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From: Sam Harbo

To: R.F. Scott,

Subj: Mink studies, completion report.

Enclosed is the mink completion report, admittedly in a rough form.

Sam Harbo

Mink Studies -- Southeastern Alaska
Completion Report

by Sam Harbo

Period Covered-

Field work was conducted during the periods January 1 to March 14 and October 15 to November 25, 1957. Most of the work was conducted in the Petersburg-Wrangell area, but a week-long survey was made in the Ketchikan area during the latter part of February, 1957. Additional laboratory work was conducted during 1957 at the Alaska Coop. Wildlife Res. Unit, College.

Summary-

The trapping methods and pressures in coastal southeastern Alaska greatly reduce the mink populations. However, an examination of carcasses collected during the 1956-1957 trapping season, which followed a closed season on mink trapping, revealed that over twice as many males as females were captured, which implies that many of the animals remaining after trapping are females. Also, more adults than juveniles were captured, which indicates production in 1956 was probably lower than that for 1955. Possibly the population had increased to such a point in 1956 that population pressures reduced productivity. More information is needed, however, to ascertain whether or not yearly open seasons are profitable.

Mink densities are high in southeastern Alaska, with densities of over 20 mink per mile of beach present prior to the 1956-1957 trapping season. The fairly steep, rocky beaches support the largest populations.

Objectives-

To determine the trapping pressures and effects on mink in southeastern Alaska; to determine the feasibility of yearly trapping seasons; and to determine the composition and density of mink populations in southeastern Alaska.

Procedure-

Collection of mink carcasses during the 1956-1957 trapping season, and subsequent aging and sexing of them, yielded most of the information on mink population composition. Censusing was attempted by counting the sets of mink tracks present after a new fall of snow. Live capturing of mink was attempted by using wire mesh live traps. Steel-trapping methods and pressures were ascertained by inspecting the trapping

areas and recording the mink catch per area. Other facets of mink ecology were gathered through observation of mink sign.

Findings-

Population Composition and Density.--A total of 247 skinned mink carcasses was collected from the Petersbur-Wrangell area throughout the 1956-1957 trapping season. Many trappers contributed carcasses, with the size of individual contributions ranging from 1 to 71. The capture dates of many were unknown, but enough information and evidence generally were available to fix capture within 5 to 10 day periods. Dried pelts were also examined to secure sex and age data, but the data sheets were lost when the patrol vessel used in the operation was destroyed by fire. About 30 carcasses were collected during the 1957-1958 season, but they have not yet been processed.

The sex and age ratios of the 247 carcasses are listed in Table 1. Immediately apparent is the male:female ratio of 201:100, a ratio heavily favoring males. Many trappers in coastal southeastern Alaska claim that they employ trapping methods selective for males, thereby maintaining a large stock of breeding females. Also, some trappers state that they release a small percentage of females caught during the season, but the author doubts that the practice is followed extensively, even by its most ardent advocates.

Many investigators report a preponderance of males in trappers' catches, attributing it to the larger range of males. Greer (1956) noted that as the Montana trapping season progressed the male:female ratios reflected a progressive decline of males and an increase of females. Yeager (1950:326) and Quick (1956:272) noted the same for marten. These observations indicate that because of their greater range, the males are reduced at a more rapid rate than the females, resulting in a ratio increase favoring females. Assuming no differential mortality rate other than trapping, and a 50:50 natal sex ratio, an even, or essentially even, male:female ratio in the trapping catch would indicate very heavy trapping pressures, or methods especially selective for females, which would reduce to insignificance the influence of the greater range of males. On that basis, the 201 males:100 females ratio of the southeastern Alaska mink catch implies a large residual population of females, and moderate trapping pressures

Table 1. SEX AND AGE DATA AND RATIOS OF 247 MINK CARCASSES COLLECTED DURING THE 1956-1957 TRAPPING SEASON IN THE PETERSBURG-WRANGELL AREA OF COASTAL SOUTHEASTERN ALASKA

Total number carcasses	247	Juveniles:adults	83:100
Juveniles	112	Males:females	201:100
Adults	135	Juveniles:adult females	233:100
		Juvenile females:adult females	71:100
Total number males	165	Juvenile males:adult males	90:100
Juvenile males	78	Juvenile males:juvenile females	229:100
Adult males	87	Adult males:adult females	181:100
Total number females	82		
Juvenile females	34		
Adult females	48		

The juvenile:adult ratio is only 83:100 (Table 1). Thislow ratio indicates a year of low productivity, yet large mink catches occurred throughout the Petersburg-Wrangell area, with sme of the trappers evaluating the 1956-1957 trapping season as "one of the best". The 1956-1957 season, however, followed a 22 month closed season, so that mink populations had increased through two breeding periods. Hibbard (1957), analysing trapping returnsof North Dakota mink, believes one should expect a decrease in the number of juceniles per adult among mink harvested in a year of normal trapping pressure following one of light trapping pressure. He only explains that (p. 413),"In years when the pressure is light, such as in 1955, there is a higher survival of all animals and the next spring's breeding stock is increased accordingly." Even with an increased bredding stock if the reproductive rate remains the same, other things being equal, the age ratios will remain the same. With decreased productivity the number of juveniles per adult decreases, however.

The other ratios also are indicators of productivity, the juvenile:adult female and juvenile female:adult female. The juvenile:adult female ratio cannot be indiscriminately used, however, for an unbalanced sex ratio or a higher capture rate for one sex, which occurred in the catch from southeastern Alaska, would bias it. Thus, the juvenile female:adult female ratio isthe better index to productivity, and, again assuming a 50:50 natal sex ratio, multiplying the juvenile female:adult female ratio by two should provide a more realistic ratio. This procedure provides a ratio of

142:100, which is much lower than the sample ratio of 233:100.

This derived ratio of 142:100, when compared with ratios given by Greer (op. cit.) for Montana mink, accentuates the low rearing success during 1956. For the 1953-1954 trapping seasons, Greer reports ratios of 363:100 and 420:100 respectively, which he apparently considers normal for that area. On that basis, reduced production must have occurred during 1956 in southeastern Alaska, a year of closed season on mink trapping. If low productivity occurred during 1956, high productivity must have occurred during 1955, for the 1956-1957 trapping season was successful. Possibly, the 1955 breeding population, although greatly reduced by the large catches made during the 1954-1955 trapping season, had very high production and survival, so stocking the area that decreased production resulted in 1956.

Mink population densities are not uniform throughout coastal southeastern Alaska but vary according to the quality and quantity of available habitat. The following discussion of densities will include only those thought to be good mink habitat.

The mink catch per unit area indicates that high mink densities exist. In an analysis of these densities, it must be remembered that only a narrow belt, approximately 10 yards in width, adjacent to the beach is utilized by mink. The density measurement used is the number of mink per mile of beach.

Catches of 10 or more mink per mile of beach are common. Some of the larger catches during the 1956-1957 season are as follows: 130 mink from 10 miles of beach in Duncan Canal, Kupreanof Is.; 165 mink from 15 miles of beach near Whale Pass, Prince of Wales Is.; and 152 mink from 10 miles of beach at Louise cove, Kuiu Island. All of these catches averaged more than 10 mink per mile of beach, with the highest average slightly more than 15.

Information on post-trapping densities is available for the 10 miles of beach in Duncan Canal that yielded 130 mink. During early March, 1957, the author conducted track counts on four segments of beach totaling three-fourths mile on the day following a fall of snow, which minimized the chance of counting successive tracks of the same individual. All tracks were followed from the point of emergence to the point of disappearance, thus ensuring that different sections of the same track were

not tabulated as separate tracks. The track counts showed eight mink still present on the area. This limited sample indicated a fairly large residual population. Whether this sample is typical of conditions throughout most of southeastern Alaska is questionable, but the sample reveals that on the 10 mile segment in Duncan Canal densities of 20 or more mink per mile of beach prevailed before trapping. The segment in Duncan Canal falls between the "best" and "poorest" categories of mink habitat, and trapping pressures on the area were of medium intensity.

Compared with the mink densities in interior Alaska, the densities in southeastern Alaska are high. Possibly, the high stable food level in the coastal area is the primary cause of this large difference in densities.

<u>Food Habits.</u>-- Compared with the fluctuating mammal populations that contribute so much to the diet of interior Alaska mink, the food supply in coastal southeastern Alaska is stable. No food habits studies were conducted in southeastern Alaska, ~~but even the most cursory examination reveals striking differences betw~~ but an unanalysed group of 30 to 40 mink scats were collected from the Rocky Pass area during October, 1957. These scats are now deposited at the Alaska Coop. Wildlife Res. Unit, College.

Mink of coastal southeastern Alaska are predatory creatures of the littoral zone. They are frequently seen feeding on various forms of invertebrates during nocturnal low water. This littoral animal life forms the bulk of the diet.

Probably the only vertebrates consumed in significant amounts are fishes, but even so the quantity of vertebrate food consumed is probably only a fraction of the invertebrate food utilized. Many marine fishes abound along the beaches, but they probably are relatively unavailable to mink. The only readily available source of fish would be the spent and spawning salmon of the large streams, and even these would be available during a short period and to the few mink moving up the streams.

The inedible remains of many invertebrates litter the area near mink den sites.

Remains of bule mussels (Mytilus edulis Linn.), clams (including butter clams, probably Saxidomus giganteus Deshayes), sea urchins (Strongylocentrotus sp.) and Dungeness crabs (Cancer magister Dana) are the most common items. Undoubtedly, many other invertebrates also are consumed.

The food levels are high and probably quite stable. Some seasonal fluctuation occurs among the fishes, but the invertebrate populations probably remain rather stable throughout the year. In some of the sheltered bays food availability may fluctuate during the winter, however, for these sheltered bays freeze during the colder portions of the winter. At such times, mink in those areas may be forced to move to open beaches.

Year to year fluctuations in food levels are probably slight. The littoral zone is very productive, containing a large number of species. Consequently, population fluctuation in a few species does not materially change the total amount of available food. This stability, coupled with the productivity of the area, ensures that food, at least on the more suitable beaches, is not limiting.

Den Locations.--Observations indicate that the more suitable areas for mink are rocky, fairly steep, but not bluffy, beaches. On such a beach food is uncovered at low tides close to protective shore areas, and the rocks furnish additional cover. Two such areas, 10 miles of beach at Louise Cove, Kuiu Island and 15 miles of beach in Whale Pass, Prince of Wales Island, produced a total catch of 317 mink, an average of 12 mink per mile of beach. A slightly sloping beach has an extensive area uncovered at low water (southeast Alaska tides of over 15 feet are common), leaving the feeding areas exposed for a considerable distance from protective cover along the shore. Consequently, mink populations are low along these beaches. At the other extreme, a bluffy beach offers very little available food even at low tides, so that here also populations are low.

The shore areas above the suitable beaches contain abundant den sites; crevices in rocks, rock piles and cavities under tree roots are utilized. The author located many such sites, two of which had served as natal dens. These two dens showed evidence

of intensive use; abundant fecal deposits and well-worn trails were still present in October. These two dens occupied level, vegetated, but rocky, points that protruded into the narrow straits between two large islands. Both sites fell just within the vegetative cover of Sitka spruce, and each had three entrances, all three consisting of rock crevices at one site, and two consisting of rock crevices and one of a squirrel hole under spruce roots at the other. All three entrances at each site would fit within a six-foot circle. Mean high tides approached to within 10 feet laterally of the most seaward entrance at one site and within 6 feet at the other. Trails from the entrances led to the water's edge, and presumably, to the feeding areas in the intertidal zone.

Movements.-- Only fragmentary information is available on the movements of coastal southeastern Alaska mink. The well-worn mink trails paralleling the beaches indicate that mink movement along the beaches does occur. Also, trappers report some mink movement up the larger streams during the summer. However, the extent and duration of these movements are not known. Transitory snow covers curtailed observations on local mink movements during January, February and the first half of March, 1957. However, during January and February movement appeared to be limited. Numerous tracks, evidently made by feeding mink, emerged from dens within the vegetative cover and led to the intertidal zone. A few of the tracks paralleled the beach for distances of 100 to 200 yards, but most re-entered dens in the vegetative cover within 100 yards from point of emergence. Often, the points of emergence and re-entry coincided. Apparently, extensive movements were the exception rather than the rule during this period.

During the first half of March, the movement pattern changed somewhat. Although many of the tracks still followed the pattern described above, a few paralleled the beach for distances of two miles or more, at times following trails in

the woods and at times the beach proper. The investigator followed one set of tracks for 2¼ miles before he had to cease tracking.

Live trapping and tagging.-- Live traps were set for a total of 219 trap nights during the period October 16 through November 11, 1957. Only two mink were captured, a large adult male and an adult female, but both died in the traps from exposure. On numerous occasions mink by-passed the traps, and one mink even deposited a live sea urchin in the entrance to the trap without actually entering the trap. Probably the high food levels in the intertidal zone decreases the attractiveness of the baits in the live traps to such an extent that the live traps are ineffective.

Another live-capturing method was also attempted. At night, preferably at low tides, a strong spot light was used to illuminate the beach while slowly cruising in a small skiff in the water near the beach. Upon spotting a mink feeding near the water's edge, the light was shined directly on the mink, the skiff was stopped and the water alongside the boat was noisily splashed. This procedure attracted the mink to the skiff. Although no mink were captured by this method, some near-misses occurred. This method deserves more investigation.

Trapping Methods, Pressures and Effects.-- The majority of the trapping parties, generally consisting of two or three individuals, utilize a fishing (troll) boat for quarters during the trapping season. The fishing boat is secured in a suitable anchorage near the trapping grounds, and a skiff is subsequently used to check the trap line. Areas that do not have suitable anchorages or that have beaches subjected to heavy winds and seas, thus limiting the use of a skiff, are not heavily trapped, but the suitable areas are, often with one party trapping 10 to 15 miles of beach.

Both baited and nonbaited sets are used. The baited sets, placed in a small

"cubby" built of either rack or wood, are located near the high tide mark or at the edge of the vegetation cover. Frozen herring, probably Clupea harengus pallasi Vallenciennes, is the most common bait, but clams and birds are also used. The nonbait sets are normally located in the mink trails at the edge of the vegetation cover. About 100-150 size No. 1½ long spring, steel traps are set by each party.

The trapping seasons for coastal southeastern Alaska have changed frequently. Recently, alternate year seasons have been in effect.

A profitable commercial fishing season coupled with low mink fur prices undoubtedly decreases the number of mink trappers and reduced trapping pressures result. Conversely, an unprofitable fishing season and high fur prices stimulate trappers and increased trapping pressures ensue. However, many individuals trap regardless of the fur prices, tending to stabalize the trapping effort.

Climatic factors essentially do not effect the trapping pressures. Heavy snows and winds often hinder trapping efforts, but prolonged curtailment of trapping does not result.

Large catches are common in coastal southeastern Alaska. A few of the catches per area have already been listed. The catch per mile of beach, however, is probably the best index of success, with catches of 15 mink per mile of beach on record.

The large mink harvest greatly reduces the size of the mink population. However, one reporductive seasnn replaces much of the loss. During the 1956-1957 season, which followed a closed season, 247 mink carcasses were collected from trappers, and sex and age ratios were determined. The data have already been presented. Suffice to say, the data indicate a low productivity during 1956, yet large populations were present during the trapping season that fall. Therefore, high production must have occurred during 1955, possibly creating such high densities that reduced production resulted in 1956. Other factors may have been influencing production during

1956, however, and further investigations are needed to reveal the true relationship of trapping pressures and population size.

Recommendations

The management problem in coastal southeastern Alaska involves regulation of trapping pressures. The trapping methods and pressures in this area are very effective, undoubtedly capable of greatly reducing the mink population. A recent result has been the closing of mink seasons in alternate years. The data gathered to date indicate that the population increases greatly the first productive season following a trapping season, not to the population level present after two breeding seasons and no open season, but possibly to such a level that reduced production results the second year. Therefore, from a total production standpoint, a season each year seems advisable. Another consideration, however, is the outfitting expense of the trappers versus the trapping returns. The cost of outfitting remains the same each year regardless of a yearly or an alternate-year season, yet the yearly returns presumably would be smaller with yearly seasons. Possibly the net returns would be larger if trapping were allowed every other year, for the outfitting expense would only be half.

Other information is also needed for a sound management program, including the reproductive rates at different population levels, the extent and rate of repopulation of locally depleted areas and the extent of such areas, and the actual carrying capacity of the beaches, and pre- and post-season mink population densities.

Much of this information could be gained by studying an isolated mink population, such as an island population. Strait Islan, located in Sumner Strait, is ideally situated for studying an isolated population, inasmuch as the island is fairly representative of the conditions in southeastern Alaska, is rather small,

and is located sufficiently far from the nearest land to discourage any mink movement onto or off of the island. Game Management Agent Graham and Wildlife Management Biologist Kleim released a few ranch mink from the Petersburg Experimental Fur Farm on the island during 1956, but a check by Graham during the winter of 1957-1958 failed to reveal any mink sign on the island. Possibly, the mink plant was unsuccessful. Establishment of a population of local wild mink on the island would provide an isolated mink population that could be readily studies and manipulated.

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Correlate
catch/mile of beach
, specific areas
in subsequent years.
(including unit/effort)