JOB PROGRESS REPORT

State: ___California___

Project Number: ___W-54-R-13___   Project Title: Nongame Wildlife Investigations

Job Number: ___IV-6___   Job Title: ___Bobcat Harvest Assessment___

Period Covered: ___July 1, 1980 - June 30, 1981___ Job Type: Survey and Inventory

SUMMARY:

An estimated total of 12,400 bobcats were taken during the 1980 hunting year and the 1980-81 trapping season. Approximately 8,700 bobcats were taken by trappers and 3,700 were taken by hunters. The total take was a decrease of about 1,800 from the 1979-80 year, even though the reported commercial take increased by 1,800 bobcats. The total estimated take was the lowest in the last five years, generally because of the continued reduction in sport hunting take. As has occurrd in recent years, the greatest take continues to come from counties along California's south coast. 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 the U. S. Fish and Wildlife Service depredation control records.

Regulations which were adopted to divide the state into three zones with different season lengths in order to apportion take according to local population conditions worked in northeastern California where the season length was reduced to three weeks. The commercial take was reduced by approximately 55%.

BACKGROUND:

Bobcat harvest has increased in California over the last decade. This reflects an abundant population of bobcats and high fur prices. The sale of bobcat fur now brings the highest dollar income to trappers of any species of fur harvested and sold in California. 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 have been performed 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 made through other jobs. A state-wide harvest monitoring system has been established where the age and sex structures of the harvested population are sampled (see Job IV-7) to determine the effect of the harvest on the various bobcat populations, and to identify the amount of harvest. This latter project is the subject of this job report.

OBJECTIVE:

Determine the annual bobcat harvest on a regional basis, for the purpose of managing populations through the manipulation of season lengths and chronology, take methods, and take limits.

PROCEDURES:

The commercial take is determined through assessment of mandatory, annual reports of licensed trappers and through a mandatory tagging program for all bobcat furs. Commercial fur takers 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 taker must supply information on the place, date and method of take and provide other biological information.

Sport take is determined through the Department's annual hunter survey questionnaire. This survey queried a 3 to 4% sample of approximately all California's licensed hunters about their hunting effort and success for various species. Information on total take, regional distribution of take effort of hunters, and percent successful hunters is gathered on bobcat hunting from this survey.

All depredation take must be reported to the Department. This information is received from the person doing the taking or from the public agency doing the depredation control work.

RESULTS:

Attached is the report cited below prepared to justify the export of harvested bobcat from California:

> California Department of Fish and Game. 1981. Information requested by the O.S.A., USFWS for approval of the international export of bobcats from California during the 1981-82 season. State of California, Resources Agency, California Department of Fish and Game, Sacramento. Multilith report, August, 1981. 18 pp.

The total estimated take of bobcats during 1980-81 was 12,413 individuals (Table 1). This was about 1,800 less bobcats than were taken during 1979-80, but 3,400, 7,700, and 300 less than were taken during 1976-77, 1977-78 and 1978-79, respectively. Of the total, trappers took the majority (70%) of the animals with hunters taking much fewer (30%).

Over the last ten years, the distributional pattern of the sport take has been fairly stable with usually seven of the ten top counties from the decade ranking in the top ten in hunter take for any one year (Table 2). However, in 1979, only three of the decade's top ten--San Bernardino, San Diego, and Mendocino counties-- were in the top ten. Four of the seven counties were from the west slope of the Sierra Nevada where the relative trapper take is fairly low. Two of the seven were Los Angeles and Ventura counties, near metropolitan Los Angeles, where the density of bobcats appears to be relatively high but also where there is a considerable commercial harvest.

In 1980, only four counties of the decade's top ten--Kern, San Bernardino, San Luis Obispo and San Diego counties--were in the top ten and only two of these were in the top ten in 1979. This demonstrates the growing lack of pattern in determining where hunter pressure might be exerted. A further demonstration of this is the appearance of Imperial County ranking sixth in hunter take. It has not ranked in the top 15 counties in the State in the last ten years. Also, Siskiyou and El Dorado counties appeared in the top ten for only the second time in the last ten years. Both were in the top ten eight and ten years ago. Tuolumne and Ventura counties were in the top ten this year for the seond time as well. However, both made the top ten in 1979 for the first time.

The distribution of the commercial take of bobcat has shown a shift of importance from the three northeastern California counties--Modoc, Siskiyou and Lassen--to the south coastal California counties (Table 3). At least two of northeastern California's three counties ranked in the top six during the seasons of 1971-72

Table 1. Estimated annual take of bobcats by hunting and trapping in California.

		Season[1]				
		1976–77	1977–78	1978–79	1979–80	1980–81
I.	Take by licensed trappers	5,400	5,146	8,326	7,809	9,595
	A. Trapper take	5,000	4,650	6,825	6,686	8,703
	B. Commercial hunter take	400	500	1,500	1,123	892
II.	Take by all hunters	10,500	15,300	5,811	7,462	3,686
III.	Animal damage control take	347	208	56	32	24
IV.	Total take (IA + II + III)	15,847	20,150	12,700	14,200	12,413

[1] Licensed trapper data for season indicated, hunter take for calendar year of first year listed, animal damage control take for fiscal year listed.

Table 2. Ten counties with the highest hunter take of bobcat reported in hunter survey and hunting tag returns, 1971-80.

Rank	1971	1972	1973	1974	1975
1	Tehama	San Luis Obispo	San Diego	Mendocino	San Diego
2	Tulare	Fresno	Shasta	Fresno	Mendocino
3	San Diego	San Bernardino	Kern	Kern	Riverside
4	San Bernardino	Mendocino	Fresno	Glenn	Santa Barbara
5	Humboldt	Kern	Tehama	Tehama	San Luis Obispo
6	Kern	Inyo	Humboldt	San Diego	Kern
7	Santa Barbara	San Diego	Mendocino	Madera	Tulare
8	Fresno	Lake	Madera	Lake	Madera
9	Siskiyou	Santa Barbara	Tulare	Yuba	Lake
10	Trinity	Madera	El Dorado	San Benito	Monterey

Rank	1976	1977	1978	1979 [1]	1980 [1][2]
1	Tulare	Los Angeles	Tulare	San Bernardino	Kern
2	Fresno	Orange	Fresno	Tuolumne	Monterey
3	Monterey	Santa Barbara	Mendocino	Los Angeles	Tuolumne
4	Humboldt	Kern	Humboldt	Nevada	El Dorado
5	San Diego	Humboldt	Kern	Ventura	San Bernardino
6	Kern	San Diego	San Diego	Inyo	Imperial
7	Butte	Contra Costa	San Bernardino	Mariposa	Ventura
8	Madera	San Bernardino	Monterey	San Diego	San Luis Obispo
9	Mendocino	Mendocino	San Luis Obispo	Calaveras	San Diego
10	Riverside	San Luis Obispo	Lassen-Shasta	Mendocino	Siskiyou

1/ For 1979 and 1980, hunter take only includes sport hunting take.
2/ Bobcat hunting tag returns used for 1980 (1980-81 season) along with sport hunting take estimated through annual hunter survey.

Table 3. Ten counties reporting highest commercial take of bobcat, 1971-81.

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	Tehama	Lassen	Modoc
4	Lassen	Siskiyou	Tuolomne	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

through 1975-76. None of these counties placed in the top 10 in 1976-77 and in 1980-81. They have averaged only one county in the top ten over the last four seasons with the highest ranking of a fifth. The emergence of the importance of south coastal California counties in the commercial harvest of bobcats can be shown by the results of the 1979-80 and 1980-81 seasons where four and five of the top ten counties have been from the south coast area. Two other geographic areas also are emerging as high take areas. These areas are Humboldt-Mendocino counties and San Bernardino-Tulare-Kern counties.

The total take of bobcats range from none in San Francisco and Sutter counties to about 1,287 in San Bernardino County (Table 4). The harvest for the ten counties having the highest harvest was at least 435 bobcats. Only 23 of the 55 counties had a reported total take of less than 100 bobcats.

The increase in take of bobcats continues to mirror the increase and maintenance of high values for bobcat furs (Table 5). The average price paid per pelt was $129.90. This is the second highest average price ever, behind the $133.50 of the 1975-76 season.

The number of individuals taking bobcats increased to 1,007 resulting in an average take of 8.04 bobcats per successful bobcat trapper (Table 6). This is an average take 4% above last year's average, but still below the average season take which occurred during the four season period 1975-76 to 1978-79. However, it is 1.3% above the average over the last ten years.

The peak of the average bobcat take per trapper, both state-wide and on county basis, was in the 1978-79 season (Table 6). Since then, the average take per trapper has gone down in the majority of the counties and has reached the lowest average in the last six seasons in 13 of the 22 counties where substantial numbers of trappers trap. Some of this trend is to be expected, as trappers have become more numerous. But the pattern of an increase in the number of trappers and a reduction in the average take per hunter clearly demonstrates that there is a finite number of bobcats available for harvest. The pattern of a decrease in the average take per trapper and a constant or reduced harvest effort signifies a decrease in the bobcat population. This probably is the case in Butte, Humboldt, Lake, Lassen, Modoc, San Diego,, Shasta, Siskiyou and Trinity counties. It may also occur soon in those counties (Fresno, Los Angeles, Monterey and San Benito) that show a continued increase in take per trapper and in the number of trappers if an overharvested situation occurs.

Over 90% of the commercially taken bobcats for which take data were gathered, were taken by trapping, 0.3% were salvaged road kills, and no method of take was given for 0.5% of the bobcats (Table 7). The remaining 8.7% of the commercially harvested bobcats were taken by hunting; 6.6% were taken through the use of dogs; 0.7% through the use of a predator call; and 1.4% were taken by hunting where the specific hunting method was not given. Although the total take by hunting decreased almost 40% from the 15.5% reported in the 1979-80 season, the take through the use of dogs remained about eight times the take where a predator call was used.

The amount of bobcats taken commercially was not uniform throughout the season (Tables 8, 9, and 10). In most counties, the amount of take was highest during the first week and declined through the rest of the season. However, a minor increase in take often occurred in the fifth, sixth, or seventh week of the season. It appears that a change in season length of one week in northeastern California would likely increase/decrease the take by about 25% and in south coastal California and the remainder of the state the increase/decrease would be about 10%.

Table 4. Take of bobcat, by county, during 1980-81.
Page 1 of 2.

	COMMERCIAL TRAPPING TAKE	COMMERCIAL HUNTING TAKE	SPORT HUNTING TAKE	DEPREDATION TAKE	ESTIMATED TOTAL TAKE
1. Alameda	1	2	21		24
2. Alpine	11				11
3. Amador	3	1	22		26
4. Butte	50	4			54
5. Calaveras	19	6			25
6. Colusa	26	6			32
7. Contra Costa	2				2
8. Del Norte	85	23			108
9. El Dorado	33	6	178		217
10. Fresno	296	27	65		388
11. Glenn	43	1	68		112
12. Humboldt	307	181	58	5	551
13. Imperial	16	1	135		152
14. Inyo	275		46		321
15. Kern	439	17	511		877
16. Kings	47				47
17. Lake	173	8		1	182
18. Lassen	92	4	65		161
19. Los Angeles	168	4	65		237
20. Madera	126	2	21	2	151
21. Marin	3	26			29
22. Mariposa	164	29	12	2	207
23. Mendocino	378	57	58		493
24. Merced	5	4			9
25. Modoc	115	11			126
26. Mono	80	1			81
27. Monterey	698	105	285		1,088
28. Napa	22		23	1	46
29. Nevada				1	1
30. Orange	6		23		29
31. Placer		7	39		46
32. Plumas	26	13	10		49
33. Riverside	69	13	56		138
34. Sacramento					
35. San Benito	301	24	12		337
36. San Bernardino	1,126	22	139		1,287
37. San Diego	325	22	93		440
38. San Francisco					
39. San Joaquin	16				16
40. San Luis Obispo	539	14	101	6	660
41. San Mateo	113				113
42. Santa Barbara	706	33	59	2	800
43. Santa Clara	11	6	40		57
44. Santa Cruz	68			1	
45. Shasta	214	13	10		237
46. Sierra	6	4			10
47. Siskiyou	269	30	85		384
48. Solano	24			1	25

Table 4. Take of bobcat, by county, during 1980-81.
Page 2 of 2.

		COMMERCIAL TRAPPING TAKE	COMMERCIAL HUNTING TAKE	SPORT HUNTING TAKE	DEPREDATION TAKE	ESTIMATED TOTAL TAKE
49.	Sonoma	101	1	22	2	126
50.	Stanislaus	62	31	38		131
51.	Sutter					
52.	Tehama	191	7			198
53.	Trinity	100	14	9		123
54.	Tulare	392	78	23		493
55.	Tuolumne	160	28	247		435
56.	Ventura	289	4	132		425
57.	Yolo			23		23
58.	Yuba	2	2			4
	TOTAL	8,703	892	2,794	24	12,413

Table 5. Bobcat pelt prices.

Season	Average Price	Highest Price[1]
1970-71	$ 10.86	Not recorded
1971-72	$ 18.83	$ 30.00
1972-73	$ 29.33	$ 61.00
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[2]	$105.80	$185.00
1978-79[2]	$120.00	$426.00
1979-80[2]	$114.20	$313.00[2]
1980-81[3]	$129.90	

[1] Highest single price reported as average price of top quality pelt is not available.

[2] Data taken only from California Trapper's Association fur sales which tend to be higher than average paid throughout season by all fur dealers.

[3] Data taken from annual reports of licensed fur dealers.

Table 6. Average bobcat harvest per successful trapper per season in California.

County	Season					
	75-76	76-77	77-78	78-79	79-80	80-81
Butte	3.8	5.6	2.9	3.1	3.4	2.5
Fresno		9.1	10.5	10.6	9.2	10.2
Humboldt	9.2	8.8	6.6	6.0	6.1	5.3
Inyo	10.6	8.3	10.9	10.5	7.3	8.5
Kern			14.6	26.9	10.6	11.0
Lake	5.3	5.3	5.7	10.0	6.4	4.7
Lassen	4.5	5.4	3.5	6.0	4.3	3.8
Los Angeles		6.6	8.6	7.6	14.8	14.1
Mendocino	6.8	6.7	5.9	8.0	5.9	6.1
Modoc	4.4	5.0	5.3	5.6	4.2	3.2
Monterey		8.1	9.1	9.2	11.3	16.3
Plumas		2.9	3.4	4.5	4.3	
Riverside	9.8			7.8	9.9	5.8
San Benito		10.9	8.7	9.0	9.8	13.0
San Bernardino		16.9	17.4	19.3	17.5	14.7
San Diego		11.1		12.1	11.5	6.0
Santa Barbara			19.4	16.9	16.8	15.2
Shasta	5.4	5.1	4.3	4.0	3.6	2.9
Siskiyou	6.2	4.3	5.1	6.7	4.4	3.8
Tehama	3.6	4.7	4.8	5.3	3.7	5.1
Trinity	2.5	3.9	4.0	5.4	4.0	3.3
Tulare		13.1	7.7	11.7	12.2	9.2
State-wide	7.78	8.11	8.08	9.04	7.76	8.04
No. of trappers harvesting bobcats.	283	446	550	766	920	1,007
No. of licensed trappers.	931	1,692	1,889	2,378	3,221	3,201

[1] County data from counties and years where more than 10 trappers per county reported take.

Table 7. Method of the commercial take of bobcats, 1980-81.
Page 1 of

County	Percent taken by trap	Percent taken by dogs	Percent taken by calling	Percent taken by misc.hunting	Percent salvaged from road kill	Percent where method unknown
1. Alameda	33 (1)1/		67 (2).			
2. Alpine	90 (9)					10 (1)
3. Amador	75 (3)		25 (1)			
4. Butte	90 (46)		6 (3)	2 (1)		2 (1)
5. Calaveras	78 (18)	22 (5)				
6. Colusa	83 (24)	14 (4)		3 (1)		
7. Contra Costa	100 (2)					
8. Del Norte	79 (80)	21 (21)				
9. El Dorado	78 (28)	3 (1)		11 (4)		8 (3)
10. Fresno	92 (279)	6 (18)	1 (2)	1 (3)	- (1)	
11. Glenn	98 (40)	2 (1)				
12. Humboldt	64 (288)	35 (159)		1 (3)		- (1)
13. Imperial	94 (15)			6 (1)		
14. Inyo	100 (259)					
15. Kern	96 (328)	4 (14)		- (1)		
16. Kings	100 (44)					
17. Lake	95 (161)	4 (6)		1 (1)		1 (2)
18. Lassen	96 (87)			3 (3)	1 (1)	
19. Los Angeles	97 (157)			2 (4)		1 (1)
20. Madera	98 (119)	2 (2)				
21. Marin	12 (3)	88 (23)				
22. Mariposa	86 (154)	12 (22)		2 (4)		
23. Mendocino	85 (346)	10 (42)		1 (5)	1 (4)	2 (10)
24. Merced	56 (5)			11 (1)	33 (3)	
25. Modoc	92 (108)			8 (10)		
26. Mono	99 (75)			1 (1)		
27. Monterey	87 (656)	12 (90)		- (1)	- (3)	- (1)

County	Percent taken by trap	Percent taken by dogs	Percent taken by calling	Percent taken by misc.hunting	Percent salvaged from road kill	Percent where method unknown
28. Napa	100 (21)					
29. Nevada						
30. Orange	100 (6)					
31. Placer	67 (24)		67 (4)	33 (2)		
32. Plumas		17 (6)		17 (6)		
33. Riverside	84 (65)		12 (9)	4 (3)		
34. Sacramento						
35. San Benito	93 (283)	2 (6)	3 (9)	2 (6)	- (1)	
36. San Bernardino	97 (1050)	1 (6)		1 (14)		1 (10)
37. San Diego	94 (306)		1 (3)	4 (14)	1 (3)	
38. San Francisco						
39. San Joaquin	100 (15)					
40. San Luis Obispo	95 (496)	2 (9)		1 (3)	- (1)	2 (11)
41. San Mateo	100 (106)					
42. Santa Barbara	96 (664)		1 (4)	2 (17)	1 (9)	
43. Santa Clara	67 (10)	27 (4)			7 (1)	
44. Santa Cruz	100 (64)					
45. Shasta	94 (201)	5 (10)	- (1)		(1)	
46. Sierra	60 (6)			40 (4)		
47. Siskiyou	90 (253)	5 (15)	3 (8)	1 (2)	1 (2)	
48. Solano	100 (23)					
49. Sonoma	99 (95)			1 (1)		
50. Stanislaus	67 (58)	33 (28)				
51. Sutter						
52. Tehama	97 (180)	1 (3)	1 (2)		1 (1)	
53. Trinity	87 (93)	10 (11)		2 (2)		1 (1)

Table 7. Method of the commercial take of bobcats, 1980-81.
Page 3 of

County	Percent taken by trap	Percent taken by dogs	Percent taken by calling	Percent taken by misc. hunting	Percent salvaged from road kill	Percent where method unknown
54. Tulare	84 (369)	14 (62)	1 (6)	- (2)		
55. Tuolumne	86 (151)	11 (20)	3 (5)			
56. Ventura	99 (272)			1 (4)		
57. Yolo						
58. Yuba	50 (2)	50 (2)				
State-wide	90.6%	6.6%	0.7%	1.4%	0.3%	0.5%
	8148	590	59	124	31	42

1/ Parenthetical values equal the actual known number of bobcats taken by that method.

8994

Table 8. Weekly proportion of commercial bobcat harvest in northeastern California, 1980-81 season.

Given in percent of total county take. Season: December 1 through December 21.

County	1	2	3	4	5	6	7	Sample size
Lassen	40	37	20	2		1		87
Modoc	40	28	23	6	4			130
Plumas[1]	26	31	26	6			11	35
Siskiyou[1]	33	19	17	9	9	7	7	281
Regional Total	35	25	19	7	6	4	5	

[1] In parts of Plumas and Siskiyou counties season extends to January 15.

Table 9. Weekly proportion of commercial bobcat harvest in south coastal California, 1980-81 season.

Given in percent of total county take. Season: December 1 through January 31.

COUNTY	1	2	3	4	5	6	7	8	9	Sample Size
Monterey	21	21	12	8	6	5	12	9	5	579
San Benito	9	18	13	8	16	14	12	7	4	320
San Diego	26	16	10	9	8	12	9	7	4	316
San Luis Obispo	24	18	18	9	9	13	5	5	6	359
Santa Barbara	18	18	12	14	9	6	9	8	6	672
Ventura	20	17	7	8	8	18	11	7	4	267
Regional Total	20	18	11	10	9	10	10	8	5	

Table 10.
Page 1
of 2.

Weekly proportion of commercial bobcat harvest in that part of California having a season from December 1, 1981 to January 15, 1982.

Given in percent of total county take.

Weeks

County	1	2	3	4	5	6	7	8 & 9	Sample Size
Del Norte	0	5	8	41	27	20			39
Humboldt	27	10	16	16	12	11	6	1	470
Mendocino	15	19	18	12	12	14	9	1	326
Shasta	31	18	15	12	6	13	5		197
Tehama	32	24	12	9	6	8	9		138
Trinity	27	22	18	10	12	5	6		95
Sub-region	24	16	16	14	11	12	7	1	1265
Colusa	5	0	23	18	23	18	15		20
Glenn	38	14	12	18	10	10			37
Lake	24	21	12	9	9	17	6	3	156
Marin	6	18	21	15	15	3	12	12	17
Napa	49	21				26	5		20
Solano	23	23	15	10	21	8			24
Sonoma	44				17	39			18
Yolo									0
Sub-region	26	17	12	10	11	16	5	2	292
Butte	32	7	22	14	11	11		2	49
Nevada				33	67				3
Placer					50	50			2
Sierra	10	40	20	10		10	10		10
Sutter			0					100	1
Yuba			33		17	17	33		3
Sub-region	24	11	21	13	13	12	3	3	68
Amador					50	50			1
Calaveras	28	35	11	4	9	13			27
El Dorado	8	28	3	5	49	7			50
Mariposa	18	23	23	9	11	8	6	2	185
Sacramento									0
Tuolumne	20	20	29	12	10	8	2		192
Sub-region	18	23	23	9	15	8	3	1	455
Alameda									0
Contra Costa					33	17	50		6
Merced	69	19	6	6					8
San Joaquin									0
San Mateo	25	37	14	8	6	4	4	2	148
Santa Clara		46		8			23	23	13
Santa Cruz	33	25	13	5	3	5	13	3	75
Stanislaus									0
Sub-region	27	32	12	7	5	4	9	3	250

Table 10.
Page 2
of 2.

Weekly proportion of commercial bobcat harvest in that part of California having a season from December 1, 1981 to January 15, 1982.

Given in percent of total county take.

Weeks

County	1	2	3	4	5	6	7	8 & 9	Sample Size
Alpine	10	10	25	5	15	35			10
Inyo	20	14	17	8	8	16	10	7	281
Mono	12	17	14	18	18	14	6		80
Sub-region	18	15	17	10	11	16	9	5	371
Fresno	20	20	16	13	16	8	7		324
Kern	20	12	14	18	11	15	9	–	641
Kings	23	25	20		9	19	3	3	40
Madera	31	14	8	14	12	16	5	1	122
Tulare	20	22	15	12	15	10	5	1	389
Sub-region	21	17	14	15	13	13	7	1	1516
Imperial	15	31	15	8	15	15			13
Los Angeles	14	19	20	5	8	24	10	1	164
Orange	100								3
Riverside	27	11	21	11	17	9	5		66
San Bernardino	25	23	13	12	12	9	5	1	958
Sub-region	24	22	14	11	11	11	5	1	1204
Total Region	23	19	15	12	12	12	7	1	

The harvest of bobcats by hunters amounted to approximately 3,686 bobcats
(Table 4). Of these, 3,373 were taken and reported by licensed hunters
(Table 11). Some of these, 579 were estimated taken by licensed hunters
who also were licensed commercial fur takers (trappers). An additional 313
bobcats were estimated taken by hunters who only had a trapping license. The
estimate of 3,373 bobcats taken by licensed hunters was derived from the
Department's annual "Game Take Hunter Survey". The response of the 2.3%
sample of the 532,850 licensed hunters in California gave an 80% confidence
level of bobcat take between 2,858 and 3889 animals. Also, it was estimated
that 4,843 persons hunted bobcats and that 50% of these were successful. These
same hunters spent an estimated 32,951 days hunting for an average take of
0.102 bobcats per day. This is below the previous take per unit effort of
0.105 and 0.114 bobcats per day recorded in 1978 and 1979, respectively. This
occurred despite a drastic decrease in hunter effort, down from 55,420 and
65,340 hunter days in 1978 and 1979, respectively.

ANALYSIS:

Once again, the total estimated take of bobcat decreased, down 13% from last
season and even slightly below the previous low recorded in 1978-79, since
accurate records have been kept. This reduction was made despite the second
highest reported commercial take (the highest, 12,250 bobcats were reported in
1927-28). A reduction of 51% in the hunter take accounted for the reduction in
total take. These trends are probably the result of the maintenance of $100
plus average pelt prices for bobcat fur and the institution of a bobcat sport
hunting tag program which also limited the take to two bobcats per sport hunter.

The effect of the increased take must be understood to assure that the bobcat
recource is not over-utilized. There are some indications that most populations
are reaching their harvest limits (see W-54-R-13, Job IV-7). This is especially
true of the bobcat population in south coastal California counties which have
demonstrated a large increase in commercial take over the last decade. At the
same time, the northeastern California counties, which traditionally have pro-
vided bobcats with higher pelt values, have not kept pace with the increased take
shown elsewhere. This could be an indication that bobcat resources in the north-
eastern counties have been harvested at a higher rate than elsewhere and cannot
sustain any further increase in harvest.

In assessing harvest figures for the impact of the take (assessing of population
structure data to determine the impact of harvest is discussed in W-54-R-13, Job
IV-7), the harvest can be compared with the estimated bobcat population on a
county by county basis (Table 12). Using population estimates given for California's
various habitat types and the distribution of that habitat (Department of Fish and
Game, 1980) a county population size can be calculated and compared to the harvest.
The comparison results in a crude estimate of mortality due to harvest. In a
harvested population of bobcats in San Diego County, the mortality due to harvest
was calculated through a capture-mark-recapture technique to be about 15%.

The total mortality rate of a bobcat population normally doesn't exceed 45 to 50%
and still maintain the same population size (Table 13). In checking crude mortal-
ity rates, 10 counties showed rates 40% or higher during the 1979-80 season and
only three counties were higher than 40% during the 1980-81 season. This reduc-
tion is due to the decrease in total take which mirrors the reduction in sport
hunting take. In San Diego County, where the population structure of the

Table 11. Statistical parameters of the hunter take of bobcat during 1980. Poisson distribution[1]

Frequency distribution:

No. of bobcats taken	No. of hunters	Total bobcats taken
0	66	0
1	35	35
2	5	10
3	2	6
4	2	8
9	1	9
10	1	·10
	$\sum f = 112$	$\sum yf = 78$

$$\bar{x} = \frac{\text{total bobcats taken}}{\text{total respondents}} = \frac{78}{12,321} = 0.0063307$$

State-wide bobcat bag = $(\bar{x})$ (total no. license buyers) = (0.0063307) (532,850) = 3373

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

$$\sigma(\bar{x}) = \sqrt{\frac{\bar{x}}{n}} = \sqrt{\frac{0.0063307}{12,321}} = 0.0007168$$

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

Level of Confidence	$(\bar{x}) \pm t\sigma$	Confidence Intervals for $(\bar{x})$	Confidence Interval for total take [2]
80%	0.0063307 ± (1.35)(0.0007168)	0.0063307 ± 0.0009677	2,858-3,889
90%	0.0063307 ± (1.65)(0.0007168)	0.0063307 ± 0.0011827	2,743-4,004
95%	0.0063307 ± (1.96)(0.0007168)	0.0063307 ± 0.0014045	2,625-4,122
99%	0.0063307 ± (2,576) (0.0007168)	0.0063307 ± 0.0018465	2,389-4,357

[1] After Shimamoto (1976)

[2] Calculated by multiplying confidence interval for $(\bar{x})$ by total number of license buyers (532,850).

Table 12. Estimates of crude mortality rates, due to harvest of bobcat populations in California, 1979-80 and 1981-82.

	Est. bob-cat pop.	1979-80 tot. bobcat harv.	1980-81 tot. bobcat harv.	1979-80 crude mortal. rate	1980-81 crude mortal. rate
1. Alameda	214	29	24	13.6	11.2
2. Alpine	201	57	11	28.4	5.5
3. Amador	504	14	26	2.8	5.2
4. Butte	1018	105	54	10.3	5.3
5. Calaveras	884	295	25	33.4	2.8
6. Colusa	609	26	32	4.3	5.3
7. Contra Costa	259	2	2	.8	.8
8. Del Norte	600	133	108	22.2	18.0
9. El Dorado	1420	114	217	8.0	15.3
10. Fresno	2066	424	388	20.5	18.8
11. Glenn	726	74	112	10.2	15.4
12. Humboldt	1611	478	551	29.7	34.2
13. Imperial	353	19	152	5.4	43.1
14. Inyo	1563	726	321	46.4	20.5
15. Kern	2759	472	877	17.1	31.8
16. Kings	105	56	47	53.3	44.8
17. Lake	1346	197	182	14.6	13.5
18. Lassen	839	336	161	40.0	19.2
19. Los Angeles	2734	674	237	24.7	8.7
20. Madera	1146	186	151	16.2	13.2
21. Marin	199	17	29	8.5	14.6
22. Mariposa	1185	531	207	44.8	17.5
23. Mendocino	2115	629	493	29.7	23.3
24. Merced	320	11	9	3.4	2.8
25. Modoc	369	267	126	72.4	34.1
26. Mono	282	100	81	35.5	28.7
27. Monterey	3061	338	1088	11.0	35.5
28. Napa	855	274	46	32.0	5.4
29. Nevada	757	474	1	62.6	.1
30. Orange	228	104	29	45.6	12.7
31. Placer	952	151	46	15.9	4.8
32. Plumas	1963	135	49	6.9	2.5
33. Riverside	2585	261	138	10.1	5.3
34. Sacramento	72	1	0	1.4	-
35. San Benito	1050	384	337	36.6	32.1
36. San Bernardino	4755	1180	1287	24.8	27.1
37. San Diego	4022	753	440	18.7	10.9
38. San Francisco	0	0	0	-	-
39. San Joaquin	119	2	16	1.6	13.4
40. San Luis Obispo	2505	413	660	16.5	26.3
41. San Mateo	124	67	113	54.0	91.1
42. Santa Barbara	2792	629	800	22.5	28.7
43. Santa Clara	1143	4	57	.3	5.0
44. Santa Cruz	236	32	69	13.6	29.2
45. Shasta	3405	241	237	7.1	7.0
46. Sierra	696	9	10	1.3	1.4
47. Siskiyou	4637	463	384	10.0	8.3
48. Solano	126	12	25	9.5	19.8
49. Sonoma	1034	79	126	7.6	12.2
50. Stanislaus	739	50	131	6.8	17.7

Table 12. Estimates of crude mortality rates, due to harvest of bobcat populations in California, 1979-80 and 1981-82.

	Est. bob-cat pop.	1979-80 tot. bobcat harv.	1980-81 tot. bobcat harv.	1979-80 crude mortal. rate	1980-81 crude mortal. rate
51. Sutter	36	0	0	-	-
52. Tehama	2455	141	198	5.7	8.1
53. Trinity	2547	147	123	5.8	4.8
54. Tulare	2546	499	493	19.6	19.4
55. Tuolumne	1601	770	435	48.1	27.2
56. Ventura	1571	741	425	47.2	27.1
57. Yolo	314	0	23	-	7.3
58. Yuba	370	61	4	16.5	1.1

Table 13. Population models showing survival rate needed to maintain stable
populations.[1]

		YEAR 1	YEAR 2	YEAR 3	YEAR 4
MODOC CO. (1978-79, 1.3 ♂/♀)					
Adults in spring		100	73	73	73
Yearlings in spring		45	72	72	72
Producing adult	(90%)	39	29	29	29
Producing yearling	(90%)	18	28	28	28
Kittens at den		143	143	143	143
Kittens surviving	(50%)	72	72	72	72
Yearlings surviving	(50%)	23	36	36	36
Adults surviving	(50%)	50	37	37	37
KERN CO. (1978-79, 1.2 ♂/♀)					
Adults in spring		100	65	66	66
Yearlings in spring		28	65	63	61
Producing adult	(90%)	41	27	27	27
Producing yearling	(75%)	10	22	21	21
Kittens at den		128	123	120	120
Kittens surviving	(51%)	65	63	61	61
Yearlings surviving	(51%)	14	33	32	31
Adults surviving	(51%)	51	33	34	34
SANTA BARBARA CO. (1978-79, 1.25 ♂/♀)					
Adults in spring		100	61	64	63
Yearlings in spring		10	54	50	50
Producing adult	(80%)	36	22	23	22
Producing yearling	(60%)	3	14	13	13
Kittens at den		98	90	90	88
Kittens surviving	(55%)	54	50	50	48
Yearlings surviving	(55%)	6	30	28	28
Adults surviving	(55%)	55	34	35	35

---

[1] Percentages of producing females are representative of breeders in these
populations (Lembeck 1978, Zezulak 1981). Litter size is 2.5 young per
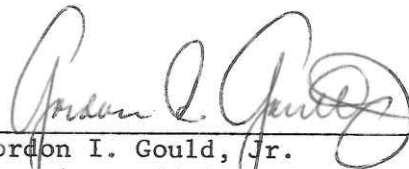female in all cases.

harvested bobcat population has remained relatively stable and the adult
mortality due to trapping was measured to be about 15% in 1979-80, the
crude mortality rate on a county-wide basis was calculated to be 18.8% in
1979-80 and 10.9% in 1980-81. No evaluation of the relationship between
crude mortality rates and other population dynamics parameters has been made.
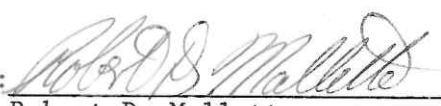This should be done to help validate population estimates and status condition.

The reduction in season length recommended last year for the northeastern sec-
tion of California was implemented. This reduced the take in the section as
evidenced by the 52-53% reduction in take in Lassen and Modoc counties. This
demonstrates the ability to reduce take by reducing season length. Also, it
further demonstrates that the relationship between the reduction in season
length and take is not linear as shown in the previous discussion on the
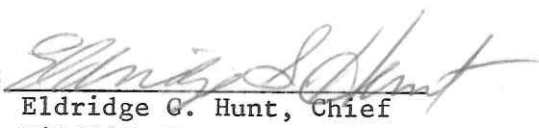temporal distribution of the commercial take during the season.

Only 254 hunters bought bobcat sport hunting tags which were required for the
first time during the 1980-81 season. They only reported taking 70 bobcats,
considerably below the 2794 calculated taken through use of the results of the
annual hunter survey and commercial tagging program. These two sets of figures
are so divergent that the total number taken as shown by the new sport hunting
tag program can't be used in comparison. However, the distribution of take
shown by the sport hunting tag program was used to determine the distribution of
the sport take.

RECOMMENDATIONS:

1. Continue to monitor the take of bobcat by geographical area in order to use
    information in determination of management procedures needed to maintain
    bobcat populations.

2. Update the estimated density of bobcats as bobcat density figures are
    obtained through field research and data evaluation.

3. Evaluate the methods used to obtain the harvest of bobcats by hunters and
    correct for any inherent biases.

4. Develop and improve methods to evaluate harvest data and to coorelate with
    other population dynamics information.

Prepared by: _____   Approved by: _____
              Gordon I. Gould, Jr.   Robert D. Mallette
              Associate Wildlife Manager-Biologist   Nongame Wildlife Coordinator

Approved by: _____   Date: __4-26-82__
              Eldridge G. Hunt, Chief
              Wildlife Management Branch

Attachment