BOBCAT ASSESSMENT

April 29, 1986

Prepared by:

Karen I. Morris

Maine Department of Inland Fisheries and Wildlife
Hedin Hall, BMHI Complex
P.O. Box 1298
Bangor, Maine 04401

NATURAL HISTORY

Bobcat populations cannot be supported in areas lacking dense understories that provide hares with habitat and bobcats with stalking cover. In Eastern Maine, hare made up 80% of the winter diet (May 1981). Hare remains were found in 92% of the bobcat droppings collected during the fall and 64% of those collected in the winter in western Maine (Major 1983). The change is primarily due to increased reliance on deer during the winter, but smaller bobcats still depend largely on hare. White-tailed deer remains were found in the stomachs of 40% of the large male bobcats but only 8% of the females and 11% of the small males contained deer (Litvaitis 1984).

Maine is near the northern edge of the bobcats' range. When the temperature drops below 46' F, a bobcat has to increase its metabolic rate (and therefore the amount of food it eats) just to keep warm (Gustafsen 1984). In addition, they have difficulty traveling when they sink more than 6 inches into the Snow (McCord 1974). Severe cold and deep loose snow may prevent bobcat from using an apparently abundant food base (Petraborg and Gunvalson 1962). Severely emaciated animals have been reported during the winter in Maine, and some bobcats are reported to have starved (major 1983).

Bobcats breed in late winter and give birth in the spring between March and May (McCord and Cardoza 1982). Examination of reproductive tracts in Maine (MDIFW 1984) indicates that about half (27 of 47) of yearling females produce young, and average litter size for yearlings (including non-breeders) is 1. Nearly 3/4 of adult females breed; their litters average 1.9 kittens (non-breeders included).

Home range sizes of radio-collared female bobcats in Maine ranged from 18 to 41 km^2, and the home ranges of males ranged from 21 to 200 km^2 (Litvaitis 1984). several studies suggest that home range size is related to prey densities (Bailey 1972, Buie 1980).

Man's activities seem to be the major cause of mortality among adults. Nine of 12 collared bobcats are known to have died during a study in western Maine. Seven of these deaths were man induced (3 road kills, 3 shot and 1 trapped), while only 2 were natural mortalities attributed to starvation (Major 1983). Natural mortality probably assumes greater importance in WMU 2 where winters are severe and there is less human activity and may be of less importance in coastal areas where winters are milder.

HISTORY

Habitat Trends

During the last 2 centuries several changes have occurred in Maine that effected bobcat habitat. The activities of man have eliminated some bobcat habitat by converting it to metropolitan areas or farmland, but logged areas and abandoned farmland provided the dense understories required by hare and bobcat and have probably been beneficial to bobcats. The milder winters that occurred in the later part of the 19th and first half of the 20th century undoubtedly improved conditions for the bobcat during this period.

Maine's forests have tended to mature since 1971. Their suitability for hare has declined during this period (Cross 1985), and their value as bobcat habitat has also decreased. This trend is expected to reverse in the near future if the current increase in forest harvesting continues. The hare is noted for population cycles in more northern parts of its range. While definite cycles have not been recorded in Maine, population fluctuations have been noted and these no doubt effect the quality of bobcat habitat. Since coyotes became established in Maine during the 1970's, they may have reduced the number of hares and other prey species as well as the amount of carrion available for bobcats.

Human access has improved over most of the State. While rural and logging roads are not expected to reduce the ability of an area to support bobcats, they are likely to increase man-induced mortality.

Population Trends

The number and distribution of bobcats in Maine appear to have undergone several changes in the past century. Prior to the Civil War, bobcats were only reported in southern parts of the State; their distribution appears to have spread north since then (Hunt 1980). Manley Hardy (1907) reported that the bobcat was rare in Maine at the turn of the century. In 1941, Aldous and Mendall reported that bobcats were common or abundant in Maine except in the more developed southwest coastal areas. From 1939 to 1973 there was a shift in the distribution of bounty payments (and presumably numbers of bobcats) from northern sections to central and eastern portions. Currently there is concern that bobcat populations have declined since the 1950's, particularly in northern Maine, although this opinion is not held universally.

Use and Demand Trends

Bobcats are taken by trapping and hunting. The latter is primarily done with hounds. Season length and pelt prices have varied considerably (Table 1).

There is no direct measure of hunter or trapper effort either for the number of people who participate or total effort (e.g. hunter-days or trap-nights). Harvest trends have tended to follow pelt price, probably because trapper effort increase when prices increase by a great deal as they did during the late 1970's. Snow conditions affect hunters and local effort may vary with snow conditions as hunters search for the best hunting conditions. However, there are several factors that may effect effort more than the price of bobcat pelts. Because bobcats are one of the less common furbearers, the price of fox, coyote, marten, raccoon, and fisher are probably more important in

Table 1. Bobcat management history.

Year	Estimated harvest[1]	Number trappers[2]	Number hunters[3]	Estimated average price[1]	Statutes and regulations	
					Trapping	Hunting
1955	588	-	-	0.17	No closed season	No closed season
1956	810	-	-	0.17	$15 bounty	$15 bounty
1957	695	-	-	1.00		
1958	614	-	-	0.60		
1959	-	-	-	1.00		
1960	844	-	-	1.81		
1961	790	-	-	-		
1962	811	-	-	3.35		
1963	768	-	-	1.81		
1964	1,199	-	-	2.78		
1965	764	-	-	8.74		
1966	642	-	-	5.50		
1967	784	-	-	5.79		
1968	552	-	-	10.80		
1969	594	-	-	8.17		
1970	730	280	-	9.88		
1971	654	281	-	11.78		
1972	641	331	-	17.58	Satutory provision repealed and replaced by regulation.	
1973	519	431	-	36.00	No closed season	No closed season
1974	610	548	-	26.10	$15 bounty	$15 bounty
1975	-	573	-	55.90	Bounty repealed - no closed season	
1976	437[5]	569	142-?	82.10	October 20-December 15	October 20-end of February
1977	399[5]	669	138-919	54.50		Unit 6 closed on 1/12/78
1978	278[5]	714	85-840	131.35	WMU 1-6 Oct. 20-Nov. 25 WMU 7-8 Oct. 25-Nov. 15	October 20-end of February
1979	318[5]	823	85-1,096	-[6]	WMU 1-3, 5-6 Oct.20-Nov. 25 WMU 4,7,8 Oct. 25-Nov. 10	December 1-February 28
1980	381[5]	954	100-970	-[6]	WMU 1-3 Oct. 20-Nov. 30 WMU 4-8 Oct. 28-Nov. 30	December 1-February 27
1981	345[5]	907	85-1,204	124.00[4]		December 1-February 28
1982	311[5]	976	88-1,037	81.50[4]	WMU 1-2 Oct. 20-Nov. 30 WMU 3-8 Oct. 28-Nov. 30	December 1-February 28
1983	248[5]	886	69-699	65.05	WMU 1-2 Oct. 20-Dec. 4 WMU 3-8 Oct. 28-Dec. 4	December 1-February 29
1984	273[5]	813	101-893	69.37	WMU 1-2 Oct. 28-Dec. 15 WMU 3-8 Oct. 28-Dec. 4	December 1-February 28

[1]Trapper questionnaire

[2]Percent of trappers who set a trap for bobcat in 1980 x licensed trappers

[3]x successful bobcat and raccoon hunters

[4]Export permits were delayed by court actions

[5]Pelt tagging records

[6]Pelt prices are not available but were high.

determining trapper behavior than the price of bobcats. Bobcat hunting is done as much or more for the sporting or trophy value as for the fur so small changes in pelt price probably do not affect effort very much.

Harvest Regulations

Bounties were paid for bobcats in Maine from 1897-1900 and from 1909 to 1975, and there was no closed season (Table 1). Beginning in 1976, separate hunting and trapping seasons were established on the species. Hunting seasons ran from late October to the end of February from 1976-1978. Since 1979, the season has been shortened, running from December 1 to the end of February. Although opening and closing dates varied slightly, the bobcat trapping season has generally run from late October to late November or early December since 1976.

Because the trade in bobcat pelts is largely dependent on fur garment makers in Europe, federal regulations concerning the export of bobcat pelts from the United States have had a substantial impact on Maine's bobcat harvest regulations. In 1977, an international trade agreement required the Department of Inland Fisheries and Wildlife (MDIFW) to monitor the supply and demand conditions for bobcat annually. After review of these assessments, a quota of federal export permits for Maine-caught bobcats was issued by the Endangered Species Scientific Authority (ESSA).

The MDIFW began monitoring harvests more closely in 1977, instituting a 72-hour pelt tagging requirement and a weekly harvest reporting system during the bobcat hunting season. When established harvest quotas of 400 were approached during the 1977-78 season, the commissioner of MDIFW closed the hunting season on January

12, 1978 in WMU 6. A series of federal court actions resulted in no export permits being issued for Maine bobcats from late 1979 through early 1983, although they have been issued annually since then.

Harvest Trends

Mail questionnaires and bounty records provided the only records of bobcat harvests from 1955 to 1975. They indicate that bobcat harvests during this period ranged from 500-1,200 animals (Table 1). Since 1976, all Maine bobcat pelts must be tagged by the MDIFW before they can be sold. This requirement has produced accurate harvest estimates for the last 9 years. Harvests have ranged from 248 to 437 bobcats during the period, but have declined since 1980 (Table 1).

Users

Bobcat have been hunted with hounds since colonial times but there have never been very many bobcat hunters (Moulton 1968). Bobcat may also be shot incidentally to other game. Bobcat are captured in traps set primarily for other land animals as well as for those set specifically for bobcat.

Past Management Goals

The objective harvest of 400 bobcats was not reached during the 1980's (Table 2).

Table 2. Comparison of bobcat harvest and species plan objective harvest.

Year	Objective harvest	Harvest	Percent deviation
1980	400	381	- 5
1981	400	345	-14
1982	400	311	-22
1983	400	248	-38
1984	400	273	-32

HABITAT ASSESSMENT

Statewide

Status

All of Maine's 27,420 mi2 of forestland could potentially provide habitat for bobcat. Sites with seedling and sapling growth provide food for prey species (hare and deer) and hunting cover for bobcat. A patchy understory seems to be preferred by bobcats, probably because it improves hunting success (Litvaitus 1984). The bobcat is found in a wide variety of cover types throughout North America; factors other than habitat type are believed to be important in determining the suitability of an area for bobcat. The abundance of prey animals is a likely factor. Major prey items in Maine are deer and hare. Hare are of greater importance, because all bobcat use this species; deer are rarely taken except by large male bobcats.

Competition with other predators is also likely to affect the availability of prey and carrion. Major (1983) found no evidence that coyotes actively excluded bobcats. However, the food habits of these two species are similar, and the presence of this additional predator probably reduces the availability of food for bobcats. In addition, coyotes have been implicated in the western states as a cause for low bobcat densities (Robinson and Grand 1958). Regional Wildlife Biologists report that hare populations are low to moderate in much of the State, but most believe that numbers are increasing or stable.

In Maine, the bobcat is near the northern limit of its range. Low temperatures increase the amount of food needed and deep loose snow may make it difficult for bobcats to travel and hunt.

The quality of Maine's bobcat habitat was assessed by applying measures of understory density and patchiness (the mixture of dense and open understory) from the Maine Forest Resurvey (U.S. Forest Service, 1982) and winter severity indices based on temperature and snow depth from the MDIFW to a Habitat Suitability Index (HSI) model (Table 3). The HSI model numerically evaluates an areals suitability for bobcat based on measurable biological and physical characteristics. While the model is useful for making general evaluations and comparisons of areas for bobcat, it presents a rather gross and insensitive approximation of the complexities of habitat suitability.

The number of habitat units present in each WMU was obtained by multiplying its HSI by the amount of bobcat habitat. One habitat unit represents 1 mi2 of prime bobcat habitat.

Changes

In 1980, the total amount of bobcat habitat was estimated to be 26,480 mi^2. The increase to 27,334 is due to a slight increase in the amount of forestland. The predicted increase in quality of bobcat habitat due to more intensive forest management appears to be beginning. According to forest resurvey data (U. S. Forest Service 1982), a mean of 163,459 acres was cut annually in the 1-3 years preceding the sampling, while only 101,070 acres were cut annually 3-10 years prior to sampling. Most regional biologists report rising or stable hare populations in their areas.

Table 3. Current (1985) habitat suitability for bobcats in Maine.

Wildlife Management Unit	Total area (mi^2)	Habitat area (mi^2)	Habitat suitability (HSI value)	Habitat units
1	3,216	2,405	0.19	457
2	8,397	7,894	0.18	1,421
3	4,234	3,864	0.25	966
4	5,726	4,804	0.42	2,018
5	2,949	2,582	0.65	1,678
6	2,610	2,181	0.75	1,636
7	2,113	1,582	0.64	1,012
8	2,825	2,022	0.59	1,193

Projections

Increased amounts of clear-cutting should reverse the downward trend in the amount of hare cover and improve conditions for bobcats. Hare numbers are reported to be increasing in many places, therefore food for bobcats should increase during the next few years but may decline by 1990 (Cross 1985). Future HSI's were calculated by assuming that understory density would increase in areas with increased clear-cutting (Table 4).

Wildlife Management Units

Status

The availability of hare cover varies considerably throughout the State. Estimated hare densities (Cross 1985) are also variable. Units 5 and 6 have the densest understories and fall hare densities are estimated to be 380/mi2 of habitat in WMU 5 and 161/Mi2 of habitat in WMU 6. units 4, 7, and 8 have the lowest values for stem cover units and the number of hare/Mi2 of habitat is reported to be 262, 252, and 138 in WMU's 4, 7, and 8 respectively. Units 1, 2, and 3 have intermediate amounts of understory cover with estimated fall hare densities of 360, 424, and 261 per Mi2 of habitat.

Winter conditions vary greatly, but the most severe conditions occur in WMU's 1, 2, and 3 and mildest conditions along the coast. Units 1, 7, and 8 have less forestland than the others while Units 2 and 3 have the most. All Units are primarily (at least 72%) forested, however.

Table 4. Future (1990) habitat suitability for bobcats in Maine.

Wildlife Management Unit	Total area (mi^2)	Habitat area (mi^2)	Habitat suitability (HSI value)	Habitat units
1	3,216	2,405	0.26	626
2	8,397	7,894	0.18	1,421
3	4,234	3,864	0.25	966
4	5,726	4,804	0.53	2,536
5	2,949	2,582	0.78	2,021
6	2,610	2,181	0.84	1,826
7	2,113	1,582	0.63	997
8	2,825	2,022	0.61	1,240

According to the HSI values, Unit 6 is the best bobcat area in the State. Bobcat harvest records and general observations of bobcat tend to support this in spite of reports of low hare numbers. The low HSI values for WMU's 1-3 are primarily due to the severe winters that can be expected to occur periodically.

Changes

There has been little change in the amount of cutting (and, therefore, young stands) in WMU's 2 and 3 in recent years. Cutting has declined slightly in Unit 7 and increased in the remaining 5 units. Regional staff report that hare are increasing in Units 1, 2, 3, and 5; stable to increasing in Units 4 and 6; stable in Unit 8 and stable to declining in Unit 7.

Projections

The trends outlined in the previous paragraph are expected to continue for the next few years. By 1990 hares were projected to be more abundant in WMU's 3, 6, and 8 and about the same in WKU , s 4 and 7. It is expected that the number of hare in WMU's 1, 2, and 5 will have declined (Cross 1985).

POPULATION ASSESSMENT - CARRYING CAPACITY

Statewide

Status

The number of bobcats an area can support is primarily determined by the amount and availability of prey. Social interactions may also be a factor, but the small territories reported in southern states (Kitchings and Story 1981, Buie 1980) compared to the relatively large home ranges reported in Maine and other northern areas (Berg 1981, May 1981), suggests that this is not a factor in Maine.

The maximum supportable winter population for the state (Table 5) was estimated to be about 3,460 bobcats by the following formula:

$$P = \frac{4H}{A}$$

where P = maximum supportable population

H = habitat units (1 habitat unit = 1 square mile of prime habitat)

A = mean area of female territories (12 mi^2)

4 = estimated number of bobcats/territory
(1 resident female + 1 resident male +
2 kittens and/or transients)

The statewide carrying capacity was calculated by summing the carrying capacities for the individual WMU's (Table 5).

Table 5. Current (1985) and projected (1990) maximum supportable winter bobcat population by WMU.

Wildlife Management Unit	1985 maximum supportable population		1990 projected maximum supportable population	
	Range	Best guess	Range	Best guess
1	100 - 200	150	150 - 250	200
2	200 - 700	470	200 - 700	470
3	200 - 400	320	200 - 400	320
4	400 - 900	670	500 -1,000	840
5	400 - 700	560	500 - 800	670
6	450 - 600	540	500 - 700	600
7	20 - 400	350	20 - 400	330
8	20 - 400	350	20 - 400	350
Statewide	1,790-4,300	3,400	2,190-4,650	3,800

Changes

Because the maximum number of bobcats that the habitat could support was not estimated for the 1980 species assessment update, no comparisons with current estimates are possible.

Projections

Cutting practices and assessments of changes in the number of hare by regional biologists suggest that the number of bobcat the State can support may increase (Table 5).

Wildlife Management Units

Status

The carrying capacity was calculated for each WMU. WMU's 4, 5,and 6 have the highest carrying capacities while WMU 1 has the lowest (Table 5).

Changes

The maximum number of bobcats that the habitat of each WMU could support was not calculated for either of the previous updates.

Projections

The maximum supportable population is expected to increase in WMU'1 1, 4, 5, 6, and 8; decrease in WMU 7 and remain constant in WMU's 2 and 3 (Table 5).

Table 6. Current (1985) and projected (1990) fall bobcat population estimates.

Wildlife Management Unit	1985 estimated population		1990 estimated population	
	Range	Best guess	Range	Best guess
1	70 - 150	110	70 - 150	100
2	60 - 450	250	60 - 450	250
3	170 - 310	240	170 - 310	220
4	170 - 650	410	170 - 650	410
5	200 - 540	370	200 - 540	370
6	360 - 520	440	360 - 520	440
7	15 - 30	15	15 - 30	15
8	20 - 40	20	20 - 40	20
Statewide	1,030-2,690	1,855	1,030-2,690	1,825

POPULATION ASSESSMENT - CURRENT ESTIMATED POPULATION

Statewide

Status

Bobcats are secretive animals and reliable population estimates are difficult to obtain. A minimum preseason population estimate of 1,030 was calculated by multiplying the recent 4-year mean harvest by 3 because it was assumed that precipitous population decline would occur if the harvest exceeded 1/3 of the population. Maximum fall population estimates were derived in a variety of ways, described in the WMU section, but are based to some extent on the mean home range size of female bobcats (Litvaitus 1984) and the assumption of an even sex ratio and 1 kitten per resident female. Placental scar counts of 1 for yearlings and 1.9 for adults (MDIFW 1984) suggest this may be a low estimate, but some kitten mortality is assumed. Of 21 adult and yearling animals monitored for long enough to determine home range by Litvaitus (1984) 3 appeared to be transients. In addition, there is undoubtedly some forest area that is not used by bobcats. The preseason population probably does not exceed 2,690 (Table 6).

There is general agreement that bobcat populations have declined since the 1950's and 60's. The harvest has tended to decline in recent years but attempts to relate this to population trends are confounded by changes in pelt price, season length, and export status. The decline in take by trappers (in spite of extremely high prices and no limit on exports in 1980 and continued decline after the ban on the export of bobcat pelts was lifted) suggest a population decline. In addition, the number of bobcats taken

per 1,000 successful land trappers has declined slightly since 1980. However, trappers appear to be concentrating more on marten and fisher then they did in the past and these sets are less likely to take a bobcat. The number of bobcats taken by hunters has followed pelt price; it declined from 1980 to 1983 and increased very slightly in 1984. The greater mobility of hunters, their long-term commitment of traini ng and maintaining hounds and the recreation value of bobcat hunting may make hunters less likely to turn to other species when bobcats become scarce. Therefore, relatively high kills by hunters might continue in spite of declining populations, especially if high pelt prices give an added incentive.

Changes

In 1980, Maine's current and projected bobcat populations were estimated to be 2,553. This is within the range of current estimates. Both are below the 1975 estimate of 4,000 animals.

Projections

Based on recent declines in harvest the population may Se expected to decline slightly assuming no changes in regulations. However, the expected increase in habitat conditions and the number of hares in much of the better bobcat range may offset this, and populations will probably remain about the same (Table 6).

Wildlife Management Units

Status

WMU's 7 and 8 have had very low harvests in spite of a high number of resident hunters and trappers. Furthermore, harvests in these WMU's have shown no tendency to fluctuate with pelt price. This suggests that the population is very low. The population is assumed to be near the minimum estimate (Table 6).

The number of bobcats in WMU 6 was estimated assuming that all areas were occupied and there were no transient animals. Neither of these assumptions is correct; but there is no measure of either, and they will partially cancel each other. Based on hunter and trapper success and apparent habitat suitability, this Unit is believed to have the densest bobcat populations in the State. Maximum population estimates for WMU's 1-5 were calculated by the following formula, it was assumed that there was one adult male and one kitten for each female.

$$Max.pop. = \frac{Habitatarea}{Averagefemale\,\mathrm{hom}\,erangesize} X\,3 \frac{HSIWMUX}{HSIWMU\,6}$$

Changes

Current population estimates for Units 1 and 2 are less than half the 1980 estimates. The decline from 228 to 100 in Unit 1 and 510 to 250 in Unit 2 reflect declining catch which was used to estimate the minimum population. The catch may have declined because trappers are putting most of their effort into fisher and marten, however. The kill in WMU's 1, 2, and 3 did not increase in 1984 when pelt prices increased; however, the change in pelt price was so small that it probably had little effect.

Projections

The kill in WMU's 4, 5, and 6 has continued to track pelt price and the population in these WMU's is likely to remain stable (Table 6). Units 7 and 8 will probably continue to have very few bobcats. The populations in Units 1, 2, and 3 are likely to be affected by winter conditions.

Population Characteristics

Maine's bobcat population has been monitored through research studies and harvest records.

Sex and age structure. During the 1980 to 1983 seasons 415 bobcat were aged. Thirty-five percent were less than a year old, 26% were yearlings, and 40% were adults. The sex ratio was nearly even for all age groups.

Net production. **Additions**. Litter size was determined to be 1 for yearlings and 1.9 for adults by counting placental scars in the uterus. Based on the sex and age ratios above, there are 130-350 yearling females and 200-540 adult females among the estimated 1,030-2,690 bobcats. They could produce 520-1,370 kittens per year, but harvest statistics suggest that only 360-940 kittens are alive by the trapping and hunting seasons.

Removals. Hunting, trapping and road kills (3) accounted for 7 of 9 mortalities among radio-collared bobcat in WMU 3 (Major 1983). Because pelt prices have been high in recent years it is likely that many road-killed animals are tagged so that the pelt

can be sold . Based on this information, the total annual mortality is estimated to be between 390 (assuming road kills are tagged) and 474 (assuming that road kills are not tagged).

Net growth. The estimates of recruitment and mortality are based on very limited information, and it is not possible to determine if the population is likely to increase, decrease or remain the same.

POPULATION ASSESSMENT – RELATIONSHIP OF CURRENT ESTIMATED POPULATION TO MAXIMUM SUPPORTABLE POPULATION

Maine's estimated bobcat population (1,855 fall and 1,500 winter) is about half of our estimate of the State's maximum supportable population of 3,460.

USE AND DEMAND ASSESSMENT - HARVEST

Statewide

Status

Bobcats may be hunted from the first of December through the end of February. The trapping season is set primarily to control the harvest of fisher and marten, and prior to 1984 varied annually, usually opening in late October and closing from mid-November to mid-December, with northern units open for about a week longer than southern units (Table 1). In 1984, statewide opening date was adopted. The recent four-year average harvest is 305 animals and has ranged from - 248 to 381 since 1980. More bobcats are taken by hunting (x = 149) than trapping (x = 115) (Tables 7a, 7b and 7c). There are no bag limits but pelts must be tagged within 72 hours and the season can be closed if the harvest exceeds the objective harvest of 400.

Changes

The number of bobcats harvested declined rapidly from 19-/b-1978. The 1980 assessment projected that this trend would continue but it did not. Pelt prices rose dramatically after this 3-year period, and probably caused an increase in harvest pressure on bobcats, and an increase in the number harvested in 1979 and 1980. Since 1980 the hunting regulations have remained constant and trapping seasons have lengthened slightly. During this time both harvest and pelt price declined until 1984 when pelt price, hunter harvest, and total harvest increased slightly but trapper harvest continued to decline.

Table 7a. Present harvest, effort and success rate of bobcat hunters based on recent 4 year averages, 1981-1984.

Wildlife Management Unit	Number shot	Number of hunters Mean	Number of hunters range	Number successful hunters	Percent successful	Hunters per 1,000 mi^2
1	7	22	4- 40	4	18	7
2	6	4	3- 4	3	75	< 1
3	15	18	8- 29	10	56	4
4	24	204	17-392	18	9	36
5	41	40	17- 62	17	42	14
6	63	62	30- 93	28	45	24
7	4	104	4-203	3	3	49
8	4	78	3-154	3	4	28
Statewide	164	532	86-978	86	16	17

Table 7b. Present harvest, effort and success rate of bobcat trappers based on recent 4-year averages, 1981-1984.

Wildlife Management Unit	Number trapped	Number[1] of trappers	Number successful trappers	Percent successful	Trappers per 1,000 mi^2
1	8	102	7	7	32
2	8	95	5	5	11
3	12	62	11	18	15
4	22	242	18	7	42
5	17	61	15	56	21
6	42	73	25	34	28
7	2	113	1	1	53
8	4	149	3	2	53
Statewide	115	887	85	10	28

[1]Number of licensed trappers x .17 partitioned to WMU's by percentage of successful land trappers in each unit.

Table 7c. Present, actual, and maximum allowable bobcat harvest.

Wildlife Management Unit	Total harvest	Maximum allowable harvest
1	15	25
2	14	60
3	27	60
4	46	100
5	58	90
6	105	110
7	6	4
8	6	5
Statewide	279	460

Projections

If current harvest trends continue, the harvest can be expected to decline slightly with trapping accounting for most of the decline. Pelt prices, harvest regulations, hunting conditions and numbers of bobcats are all expected to impact harvest size (Tables 8a, 8b and 8c). However, the trophy value of bobcat will probably keep the kill by hunters relatively high and the pelt prices of the more common furbearers may have more effect on the activities of trappers than the price of bobcat.

Wildlife Management Units

Status

WMU 6 has the largest harvest of bobcats foll wed by Units 5, 4, and 3. Few bobcat are harvested in the remaining Units (Tables 7a and 7b).

Changes

The 1980 bobcat species assessment predicted that no bobcats would be harvested in WMU's 4, 6, and 7 in 1982 but actual harvests were 52, 109, and 5 respectively (recent 4 year average). Predicted harvests were too high (38 compared to 13) for WMU 2 and too low for WMU's 3 (13 compared to 24) and 5 (36 compared to 57). The predictions for Units 1 and 8 were reasonably close (20 predicted compared to 25 actual and 11 predicted compared to 13 actual).

Projections

The projected harvests are based on recent trends for each WMU (Tables 8a and 8b).

The trapper harvests for WMU's 7 and 8 have remained at low levels with no obvious trends; and no changes are anticipated. Trapper take has tended to decline in WMU's 3, and 6 and is likely to continue due to declines in pelt prices. The lowest trapper harvest in the past 3 years was used to project future harvests in these WMU'S; continued declines in pelt price cannot be predicted and habitat quality and populations are expected to remain stable (WMU 3) or increase slightly (WMU 6) so a continued decline may be averted. The trapper take in the remaining units have not shown any consistent trends during the 1980's and are expected to remain near current levels.

The hunter harvest in WMU's 7 and 8 are expected to remain at the current low levels. Hunter harvests in WMU's 1, 2, 4, 5, and 6 declined until 1984 and then increased with pelt price (Table 1). Because of this apparent reversal of the downward trend, current harvest levels are used as the projections.- Hunter harvests in WMU 3 have tended to increase since 1980 and the most recent (highest) harvest was used as a projection.

USE AND DEMAND ASSESSMENT - TYPES OF USERS

Statewide

Status

Bobcats are both hunted and trapped. There is no direct measure of the number of people who participate in either hunting or trapping bobcat but several indirect measures are available.

Bobcat and raccoon hunting are usually done with hounds, and the same dogs are often used for both species. At least as many people who tag a bobcat must hunt them, and every houndsman is a potential bobcat hunter. The number of hunters who tag a raccoon is used to estimate the upper number of bobcat hunters, and the numbers who tagged a bobcat was used as the lower limit. The mean was used to estimate the number of bobcat hunters (Table 8a). Eighteen percent of Maine trappers surveyed by Clark in 1980 (1985) reported that bobcat were among the 3 most preferred species of upland furbearers, and 17% reported setting a trap specifically for bobcat. The number of bobcat trappers is estimated to be 17% of total license sales, although sets made for other furbearers commonly take bobcat. The number of sets made specifically for bobcat probably varies from year to year. Interest in harvesting bobcat was probably higher in 1980, than in the years since. Pelt prices were high then, and there were no restrictions on the export of pelts.

Table 8a. Projected 1990 bobcat harvest, effort and success rates of bobcat hunters.

Wildlife Management Unit	Number shot	Estimated number of users	Successful users	Percent successful	Users/ 1,000 mi²
1	7[1]	22	4	18	7
2	6[1]	4	3[2]	75	< 1
3	22[2]	18	16[2]	89	4
4	24[3]	204	18	9	36
5	41[3]	40	17	42	14
6	63[3]	62	28	45	24
7	4[1]	104	3	3	49
8	4[1]	78	3	4	28
Statewide	171	532	92	17	17

[1]Has remained fairly stable - used recent 4-year average (1981-1984).

[2]Has shown continued increase since 1980 - used highest recent 4 year value.

[3]Has tracked pelt price in recent years - expected to vary with price - recent 4-year average used as estimate.

Table 8b. Projected 1990 bobcat harvest effort and success of bobcat trappers.

Wildlife Management Unit	Number Trapped	Estimated number of users	Successful users	Percent successful	Users/ 1,000 mi²
1	8[1]	102	7	7	32
2	8[1]	95	5	5	11
3	9[2]	62	11	18	15
4	22[1]	242	18	7	42
5	17[1]	61	15	25	21
6	34[2]	73	19	26	28
7	2[1]	113	1	1	53
8	4[1]	149	3	2	53
Statewide	104	887	83	9	28

[1]There has been no obvious trend over the past 5 years and the recent 4 year average is used.

[2]There appears to be a decline - lowest of last 3 years.

Table 8c. 1990 projected and maximum allowable bobcat harvest.

Wildlife Management Unit	Projected harvest	Maximum allowable harvest
1	15	25
2	14	60
3	31	55
4	46	100
5	58	90
6	97	110
7	6	4
8	8	5
Statewide	275	435

Changes

The total number of users was not projected in the last 2 updates. Therefore changes in use cannot be discussed.

Projections

Recent trends in the estimated number of users has paralleled pelt prices since the mid 1970's. Although there will always be some people who pursue bobcats primarily for sport, the number of people who hunt or trap bobcats and the amount of time each spends, will probably be affected by major changes in pelt prices. Pelt prices increased slightly from 1983 to 1984, but they are still lower than in 1980. Unless pelt prices increase dramatically, the number of users will probably remain near to what it has been in the past few years (Table 9).

Wildlife Management Units

Status

The low estimated hunter success rates for WMU's 4, 7, and 8 are probably due to a combination of 2 factors (Table 7a). First, the bobcat is relatively rare in these areas and hunter success probably is lower than in other WMU'S. Second, the estimate of the number of hunters was based, in part, on the number of successful raccoon hunters. Few of these houndsmen are likely to make much effort to hunt the bobcat in these WMU's where it is relatively rare. The very high success rate in WMU 2 is likely due to hunter behavior. Few people live in WMU 2 and hunters are likely to be hunting far from home. Because it is unlikely that many people would travel very far for

Table 9. Past, present, and estimated future harvest (actual, allowable, and objective) and users (total and successful).

	Harvest			Users			
				Total		Successful	
Year	Actual	Maximum allowable	Objective	Trapper	Hunter	Trapper	Hunter
1971	654	unknown	1	280	---	---	---
1972	641	"	1	281	---	---	---
1973	519	"	1	331	---	---	---
1974	610	"	1	431	---	---	---
1975	---	1,054	1,000	548	---	---	---
1976	437	"	1,000	573	142-	93	142
1977	399	"	1,000	569	138- 919	108	138
1978	278	"	1,000	669	85- 840	100	85
1979	318	"	1,000	714	85-1,096	103	85
1980	385	638	400	823	100- 970	115	100
1981	345	"	400	954	85-1,204	105	85
1982	311	"	400	907	88-1,037	88	88
1983	248	"	400	921	69- 699	73	69
1984	273	"	400	837	101- 893	77	101
1985	279	460		813			
1990	275	435		887	70-1,200	83	92

[1]Bountied - assume as many as possible.

a chance to hunt raccoon, most hunters in this Unit are likely to be serious bobcat hunters.

Changes

The total number of users was not projected by WMU in the last update. Therefore, changes in use cannot be discussed.

Projections

No changes in hunter or trapper numbers are predicted on the WMU basis although some variation in hunter distribution is probably because hunters will go where snow conditions are best for running hounds.

SUMMARY AND CONCLUSIONS

Until 1975 the bobcat was regarded as an undesirable predator and bounties were paid for it. However, the bobcat is now valued as a game species and forbearer, and more people appreciate predators for their intrinsic and aesthetic values than in the past. There is now mandatory tagging of bobcat pelts and the season can be closed (as it was in 1978) when the kill reaches the objective level.

In Maine, bobcat are at the northern edge of their range and may be adversely affected by severe winters. The historical record indicates that the abundance and distribution of bobcat in Maine has varied considerably over the past 2 centuries. These changes roughly coincided with climatic and habitat changes.

The last 10 to 15 years have not been favorable for the bobcat. The addition of the coyote to Maine's fauna has no doubt increased competition for hare, other prey, and carrion, and may be at least partially responsible for the decline in bobcat. High pelt prices probably increased the hunting and trapping pressure on this species in the late 1970's and early 1980's. In addition, Maine's forests matured during the 1970's, reducing the amount of young stands that provide food for prey and hunting cover for bobcats and there were several hard winters during the 1970's. Many observers including trappers and regional biologists, feel that the number of bobcat is lower than in the 1950's and 60's. Attempts to evaluate bobcat populations from harvest data are confounded by changes in season length, export status, and the price of the pelts of bobcat and other furbearers.

The number of bobcat is currently below carrying capacity. The increased amount of clear-cutting is expected to improve conditions for hare and therefore for bobcat. However, it will also continue to improve access and make the hunting and trapping of bobcat more efficient.

LITERATURE CITED

Aidous, C. M., and H. L. Mendall. 1941. The status of big game and fur animals in Maine. Maine Coop. Wildl. Res. Unit. Mimeo.

Bailey, T. N. 1974. Social organization in a bobcat population. J. Wildl. Manage. 38:435-446.

Berg, W. E. 1981. Ecology of bobcats in Minnesota. Pages 55-61 *in* Proc. Bobcat Res. Conf. -- Current Research on Biology-and management of Lynx rufus. Nat. Wildl. Fed. Sci. and Tech. Ser. No. 6. 137pp.

Buie, D. E. 1980. Seasonal home range and movement patterns of the bobcat on the Savannah River Plant. M. S. Thesis, Clemson Univ., Clemson, SC. 68pp.

Clark, A. G. 1985. Characteristics of trappers in Maine. M. S. thesis, Virginia Polytechnic Institute and State University, Blacksburg. 149 pp.

Cross, R. 1985. Hare assessment. Maine Dept. Inland Fisheries and Wildlife. In progress.

Gustafsen, K. A. 1984. The winter metabolism and bioenergetics of the bobcat in New York. M.S. Thesis, State Univ. New York, Syracuse. 112pp.

Hardy, M. 1907. As cited in Hunt 1980.

Hunt, J. 1980. Bobcat Management Plan. Pages in Planning for Maine's Inland Fish and Wildlife, Vol. IV, Upland Furbearers. Maine Dept. of Inland Fisheries and Wildlife, Augusta. pp.

Kitchings, J. T., and J. D. Story. 1981. Home range and diet of bobcats in eastern Tennessee. Pages 47-52 in Proc. Bobcat Res. Conf. -- Current research on biology and management of Lvnx rufus. Nat. Wildl. Fed. Sci. & Tech. Ser. No. 6. 37pp.

Litvaitus, J. A. 1984. Bobcat movements in relation to prey density. Ph.D. Thesis. University of Maine, Orono. 103pp.

Maine Dept. Inland Fisheries and Wildlife. 1984. Annual Performance Report Appendix. Small Game-Furbearer Project, Jobs 106 and 129, W-69-R-15.

Major, J. T. 1983. Ecology and interspecific relationships of coyotes, bobcats and red foxes in western Maine. Ph.D. Thesis. University of Maine, Orono. 64pp.

May, D. W. 1981. Habitat utilization by bobcats in eastern Maine. M.S. Thesis, University of Maine, Orono, Maine 36pp.

McCord, C. M. 1974. Selection of winter habitat by bobcats on the Quabbin Reservation, Massachusetts. J. Mammal. 55:428-437.

McCord, C. M., and J. E. Cardoza. 1982. Bobcat and lynx. Pages 728-766 In J. A. Chapman and G. A. Feldhamer (eds). Wild Mammals of North America. John Hopkins Univ. Press, Baltimore, MD.

Moulton, V. L. 1968. Why bounty bobcats? Maine Fish and Game. Winter 1969.

Petraborg, W. H. and V. E. Gunvalson. 1962. Observations on bobcat mortality and bobcat predation on deer. J. Mammal. 43:430-431.

Robinson, W. B., and E. F. Grand. 1958. Comparative movements of bobcats and coyotes as disclosed by tagging. J. Wildl. Manage. 22:117-122.

U. S Forest Service. 1982. 1980 Maine Forest Resurvey. Northeastern Forest Experiment Station, U. S. Forest Service, Broomall, PA.

BOBCAT MANAGEMENT GOAL AND OBJECTIVES
1985-1990

GOAL: Maintain bobcat populations at no lower than current levels and maintain user opportunity.

OBJECTIVES

Abundance: Maintain fall bobcat population at no lower than current levels (estimated at approximately 1,850) through 1990.

Use: Maintain current hunting and trapping opportunity (season length and timing) through 1990 as long as abundance objective is met.

Capability of Habitat: The habitat is capable of supporting bobcat densities at 1985 levels.

Feasibility: It may not be possible to meet the abundance objective annually because of the impact of severe winters on bobcat. Several severe winters in a row are likely to reduce the bobcat population.

Desirability: These objectives will have both desirable and undesirable aspects for hunters and trappers. While it is expected to maintain opportunity to pursue bobcats in most years, it could result in hunting season closures if the kill increases by a large amount and/or the population appears to decline. Most people are expected to support maintaining the number of bobcat at at least their present numbers.

Possible Consequences: Because some people regard the bobcat as rare(or even threatened) lack of a strong effort to reduce the kill could result in adverse public opinion. Season closures (if required) are likely to be unpopular.

Summary of Working Group Concerns

BOBCAT

Habitat

1. Habitat has a big effect on bobcats - thinning thickets reduces rabbit population.

Population

1. Population in northern Maine has declined over the last 15 years. Estimates in our assessment are too high.

2. Coyotes compete with bobcats - eat food previously available to cats.

3. Fisher may prey on bobcat kittens.

4. More than 1 think effects bobcat populations: Winter, harvesting, predation, habitat, food.

5. Need more information on population - concerned that our estimates are not good. Our population estimates should be improved.

Harvest/Use Opportunity

1. Changes in harvest over last 10 years do not necessarily reflect changes in populations (other factors influence harvest; e.g., season length, pelt values, weather, etc.)

2. Concerned with using a limit or shortening hunting season. Hunting season changes have already been made.

Bobcat Problems and Strategies in Order of Priority

Problem 1: Lack of information on the size and dynamics of bobcat populations.

- **Strategy 1:** Develop and implement a system to monitor bobcat populations on a WMU basis.

Problem 2: Lack of information on the major factors affecting net productivity.

- **Strategy 1:** Determine the relationship between winter conditions and bobcat survival and recruitment.
- **Strategy 2:** Develop and implement a method to monitor winter conditions and predict when (if) bobcat numbers can be expected to decline.
- **Strategy 3:** Determine impact of coyote numbers on bobcat populations.

Problem 3: Lack of information on' the quantity and quality of bobcat habitat on a WMU basis.

- **Strategy 1:** Evaluate the existing model for measuring habitat and estimating carrying capacity.

Problem 4: Opposition to consumptive use of bobcats by non-consumptive users.

- **Strategy 1:** Develop programs to minimize the conflicts and concerns of nonconsumptive users and maintain use opportunity.