Journal of Urban Ecology

*Journal of Urban Ecology*, 2020, 1–6

doi: 10.1093/jue/juaa021
Short Notes

# Baseline diet of an urban carnivore on an expanding range front

N. Duncan,[1,*] O. Asher,[2] M. Weckel,[3] C. Nagy,[4] C. Henger,[5] F. Yau[6] and L. Gormanzano[7]

[1]Department of Mammalogy, American Museum of Natural History, Central Park West @79th St, New York, NY 10024, USA, [2]Macaulay Honors College at Lehman College, City University of New York, Bronx, NY 10468, USA, [3]Department of Education, American Museum of Natural History, Central Park West @79th St, New York, NY 10024, USA, [4]Mianus River Gorge, 167 Mianus River Road, Bedford NY 10506, USA, [5]Louis Calder Center-Biological Field Station, 31 Whippoorwill Rd, Armonk, NY 10504, USA, [6]Humane Society of Westchester, New Rochelle, NY 10801, USA and [7]American Museum of Natural History, Central Park West @79th St, New York, NY 10024, USA

*Corresponding author. E-mail: duncan@amnh.org

**Submitted:** 13 November 2019; **Received (in revised form):** 18 May 2020



## Abstract

For the past 200 years, coyotes have steadily expanded their range eastward from the Midwestern USA. They have successfully colonized the contiguous landscape east of the Mississippi River and have been documented on Long Island, New York since 2009 with successful breeding confirmed in 2016. Occupying a diverse array of habitat types along the way, they are now commonplace in many urban and suburban landscapes as well. Using 149 scats and 13 stomachs collected from 2009 to 2017 and analyzed by traditional scat analysis methods, we described the diet of coyotes found in the New York City. The most common prey items, as a percentage of scats, were rodents (35.2%), birds (27.7%), followed by anthropogenic items (26.4%). These results were similar when compared to that of seven other urban centers in North America.

Key words: coyote, diet, New York City

## Introduction

Coyote (*Canis latrans*) diet west of the Mississippi River has been well documented (Poessel, Mock, and Breck 2017), as well as in territory more recently colonized in the Eastern United States (Mastro et al. 2011). Less studied, however, is coyote dietary ecology in urban centers of the Northeastern USA and Canada where coyotes can now be found in several large cities including Boston, MA; Toronto, ON; Philadelphia, PA; Washington, D.C. and New York City (NYC), NY. Save for Toronto, ON (Thompson 2014) diet studies of urban coyotes have largely been restricted to the Northwest (Seattle: Quinn 1995), Midwest (Chicago: Morey, Gese, and Gehrt 2007, Calgary: Murray et al. 2015, Denver: Poessel, Mock, and Breck 2017) and West Coast (Los Angeles: Fedriani, Fuller, and Sauvajot 2001; San Diego: Larson et al. 2015).

Deciphering the diet of the coyote as it expands its range is paramount to understanding its impacts upon the ecosystem and potential interactions with human populations. Cities offer access to both natural prey items found in remnant, but fragmented habitat, and to anthropogenic subsidized food sources. The diet of urban coyotes has direct implications for human–wildlife interaction depending on what, where and when coyotes forage and hunt (Alexander and Quinn 2011). How coyotes selectively use food resources in Northeastern cities may also impact intraguild community structure, holds the potential for trophic cascades and has ramifications for disease ecology (see Levi et al. 2012; Way and White 2013). Lastly, Northeastern cities poise a unique line of inquiry where the coyote population has a hybrid ancestry, with a genome consisting of coyote, dog and wolf lineages (Kays, Curtis, and Kirchman 2009). Whether this novel admixture impacts coyote diet ecology in densely populated cities is largely unknown.

Using morphological characters to identify prey remains found in scat and stomachs, we describe the diet of northeastern coyotes living in NYC to address the following objectives: (i) to document the baseline diet of an urban coyote population at the edge of its range less than 25 years since its establishment; and (ii) to evaluate the relative importance of traditional prey items (e.g. rodents, lagomorphs, etc.) as compared to anthropogenic items and human commensal species (e.g. *Rattus norvegicus*; *Felis sylvestris* and *Canis familiaris*) in the most densely populated metropolis in the USA. We discuss our findings in relation to previously reported urban coyote diets from several metropolitan areas across North America.

## Methods

Our study was conducted across three of the five NYC boroughs at nine sites (eight parks managed by the NYC Department of Parks and Recreation and an additional property owned by the NY/NJ Port Authority; Table 1). We analyzed 149 scats that were collected opportunistically from 2009 to 2017 as part of a concurrent camera trap study (Nagy et al. 2016, 2017) and supplemented with searches by a domestic canine trained to search specifically for coyote feces. Additional diet items were identified from the stomach contents of 13 opportunistically collected specimens, roadkill and euthanized animals.

Two separate techniques were used to authenticate scat as coyote in origin. Scats were primarily confirmed as coyote utilizing mitochondrial DNA amplification techniques outlined in De Barba et al. (2014). Primers used were SIDl, H3R and H16145. Feces were also considered to belong to coyotes if individual coyote hairs were positively identified during the hair analysis stage. Krausman et al. (2006) has shown that even with strict field protocols to identify coyote scat in an urban environment ≤30% can be misidentified and belong to other canids. By utilizing DNA analysis and hair identification techniques, we remove this potential for error and can provide an accurate dietary profile.

**Table 1:** Park size and green cover (trees and grass) in each of the study sites

| Site | Park size (ha)[b] | Green cover[a] | Scats/stomachs |
|---|---|---|---|
| Bronx County | | | |
| Pelham Bay Park | 895.4 | 704.0 | 60 |
| Van Cortlandt Park | 435.6 | 343.2 | 17 |
| Pugsley Creek Park | 25.4 | 23.3 | 12 |
| Riverdale Park | 18.6 | 23.9 | 10 |
| Bronx Park | 270.7 | 115.6 | 9 |
| Ferry Point Park | 129.2 | 89.5 | 4 |
| New York County | | | |
| Inwood Park | 78.6 | 57.0 | 1 |
| Queens County | | | |
| Elmjack | 17.9 | 11.6[c] | 40 |
| Railroad Park | 9.0 | 9.0 | 6 |

Scats ($n = 146$) and stomachs ($n = 13$) collected at each site are also listed; NY, NY (2009–2017).
[a]Digitized by hand.
[b]2010 NYC data set NYC.
[c]After construction 2016.

Following the methodology outlined in Zielinski and Duncan (20014), prey remains and other identifiable dietary items were recovered for identification. Encased in mesh nylon, scats were hand agitated and allowed to soak overnight in tap water. Remaining fecal matrix was then rinsed away over a 500-micron (0.0197 in.) standard sieve. Remaining undigested hard parts, such as bone, hair, feathers, seeds and anthropogenic items, were removed, separated and allowed to dry for later identification.

To determine potential mammalian prey items, a species list was compiled using various checklists (Connor 1971; BioBlitz 2013 Data (Central Park), 2014). Mammalian skeletal material was identified using a comparative collection of skeletal specimens from the American Museum of Natural History, Department of Mammalogy (New York), supported by texts (Stains 1959; Elbroch 2006). When possible, identifications from skeletal remains were confirmed using guard hairs. When no skeletal remains were present and/or unidentifiable, some identifications were made solely based on hair characteristics, external morphology, cuticle scales and medullary patterns (Adorjan and Kolenosky 1969; Moore, Spence, and Dugnolle 1974). We reported the diet of NYC coyotes as a frequency of occurrence (FO) calculated as

$$\mathrm{FO_i}(\%) = \left(\frac{n_i}{N}\right) * 100$$

where $n_i$ was the number of scats containing the diet item and $N$ is the total number of scats. We also represent coyote diet as percent occurrence (PO) calculated as

$$\mathrm{PO_i}(\%) = \left(\frac{n_i}{\sum n_i}\right) * 100$$

where $\sum n_i$ is the total number scats containing the diet item $i$, and $N$ is the number of scats. $\mathrm{PO_i}$ was used to compare diet across metropolitan areas.

We compiled previously published data on coyote diet across seven metropolitan areas: Calgary and Edmonton, AB (Murray et al. 2015); Cleveland-Akron, OH (Bollin- Booth 2007); Seattle and Kings County, WA (Quinn 1997), San Diego and Orange County, CA (Larson et al. 2015) and Schamburg, IL (outside of Chicago; Morey, Gese, and Gehrt 2007); and Toronto, ON (Thompson 2014). We aggregated diet items across five major groupings (mammal, plant, anthropogenic, bird/reptile/fish and invertebrate) and present data as $\mathrm{PO_i}$. Mammals were reported to order and to species in the case of *Felis catus* and *Canis familiarus*. Where possible, we broke 'plants' into 'grass/herb' and 'fruit/seed'. Regarding the latter, we did not distinguish between wild or anthropogenic origin (e.g. cultivated *Prunus* sp.) as most studies followed this model. Anthropogenic items were divided into digestible items (e.g. dog food) and non-edible (e.g. paper, metal, plastic, etc.) where possible. For our comparative table, we did not include the following categories as they were not universally reported: unidentifiable prey remains, *C.latrans*, rocks, dirt and leaf litter.

## Results and discussion

We identified a total of 470 distinct diet items across 146 scats and 13 stomachs ($n = 159$); hereafter samples, from nine sites

(Table 1). Most were collected from Bronx county ($n = 103$), followed by Queens county ($n = 45$) and New York county ($n = 1$). Mammalian prey was the most common diet category (91.8% FO; Table 2); followed by plants and woody debris, birds, anthropogenic and invertebrates. Coyote was the most common species found across samples (23.3% FO); however, this is likely incidental ingestion from grooming. Of mammalian prey remains, white-tailed deer (*Odocoileus virginianus*; 19.5% FO) was the most frequently documented remain identified to species. However, the Order, Rodentia was more prevalent (35.2%, FO), of which the grey squirrel (*Sciurus carolinensis*) was the most common food item. We found no evidence of domestic dog (*C.familiarus*) consumption and only 4.4% (FO) of samples had house cat (*F.catus*) remains.

The coyote is often described as an opportunistic feeder, a strategy reflected in NYC coyote diet. Thirty of the 31 scats containing deer were from Pelham Bay Park. The largest park in our study, Pelham Bay, supported the highest deer density in the Bronx and was one of only two parks with a deer population (Weckel, unpublished data). On the other end of the urbanization spectrum was the Elmjack site. Our second smallest site (17.9 ha) was partially cleared for construction of a parking lot over the course of the study, losing over 35% forest cover from 2014 to 2016; all scat was collected after construction was

**Table 2:** Dietary items identified from coyote scat and stomachs

| Diet category | Count (no. of samples[a] containing diet category) | Frequency occurrence (%; FO) | Percent occurrence (%; PO) |
|---|---|---|---|
| **Mammalia** | **146** | **91.8** | |
| **Carnivora** | **58** | **36.5** | |
| *Canislatrans* | 37 | 23.3 | 7.9 |
| *Procyon lotor* | 15 | 9.4 | 3.2 |
| *Felis catus* | 7 | 4.4 | 1.5 |
| **Artiodactyla;** *Odocoileus virginianus* | **31** | **19.5** | 6.6 |
| **Rodentia** | **56** | **35.2** | |
| Family Cricetidae | 24 | 15.1 | |
| *Ondatra zebithicus* | 11 | 6.9 | 2.3 |
| *Microtus pennsylvanicus* | 11 | 6.9 | 2.3 |
| *Microtus* sp. | 1 | 0.6 | 0.2 |
| *Peromyscus* sp. | 2 | 1.3 | 0.4 |
| Family Sciuridae | 20 | 12.6 | |
| *Sciurus carolinensis* | 17 | 10.7 | 3.6 |
| *Marmota monax* | 2 | 1.3 | 0.4 |
| *Tamiasciurus hudsonicus* | 1 | 0.6 | 0.2 |
| Family Muridae | 7 | 4.4 | |
| *Rattus norvegicus* | 7 | 4.4 | 1.5 |
| Unknown Rodentia | 8 | 5.0 | 1.7 |
| **Lagamorpha;** *Sylvilagus* sp. | **15** | **9.4** | |
| **Didelphimorphia;** *Didelphis virginiana* | **2** | **1.3** | |
| **Eulipotyphla;** *Blarina brevicauda* | **2** | **1.3** | |
| **Aves** | **44** | **27.7** | |
| **Invertebrate** | **29** | **18.1** | |
| Insecta | 29 | 18.2 | 6.2 |
| Bivalvia | 1 | 0.6 | 0.2 |
| Malacostraca | 1 | 0.6 | 0.2 |
| **Vegetation and woody debris** | **129** | **81.1** | |
| Leaf litter/Woody debris | 90 | 56.6 | 19.1 |
| Grass sp. | 45 | 28.3 | 9.6 |
| Fruit/seed | 38 | 23.9 | 8.1 |
| **Anthropogenic** | **42** | **26.4** | |
| Plastic | 16 | 10.1 | 3.4 |
| Paper | 12 | 7.5 | 2.6 |
| Cloth/fiber | 9 | 5.7 | 1.9 |
| Foil | 5 | 3.1 | 1.1 |
| Bird seed | 2 | 1.3 | 0.4 |
| Processed meat | 2 | 1.3 | 0.4 |
| Leather | 2 | 1.3 | 0.4 |
| Glass | 1 | 0.6 | 0.2 |
| Metal | 1 | 0.6 | 0.2 |
| Rubber | 1 | 0.6 | 0.2 |
| Styrofoam | 1 | 0.6 | 0.2 |
| Wire | 1 | 0.6 | 0.2 |

Items are represented as total number of items and percent of occurrence; New York City, NY (2009-2017). Bold values are to emphasize values for Orders which correspond to the bold Order names.
[a]Samples = scats and stomachs.

**Table 3:** Percent occurrence of diet items found in coyote scat and stomachs across seven metropolitan areas in North America

| Metropolitan area: | Calgary, AB | Cleveland-Akron, OH | Edmonton, AB | Kings County, WA | New York City, NY[a] | San Diego and Orange Co, CA | Schaumburg, IL | Toronto, ON |
|---|---|---|---|---|---|---|---|---|
| Population density[b]: | 1329 $km^{-2}$ | 402 $km^{-2}$ | 1271 $km^{-2}$ | 1413 $km^{-2}$ | 10,430 $km^{-2}$ | 258 & 1392 $km^{-2}$ | 1500 $km^{-2}$ | 4149 $km^{-2}$ |
| Citation: | Murray et al. (2015) | Bollin-Booth (2007) | Murray et al. (2015) | Quinn (1997) | Current study | Larson et al. (2015) | Morey, Gese, and Gehrt (2007) | Thompson (2014) |
| **Mammal** | **48.1** | **75.9** | **67.5** | **46.7** | **38.5** | **69.0** | **54.3** | **47.7** |
| Artiodactyla | 3.6 | 23.8 | 5.0 | | 9.0 | 0.6 | 6.8 | |
| Carnivora | 0.3 | 5.9 | 9.0 | | 4.4 | 8.3 | 3.2 | |
| *C.familiarus* | 0.3 | | 0.4 | | | | | |
| *F.catus* | 0.3 | 0.1 | 2.4 | 12.6 | 2.0 | 15.5 | 4.6 | 0.8 |
| Didelphimorphia | | | | | 0.6 | 1.2 | | 0.8 |
| Eulipotyphla | | | | | 0.6 | 6.0 | | |
| Lagomorpha | 3.3 | 8.2 | 14.1 | | 4.4 | 11.3 | 17.3 | 18.5 |
| Mephitidae | | 0.0 | 6.3 | | | | | |
| Rodentia | 40.4 | 35.6 | 30.2 | 14.6 | 17.5 | 23.8 | 22.3 | 27.7 |
| Other | | 2.4 | | 19.5 | | 2.4 | | |
| **Plant** | **25.0** | **17.5** | **12.9** | **45.0** | **24.2** | **13.7** | **27.9** | **46.9** |
| Fruit/Seed | 5.4 | | 3.2 | 41.1 | 11.1 | 13.7 | 21.0 | |
| Grass/Herb | 19.6 | | 9.7 | 3.9 | 13.1 | | 6.8 | |
| Not specified | | 17.5 | | | | | | |
| **Anthropogenic** | **19.2** | **2.5** | **17.4** | **5.7** | **15.4** | **3.0** | **7.3** | **0.0** |
| Digestible | 13.9 | | 9.9 | 4.3 | 1.2 | | | |
| Non-edible | 5.4 | 2.5 | 7.5 | 1.4 | 14.2 | 3.0 | | |
| Not specified | | | | | | | 7.3 | |
| **Bird/reptile/fish** | **5.8** | **2.8** | **1.5** | **2.6** | **12.8** | **8.9** | **5.5** | **5.4** |
| Bird | 5.8 | 2.3 | 1.5 | | 12.8 | 8.9 | 5.5 | 5.4 |
| Bird/reptile | | | | 2.6 | | | | |
| Reptile/fish | | 0.5 | | | | | | |
| **Invertebrate** | **1.8** | **1.3** | **0.7** | | **9.0** | **5.4** | **5.0** | **0.0** |

[a]343 total prey items; does not include *C.latrans*, rock, leaf litter remains found in scat.
[b]Population density—When possible we used data reported by authors; otherwise we used census data corresponding to the study period based

completed in 2016. Here, coyote diet had the greatest percentage of anthropogenic and urban commensal species: Elmjack samples consisted of only 25% of all scats and stomachs in this study yet represented 85% and 48% of scats with *Rattus* sp. and anthropogenic remains. It should be noted that 10 of 11 coyotes were euthanized at Elmjack following concern over potential negative interactions with park users, substantiated claims of human feeding and evidence of food conditioning.

The patterns observed in NYC coyote diet were similar to several other cities despite differences in climate and human density (Table 3). Mammals were the most commonly consumed prey category across all metropolitan areas ranging from 38.5% for NYC to 75.9% (PO) in Cleveland-Akron, OH. As in NYC, rodents were the most numerically important mammalian order across studies. The relative importance and contribution of anthropogenic items to coyote diet varied substantially across urban sites ranging between 3.0% (PO, San Diego & Orange Counties, CA) to a high of 19.2% (PO) in Calgary, Alberta with NYC coming in on the higher end (15.4%, PO). Interestingly, NYC reported the highest PO of non-edible anthropogenic items (14.2%, PO), although most of these items (e.g. foil) can be associated with human food. Note, traditional prey identification methods from scat may underestimate some anthropogenic sources (e.g. processed meat) unless associated with ingestion of indigestible remains (e.g. foil wrapper). A case in point: one of the stomachs had sliced hot dogs which matched reports of residents feeding resident coyotes (pers. comm.). These items would not have been recovered in a scat sample by traditional methods despite being a portion of the coyote diet.

Overall, the diet of NYC coyotes primarily reflects those resources provided by the parks they inhabit (e.g. mammals, birds, fruit); albeit, with evidence that coyotes supplement with human-derived food sources, especially in response to poor habitat conditions and habitat destruction, as in the case of Elmjack coyotes. This paints a largely optimistic picture for NYC whose parks appear to support sufficient biodiversity to support a 'natural' coyote diet despite being surrounded by an urban matrix with the highest population density in North America. Indeed, to the disappointment of many urbanites, NYC coyotes are unlikely to control urban commensals such as rats. This nuisance rodent contributed a notable portion of coyote diet only in the most fringe of habitat where coyote itself was considered a nuisance. Future research will focus on how coyotes will impact local ecology as a top urban predator as the species continues to expand its range into Long Island.

## Acknowledgments

This study would not be possible without the volunteers who spent many hours searching for scat: Jeff Krause, Lynn Krause, Zachary Berzolla, Kasey French, Rebecca Bauer, Miranda Bandeli, Kate Harrison, Kyle Sanduski, Tim Morris, Gabriella Placido, Alex Golden, Jared Ortega, Monika Ryczek, Isabella Yepes, Kristen Schaumber and Melissa Zostant. We are especially indebted to the students from The Science Research Mentoring Program at the American Museum of Natural History who helped with the identification of prey remains; Joshua Boadu, Catherine Golubovsky, Rachel Lee, Sandra Lewocki, and Rita Pozovskiy, Special thanks to Dr. J. W. Eichenbaum for the donation of a Zeiss microscope to the project. Additional funding was provided by the Morgenthau Preserve, The Rusticus Garden Club, and The Dorr Foundation. We thank Javier Monzon and an anonymous reviewer whose comments improved the manuscript.

*Conflict of interest statement*. None declared.

## References

Adorjan, A. S., and Kolenosky, G. B. (1969) 'A Manual for the Identification of Hairs of Selected Ontario Mammals', *Ontario Department of Lands and Forests Research Report*, **90**: 1–64.

Alexander, M. S., and Quinn, M. S. (2011) 'Coyote (*Canis latrans*) Interactions with Humans and Pets Reported in the Canadian Print Media (1995–2010)', *Human Dimensions of Wildlife*, **16**: 345–59.

BioBlitz 2013 Data (Central Park). (2014) 'Macauley Honors College, City University of New York', <https://eportfolios.macaulay.cuny.edu/bioblitz/2014/09/22/bioblitz-2013-data-central-park/> accessed 9 September 2016.

Bollin- Booth H.A.2007. Diet Analysis of the Coyote (Canis latrans) in Metropolitan Park Systems of Northeast Ohio'.Thesis. Cleveland State University. Cleveland, Usa.

Connor, P. F. (1971) 'The Mammals of Long Island, New York', *New York State Museum and Science Service Buletin*, **416**. 1-78,

De Barba, M. et al. (2014) 'DNA Metabarcoding Multiplexing and Validation of Data Accuracy for Diet Assessment: Application to Omnivorous Diet', *Molecular Ecology Resources*, **14**: 306–23.

Elbroch, M. (2006) *Animal Skulls: A Guide to North American Species*. Mechanicsburg, PA: Stackpole Books.

Fedriani, J. M., Fuller, T. K., and Sauvajot, R. M. (2001) 'Does Availability of Anthropogenic Food Enhance Densities of Omnivorous Mammals? An Example with Coyotes in Southern California', *Ecography*, **24**: 325–31.

Kays, R., Curtis, A., and Kirchman, J. J. (2009) 'Rapid Adaptive Evolution of Northeastern Coyotes via Hybridization with Wolves', *Biology Letters*, **6**: 89–93.

Krausman, P. R. et al. (2006) 'Molecular Identification of Coyote Feces in an Urban Environment', *Southwestern Naturalist*, **51**: 122–6.

Larson, R. N. et al. (2015) 'Food Habits of Coyotes, Gray Foxes, and Bobcats in a Coastal Southern California Urban Landscape', *Western North American Naturalist*, **75**: 339–47. p

Levi, T et al. (2012) 'Deer, Predators, and the Emergence of Lyme Disease',*Proceedings of the National Academy of Sciences*, **109**: 10942–7.10.1073/pnas.1204536109

Mastro, L., Gese, E. M., Young, J. K., and Shivik, J. A. (2011). 'Coyote (Canis latrans),100+ Years in the East: A Literature Review'. Addendum to the Proceedings of the 14th Wildlife Damage Management Conference (2012).

Moore, T. D., Spence, L. E., and Dugnolle, C. E. (1974) 'Identification of the Dorsal Guard Hairs of Some Mammals of Wyoming', Wyoming Game and Fish Department, Laramie.

Morey, P. S., Gese, E. M., and Gehrt, S. (2007) 'Spatial and Temporal Variation in the Diet of Coyotes in the Chicago Metropolitan Area', *The American Midland Naturalist*, **158**: 147–62.

Murray, M. et al. (2015) 'Greater Consumption of Protein-Poor Anthropogenic Food by Urban Relative to Rural Coyotes Increases Diet Breadth and Potential for Human–Wildlife Conflict', *Ecography*, **38**: 1235–8.

Nagy, C. et al. (2017) 'Initial Colonization of Long Island, New York by the Eastern Coyote *Canis latrans* (Carnivora, Canidae), Including First Record of Breeding', *Check List*, **13**: 901–7.

Nagy, C. M. et al. (2016) 'Occupancy and Breeding Status of Coyotes in New York City Parks, 2011 to 2014', *Urban Naturalist*, **9**: 1–16.

Poessel, S. A., Mock, E. C., and Breck, S. W. (2017) 'Coyote (*Canis latrans*) Diet in an Urban Environment: Variation Relative to Pet Conflicts, Housing Density, and Season', *Canadian Journal of Zoology*, **95**: 287–97.

Stains, H. J. (1959) 'Use of the Calcaneum in Studies of Taxonomy and Food Habits', *Journal of Mammalogy*, **40**: 392–401. p

Thompson, B. (2014) 'Coyote and Their Movement in Relation to Resources in Tommy Thompson Park,' Thesis, York University, Toronto, Ontario, Canada.

Way, J. G., and White, B. N. (2013) 'Coyotes, Red Foxes, and the Prevalence of Lyme Disease', *Northeastern Naturalist*, **20**: 655–66.

Zielinski, W. J., and Duncan, N. P. (2014) 'Diets of Sympatric Populations of American Martens (*Martes americana*) and Fishers (*Martes pennanti*) in California', *Journal of Mammalogy*, **85**: 470–7.