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STATUS OF THE BOBCAT IN CALIFORNIA

by

Ann Biberdorf

INTRODUCTION

Taxonomy. Grinnell, et al. (1937) describe four subspecies of wildcat (bobcat) that occur in California. These are the northwestern wildcat (Lynx rufus fasciatus) of the extreme northwestern coast belt into Mendocino County, pallid wildcat (L. r. pallescens) of the Great Basin area of northeastern California, desert wildcat (L. r. baileyi) of the Colorado and Mohave desert regions, and California wildcat (L. r. californicus) from the remainder of the state.

Because bobcats may move up to 20 or 25 miles, subspecies of bobcats may overlap one another by as much as 50 miles. In this area of overlap there is interbreeding, so subspecific classification is not always possible. Generally, the coastal and southern bobcats are smaller than those found inland and to the north.

Legal Status. In California prior to 1971 the bobcat was a nonprotected animal with no restrictions or limits on its take. A concern about the status of bobcats developed, particularly because of increased awareness by management agencies of the value of nongame species as well as game species. In 1971, the species was given nongame status, (Sec. 4150, Fish and Game Code) and in subsequent years there has been a drastic increase in commercial demand for bobcat fur. This has caused an increase in fur prices and commercial take (Table 1). In 1974, a six month season was imposed on the take or pursuit of bobcats to offer protection during the reproductive period. The season length was further reduced in 1976 to 3½ months and to 2½ months in 1979.

The current hunting and trapping regulations dictate three different seasons for various bobcat populations in the state. This approach is effective in management of local populations. A shortened, three week season has been imposed in northeastern California where harvest data and population studies have shown a need to decrease the hunting and trapping pressure. The reverse situation has been found in south coastal California where the bobcat population has been dense and in a healthy condition. Here there is a 10 week season. In the remainder of the state, there is an eight-week season. All trappers, commercial hunters and sport hunters, are required to have the proper permit to take bobcats. Pelts for commercial and private use must be marked by the Department of Fish and Game (Sec. 479, Title 14, Fish and Game Code), and the date, sex, area of take, and the lower jaw of all bobcats taken must also be furnished. A tooth from the lower jaw is used to age the bobcat and the age structure of bobcat populations is used in the management process. Exports of bobcat pelts are regulated by the Office of Scientific Authority (O.S.A.) of the U. S. Fish and Wildlife Service. International trade in pelts of any wild cat species is tightly controlled as high demands have pushed several exotic species to an endangered status.

## NATURAL HISTORY

Habitat. Bobcats are found in most habitat types throughout California except those occurring in densely populated areas. Rocky ground, cliffs and dense brush are preferred throughout its range. Altitudinally, the bobcat occurs from below sea level in Death Valley to 11,000 feet in the Sierra Nevadas (Grinnell, et al. 1937). The amount of suitable bobcat habitat in the state is estimated to be 146,718 mi<sup>2</sup> and unsuitable habitat is only 6.9% of that amount, or 10,086 mi<sup>2</sup> (Gould, 1981).

Food Habits. Various bobcat food habit studies have been conducted where the frequency of occurrence, percent by weight or percent by volume of various prey species have been determined from bobcat stomach contents (Zezulak and Schwab, 1980). The literature depicts rodents as the most frequent bobcat prey item in California (Leach and Frazier, 1953; Grinnell, et al., 1937; McLean, 1934), Vermont (Hamilton and Hunter, 1939), and in Virginia and North Carolina (Progulske, 1955). Rabbits and hares constitute the next most important prey item in these states (except in Vermont), but are the most important prey item in Utah and eastern Nevada (Gashwiler, et al., 1961) and Minnesota (Rollings, 1945). Deer were the most important prey item in Massachusetts (McCord, 1974), but ranked second in Utah, Nevada, and in Minnesota. These three groups of prey are consistent food items of bobcats and probably vary in importance with their relative abundance within the habitat studied and by the season of the year.

Although recent Department field studies have not fully investigated the food habits of the study populations of bobcats, it appears that the brush rabbit (Sylvilagus bachmani) was the main item consumed by bobcats in two study areas in San Diego County. In Joshua Tree National Monument, the blacktail jackrabbit (Lepus californicus) appears to be the major prey item while microtine rodents were a frequently observed food item taken by bobcats at Lava Beds National Monument.

Reproduction. Crowe (1975) determined in Wyoming that female bobcats are capable of breeding at one year of age, whereas males are sexually mature at two years of age. Both sexes remain reproductively active throughout their life which may extend beyond 14 years in the wild. Fritts and Sealander (1978) reported an average of 2.5 bobcats per litter in Arkansas. An average litter size of 2.8 bobcats was determined in studies in Idaho (Baily, 1972) and in Wyoming (Crowe, 1975). Gashwiler, et al. (1961), found that litters averaged 3.5 in Utah. Crowe (1975) and Gashwiler (1961) report a higher number of corpora lutea (averages of 3.4 and 4.8, respectively) than the actual number of bobcats born which indicated the possibility of intra-uterine embryo loss. While the majority of bobcat young are born in April or May in Utah, (Gashwiler, et al., 1961) and in May and June in Wyoming (Crowe, 1975), both studies indicate that young may be born during any month between March and October.

Bobcat sex ratios vary greatly with lows of 0.40 males per female in Vermont (Foote, 1945) and 0.60 adult males per adult female in Idaho (Baily, 1972) to a high of 2.1 males per female in an area of San Diego County, California (Lembeck, 1978).

Lembeck (1978) substantiated the fact that the age and sex structures of bobcats are indicative of the harvest pressure. In unharvested populations, older males constitute the majority of the individuals. In harvested populations, the portions of both females and young individuals in the population increase as the harvest pressure increases.

Movements. Grinnell, et al. (1973) gives 25 square miles as a typical bobcat home range, with daily movements of four to five miles. Research conducted on bobcat populations in California indicate that home range size is quite variable. Some factors which affect home range size include: habitat, sex, age, and food supply. In northeastern California, annual home range sizes of adult bobcats ranged from 11.5 to 36.5 mi<sup>2</sup> (Zezulak, 1981). In contrast, home range size of adult males varied from 0.9 to 6.4 mi<sup>2</sup> in El Capitan Reservoir area, San Diego County (Lembeck, 1978).

Bobcats typically begin and terminate daily activity in relation to peaks of prey activity; generally, peaks occur at dawn and dusk (Zezulak, 1981). Also, they are active at night and even during the day, if temperatures are not hot. Movements are associated with hunting and travel between prime habitat areas (Zezulak, 1981).

Distribution. Bobcats have been taken in all counties in the state, except San Francisco, in the last 30 years. Recent trapping data indicate substantial harvests from San Diego, Humboldt, Shasta, San Bernardino, Inyo, Modoc, Mendocino, Fresno, Siskiyou, San Benito and Santa Barbara Counties. Counties with large human populations or extensive agriculture usually report the take of few or no bobcats. Distribution of bobcats in California has been fairly well established by examining trapping and hunting reports.

Density. Measuring bobcat density is difficult; while harvest data provides the area of take, it does not adequately measure relative abundance. Telemetry studies conducted by the Department of Fish and Game show that density is variable, depending on quality of habitat and availability of prey. Bobcat densities vary from as high as almost 4 per square mile occurring in chapparral habitat to as low as 0.13 bobcats per square mile in inland sagebrush and juniper-pinyon habitats (Gould, 1981). Using harvest data and known densities of bobcats in different areas, typical densities can be calculated for other habitat types.

Bobcat densities vary with the season of year. The birth of young dramatically increases bobcat densities. With the increase in numbers, there is a corresponding increase in mortality rates, particularly among the youngest bobcats. Therefore, density estimates, like those given above, usually reflect the number of resident breeding adults.

Research. The Department of Fish and Game has conducted research on four bobcat populations since 1976. Information gathered from these research projects combined with harvest data provides the necessary knowledge for bobcat management. Research on bobcats has included studies of both harvested and unharvested populations, and of the parameters of population dynamics: home range size, sex and age structures, reproduction, mortality and certain behavioral aspects.

## HARVEST

Trapping. Historically, the average price paid per pelt has influenced the numbers of bobcats taken. A high price paid one year generally brings a large increase in the take of the following year (Table 1).

Records of the take of bobcat by licensed trappers from the 1920's show a significant increase in the take and prices paid per pelt during the decade. The take for the 1921 to 1922 season was estimated at 997 bobcats, which brought an average \$1.14 per pelt. During the 1927 to 1928 season, an estimated 12,250 bobcats were reported taken in California, the largest take to date. The average price had risen to \$2.83 per pelt.

A reduction in trapping of all species including the bobcat was exhibited during subsequent years. The initial decline corresponded to a drop in fur prices during the depression; the demand for bobcat pelts did not increase again until the early 1970's (Table 1).

During the 1980-81 season, an estimated 12,463 bobcats were taken in 55 of California's 58 counties (Gould, 1981). Approximately 77% (9,595) were reported taken by licensed trappers and commercial hunters (Table 2). A minimum of 61.8% (5,934) of the bobcats reported taken by licensed trappers and commercial hunters were brought by licensed fur dealers in California. The average price paid to trappers selling a bobcat fur during the 1980-81 season was \$129.90.

Hunting. Bobcats are taken by pursuing with hounds, using a predator call, or incidentally while hunting other animals. In recent years where the bobcat season has been shortened, there has been less overlap with other hunting seasons and take incidental to other hunting has been greatly reduced (from 48% in 1976 to 23% in 1977). The take by the other two methods is approximately equal; but, the pursuit of bobcats with hounds is more common in the northern part of the state while the take of bobcats using a predator call is more common in southern California.

An annual hunter survey is conducted by the Department to estimate hunter harvest of game species. The take of bobcats has been included in the survey since 1968, but due to survey errors for this species reliable estimates were not obtained until 1976. Since then, the estimated hunter take has been: 1976, 10,500; 1977, 15,300; 1978, 5,800; 1979, 6,700; and 1980, 3,700. The decreasing trend in the take has been caused by shorter seasons and a recent imposition of a two bobcat per hunter bag limit.

Predator Control. California began a program to "control" predators in 1932. Trappers were employed until 1955 and 18,984 bobcat were reported taken during that time (Table 2).

Currently, the U. S. Fish and Wildlife Service administers the major predator control program in California. This is a cooperative program involving agreements with State Departments of Food and Agriculture and Health and with 34 individual county governments. Thirteen counties carry out their own control outside the cooperative program. There are 11 counties without a predator control program (Ferrel 1976).

The total take reported by animal control personnel remained fairly constant from 1930 until the prophylactic control of bobcats dramatically decreased in the early 1970's (Table 2). The decrease in bobcats taken for animal control has been offset by an increase in commercial fur harvest. Current animal control efforts involving bobcats are handled on a specific complaint by complaint basis.

Export Restrictions. In 1977, the federal government, through the Endangered Species Scientific Authority (E.S.S.A.), began an active program to monitor the international trade of species believed to have the potential to become endangered. Such a program was required of member nations to the treaty on International Trade in Endangered Species of Wild Fauna and Flora of which the United States is a part. As a result, the federal government requested states to institute a tagging program for bobcat fur to be exported. The State of California, through the action of the Fish and Game Commission, complied by issuing 6,000 tags for the 1977-78 season, Section 479, Fish and Game Commission Order, Rules and Regulations for 1977). A \$3.00 administrative fee is charged for each tag which must be affixed to a bobcat fur before the fur may be exported from California. Currently shipping tags are required, although their availability is not limited except by season length.

In 1979, a suit was filed against the E.S.S.A. which questioned their decision to allow the export of bobcat pelts. As a result of this action and subsequent appeals, the court has banned the export from the United States of bobcat pelts taken after July 1, 1981, until such time that the U. S. Fish and Wildlife Service can prove to the Court that the present harvest programs in each state are not detrimental to the survival of bobcat populations in the United States. This may reduce commercial demand since a large portion of all raw fur is sent to Europe for tanning.



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TABLE 1

HISTORY OF THE TAKE OF BOBCAT IN CALIFORNIA BY LICENSED FUR TRAPPERS,  
STATE TRAPPERS AND U. S. FISH & WILDLIFE SERVICE AND AVERAGE PRICE PER PELT  
1930 - 1981

<u>Trapping Season</u>	<u>Average Price Per Pelt</u>	<u>Licensed Fur Trappers</u>	<u>State Trappers</u>	<u>U. S. Fish and Wildlife Service</u>	<u>Total</u>
1930-31	1.20	1,684		838	2,522
1931-32	.90	1,250		865	2,115
1932-33	.50	725	369	808	1,902
1933-34	.90	1,290	50	699	2,039
1934-35	.80	1,436	50	802	2,288
1935-36	1.00	1,994	50	1,261	3,305
1936-37	1.00	2,650	421	1,416	4,487
1937-38	.80	2,292	740	1,131	4,163
1938-39	1.00	2,254	1,123	1,465	4,842
1939-40	1.10	2,474	794	1,463	4,731
1940-41	1.70	2,776	1,017	1,400	5,193
1941-42	2.00	3,239	1,046	1,484	5,769
1942-43	2.70	1,923	718	1,317	3,958
1943-44	5.50	2,780	601	1,368	4,749
1944-45	3.10	2,063	545	1,162	3,770
1945-46	3.20	1,730	753	1,383	3,866
1946-47	1.60	1,072	1,194	1,817	4,083
1947-48	1.10	689	2,081	1,980	4,750
1948-49	.70	510	1,459	1,969	3,938
1949-50	.50	375	1,181	2,317	3,373
1950-51	1.00	293	1,255	2,195	3,743
1951-52	.90	239	1,026	2,138	3,403
1952-53	1.50	336	919	2,867	4,122
1953-54	1.30	144	796	3,055	3,995
1954-55	1.50	223	796	2,965	3,984
1955-56	1.70	228		2,409	2,637
1956-57	1.30	276		2,823	3,099
1957-58	1.90	202		2,687	2,889
1958-59	3.10	222		3,444	3,666
1959-60	4.20	175		3,664	3,839
1960-61	4.70	304		3,364	3,668
1961-62	3.30	205		3,375	3,580
1962-63	2.80	295		3,366	3,661
1963-64	3.40	361		3,327	3,688
1964-65	4.20	221		2,742	2,963
1965-66	11.80	489		2,479	2,968
1966-67	8.00	241		2,386	2,627
1967-68	13.60	276		2,093	2,369
1969-70	10.60	588		1,697	2,285
1970-71	10.90	319		1,147	1,466
1971-72	18.80	588		936	1,524
1972-73	29.30	686		599	1,285
1973-74	45.00	1,244		348	1,592
1974-75	50.50	1,393		319	1,712
1975-76	133.50	2,203		347	2,550
1976-77	76.00	3,618		205	3,823
1977-78 <sup>1/</sup>	105.80	5,146		208	5,354
1978-79	120.00	8,326		56	8,382
1979-80	114.20	7,809		32	7,841
1980-81	129.90	9,595		24	9,619

1/ The 1977-78 season was the first which pelts were tagged, previous estimates were



TABLE 2  
NUMBER OF BOBCAT TAKEN BY LICENSED FUR TRAPPERS BY  
COUNTY 1975-76, 1980-81 TRAPPING SEASONS

County	1975-76		1980-81	
	Number Taken	% of Total	Number Taken	% of Total
Alameda	18	0.81	3	0.03
Alpine	13	0.59	10	0.10
Amador	1	0.04	4	0.04
Butte	39	1.77	51	0.53
Calaveras	0		23	0.24
Colusa	7	0.31	29	0.30
Contra Costa			2	0.02
Del Norte	2	0.09	101	1.0
El Dorado	15	0.68	36	0.37
Fresno	71	3.22	303	3.15
Glenn	28	1.27	41	0.43
Humboldt	224	10.20	451	4.69
Imperial	8	0.36	16	0.17
Inyo	118	5.35	259	2.69
Kern	71	3.22	343	3.57
Kings	0		44	0.45
Lake	75	3.40	170	1.77
Lassen	52	2.36	91	0.95
Los Angeles	39	1.77	162	1.68
Madera	9	0.41	121	1.26
Marin	0		26	0.27
Mariposa	20	0.91	180	1.87
Mendocino	66	2.99	407	4.23
Merced	8	0.36	9	0.09
Modoc	125	5.67	118	1.23
Mono	54	2.45	76	0.79
Monterey	0		751	7.81
Napa	17	0.77	21	0.22
Nevada	1	0.04	0	
Orange	0		6	0.06
Placer	8	0.36	6	0.06
Plumas	20	0.91	36	0.37
Riverside	97	4.40	77	0.80
Sacramento	0		0	
San Benito	39	1.77	305	3.17
San Bernardino	94	4.27	724	7.53
San Diego	190	8.62	326	3.39
San Francisco	0		0	
San Joaquin	18	0.82	15	0.16
San Luis Obispo	40	1.81	520	5.40
San Mateo	0		106	1.10
Santa Barbara	21	9.53	694	7.21
Santa Clara	0		15	0.16
Santa Cruz	0		64	0.66
Shasta	122	5.54	213	2.21
Sierra	3	0.14	10	0.10
Siskiyou	107	4.86	280	2.91
Solano	94	4.27	23	0.24
Sonoma	34	1.54	96	1.00
Stanislaus	7	0.32	86	0.89
Sutter	0		0	
Tehama	73	3.31	186	1.93
Trinity	28	1.27	107	1.11
Tulare	30	1.36	439	4.56
Tuolumne	16	0.73	176	1.83
Ventura	41	1.86	276	2.87
Yolo	7	0.32	0	
Yuba	33	1.50	4	.041
Unknown			957	9.95
TOTAL	2,203		9,619	