bobcat predation
BC91177	F	Fawn	ENP	03 Jun 91	PR	Bobcat predation
BC91176	M	Fawn	ENP	04 Jun 91	PR	Bobcat predation
BC91143	F	Fawn	BCNP	07 Jun 91	H	Undetermined
BC91152	F	Fawn	ENP	07 Jun 91	H	Bobcat predation
BC91165	M	Fawn	ENP	12 Jun 91	PR	Bobcat predation
BC91178	F	Fawn	ENP	27 Jun 91	PR	Malnutrition

APPENDIX A, Table 10. Continued, 3 of 3.

^a Capture number.

^b Age (years) at death.

^c Habitat: prairie (PR); hardwood island (H); pine island (PN);
cypress (C); cypress prairie (CPR); sawgrass (S); willow (W).

^d Necropsy indicated emaciated condition.

^e Deer censored prior to death.

^f Cause of death to be evaluated by necropsy.

**APPENDIX B. HOME RANGES OF INDIVIDUAL RADIO-INSTRUMENTED
WHITE-TAILED DEER IN BIG CYPRESS NATIONAL PRESERVE
AND EVERGLADES NATIONAL PARK.**

**Table 1. Home ranges of individual radio-instrumented
deer, derived by the minimum convex polygon (MCP)
and harmonic mean (HR) methods, 1990.**

APPENDIX B, Table 1. Individual home ranges (km²) of radio-instrumented white-tailed deer in Big Cypress National Preserve/Everglades National Park, 01 January-31 December 1990. Home range sizes were calculated by both minimum convex polygon (MCP) (Mohr 1947) and harmonic mean (HM) (Dixon and Chapman 1980) methods.

Deer ID	Dry season		Wet season		Hunting season		Annual	
	1 Jan- 31 May MCP	HM	1 Jun- 30 Sep MCP	HM	1 Oct- 31 Dec MCP	HM	MCP	HM
002 (AF) ^a	4.5(31) ^b	8.9	2.2(25)	3.2	3.9(20)	5.1	8.2(76)	7.3
003 (YM)	1.7(31)	1.9	1.1(26)	1.0	4.1(19)	7.7	5.7(76)	3.7
004 (AF)	2.1(32)	4.1	1.9(24)	2.7	1.8(19)	4.5	5.7(75)	5.5
005 (AF)	1.6(32)	3.7	1.3(24)	2.6	1.6(19)	2.8	3.8(75)	6.1
006 (AF)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
008 (AF)	2.7(30)	3.4	1.8(28)	2.4	1.2(17)	1.4	3.6(75)	4.1
010 (AF)	2.6(27)	7.1	2.6(24)	3.6	0.6(18)	0.6	3.5(69)	8.4
013 (AM)	-.-----	-.--	1.5(15)	2.1	0.8(18)	1.3	2.2(33)	2.2
014 (AF)	4.3(29)	2.8	1.1(26)	2.0	0.8(20)	0.9	5.2(75)	2.8
016 (AF)	2.7(30)	4.5	-.-----	-.--	-.-----	-.--	2.7(30)	4.5
017 (AM)	8.0(30)	4.9	2.1(25)	2.9	-.-----	-.--	10.4(67)	5.1
019 (AF)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
021 (AF)	0.5(28)	0.8	4.8(25)	1.8	0.3(18)	0.7	6.5(71)	1.7
022 (AF)	2.0(31)	2.2	1.4(24)	1.8	3.1(19)	3.7	3.7(74)	4.8
023 (AM)	3.0(29)	4.2	-.-----	-.--	-.-----	-.--	3.4(41)	5.0
025 (AM)	0.7(28)	0.9	6.3(25)	12.4	0.5(19)	0.8	6.3(72)	6.9
026 (AF)	0.5(36)	0.7	0.5(26)	0.7	0.3(21)	0.4	0.6(83)	0.9
027 (AM)	12.3(29)	29.3	2.0(23)	2.9	-.-----	-.--	13.2(52)	7.8
033 (AM)	0.6(29)	0.8	4.3(25)	6.4	0.3(19)	0.5	4.3(73)	7.7
034 (AM)	1.1(30)	1.3	1.4(27)	2.3	0.1(22)	0.5	2.8(79)	4.0
036 (AM)	1.6(26)	2.5	12.7(26)	16.0	8.2(20)	18.0	19.5(72)	18.0
039 (AF)	0.5(18)	1.0	-.-----	-.--	-.-----	-.--	0.6(40)	1.0
041 (AF)	1.6(30)	1.7	1.5(28)	2.8	1.0(19)	1.3	2.2(77)	2.4
044 (YM)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
045 (AF)	4.7(31)	5.6	3.2(23)	4.1	3.0(18)	4.9	6.4(72)	7.9
046 (AM)	2.5(30)	3.9	3.7(25)	5.4	3.2(19)	4.1	5.7(74)	5.8
047 (AF)	2.3(27)	3.3	2.7(25)	3.6	1.2(19)	1.9	4.1(71)	3.7

APPENDIX B, Table 1. Continued, 2 of 4.

Deer ID	Dry season		Wet season		Hunting season		Annual	
	1 Jan- 31 May MCP	HM	1 Jun- 30 Sep MCP	HM	1 Oct- 31 Dec MCP	HM	MCP	HM
050(YF)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
052(AM)	2.5(28)	3.6	3.0(28)	3.8	1.1(21)	1.7	5.0(77)	5.3
053(AF)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
055(AF)	1.6(31)	2.7	1.6(26)	2.5	1.8(19)	2.4	2.9(76)	3.3
056(AM)	5.7(29)	14.7	5.5(20)	4.9	-.-----	-.--	7.7(49)	11.7
058(AF)	5.4(30)	5.6	0.4(26)	0.5	0.9(20)	1.0	5.5(76)	2.7
059(AF)	2.0(29)	3.5	1.7(27)	2.7	2.5(18)	3.9	5.1(74)	4.6
060(AM)	1.1(30)	1.9	5.5(27)	7.5	0.9(18)	2.4	7.1(76)	8.5
061(AM)	0.9(32)	0.9	1.2(26)	1.7	0.4(19)	0.7	2.3(77)	1.7
062(AF)	5.5(32)	2.2	0.3(24)	0.5	0.5(21)	0.7	5.7(77)	1.9
063(AF)	0.5(35)	1.2	5.6(27)	2.6	0.9(21)	1.2	9.6(83)	3.3
066(AF)	2.4(29)	4.3	-.-----	-.--	-.-----	-.--	2.4(31)	4.5
067(AF)	5.2(29)	6.7	1.2(27)	1.9	3.3(20)	5.2	8.3(76)	6.9
068(AF)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
069(AF)	6.9(27)	12.0	3.2(24)	6.5	4.1(19)	5.7	10.8(70)	18.3
070(AF)	2.0(17)	2.7	-.-----	-.--	-.-----	-.--	-.-----	-.--
071(AM)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
072(YF)	3.3(27)	4.5	2.1(23)	2.8	1.8(18)	2.5	5.0(68)	7.4
073(YM)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
074(AM)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
075(YM)	1.3(27)	1.3	-.-----	-.--	-.-----	-.--	1.3(29)	1.3
076(FM)	0.7(15)	0.8	1.0(24)	1.6	-.-----	-.--	1.2(39)	1.7
077(AM)	1.5(16)	2.6	3.3(25)	7.5	-.-----	-.--	7.3(53)	10.3
078(YM)	2.4(18)	2.8	6.5(27)	11.4	5.6(20)	13.8	13.7(65)	14.1
079(FF)	0.3(15)	0.4	0.4(25)	0.7	-.-----	-.--	0.4(46)	0.7
080(FF)	0.7(17)	1.3	-.-----	-.--	-.-----	-.--	-.-----	-.--
081(AF)	0.8(18)	1.4	2.1(26)	4.9	4.7(18)	11.8	6.8(62)	12.2
082(FF)	1.2(16)	2.3	-.-----	-.--	-.-----	-.--	1.7(25)	2.5
083(FF)	0.5(16)	1.0	0.4(15)	0.8	-.-----	-.--	1.0(31)	1.3

APPENDIX B, Table 1. Continued, 4 of 4.

Deer ID	Dry season		Wet season		Hunting season		Annual	
	1 Jan- 31 May		1 Jun- 30 Sep		1 Oct- 31 Dec			
	MCP	HM	MCP	HM	MCP	HM	MCP	HM
115 (FM)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
116 (FM)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
117 (FM)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
118 (AM)	-.-----	-.--	6.3 (19)	6.7	-.-----	-.--	6.3 (28)	6.7
119 (AM)	-.-----	-.--	9.6 (18)	7.3	3.2 (19)	3.5	9.6 (37)	7.1
120 (AM)	-.-----	-.--	8.3 (18)	12.6	4.2 (18)	7.3	12.6 (36)	19.6
121 (AM)	-.-----	-.--	-.-----	-.--	8.7 (18)	10.5	15.4 (32)	16.5
122 (AM)	-.-----	-.--	-.-----	-.--	2.1 (19)	2.6	14.8 (32)	18.1
123 (AF)	-.-----	-.--	-.-----	-.--	0.7 (18)	1.2	1.1 (27)	1.8
124 (AF)	-.-----	-.--	-.-----	-.--	3.8 (18)	16.0	3.8 (28)	11.2
125 (AF)	-.-----	-.--	-.-----	-.--	0.7 (18)	1.2	1.6 (28)	2.3
127 (AF)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
128 (AM)	-.-----	-.--	-.-----	-.--	7.2 (19)	16.9	12.3 (27)	24.5
129 (AF)	-.-----	-.--	-.-----	-.--	1.1 (18)	1.5	1.6 (26)	2.2
130 (AM)	-.-----	-.--	-.-----	-.--	0.3 (19)	0.5	0.8 (27)	1.6
131 (AF)	-.-----	-.--	-.-----	-.--	2.9 (18)	2.8	2.9 (26)	4.3
132 (AM)	-.-----	-.--	-.-----	-.--	3.2 (18)	4.2	6.8 (25)	10.7
133 (AM)	-.-----	-.--	-.-----	-.--	2.1 (16)	2.5	-.-----	-.--
134 (AM)	-.-----	-.--	-.-----	-.--	1.4 (18)	1.9	6.9 (25)	18.7
135 (AF)	-.-----	-.--	-.-----	-.--	2.5 (18)	3.9	2.5 (26)	3.9
136 (AM)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
137 (AF)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
138 (AF)	-.-----	-.--	-.-----	-.--	1.0 (18)	1.2	1.0 (27)	1.4
139 (AF)	-.-----	-.--	-.-----	-.--	-.-----	-.--	-.-----	-.--
140 (AM)	-.-----	-.--	-.-----	-.--	2.5 (19)	3.6	3.1 (26)	4.3
141 (AF)	-.-----	-.--	-.-----	-.--	1.4 (18)	2.3	1.4 (25)	2.6

^a Age/sex designation: A=adult, Y=yearling, F=fawn; M=male, F=female.

^b Numbers in parentheses indicate sample sizes (radio-locations).

APPENDIX B, Table 1. Continued, 3 of 4.

Deer ID	Dry season		Wet season		Hunting season		Annual	
	1 Jan- MCP	31 May HM	1 Jun- MCP	30 Sep HM	1 Oct- MCP	31 Dec HM	MCP	HM
084 (FM)	1.4 (15)	1.9	0.4 (18)	0.9	-.-----	-.-	1.6 (33)	2.1
085 (FM)	0.5 (15)	0.5	0.5 (26)	0.9	1.1 (18)	1.9	1.3 (59)	1.5
086 (FF)	1.1 (16)	1.4	-.-----	-.-	-.-----	-.-	-.-----	-.-
087 (FM)	0.2 (16)	0.4	0.3 (25)	0.7	0.2 (18)	0.3	0.5 (59)	0.7
088 (FM)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
089 (AM)	2.0 (16)	3.3	3.8 (16)	5.4	-.-----	-.-	4.6 (32)	5.6
090 (FM)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
091 (AM)	4.3 (16)	8.6	9.5 (25)	12.9	0.5 (19)	0.3	25.0 (60)	18.9
093 (FF)	-.-----	-.-	0.3 (23)	0.3	-.-----	-.-	0.5 (41)	0.5
094 (FF)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
095 (FM)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
097 (AM)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
098 (FM)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
099 (FM)	-.-----	-.-	1.3 (25)	2.0	1.4 (18)	2.4	1.9 (56)	3.0
100 (FF)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
101 (FF)	-.-----	-.-	1.1 (25)	1.7	1.2 (17)	2.1	2.9 (52)	2.6
102 (FM)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
103 (FF)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
104 (FF)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
105 (FF)	-.-----	-.-	0.3 (24)	0.2	1.6 (19)	1.0	1.7 (53)	0.6
106 (FF)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
107 (FF)	-.-----	-.-	0.5 (26)	0.9	2.5 (20)	5.5	2.9 (54)	3.0
108 (FM)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
109 (AM)	-.-----	-.-	4.8 (25)	6.9	1.7 (19)	2.0	5.6 (54)	4.7
110 (FM)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
111 (FF)	-.-----	-.-	0.3 (25)	0.4	-.-----	-.-	0.3 (37)	0.5
112 (FM)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
113 (FM)	-.-----	-.-	-.-----	-.-	-.-----	-.-	-.-----	-.-
114 (FF)	-.-----	-.-	1.3 (27)	1.7	0.6 (19)	0.7	1.7 (53)	2.7

**APPENDIX C. OBSERVABILITY COEFFICIENTS FOR RADIO-
INSTRUMENTED WHITE-TAILED DEER IN BIG CYPRESS NATIONAL
PRESERVE AND EVERGLADES NATIONAL PARK.**

**Table 1. Observability coefficients, as measured
by the visibility of radio-located deer,
summer/wet season 1990.**

**Table 2. Observability coefficients, as measured
by the visibility of radio-located deer,
fall/hunting season 1990.**

**Table 3. Observability coefficients, as measured
by the visibility of radio-located deer,
spring/dry season 1991.**

APPENDIX C, Table 1. Observability bias for the aerial census conducted during summer/wet season 1990, as measured by the visibility of radio-instrumented deer during the same diel and seasonal time period. Only locations of radio-instrumented deer recorded within the census areas during early morning (sunrise to 2 hours post-sunrise) between 01 June-30 September 1990 were included in the calculation of visibility coefficients.

BIG CYPRESS NATIONAL PRESERVE

ID# Visibility¹

Adult & Yearling Males

BC8903 1/8
BC9078 3/6

Total 4/14 (28.6%)

Adult & Yearling Females

BC8902 2/7
BC8904 2/6
BC8905 0/6
BC8908 2/9
BC8914 0/6
BC8941 3/8
BC8955 0/7
BC8958 0/6
BC9067 3/6

Total 10/55 (18.2%)

Fawns

BC9083 1/4
BC9084 3/5
BC9099 3/7
BC90102 0/3
BC90107 1/7
BC90108 0/1

Total 8/27 (29.6%)

EVERGLADES NATIONAL PARK

ID# Visibility¹

Adult & Yearling Males

BC8925 4/6
BC8933 0/6
BC8934 2/7
BC8946 2/6
BC8952 0/7
BC8961 2/8
BC9089 1/6
BC9091 5/6
BC90109 5/7

Total 21/59 (35.6%)

Adult & Yearling Females

BC8926 1/6
BC8945 3/6
BC8962 1/6
BC8963 3/9
BC9072 4/6

Total 12/33 (36.4%)

Fawns

BC9082 1/2
BC9093 3/6
BC90103 0/2
BC90105 2/6
BC90106 1/2
BC90111 2/7

Total 9/25 (36.0%)

BCNP OBSERVABILITY COEFFICIENT:
22/96 (22.9%)

ENP OBSERVABILITY COEFFICIENT:
42/117 (35.9%)

¹ Number of radio-locations for which deer were observed visually/total number of radio-locations.

APPENDIX C, Table 2. Observability bias for the aerial census conducted during fall/hunting season 1990, as measured by the visibility of radio-instrumented deer during the same diel and seasonal time period. Only locations of radio-instrumented deer recorded within the census areas during early morning (sunrise to 2 hours post-sunrise) between 01 October-31 December 1990 were included in the calculation of visibility coefficients.

BIG CYPRESS NATIONAL PRESERVE

ID#	Visibility ¹
<u>Adult & Yearling Males</u>	
BC8903	3/5
BC9078	6/7
BC90133	2/6

Total	11/18	(61.1%)
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Adult & Yearling Females

BC8902	2/4
BC8904	2/5
BC8905	3/5
BC8908	2/3
BC8914	5/5
BC8941	4/4
BC8955	3/4
BC8958	5/5
BC8959	5/5
BC9067	3/6
BC90131	5/5
BC90135	5/5

Total	44/56	(78.6%)
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Fawns

BC9099	2/4	
BC90107	3/6	
Total	5/10	(50.0%)

BCNP OBSERVABILITY COEFFICIENT:
60/84 (71.4%)

EVERGLADES NATIONAL PARK

ID#	Visibility ¹
<u>Adult & Yearling Males</u>	
BC8925	1/4
BC8933	1/4
BC8934	1/6
BC8946	2/4
BC8952	0/8
BC8961	2/4
BC9091	0/4
BC90109	3/4
BC90128	3/4
BC90136	3/3
BC90140	4/4

Total	20/49	(40.8%)
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Adult & Yearling Females

BC8926	0/4
BC8945	3/4
BC8962	4/4
BC9072	4/4
BC90123	3/4
BC90124	2/3
BC90125	3/4
BC90129	4/4
BC90138	4/4
BC90139	1/1
BC90141	4/4

Total	32/40	(80.0%)
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Fawns

BC90105	3/4	
Total	3/4	(75.0%)

ENP OBSERVABILITY COEFFICIENT:
55/93 (59.1%)

¹ Number of radio-locations for which deer were observed visually/total number of radio-locations.

APPENDIX C, Table 3. Observability bias for the aerial census conducted during spring/dry season 1991, as measured by the visibility of radio-instrumented deer during the same diel and seasonal time period. Only locations of radio-instrumented deer recorded within the census areas during early morning (sunrise to 2 hours post-sunrise) between 01 January-31 May 1991 were included in the calculation of visibility coefficients.

BIG CYPRESS NATIONAL PRESERVE		EVERGLADES NATIONAL PARK	
ID#	Visibility ¹	ID#	Visibility ¹
Adult & Yearling Males		Adult & Yearling Males	
BC8903	2/8	BC8925	1/5
BC9078	4/8	BC8933	0/5
		BC8934	0/6
		BC8946	2/6
		BC8952	2/6
		BC8961	3/6
		BC9091	1/4
		BC90109	4/6
		BC90128	5/8
		BC90140	3/7
Total	6/16 (37.5%)	Total	21/59 (35.6%)
Adult & Yearling Females		Adult & Yearling Females	
BC8902	3/3	BC8945	4/7
BC8904	2/5	BC8962	3/5
BC8905	0/4	BC8963	2/8
BC8908	5/7	BC89123	4/6
BC8914	4/6	BC90124	1/4
BC8941	3/5	BC90125	3/7
BC8955	3/6	BC90129	8/8
BC8958	4/6	BC90138	3/5
BC9067	6/6	BC90141	8/8
BC90107	5/6		
BC90131	5/6		
Total	40/60 (66.7%)	Total	36/58 (62.1%)
Fawns		Fawns	
BC91142	2/4	BC91152	2/3
BC91143	0/3	BC91154	0/1
BC91173	1/1	BC91160	0/1
BC91174	1/3	BC91162	0/1
		BC91163	1/3
		BC91165	1/4
		BC91167	1/3
Total	4/11 (36.4%)	Total	5/16 (31.3%)
BCNP OBSERVABILITY COEFFICIENT:		ENP OBSERVABILITY COEFFICIENT:	
50/87 (57.5%)		62/133 (46.6%)	

¹ Number of radio-locations for which deer were observed visually/total number of radio-locations.