

FISHER

Martes pennanti (Erxleben)

OTHER NAMES.—*Mustela pennanti*; *Mustela canadensis pacifica*; *Mustela pennanti pacifica*; *Martes pennanti pacifica*; Pekan; Pennant Marten; Pennant Cat; Black Cat; Fisher Cat; Pacific Fisher.

General characters.—In size and appearance somewhat like a gray fox, but legs shorter, ears shorter and not pointed, and coloration very much darker. Body moderately slender; tail long and bushy, but tapering from base; ears broad and low (semi-



Fig. 72. Fisher, face view of freshly trapped specimen (adult male, no. 23668, Mus. Vert. Zoöl.); from Chinquapin, Yosemite National Park. Mus. Vert. Zoöl., no. 2008. Shows shape of nose pad and of ears, and distribution of vibrissae.

circular); face broad between smallish eyes, but muzzle sharp, foxlike. (See figs. 72, 73.) Size of males: head and body alone, about 2 ft. long; tail without hairs, 16 in. long. Size of females: body up to 20 in. long, tail 15 in. long. Weight of males up to 10 lb., of females up to 5½ lb. Fur thick and long. Coloration dark brown, becoming more or less grayish on head and fore part of body, and blackish on rump, legs, and tail; tail solidly black at end, no white tip. (See Pl. V, facing p. 228.)

Description.—Adults (prime winter pelts from the Yosemite region): No sharply set-off color markings anywhere, save for occasional, irregularly placed white spots on lower surface; a gradual change in color tone is apparent, from rather ashy grayish brown on head to nearly black on legs and tail. The muzzle, including the whiskers, is dark bistre; nose pad, black; hair on rim and inside of ear, buffy white. Backs of ears, head from cheeks and between ears backward, sides of neck and shoulders, a grizzled grayish or buffy white; this because overhairs are black terminally, white or buffy white subterminally, and dark mummy brown basally. This same pattern of hair color extends back along sides of body to flanks, but there the terminal black tips be-

"Some years ago one of the creeping redwood fires, that burn slowly and do little damage to the large trees but destroy the cover and drive out or destroy the smaller animals, burned over the forest for miles in this section, leaving little chance for such animals as martens to remain.

"All trappers agree that, although martens have been taken along streams well down toward sea level, they are found mostly on the high ridges. This makes the trapping of them difficult, as the climb in winter is heart-breaking, owing to the wet tangle of brush and down timber, higher than one's head, up steep, slippery hillsides. . . . There may therefore be places where martens are left, though, if at all common, individuals ought to stray to lower levels within reach of the roads along the stream courses, and one now and then be taken. These animals presumably leave but little sign.

"The sort of places where martens have been found about here seems mostly the fir [spruce] timber country above the redwoods, or where the redwoods give way to fir and hardwoods back from the coast. However, old-timers say they used to be found in the redwoods proper. I have heard of several taken years ago at but a few hundred feet altitude. There are still some martens trapped each winter along the lower Klamath River.

"The common saying among trappers is that martens eat red squirrels (chickarees), which they can catch readily, as well as mice and birds. Old hunters say they will not live where there are fishers."

Under date of April 1, 1926, Mr. Wilder offered further information: "Trappers tell of taking martens in recent years on the ridges above the Eel and Mattole rivers, and I think there may be some left there now. A few years ago an Indian took 35 in a little pocket that had been left untrapped several miles east of Big Lagoon. . . . Old-timers tell of one trapper catching 50 in one winter a few miles east of Loleta."

In other, later communications, Wilder informed us that two trappers from Fort Bragg spent the trapping seasons of 1926 and 1927 on the ridges within ten miles of Carlotta. In those seasons the two men caught 25 martens. Commenting upon the total catch of these trappers, Wilder said it was "a remarkable record for this section, but was made in a region so difficult that no one else would work in it, and included the use of 400 traps over lines many miles in length." It was from these trappers that Wilder obtained the last members of the series of Humboldt pine marten now in the Museum.

A total of 43 marten skins was definitely reported by trappers in the 5-year period 1919-1924, from the part of the State we consider to lie within the range of this race.

come longer and the subterminal light bands darken until they are cinnamon brown. The darkening of the overhairs is most pronounced down middle of back from between ears, progressively increasing to base of tail; a similar effect, as of a dark band, is seen on lower surface from chin to belly, save as sometimes interrupted by the sporadic white spots already alluded to. The color of the underfur is everywhere dark, rather rich brown, varying from mummy brown on sides of neck, and dark sepia on throat, to deep mars brown on tail. The overhairs of rump, feet, and tail are glossy black. Claws yellowish white, becoming dusky at base.

On animal in prime condition, the thickness of pelage is indicated by the following measurements in millimeters (taken from no. 23668, Yosemite National Park, December 17): On top of head between ears, underfur 15 long, overhair 27 long; between



Fig. 73. Fisher, side view of head of freshly trapped specimen (adult male, no. 23668, Mus. Vert. Zoöl.); from Chinquapin, Yosemite National Park. Mus. Vert. Zoöl., no. 2009. Shows outline of head and shape of ear.

shoulders, underfur 22, overhair 35; on rump, underfur (crinkly) 27, longest overhairs (straight and very fine at tips) 54; on tail near base, underfur 26, overhair 55; longest hairs at tip of tail, 100; on fore part of belly, underfur 16, longest overhairs 45; on chest, underfur 16, longest overhairs 37; on rim of ear, dense pelage (both overhair and underfur?), 2; whiskers (vibrissae), up to 68 long. Nose pad (dry), height 14, width 16.

Variations.—The variations in coloration of fishers, judging from the specimens at hand from California, are slight. The pallor of the grizzling on the head and shoulders varies from ashy white to a rather buffy white. The extreme of dullness in this regard is shown in certain pelts from the Trinity region of northwestern California. However, a slight yellowing of the pelage of some skins may have resulted from the tanning process used, and hence this color tone may be wholly adventitious.

The ventral spotting is usually restricted to two regions, the chest and the near vicinity of the genitalia. There may be simply a few scattering white hairs or small tufts of them, or there may be abrupt, solidly white spots as much as 2 in. in diameter, involving the entire depth of overhair and underfur. These spottings never accord with perfect bilateral symmetry, though there may be a divided representation on the 2 sides of the chest. There is a median white spot on the throat, well marked or barely indicated, in

3 or 4 pelts. These white interruptions of the body color on the lower surface of the fisher remind one of the ventral orange markings in the marten.

So far as shown by the material examined, there is only one annual molt; it comes in the fall, probably taking place slowly. A pelt of date of December 13, our earliest in the fall, is absolutely prime. With the advance of spring a slight fading of the brown tones is apparent. We have no midsummer examples. Moreover, we have not seen any very young fishers from which to determine any features of coloration or other features that might be peculiar to early stages in the growth of the individual.

EXTERNAL MEASUREMENTS (IN MILLIMETERS) AND WEIGHTS OF *Martes pennanti*
FROM CALIFORNIA

No. M.V.Z.	Sex	Age	Locality	Trapper	Date	Total length	Tail vertebrae	Hind foot	Ear from crown	Weight (pounds)
16596	♂	subad.	Black Gulch, 10 mi. S Cecilville, Siskiyou Co.....	Jack Hinz	Mar. 25, 1912	990*	369*	120*	50*	8
16531	♂	ad.	Cecil Lake, 8 mi. S Cecilville, Siskiyou Co.....	Jack Hinz	Feb. 19, 1912	996*	381*	113*	50*	10
23668	♂	ad.	Chinquapin, Mariposa Co.....	A. J. Gaylor	Dec. 17, 1915	1033	422	128	38	..
24740	♂	subad.	Fort Monroe, Mariposa Co.....	A. J. Gaylor	Feb. 3, 1917	1000	375	120	35	..
12901	♀	subad.	Near Helena, Trinity Co.....	Geo. Knowles	Feb. 20, 1911	830	340	90	35	4½
16386	♀	subad.	Ray's Gulch, 5 mi. SE Cecilville, Siskiyou Co.....	Jack Hinz	Dec. 13, 1911	863*	375*	89*	50*	5½
19095	♀	ad.	Head of Ray's Gulch, 8 mi. SE Cecilville, Siskiyou Co.....	Jack Hinz	Jan. 27, 1913	863*	350*	101*	38*	5½
23686	♀	subad.	Fort Monroe, Mariposa Co.....	A. J. Gaylor	Feb. 22, 1916	900	380	115	40	..

* Changed from inches.

Measurements.—Of males, in inches: Total length 38 to 40, tail (without hairs) 14½ to 16½, hind foot 4½ to 5, ear (height above crown) about 1½. Of females, total length 32½ to 35½, tail (without hairs) 13½ to 15, hind foot 3½ to 4½, ear about 1½. For details see table on this page.

Weights.—The heaviest male of which we have dependable record weighed 10 lb., the heaviest female 5½ lb. The few authentic weights available (see accompanying table, above) indicate that the average weight of females is not more than two-thirds that of males.

Skulls.—The skull of the fisher is not so lightly built as that of the marten or weasel, nor is it nearly so heavy as that of the wolverine or badger; it is just about a fair average "mustelid" skull (see fig. 74). There is one feature, however, that merits special mention, and that is the striking change that takes place in the male as it ages. This feature has been remarked upon before; for instance, by Oldfield Thomas (1886, p. 125, Pl. XI), who accounts for it on the basis of "increase in the power of biting, and the consequent development of the biting muscles" in later life (the idea might better be expressed by reversing the order of these phrases).

We present in the table on page 215 some of the dimensions of two series of skulls, 10 male and 10 female, arranged in each sex group from oldest to youngest. As will be seen, the increases are far greater in males than in females. The criterion used by us for determining relative age is the degree of closure of sutures everywhere, especially of the basicranial sutures, or effacement of any sort of indications of where these were. Evidences of wear upon the teeth seem of little use in this species, for at most the cusps and points are but slightly worn down; any gross injuries can be accounted for by the animal's biting upon the steel of traps.

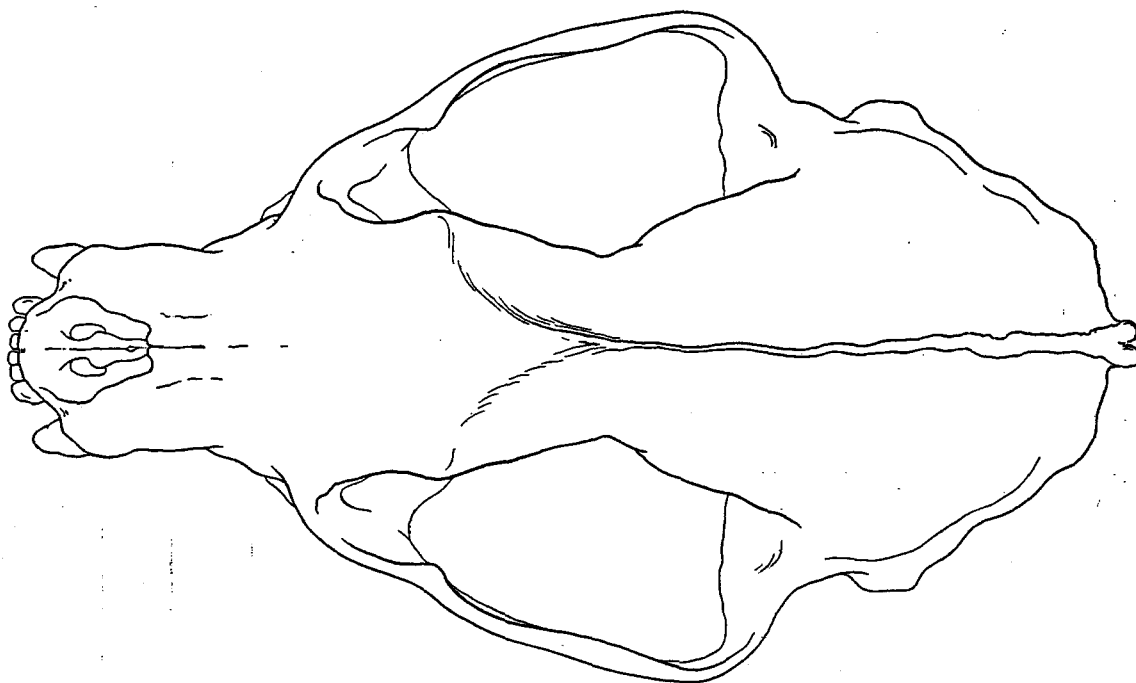


Fig. 74. Skull of fisher, dorsal view. Drawn from adult male, no. 23668, Mus. Vert. Zool., trapped on December 17, 1915, at Chinquapin, Yosemite National Park. $\times 1$. Compare with corresponding figures of wolverine and river otter.

The modifications with age, then, comprise: (1) the great elevation of the sagittal crest, which is highest above the brain case supraoccipitally; (2) the great outward bowing of the zygomatic arches; (3) the narrow constriction of the brain case a short distance behind the postorbital processes.

As indicating amount of increase in mass of bone with age in the two sexes, we present the following weights, in grams, of air-dry skulls without lower jaws: Young male (no. 16596), 30.5; old male (no. 23883), 38.2; young female (no. 31129), 20.9; old female (no. 29812), 22.8. We believe the ages of male and female correspond closely in each age group. Therefore the ratio of increase in the male, with respect to the ages used, is about 25 per cent, whereas in the female it is only about 9 per cent. Since it is likely that somewhat similar ratios obtain with respect to the body as a whole as are shown by the bones, old females may be inferred to weigh but 60 per cent as much as old males, and young females about 70 per cent as much as young males. This first figure is about the same as that obtained from actual weights taken (see table, p. 213).

Distribution area in California.—In general, forested areas of the higher mountain masses north of the Thirty-fifth Parallel. In detail, in the northwestern part of the State south from the Oregon line to Lake and Marin counties and east to and including Mount Shasta; not often in the immediate coastal region (redwood belt) nor, so far

as known at present, in the Warner Mountains, Modoc County; south from Mount Shasta and Lassen Peak throughout the main Sierra Nevada to Greenhorn Mountain, in north central Kern County. (See accompanying map, fig. 75.) Belongs to middle altitudes, 2000 ft. (near sea level occasionally) to 5000 ft. at the north, ordinarily 4000 ft. to 8000 ft. in the Mount Whitney region, although vagrant individuals go beyond

MEASUREMENTS (IN MILLIMETERS) OF SKULLS OF *Martes pennanti* FROM CALIFORNIA
ARRANGED FOR EACH SEX FROM OLD TO YOUNG

No. M.V.Z.	Age*	Locality	Greatest length of skull	Condylobasal length	Basilar length	Palatilar length	Zygomatic breadth	Mastoid breadth	Breadth across post- orbital processes	Interorbital width	Width of rostrum	Height of brain case at bullae†
Males												
16531	1	Near Cecilville.....	124.8	116.6	107.2	59.6	77.7	56.9	30.5	27.3	23.4	42.3
23883	1	Near Hetch Hetchy Val..	124.6	112.5	103.9	56.5	79.0	54.8	28.7	26.6	22.6	43.8
23884	1	Near Hetch Hetchy Val..	124.2	116.4	107.4	59.7	75.3	55.2	28.8	26.6	23.4	44.1
23668	2	Chinquapin, Yosemite Park.....	120.3	112.8	103.8	58.7	73.7	53.9	29.4	26.3	22.5	41.2
29809	2	Grouse Cr., Yosemite Park.....	120.8	110.7	101.5	57.5	70.0	52.0	29.1	27.1	22.2	41.0
31326	3	Yosemite Park.....	119.0	115.7	106.6	60.0	70.3	55.4	27.8	25.3	23.8	42.4
21396	4	Yosemite Park.....	118.5	114.6	106.1	59.4	66.4	53.8	27.3	25.0	22.6	39.1
29811	4	Grouse Cr., Yosemite Park.....	117.4	115.0	105.8	....	67.8	52.4	28.6	25.9	23.1	40.0
24740	4	Fort Monroe, Yosemite Park.....	116.4	112.5	103.1	58.2	65.7	53.0	27.5	25.3	21.7	39.0
16596	4	Near Cecilville.....	112.8	112.1	103.6	58.0	63.6	52.1	27.8	25.4	21.1	36.8
Females												
29812	1	Tuolumne Big Trees....	105.3	101.6	93.6	52.2	61.9	46.7	25.7	23.7	19.7	36.7
31094	1	Yosemite Park.....	103.9	100.4	92.4	51.0	59.9	46.4	25.6	22.6	18.8	36.7
19095	2	Near Cecilville.....	99.6	95.9	87.9	48.6	57.9	44.7	25.2	22.8	18.0	34.0
16386	2	Near Cecilville.....	101.1	97.4	89.7	49.6	60.5	47.0	24.7	22.7	18.9	37.1
20955	4	Eden Valley.....	102.6	100.7	88.3	51.0	57.8	46.4	24.9	23.0	18.5	36.5
29791	4	Yosemite Park.....	101.6	99.1	91.3	50.3	56.6	46.3	25.1	22.6	18.1	35.8
23686	4	Fort Monroe, Yosemite Park.....	100.8	98.9	91.4	50.0	55.2	44.7	25.0	22.4	18.0	35.6
29813	4	Tuolumne Big Trees....	100.7	99.0	91.0	50.0	54.9	45.2	24.8	21.2	18.3	36.7
31129	4	Big Meadows, Yosemite Park.....	100.0	98.3	90.0	50.2	55.3	45.9	24.7	21.5	18.5	37.2
31133	5	Crane Flat, Yosemite Park.....	98.0	95.0	87.2	48.0	51.5	44.3	22.4	19.8	18.7	34.8

* 1=old adult; 2=middle-aged; 3=young adult; 4=less than 1 year old; 5=very young, youngest of all; permanent teeth all in, but sutures open; date, "February."

† Including sagittal crest.

these limits; for example, to as high as 10,900 ft. near Mount Lyell. Life zones, Canadian and the upper part of Transition. There is no evidence to indicate the former occurrence of this fur bearer much beyond its present limits, although the individual numbers everywhere have been markedly reduced.

Specimens examined from California.—Skins, skins-with-skulls (some with complete skeletons), or skulls-only, contained in the Museum of Vertebrate Zoölogy unless otherwise noted: Trinity County: near Helena, 2; Wells Creek, 1 (U. S. Nat. Mus.). Siskiyou County: near Cecilville, 4. Mendocino County: Cahto, 1 (U. S. Nat. Mus.); near Covelo, 1 (U. S. Nat. Mus.); Eden Valley, 1. Lake County: near Lakeport, 1 (Stanford

Univ.). Shasta County: Burney Mountain and Rock Creek Mountains, near Cassel, 2 (U. S. Nat. Mus.). Tuolumne County: near Hetch Hetchy Valley, 3; Hog Ranch, 1; Tuolumne Big Trees, 2. Mariposa County: Big Meadows, 1; Crane Flat, 1; Big Creek, 2 (U. S. Nat. Mus.); "Yosemite Valley," 4 (1 in U. S. Nat. Mus.); Fort Monroe, 2;

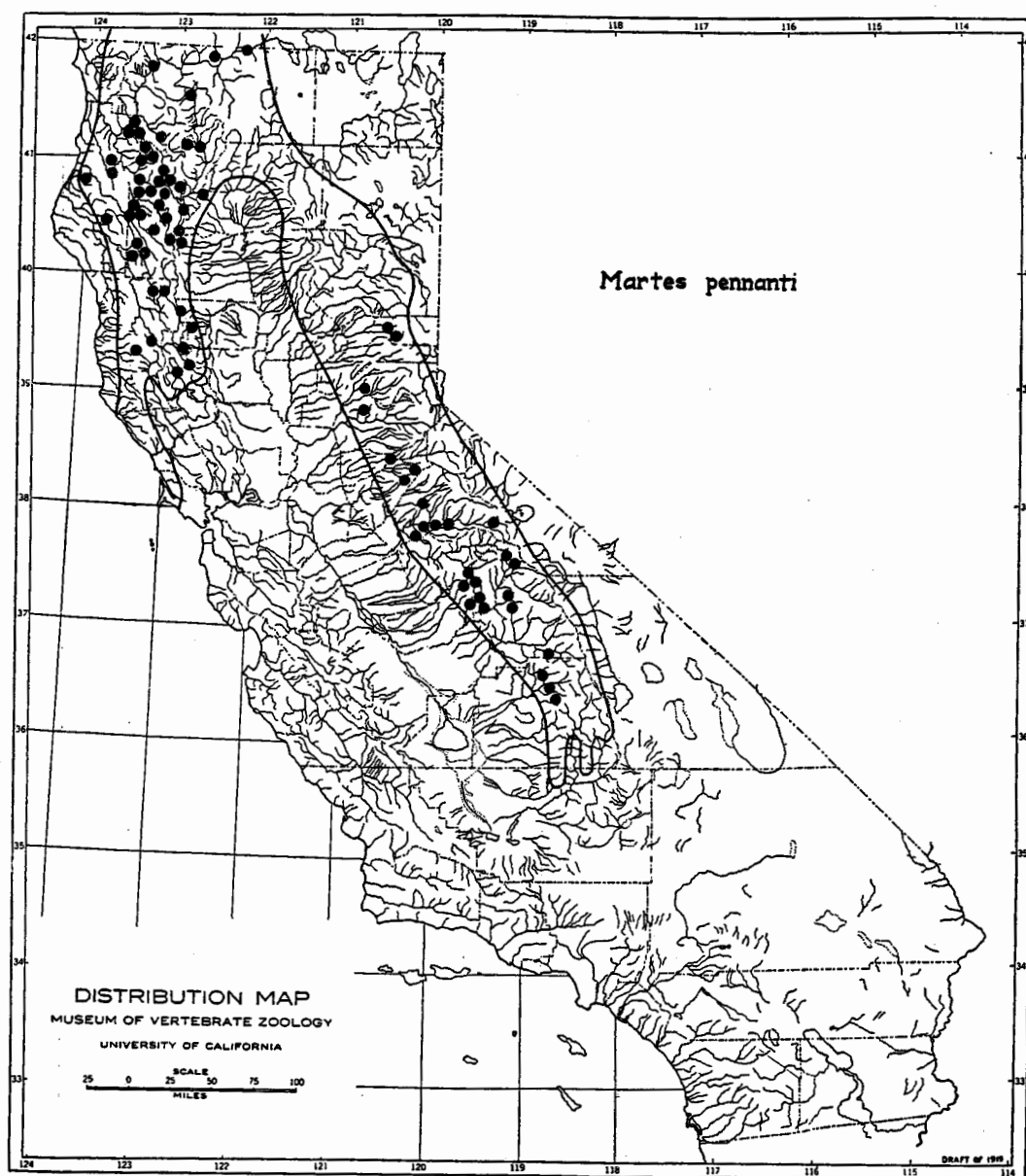


Fig. 75. Distribution of the fisher in California, as based on reports of trappers for the 5-year period, 1919-1924. Spots indicate, almost all of them with certainty, the locality of capture; probably some indicate residence or post office of trapper. Assumed general range within past seventy-five years, outlined.

Grouse Creek, 3; "Yosemite National Park," 2; Chinquapin, 1; Wawona, 1 (U. S. Nat. Mus.). Tulare County: Atwell's Mill, 1 (U. S. Nat. Mus.). Total, 37.

Critical comment.—We have attempted to consider with some care the status of the fisher to see if sufficient evidence exists for recognizing by name any geographic races within the species. A supposed western subspecies, *pacifica* (*Mustela canadensis pacifica* Rhoads [1898, p. 453]), has stood in the literature without challenge ever since first named; and on geographic grounds the existence of such a race was to be expected.

The senior writer examined the appropriate materials in the United States National Museum, including the Biological Survey collection, having with him skins and skulls from California for purposes of comparison. Without looking up Rhoads' description at that time, he went over eastern and western specimens, including skins and skulls from Maine, Quebec, Washington, and California, but did not find any character of sufficient constancy to warrant recognition of a race "*pacifica*." There were 24 skulls from near Mount Adams, Washington, a place not far from the type locality of "*pacifica*," and these showed such great age and individual as well as sexual variation as to convince the observer that any characters of geographic significance would have to be very well marked indeed to stand out as of practical diagnostic value.

Turning now to Rhoads' descriptions of fishers (1898, pp. 434-436), we find that the characters given for his *pacifica*, based, be it noted, on very meager material (a total of 2 skins and 5 skulls), are as follows: (1) darkness of general color; (2) large size; (3) large last upper molar, with broad inner lobe. With respect to darkness of color, eastern and Washington skins average so closely alike that this supposed distinction fails. With respect to size, which Rhoads emphasizes as an outstanding character of "*pacifica*," the only skull measurements he presents are of his type, said by the trapper from whom he obtained it to have been a female, but the dimensions given are those of a male! They fall within the figures we give (see table on p. 215) for Californian specimens of that sex. Rhoads seemingly had no notion of the great amount of sexual variation in the fisher. Suffice it to say that we find no ground for ascribing to this animal any readily appreciable geographic variation in size. With reference to size and shape of last upper molar, again there is so much variation in the material now examined that we find nothing outstanding by which to distinguish a western from an eastern subspecies.

However, in our Californian series of specimens, certain slight though inconstant peculiarities have become apparent. A prime skin (no. 21396) from the Sierra Nevada is not duplicated in pallor (whiteness) about the head and shoulders by any other skin seen from any place in the range of the fisher. Several other skins from the Sierra, though not quite so pale as this one, still are paler, less tawny, than Washington pelts, whereas some other Sierran ones are equally as tawny. It may thus be said that there is a mean *tendency* in the Sierran fishers to be paler-colored than northern or eastern fishers. But, in our opinion, this tendency is not strong enough to warrant recognition in nomenclature.

We have in the fisher, then, a mammal that ranges all the way across the North American continent, in midnorthern latitudes, but that has not (as yet) responded to the varying conditions—as most mammals, such as its relatives, the mink and marten, have done—by breaking up into distinguishable geographic races, or subspecies. As a reason for this conservatism, we might suggest that the fisher has the physical ability and the individual proneness to wander; it occupies rather continuously (or did until recent years) forest territory of relative climatic uniformity, and its general range is not interrupted by barriers insurmountable by wandering individuals. Its population, by progressive infiltration and crossbreeding of individuals down through time, has been maintained throughout the entire range of the species in a condition of relative homogeneity.

The fisher or fisher cat is also known as pekan, black cat, or Pennant's cat. The name pekan is of American Indian origin; black cat is not properly applied because the animal belongs closely with the weasels and not with

the cats; and fisher is misleading because, at least in California, the animal has no special desire for a fish diet. Indeed, this animal shows neither predilections nor structures indicating any adaptation toward an aquatic mode of life. It is a big, somewhat specialized weasel that has taken to living a good deal in the woods.

The fisher is one of the larger members of the weasel tribe. It is moderately slim-bodied and short-legged, with a long, tapering tail three-fourths as long as its body. The front half of the animal is chiefly of a light brown color, strongly grizzled with ashy or white. The rear half of the body is dark brown, becoming almost black on the feet and tail. The ears are short and round, and well covered with short buff-colored fur inside and out. The pearly white claws are strongly curved (see fig. 76) and thus well adapted to tree climbing. (See figs. 77, 78.)

There has been some misapprehension, if not exaggeration, about the size of the fisher. For example, it has been said that this animal attains a length of 5 feet and a weight of 18 or 20 pounds. Fortunately, we are able to present some authentic dimensions



Fig. 76. Front middle claws of fisher, pine marten, and mountain weasel, nos. 16596, 33626, and 22117, respectively, Mus. Vert. Zoöl. $\times 1$.

and weights. Out of 8 fishers from California, the largest, a middle-aged male, had a total length of $40\frac{2}{3}$ inches (1033 mm.) of which the tail, not counting hairs, measured $16\frac{3}{8}$

inches (422 mm.). This fisher was in good flesh and weighed 10 pounds. Our largest female fisher had a total length of $35\frac{1}{2}$ inches (900 mm.), and the tail measured 15 inches (380 mm.). The greatest weight for a female was $5\frac{1}{2}$ pounds. (See table, p. 213.)

In California the fisher is essentially an inhabitant of the middle forest belt, living mostly at altitudes between 3500 and 7500 feet. This statement applies to the main range of the species. We have records from trappers indicating that fishers have been taken almost at sea level in the northwestern coast belt. In the Hyampom region of Trinity County, the fishers are trapped regularly in the lower canyons of the mountains rather than at any great altitude. However, on the north slope of Mount Lyell in Yosemite National Park, a fisher was seen by a party of Museum collectors on July 18, 1915, at an altitude of 10,900 feet. (See figs. 79, 80.)

Mr. Byron Lovelace, county surveyor of Tulare County, says that he has found sign of fishers in that county at altitudes between 4000 and 8000 feet, whereas pine martens occur there at from 8500-foot to 10,000-foot altitudes.

This corroborates our other testimony to the effect that the fisher as a rule belongs in a belt of territory altitudinally just below that of the marten. Both animals are forest hunters, but each belongs to a separate type of forest.

In California the fisher is found at the present time coastwise from the Oregon line south to southern Mendocino County. (See map, fig. 75.) In



Fig. 77. Front foot of fisher. Specimen (male, no. 23668, Mus. Vert. Zoöl.) from Chinquapin, Yosemite National Park. Mus. Vert. Zoöl., no. 2010. $\times 1$.

the north it occurs from near the seacoast east through Trinity and Siskiyou counties to Mount Shasta, and it ranges from Shasta County south along the western slope of the Sierra Nevada to near Mineral King, Tulare County. The only records that we have of fishers being taken east of the main Sierran divide are of two trapped in the winters of 1920 and 1930 on the ridge just west of Eagle Lake, Lassen County. With respect to their southernmost record station for California, Henry W. Ross, in a letter of September 21, 1925, says: "About 5 or 6 years ago, Joe Smith of Isabella caught a couple of fishers on top of Greenhorn Mountain, which is on the north side of Kern River about 10 miles from Bodfish, Kern County." Byron Lovelace

reports in a letter of October 5, 1920, that he has caught fishers at Woodward Meadow, on the North Fork of the Kaweah River, and at Mineral King on the headwaters of the East Fork of the Kaweah River. Lovelace also says he does not believe that any fishers now remain south of the northern boundary of Kern County.



Fig. 78. Hind foot of fisher. Specimen (male, no. 23668, Mus. Vert. Zoöl.) from Chinquapin, Yosemite National Park. Mus. Vert. Zoöl., no. 2011. $\times 1$. Compare with wolverine, figures 91, 92.

From reliable testimony we conclude that formerly the fisher ranged south along the coast of northern California to Marin County. A Mr. McCall, who resided at Fort Ross, Sonoma County, for thirty years, knew of the presence of fishers at that locality in previous years. (McCall was interviewed by C. L. Camp.) In 1913 John Briones of Point Reyes reported that a fisher was active three miles west of Inverness, Marin County. The nature of the vegetation there, together with the occurrence of mountain beaver (*Aplodontia*) and other good Canadian Zone species of animals, indicates the suitability of that locality for fishers.

Although the fisher is of a markedly retiring nature, it does not restrict

its hunting to the nighttime. Several times to our knowledge fishers have been observed foraging in the daytime in California. One was seen in the morning, a second at midday, and a third in the evening. At Horse Mountain, Humboldt County, in the first week in October, 1916, between 6 and

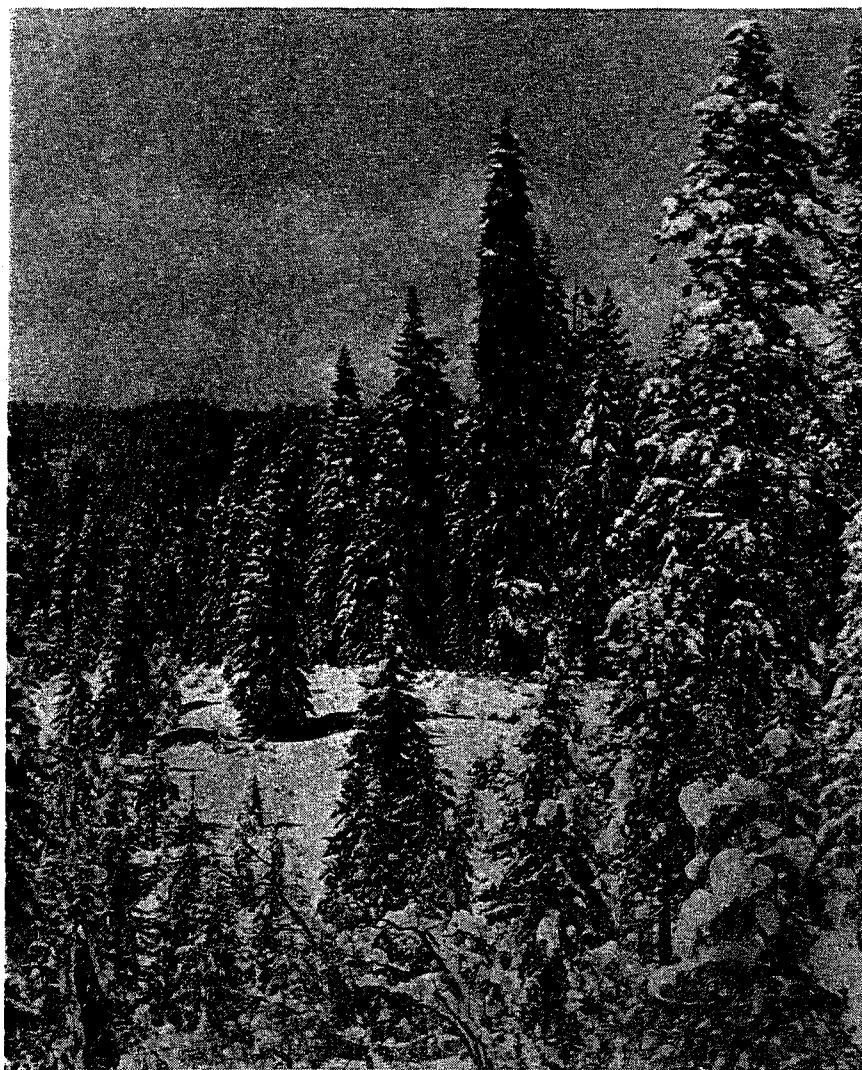


Fig. 79. Type of area inhabited by fisher in Giant Forest, Sequoia National Park, as it appeared on March 10, 1935.

Photograph by Wildlife Division; courtesy of the National Park Service, Department of the Interior.

7 o'clock in the morning, C. O. Fisher heard a gray squirrel chattering in terror in the top of a tan oak. Investigation revealed a fisher in hot pursuit of the squirrel, which it soon overtook and killed. The squirrel put up a game fight, but it lasted only a few moments. The observer said that the fisher, after killing its prey, bit off the squirrel's tail, seemingly because the tail got in its way and interfered with the movement of its front feet as it climbed about in the tree.

On September 24, 1921, one of us (D.) was in the company of State Lion Hunter Jay Bruce, hunting mountain lions in Game Refuge 1D near Big Bar, Trinity County. At midday, in an alder thicket on a steep, shaded hillside, a covey of Oregon ruffed grouse was flushed. A fisher had apparently been stalking the grouse, for the hounds struck its fresh trail when the grouse flushed and followed it down a heavily wooded creek. Two of the

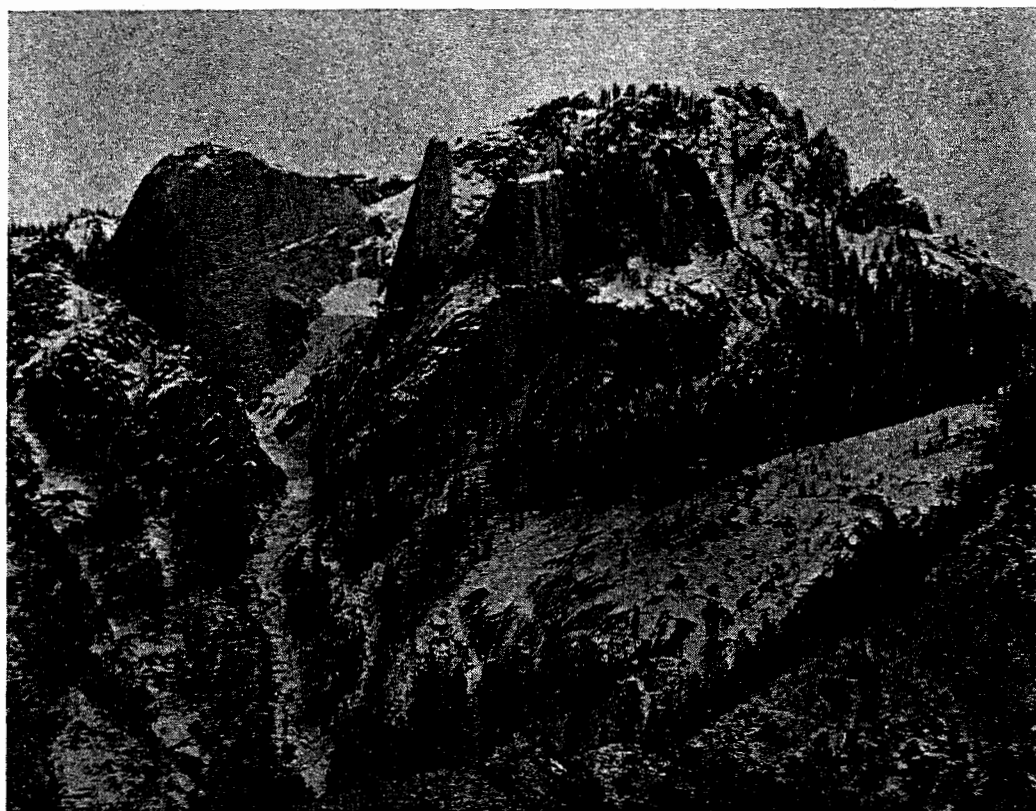


Fig. 80. Summer habitat of fisher, at Castle Rocks, Kaweah River, Sequoia National Park, as it appeared on March 13, 1935.

Photograph by Wildlife Division; courtesy of the National Park Service, Department of the Interior.

hounds, which had trailed fishers before, became much excited; but the regular lion dogs were puzzled by the strong, fresh scent. The fisher had an elusive way of "treeing" and then escaping by running out on a limb and jumping to another tree. The dogs bayed the animal several times, but it always escaped before the hunters could reach the place where it was treed, they being delayed by the steepness and roughness of the mountain side.

At 5 o'clock in the afternoon of November 5, 1920, at Bear Trap Meadow, Tulare County, Byron Lovelace shot a male fisher out of a tree. The stomach of this fisher contained a recently eaten squirrel.

At 3 P.M. on December 5, 1916, Jay Bruce found fresh fisher tracks in one foot of snow on North Crane Creek, below the Tuolumne Grove of big trees

in Yosemite National Park. Evidently these tracks had just been made, because they had not yet filled appreciably with the snow which was falling steadily. This fisher progressed by a series of bounds, as a weasel does. The hind feet registered in the holes in the snow made by the front feet, so that only two rows of tracks were left. The distance covered at a leap was from $3\frac{1}{2}$ to 4 feet. One footprint was always slightly ahead of its fellow. Some-



Fig. 81. Track made by fisher in firm earth at Granite Creek, at an altitude of 6200 feet, Sequoia National Park; found on May 19, 1935. This impression measured $1\frac{3}{4}$ inches in width and $2\frac{1}{2}$ inches in length.

Photograph by Wildlife Division; courtesy of the National Park Service, Department of the Interior.

times the animal had slowed down to a walk when approaching a tree trunk. Bruce at another time found fresh tracks of two fishers, presumed to be a pair; and once in midwinter two fishers together came around the snow-covered cabins in the Mariposa Grove of big trees at Wawona, Yosemite National Park. (See fig. 81.)

W. H. Parkinson gave us the following detailed account of his meeting with a live fisher.

"About 3 P.M. on November 12, 1913, while my wife and I were taking a stroll going west from our Red Top Camp, in the Sierra of Fresno County, our fox terrier began 'winding' as though he smelled a bear or a deer. He

kept this up for a hundred yards or so. The wind was blowing toward us. The forest was mixed red fir and lodgepole pine, with openings of an acre or more here and there. Across one of these nearly bare spots, just ahead, I saw a fisher jumping gracefully and slowly. It seemed to be in no hurry and stopped just opposite us to walk around an old log, apparently looking for a chipmunk. It finally went on in the direction it had been traveling and disappeared in the forest.

"We had for the moment forgotten the dog. We hurried along to get another glimpse of the fisher. When we arrived at the place where it had disappeared we saw our dog, about twenty yards distant, looking up into a lodgepole and saying not a word. He was a great bear and cat dog, having treed many of these animals, and when he treed he could be heard for a great distance. But this was a new kind of game. The dog had seen the fisher cross the opening and had slipped ahead in a round-about way to intercept it, an old trick of his with bear. The fisher was up about forty feet. When it saw us it started down, head foremost like a Douglas squirrel. Its hind legs and claws were used in exactly the same manner as a squirrel uses its rear legs and feet in descending a tree. When it got to within fifteen feet of the ground and clear of limbs it stopped and began scolding the dog just as a big gray squirrel would do. Like a squirrel it pounded with one forefoot and then the other on the tree, all the while hanging there head downward. The vocal noise it made was a sort of growl terminating in a snarl or hiss that is hard to describe.

"The fisher dashed around the tree as easily as a chipmunk would, saw us and dashed back to the side where the dog was, scolding every second and patting its paws against the bark. We decided to scare it out to see what next it would do. I fired a 30-30 bullet into the bark near it and it made a leap for the ground, landing fifteen feet from the tree and clear past the dog. On the ground the dog soon overtook the fisher. What happened just then will always be more or less hazy in my mind. There was a blur of white dog and dark fisher that lasted about two or three seconds. This blur then separated into two parts—one dark and the other white and *red*. The fisher was near a fir, up which it soon climbed about fifty feet. The dog (one of the gamest I ever have had) was still full of fight but was bleeding from a dozen wounds scattered from his nose to his tail. How the fisher could bite the dog in so many different places in so short a time is hard to understand. From there on for one-fourth mile we were treated to a rare spectacle. The fisher traveled through the tree tops nearly as fast as we could run. It leaped from a branch of one tree to a branch of another with the ease and assurance

of a bird. It finally reached an extra large red fir with a heavy crown into which it ascended to within a dozen feet of the top. The only glimpse we could get of it was of its head. By lying flat on the ground and looking straight up the body of the tree we could see its head move now and then. We left it there.

"In December of the same year when I was trapping I caught three fishers on the same line of travel used by the one we treed. These were a large male, a medium sized female, and a male cub only about one-third grown. All these were caught with horse meat for bait."

A. J. Gardisky, in a letter of April 11, 1922, says that "when the going is good," the fisher's tracks are often found bunched, all four tracks close together, rather than strung out in two rows as they are when the snow is loose and deep. This observer reports that a large male fisher covers from four to five feet at each leap. After a heavy snowstorm, Gardisky says, many fur bearers, including fisher and marten, have had little or no food for several days and will then travel slowly and move cautiously, endeavoring to ensure themselves of a meal if any kind of prey is available.

Frank Elkins, long a resident of South Fork Mountain, Trinity County, told one of us (G.) in 1923 that fishers, in his experience, do not like the wet. When the winter storms come, the fishers go up out of the canyons onto the high ridges where the snow lies deep. There in late winter they work under the snow and beneath the brush and small trees, which have spaces under them intercommunicating over extensive slopes; in these spaces beneath the snow are "hordes of mice" upon which the fishers feed.

Forest Ranger F. V. Jotter (1918, p. 155) has recorded his impressions of fisher in the Trinity National Forest. There this animal usually inhabits the higher, heavily timbered slopes; it comes down to lower altitudes rarely and then chiefly in the winter months when the country is covered with snow. Its food "consists chiefly of field mice, gophers, tree squirrels and other small bird and animal life." It was estimated (in 1918) that 20 to 25 fisher skins were taken each year in the Trinity National Forest, "although the species is becoming more rare."

B. H. Mace (1917, p. 138) reported that in the season 1916-17 ten fishers were taken in the California National Forest (Yolla Bolly to Sanhedrin).

The late S. L. N. Ellis, in a letter of November 21, 1921, said that near Sandy Plateau, on the headwaters of the Kern River, a fisher once was seen in hot pursuit of a ground hog (marmot). As soon as the fisher discovered that he was being watched, he turned and fled down the hillside through the trees. A. J. Gardisky (letter of April 11, 1922) tells us that on the head-

waters of the San Joaquin River, west of Mammoth, Mono County, fishers follow up all the small creeks in quest of mountain beavers.

From evidence obtained by stomach examinations and from actual observations in the field, we find that a large part of the fisher's food consists of rodents, including porcupines, marmots, mountain beavers, gray squirrels, chickarees, wood rats, chipmunks, and mice. We have no positive evidence that fishers kill and eat game birds in California, but it is probable that they do at times prey upon both Oregon ruffed grouse and Sierra dusky grouse. Twice fishers have been found hanging around coveys of grouse under conditions that would lead one to think that this association was not accidental. Occasionally, the fisher resorts to vegetable food.

Certain trappers of known experience and reliability tell us that fishers choose cavities near the tops of large trees for their dens. Other trappers of equal dependability say that these animals make their dens in hollow logs on the ground. It is probable, therefore, that either type of site is used. Informants agree that there are from two to four young in a litter and that they are born about the first of May. We have no data on the period of gestation or the condition of the young at birth, and have been unable personally to examine any breeding den of this species in California.

An account of a breeding den of the fisher has come to us from W. H. Parkinson. In the Sierra Nevada of Fresno County in late June, 1912, an Indian reported the finding of a den of queer animals and asked for help in identifying them. He had been making trips from a near-by logging camp to watch them in the evenings. The den was located on the east rim of Blue Canyon at an altitude of 5000 feet. A bald granite "slick rock," some 300 feet across, riven in many directions by deep crevices, with flakes 6 feet thick raised here and there a foot or so by the expansion and rupture of the surface of this exposed piece of bedrock, provided an ideal den. The animals could crawl back under these great slabs to appreciable distances from the many entrances. The place smelled strongly of fisher. The scent of this animal is nothing to be compared with that of the wolverine, but it is strong and quite distinctive. Excrement of fisher was all about, along with pieces of gray squirrel hair and skin. In the excrement, which was examined carefully, were feathers of quail, grouse, and birds that Parkinson was unable to identify. There also were remains of many rodents such as gray squirrels, ground squirrels, wood rats, and mice.

The young fishers, three in number, had been seen many times by the Indian. He and Parkinson watched one evening. About 5:30 o'clock the young animals began to come out and to scamper about as young squirrels

do, but they never strayed far from one of the several entrances to the den. They were about the size of small mink and were much lighter in color than adult fishers, especially on the head and fore part of the body. When something scared them, they would all dart for cover like lizards, and then one or another would poke its head over the rim of a rock slab and peer about. Then out they would come, starting mock battles and playing as young pups or kittens do. It was thought that the mother was in the den during this time. The Indian had seen her at least twice in broad daylight; once she was bringing in a gray squirrel, and another time a half-grown mouse. This family left the den about the middle of July when the young were perhaps one-third grown. They were never seen again. Trappers staying at the logging camps the following winter caught two fishers in the same locality, one an adult and the other a young female.

Only once within our knowledge have fishers in California been killed by another wild animal. J. C. Howe, of Kernville, wrote us (in a letter of March 5, 1926) that a trapper he knew found on the upper Kern River two fishers which had been killed by mountain lions. One was so fresh that its pelt was saved. The black bear is probably too clumsy to catch a fisher, and a coyote very likely would want "someone to help him let go" if he did succeed in catching one. A slow-moving porcupine, with his protective armor of demountable, penetrating quills, might, in self-defense, do the trick.

Fishers are nowhere abundant in California. Even in good fisher country it is unusual to find more than one or two to the township. With respect to the entire range of this animal in California, it is doubtful if there is one fisher to each 100 square miles. We doubt if there are at this writing (1926) 300 fishers left alive in the State.

In 1909 Mr. Allen Sherwood, a lifelong resident of Mendocino County, told one of us (D.) that forty years previously fishers were found all along the ridges on the coastal slope of Mendocino County, but they had been trapped so relentlessly that only a very few were left. This has been the history of the fisher in many other localities. Recently there has been a striking decline in the number of fishers reported as trapped in California, the catch dropping from 102 in 1920 to 34 in 1924. This is a loss of 67 per cent in five years. In 1924 only 14 of the 2590 licensed trappers in the State reported fisher catches, though of course it must be remembered that relatively few trappers operate chiefly in fisher country. The California trappers who have been most successful in trapping this animal, together with their yearly catches, are listed on page 228.

The decrease in the fisher population is not merely local, but involves

nearly the entire habitat of this animal. The two places in California where the fisher now receives year-round protection are Yosemite and Sequoia national parks. Even in Yosemite National Park this much-needed protection has been given only recently (1925). Even as late as the season of 1919-20 the rangers in Yosemite trapped 12 fishers.

In seeking to discover the cause of this decrease, we have to take into account the following facts. (1) The fisher is by nature a solitary animal. (2) Its food habits and requirements are such that each fisher requires a large amount of forage territory in order to live. (3) The areas suitable for

Name	Address	1920	1921	1922	1923	1924	Total
L. N. Barber.....	{ Willits, Mendocino Co..... Big Bar, Trinity Co..... }	..	5	3	..	1	9
Charles Rouse.....	{ Buck Meadows, Tuolumne Co.....	..	..	..	..	9*	9
G. Lunsden.....		..	..	..	..	..	..
H. S. Nonemaker...	Denny, Trinity Co.....	..	4	1	..	3	8
Joseph Kinsman...	Northfork, Madera Co.....	2	2	2	1	..	7
William Hanes.....	{ Stonyford, Colusa Co.....	6	..	..	..	..	6
Charles Hanes.....		..	..	..	..	..	..

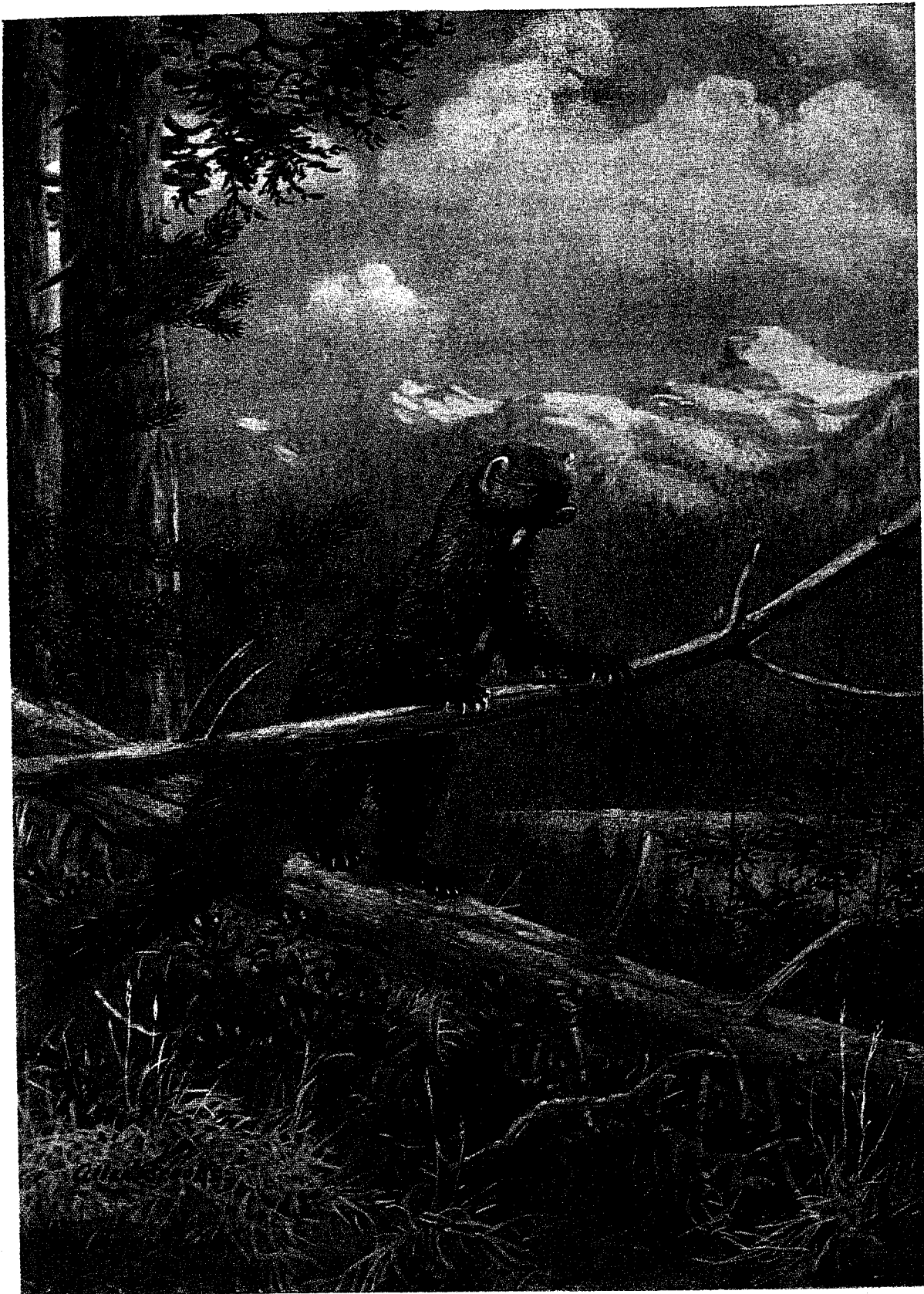
* These fishers were trapped near the boundary of a national park and some park-bred animals were probably represented.

fishers to live in are limited. (4) The rate of reproduction of the fisher is relatively low. (5) The forests in which the fisher lives are being reduced by timber-cutting. All these are things which tend naturally to limit the fisher population.

Moreover, there are other limiting factors. For example, the fisher's pelt has all the attributes that make a fur commercially valuable. It is rare, therefore "exclusive." The underfur is thick and soft; the overhairs give gloss and beauty to the fur. The pelt, in its natural color, blends well with wearing apparel. The fur is very durable. And lastly, fisher pelts have been continually in style.

The average price received by the trapper for a California fisher pelt was \$67.33 in 1920, when 102 fishers were reported trapped. In 1921 the bottom fell out of the fur market; the average price for a fisher skin dropped to \$12, and 42 were reported trapped. By 1922 the average price had increased to \$39.20, with but 27 pelts reported. The average price increased in 1923 to \$49.67, but in spite of this the catch dropped to 24. In 1924 the average price was \$56.02, and the catch was increased to 34.

Because of their rareness, beauty, durability, and general desirability, there has been an increasing demand for fisher pelts. As the demand has increased, the price has risen. The increase in price has stimulated the trap-



FISHER

ping of fishers, so that not only has the natural increase been trapped, but more and more of the breeding stock has been levied upon each year. The fishers have been unable to withstand this augmented and unnatural toll levied upon them. The inevitable result has been a rapid exhaustion of the supply (breeding stock) except in places such as certain national parks where there comes near to being true and continuous sanctuary for these animals.

In 1924, attention was directed by one of us (D.) to the then alarming decrease in the number of fishers trapped in California, and it was recommended to the legislative committee of the State Fish and Game Commission that a 3-year closed season at once be given to the marten, fisher, and wolverine. Favorable action was not obtained; it was asserted that it would be impossible to prevent fishers from getting into traps set for other fur bearers. We may point out to the contrary that nearly all the fishers taken in California are treed with dogs trained for this purpose or caught in traps specially set for this kind of animal. Thus, in 1924 only 14 trappers in the State succeeded in catching fishers; but one of these trappers received \$100 for the single fisher pelt that he obtained. It is easy to see why trappers make a special effort to catch this animal.

There is no truly practical reason why the fisher should not be given a much-needed, prolonged closed season in California. Michigan closed the season on fisher and marten, yet the wolf, coyote, fox, lynx, and wildcat were left unprotected in that state. Alaska has a closed season on marten, yet permits certain other fur bearers to be trapped. Many states have closed seasons on some fur bearers and at the same time permit other species to be trapped. It has proved feasible to give adequate protection to fishers in Yosemite National Park while permitting desired "control" of coyotes by shooting some. The elimination of surplus mountain lions both in State game refuges and in national parks has been accomplished in California by the efforts of a State lion hunter and his pack of well-trained lion dogs. An adequate breeding stock of fishers could be maintained in certain of our State game refuges as well as in national parks. Game Refuge 1D in Trinity County is one of the best breeding grounds of the fisher in California; it would be possible, without placing other game in jeopardy, to make this refuge a sanctuary for fisher as well as for deer. If the trappers receiving permits to capture and kill so-called predatory animals in State game refuges were allowed to take mountain lions and coyotes only, they could not make a special effort to trap fishers as they now do because of the high value of fisher pelts.

If we are to ensure the future of the fisher in California we must either give the species a complete closed season for a period of years, or establish local protection for it through our State game refuges. Since in winter there are few if any game wardens in the territory where marten and fisher are trapped, any legislation, to be effective, must have the support both of the trappers and of the fur buyers. It has been our experience, through personal contact with many trappers in California, that when the facts are presented fairly the trappers themselves are among the first to favor adequate, practical protection for fur bearers. And the fur buyers would certainly support any conservation measure that would ensure a steady future profit for them.

With the decrease in the wild supply of our more valuable fur bearers, there has been a corresponding increase in artificial propagation and even domestication of these animals. The fisher is thought by some to be one of the most promising candidates for fur farming. In 1925 a fox farmer who had just sold his silver fox ranch came to the University of California and inquired what fur bearer with a beautiful, durable, high-priced pelt was becoming rare in its wild state. He reasoned that, with a breeding stock of about 20,000 silver foxes in the United States alone, the supply of silver fox pelts would increase rapidly, and this would result in lowering their price. (By 1934, his prediction had been fulfilled.)

This fox farmer was looking for the animal that was to be the "silver fox" of the future. He and many others believed that the favored place of the silver fox in the fur business would be usurped by the fisher, and that the fisher pelt would become the exclusive fur. Some of the obstacles to raising fishers in captivity were pointed out, but the farmer showed how similar problems had been met in raising silver foxes. His chief concern was to learn what part of California produced the best fisher pelts and the names of trappers in that territory who might be able to catch fishers alive for breeding purposes.

However, whether the fisher can be reared in captivity on a commercially successful scale has not yet been determined (see Ashbrook, 1928, pp. 124 ff.). The only assured method of maintaining the fisher population is to conserve the natural breeding stock within its restricted native habitat.

WEASELS

SEVERAL SPECIES and races of weasel, genus *Mustela*, occur in California. For the present work we have made no special study of the systematics of this group of animals, because it is of lesser importance in our general problem, and because, at this writing, the whole group is in need of systematic revision. Our attention, then, has been restricted to the natural history of the largest kinds of weasel in California, especially those which live in the mountains, turn white in winter, and have some value as fur producers.

The long-tailed weasel (*Mustela longicauda*, with subspecies) is one of the smaller members of its family, the Mustelidae, being appreciably shorter and much lighter in build than even the mink. The coloration in summer is clear pale brown above and on the tail, which has a black tip. The underparts are light yellowish except for the white chin (see fig. 82). In winter in the higher parts of the mountains weasels have an entirely white coat except for the black tip on the tail. (See Pl. IV, facing p. 196.)

Weasels feed almost entirely upon small mammals which they hunt out and kill. The kinds of animals that they can overcome are limited in large part to those vegetation feeders (rodents and small-sized rabbits) which are smaller or not much larger than the weasels themselves. There is the further restriction that these vegetarian animals must be available in numbers sufficient to provide the weasels with daily or almost daily access to them. The presence of weasels locally, especially in numbers, is almost always to be accounted for by a good-sized rodent population. The occurrence of these food animals in numbers is usually more easily detected by naturalists than the presence of the weasels.

Places where weasels have been found numerous include rock slides where conies and wood rats live, land where pocket gophers are plentiful, ground squirrel colonies, and burrow systems of the mountain beaver. Often, buildings that are infested with rats or mice will attract weasels to live about them. In all these places the chief attraction to the weasel is the presence of living animals of the right kinds and in sufficient numbers to ensure a continuing food supply. For an animal as small as a weasel, hiding places and den sites are easily found in many kinds of habitat, so this factor of subsistence enforces no particular limitations.

On December 23, 1914, weasel tracks were seen (C. L. Camp, MS) on the snow along the Vernal and Nevada Falls trail in Yosemite National Park. Runways crossed the trail in many places, but these did not extend very far