Age Structure Differences in American Mink, *Mustela vison*, Populations under Varying Harvest Regimes

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Whitman, Jackson S. 2003. Age structure differences in American Mink, *Mustela vison*, populations under varying harvest regimes. Canadian Field-Naturalist 117(1): 35–38.

Two American Mink populations were examined using canine tooth cementum annuli to assess age structure of harvested segments of the populations. Trapping mortality was different between these two populations. Comparisons are made with a Montana Mink population. I propose that furbearer managers can readily assess relative harvest pressures by analyzing the age structure of a Mink population, and offer management recommendations for populations displaying various age structures.

Key Words: American Mink, *Mustela vison*, age structure, cementum, harvest management, Alaska, Idaho, Montana.

Raw fur prices fluctuate dramatically due to unpredictable fashion trends. Thus, trapping intensity varies accordingly. American Mink (*Mustela vison*) are one of several species that are harvested throughout most of the United States and Canada (Eagle and Whitman 1987), and are considered a valuable fur resource (Deems and Pursley 1983). As early as 1938 it was recognized that intensive trapping can cause local declines in Mink populations (Errington 1938; McCabe 1949). However, furbearer managers are often at a disadvantage when assessing the status of various populations because of inadequate funding or staff.

In the absence of empirical population data, information presented here may provide managers with a reasonable, and relatively inexpensive, tool for assessing the status of wild Mink populations. Mink carcasses can easily be collected from trappers. In addition to assessing other parameters (diet, fat indices, sex ratios, reproductive status, etc.), canines or other teeth can be extracted, processed, and evaluated. A low incidence of juveniles in the harvested segment of the population may indicate low harvest pressure, poor recruitment, or may signal the presence of more severe environmental problems, such as the presence of toxic contaminants (Aulerich et al. 1974; O'Shea, et al. 1981), or food shortages.

Study Areas

Two American Mink populations were analyzed. A population in west-central Idaho (Upper Payette River drainage, Valley County) was studied between 1977 and 1980 (Whitman 1981). This population (Idaho) inhabited a high glacial valley, ranging from 1500-2000 m elevation in riverine habitat. Weather conditions were continental, typified by accumulations of snow in winter (mid-November through mid-April) and temperate, dry summers. Yearly precipitation averaged 64 cm. Temperature variations ranged from an average of –7.4°C in January to 17.1°C in July (Whitman 1981). This study area encompassed at least nine traplines that had been trapped annually for several decades at a moderate intensity.

A second Mink population in the Alexander Archipelago in southeast Alaska (Alaska), on Baranof and Chichagof Islands near Sitka, inhabited a marine coastal environment characterized by temperate, rainy conditions. Snow accumulations were highly variable, but rarely amount to more than 30 cm. Average annual precipitation was 219 cm, with temperature means of 3°C to 17°C in January and August, respectively. Carcass collections from this area were from the 1999/2000 trapping season, a year with no measurable snow accumulation. Area trappers only incidentally caught Mink while targeting American Marten (*Martes americana*) and River Otter (*Lontra canadensis*), so harvest pressures were extremely light.

Methods

Skinned Mink carcasses harvested during open seasons (November-January) were collected from trappers in both study areas. Lower canine teeth were extracted from animals suspected to be adults based on presence or absence of the suprasesamoid tubercle (Greer 1957), skull and bacular morphology, tooth wear, or skull suture characters. Juvenile animals (<8 months) were easily discernible from older age classes based on the above-mentioned osteological characters. Canines were sectioned, stained, and analyzed for number of cementum annuli (Matson's Laboratory, Milltown, Montana). Cementum annuli were assumed to represent the actual age of Mink in years (Eagle and Whitman 1987).

Logarithmic regression analysis was used to fit curves to age class data from harvested populations.

There were no significant differences between sexes in age class distribution, so sexes were pooled. Forty-two and 81 Mink were used for Idaho and Alaska samples, respectively.

Results and Discussion

Of 42 Mink from Idaho, 17 were adults (>1 year), for a juvenile:adult ratio of 1.47:1. In the Alaska sample, 45 of 81 animals were adults (0.8:1 ratio) (Table 1). The oldest animal in both populations was a single four-year-old, confirming reports of Mitchell (1961) in Montana, Gerell (1971) in Sweden, and Askins and Chapman (1984) in Maryland that population turnover largely occurred during a three-year period. Mitchell (1958) compared ages of Mink in intensively harvested areas versus unharvested areas, and reported dramatically different demographic parameters (juvenile:adult ratios of 4.5:1, and 0.3:1, respectively). In an attempt to clarify data reported by Mitchell (1958), and to compare those data with my own, I have assumed that his "adult" animals were all between the ages of 1 and 3 years.

In the Idaho study, I characterized Mink harvest as moderate; this harvest had been occurring for more than a decade prior to the investigation, and continued throughout the 1977-1980 study. Mink were common, but I assumed populations were below carrying capacity. In the Alaska investigation, trappers incidentally caught Mink in sets primarily designed for American Marten (*Martes americana*) and I judged their effects on Mink populations negligible. Because Marten did not exist on islands over most of the area, Mink harvests had been light prior to this investigation for at least five years. Thus, harvest pressures were assumed to be extremely light, and Mink existed at or near carrying capacity.

Comparison of age structure among populations (Figure 1) suggests that furbearer managers may be able to use age structure data as an indicator of the effects of harvest rate on Mink populations. If logarithmic curves can be fit to age structure data, steepness of the curves may be used to estimate harvest intensity. Obviously, Mink populations exist at widely differing densities throughout their range, largely dependent on carrying capacity of various habitats. High or low catches per unit area or per unit effort do not necessarily reflect high or low harvest pressure.

Using juvenile to adult ratios to assess harvest pressures can also be used without the time and expense of cementum analyses (Table 1) using my assessment of relative harvest pressure. In areas where the juvenile to adult ratio is greater than 2.0:1 and trapping is intense, managers should consider modifying regulations to reduce the harvest. However, where Mink trapping is incidental to other species, alignment of seasons is often an overriding

FIGURE 1. Comparison of harvest age classes for American Mink (*Mustela vison*) from Alaska, where no recent prior harvest had occurred, and from Idaho, where harvest was ongoing, but relatively moderate.

TABLE 1. American Mink juvenile:adult ratios in relation to harvest pressure from 4 study areas in North America, with management recommendations.

Relative Harvest	Author	Location	Juv:Ad Ratio	Possible Management Action
No Harvest	Mitchell, 1958	Montana	0.3:1	Nothing; Perhaps encourage harvest
Very Light Harvest	This Study, 2000	Alaska	0.8:1	Nothing
Moderate harvest	This Study, 1981	Idaho	1.5:1	Monitor future harvests closely
Heavy Harvest	Mitchell, 1958	Montana	4.5:1	Reduce or eliminate open seasons

management consideration. Additionally, where Mink harvest is incidental, adults may be more aggressive in patrolling their respective home ranges and thus more vulnerable to capture.

Interestingly, most authors agree that a high proportion of young in the harvest of American Marten is desirable (Strickland and Douglas 1987). Thus, from the data contained herein, there appears to be an incongruity in prescribed management of two closely related species. This can perhaps be explained by species differences in home range use and the relative numbers of dispersing and transient young-of-the-year animals in the populations. The greater vulnerability of young Marten is probably due to a number of factors, including lack of established home ranges and lack of experience. Young Mink, on the other hand, probably disperse from their natal ranges earlier than Marten, establishing home ranges before the trapping season commences (Gerell 1970), or may remain as residents in their natal home ranges (Harbo 1958).

Acknowledgments

I thank Linda Bergdoll-Schmidt for her assistance in numerous Mink carcass necropsies, often under malodorous conditions. The Idaho carcass collections were conducted through the University of Idaho Cooperative Wildlife Research Unit by the author with the supervision and encouragement of Maurice Hornocker. Wayne Melquist often provided field assistance and support. Alaska work was conducted as part of management operations by the author while working for the Alaska Department of Fish and Game. For their assistance in providing carcasses, I

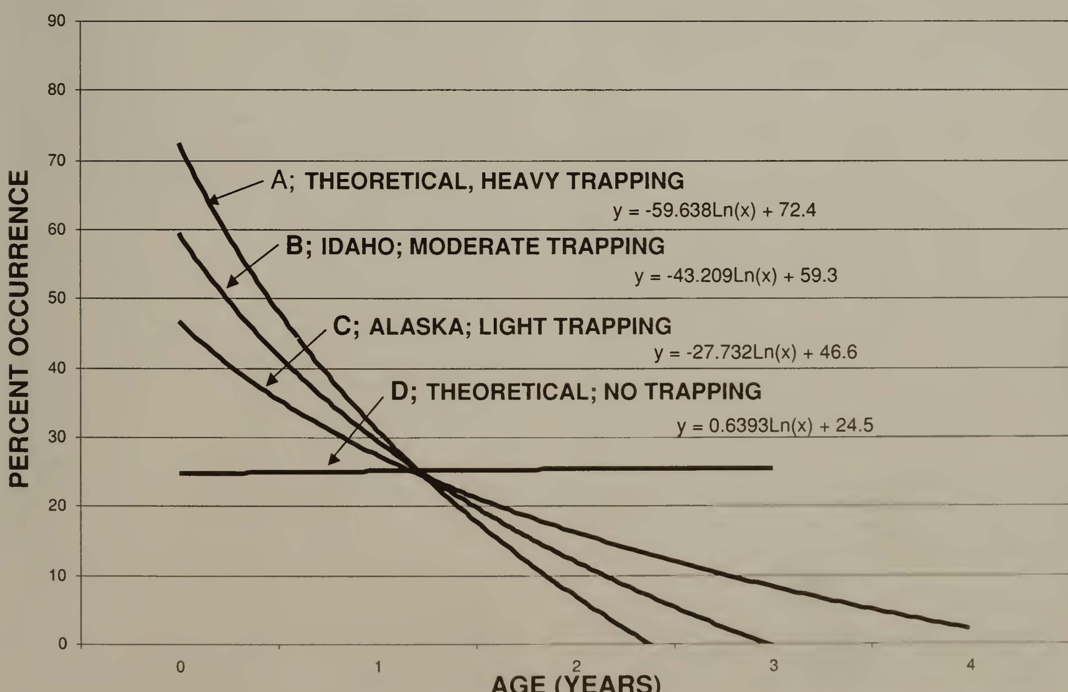

FIGURE 2. Theoretical (lines A and D) and actual (lines B and C) logarithmic regression lines of American Mink age distribution ranging from a population with very heavy trapping pressure (line A) through a population with no trapper exploitation (line D)

thank the many trappers who made the effort to contribute samples, especially Jim Bacon and Loyal, Mike, and Kevin Johnson. L. Johnson, W. B. Dinneford, J. Copeland and two anonymous reviewers provided valuable criticisms of this manuscript. Thanks are also extended to my supervisor, W. B. Dinneford, for allowing the latitude to explore furbearer population and management concerns.

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Received 30 October 2000
Accepted 30 June 2003