SMALL MAMMAL SURVEY OF ANIACKHAK CALDERA

Report to the National Park Service
on field work in July 1987
by:

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December 1987
Little information has been published on the small mammals of the Alaska Peninsula. Olaus Murie (1959) reports on his own reconnaissance of the Peninsula and Aleutian Islands in 1936 and 1937 and reviews the scant previous work. Schiller & Rausch (1956) collected in the Katmai area, near the base of the Peninsula but mammal records from along the length of the Peninsula are essentially incidental.

Thus, knowledge of the small mammal fauna of Aniakchak National Monument must be inferred from the scattered regional records. In order to assess a variety of resource management needs, the NPS was surveying baseline ecological parameters in the Monument during the summer of 1987. As a part of this reconnaissance, we surveyed the small mammal fauna of Aniakchak Caldera in order to determine what species are present in the Caldera, their relative abundance, and their general habitat affinities.

METHODS

Small mammal trapping was done from 8 July until 22 July from a base camp on the west shore of Surprise Lake. Because much of the substrate in and around the Caldera is unvegetated, the amount of habitat suitable for any small mammals is limited. Nonetheless, the shores of Surprise Lake and its adjoining streams have some distinct vegetational communities and three of these were intensively sampled. Also, somewhat remote from the Lake, a vegetated boulder field below the rim of the crater was

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sampled. The sites of systematic trapping effort are described below:

Site I: West shore of Surprise Lake. This shore of the Lake is an old lava flow and hence is a stable substrate. This stability makes it perhaps the most complex vegetational community in the Caldera.

Site II: Flood plain near Gates, south of Surprise Lake. This is a flat, well consolidated substrate supporting a mosaic of vegetation communities including, mesic forb herbaceous mixed-herb, open low scrub-willow and dry forb herbaceous-alpine habitats.

Site III: Northwest inlet of Surprise Lake. This is loose ash dunes somewhat stabilized by beach rye (Elymus). Low areas along the streams seemed extremely productive, perhaps from the longer growing season resulting from the volcanically warmed waters. These low areas seemed too wet for nesting by small mammals but they were clearly being grazed by voles and lemmings.

Site IV: Boulder field below the Black Nose. This is well-drained coarse talus and boulders on the inside of the crater wall. A small, perhaps seasonal, stream runs along lower edge. Compared with similar substrates in the vicinity, this site was richly vegetated with mosses and prostrate dicots. If July 1987 was typical of other years, this site must have an extremely short growing season; when we were there it was just melting out and the plant phenology seemed some weeks behind the lakeshore.
It is a logical site for heavy accumulation of snow.

Further description of the Caldera’s vegetation, including surveys from the immediate vicinity of these trapping sites, is offered by Bosworth (1987).

In addition to these four sites, some sites were trapped unsystematically, either setting on sign, or setting for specific species. Such sets are described in the individual species accounts.

Three types of traps were used; Museum Special snap traps, Sherman folding box traps (9 X 3 X 3.5 inches), and conical steel pitfall traps (6 inches in diameter and 10 inches deep). Of these three types of trap, pitfalls were used most consistently because they are by far the most random sampling device. Pitfalls were not used at Site IV because they could not be implanted easily in the rocky substrate. Pitfalls were set in rows with the traps two to three meters apart. An effort was made to set in likely paths of small mammal movement, such as along natural features of the landscape and in the runways of voles.

Sherman traps were used in a futile effort to secure live collared lemmings for chromosomal study, but this species proved to be rare in the crater. A few tundra voles were trapped incidentally in this effort.

Specimens were preserved in alcohol for later preparation as study skins and skeletons. As such, some will be used for a reference collection at NPS headquarters in King Salmon and some
will be deposited in the mammal collection at the University of Alaska Museum (UAM). The latter will be double catalogued on the NPS Museum catalogue and the UAM mammal catalogue as a permanent loan to the UAM.

RESULTS & DISCUSSION

Six species of small mammal were trapped in the Caldera, three of which are represented by single specimens. In addition, several others were observed either directly or from sign. Two species that were expected, Clethrionomys rutilus and Sorex tundrensis, were not encountered.

Data on the common species for the four intensively sampled sites is presented in Table 1.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>Trap nights with:</th>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Snaps</td>
<td>Shermans</td>
<td>Pitfalls</td>
<td>M. oec.</td>
<td>S. c.</td>
</tr>
<tr>
<td>SITE I</td>
<td>0</td>
<td>0</td>
<td>495</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>SITE II</td>
<td>0</td>
<td>0</td>
<td>705</td>
<td>35</td>
<td>7</td>
</tr>
<tr>
<td>SITE III</td>
<td>0</td>
<td>0</td>
<td>357</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>SITE IV</td>
<td>296</td>
<td>120</td>
<td>0</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>296</td>
<td>120</td>
<td>1557</td>
<td>67</td>
<td>10</td>
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</tbody>
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*H. oec.* = *Microtus oeconomus*; *S. c.* = *Sorex cinereus*; *S. m.* = *Sorex monticolus.*
The decidedly higher capture rates at Sites II and III are because these two areas contained relatively high proportions of monocots, and hence were excellent habitat for *Microtus*. Voles of this genus often have dynamic population changes, frequently reaching densities well above the carrying capacity of local habitat. It seems clear that Sites II and III were located in focal areas of population growth.

In the following species accounts, we discuss all insectivores, lagomorphs, and rodents likely to occur at Aniakchak:

*Sorex cinereus* (Common Shrew, Masked Shrew) This species is widespread and common. We captured masked shrews in two of our four study sites in the Caldera. It is reported from Chignik (Murie 1959), and undoubtedly occurs in most well-vegetated habitats within Aniakchak Monument and Preserve.

*Sorex monticolus* (Dusky Shrew, Montane Shrew) This species is widespread and common. We captured dusky shrews in three of the four study sites in the Caldera. It is also documented from Chignik (1). It undoubtedly occurs in numerous habitats within the boundaries of the Monument and Preserve. In comparison with *S. cinereus*, it prefers relatively well-drained habitats, but as mentioned below, we captured some specimens on the edge of a swift rocky stream.

*Sorex palustris* (Water Shrew) The nearest record is from Lake
Iliamna (MacDonald & Elliot 1984), but, in spite of wide
distribution in the state, specimens of water shrew from Alaska
are rare. The northwestern extent of this shrew's range has
recently been extended (MacDonald & Elliot, 1984; Jarrell, 1986).
Water Shrews are not usually taken unless traps are set
specifically for them. Thus, their range is certainly not yet
fully documented and they could well be more widely distributed
in south coastal Alaska. We set traps in and near a likely small
stream near the Gates but caught only dusky shrews.

*Sorex tundrensis* (Tundra Shrew) This is one species not taken in
the Caldera which might well occur there. The western-most
record in Murie (1959) is Wide Bay (57°22'N, 156°11'W). Thus, a
limited distribution on the Alaska Peninsula was indicated.
Later work by the NPS (Manski, pers. comm.) in August revealed
this species on the Pacific Coast at the mouth of the Aniakchak
River. Thus, this species does occur within the boundaries of
the Preserve, as a slight extension of the known range. Suitable
habitat is found in the Caldera and further collecting,
particularly at the north end of Surprise Lake, could reveal its
presence.

*Lepus othus* (Tundra Hare) This species is well documented along
the length of the Alaska Peninsula (Anderson 1978). Droppings
and tracks seen by our party indicate that tundra hares sometimes
visit the Caldera, but no specimen was taken or seen.
Spermophilus parryii (Arctic Ground Squirrel) Ground squirrels seem ubiquitous in the Caldera. With the exception of low wet areas, virtually any place that there were vascular plants, there were likely to be squirrels.

Castor canadensis (Beaver) Beaver lodges are a conspicuous feature of tundra ponds around the Crater. Nevertheless, no sign of beaver was found in the Caldera. There are probably not sufficient woody plants for beaver.

Clethrionomys rutilus (Northern Red-backed Vole) Red-backed voles are the most ubiquitous rodent in Alaska. But we did not trap a single specimen in the Caldera. Their scarcity, or absence, could well be associated with the scarcity of birch (Betula spp.) in the Caldera.

Microtus pennsylvanicus (Meadow Vole) Meadow voles have been taken in the Katmai region (Schiller & Rausch 1956) but Murie (1959) thought that they did not occur farther west than the base of the Alaska Peninsula. Microtus specimens from eastern parts of the Peninsula should be identified to species by molar pattern.

Microtus oeconomus (Tundra Vole, Root Vole) Tundra voles were the most common mammal in the Caldera when we were there. It was apparent from sexually mature voles of small size, that the population was increasing rapidly. The highest densities occurred in low grassy areas (Sites II and III). During the
course of our stay, voles seemed to be moving upward, into dryer habitats, perhaps following the increasingly available forage as the season progressed. By the time we left, voles were being taken in sets intended for collared lemmings, well up on the lava flows covered by willow (Salix arctica) mats; these traps had been previously unproductive. Tundra voles were the only small mammal identified in several old pellets from predatory birds.

*Ondatra zibethicus* (Musk rat) Muskrats have been taken as far west as Ugashik (Murie 1959). We saw no signs of them in the Caldera, nor did we see probable muskrat habitat.

*Lemmus sibiricus* (Brown Lemming) One brown lemming (GHJ 963) was taken in a pitfall trap in *Elymus* dunes (Site III) on 19 July. This area supported a high density of tundra voles. The habitat requirements of tundra voles and brown lemmings are similar; both feed primarily on monocots. Both also have high potential rates of population growth. Thus, it is quite conceivable that in some years brown lemming populations could eclipse vole populations and become the predominant microtine in grassy areas. On the other hand, this species is known from as far west as Chignik Bay (Murie 1959); it might remain relatively scarce near the limits of its geographic range.

*Dicrostonyx nelsoni* (Collared, or Varying Lemming) One collared lemming was taken in a snap trap on the lava flows just above our camp on the west side of Surprise Lake. This was steep rocky
terrain with prostrate vegetation, especially Salix arctica. A nearby winter dung pile was attributed to this species. Collared lemmings are found the full length of the Alaska Peninsula (Murie 1959). The subspecies penninsulare is assigned to D. nelsoni by Johnson in Honaki, Kinman, & Koeppl (1982).

**Zapus hudsonius** (Meadow jumping mouse) One adult male (GHJ 921) was captured by hand in the wet sedge marsh at the northwest inlet to Surprise Lake. Jumping mice occur throughout the length of the Alaska Peninsula (Murie 1959). Given the altitude and consequent climatic severity of the Caldera, local occurrence of a characteristically temperate-to-boreal species was a little surprising. The presence of jumping mice in this wetland may be facilitated by the ameliorative effect of the Caldera's thermal features.

**Erethizon dorsatum** (Porcupine) A porcupine was encountered near the Gates on July 11 and droppings were observed regularly in the course of our explorations.

**CONCLUSIONS**

The small mammals of Aniakchak Caldera are typical of early successional communities in Alaska. Arctic ground squirrels and tundra voles regularly occur on disturbed sites, such as the banks of glacial rivers, throughout their respective ranges. The surprising absence of red-backed voles is likewise somewhat consistent with recent disturbance, though less consistent with
the diverse plant community along the lake shore.

We captured all but two of the species of mouse-sized mammals which are known to occur on this part of the Alaska Peninsula. Our failure to capture these is not, of course, conclusive evidence of their absence. In a biogeographic sense, this high diversity suggests that the Caldera is not significantly isolated from immigration by small mammals. If it were, random extinction should have eliminated the rarer species.

Population densities of voles and lemmings fluctuate dramatically at higher latitudes. Tundra voles were abundant and reproducing rapidly during our visit. Predators were not yet evident. Two other species of arvicolid rodent, the collared and brown lemmings, were represented only by single specimens. Future surveys will likely find different densities of tundra voles and perhaps a different species of arvicolid predominating.
REFERENCES


