

**STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME
WILDLIFE MANAGEMENT DIVISION
NONGAME BIRD AND MAMMAL SECTION**

BOBCAT HARVEST ASSESSMENT, 1990-91

by

William E. Grenfell Jr.

January 1992

State of California
THE RESOURCES AGENCY
Department of Fish and Game

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ABSTRACT

An estimated 1,889 bobcats were taken during the 1990 hunting year and the 1990-91 trapping season. Trappers took 962 bobcats, and hunters took 695. The total take was a decrease of 55% from the 1990-91 year and was the lowest reported take in the last 15 years. The bobcat take decreased in all regions of the State except in the Central Coast and East Sierra (Table 4). The average pelt price increased from \$17.91 last year to \$49.50 this year (Table 5). The average take per successful trapper decreased, but hunter success increased slightly.

Data on the bobcat harvest were gathered through the process of tagging bobcat furs for export; the annual trapping report and hunter survey; and from U.S. Department of Agriculture, Animal Damage Control records.

INTRODUCTION

Bobcat harvest increased in California from the 1960s through the late 1970s. This increase reflected high fur prices and an abundant population of bobcats. The sale of bobcat fur has brought the highest dollar income to trappers of any species harvested and sold in California since the 1975-76 season. In order to determine the magnitude of the bobcat harvest and the resultant effect on bobcat populations throughout the State, a number of studies were initiated. Field studies of local population dynamics were completed on unharvested populations in Siskiyou, Riverside and San Diego counties and on a harvested population in San Diego County. Reports on these studies have been previously distributed. A statewide harvest monitoring system was used where the age and sex structures of the harvested population were sampled to determine the effect of the harvest on various bobcat populations and to identify the amount of harvest. The age and sex structure of the various bobcat populations in California stabilized during the mid-1980s. Currently, only the monitoring of harvest quantity is being conducted, since the demand and harvest have been relatively stable since 1982-83.

Public interest in the bobcat, on both the domestic and international fronts, has increased greatly over the last 18 years. Prior to 1971, the bobcat in California was a nonprotected mammal, and there were no restrictions on its take. In 1971, this species was given nongame status by the California Legislature. Subsequently, in 1974 a six-month season was imposed on the take of bobcats. This season was further restricted to the standard 3½ month furbearer season in 1976. During the 1978-79 season, the export tag quota was reached by the end of January, effectively shortening the season by one month. During 1979-80 the season was reduced to 2½ months, but was closed on December 29, 1979, one month earlier than proposed, because the quota of export tags had been reached once again.

For the 1980-81 season, the State was divided into three harvest zones, each with a different length season, depending upon the status of the local bobcat populations. These regulations were a result of previous research and monitoring efforts (see W-54-R-12, IV-7). The 1981-82 season length was increased by one week in length, except in the northeastern California region, in order to have the bobcat season coincide with the season on gray fox. In 1982-83, the northeastern California season was set back two weeks, and its length was increased by a week.

The season limit for bobcat sport hunters was set at two for the 1980-81 season and increased to five for the 1984-85 season. Prior to 1982-83, the sport hunting season length and timing coincided with the commercial take season. In 1982-83, the sport hunting season was extended for two weeks at the end of the commercial seasons in Del Norte, Humboldt, Kern, Lake, Mendocino, Trinity and San Diego counties. For the 1985-86 season, the sport hunting season was extended on a statewide basis to open a week before the commercial season and to last until February 15.

The Defenders of Wildlife petitioned the Secretary of the Interior in early 1977 to place the bobcat on the endangered species list. Subjective evaluation of data from Animal Damage Control take, along with increased fur prices and commercial demand and take of bobcats, led this group to take this action. The Secretary later found that the petitioned action was not warranted.

In 1973, the United States became a party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora. This treaty restricted trade in endangered species and established procedures to monitor the trade of other species that might be faced with endangerment in the future. The bobcat was one of the species deemed by the parties to the treaty as a candidate for future endangerment. The Endangered Species Scientific Authority (E.S.S.A.) was established as the scientific body to monitor the species status in the United States, and the U.S. Fish and Wildlife Service was given the authority over trade as provided by the treaty. The E.S.S.A. evaluated data to justify harvest and export of bobcat furs for three years.

In November, 1979, Defenders of Wildlife brought suit against the E.S.S.A. The suit was heard in December, and the court's decision reversed the E.S.S.A.'s findings for five states and parts of two others, but not for California. After the suit, the E.S.S.A. was dissolved and the responsibility was given to the U.S. Fish and Wildlife Service, whose Office of the Scientific Authority (O.S.A.) now has the responsibility for scientific monitoring.

An appeal by Defenders of Wildlife of the court's ruling to the Court of Appeals, District Court for the District of Columbia, resulted in a court order that prohibited bobcat pelts taken after July 1, 1982 from being exported. This ban was imposed until O.S.A. could satisfy the court that export findings were based on reliable population estimates and that each state would enforce a predetermined take limit. Guidelines from O.S.A. to the states to obtain this information were not accepted by the court. During 1982 there was legislative redefinition of the Endangered Species Act which effectively voided the court's ban on export. On December 1, 1982 the export ban was lifted and the major European market was reopened.

Since late 1982, there has been little activity to ban the harvest of bobcats. However, this has been a period of intense management and monitoring of bobcat populations and harvest. It is the results of this management and monitoring that are discussed in this report.

OBJECTIVES

1. Determine the annual bobcat harvest on a regional basis.
2. Use this information along with previously gathered information on bobcat biology and population dynamics to develop a statewide management plan and to manage local populations by manipulating season lengths and chronology, take methods, and harvest limits.

METHODS

The commercial take is determined through assessment of mandatory annual reports of licensed trappers and an export tagging program for all bobcat furs. Commercial fur trappers report their take at the end of each license year (fiscal year), giving the quantity of take of each species by county. Anyone possessing or wishing to sell or to transport a bobcat fur must have it tagged. As part of the tagging process, the trapper must supply information on the place, date and method of take.

Sport take is determined through the Department's annual hunter survey questionnaire. This survey queries a 2 to 4% sample of California's licensed hunters about their hunting effort and success for various species. Information on total take, distribution of hunting effort and percent of successful hunters is gathered on bobcat hunting from this survey. Additional information on sport hunting is gathered through the sale of hunting tags and their return. Sport hunters of bobcat are required to report their kill and provide information on their take.

All depredation take must be reported to the Department. This information is reported directly by the person doing the taking or by the public agencies doing the depredation control work.

RESULTS

For the 1990-91 season, the total estimated take of bobcats was 1,889 individuals (Table 1). This was 1,566 (55%) less than were taken during 1989-90 and the lowest estimated take in the 15 seasons since 1976-77. Trappers continue to take the majority (51%) of bobcats. The total hunter take of 695 was slightly lower than in 1990-91. The hunter take also was the lowest in 15 seasons since the 1976-77 season (Table 1). The total take of bobcats ranged from none in eight counties to 216 and 135 in Kern and Tulare counties respectively (Table 2). This year only 5 of 58 counties reported a take of more than 100 bobcats; last year more than 100 bobcats were taken from 12 counties.

Season	Total Commercial Take (IA+IB)	Commercial Trapper Take (IA)	Commercial Hunter Take (IB)	Total Hunter Take (II)	Animal Damage Control Take (III)	Total Annual Take (IA+II+III)
1977-78	5150	4650	500	15300	208	20158
1978-79	8325	6825	1500	5811	56	12692
1979-80	7809	6686	1123	7708	32	14426
1980-81	9595	8702	893	3737	24	12463
1981-82	9337	8162	1175	3037	34	11233
1982-83	8513	7427	1086	2951	48	10426
1983-84	7362	6576	786	2077	43	8696
1984-85	8897	7495	1402	2993	48	10536
1985-86	8099	6927	1172	2861	36	9824
1986-87	9123	8003	1120	1739	44	9786
1987-88	8994	8017	977	2773	47	10837
1988-89	5586	4877	709	1778	52	6707
1989-90	2980	2677	303	715	63	3455
1990-91	1148	962	186	881	46	1889

Table 2. Take of Bobcats by County During the 1990-91 Season.

County	Licensed Trapper Take	Commercial Hunter Take	Sport Hunter Take	Animal Damage Control Take	Total County Take
Alpine	2				2
Amador			18		18
Butte			15		15
Calaveras			5		5
Colusa	90		13		103
Contra Costa			8		8
El Dorado	32		15	1	48
Fresno	63	5	62		130
Glenn	6				6
Humboldt	2	20	4	1	27
Inyo	3	7	4		14
Kern	169	22	22	3	216
Lake			10	1	11
Lassen	24	5	13	3	45
Los Angeles	59		15		74
Madera			13		13
Marin				1	1
Mariposa				1	1
Mendocino			38	4	42
Merced			2	1	3
Modoc	30		23	1	54
Mono	21	9			30
Monterey	34		28		62
Napa			18	2	20
Nevada			5	7	12
Orange	8				8
Placer			2		2
Plumas	9		13		22
Riverside	13		45		58
San Benito	1				1
San Bernardino	78	9	31		118
San Diego	52		18	8	78
San Joaquin			2		2
San Luis Obispo	35	2	26		63
San Mateo			2		2
Santa Barbara			18	2	20
Santa Clara	36		25		61
Santa Cruz			10		10
Shasta	14	26	31		71
Siskiyou	34	32	13		79
Solano			8	1	9
Sonoma	15		15	5	35
Stanislaus			25		25
Sutter			5	1	6
Tehama	3		28		31
Trinity	6		8		14
Tulare	67	49	19		135
Tuolumne			8	3	11
Ventura	56		10		66
Yolo			2		2
Total	962	186	695	46	1889

No bobcats were reported taken in Alameda, Del Norte, Imperial, Kings, Sacramento, San Francisco, Sierra and Yuba counties.

Eight of the 10 counties reporting the highest commercial take of bobcats were the same as last year. However, Shasta and Colusa counties replaced Humboldt and Monterey counties.

Rank	1971-72	1972-73	1973-74	1974-75	1975-76
1	Modoc	Merced	San Diego	San Diego	Humboldt
2	Shasta	Modoc	Modoc	Modoc	San Diego
3	Merced	Shasta	Hama	Lassen	Modoc
4	Lassen	Siskiyou	Tuolumne	Humboldt	Shasta
5	Siskiyou	Humboldt	Siskiyou	Inyo	Inyo
6	Riverside	Sierra	Humboldt	Siskiyou	Siskiyou
7	San Bernardino	Tehama	Mendocino	Colusa	Riverside
8	San Diego	San Bernardino	Shasta	Riverside	San Bernardino
9	Humboldt	Butte	Lake	Fresno	Solano
10	Plumas	San Diego	Solano	Lake	Lake
Rank	1976-77	1977-78	1978-79	1979-80	1980-81
1	Humboldt	San Bernardino	Humboldt	Santa Barbara	San Bernardino
2	San Bernardino	Humboldt	San Bernardino	Humboldt	Monterey
3	Santa Barbara	Tulare	Shasta	Tulare	Santa Barbara
4	Shasta	Santa Barbara	Kern	Kern	San Luis Obispo
5	San Benito	Kern	Siskiyou	San Bernardino	Humboldt
6	Mendocino	Inyo	Santa Barbara	Siskiyou	Tulare
7	Tulare	Mendocino	Inyo	San Diego	Mendocino
8	Fresno	Modoc	Modoc	Mendocino	Kern
9	San Diego	Shasta	Mendocino	Monterey	San Diego
10	Inyo	Monterey	Tehama	San Luis Obispo	San Benito
Rank	1981-82	1982-83	1983-84	1984-85	1985-86
1	San Bernardino	San Bernardino	San Bernardino	Kern	Kern
2	Kern	Monterey	Kern	Tulare	San Bernardino
3	Monterey	Kern	Santa Barbara	Monterey	Tulare
4	Santa Barbara	Santa Barbara	San Luis Obispo	San Bernardino	Monterey
5	Tulare	San Luis Obispo	Los Angeles	Santa Barbara	Santa Barbara
6	Humboldt	Tulare	Monterey	San Luis Obispo	San Diego
7	San Diego	Humboldt	Tulare	Los Angeles	Ventura
8	Ventura	Los Angeles	San Diego	Humboldt	Humboldt
9	Fresno	San Diego	Ventura	Siskiyou	Los Angeles
10	San Luis Obispo	Ventura	Humboldt	San Diego	Inyo
Rank	1986-87	1987-88	1988-89	1989-90	1990-91
1	San Bernardino	San Bernardino	San Bernardino	Kern	Kern
2	Kern	Kern	Kern	San Bernardino	Tulare
3	Santa Barbara	Monterey	San Diego	Ventura	Colusa
4	Tulare	Tulare	Santa Barbara	Fresno	San Bernardino
5	Ventura	Santa Barbara	Monterey	Monterey	Fresno
6	Monterey	Siskiyou	Los Angeles	Los Angeles	Siskiyou
7	San Luis Obispo	Humboldt	Ventura	San Diego	Los Angeles
8	San Diego	Ventura	Fresno	Siskiyou	Ventura
9	Humboldt	San Diego	Tulare	Tulare	San Diego
10	Fresno	San Luis Obispo	San Luis Obispo	Humboldt	Shasta

The 1990-91 take of bobcats was among the lowest in the previous six seasons in all but two of the geographic areas monitored (Table 4). The increase in the East Sierra was from a very low 11 bobcats last year (1989-90) compared to 42 in the 1990-91 season. The bobcat harvest increased from 27 to 36 animals in the Central Coast, also.

Table 4. Geographical Differences in the Amount of Commercial Take of Bobcats in California, 1985-86 to 1990-91.

Area	1985-86 Take	Change <to> (%)	1986-87 Take	Change <to> (%)	1987-88 Take	Change <to> (%)	1988-89 Take	Change <to> (%)	1989-90 Take	Change <to> (%)	1990-91 Take
Northeast	390	32	514	17	601	-53	282	-28	230	-61	90
Northwest	967	26	1216	11	1355	-49	694	-48	362	-68	115
North Coast	367	16	425	14	483	-35	312	-64	112	-1	111
Central Coast	130	-18	107	12	120	-67	40	-32	27	+33	36
North Sierra	43	53	66	-64	24	-67	8	0	8	-100	0
Central Sierra	253	-8	232	47	342	-63	127	-72	35	-9	32
East Sierra	406	-16	343	-28	248	-71	73	62	118	+381	42
South Coast	2344	23	2881	-13	2510	-30	1753	-51	857	-79	180
South Sierra	1745	.10	1923	-6	1809	-43	1026	-32	696	-46	375
Southern California	1454	-3	1416	6	1502	-15	1271	-58	535	-69	167
Total	8099		9123		8994		5586		2980		1148

The market for bobcat fur has become relatively stable in both political and economic terms. However, the average price of a bobcat pelt dropped by about 88% in the two years prior to 1990-91. It dropped from an all time high of \$167.33 in 1986-87 to \$17.91 in 1989-90 (Table 5). During 1990-91, the pelt price increased to \$49.50. There was no national or international regulatory action pending which might have influenced the demand for bobcat furs. The market just appears to be saturated.

Table 5. Bobcat Pelt Prices, 1970-71 to 1990-91.

Season	Average Price	Highest Price
1970-71	\$ 10.86	Not Recorded
1971-72	\$ 18.83	\$ 30.00
1972-73	\$ 29.33	\$ 6.00
1973-74	\$ 45.00	\$ 110.00
1974-75	\$ 50.00	\$ 110.00
1975-76	\$ 133.50	\$ 300.00
1976-77	\$ 76.00	\$ 225.00
1977-78	\$ 105.00	\$ 185.00
1978-79	\$ 120.00	\$ 426.00
1979-80	\$ 114.20	\$ 313.00
1980-81	\$ 129.90	\$ 325.00
1981-82	\$ 114.53	\$ 325.00
1982-83	\$ 105.85	\$ 342.11
1983-84	\$ 102.33	\$ 380.00
1984-85	\$ 121.96	\$ 368.00
1985-86	\$ 107.86	Not Available
1986-87	\$ 167.33	Not Available
1987-88	\$ 142.73	Not Available
1988-89	\$ 102.31	Not Available
1989-90	\$ 17.91	Not Available
1990-91	\$ 49.50	\$ 125.00

Because of the reduction in the commercial take of bobcats, the average take per trapper dropped to 7.0, below the 12-season average of 10.8 bobcats per successful trapper (Table 6).

County	Season											
	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	1990-91
Butte	3.4	2.5										
Fresno	9.2	10.2	9.1	8.5	11.9	10.0	12.1	17.6	15.3	16.1	17.4	
Glenn		5.0	5.5	6.8		5.8			10.7			
Humboldt	6.1	5.3	5.7	4.8	7.6	9.3	18.0	12.5	13.0	8.6	2.3	
Inyo	7.3	8.5	5.0	5.3	7.8	5.6	14.2	9.7	6.2			
Kern	10.6	11.0	10.8	12.2	16.5	18.4	14.7	13.0	14.2	9.1	11.7	16.9
Lake	6.4	4.7	5.9	4.6	5.9			7.2	7.9			
Lassen	4.3	3.8	5.9	6.5	3.6	4.8	4.4	4.4	9.8	3.9	5.6	
Los Angeles	14.8	14.1	8.1	8.8	13.5	15.8	14.9	15.6	11.1	12.0	14.4	5.9
Madera			8.9		11.3	12.7			7.3			
Mariposa	11.8	5.7	10.1	6.3		9.6	7.2	10.1	19.9			
Mendocino	5.9	6.1	4.5	5.4	6.1	5.9	5.1	6.5	6.2	5.4		
Modoc	4.2	3.2	4.6	5.5	7.7	7.2	6.3	6.2	7.2	7.2	3.0	
Mono	5.9		4.2	6.9	9.2				6.5			
Monterey	11.3	16.3	14.2	11.7	14.7	18.0	17.8	21.4	24.8	14.0	16.1	
Plumas	4.3		5.5	4.5								
Riverside	9.9	5.8	7.8	9.0	7.4	10.3	10.1	9.8	12.0	8.7	16.5	
San Benito	9.8	13.0	9.0	9.8		8.3		14.2				
San Bernardino	17.5	14.7	9.2	10.0	12.0	11.6	14.6	14.6	13.3	12.3	14.0	5.2
San Diego	11.5	6.0	9.4	9.8	10.6	11.8	10.8	11.6	14.0	16.9	16.8	
San Luis Obispo	9.0	13.9	8.5	10.6	14.4	11.1	10.8	14.7	14.4	10.4	7.5	
Santa Barbara	15.2	13.6	12.2	16.6	17.4	16.3	16.1	13.9	13.9	11.7		
Shasta	3.6	2.9	3.1	3.3	4.1	4.4	4.8	4.7	4.9	6.3	4.9	
Siskiyou	4.4	3.8	5.7	5.1	5.2	0.2	5.6	5.9	9.9	6.5	5.0	2.5
Sonoma	4.8	6.4	7.5	8.4	6.5	4.6		6.8		9.3		
Tehama	3.7	5.1	4.1	3.8	3.7	6.3	3.8	3.9	5.8			
Trinity	4.0	3.3	3.3	4.4	2.5	3.5		8.5	5.0	2.2		
Tulare	12.2	9.2	9.3	11.2	10.5	13.4	14.5	12.3	17.1	8.5	6.2	6.7
Tuolumne		7.4	5.8	6.9	5.4				5.2			
Ventura	10.0	9.4	10.4	11.2	10.4	13.5	12.6	18.4	16.6	9.9	16.1	
Statewide	7.76	8.04	8.78	9.08	11.86	12.01	12.71	14.75	13.55	12.61	12.06	7.00
# Trappers harvesting bobcats	920	1,007	909	821	488	398	547	584	664	443	303	124
# Trappers licensed	3,221	3,201	3,686	3,901	1,607	1,650	1,417	1,347	1,460	1,244	834	511

* County data from counties and years where more than ten trappers per county reported.

As usual, the commercial take of bobcats was primarily by trapping (84%) (Tables 7 and 8). Hunting with dogs remains the second most common way to take bobcats. This method was most commonly employed in Humboldt County. About 0.2% of the bobcat furs were salvaged; and, of the remaining, 2.4% were taken through the use of a predator call and 0.5% were taken by hunting where the specific method was not given. Predator calling only occurs occasionally as a commercial hunting method.

Table 7. Method of Commercial Take of Bobcats, 1990-91.

County	% Taken by Trap	% Taken by Dogs	% Taken by Calling	% Taken Misc. Hunting	% Salvaged Road Kill	% Method Unknown	Sample Size
Alpine	100						2
Amador							--
Butte							--
Calaveras							--
Colusa	100						90
El Dorado	100						32
Fresno	93	7					68
Humboldt	9	91					22
Imperial							--
Inyo	30		60	10			10
Kern	88	12					191
Lake							--
Lassen	83	14	3				29
Los Angeles	100						59
Madera							--
Marin							--
Mendocino							--
Modoc	100						30
Mono	70		30				30
Monterey	100						34
Napa							--
Nevada							--
Orange	100						8
Placer							--
Plumas	100						9
Riverside	100						13
San Benito	100						1
San Bernardino	89		11				87
San Diego	100						52
San Luis Obispo	95			5			37
Santa Barbara							--
Santa Clara	100						36
Shasta	35	65					40
Siskiyou	50	42	5	2	1		66
Sonoma	100						15
Stanislaus							--
Tehama	100						3
Trinity	100						6
Tulare	57	41		2			116
Tuolumne							--
Ventura	100						56
Yolo							--
Yuba							--
Total	83.7	13.2	2.4	.5	.2	0	1148
* 0 = less than 0.5 percent.							

Table 8. Method of Commercial Take of Bobcats, 1980-90.

Season	Method of Take (Percent of Total Statewide Take)					
	Trap	Dogs	Calling	Misc. Hunt.	Road Kill	Unknown
1980-81	90.6	6.6	0.7	1.4	0.3	0.5
1981-82	86.2	9.5	1.3	1.8	0.3	0.9
1982-83	86.7	10.4	0.9	1.4	0.2	0.4
1983-84	89.0	9.3	0.4	1.1	0.2	<0.1
1984-85	82.8	13.5	0.7	1.7	0.3	1.0
1985-86	85.1	13.2	0.6	0.7	0.1	0.3
1986-87	83.4	10.6	0.8	0.8	0.1	4.2
1987-88	88.5	9.6	1.1	0.6	0.1	0.1
1988-89	85.5	11.8	0.9	0.4	0.1	1.4
1989-90	89.9	7.8	0.7	1.6	-	-
1990-91	83.7	13.2	2.4	0.5	0.2	-

The harvest of bobcats by hunters was approximately 881 (Table 1). Of these, 817 were taken and reported by licensed hunters (Tables 9 and 10), 695 were taken by hunters with hunting licenses only, 122 by hunters with both hunting and trapping licenses, and 64 by hunters with only a trapping license. The estimate of 881 bobcats taken by licensed hunters was derived from the Department's annual "Game Take Hunter Survey." A sample of 3.7% of California's 376,935 licensed hunters produced 13,828 responses. This sampling provides an 80% confidence level for the estimated take of bobcats by licensed hunters of between 656 and 978 individuals (Table 9). These same hunters spent an estimated 11,448 days hunting bobcats for an average take of 0.061 bobcats per day (Table 10). This is the third lowest hunter take per unit of effort in the last 13 seasons.

Additional information on the extent and distribution of the sport hunting take of bobcats is gathered through the sport hunting tag program. Obtaining these tags and returning them to the Department upon taking bobcat are legal requirements of bobcat hunters, and the system should provide considerable information. Given a sport hunting public of about 1,928 (estimated from the annual hunter survey and subtracting all trappers who reported taking bobcats), about 44.5% of the sport hunters purchased the required tags in 1990. Additionally, sport hunters sent in tags for about 37.3% of the bobcats compared to the estimated take in the annual hunter survey.

DISCUSSION

The total bobcat harvest, as last year, decreased again in the 1990-91 season. The reduction in bobcat take was coupled with a substantial reduction in pelt prices of both coyotes and gray foxes. These lower pelt prices are determined by the fur market and make it economically unrealistic for many trappers to trap if the pelt prices for all three species (coyote, bobcat and gray fox) are low. There was no national or international regulatory action enacted or pending which might have influenced the demand for bobcat furs. The market just appears to be saturated. It is expected to improve somewhat during the 1991-92 trapping season.

Table 9. Statistical Parameters of the Hunter Take of Bobcats During 1990-91, Poisson Distribution.*

From Hunter Survey:

No. of
Hunters
76

Total Bobcats
Taken
30

$$\text{Average take per hunter } \bar{x} = \frac{\text{total bobcats taken}}{\text{total respondents}} = \frac{30}{13,828} = 0.002169$$

$$\text{Statewide bag} = (\bar{x})(\text{tot. no. license buyers}) = (0.002169)(376935) = 817$$

Assuming that bobcat take follows a Poisson distribution, confidence limits can be assigned by knowing \bar{x} and n (total no. of respondents)

$$\sigma(\bar{x}) = \sqrt{\frac{\bar{x}}{n}} = \sqrt{\frac{0.002169}{13828}} = 0.0003162$$

Confidence interval of $\bar{x} = \bar{x} \pm t\sigma$

Confidence Levels	Mean \pm std. deviation $\bar{x} \pm t \sigma$	Confidence Intervals $\bar{x} \pm t\sigma$	Confidence Intervals for Total Take **
@ 80% =	$\bar{x} \pm (1.35) \sigma$	0.002169 \pm 0.0004268	656 to 978
@ 90% =	$\bar{x} \pm (1.65) \sigma$	0.002169 \pm 0.0005217	621 to 1013
@ 95% =	$\bar{x} \pm (1.96) \sigma$	0.002169 \pm 0.0006197	583 to 1051
@ 99% =	$\bar{x} \pm (2.576) \sigma$	0.002169 \pm 0.0008145	510 to 1124

* After Shimamoto (1976)

** Calculated by multiplying confidence intervals for \bar{x} by the total number of license buyers.

Table 10. Licensed Sport Hunter Take of Bobcats, 1978-90

Year	Est. Licensed Hunter Take	No. Licensed Hunters Hunting Bobcats	Percent Successful	Days Hunted	Bobcats Take/Day
1978	5733	7566	45	57603	0.100
1979	7462	5960	47	65340	0.114
1980	3373	4843	59	32951	0.102
1981	2585	4551	45	30192	0.086
1982	2574	4408	41	32984	0.078
1983	1794	3082	43	23184	0.077
1984	2232	3456	33	35670	0.063
1985	2205	2597	40	22785	0.097
1986	918	1938	21	15402	0.057
1987	2278	2482	45	20740	0.110
1988	1400	2040	43	18800	0.074
1989	549	1221	36	11154	0.049
1990	817	2052	29	11448	0.061

Since the 1982-83 season, and with no change in season length, the harvest has remained below the 14,400 statewide harvest limit. Harvest monitoring should continue; and, if the statewide harvest reaches 14,000 bobcats, the age and sex structure monitoring should be reinstated.

The bobcat take in northeastern California has been monitored every year because the age and sex structures had not increased to levels comparable to other areas of the State during the time the Department monitored these population parameters. The population now appears to continue to support a stable, if slightly cyclic harvest (Table 11). If the harvest in this local area increases to more than 425 for more than two successive seasons, additional management action should be instigated to determine the effects on that population. The local harvest has been below this level for the last three seasons.

Table 11. Recent Commercial Harvest of Bobcats in Northeastern California.					
Season	County				Total Northeastern California
	----- Eastern Siskiyou	Modoc	Lassen	Plumas	
1978-79	81	306	246	47	680
1979-80	88	216	302	95	701
1980-81	82	126	96	39	343
1981-82	49	143	147	58	397
1982-83	74	238	177	35	524
1983-84	45	182	84	17	328
1984-85	54	231	188	33	506
1985-86	78	181	108	23	390
1986-87	78	237	139	60	514
1987-88	148	223	187	43	601
1988-89	60	107	85	30	282
1989-90	36	62	85	47	230
1990-91	22	30	29	9	90

The disparity between the information provided by the annual hunter survey and the sport hunting tag program continues. The take reported from sport hunting tags is 37.3% of the estimated sport hunting take. The number of sport hunting tag buyers is about 44% of the estimated number of bobcat hunters (Table 12).

Table 12. Sport Hunting Tag Program Compliance, 1983-84 to 1990-91

	Season							
	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91
No. of Sport Hunting Tag Buyers	495	547	777	823	908	807	890	858
Estimated No. of Bobcat Hunters *	2594	3058	2050	1354	1818	1597	952	1928
Percent of Hunters Buying Tags	19.1	17.9	37.9	60.8	49.9	50.5	93.5	44.5
Take Reported by Return of Sport Hunting Tags	107	156	149	147	177	205	280	259
Estimated Sport Hunting Take **	1291	1591	1689	619	1796	1069	412	695
Percent of Take Reported	8.3	9.8	8.8	23.7	9.9	19.2	68.0	37.3

* Estimated number of bobcat hunters calculated by subtracting number of licensed trappers taking bobcats from the number of hunters estimated by annual Hunter Survey.

** Estimated sport hunting take calculated by subtracting estimated take by persons both licensed to hunt and trap from the reported licensed hunter take.

RECOMMENDATION

1. Continue to monitor the take of bobcats by geographical area in order to use that information to determine the management needed to maintain viable bobcat populations throughout California.