Winter diet of Vancouver Island marten (*Martes americana*)

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Digestive tracts from 701 marten (*Martes americana*) of known sex and age taken during the 1983–1986 fur harvests were used to determine winter diet of marten from Vancouver Island, British Columbia. Small mammals, deer, birds, and salmonid fish were the major food items. Marten exploited nine species of small mammals including four introduced species, but more than 50% of the small mammal prey were deer mice (*Peromyscus* spp.). We attributed most deer remains to carrion. Avian prey was primarily small passerine and piciform species with Winter Wrens (*Troglodytes troglodytes*) accounting for about 40% of the identifiable bird remains. Salmon remains were from bait consumption and fish exploited during the spawning runs. Although minor intersexual variation in diet was evident with females consuming more small mammals and small birds, dietary overlap between sexes was pronounced in this insular population.

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L'examen du tube digestif de 701 martres (*Martes americana*) de sexe et d'âge connus capturées au cours de la période de piegeage 1983–1986 a permis de déterminer le régime alimentaire d'hiver chez ces animaux dans l'Île de Vancouver, Colombie-Britannique. Les martres ont consommé surtout des petits mammifères, des cerfs, des oiseaux et des poissons salmonidés. Les animaux ont exploité neuf espèces de petits mammifères, dont quatre espèces introduites, mais plus de 50% des petits mammifères consommés étaient des *Peromyscus* spp. Les restes de cerfs provenaient probablement surtout de charognes. Les oiseaux qui servaient de proies étaient surtout de petits passereaux et des espèces piciformes et les Troglodytes des forêts (*Troglodytes troglodytes*) constituaient 40% des restes reconnaissables d'oiseaux. Les débris de saumons provenaient de la consommation d'appâts ou de poissons attrappés au cours des migrations de fraye. Il y avait une légère différence entre le régime alimentaire des mâles et celui des femelles et les femelles consommaient plus de petits mammifères et de petits oiseaux, mais le chevauchement alimentaire s'est avéré très important chez cette population insulaire.

[Traduit par la revue]

Introduction

Literature on winter food habits of the American marten (*Martes americana*) is extensive. For western North America, there are studies from Alaska (Lensink et al. 1955; Buskirk and MacDonald 1984), Northwest Territories (More 1978; Douglass et al. 1983), northeastern British Columbia (Quick 1955), the Rocky Mountains (Cowan and MacKay 1950; Weckwerth and Hawley 1962; Koehler and Hornocker 1977), the eastern Cascades of Washington (Newby 1951), and the Sierra Nevada of California (Zielinski et al. 1983; Hargis and McCullough 1984). Nonetheless, several aspects of marten feeding biology have not been examined. To date, all of the information on winter food habits for this species is based on studies from the continental interior of North America and no data are available on marten diets in Pacific coast habitats. Another facet of marten feeding biology that has not been explored is the possible relationship between sexual dimorphism in body size and intersexual resource partitioning (Erlinge 1979; Moors 1980). Male marten are substantially larger than females (Clark et al. 1987) yet none of the published studies evaluated sexual differences in diet.

A large sample of carcasses of known sex and age provided an opportunity to undertake a comprehensive study of winter diet in marten from Vancouver Island, British Columbia. This insular population has adapted to an ecological regime distinct from that of the continental interior. Winter climate on Vancouver Island is maritime with mild temperatures and little snow cover at lower elevations. In contrast to continental regions where the winter prey base is dominated by small mammals, winter prey available to Vancouver Island marten is more varied, with few small mammal species, a diverse avifauna, and such marine resources as salmon and intertidal invertebrates (Cowan and Guiguet 1965; Hatler 1976; Hatler et al. 1978; Morgan et al. 1985). Therefore, this population should have a broader diet than marten in the continental interior. Moreover, Vancouver Island is an ideal population for assessing sexual variation in food habits. This population exhibits greater sexual dimorphism in skull size than marten from the coastal mainland of Alaska and British Columbia (Giannico and Nagorsen 1989). Sexual dimorphism in body mass is also pronounced, with males about 65% heavier than females. If sexual dimorphism in size plays a role in reducing intersexual competition for food, then Vancouver Island marten should exhibit marked sexual differences in prey size. Herein we describe the prey items and assess sexual variation in the diet of Vancouver Island marten, and compare prey composition and the dietary breadth of this insular population with those of other western North American populations.

Materials and methods

Samples

Our study was based on 701 marten carcasses obtained from

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trappers. These animals were taken in Conibear-type traps in arboreal box sets (Baker and Dwyer 1987). All carcasses had food remains in their digestive tracts; 26 additional marten examined during the study were excluded from the analyses because they had empty digestive tracts. Samples were collected during three trapping seasons (November–February) from 1983 to 1986. Total monthly samples were 61 in November, 239 in December, 99 in January, and 29 in February; month of capture was unknown for 273 marten. Sample sizes for each year were: 95 in 1983–1984, 571 in 1984–1985, and 35 in 1985–1986. The annual marten harvest for Vancouver Island was similar during the 3 years of the study and these discrepancies in yearly sample sizes resulted from trapper response.

Study area

Marten came from 33 traplines (Fig. 1). Although traplines were widely distributed across Vancouver Island, they were all situated at low elevations (0–400 m asl) in the Coastal Western Hemlock and Coastal Douglas-fir biogeoclimatic zones (Krajina et al. 1982). Forests in these zones are mainly coniferous, consisting of western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), yellow cedar (*Chamaecyparis nootkatensis*), Pacific silver fir (*Abies amabilis*), grand fir (*Abies grandis*), and Sitka spruce (*Picea sitchensis*). Deciduous trees in trapping areas included red alder (*Alnus rubra*), black cottonwood (*Populus trichocarpa*), and bigleaf maple (*Acer macrophyllum*). Most traplines were in 20- to 80-year-old stands of second-growth forest. However, the habitat within a 2-to 3-km radius of trap sites was typically a mosaic of various seral stages ranging from recent clear-cuttings to old-growth forest. Traplines were usually below snow line and winter climate in these areas was mild with heavy precipitation mostly in the form of rain (Tuller 1979).

Mammalian fauna in these communities included seven other carnivores, ermine (*Mustela erminea*), mink (*Mustela vison*), river otter (*Lutra canadensis*), wolverine (*Gulo gulo*), gray wolf (*Canis lupus*), mountain lion (*Felis concolor*), and black bear (*Ursus americanus*), and two species of ungulates, elk (*Cervus elaphus*) and black-tailed deer (*Odocoileus hemionus*). Small mammals (excluding bats) inhabiting the study area included eight indigenous species: water shrew (*Sorex palustris*), vagrant shrew (*Sorex vagrans*), dusky shrew (*Sorex monticolus*), Townsend's vole (*Microtus townsendii*), deer mouse (*Peromyscus maniculatus*), Columbian mouse (*Peromyscus oreas*), red squirrel (*Tamiasciurus hudsonicus*), beaver (*Castor canadensis*); and five introduced species: eastern cottontail (*Sylvilagus floridanus*), muskrat (*Ondatra zibethicus*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), and black rat (*Rattus rattus*).

Winter avifauna of Vancouver Island consists of large populations of overwintering waterfowl in coastal areas and a diverse assemblage of resident and migratory land birds (Hatler et al. 1978; Morgan et al. 1985).

Analytical procedures

We removed the entire gastrointestinal tract from each carcass; contents were rinsed and dried. The stomach and intestines of an individual usually contained remains from different meals; therefore, we kept their contents separate to facilitate prey identifications. As well, stomach contents were only partly digested and usually they could be identified more easily than digested material in intestines. We sexed marten by anatomy; age was determined from cementum annuli counts on lower canine teeth. Tooth sectioning and age interpretation was done by a commercial laboratory (Matson's Laboratory, P.O. Box 308, Milltown, MT, U.S.A.).

Study skins and skeletons in the research collections of the Royal British Columbia Museum (BCPM) were used to identify bird and mammal remains. We prepared a reference collection of hair fibres and feathers mounted on microscope slides for selected species. Most mammals were identified from feet, tails, miscellaneous bones, and teeth. Macroscopic and microscopic (cuticular scale patterns, medulla forms) examination of hair structure (Day 1966) was also a valuable diagnostic aid. Although we were able to identify many mammal items to species, remains of rats, deer mice, and shrews could be identified only to genus. We could identify some bird material to species by macroscopic colour patterns on feathers. Other bird items were identified to family or order by microscopic features on the downy barbules of feathers (Day 1966). Unfortunately, these diagnostic features were absent from many bird remains. Bills and feet also assisted in bird identifications. Nomenclature for birds and mammals was based on the American Ornithologists' Union (1983) and Jones et al. (1986), respectively. To obtain information on baits, we sent a questionnaire to 30 trappers; 27 responded with lists of baits used.

For data analyses, we combined prey items found in the stomach and intestine of an individual. Marten were pooled from all trapping periods and traplines in the statistical analyses. Sampling inadequacies (see Samples) prohibited analyses of seasonal, year-to-year, or regional variation in diet. Frequency of occurrence of each prey item was derived from the number of occurrences of the item in the total sample. We did not calculate the actual volumes of material in digestive tracts. Instead we estimated mean percentage volume by the aggregate percentage method (Korschgen 1980). Percentage volume of each item in a sample was estimated visually. Mean percentage volumes are more subjective than actual volumes but they give a general indication of the concordance between frequency of occurrence and relative volume for a food item.

We compared diets in four sex–age groups of marten: juvenile males, juvenile females, adult males, and adult females. Juveniles were young of the year (cementum = 0); adults were 1 year or older (cementum ≥ 1). Because sample sizes of many prey items were small (Table 1), our analyses were restricted to seven major prey categories: ungulate, small mammal, bird, fish, plant material, unidentified digested material, and bait. The frequencies of each category in the four groups were tested for independence by the *G*-statistic (Sokal and Rohlf 1981). Dietary breadth was calculated from the niche breadth formula of Pianka (1973):

$$\text{dietary breadth } (B) = 1/\Sigma P_i^2;$$

where P_i is the proportion of food item i in the total diet. Values were standardized to range from 0 to 1 by dividing B by the total number of food items (N). When $B = 1.0$, the N number of food items are eaten in identical proportions. Dietary overlap was based on the niche overlap formula of Pianka (1973):

$$\text{dietary overlap } (\alpha) = \frac{\Sigma P_{ij} \cdot P_{ik}}{(\Sigma P_{ij}^2 \cdot \Sigma P_{ik}^2)^{1/2}}$$

where P_{ij} is the proportion of food item i in the diet of group j and P_{ik} is the proportion of food item i in the diet of group k. Overlap values range from 0 (no prey in common) to 1 (diets identical).

To test for prey size differences between males and females, we classified small mammal and bird prey species into weight classes. Small mammals were assigned to four weight classes: 0–50 g (shrews, mice), 51–150 g (voles), 151–700 g (rats, squirrels), and >700 g (rabbits, beaver). Bird species were grouped into three weight classes: 0–10 g (wrens, kinglets), 11–100 g (small woodpeckers, sparrows, thrushes), and >100 g (flickers, jays, grouse). Body weights of representative adult birds and mammals from Vancouver Island were obtained from specimen data in the BCPM.

Results

General diet

Food remains were mostly mammals, birds, fish, plant material, and unidentified digested material (Table 1).

Present in 29% of the gastrointestinal tracts, small mammal species were the predominant mammals in the diet. More than 50% of the small mammals were *Peromyscus* spp; other species constituted a small proportion of the food remains. Because *S. floridanus* is restricted to southern Vancouver Island, values given in Table 1 underestimate its importance in

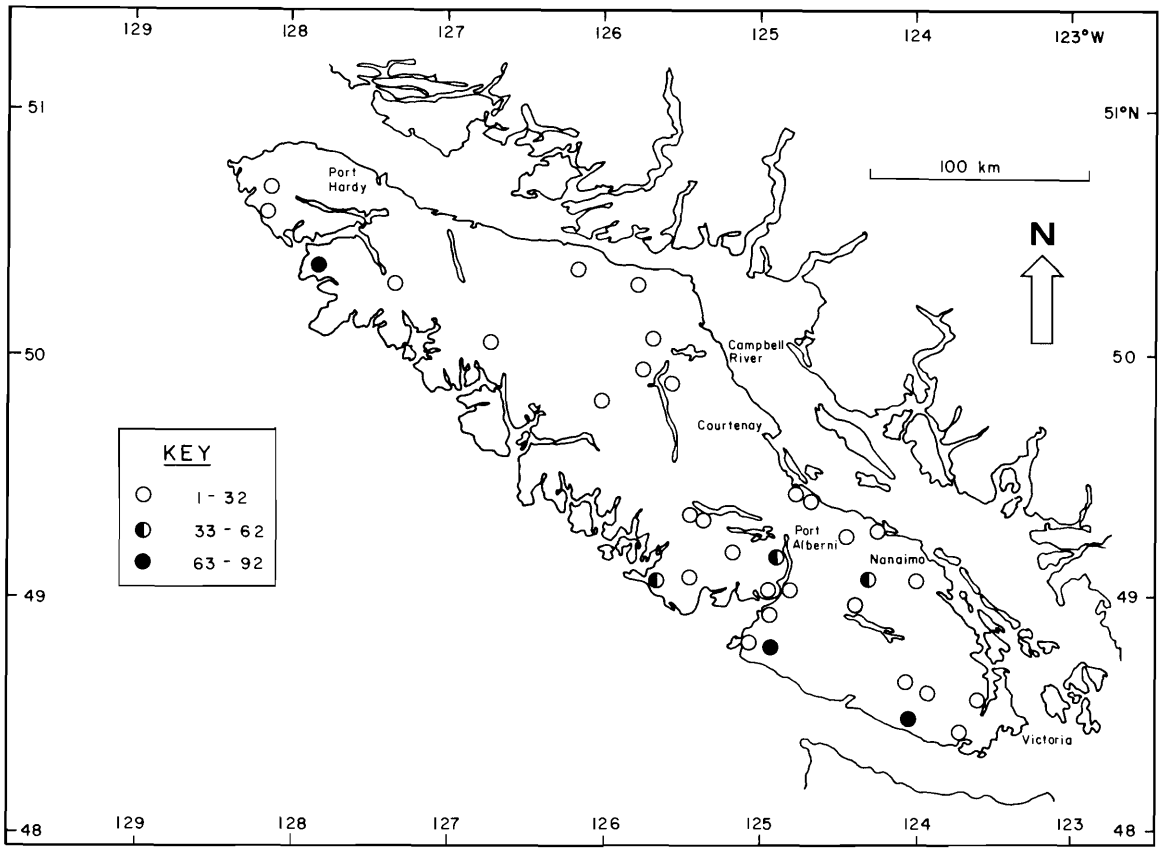

FIG. 1. Locations of 33 traplines on Vancouver Island, British Columbia, from which the 701 marten were collected. Degree of shading indicates sample sizes for each trapline.

the diet. Frequency of occurrence of *S. floridanus* in marten taken from traplines within the geographic range of the rabbit was 5.1%. Marten that had eaten *M. musculus* and *Rattus* spp. came from a number of widely separated localities across Vancouver Island, but all were from traplines situated near settlements or agricultural areas.

Ungulates were the only large mammals in food remains. Except for *C. elaphus* in one marten, all ungulate remains were *O. hemionus*. Only 6 of 30 (22%) trapper reported using *O. hemionus* as bait. Because marten with *O. hemionus* remains came from most traplines in the study area, including those where deer was not used as bait, we suspect that most of the *O. hemionus* found in digestive tracts was from carrion consumption.

We identified bird remains in 29% of the samples. About a third of the bird items could not be identified to any taxonomic category. Most unidentified bird material was bone fragments and feather quills. Unidentified egg shells were found in three marten. Identifiable bird remains were mainly species of Passeriformes (91.2%). Piciformes (6.3%) and Galliformes (2.4%) were less common. No waterfowl (Anseriformes) were found. The most commonly identified family was Troglodytidae (wrens); it accounted for 40% of the birds that could be identified to family. All wrens appeared to be the Winter Wren (*Troglodytes troglodytes*). Species of Muscicapidae eaten by Vancouver Island marten included the Golden-crowned Kinglet (*Regulus satrapa*), Ruby-crowned Kinglet (*Regulus calendula*), American Robin (*Turdus migratorius*), and Varied Thrush (*Ixoreus naevius*). Four species of woodpeckers (Picidae) were found in digestive tracts: Red-breasted Sapsucker (*Sphyrapicus ruber*), Downy Woodpecker (*Picoides pubescens*), Hairy Woodpecker (*Picoides villosus*), and Northern Flicker (*Colaptes auratus*). Emberizidae remains that we could identify were all Dark-eyed Junco (*Junco hyemalis*). Two species of Phasianidae were identified: Blue Grouse (*Dendragapus obscurus*) and Ruffed Grouse (*Bonasa umbellus*). All Corvidae were Steller's Jay (*Cyanocitta stelleri*).

Fish material (flesh, skin, scales, bones) occurred in 22% of the digestive tracts. We made no attempt to identify fish remains to species but the cycloid scales, large bones, and pink coloured flesh suggested that most fish were salmonid species. Fish (salmon, herring) was used for bait by 89% of the trappers, and some undigested fish remains recovered in stomachs undoubtedly resulted from bait consumption.

Invertebrates, reptiles (*Thamnophis* spp.), and amphibians (*Hyla regilla*, *Rana aurora*) were minor items in the diet. Most invertebrates were insects (Coleoptera, Hymenoptera). The only evidence of marten eating marine invertebrates were crab shells recovered in a marten trapped near Tofino on the west coast of Vancouver Island.

Although we found plant material in 45% of the marten, its volume in digestive tracts was small. The majority of vegetation was conifer needles, moss fragments, and fern fronds; this material was probably ingested incidentally with prey. Seeds were recovered in only three digestive tracts; partly digested apples were identified in the stomachs of four marten.

A major portion of the material in gastrointestinal tracts consisted of partly digested meat or skin that we classified as unidentified digested material. Although this digested material was usually associated with bones or keratinous

TABLE 1. Food items found in the digestive tracts of 701 marten from Vancouver Island, British Columbia, taken November–February, 1983–1986

	No. of occurrences	% frequency	Mean % volume
Mammals	342	48.8	24.7
Ungulates	140	20.0	7.5
Peromyscus spp.	109	15.5	9.3
Tamiasciurus hudsonicus	39	5.6	3.5
Microtus townsendii	16	2.3	1.6
Sylvilagus floridanus	13	1.9	1.1
Sorex spp.	11	1.6	0.5
Rattus spp.	6	0.9	0.6
Mus musculus	6	0.9	0.4
Castor canadensis	1	0.1	0.1
Plecotus townsendii	1	0.1	0.0
Total small mammals	202	28.8	17.1
Birds	208	29.7	14.0
Unidentified birds	75	10.7	2.4
Unidentified passerines	51	7.3	3.3
Troglodytidae	32	4.6	3.1
Muscicapidae	19	2.7	2.0
Picidae	13	1.9	1.5
Emberizidae	9	1.3	0.9
Phasianidae	5	0.7	0.4
Corvidae	4	0.6	0.4
Fish	153	21.8	8.5
Reptiles and amphibians	4	0.6	0.2
Invertebrates	16	2.3	0.7
Plant material	302	43.1	5.2
Unidentified digested material	456	64.7	41.1
Bait	88	12.6	5.7

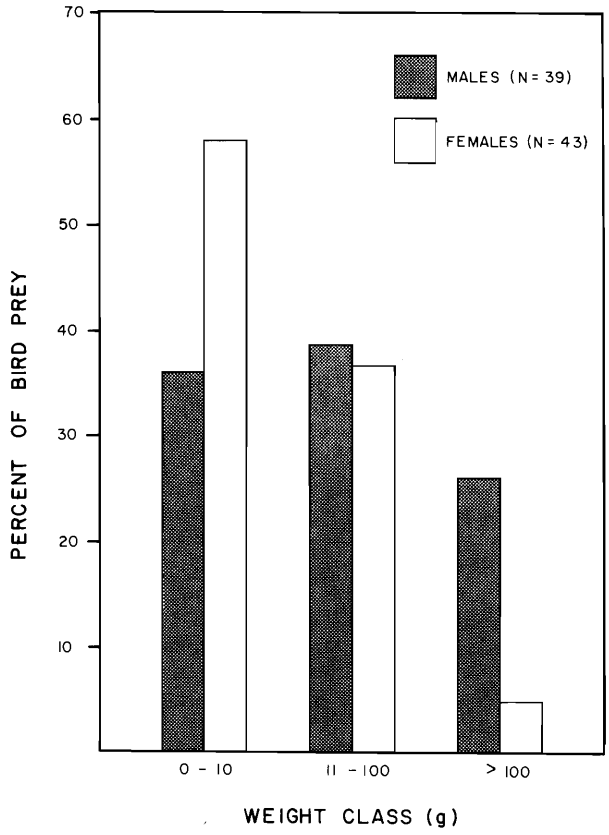

FIG. 2. Proportions of three size classes of avian prey in the winter diets of male and female marten from Vancouver Island, British Columbia.

material (feathers, hair), we treated it as a separate category. Undigested pieces of cut meat (probably *O. hemionus* or *C. canadensis*) found in stomachs were considered to be bait. Although about 13% of the carcasses had bait in the stomachs, we suspect that bait consumption did not seriously bias our results because most bait was undigested and easily identified. With trap sets used in our study, marten would die quickly after ingesting bait.

Sex and age variation in diet

Of seven food categories (Table 2) only small mammals differed significantly between the four sex–age groups, with small mammals more frequent in both age categories of females. Dietary breadth values (Table 2) demonstrated that prey diversity was similar in the four groups. Dietary overlap was pronounced among the groups with values ranging from 0.98 to 0.99. Both sexes took all size classes of birds and small mammals, but most prey weighed less than 100 g. No significant ($G = 4.52$, df = 3, $P > 0.05$) intersexual variation was evident in the size categories of small mammal prey consumed. However, size of avian prey was associated significantly with sex ($G = 8.80$, df = 2, $P < 0.05$). Males took more birds of a jay or grouse size and females more birds of kinglet or wren size (Fig. 2).

Discussion

Throughout most of North America, marten feed primarily on small mammals in winter (for literature, see Clark et al. 1987). In comparison, the winter diet of Vancouver Island marten is more diverse (Table 3). This varied diet reflects in part the depauperate small mammal fauna of the island as well as the availability of alternative prey such as birds and salmonid fish.

Vancouver Island marten also differ in the species of small mammals exploited. In most regions mice, especially voles (Arvicolidae), constitute much of the winter food of marten. Deer mice (*Peromyscus* spp.) typically are minor prey even though they are usually abundant in marten habitats. Mice were not as predominate in the diet in our study, and most mice eaten were *Peromyscus* spp. with voles (i.e., *M. townsendii*) making a small contribution. Given that there is some evidence that marten selectively prey on *Microtus* spp. (Weckwerth and Hawley 1962; Francis and Stephenson 1972), the scarcity of *M. townsendii* in the diet is noteworthy. Moreover, mean body weight of adult *M. townsendii* from Vancouver Island is nearly three times that of adult *Peromyscus* spp. (58 vs. 22 g); therefore, *M. townsendii* would provide greater biomass per kill. Continental areas of North America, where voles are major prey of marten, support two to six species of voles (Rose and Birney 1985). Arvicolid fauna in these areas includes forest species (e.g., *Clethrionomys gapperi*, *Phenacomys intermedius*) and species associated with more open, graminoid habitats (e.g., *Synaptomys* spp., *Microtus* spp.). Vancouver Island has only one vole, *M. townsendii*, and it is restricted in its habitat. Personal observations from Vancouver Island and data from the coastal mainland of British Columbia (Hawes 1975) suggest that *M. townsendii* is associated primarily with salt marshes, wet meadows, open fields, riparian habitats, and alpine meadows. These habitats are small and patchy on the island. In comparison, *Peromyscus* spp. are ubiquitous

TABLE 2. Occurrence of seven prey categories in the digestive tracts of four sex–age groups of marten from Vancouver Island, British Columbia, taken November–February, 1983–1986

	Male		Female	
	Adult (N = 256)	Juvenile (N = 136)	Adult (N = 179)	Juvenile (N = 130)
Ungulate	57 (22.3)	31 (23.1)	25 (14.0)	27 (20.8) ns
Small mammal	62 (24.2)	29 (21.6)	63 (35.1)	48 (36.9)*
Bird	80 (31.3)	32 (23.5)	58 (33.0)	37 (28.5) ns
Fish	51 (19.9)	36 (26.9)	34 (19.0)	32 (24.6) ns
Plant material	111 (43.4)	60 (44.8)	81 (45.3)	47 (37.7) ns
Digested material	172 (67.2)	84 (61.8)	115 (64.3)	85 (65.4) ns
Bait	29 (11.3)	16 (11.9)	26 (14.5)	17 (13.1) ns
Dietary breadth	0.78	0.82	0.80	0.82

NOTE: Frequency (%) is given in parentheses.
*$P < 0.05$, $G = 14.07$, df = 3.

TABLE 3. Standardized dietary breadths of marten from seven locations in northwestern North America

	Dietary breadth	Source
Vancouver Island, B.C.	0.69	This study
Fort Nelson area, B.C.	0.31	Quick 1955
Rocky Mountains, Alberta and B.C.	0.19	Cowan and Mackay 1950
Eastern Cascades, Washington	0.24	Newby 1951
North central Idaho	0.22	Koehler and Hornocker 1977
Glacier National Park, Montana	0.36	Weckwerth and Hawley 1962
Sierra Nevada, California	0.22	Zielinski et al. 1983

NOTE: Derived from the proportions of six prey categories (ungulate, small mammal, bird, fish, invertebrate, berries) in the winter diet.

throughout the coast forests of the Pacific Northwest, and they occur in high densities in most seral stages of succession (Sullivan 1979).

The relatively small contribution of squirrels and shrews to the diet is consistent with the winter food habits of marten in other parts of western North America. The opportunistic nature of marten predation is underscored by the presence of four introduced mammals in the diet. This is the first North American report of marten eating the murid rodents *M. musculus*, *R. rattus*, and *R. norvegicus*. Although these rodents were minor items in the overall diet, they may be locally important. *Rattus norvegicus* and *M. musculus* are restricted to settlements and agricultural areas, but feral populations of *R. rattus* exist in second-growth forest on Vancouver Island (Cowan and Guiguet 1965). Several trappers reported that they occasionally captured rats (probably *R. rattus*) in their marten traps. Predation on *S. floridanus* is noteworthy because this rabbit was introduced to Vancouver Island only in the late 1960's when a few individuals were released near Victoria. It has successfully colonized much of the southern part of the island and, within its present range, *S. floridanus* rivals *T. hudsonicus* in importance as winter prey for marten.

We found more ungulate remains in the diet than has been reported elsewhere, with *O. hemionus* the second most common mammal in our digestive tract samples. The use of *O. hemionus* as bait by some trappers makes it impossible to estimate reliably the contribution of deer carrion to the diet. Marten are known to scavenge ungulate carcasses, particularly in winter (Francis and Stephenson 1972; Pulliainen 1981). Deer carcasses should be readily available to marten throughout the winter. Currently there is a large *C. lupus* population on Vancouver island and its major prey is *O. hemionus* (Jones and Mason 1983).

In most boreal regions of North America where the winter avifauna consists of a few resident species, birds are usually not a major winter food of marten. Galliformes (grouse, ptarmigan) are the most commonly identified avian prey in these regions (e.g., Buskirk and MacDonald 1984), although it is difficult to evaluate the bird species eaten in most studies because investigators identified avian remains as simply "bird" or assigned them to broad taxonomic categories. Vancouver Island, with its moderate winters and varied habitats, supports a diverse and abundant avifauna in winter (Hatler et al. 1978; Morgan et al. 1985). Here passerine and piciform birds form a significant portion of the marten's winter diet. All of these birds are relatively common species on Vancouver Island in winter and they provide an alternative food resource to small mammals. Most avian prey were small birds, and in fact about half of the identifiable bird remains consisted of kinglets and wrens, species that weigh less than 10 g. Ours is the first North American report of marten feeding extensively on small birds. However, Lockie (1961) found that more than half of the avian prey taken by the European marten (*Martes martes*) in Scotland during winter were such small birds as tits (*Parus* sp.) and wrens (*T. troglodytes*).

In Pacific coast habitats, salmonid fish provide an important

winter food for marten. Although some salmonid remains in our study presumably were the result of bait consumption, marten undoubtedly utilize dead or dying salmon during the annual salmon runs. The observations of Hatler (1976) and anecdotal reports from trappers support this conclusion. Five species of Pacific salmon (*Oncorhynchus* spp.) spawn in various rivers and streams on Vancouver Island with spawning periods extending from September through December (Aro and Shepard 1967). According to trappers, dead salmon may persist in some trapline areas until late January. Therefore, salmon represent a large and readily available food resource for marten during much of the winter.

Reptiles, amphibians, plants, and invertebrates were minor food items but their occurrence in digestive tracts demonstrates the diversity of prey that marten exploit. The scarcity of marine invertebrates in the diet is noteworthy. Of the 33 traplines in our study, 13 bordered the ocean (Fig. 1) and some of the marten taken on these lines had access to coastal habitats. The extent that marten forage in the intertidal zone is unknown but trappers reported that marten were occasionally observed there. Although the intertidal region is rich in such marine invertebrates as crabs, these resources are not exploited by marten, presumably because the intertidal niche on Vancouver Island is occupied by *M. vison* (Hatler 1976).

Vancouver Island marten demonstrate minor sexual variation in winter diet that is independent of age. Females consume more small mammals overall although the sexes show no segregation in the size of small mammal prey. Total avian prey taken by the sexes is similar but females consume more small (<10 g) birds than males. Because sexual differences in diet have not been examined in other food habit studies of *M. americana*, it is not clear if the sexual variation found in our study is a phenomenon associated with insularity or a general characteristic of all North American marten. Dietary overlap values for male and female Vancouver Island marten, however, fall within the range of those calculated by Moors (1980) for European marten (*M. martes*) and other mustelids. Similarly the tendency for females to utilize smaller prey than males is a trend evident in other mustelids, particularly species of *Mustela* (Moors 1980). The only data available for marten is derived for Yurgenson's (1947) study of *M. martes*. Based on small sample sizes, Yurgenson (1947) reported that males consumed more hares and galliform birds and females more small mammals, but Powell (1979) found no statistically significant intersexual variation in Yurgenson's data.

Giannico and Nagorsen (1989) speculated that the greater sexual size dimorphism evident in insular marten from coastal Alaska and British Columbia may permit the sexes to exploit different-sized prey and thus reduce intersexual competition for food. Our results provide no evidence for this hypothesis. The extensive overlap in food items and prey size among male and female Vancouver Island marten suggests that there is little partitioning of the food niche in this population. Dietary overlap generally results in competition when food resources are limiting (Moors 1980). With the diversity of prey available to Vancouver Island marten in winter, it seems unlikely that food resources are limiting. Because no data are available on the abundance or availability of prey during the period of our study, we cannot explain the biological significance of more small mammals and birds in the diet of female marten.

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