BEAVER ASSESSMENT

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BY

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NATURAL HISTORY

The beaver has occurred in Maine, probably in relative abundance, for centuries. The beneficial impact of the formation, decline, and reformation of beaver flowages on other wildlife and the general productivity of the environment is far-reaching, and long-lasting, and readily apparent throughout the State. The benefits come from the development of new vegetation and soil conditions. Low-growing shrubs appear around a new pond and serve as food for deer and small mammals; earthworms increase and provide food for woodcock; grouse (partridge) and many nongame birds feed on the fruit- and nut-bearing shrubs; raccoon, mink, and otter thrive on the fish and invertebrates; and waterfowl are provided vital nesting and brood-rearing sites. As a beaver colony utilizes the available food supply and moves on, the dams breach, the pond flows out and the exposed bottom is revitalized. The process may be likened to a natural environmental cultivation.

There are also some unfavorable features imposed by habitat created by beavers. For instance, warmer water temperatures resulting from slower flowing streams could affect fish habitat, or the beaver dam may interfere with the migration of spawning fish. Valuable timber could be destroyed; and roads might be flooded. However, on the average, the benefits of beaver ponds far outweigh their faults.

Unexploited beaver colonies usually consist of relatively stable family units, with the adult male and female remaining lifelong mates. Beaver usually mate when they are two years old. New pairs form during the summer and establish a home in the fall. They build a den of sticks and mud or excavate a bank den, and build a brush pile

under water for winter food. If there is no existing pond, the newly formed beaver pair will create a pond by building a dam in flowing water.

Many ponds and dams appearing for the first time are built by newly paired beavers that may have travelled a substantial distance. New colonies may or may not be near an already established colony. The colony does not contain a full family complement until the second fall after its establishment.

During the period from mid-winter to early spring, adult beaver in Maine average 40 pounds in weight. In the same period, kits average 17 pounds and yearlings, 24 pounds.

Beavers breed in February, and the single litter of 2 to 3 "kits" (4 is the average), is born in late May. The female beaver remains near the den and tends her young, while the male travels more. Soon after ice out the male beaver starts to roam, returning to the home pond only infrequently during the summer. As summer progresses the male returns more often, and by fall he helps the female gather brush for the winter food supply and for repairs to the house and dam.

During the second summer of travel, the male is often accompanied by the young of the previous year. These yearlings return with him and take part in the fall preparations. In the next spring, as two-year-olds they travel with the male again along with a new set of yearlings. However, instead of returning in the fall they find mates, and form a new family unit.

Many things may happen to alter this well ordered existence. One of the adults may be trapped so that no kits are born that year. High or low water may cause the family to move to a better location. They may move the colony to a better food source

or to avoid competition with another colony. Several beavers may be trapped in one season with the result that almost any sex and age combination may be found occupying a colony. However, in the typical unexploited colony after two breeding seasons, there would be an adult pair, about four yearlings, and 4 kits.

Beavers are known to cut nearly any species of shrub and tree occurring in their area - some as large as 1511 in diameter. The bark of certain types of wood is used for food, while other species are used as construction material. Aspen (poplar) trees are the preferred food of beaver and, where available, will be used almost exclusively. However, other hardwoods will serve, particularly in young growth stages. Areas that have an abundance of hardwood may support high beaver population levels.

The beaver is able to utilize the wood by the use of its four specialized front incisor teeth. These teeth have a layer of hard enamel at the front and soft dentine at the back. Constant use wears away the dentine and leaves a chisel-shaped biting edge. These teeth grow continuously, and if for any reason are not used, they can cause death by growing in an arch, back into the skull.

Beavers have the unique ability to construct complex dens and dams and prepare other features necessary to the colony. The house and dam are made with sticks of wood packed with mud. Winter food is cut and piled on the pond floor for use after ice up. Alders are usually used to build dams because of their abundance near water. The branches are laid with the butt end downstream so that they trap other debris flowing downstream. Into the tangle of brush are put mud, rocks, and other debris to make it watertight. The force of the water holds all the material in place. The beavers continue to chink the dam with other woody material from which they have

eaten the bark, so the structure continuously takes on more mass and height. Without constant maintenance the dam deteriorates quickly. However, it is the periodic drawdown of beaver flowages which results in the chemical recharging of the soil, and regeneration of succulent vegetation that so revitalizes maturing beaver habitats.

HISTORY

Habitat Trends

The best habitat for beaver includes regenerating hardwood trees, and specifically those of the aspen family (Populus spp.). The vegetation to be utilized must be within a mile of an adequate water body or stream in which the beaver actually builds a colony. There have been substantial changes to streams and ponds, and to the surrounding forests throughout the history of the State. Many hydroelectric and log driving dams were built during the 19th and early 20th centuries creating new impoundments. The impoundments provided fresh shoreline; but they also inundated former streams and wetland areas with deepwater acreage unsuitable for beaver. During this same period, agricultural and urban clearing reduced the suitability of a large amount of shoreland for beaver. Prior to the 1960's, frequent forest fires set back natural succession giving rise to new young stands of hardwoods. And in the last 20 years increased timber harvests have opened millions of acres of mature forests and brought on various stages of regeneration. The actual net benefit to beaver from all these impacts is difficult to know.

Population Trends

During precolonial times, beaver apparently occurred in relative abundance throughout Maine with populations estimated up to 100,000 (Hodgdon and Hunt 1953). Following colonization beaver were over-exploited reducing the statewide population to near extirpation by 1900. Beaver harvests were prohibited by regulations in 1899 and

the beaver population began a slow recovery. In 1916 beaver abundance was sufficiently recovered to cause nuisance complaints, and harvests were once again allowed in selected townships to reduce flooding of agricultural land and roadways.

Further declines occurred between 1916 and 1929, probably not from the legal trapping, but because of illegal harvests resulting from the uncontrolled interstate sale of beaver pelts (Hodgdon and Hunt 1953). However, in 1929 the Federal Lacey Act became effective, prohibiting interstate shipment of untagged furs. Illegal exploitation of beaver declined thereafter and the statewide beaver Population has increased steadily ever since.

Harvest Regulations

The first game law in what is now the State of Maine was passed by the General Court of Massachusetts about 1764 prohibiting (except by Indians) the taking of any furs "…to the Northward or Eastward of Saco truck house or the place where this truck house stood, except in the towns and plantations (of residence) under penalty of 40 shillings for every such offense..."

No other law was passed that affected beaver management until 1866 when the Maine legislature assed a law prohibiting taking beavers and other furbearers from June 1 to October 15. In 1899, the beaver season was permanently closed, but the Commissioner had the power to open the season if beaver were causing damage (Table I).- In 1913, the Maine Legislature passed a law that required a written complaint from the landowner before the Commissioner could open an area to beaver trapping. The first areas were opened in 1915. Also from 1915 on, all beaver pelts were to be

either sealed or stamped (varied from year to year), by a game warden. These regulations,.with minor revisions, were in affect until 1947 (Boettger 1968).

In 1947, the State Legislature established an annual season for beaver trapping from January I to February 7 in areas where beaver were doing damage. In 1955, the entire State was opened to beaver trapping from January I to February 28, but specific areas could be closed by the Commissioner (Boettger 1968).

In 1963, the Commissioner was given the authority to set the length of the season or to close areas to trapping in certain areas without legislative approval. In 1972, the Commissioner's authority was further extended so that he could lengthen the beaver season either statewide or in certain areas.

Harvest Trends

The harvest of beaver has fluctuated closely around 10,000/year for the past 20 years (Table 1). The fluctuations have generally reflected changes in the pelt values. In colonial times, beaver pelts were widely used as a unit of trade by the Indians and early settlers leading to overexploitation. The decline in beavers continued until by 1764 the resource had declined, and very few beavers were being trapped. Demand remained high until diminishing returns, and finally restrictions on trapping, virtually eliminated beaver harvests by 1900.

Continuous annual reporting began in 1929 documenting annual harvests. Between 1915 and 1936, the harvest varied from 24 to 1,908 beaver. The beaver harvest, since 1936, has varied widely, but the trend has been a slow increase (Table 1).

Table 1. Beaver management history in Maine.

Year	Estimated average price[1]	Estimated harvest[2]	Statutes and Regulations[4] Trapping
Until 1866	--	--	No closed season anywhere in State.
1866-1877	--	--	October 15 to May 31
1878-1898	--	--	October 16 to April 30
1899-1913	--	--	No open season, (trapped locally with permission of Commissioner).
1913-1946	--	--	No open season (if landowner complains, Commissioner may open local areas).
1946-1953	--		January 1 to February 7 (only in areas where beaver are doing damage).
1954-1955	--	--	January 1 to February 28 (same as above).
1955	17.00	8,884	January 1 to February 28 except as
1956	13.00	13,949	closed or shortened.
1957	13.00	5,511	Northern Zone - January 1 to
1958	15.00	6,373	February 18; Southern Zone -
1959	13.00	6,819	January 1 to January 31
1960	15.00	6,891	except as closed or shortened.
1961	--	8,147	
1962	12.00	7,734	
1963	14.00	6,535	January 1 to end of February
1964	14.00	12,218	except as closed or shortened.
1965	11.00	10,582	
1966	16.00	7,095	
1967	14.00	9,369	
1968	17.00	8,769	
1969	21.00	10,306	
1970	15.00	10,128	
1971	18.00	6,288	
1972	22.77	10,895	Statutory provision repealed and
1973	18.75[3]	11,054	replaced by regulation. January 1
1974	20.80	12,941	to end of February except as closed,
1975	16.30	11,295	lengthened or shortened.
1976	22.10	6,797	December 1 to end of February except
1977	27.80	9,632	as shortened, lengthened or closed.
1978	20.30	11,182	
1979	32.92[3]	10,447	WMU 1 and 2, December 1 to end of
1980	23.08[3]	19,209	February; and WMU 3, 4, 5, 6, 7, and
1981	16.86[3]	6,927	8, January 1 to February 15 both with
1982	13.87[3]	7,133	exceptions.
1983	15.90[3]	11,341	
1984	18.75[3]	8,840	

[1]Trapper questionnaire.

[2]Pelt tagging records.

[3]Average price, NH Fur Harvest Records and Maine Furbuyer Survey, 1983-1984.

[4]No open season for hunting.

Users

"No animal has been so closely associated with, and instrumental in, the development of New England as the beaver. The Indians used the beaver for food, clothing and bed coverings, hangings in wigwams, and as gifts. Castoreum, the secretion from the scent glands, was considered a most efficient remedy for earache, deafness, headache, loss of memory, and insanity. The skins were a medium of exchange and the chief article of wealth" (Babcock 1929). The settlers also used beaver skins as a principal unit of trade within the colonies and with Britain. The constant demand and unrestricted use continued until 1899 when beaver trapping was prohibited.

Beaver trapping licenses were not required until 1927. During the period to 1933 the average number of licenses sold was 638. The sale of all trapping licenses during the same period averaged 2,778. During the period 1965 to 1970, an average of 1,596 regular trapping licenses were sold.

Past Management Goals

The first planning document established a goal to increase the beaver population to a level that could support an annual harvest of 15,000 beaver by 1,500 trappers. However, beaver numbers in areas of heavy trapping pressure in WMU's 1, 4, 5, 7, and 8 were sufficient to meet the goal, and the number of trappers in most of those WMU's appeared to be increasing still. Trapping pressure was low throughout WMU 2. Therefore, strategies were established to increase trapping pressure in WMU 2, reduce pressure in 4, 7, and 8, and reevaluate the food and habitat indices to insure more

accurate harvest objectives. Season dates were lengthened to increase harvests, and towns, and areas within towns (streams, flowages, etc.), requiring it were closed in an attempt to increase populations and, ultimately, harvests.

The results (Table 2), were not entirely satisfactory, as shown by a decline in the ratio of objective harvest to actual beaver taken. In the 1980 beaver update, the goal was adjusted to accommodate an expected 12,000 beaver harvest with then current population levels. The subsequent management strategies using regulatory changes did not adequately manipulate optimum population levels in most areas. Regulation of beaver closures has, apparently, succeeded id preventing over-harvest of beaver in any town over the planning period.

Table 2. Beaver management analysis for Wildlife Management Units, 1979 and 1985.

	Wildlife Management Units, 1979								Wildlife Management Units, 1985							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Harvest objective	1,649	4,062	2,171	2,765	1,848	1,137	691	676	1,812	4,545	1,969	3,061	1,528	1,139	707	971
Upper range	1,814	4,468	2,389	3,042	2,033	1,251	760	743	2,265	5,681	2,461	3,826	1,910	1,424	884	1,214
Lower range	1,484	3,656	1,954	2,489	1,663	1,023	622	608	1,359	3,409	1,477	2,296	1,146	854	530	729
Average 3-year catch	1,411	1,792	1,167	2,710	977	1,114	758	489	1,381	1,338	987	2,818	1,213	950	1,236	797
Average number of trappers per town	2.92	1.47	1.61	3.27	2.59	2.17	1.98	1.53	2.16	0.86	1.31	2.99	2.77	1.79	2.70	1.90
Ratio of average 3-year catch to desired harvest	0.855	0.441	0.537	0.980	0.529	0.979	1.096	0.724	0.762	0.294	0.501	0.921	0.794	0.834	1.749	0.820
Towns rated A*	14	20	48	30	18	16	31	38	16	31	12	21	20	20	10	22
Percent rated A	16.1	8.9	39.0	19.7	24.0	18.8	37.8	45.8	18.4	13.8	9.8	13.8	26.7	23.5	12.2	26.2
Towns rated B	22	134	0	0	0	0	0	0	37	156	68	39	30	26	11	17
Percent rated B	25.3	59.8	0.0	0.0	0.0	0.0	0.0	0.0	42.5	69.6	55.3	25.7	40.0	30.6	13.4	20.2
Towns rated C	11	24	18	31	16	10	11	6	26	15	23	50	15	24	42	17
Percent rated C	12.6	10.4	14.6	20.4	21.3	11.8	13.4	7.2	29.9	6.7	18.7	32.9	20.0	28.2	51.2	20.2
Towns rated D	40	36	48	84	40	36	19	10	0	1	5	2	0	1	3	5
Percent rated D	46.0	16.1	39.0	55.3	53.3	42.4	23.2	12.0	0.0	0.4	4.1	1.3	0.0	1.2	3.7	6.0
Towns rated E	0	10	9	7	1	23	21	29	8	21	15	40	10	14	16	23
Percent rated E	0.0	4.5	7.3	4.6	1.3	27.1	25.6	34.9	9.2	9.4	12.2	26.3	13.3	16.5	19.5	27.4

STATEWIDE SUMMARY

Maximum desired catch 16,500
Statewide objective catch 15,000
Minimum desired catch 13,500
Average three-year catch 10,416
Ratio of actual to desired catch 0.894

STATEWIDE SUMMARY

Maximum desired catch 19,665
Statewide objective catch 14,497
Minimum desired catch 11,799
Average three-year catch 10,719
Ratio of actual to desired catch 0.739

*See following page for description of ratings.

HABITAT ASSESSMENT

Statewide

Status

There are about 37,000 linear miles of beaver habitat in Maine. For the purposes of this assessment, all inland waters of the State, except those areas where the life requirements of the beaver cannot be met, are considered beaver habitat. The amount of beaver habitat, measured in "miles of shoreline", is adjusted by an index of the habitat quality. The index reflects the density and abundance of preferred food tree species, all hardwood tree species, and the so-called "water lily" variable (ratio of all water area to eutrophic lakes). Those shoreline miles in which no food value is indicated are not included in the totals (Table 3).

The number of habitat units (linear miles x index value) represents the capacity of the area to support a certain number of beaver and make it possible to compare areas at different points in time.

Changes

The quantity of beaver habitat identified in the previous assessment was based on 17,427 linear miles of beaver habitat. Almost 37,000 linear miles of beaver habitat are now identified. The increase reflects a reassessment of beaver habitat, from only rivers and streams to all shoreline containing the necessary requisites for beaver habitat.

Table 3. Current beaver habitat (1982).

Wildlife Management Unit	Total area (square mile)	Habitat length (linear mile)	Food suitability index	Habitat units
1	3,216	3,701	0.49	1,813
2	8,397	9,520	0.41	3,903
3	4,234	4,494	0.47	2,112
4	5,726	6,594	0.52	3,429
5	2,949	4,199	0.49	2,058
6	2,610	3,455	0.58	2,004
7	2,113	1,859	0.56	1,041
8	2,825	3,087	0.60	1,852
Totals	32,070	36,909	--	18,212

The food index also increased because of changes in the composition and successional stages of the forest. The index value represents 2 data bases used in 1970 and 1980 volumes of preferred trees, and of all hardwood species that show an increase in the volume of hardwoods in most parts of the State (Powell and Dickson 1984). The impact of human developments on the quality or amount of wetlands in WMU 7 and 8, though probably significant, has not been demonstrated.

Proiections

The amount of habitat in 1990 is expected to decline proportional to human developments. However, improvements in habitat quality are expected as hardwoods (preferred beaver food) increase (Table 4).

Wildlife Management Units

Status

As expected there is a Positive relationship between WMU area and beaver habitat quantity (Table 3). WMU 7 has less than one mile of habitat per square mile of WMU area, however there appears to be an error in this estimate. WMU 5 has almost 1½ miles per square mile and the balance of the Units have just over one mile per square mile.

The food value index is higher than the State average in four WMUs (4, 6, 7, and 8), about the same in three WMU's (1, 3, and 5), and lower in WMU 2. The variation in the values is consistent with previous assessments.

Table 4. Projected beaver habitat (1990).

Wildlife Management Unit	Total area (square mile)	Habitat length (linear mile)	Food suitability index	Habitat units
1	3,216	3,699	0.53	1,960
2	8,397	9,518	0.44	4,188
3	4,234	4,491	0.50	2,246
4	5,726	6,590	0.56	3,690
5	2,949	4,198	0.52	2,183
6	2,610	3,454	0.61	2,107
7	2,113	1,856	0.76	1,411
8	2,825	3,069	0.80	2,455
Totals	32,070	36,875	--	20,240

Changes

The food value index used in the previous assessment is not comparable to that used here.

Projections

The trend towards greater human development, particularly in WMU 7 and 8, may reduce the amount of habitat available to beaver. However, the impact of many types of development are not known. Improvement in overall quality due to increased hardwood growth in all WMU's is reflected in the higher index values for 1990 (Table 4).

POPULATION ASSESSMENT - CARRYING CAPACITY

Statewide

Status

The maximum supportable beaver population in the fall (preharvest) is considered to be within a range of 45,000 to 68,000 animals based on the index values by WMU (Table 5). The amount, quality and availability of the tree species on which beaver feed limits population growth. As a given flowage area is depleted of food the colony begins to break up, young animals disperse further and adults search for new sites. As food diminishes and lucrative sites cannot be found, the health and vigor of the animals declines, and they become more prone to disease and parasites. Winter starvation occurs when insufficient food is stockpiled.

Changes

This carrying capacity evaluation is not comparable to that in the previous assessment.

Projections

The maximum supportable beaver population is expected to increase in proportion to improvements in habitat suitability (Table 5).

Table 5. Current (1985) and projected (1990) maximum supportable beaver population by Wildlife Management Unit.

Wildlife Management Unit	1985 maximum supportable population		1990 projected maximum supportable population	
	range	one third point	range	one third point
1	5,160 - 7,800	6,000	5,690 - 7,350	6,200
2	9,680 - 15,930	11,800	10,620 - 16,560	12,600
3	5,110 - 7,870	6,000	5,220 - 8,280	6,200
4	8,850 - 13,060	10,300	9,530 - 14,060	11,000
5	4,850 - 7,340	5,700	5,220 - 7,710	6,100
6	4,690 - 6,650	5,300	4,980 - 6,940	5,600
7	2,420 - 3,470	2,800	3,470 - 4,520	3,800
8	4,100 - 5,740	4,600	5,710 - 7,340	6,300
Totals	44,860 - 67,860	52,500	50,440 - 72,760	57,800

Wildlife Management Units

Status

All WMU's have a carrying capacity greater than 2,000 beaver (Table 5). WMU 2 has the highest carrying capacity and WMU 4 has the lowest. WMU 7 data may be inaccurate, reducing the number of habitat units below the upward trend shown in other parts of the State.

Changes

This carrying capacity evaluation is not comparable to that in the previous assessment.

Projections

Based on the current trend, carrying capacities are expected to increase all WMU'S. Changes in carrying capacity are projected in the same proportion as the rate of change for food index values (Table 5).

POPULATION ASSESSMENT - CURRENT ESTIMATED POPULATION

Statewide

Status

The current statewide beaver population is estimated to be between 45,000-70,000 beaver (Table 6). There are probably more beaver in Maine now than at any time during the past century. The age of beavers harvested, and thereby the composition of the major age groups in the population, is determined by the size of the pelts. Using regressions formulas based on beaver colonies having known compositions, a theoretical population size has been developed. The validity of the process has not been confirmed; however, the success rate for trappers tends to be consistent with WMU population trends developed therein.

Changes

The current estimate is almost two times larger than the previous estimate. However, the procedures used in the current assessment are not comparable to those used in 1980. The last plan underestimated the number of beavers because it was based on a habitat base that did not include lakes and ponds. Pelt ratio values were examined for the six trapping seasons beginning in 1979-80. An upward trend in population was identified.

Table 6. Current (1985) and projected (1990) beaver population estimates by Wildlife Management Unit.

Wildlife Management Unit	1985 Estimated population		1990 Estimated population	
	range	one third point	range	one third point
1	5,080 - 7,680	5,900 6,000 Max.	5,560 - 7,180	6,100
2	10,420 - 17,140	12,700 11,800	10,420 - 17,140	12,700
3	5,350 - 8,230	6,300 6,900	5,100 - 7,850	6,000
4	8,580 - 12,650	9,900 10,300	6,900 - 11,200	8,300
5	4,870 - 7,370	5,700 5,700	5,090 - 7,510	5,900
6	4,690 - 6,650	5,300 5,300	4,960 - 6,910	5,600
7	1,310 - 1,880	1,500 2,800	3,270 - 4,260	3,600
8	3,880 - 5,430	4,400 4,600	4,590 - 5,900	5,000
Totals	44,180 - 67,030	51,700	45,890 - 67,950	53,200

Projections

Recent trends indicate that beaver will be slightly more abundant than they are currently (Table 6).

Wildlife Management Units

Status

The highest populations are found in WMU 2 and 4. The-statewide calculation is a summation of the WMU'S. No WMU has a problem of too low beaver populations.

Changes

Recent changes in populations show increases in all WMU's. WMU's 2, 3, and 5 have had the largest proportional increases (Table 6).

Projections

Populations are expected to reflect trends in habitat quality.

POPULATION ASSESSMENT RELATIONSHIP OF ACTUAL POPULATION TO MAXIMUM SUPPORTABLE POPULATION

The number of beaver currently in Maine is close to, or at, the maximum supportable population statewide (Table 5 and 6). WMU 2 has already exceeded the maximum, and projections indicate the maximum will be exceeded in 1990. Projections for the other WMU's indicate continued populations close to the maximum supportable. This is expected to result in a decline in the condition of beaver habitat and, ultimately, in a decline in beaver populations.

USE AND DEMAND ASSESSMENT - HARVEST

Statewide

Status

The average harvest of beaver (1981-1985) is about 10,000 animals (Table 7). Nonlegal removals that do not show in the tagging record are believed to be insignificant. Nuisance removals in high trapper use areas may have an affect on the regular trapper harvest but there has been insufficient documentation to fully assess the impact.

Based on earlier estimates of allowable harvest, the high harvest of 1979-1980 was viewed as excessive, and the following year season lengths were shortened accordingly. However, in 1980-1981 beaver pelt values fell to record low levels, and combined with reduced seasons, resulted in very low harvests the following year.

Changes

The harvest has been almost static since the last assessment. The average harvest in 1977 was 9,632 beaver, up only 4% in 1982 at 10,029 beaver.

Projections

Historically there has been a great fluctuation in the harvest such that trends of several years have reversed unexpectedly (Table 3). The largest decrease in harvest followed the largest increase. Although population levels are expected to increase slightly, the number of beaver trappers is expected to decrease. This may contribute to even higher beaver numbers and correspondingly more nuisance complaints.

Table 7. Recent average (1981-84) beaver harvest, effort and success rates by Wildlife Management Unit.

Wildlife Management Unit	Harvest	Total number of users	Successful users	Percent successful	Users per 100 habitat units
1	1,416	115	112	97	6
2	1,327	92	89	97	2
3	879	63	62	98	3
4	2,564	226	219	97	7
5	1,051	94	90	96	5
6	871	78	76	97	4
7	1,180	116	113	97	11
8	730	88	84	96	5
Statewide	--	872	848	97	5

Wildlife Management Units

Status

WMU's 1, 2, 4, 5, and 7 each count for a harvest over 1,000 beaver. The average harvest by WMU ranges from 730 in WMU 8, to 2,564 in WMU 4 (Table 7). WMU 1 and 2 are widely underutilized for beaver despite recent increases in accessibility.

Changes

Since 1977 the average take has increased in WMU's 1, 4, 7, and 8. WMU 7 increase was about 100%. There were declines in WMU's 2, 3, and 6, with WMU 5 stable. Comparing 9 year trends instead of 2 year averages reveals that WMU's 5, 7, and 8 are increasing and WMU 7 at over 8%/year. Trends for WMU's 1 and 4 are stable, and WMU's 2, 3, and 6 decline. There is a lot of year to year fluctuation in the number of successful trappers. This is probably related to pelt prices, and not to abundance.

Projections

Harvests are expected to increase in WMU 5 and 7, and decrease in all other WMU's (Table 8).

Table 8. Future average (1990) beaver harvest, effort and success rates by Wildlife Management Unit.

Wildlife Management Unit	Harvest	Total number of users	Successful users	Percent successful	Users per 100 habitat units
1	1,280	73	72	99	4
2	980	51	49	96	1
3	660	43	43	100	2
4	2,440	196	194	98	5
5	1,120	86	81	94	4
6	700	67	65	97	3
7	1,750	138	137	99	10
8	940	90	87	97	4
Statewide	9,400	696	688	99	3

USE AND DEMAND - USERS

Statewide

Status

Nonconsumptive use of beaver is significant, represented by campowners and others who enjoy the esthetic benefits of the animal itself, and the affects it has on the land. The benefits of beaver created habitat to other wildlife is also substantial. It is not possible to estimate a meaningful value for nonconsumptive use at this time.

Trappers comprise the consumptive user group. Numbering over 800 which is only 16% of all trappers (Table 7). In a recent 4-year average (1980-1984) 848 of 872 winter trappers took beaver (Table 7).

Changes

Since the last assessment, the average number of successful beaver trappers has decreased. Trends (from beaver registration data) suggest that there may be an increase in the number of "serious" trappers taking large numbers of beavers, and a decline in the number of occasional or "casual" trappers who take fewer beaver. Harvest projections for all WMU's reflect a downward trend in the overall number of beaver trappers.

Projections

An expected decline in consumptive users corresponds to the anticipated decline in harvests by 1990.

Wildlife Management Units

Status

Trapper numbers are highest in WMU 4 (Table 7). Trapper densities (users per WMU) are the highest in WMU's 7, 4, and 1.

Changes

The average of successful beaver trappers in WKU 8 has increased significantly since 1977. Users have decreased in WMU's 2 and 3, and remained fairly stable in all other WMU's. In comparison the trend since 1976 shows over 5% per year decreases in WMU's 1, 2, and 3; and no significant changes in WMU's 4, 5, 6, and 8; and an increase of 4% per year in WMU 7.

Projections

There is an expected decrease in beaver trappers in WMU's 1, 2, and 3; and an increase in WMU 7; the other WMU's will remain stable (Table 8).

SUMMARY AND CONCLUSIONS

The beaver is an important furbearer in Maine, not just for its fur value, but also for the benefits it provides to wildlife and fish habitat. Flooding of roadways and timber, and adverse effects on water temperatures are among several negative impacts caused by beavers that must be considered in management. Beaver live in a colony, or family unit, comprised of a mated pair, about 4 yearlings (young of the previous year), and about 4 kits (young of the current year). A dam is constructed to control the water depth, and a beaver lodge or den is built for safety from the elements. In the winter beaver eat from a food cache of preferred tree species stockpiled under the ice.

Beaver usually mate for the first time at two years of age. If there is no existing dam and lodge a new colony will be established on a suitable site. Trapping, flooding or drought may disrupt the colony, reducing the number of beaver or making it necessary to move. Preferred hardwoods species are necessary for food and construction material. This material is utilized by specialized teeth, digestive system and behavioral mechanisms.

While the amount and condition of beaver habitat has varied over the years, the quality and availability of food has not generally limited their numbers. Dams have created new impoundments, fires have set back forest succession, and various other developments have had both positive and negative impacts on beaver habitat.

Overexploitation by Indians and early settlers was responsible for near extirpation during the 19th century. Restriction of harvests through game laws and federal trade laws allowed beaver populations to rebuild. Presently beaver harvests are established

annually on a township basis to obtain optimum harvests and minimize nuisance complaints. Harvested beaver sex and age ratios, condition of the colony, and expected habitat conditions, together with the nuisance factor, are used to determine if an area should be open to trapping.

The availability of preferred tree species determines the carrying capacity for beaver. Based on present information, the statewide maximum supportable population is between 45,000 and 63,000 beaver. Currently there are estimated to be about 51,000 beaver statewide, or near carrying capacity in many regions.

Harvests have been averaging About 10,000 beaver statewide for several years. Pelt prices and weather conditions have the major influence on the harvest. However, the trend is towards fewer numbers of beaver trappers, and a decline in harvests despite high beaver abundance in 1990 is anticipated (Table 9).

Beaver present a difficult management dilemma because of their high resource and habitat values, and regional concentration of users. This results in overuse in local areas, and under use in large regions where nuisance situations then develop. Management in Maine has been towards township and smaller areas to distribute trapping pressure more equitably.

Table 9. Past, present, and estimated future beaver harvests and users.

Year	Harvest			Total users
	Actual	Allowable	Objective	
1976	9,833	15,000	15,000	1,039
1977	11,192	15,000	15,000	1,151
1978	10,539	15,000	15,000	1,037
1979	19,209	15,000	15,000	1,651
1980	6,927	7,000	12,000	769
1981	7,149	9,000	12,000	746
1982	11,341	11,000	12,000	939
1983	8,841	13,000	12,000	805
1984	12,785	15,000	12,000	997
1990	9,400	18,000	---	700

LITERATURE CITED

Boettger, R. F. 1968. Beaver in Maine. Me. Dept. Inl. Fish and Wildl.

Hill, E. P. 1982. Beaver. P 256 in Chapman and Feldhamer (eds). Wild Mammals of North America. Johns Hopkins Univ. Press, Baltimore.

Hodgedon, K. W. and J. H. Hunt. 1953. Beaver management in Maine. Game Div. Bull. No. 3. 102pp.

BEAVER MANAGEMENT GOALS AND OBJECTIVES
1985-1990

Goal: Maintain beaver populations at current level (near carrying capacity) and increase harvest.

OBJECTIVES

Abundance: Maintain beaver population at 1985 levels (estimated at 44,000-67,000 or near carrying capacity) through 1990.

Harvest: Increase average harvest of beaver to 15,000 statewide per year (or whatever level needed to maintain population near carrying capacity) and maintain at that level through 1990 and minimize the mortality of beaver due to nuisance control.

Capability of Habitat: The habitat will support the proposed population level if the population is locally proportional to the habitat capability.

Feasibility: The feasibility is subject to the demand for beaver pelts. It is feasible under conditions of high demand statewide. It is-feasible under present demand levels only in the more accessible parts of the State. It would be unfeasible statewide if demand for pelts decreases from current levels. Will require a higher level and therefore more expensive level of local habitat information than is currently being collected.

Desirability: This is the optimum in beaver management desirability.

Possible Consequences: Maintaining populations may require maintaining habitat by initiating increased harvest removals in some areas. In the absence of locally balanced harvests some habitat damage by excessive beaver populations can be expected. Some population controls in the form of nuisance removals can be expected to continue at high levels or at increased levels if harvest demands do not increase.

Summary of Working Group Concerns

BEAVER

Habitat

1. There are problems with landowners - some want beaver, some do not and some do not want damage but also do not want trapping.

2. Timber harvesting along brooks (slash in water) and skidder crossings causes problems.

Populations

1. Coyotes are killing beaver.

Harvest

1. Towns are being closed even though they have high populations.

2. Some areas are closed and then beaver are being shot.

3. Estimates of future trapper numbers are too low.

4. Nuisance beaver should only be killed as a last resort.

5. There are problems associated with under-harvest:\
   a. Damage problems.
   b. Habitat conversion to lower quality habitat.

6. Use a better designation (description) when opening and/or closing individual property owners.

Beaver Problems and Strategies in order of Priority

Problem 1: Lack of adequate information on the size and dynamics of beaver population on a WMU basis.

Strategy 1: Evaluate and update existing method for measuring habitat and estimating carrying capacity.

Strategy 2: Evaluate existing system for monitoring populations and regulating harvest on a WMU basis.

Problem 2: Lack of harvest effort in areas that are remote and have poor access.

Strategy 1: Change trapping rules to shift harvest effort.

Strategy 2: Remove beaver from areas that are remote and have poor access by other than conventional trapper harvests.

Problem 3: Lack of a record of non-harvest beaver removals.

Strategy 1: Initiate a nuisance record system as already proposed.

Problem 4: Opposition to consumptive use of beaver by nonconsumptive users.

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