

MAMMALS OF THE KATMAI NATIONAL MONUMENT, ALASKA

Everett L. Schiller* and Robert Rausch†

IN THE summer of 1953 a programme of scientific research that included a biological reconnaissance was initiated in Katmai National Monument by the U.S. Park Service. The Arctic Health Research Center and other agencies of the Federal Government were invited to participate in this work. The writers were given the opportunity to survey the mammals of the region and to make observations on the ectoparasites and endoparasites of the animals collected.

It is the purpose of this paper to present information obtained on the occurrence and distribution of the mammals of the region.

Background information

Katmai National Monument, comprising about 1,700 square miles located at the base of the Alaska Peninsula, was established in 1918 to protect the area most drastically affected by the volcanic eruption of 1912. In 1931 and 1942 the boundaries were extended to include additional areas of geological and biological interest.

The monument is traversed on the west side by the Aleutian Range, and its topography is quite mountainous. Except where extensive glacial outwash has led to the formation of low valley floors and pumice beaches, the shoreline is characterized by deep estuaries, lagoons, and numerous small islands. The highest peaks reach an altitude of 7,500 feet; many of the steep slopes are covered by a thick layer of volcanic ash. Craters of extinct volcanoes are numerous, and seven volcanoes were active during the time of this work. The Valley of Ten Thousand Smokes that was formed during the eruption of 1912 lies below the western slope of the Aleutian Range. This area was described in detail by Griggs (1922). Vegetation is gradually becoming re-established in this valley. West of the Aleutian Range the foothills border a series of large lakes. A nearly level plain with many ponds and lakes, including Becharof and Ugashik lakes, extends from the foothills of the Aleutian Range south-westward to Bristol Bay.

The region where the field work was performed lies in a transitional zone between the Hudsonian and the Aleutian biotic provinces (Dice, 1943). The vegetation, climate, and mammals of this region were discussed by Osgood (1904).

*Present address: Department of Pathobiology, Johns Hopkins University, Baltimore, Maryland.

†Arctic Health Research Center, Public Health Service, U.S. Department of Health, Education, and Welfare, Anchorage, Alaska.

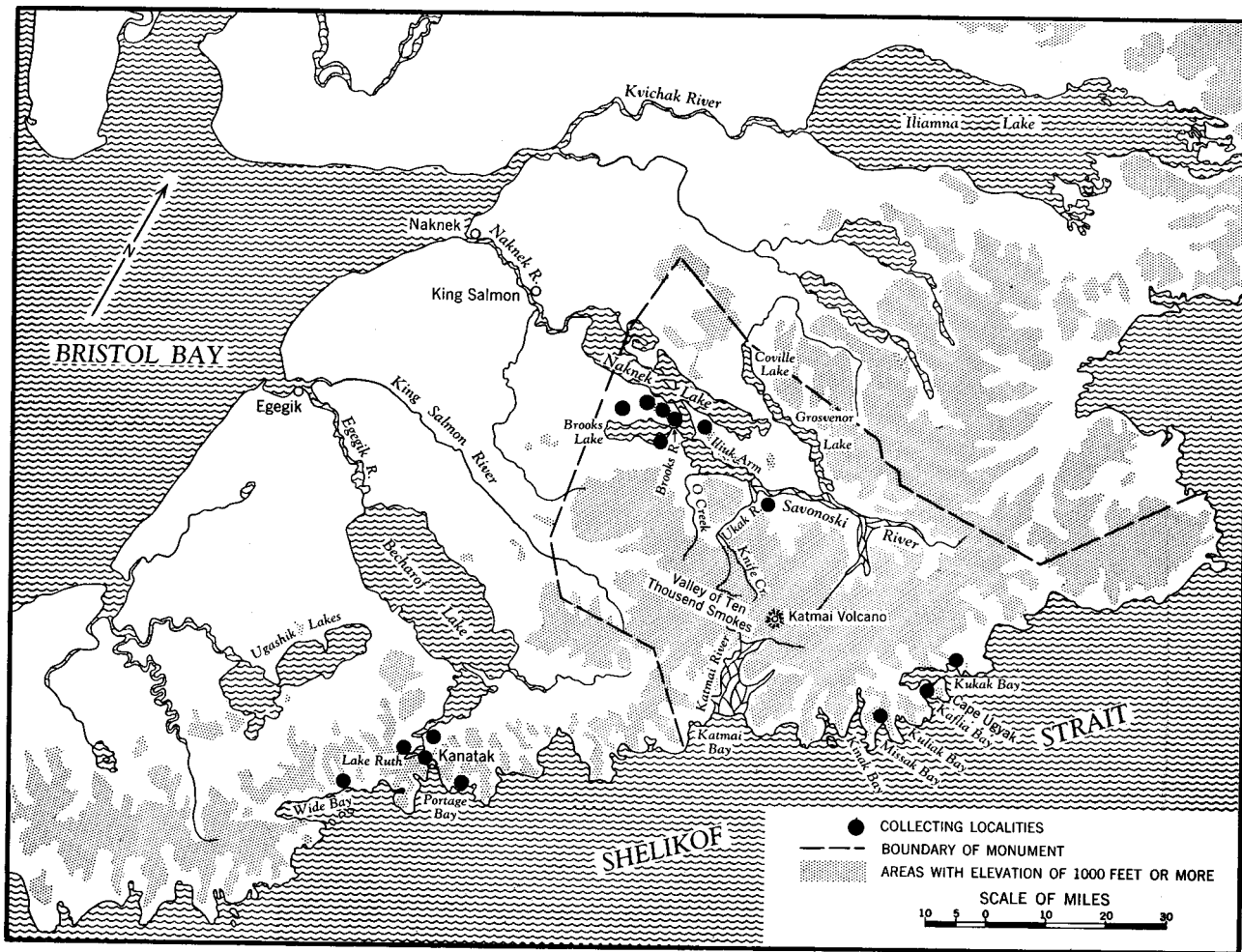


Fig. 1.
Region of
Katmai
National
Monument,
Alaska.

Material and methods

Field work was performed by Schiller from July 1 to August 4, 1953 in the Katmai region, and from May 3 to May 23, 1954 in the region of Becharof Lake. Travel was mainly by boat and plane; in the monument a helicopter was sometimes used.

Mammals were collected by trapping and shooting; study skins were prepared in the field in the standard manner. All mammals were examined for the presence of parasites. Records of larger mammals were based on observations only, since none were collected. The skulls were prepared for study at the laboratory in Anchorage. The taxonomic work was performed by Rausch. The specimens collected will be deposited in the U.S. National Museum. Collecting localities are shown on the map (Fig. 1).

Results

Sixteen species of mammals were collected, and for 16 additional species sight records or information were obtained. These are discussed separately:

***Sorex vagrans shumaginensis* Merriam.* Dusky shrew.**

Thirty-one specimens of this shrew were trapped at various localities: eleven near a small cove along the south side of Naknek Lake, in a marsh where *Calamagrostis* sp. was the predominant plant; four in a ravine at an altitude of about 2,000 feet north of Brooks Lake; four along the shore of Naknek Lake in a birch-alder community; twelve around the buildings of an abandoned cannery at Kukak Bay.

Osgood (1904) collected this shrew along Becharof Lake and at Kanatak. Although traps were set at both places in the spring of 1954 no specimens were taken.

***Sorex cinereus hollisteri* Jackson. Cinereus shrew.**

Four specimens of *S. cinereus* were collected: two in a marsh at the east end of Naknek Lake, and two along the banks of a stream emptying into Iliuk Arm near the mouth of Savonoski River.

Osgood (1904) found this shrew to be scarce along his route across the Alaska Peninsula, but numerous in the coastal region.

***Ursus arctos* Linnaeus. Brown bear.**

The brown bear was the mammal most in evidence in the monument. Bear trails were observed everywhere—in low grasslands, in dense alder thickets along river banks, and on snow fields in the mountains. During the time of the field work bears were numerous at lower altitudes (below 1,500 feet). Prior to the salmon run they were seen on the lower mountain slopes and along

*The specific name *S. vagrans* replaces *S. obscurus*, according to the recent revision by Findley (1955).

the river banks, where they were feeding on plants (particularly *Equisetum* sp.). After the salmon run began, the bears congregated along the streams, where they caught and ate salmon. None were seen around Kanatak and lower Becharof Lake, although tracks were noted across snow fields at higher elevations. Bears are hunted extensively outside the monument. A young female bear was killed by an Aleut hunter on May 13, 1954 on the beach at Wide Bay. This animal weighed 134 kg.

The bears of the upper peninsula are not typical of the very large *U. arctos gyas* Merriam, that occurs farther to the west. They average smaller in size, and cranially resemble more the animals to the north.

***Vulpes vulpes alascensis* Merriam. Red fox.**

Red foxes were numerous in the monument and in the region to the southwest. They were abundant along the larger bays of Shelikof Strait. A den occupied by a family of foxes was found at the site of the former village of Kukak on Kukak Bay. It was inhabited by the adult male and female and six young. The foxes were feeding mostly on voles (*Microtus oeconomus*), and remains of recently killed animals of this species were scattered around the entrance of the den.

Foxes were common at Kanatak in May, 1954. Several dens were found in the sand drift on the northeast shore of Portage Bay. The animals were seen feeding at low tide along the beaches. An adult male weighing 6 kg. was collected here, and another adult male was found dead at Wide Bay.

Aleuts living in this area found several dead foxes after the snow melted in the spring of 1954. Descriptions of the behaviour of some animals they had seen in late winter indicated that they probably were rabid. During the month of March, one man killed four foxes close to his house and one of his dogs was bitten. In about two weeks the dog developed symptoms typical of rabies. The heads of the four foxes were sent to the laboratory in May, but decomposition was too far advanced to permit recovery of the virus. However, rabies virus was recovered from the brain of a fox killed at Naknek in April, 1954.

The foxes at Kukak Bay were found to harbour hookworms, *Uncinaria stenocephala* (Railliet, 1884), and tapeworms, *Taenia* sp.

Osgood (1904) reported that the Aleuts at Kanatak trapped more than 100 red foxes in the winter of 1902-3, mainly around the head of Becharof Lake.

***Canis lupus* Linnaeus. Wolf.**

Although local pilots from both King Salmon and Egegik reported wolves to be fairly common in the monument, none were seen by any of the personnel of the Katmai project during the summer of 1953. Wolf tracks were found at the following localities: near the mouth of O Creek, along the Savonoski River, at Missak Bay, on the delta of Katmai River, and on the shores of Naknek Lake. The trail of one animal was also seen along Knife Creek in the Valley of Ten Thousand Smokes.

Osgood (1904) found no evidence of wolves in this region.

***Martes americana actuosa* (Osgood).** Marten.

No marten or any evidence of them were noted in the course of this work. A pilot from Egegik reported seeing marten during the last few years in the vicinity of Coville and Grosvenor lakes. Mr. V. Cahalane (personal communication) also noted the occurrence of this species during a visit to the monument in the fall of 1940.

Osgood (1904) obtained no information on the occurrence of marten in this region.

***Mustela erminea arctica* (Merriam).** Ermine.

One ermine was seen at the abandoned cannery at Kukak Bay by Dr. John Lucke, geomorphologist with the Katmai project. A field party reported the presence of another on one of the small islands in Kukak Bay on which glaucous-winged gulls were nesting. None were collected.

Osgood (1904) collected one ermine at the head of Becharof Lake, and secured other specimens from the general region.

***Mustela rixosa eskimo* (Stone).** Least weasel.

An Aleut resident of Kanatak described what he believed were least weasels that he had observed around abandoned buildings in the village during the summer of 1953. At that time the population of voles (*Microtus* sp.) was at a high density. None were seen during the present work.

***Mustela vison ingens* (Osgood).** Mink.

An adult female mink was captured alive at Kukak Bay and maintained for several days on a diet of voles. It later died, following the feeding of a small fish, and it was found that a bone had perforated its stomach. At the time of death the animal weighed 769 grammes and measured 548 mm. in total length.

According to Aleuts living at the head of Becharof Lake, mink are common in that region.

***Lutra canadensis* (Schreber).** Otter.

Many trails of otter were found along small streams emptying into Naknek and Brooks lakes, and Iliuk Arm. Tracks were observed along lakes and streams near the coast of Shelikof Strait. According to the Aleuts, otter are common around Becharof and Ugashik lakes. No specimens were collected.

Osgood (1904) also found otter to be common around Becharof Lake.

***Gulo gulo luscus* (Linnaeus).** Wolverine.

A wolverine was seen just north of Kukak Bay by Mr. William Thompson, geographer of the Katmai project. Schiller found tracks on the pass between Kanatak and Lake Ruth in 1954. The Aleuts were of the opinion that wolverines were relatively common in this area. No specimens were secured.

Osgood (1904) did not collect or observe wolverines in the region under consideration.

***Felis lynx canadensis* Kerr.** Canada lynx.

Lynx were probably fairly common throughout the monument. These animals and their tracks were seen near the fish weir in Brooks River by personnel of the Katmai project. Tracks were observed on the banks of O Creek, and on the mud flats of Ukak and Savonoski rivers. No specimens were collected.

Osgood (1904) found the lynx rare during the time of his work.

***Lepus americanus dalli* Merriam.** Snowshoe hare.

Snowshoe hares were scarce in all areas of the monument where observations were made in 1953. Old droppings were seen in nearly all timbered areas visited, but little recent sign was noted. The partially-eaten carcass of a young animal was found on a bear trail at the west end of Naknek Lake. No other specimens were obtained.

***Lepus timidus othus* Merriam.** Arctic hare.

Pilots flying over the area reported seeing many arctic hares in the region of the Alaska Peninsula south of the coniferous forest in 1953-54, especially around Port Heiden, and Becharof and Ugashik lakes. In May, 1954 the hares were still in winter pelage and remained around snow fields at higher elevations. One female arctic hare weighing 5.5 kg. was collected near the lower end of Becharof Lake on May 16, and the partially eaten carcass of another was found at Wide Bay.

Osgood (1904) did not find any recent evidence of arctic hares during the time of his work.

***Marmota marmota caligata* (Eschscholtz).** Hoary marmot.

Two small colonies of hoary marmots were found on a mountain at the northeast coast of Portage Bay. Two adults were collected there in the spring of 1954, one of which, taken on May 12, contained three embryos with crown-rump length of 60 mm. The skin of another marmot was obtained from an Aleut at Kanatak.

Osgood (1904) collected no marmots in this region, but mentioned specimens from Kanatak in the Biological Survey collections.

***Citellus undulatus ablusus* Osgood.** Ground squirrel.

Ground squirrels occurred in a variety of habitats in the monument. Near the summit of the mountain rising from Cape Ugyak, Kukak Bay, their burrows had been excavated in deposits of loose, granular pumice. The entrances to these burrows were unusually large, probably because of the nature of the pumice. Twenty-three ground squirrels were collected. In addition, six adults were captured alive and brought to the laboratory in Anchorage, where two of the females gave birth to young. One litter, borne June 1, 1954, consisted of three animals weighing 6.6, 6.4, and 6.0 grammes. A second litter of two was born a few days later. None of the young survived more than a few hours.

Some of the ground squirrels collected in the monument harboured fleas, *Oropsylla idahoensis* (Baker). Ticks, *Ixodes angustus* Neumann, were found on ground squirrels from Cape Ugyak.

Osgood (1904) found this ground squirrel abundant.

Tamiasciurus hudsonicus kenaiensis Howell. Red squirrel.

Red squirrels were uncommon in the timbered regions north of the Aleutian Range, but the presence of old middens and nests was noted. Two female red squirrels were collected along Naknek Lake, one of which, obtained on July 8, 1953, contained one embryo (crown-rump length 30 mm.). Both squirrels harboured fleas; one was infested with *Monopsyllus vison* (Baker), and the other with *M. vison* and *Orchopeas caedens durus* (Jordan).

Osgood (1904) found red squirrels to be scarce in those places where he made observations.

Synaptomys borealis dalli Merriam. Bog lemming.

Two specimens of the bog lemming were collected during this study. One was trapped in a marsh near Brooks River; the other was taken at Cape Ugyak in an alpine habitat at an altitude of about 1,500 feet.

Osgood (1904) collected the bog lemming farther to the north, but did not observe any in the region under consideration. The present material extends the known range of this species to the southwest.

Dicrostonyx torquatus rubricatus (Richardson). Varying lemming.

On May 16, 1954 only one female varying lemming, weighing 40 grammes was collected in low, wet tundra along the southern arm of Becharof Lake. Another was seen on the pass between Portage Bay and Lake Ruth between two small fields of snow.

Although Osgood (1904) collected no varying lemmings, he stated: "A few small burrows, possibly of *Dicrostonyx*, were found in some sandy banks near the lower end of Becharof Lake, but excavation proved them deserted."

Clethrionomys rutilus dawsoni (Merriam). Red-backed vole.

Red-backed voles were uncommon in the monument north of the Aleutian Range during the summer of 1953; twelve animals were collected in this region. However, sixty animals were collected at Kukak Bay, where the population was dense, especially around abandoned cannery buildings. These voles were found in a variety of plant communities, including *Alnus-Equisetum*, *Picea-Alnus-Salix*, and *Calamagrostis*.

On the basis of a small series of specimens collected at Egegik River, near the outlet of Becharof Lake, Osgood (1904) suggested that a small peninsular form may exist in this region. Although the number available for study is small, nothing was observed that would support this view. This vole was abundant during the time of Osgood's observations.

Ticks, *Ixodes angustus*, were collected from one red-backed vole taken in the monument.

Microtus oeconomus kadiacensis (Merriam). Tundra vole.

North of the Aleutian Range the tundra vole was collected only at the site of the old Aleut village of Savonoski, near the mouth of the Savonoski River. Here seven voles were trapped in a *Calamagrostis-Elymus* community in a total of 1,440 trap nights. This vole was abundant along the coast of Shelikof Strait, however, and 294 were collected at Kukak Bay in late July, 1953. Deeply worn runways and other evidence indicated high densities of population at Kafia, Kuliak, Kinak, and Missak bays.

In May 1954, when field work was undertaken at Kanatak and Becharof Lake, this vole had become scarce. Aleuts stated that the voles had been abundant in the fall of 1953, but apparently had died in great numbers during the winter. Numerous runways occurred from near sea level to an altitude of about 3,000 feet at Kanatak. More than 500 traps were set and maintained for 15 days, during which time only five voles were taken, and four of these were trapped around buildings in the village. Excavation of burrows at Kanatak disclosed carcasses of voles in nests, and dead animals were also found in vacant buildings. Members of the Katmai project who worked in the monument during the summer of 1954 reported few voles in areas where they had been numerous the year before.

As noted by Osgood (1904), *M. oeconomus* from near the base of the Alaska Peninsula is similar to *M. o. kadiacensis*, but the skull of the latter is somewhat more massive. Voles from the monument closely resemble specimens from the vicinity of Skwentna, farther to the north, and in colour were identical with topotype specimens from Kodiak Island.

Ectoparasites were collected from only a few voles at Kukak Bay; these included a tick, *Ixodes angustus*, and a flea, *Megabothris abantis* (Rothschild).

Microtus pennsylvanicus alcorni Baker. Meadow vole.

This vole was uncommon during the time of the present work. Three specimens were collected in small marshes along the south shore of Naknek Lake in about 4,000 trap nights. Runways were not seen.

Specimens of *M. pennsylvanicus* from the monument are identical with animals collected at Skwentna to the north. Although Osgood (1904) designated voles from this same general region as *M. pennsylvanicus drummondi* (Audubon and Bachman), the form occurring here has more recently been considered as *M. pennsylvanicus alcorni* (Baker, 1951) (see Hall and Cockrum, 1953). The present records extend the known range of this species to the southwest.

Zapus hudsonius alascensis Merriam. Jumping mouse.

Jumping mice were trapped in three different localities north of the Aleutian Range: one was taken above timberline at an elevation of about 2,000 feet; another was trapped in a marsh on the south shore of Naknek Lake; and four were collected on the mounds of the former Savonoski village. Three of the specimens from Savonoski had very sparse hair on the head and dorsum, but this appeared to be only an unusual molt.

Osgood (1904) recorded the jumping mouse from as far west as Cold Bay. The Aleuts of Kanatak and Becharof Lake knew nothing of the occurrence of this mammal.

Castor canadensis Kuhl. Beaver.

Beavers were abundant in the monument, particularly around Naknek Lake and in the Brooks River drainage. In the lowlands south of Brooks Lake, many beaver ponds were seen from a helicopter. One beaver dam near Brooks River was nearly a mile long. Beavers were also common in the lower Becharof Lake region. Several animals had been taken here by the Aleuts during the winter of 1953-54, and of these one skull was obtained. No other specimens were collected.

Osgood (1904) mentioned a small colony of beavers near Becharof Lake, and found the animals numerous also farther to the northwest.

Erethizon dorsatum myops Merriam. Porcupine.

No porcupines were seen in the area between Grosvenor Lake and the lower Savonoski River by any of the project personnel during the summer of 1953. On May 16, 1954 a female porcupine weighing 5.6 kg. was collected in a thicket of alder about 1,000 feet above Becharof Lake. According to the Aleuts, porcupines are not uncommon in this vicinity, and they are sometimes also seen at Kanatak.

Osgood (1904) obtained two porcupines from the Becharof Lake region and stated: ". . . they have a great fondness for the aments and young leaves of the alder, which probably accounts for their occasional or possibly regular occurrence in the tundra region."

Ondatra zibethica spatulata (Osgood). Muskrat.

No muskrats were observed in the monument during the summer of 1953. The Aleuts find many muskrats in Becharof and Ugashik lakes, but only two were seen during the brief period of field work along the southern arm of Becharof Lake in May 1954. None were collected.

Osgood (1904) obtained eleven muskrats from Becharof Lake and found them abundant in suitable habitats throughout the region.

Alces alces gigas Miller. Moose.

Only a few moose were seen by personnel of the Katmai project in the summer of 1953. An adult male was found dead and nearly submerged in Naknek Lake. The molar teeth of this animal were excessively worn, apparently due to the abrasive effect of volcanic ash, which is present in quantity on the vegetation of the region.

The Aleuts reported seeing several moose around Kanatak, and some thought that the moose are ranging farther down the Alaska Peninsula than formerly. Maddren (*in* Osgood, 1904, p. 30) believed that the moose in this region were restricted in their distribution by the limits of birch forest. It is

now known that birch is not a requisite food species, and moose may be found wherever the larger species of *Salix* are abundant.

Several moose were seen during a flight from Kanatak to Naknek Air Base in May 1954. Most of these were south of Naknek Lake, in the area between Brooks Lake and Naknek River.

Rangifer tarandus ?granti Allen. Caribou.

Caribou were formerly found in large numbers in the region of Becharof and Ugashik lakes. Their distribution was continuous from the base of the peninsula, by way of the treeless area north of Naknek Lake, through the region of Lake Iliamna to the mainland. Residents of King Salmon stated that the caribou have been absent from the Naknek Lake area for many years and that none occur at the present time between Naknek Lake and Lake Iliamna. According to Leopold and Darling (1953), caribou discontinued their migration from the mainland to the peninsula when this range became depleted after intensive grazing by reindeer. The latter became originally established on the base of the peninsula about 1920; they numbered up to 10,000 or more animals and occupied the region of Dillingham-Egegik-Iliamna for more than 20 years. A small herd of caribou remained on the peninsula south of this region, and according to Scott *et al.* (1950) numbered about 2,500 animals in 1949. These animals winter on the tundra around Becharof Lake and pass the summer near the coast in the vicinity of Port Moller, 200 miles to the west. As shown by Leopold and Darling (1953), the gap in the distribution of these animals has not yet become closed again. However, since the lichens have recovered considerably on former reindeer range, Leopold and Darling predicted that the caribou may some day re-occupy this region.

It is unlikely that the subspecies *R. tarandus granti* has escaped cross-breeding with the introduced domesticated form. Osgood (1904) pointed out that the population of the peninsula was never separated from the mainland herds, as was thought by Allen (1902).

Phoca vitulina Linnaeus. Harbour seal.

Harbour seals were common along the coast of Shelikof Strait, particularly in Kukak, Katmai, and Portage bays. Many of these animals are killed annually by fishermen, who believe that they feed upon salmon. No specimens were collected.

Callorhinus ursinus (Linnaeus). Fur seal.

The carcass of a young male fur seal was found on the beach at Kanatak, where it had been washed ashore during May 1954. The animal had been dead for some time. The skull was preserved.

Eumetopias jubata (Schreber). Steller's sea lion.

The carcasses of two adult male Steller's sea lions were found on the beach at Kukak Bay in July 1953; both carcasses were badly decomposed.

Discussion

The effect of the volcanic eruption of 1912 on the mammals of the Katmai region cannot be evaluated. Detailed observations prior to 1912 are lacking, and it was unfortunately impossible to relate plant succession to presence and abundance of the various species of mammals. It is obvious that all of the smaller species, such as the microtine rodents and shrews, are widely distributed in this region, and no species which might be expected here is absent.

In the event of another eruption of similar magnitude, it is hoped that annual studies can be made on selected areas. This would make possible an evaluation of the initial effect upon the flora and fauna, and would permit an understanding of plant succession and the related occurrence of mammals.

Acknowledgments

The authors take this opportunity to express their appreciation to the National Park Service, U.S. Department of the Interior, for making this survey possible; to personnel of the Katmai Project in 1953 and 1954, for contributing valuable field data; to Mr. George P. Holland, Entomology Division, Canada Department of Agriculture, Ottawa, who identified the fleas collected; to Mr. Glen M. Kohls, Rocky Mountain Laboratory, Hamilton, Montana, who identified the ticks; to the Aleut people of Kanatak, Alaska, who provided much worthwhile information; and to all others from whom we received assistance in the field and in the laboratory.

References

- Allen, J. A. 1902. "A new caribou from the Alaska Peninsula." *Amer. Mus. Nat. Hist. Bull.* No. 16, pp. 119-127.
- Dice, L. R. 1943. 'The biotic provinces of North America.' Ann Arbor: Univ. Mich. Press, 78 pp.
- Findley, J. S. 1955. "Speciation of the wandering shrew". *Mus. Nat. Hist. U. Kans. Publ.* Vol. 9, No. 1, 68 pp.
- Griggs, R. F. 1922. 'The Valley of Ten Thousand Smokes'. Washington: National Geographic Soc., 340 pp.
- Hall, E. R., and E. L. Cockrum. 1953. "A synopsis of the North American microtine rodents." *Mus. Nat. Hist. U. Kans. Publ.* Vol. 5, pp. 373-498.
- Leopold, A. S., and F. F. Darling. 1953. 'Wildlife in Alaska. An ecological reconnaissance'. New York: Ronald Press Co., 129 pp.
- Osgood, W. H. 1904. 'A biological reconnaissance of the base of the Alaska Peninsula.' *North Amer. Fauna.* No. 24, U.S. Dept. Agr., 86 pp.
- Scott, R. F., E. F. Chatelain, and W. A. Elkins. 1950. 'The status of the Dall sheep and caribou in Alaska.' *Trans. 15th North Amer. Wildlife Conf.*, pp. 612-25.