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Lynx rufus.

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Lynx, Kerr, 1792

Lynx Kerr, 1792:155. Type species *Lynx vulgaris* Kerr [=*Felis lynx* Linnaeus].
Lynceus Gray, 1821:302. Type species *Felis lynx* Linnaeus (preoccupied by *Lynceus* Müller, 1785, a crustacean).
Lyncus Gray, 1825:339. Renaming of *Lynceus* Gray.
Pardina Kaup, 1829:53. Type species *Felis pardina* Temminck.
Lynchus Jardine, 1834:274. Emendation of *Lynceus* Gray.
Cervaria Gray, 1867:276. Type species *Lyncus pardinus* [=*Felis pardina* Temminck] (preoccupied by *Cervaria* Walker, 1866, a lepidopteran).
Eucervaria Palmer, 1903:873. Renaming of *Cervaria* Gray.

CONTEXT AND CONTENT. Order Carnivora, Family Felidae. Bobcats and lynxes have often been included in the genus *Felis* (Nowak, 1991). However, *Felis* has three upper premolars and *Lynx* has two (Hoffmeister, 1989). *Lynx* is recognized here as a genus (Collier and O'Brien, 1985; Werdelin, 1981; Wozencraft, 1993) and includes *L. canadensis*, *L. lynx*, *L. pardinus*, and *L. rufus* (Wozencraft, 1993). *L. rufus* and *L. pardinus* are believed to be ethological and ecological equivalents, as are *L. canadensis* and *L. lynx* (van Den Brink, 1970). A key to species (Hall and Kelson, 1959; van Den Brink, 1970) follows:

1 Specimen from Eurasia 2
  Specimen from North America 3
2 Tail spotted and with short black tip; coat heavily spotted; anterior condyloid foramen confluent with foramen lacerum posterius .... *L. pardinus*
  Tail with broad black tip but otherwise unmarked; coat without markings on back; anterior condyloid foramen separate from foramen lacerum posterius .... *L. lynx*
3 Tail tipped with black above and below; tail <0.5 length of hind foot; anterior condyloid foramen separate from foramen lacerum posterius .... *L. canadensis*
  Tail tipped with black only above; tail >0.5 length of hind foot; anterior condyloid foramen confluent with foramen lacerum posterius .... *L. rufus*

Lynx rufus Schreber, 1777

Bobcat

Felis rufa Schreber, 1777:412. Type locality "Provinz New York in Amerika."
Lynx fasciatus Rafinesque, 1817:46. Type locality "Northwest Coast." Based on specimens from Netul river near Astoria, Oregon.
Lynx floridanus Rafinesque, 1817:46. Type locality "Florida."
Lynx montanus Rafinesque, 1817:46. Type locality "Catskill Mountains, New York."
Felis maculata Horsfield and Vigors, 1829:381. Type locality "Mexico." Name preoccupied by *Felis* (*Lynx*) *vulgaris maculatus* Kerr, 1792.
Lynx baileyi Merriam, 1890:79. Type locality "Mocassin Spring, north of Colorado river, Coconino county, Arizona."
Lynx texensis Allen, 1895:188. Type locality "the vicinity of Castroville, on the headwaters of the Medina [River], Medina county, Texas."
Lynx gigas Bangs, 1897:50. Type locality "15 miles back of Bear River, Nova Scotia."
Lynx uinta Merriam, 1902:71. Type locality "Bridger Pass, Carbon county, Wyoming."

CONTEXT AND CONTENT. Context as given in generic summary above. Twelve subspecies of *L. rufus* are currently recognized (Hall, 1981).

L. r. baileyi Merriam, 1890:79, see above (*eremicus* is a synonym).
L. r. californicus Mearns, 1897:2. Type locality "San Diego, San Diego county, California." (*oculeus* is a synonym).
L. r. escuinapae Allen, 1903:614. Type locality "Escuinapa, Sinaloa" [Mexico].
L. r. fasciatus Rafinesque, 1817:46, see above.
L. r. floridanus Rafinesque, 1817:46, see above.
L. r. gigas Bangs, 1897:50, see above.
L. r. oaxacensis Goodwin, 1963:1. Type locality "Los Nanches, San Pedro Jilotepec, District of Tehuantepec, Oaxaca, Mexico."
L. r. pallescens Merriam, 1899:104. Type locality "South side of Mount Adams, near Trout Lake, Skamania county, Washington." (*uinta* is a synonym).
L. r. peninsularis Thomas, 1898:42. Type locality "Santa Anita, Baja California."
L. r. rufus Schreber, 1777:412, see above (*montanus* is a synonym).
L. r. superiorensis Peterson and Downing, 1952:1. Type locality "McIntyre Township, near Port Arthur, Ontario."
L. r. texensis Allen, 1895:188, see above (*maculata* is a synonym).

DIAGNOSIS. *Lynx rufus* (Fig. 1) is approximately twice the size of a domestic cat and, on average, smaller than the Canada lynx (*L. canadensis*; Jackson, 1961). Only on Cape Breton Island (New Brunswick, Canada) are bobcats heavier than lynxes; adult male bobcats are 40% heavier than adult male lynxes (Parker et al., 1983).

The bobcat can be differentiated from the lynx by its lack of large furry pads, slightly longer tail (18–22% of length of head and body), shorter ear tufts (<2.5 cm), and more well–defined spots on the coat (Banfield, 1987; Hoffmeister, 1989). The tail is banded, and the tip is black on the upper side only, while that of *L. canadensis* is black all around. The coat coloration of *L. rufus* is more reddish rather than grayish as in *L. canadensis* (McCord and Cardoza, 1982; Nowak, 1991). Mountain lion (*Puma concolor*) cubs, although spotted, have no elongate hair on the side of the face, and have long tails (Hoffmeister, 1989).

The skull of the bobcat (Fig. 2) is usually smaller than that of the Canada lynx, has relatively larger auditory bullae, and is narrower inter-orbitally (always <30 mm). The anterior condyloid foramen is confluent with the foramen macerum (located between bulla and foramen magnum), rather than separate as in the lynx (Hoffmeister, 1989). Presphenoid is <6 mm in greatest width, and the length of the upper carnassial is <16 mm (Jackson, 1961).

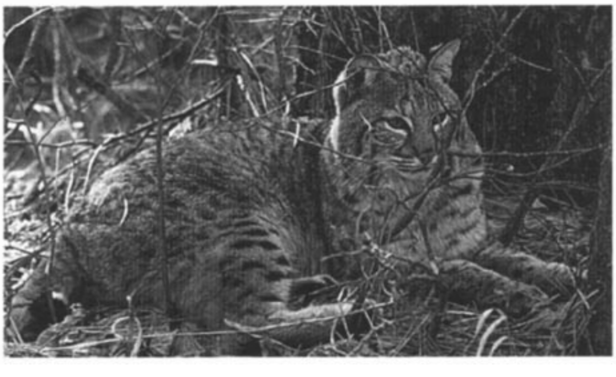

FIG. 1. Adult *Lynx rufus* in Vermont. Photograph courtesy of S. Morse.

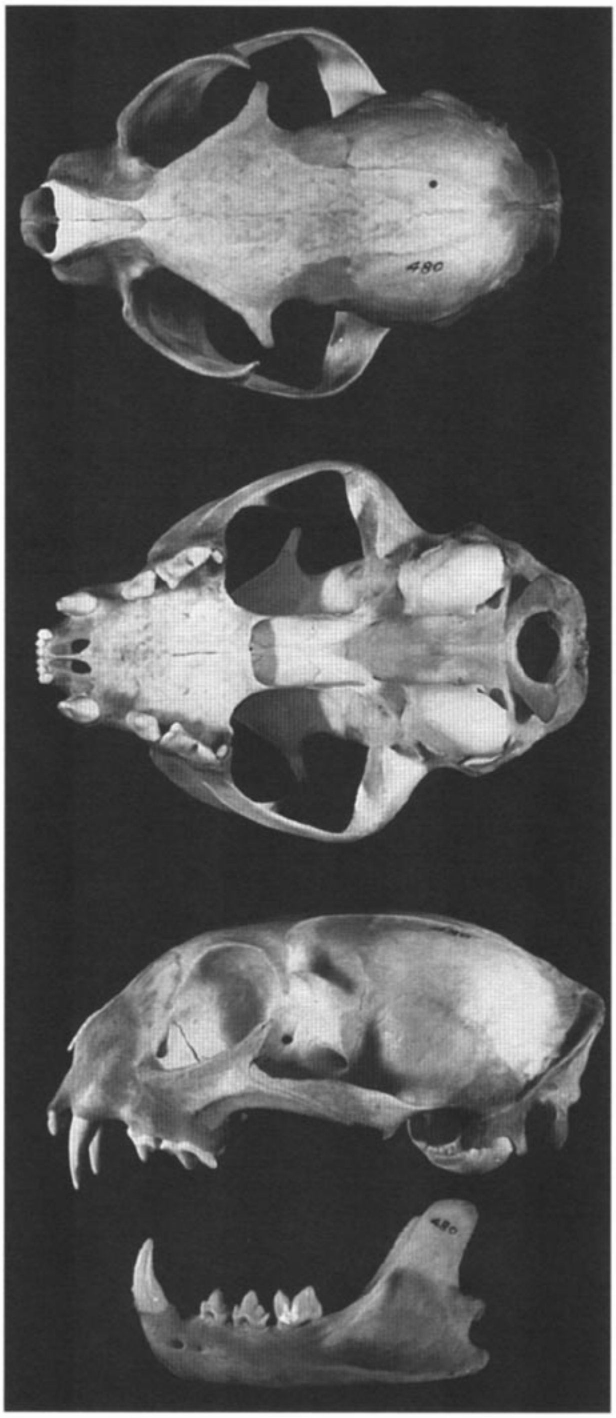

FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Lynx rufus* from Saskatchewan (sex unknown, University of Saskatchewan Biology Museum #480). Greatest length of cranium is 125.0 mm.

Bregmatic fontanelle bones are present in *L. rufus* and absent in *L. canadensis* (Pratt, 1942).

GENERAL CHARACTERS. The fur of the bobcat is dense, short, and soft. True color phases do not occur, but *L. rufus* is the only lynx known to exhibit melanism (Ulmer, 1941). Albinism may occur (Young, 1958:32b, plate 12). The general coloration is yellowish to reddish brown, with numerous black spots and black-tipped guard hairs (Banfield, 1987). The venter is white with black spots, and the forelegs are tawny with horizontal black bars medially (McCord and Cardoza, 1982). The face has a black nose pad, white vibrissae, and a black striped ruff and forehead. The dorsal surface of the ear is black with a central white spot (Banfield, 1987). The bobcat possesses two tufts of facial vibrissae on each cheek, and the ears possess a tuft of hair at the tip which may be absent during molt (Pocock, 1917).

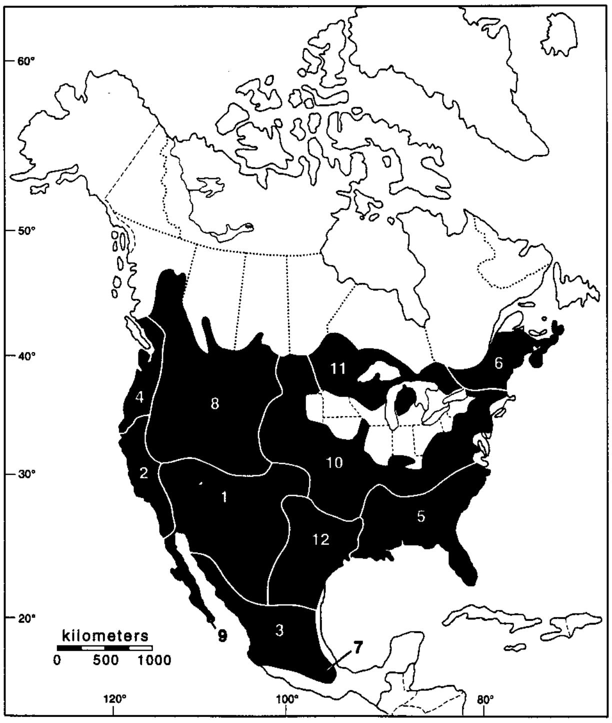

FIG. 3. Distribution of *Lynx rufus* in North America (modified from Anderson, 1987*a*; Hoffmeister, 1989; McCord and Cardoza, 1982; Rolley, 1987): 1, *L. r. baileyi*; 2, *L. r. californicus*; 3, *L. r. escuinapae*; 4, *L. r. fasciatus*; 5, *L. r. floridanus*; 6, *L. r. gigas*; 7, *L. r. oaxacensis*; 8, *L. r. pallescens*; 9, *L. r. peninsularis*; 10, *L. r. rufus*; 11, *L. r. superiorensis*; 12, *L. r. texensis*.

Lynx rufus exhibits sexual dimorphism in size, with males 10% longer and 25–80% heavier than females (Anderson, 1987*a*; Jackson, 1961; Litvaitis et al., 1984). Sexual dimorphism is believed to be highest in mountainous regions and lowest in areas of little topographic relief (Sikes and Kennedy, 1993). Body mass varies geographically, with larger males found in northern and eastern localities, and largest females in north–central localities. The smallest individuals of both sexes occur in the southern Appalachian mountains (Sikes and Kennedy, 1992). Mean body measurements and ranges (in mm) of males and females, respectively, are: total length, 869 (475–1,252), 786 (610–1,092); length of tail, 148 (108–201), 137 (90–171); length of hind foot, 170 (135–223), 155 (125–190); length of ear, 66 (37–85), 63 (32–80—McCord and Cardoza, 1982). Mean body mass (in kg; range in parentheses) of males and females, respectively, is 9.6 (6.4–18.3) and 6.8 (4.1–15.3—Banfield, 1987).

Average cranial measurements (in mm; *SD* and *n* follow in parentheses) of male and female bobcats, respectively, are: greatest length of skull, 129.3 (5.8, 323), 120.7 (5.7, 290); condylobasal length, 117.6 (5.2, 320), 110.0 (4.9, 283); basal length, 108.4 (5.1, 313), 101.3 (4.9, 283); zygomatic width, 89.8 (5.0, 313), 84.2 (4.4, 282); palatal length, 51.0 (2.8, 332), 47.6 (2.5, 301); palatal width, 32.8 (1.9, 329), 31.0 (1.9, 289); length of auditory bulla, 23.1 (1.2, 324), 22.0 (1.1, 288); width of auditory bulla, 14.9 (0.8, 323), 14.3 (0.9, 288), interbullar breadth, 13.4 (1.4, 280), 12.7 (1.2, 261); breadth of braincase, 53.6 (1.7, 280), 52.3 (1.8, 264—Sikes and Kennedy, 1992). Additional measurements may be found in Sikes and Kennedy (1992).

DISTRIBUTION. The bobcat is present throughout Canada and the United States except in Alaska, Hawaii, Vancouver Island, Prince Edward Island, and Newfoundland (Fig. 3). Its distribution southward extends to Rio Mescale, Mexico, just below the 18th parallel (Young, 1958). It has been exterminated in much of the Ohio Valley, upper Missisipi Valley, and southern Great Lakes region (Peterson and Downing, 1952). In Canada, the distribution of the bobcat extends slightly above the 50th parallel (Young, 1958).

On Cape Breton Island (New Brunswick, Canada), the bobcat appeared around 1955, and gradually invaded the lowlands (Parker et al., 1983). A northward expansion of its range was observed in Ontario (Peterson and Downing, 1952) and in Minnesota, (Rollings, 1945) during the early 1900s. This northward expansion occurred concomitantly with the clearing of mature conifer forests for agriculture and the consequent receding of Canada lynx (Rolley, 1987; Rollings, 1945). In addition, bobcats have been reintroduced successfully in northwestern New Jersey (McCord and Cardoza, 1982) and on Cumberland Island, Georgia (Diefenbach et al., 1994). Ultimately, the northern distribution of the bobcat is limited by deep snow (Litvaitis et al., 1986*b*; Parker et al., 1983).

FOSSIL RECORD. The genus *Lynx* is considered to be of African origin (Werdelin, 1981). *L. rufus* originated from *L. issiodorensis* in North America (Werdelin, 1981). The genus *Lynx* separated from *Panthera* ca. 2.0×10^6 years ago (Collier and O'Brien, 1985). The first appearance of *L. issiodorensis* in the fossil record dates from the Villafranchian (Savage and Russell, 1983). The oldest record of *L. rufus* dates from Blancan III and IV of Repenning, from ca. 3.2 to 1.8×10^6 years ago (Savage and Russell, 1983). Irvingtonian bobcats (known under Cope's name *L. r. calcaratus*) were larger than Rancholabrean and recent specimens, suggesting a gradual reduction in size (Kurtén and Anderson, 1980).

FORM AND FUNCTION. Skulls of males are on average 3% larger in linear measurements than that of females (Hall and Kelson, 1959). The lambdoidal ridge is well developed, and strengthens the cervical musculature for killing large prey. The sagittal crest is well developed, and provides jaw strength (Kelson, 1946). The mandible is almost straight, giving *L. rufus* a prominent chin. The bobcat possesses a stiff symphysis which yields more effective cutting of flesh by the carnassials and low power in the cracking of large bones (Scapino, 1981).

The dentition of *L. rufus* is highly specialized for killing prey and shearing meat (Tumlison and McDaniel, 1984*a*). Adult carnassials are more posteriorly located in the jaw than are lacteal carnassials and provide greater shear force in adults due to proximity to the angle of the jaw (Tumlison and McDaniel, 1984*a*). Unlike the genus *Felis*, *Lynx* does not possess P2. The dental formula is i 3/3, c 1/1, p 2/2, m 1/1, total 28 (Rolley, 1987).

The clitoris of the female is minute (Pocock, 1917). The glans penis of the male is short, subconical, and usually armed with a backwardly directed spiny papilla (Pocock, 1917). Adrenal glands are heavier in males than females, and size is correlated with reproductive status (McKinney and Dunbar, 1976). *L. rufus* has four mammae, two abdominal and two inguinal (Jackson, 1961).

Male bobcats possess a rudimentary baculum (Maser and Toweill, 1984). The distal portion is a narrow shaft, while the proximal region is expanded and bifurcated ventrally (Tumlison and McDaniel, 1984*b*). Baculum length of six Oregon and nine Arkansas bobcats, respectively, averaged 4.2 mm (*SD* = 1.3) and 5.7 mm (*SD* = 1.5), and width averaged 2.6 mm (*SD* = 1.1) and 2.3 mm (*SD* = 0.3—Maser and Toweill, 1984; Tumlison and McDaniel, 1984*b*).

The bobcat is digitigrade with sharp, retractile claws. The hind feet have four toes. Front feet are larger than hind feet, and the fifth toe is raised (McCord and Cardoza, 1982). Toes are joined by a web (Pocock, 1917). The average relative support capacity of the bobcat paw in snow is 22 g/cm^2 (*n* = 5, range 20–25, *SD* = 2.7) and is ca. 50% that of paws of the Canada lynx (Parker et al., 1983). The feet of *L. rufus* resemble those of *L. canadensis* in web development, but the inner lobes of the sheaths of the claws are relatively smaller on both front and hind feet, and the plantar pads are longer compared with their width (median length is ca. 75% total width). The feet are also less hairy (Pocock, 1917).

Food intake by the bobcat varies with physical condition. Energy consumption averages 138 kcal kg^{-1} day^{-1}, and intake energy is allocated as follows: feces 9%, urine 8%, weight gain 6%, and metabolism 77% (Golley et al., 1965). Metabolizable energy differs among prey types; white-tailed deer has the highest value (5.58 kcal/g dry matter), whereas gray squirrels (*Sciurus carolinensis*), microtines, and snowshoe hare yield 4.16, 3.91, and 2.93 kcal/g dry matter, respectively (Powers et al., 1989). The standard metabolic rate of bobcats is 79 kcal/kg of body weight and does not vary seasonally (Mautz and Pekins, 1989). It appears that bobcats use sunning and selection of microhabitat as behavioral adaptations to help offset increased thermoregulatory costs of winter (Mautz and Pekins, 1989).

ONTOGENY AND REPRODUCTION. Bobcats are polygamous (Provost et al., 1973). Female bobcats are seasonally polyestrous (Crowe, 1975*a*; Duke, 1949, 1954; Gashwiler et al., 1961) and those females that fail to become pregnant in early spring may come in heat again later in the spring or early summer (Duke, 1954). *L. rufus* females are induced ovulators (Colby, 1973), and may experience estrus in their first year (Crowe, 1975*a*; Fritts and Sealander, 1978*a*; Johnson and Holloran, 1985). However, most females breed during their second spring (Knick et al., 1985; Rolley, 1985). Severe drought affecting prey availability may reduce pregnancy rates (Rolley, 1985).

In males, the onset of spermatogenesis is more closely related to body mass than to age (Crowe, 1975*a*). Male bobcats show seasonal reduction in spermatogenic activity during summer and early fall (Crowe, 1975*a*), although such reduction may be absent in older males (Duke, 1954; Fritts and Sealander, 1978*a*). Mean (± 1 *SD*) testicular volume in males is 2.31 ± 0.49 ml (Crowe, 1975*a*). In juvenile bobcats, the diameter of the seminiferous tubules increases from a mean (± 1 *SD*) of 67.8 ± 5.0 μm (*n* = 10) at 6 months, to 78.7 ± 3.6 μm at 10 months of age, with a resulting increase in spermatogenic activity. Adults are reproductively active until death (Crowe, 1975*a*).

The breeding season of the bobcat varies with latitude, longitude, altitude, and climatic variations (Crowe, 1975*a*). Breeding is possible throughout the year, although most breeding occurs from December to July (Crowe, 1975*a*, 1975*b*; Fritts and Sealander, 1978*a*; Gashwiler et al., 1961). Early breeders may have a second litter late in the year (Crowe, 1975*a*; Duke, 1954).

Gestation averages 63 days (range 50–70 days—Hemmer, 1976; Young, 1958). Young bobcats may be born during any month of the year (Berg, 1979; Fritts and Sealander, 1978*a*; Gashwiler et al, 1961; Young, 1958), although most births occur from late April through June (Bailey, 1979; Crowe, 1975*a*, 1975*b*).

Average litter size can be determined using counts of corpora lutea (Gashwiler et al., 1961), follicles (Hoppe, 1979), placental scars (Johnson and Holloran, 1985; Parker and Smith, 1983), embryo counts (Fritts and Sealander, 1978*a*), and live litters (Gashwiler et al., 1961). Litter size ranges from one to six and averages 2.0 in Kansas (Johnson and Holloran, 1985), 2.5 in Arkansas (Fritts and Sealander, 1978*a*) and Nova Scotia (Parker and Smith, 1983), 2.7 in Texas (Blankenship and Swank, 1979) and Idaho (Bailey, 1979), 2.8 in Wyoming (Crowe, 1975*b*), 3.1 in Michigan (Hoppe, 1979), 3.2 in Minnesota (Berg, 1979), and 3.5 in Utah (Gashwiler et al., 1961). A female from Florida had a mean littersize of 3.3 over seven consecutive litters (Winegarner and Winegarner, 1982). Litter size is higher for adult females than for yearlings (Knick et al., 1985).

Bobcats weigh 280–340 g at birth (Young, 1958). The young are born blind and remain so for ca. 3–11 days (Hemmer, 1976; Pollack, 1950). Young are raised by the female; males provide no parental care (Bailey, 1974). The nursing period lasts 2 months (Young, 1958). A litter of *L. rufus* was observed eating solid food during the ninth week although they continued to nurse daily until 4 months old (Winegarner and Winegarner, 1982). Deciduous dentition erupts at 11–14 days and is complete by 9 weeks. Permanent dentition erupts at 16–19 weeks of age and is complete by 34 weeks (Crowe, 1975*a*; Jackson et al., 1988).

ECOLOGY. The bobcat inhabits a variety of environments including subtropical swamps in the southeast, arid areas in the northwest, and temperate forests in the north (Werdelin, 1981). Habitat preferences throughout the year strongly reflect prey abundance (Koehler and Hornocker, 1989; Litvaitis et al., 1986*b*; Rollings, 1945), and males and females may prefer different habitats seasonally (Rolley and Warde, 1985). During summer, bobcats prefer higher elevations and are not as selective in their use of habitats (Koehler and Hornocker, 1989). In winter, habitat selection is greatly influenced by snow conditions, and bobcats prefer low elevations, south-southwest facing slopes, rocky terrain, and open areas (Koehler and Hornocker, 1989; McCord, 1974). In Minnesota and Wisconsin, lowland coniferous forests and swamps are preferred (Berg, 1979; Lovallo and Anderson, 1996*b*; Rollings, 1945), whereas lowland deciduous cover is avoided (Fuller et al., 1985*a*). In Montana, bobcats prefer dense thickets of conifers, river bottoms, and black-tailed prairie dog (*Cynomys ludovicianus*) towns (Knowles, 1985). In Oklahoma, bobcats prefer grassy and brushy areas, while mature stands of pine and oak are avoided (Rolley and Warde, 1985).

Lynx rufus has a strictly carnivorous diet. The major food of bobcats is lagomorphs (Bailey, 1974, 1979; Berg, 1979; Dibello et al., 1990; Knick, 1990), whereas sciurids and ground-dwelling microtines are consumed opportunistically (Jones and Smith, 1979; Litvaitis et al., 1986*a*; Maehr and Brady, 1986). Larger rodents such as muskrats (*Ondatra zibethicus*), woodchucks (*Marmota monax*), porcupines (*Erethizon dorsatum*), beavers (*Castor canadensis*, and mountain beavers (*Aplodontia rufa*) may also be part of the diet (Dibello et al,. 1990; Litvaitis et al., 1986*a*; Witmer and DeCalesta, 1986).

Occasionally, *L. rufus* consumes carnivores (Fritts and Sealander, 1978*b*; Witmer and DeCalesta, 1986), javelina (*Tayassu tajacu*; Jones and Smith, 1979), feral pig (*Sus scrofa*; Fritts and Sealander, 1978*b*; Maehr and Brady, 1986), and domestic animals (Fritts and Sealander, 1978*b*). There are observations of *L. rufus* killing bats (Wroe and Wroe, 1982) and translocated Japanese monkeys (*Macaca fuscata*; Gouzoules et al., 1975). Bobcat predation is the major cause of death of the endangered San Joaquin kit fox (*Vulpes macrotis mutica*) in California (Disney and Spiegel, 1992).

Bobcats can kill healthy adult white-tailed deer (*Odocoileus virginianus*; Marston, 1942; Matson, 1948; McCord, 1974; Petraborg and Gunvalson, 1962), mule deer (*O. hemionus*; Bailey, 1979; Koehler and Hornocker, 1989), American pronghorn antelope (*Antilocapra americana*; Beale and Smith, 1973; Young, 1958), and bighorn sheep (*Ovis canadensis*; Koehler and Hornocker, 1989). During winter, consumption of white-tailed deer is dependent on bobcat size; larger animals, irrespective of age or sex, consume more deer (Litvaitis et al., 1984). Ungulates may also be consumed as carrion, roadkills, or animals crippled by hunting (Fritts and Sealander, 1978*b*).

Galliformes are the most important taxa of birds consumed (Bailey, 1979), but Passeriformes, Strigiformes, Gruiformes, Accipitridae and Anatidae are also consumed (Anderson, 1987*b*; Fritts and Sealander, 1978*b*; Maehr and Brady, 1986). Remains of bird eggs are sometimes found in bobcat scats (Jones and Smith, 1979). Other prey include reptiles (Fritts and Sealander, 1978*b*; Maehr and Brady, 1986), fish (Yoakum, 1964), and insects (Dibello et al,. 1990).

Population estimates have been obtained using scent-station surveys (Diefenbach et al., 1994), radioisotope tagging (Provost et al., 1973), track counts (Klepinger et al., 1979), mail surveys (Hatcher and Shaw, 1981), and mark-recapture (Lembeck and Gould, 1979). In some areas, bobcat populations may follow cyclic fluctuations related to the abundance of snowshoe hares (Rollings, 1945). Densities of one bobcat to 3.6–4.1 km^2 in Arizona (Jones and Smith, 1979), one bobcat to 0.7–0.9 km^2 in California (Lembeck and Gould, 1979), one bobcat to 23.3 km^2 in Idaho (Koehler and Hornocker, 1989), and one bobcat to 11 km^2 in Oklahoma (Rolley, 1985) have been reported.

Sex ratios of wild populations typically do not differ from 1:1. In Vermont, sex ratio (males:females) of adults was 0.40:1 (n = 351—Foote, 1945), 0.64:1 (n = 1,381) in Wisconsin (Klepinger et al., 1979), 0.83:1 to 1.25:1 (n = 1,238) in Washington (Knick et al., 1985), 0.87:1 (n = 411) in Oklahoma (Rolley, 1985), 1.05:1 (n = 180) in the eastern United States (Pollack, 1950), 1.08:1 (n = 605) in Nova Scotia (Parker and Smith, 1983), and 1.29:1 (n = 407) in Minnesota (Henderson, 1979).

Adult bobcats can be aged through tooth cementum layers, ratios of canine pulp cavities, and tooth measurements (Crowe, 1972, 1975*a*; Johnson et al., 1981), whereas young can be aged using schedules of tooth eruption (Crowe, 1975*a*; Jackson et al., 1988). The age structure of 553 bobcats harvested in Oklahoma was 26% juveniles, 32% yearlings, and 43% adults (Rolley, 1985).

Home range size of bobcats increases as food abundance decreases, and it is smaller for females than for males (Bailey, 1974; Knick, 1990; Litvaitis et al., 1986*b*). Female home ranges are smallest during the breeding and rearing period (Bailey, 1974; Kitchings and Story, 1984), whereas home ranges of males increase during the breeding season (Litvaitis et al., 1987; Witmer and DeCalesta, 1986). Home ranges of females are usually exclusive (Bailey, 1974; Lembeck and Gould, 1979; Miller and Speake, 1979; but see Kitchings and Story, 1984), whereas home ranges of males exhibit intra- and intersexual overlap (Bailey, 1974; Berg, 1979; Lovallo and Anderson, 1996*b*). Size and location of home ranges of adult male bobcats are influenced by adjacent and overlapping males (Anderson, 1988). Bobcats exhibit strong site-fidelity among seasons in the location of their home range (Litvaitis et al., 1987). Home ranges are maintained by visual or olfactory signs from the resident (Anderson, 1988). Removal of resident adult bobcats leads to range extension by neighboring individuals (Anderson, 1988; Lovallo and Anderson, 1995). Vacant territories may also be colonized by transient animals (Litvaitis et al., 1987).

Average sizes of the annual home range (in km^2; n in parentheses) of adult males and females, respectively, are as follows: 2.63 (6), 1.12 (6) in Alabama (Miller and Speake, 1979); 42.1 (4), 19.3 (8), and 53.0 (7), 28.5 (13) in Idaho (Bailey, 1974; Knick, 1990); 95.7 (10), 31.2 (8) in Maine (Litvaitis et al., 1986*a*); 58.3 (22), 36.6 (11) in Minnesota (Fuller et al., 1985*a*); 62 (16), 38 (6) in Minnesota (Berg, 1979); 20.8 (3), 10.35 (3) in South Carolina (Buie et al., 1979); 76.8 (2), 25.9 (3) in Tennessee (Kitchings and Story, 1984); 60.4 (6), 28.5 (6) in Wisconsin (Lovallo and Anderson, 1996*b*). In Tennessee, home ranges of juvenile males and females averaged 158.6 (n = 4) and 14.0 (n = 5) km^2, respectively (Kitchings and Story, 1984).

Daily movements of adult males and females, respectively, average 4.9 km and 1.1 km in Montana (Knowles, 1985), 2–3 km and 1–1.5 km in Oregon (Witmer and DeCalesta, 1986), and 7.3 km and 6.5 km in autumn and 9.9 km and 6.2 km in winter in South Carolina (Buie et al., 1979). Two young male bobcats travelled 182 km and 158 km during dispersal (Knick and Bailey, 1986).

Bobcats may compete with coyotes and red foxes (Major and Sherburne, 1987; Witmer and DeCalesta, 1986). Home ranges of coyotes and wolves consistently overlap with home ranges of bobcats (Berg, 1979). In Maine, the diets of *L. rufus* and *C. latrans* were similar, and coyotes may have reduced the carrying capacity of bobcats by diminishing the availability of prey (Litvaitis and Harrison, 1989). Home ranges of both species overlap spatially and temporally (Litvaitis and Harrison, 1989; Major and Shepburne, 1987; Witmer and DeCalesta, 1986). Interference competition between coyotes and bobcats is apparently restricted to female and juvenile bobcats is apparently restricted to female and juvenile bobcats because of their small body size. As competitors, coyotes are dominant over bobcats (Litvaitis and Harrison, 1989), most likely because bobcats are more specialized (Dibello et al., 1990). Mountain lions (Young, 1958), wolves (*C. lupus*; Young, 1958), coyotes (Knick, 1990; Litvaitis and Harrison, 1989), and farm dogs (Knick, 1990) are able to kill adult bobcats. Occasionally, bobcats may be cannibalistic (Litvaitis et al., 1982). However, most mortality is human induced, through hunting, trapping, or poaching (Fuller et al., 1985*c*, 1995; Litvaitis et al., 1987; Rolley, 1985). Roadkills (Kitchings and Story, 1984; Knick, 1990; Litvaitis et al., 1987) and electrocution from climbing powerline poles (Bailey, 1974) also occur. Bobcats may die of starvation (Fuller et al., 1995; Knick, 1990; Litvaitis et al., 1986*b*, 1987; Petraborg and Gunvalson, 1962), or from wounds inflicted by porcupine quills (Fuller et al., 1985*c*).

Free-ranging bobcats are occasionally infected with rabies (Jenkins et al., 1979) and cat-scratch fever (Young, 1958). Bobcats may contract pneumonia (Fuller et al., 1995), gastric enteritis (Fuller et al., 1995), or respiratory infections (Kitchings and Story, 1984). Transmission of *Cytauxzoon felis* to a bobcat by a tick (*Dermacentor variabilis*) has been reported (Kocan et al., 1985). Hematology and serum chemistry of bobcats is similar to that of the domestic cat (Fuller et al., 1985*b*; Kocan et al., 1985).

The bobcat is host to nematodes, trematodes, cestodes, protozoans, acanthocephalans, helminths, and Microfilariae (Anderson et al., 1992; Pence and Eason, 1980; Smith et al., 1995; Tiekotter, 1985; Watson et al., 1981). Ectoparasites include the sarcoptic mite *Notoedres cati* (Pence et al., 1982), fleas (Stone and Pence, 1977; Young, 1958), ticks (Stone and Pence, 1977; Wehinger et al., 1995), and lice *Felicola subrostratus* (Lovallo et al., 1993).

Lynx rufus can live 32 years in captivity (Jones, 1977), and up to 15.5 years in the wild (Knick et al., 1985). In Massachusetts, annual survival of adults was 0.62, and declined to 0.49 and 0.19 under conditions of heavy harvest and poaching, respectively (Fuller et al., 1995). In Oklahoma, survival of adults ranged from 0.53 to 0.66, whereas that of juveniles was 0.30 (Rolley, 1985). In Nova Scotia, annual survival rates of adults were 0.58 and 0.63 for males and females, respectively (Parker and Smith, 1983). In an unharvested population in California, predation, disease, and starvation accounted for 35%, 15%, and 10% of deaths, respectively (Lembeck and Gould, 1979). In South Dakota, survival from 6 months through adult life was 60% annually (Frederickson and Rice, 1979).

Bobcat pelts were of relatively little value prior to the 1970s, and most bobcats were harvested for predator control purposes or for taxidermy (Rolley, 1987). However, the price of bobcat pelts increased sharply during the 1970s and the harvest for Canada and the United States increased from an estimated 14,230 bobcats in 1970-1971 (average pelt price Can $10.60) to 75,708 bobcats during the 1983-1984 season (average pelt price Can $142.00). Approximately 75% of the harvest comes from trapping and 25% from hunting (Rolley, 1987).

Wild bobcats may be captured alive with leghold traps, foot snares, box traps, or treed by dogs (Fuller et al., 1995; Major and Sherburne, 1987; Robinson and Grand, 1958). Bobcats have been anesthetized using phencyclidine hydrochloride (Bailey, 1971), ketamine hydrochloride (Litvaitis and Harrison, 1989; Major and Sherburne, 1987), promazine hydrochloride (Knick, 1990), Sernylan (Provost et al., 1973), and Acepromazine (Kitchings and Story, 1984). Young bobcats can be radio-collared using expandable drop-off transmitter harnesses (Jackson et al., 1985).

Bobcat scats can be differentiated from scats of similar-sized carnivores by thin-layer chromatography, gas chromatography, or biochemical analysis (Johnson et al., 1984). Hair of the bobcat can be identified by the number, order and color of the bands, the cross-sectional translucence and shape, and the cuticular scale pattern (Hilton and Kutscha, 1978). Mercury levels in hair of bobcats can be used as an index of levels of mercury in skeletal muscle and liver (Cumbie, 1975).

BEHAVIOR. Parturition in bobcats occurs in a dry, well hidden, and relatively inaccessible natal den (Rollings, 1945). Natal dens are often used for many years, and most often occur in natural rocky areas and caves (Bailey, 1979). On occasion, abandoned beaver lodges (Lovallo et al., 1993), nuclear reactor cooling towers (Bailey, 1979), and storage sheds (Bailey, 1979) may also be used as natal den sites. Female bobcats often move their young to auxiliary dens (Bailey, 1979). Individual females may use one natal den and up to five auxiliary dens for the rearing of one litter (Bailey, 1979). Auxiliary dens usually do not offer as much protection and cover as natal dens and are usually located in rocky terrain within 6.5 km of the natal den (Bailey, 1979).

Daily resting sites are most often located on steep-sloped, rocky areas with dense vertical cover and sparse herbaceous ground cover (Anderson, 1990). Resting sites may include rockpiles (Bailey, 1974; Rollings, 1945), brushpiles (Kitchings and Story, 1984), abandoned woodchuck burrows (Kitchings and Story, 1984), windfalls, hollow snags, hollow trees, overhanging roots, and rocky cliffs (Rollings, 1945). Bobcats often rest near fresh kills (Marston, 1942; McCord, 1974).

Young bobcats start accompanying the female when 3 months old (Bailey, 1979). At 6 months of age, bobcats travel alone, but always close to the den. Young bobcats disperse before the next litter is born (Bailey, 1979), typically in May or June (Kitchings and Story, 1984).

Bobcats readily use roads, trails, spruce plantations, or cliffs for travel (McCord, 1974). In Wisconsin, bobcats select home ranges with higher densities of trails and lower densities of highways (Lovallo and Anderson, 1996*a*). Although bobcats are highly mobile, they avoid areas of snow depth >15 cm when possible (McCord, 1974). In deep snow conditions, bobcats make greater use of fallen logs, animal trails, roads, and snowmobile trails (McCord, 1974).

The bobcat is usually a solitary hunter, although family groups may travel together in late winter (Marston, 1942). The most common hunting tactic consists of a stealthy approach followed by a pounce and strike. During approach, bobcats take advantage of all available cover and topography (Marston, 1942; McCord, 1974). Bobcats may also wait, crouched atop a log, stump, or other vantage point, until the prey passes on a nearby trail that can be reached by a few short leaps (Rollings, 1945). Bobcats rarely climb trees for hunting (Rollings, 1945).

Deer are often attacked while bedded, and most kills occur in bedding areas (McCord, 1974). Deer are killed by choking following a bite to the throat (Marston, 1942). Bobcats often continue hunting, even after a successful kill (McCord, 1974), and this may occasionally result in surplus killing (Marston, 1942).

Bobcats usually begin feeding on the uppermost part of the hindquarters of big game animals (Matson, 1948). Small birds that are captured are consumed whole, while birds the size of a blackbird or larger are plucked (Leyhausen, 1979). Prey remains are often covered, although bobcats may not always finish consuming cached prey (Marston, 1942; Young, 1958).

Adult bobcats scent-mark using feces, urine, scrapes, and anal glands. Scent marking serves to maintain territories (Bailey, 1974). Vocalizations include caterwauling (particularly during the breeding season), spits, growls, puffs, and hisses when threatened (Young, 1958). Bobcats may escape predators by climbing trees (Provost et al., 1973). *L. rufus* is a good swimmer, and may enter water for fishing, defecation, or play (Yoakum, 1964).

Bobcats are mainly nocturnal, and both sexes exhibit a similar bimodal pattern of activity. Peaks occur at 1800–2400 and 0400–1000 (Buie et al., 1979; Miller and Speake, 1979), and least activity is at midday (Miller and Speake, 1979; Witmer and DeCalesta, 1986).

Courtship behavior includes pursuit or running encounters, bumping, and ambushes. Bobcats may copulate from two to five times in relatively short periods, and the neck grip might be necessary before the male can mount the female. Rape attempts may occur (McCord, 1973).

GENETICS. *Lynx rufus* has 2N = 38 chromosomes, with 32 metacentrics, submetacentrics or subtelocentrics, and four acrocentrics. Both sex chromosomes are submetacentric (Hsu and Benirschke, 1974). Hybridization between male *L. rufus* and female *Felis catus* has been reported (Gashwiler et al., 1961; Young, 1958).

CONSERVATION STATUS. The bobcat is listed (under *Felis rufus*) in Appendix II of the Convention on International Trade of Endangered Species (CITES; Nowak, 1991). Only one subspecies, *L. r. escuinapae*, is listed as endangered in Appendix 1 of CITES.

REMARKS. The name bobcat is an abbreviation for bob-tailed cat, referring to the animal's short tail with its dark rings. Other vernacular names include bay lynx, catamount, lynx cat, wildcat, loup-cervier (French), lynx roux (French), pichou (French Canadian), chat sauvage (French), gato monte (Spanish), and red lynx (Banfield, 1987; Jackson, 1961). The specific epithet *rufus* is latin for "red", referring to the reddish-brown coloration of the bobcat.

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