

RICK WILLIAMS

RAPTOR RESEARCH



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DIETS OF NORTH AMERICAN FALCONIFORMES*

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Introduction

Most birds are predatory sometime during their lives whether we consider a hummingbird such as the Purple-Mountain Gem (*Lampornis calolaema*) hawking insects in the forests of Costa Rica (Snow 1977) or the giant Monkey-eating Eagle (*Pithecophaga jefferyi*) killing a primate in the Philippine jungles (Kennedy 1977). Generally, however, one thinks of members of the orders Falconiformes and Strigiformes as birds of prey, and occasionally, certain other species, such as members of the Corvidae, are included within this classification in the functional sense.

For the purpose of this discussion, only the Falconiformes, or the vultures, kites, hawks, eagles, and falcons of North America, are considered. Evidence presented by Sibley and Ahlquist (1972) indicates that this order is polyphyletic in origin, and its members may represent analogous solutions by several groups to fill certain similar voids within the myriad of ecological niches. Nevertheless, the physical characteristics common to these birds usually include a sharp hooked beak for tearing flesh, strong grasping feet with large sharp talons for holding or killing prey (vultures excluded), and particularly keen eyesight. Other adaptations vary widely and may directly influence the diet of a raptor by facilitating the capture of prey, or more indirectly, may assist a particular predatory bird in penetrating an environment less crowded with competitors.

Some raptors, such as the Everglade Kite (*Rostrhamus sociabilis*) with its long and pointed, hooked beak adapted for manipulating and removing the soft bodies of the Apple Snail (*Pomacea*) from its shell (Snyder and Snyder 1969), are highly specialized for predation upon a single animal. Consequently the range of the predator is limited by the range of the prey, and any decline in the prey population influences that of the predator. Other raptors such as the Bald Eagle (*Haliaeetus leucocephalus*) are more versatile and feed on a wide variety of prey, often utilizing for the most part different classes of foods in different parts of their range (Herrick 1924; Sherrod, White, and Williamson 1977). Changes in diet according to the season and the availability of certain prey species, as during migration, are also common, exemplified by the switch from vertebrate to invertebrate prey in the spring by American Kestrels (*Falco sparverius*) in certain localities (Breckenridge and Errington 1938). Both of the last two mentioned raptors are examples of generalists. As a rule they are much more widely distributed than specialists, and, although declines in one prey species may affect the predator populations, these raptors can rely more heavily on other prey species during periods of

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hardship. Most birds of prey are closer to being generalists but can be classified as intermediate between these two extremes. Overall, raptors are opportunists and given certain circumstances (prey abundance, vulnerability of prey, hunger of hawk) will attack a wide variety of prey within their general capabilities.

The Diet of Raptors in the Wild

There are roughly five methods of determining the diet of wild raptors. Each method seems to have advantages and disadvantages as discussed, in part, in the literature (Errington 1930, 1932; Bond 1936; Hartley 1948).

The first is simply to collect the raptor and examine the contents of its crop and stomach. This method yields a higher percentage of smaller or invertebrate items in raptor diets than other methods, but some prey in the stomach will be unidentifiable. In addition to the fact that some stomachs will be empty, this technique yields a minimum amount of data per bird when compared with most of the other procedures used. More importantly, since the existence of a number of raptors is threatened, this procedure is rarely acceptable today. It was principally used by early government biologists (Fisher 1893, McAttee 1935) to determine which species of raptors were "good" and which were "harmful." If stomach contents are deemed essential, emetic techniques such as those discussed by Tomback (1975) might be adapted to raptors without sacrificing the bird.

A second method is to examine nests or plucking perches near the nest for remains of prey animals which adults have been eating or feeding to the young. This technique may favor larger prey species since smaller specimens may be swallowed whole or in a few bites with little plucking, while feathers, fur, and bones are nearly always left from larger items.

Examination of regurgitated pellets comprises a third method of prey identification. The pellets can be picked up regularly under roosts or nests and analyzed for content. The value of pellet examination varies, and since bones can be digested to different degrees and fur or feathers likewise destroyed, these castings can sometimes reveal qualitatively but not quantitatively the species eaten. Certain foods, such as fish or insects, may leave little casting material that can later be found when regurgitated since a pellet formed of scales or exoskeletons quickly flakes apart and is lost.

A fourth technique is to squeeze the food in the nestlings' crops out through the mouth and examine the contents. As the fledglings grow older, they are tethered at the base of the nest tree to facilitate their examination. This gives an accurate account of the items which the adults are catching during the breeding season, and has been used successfully by some experienced raptor biologists. However, there are four reasons why inexperienced workers should avoid this technique. Firstly, nestlings are fed certain amounts of roughage, including bones, and to force this mass back up the throat may tear esophageal tissue. Secondly, it subjects the young to an obvious decrease in nutrition, unless the sample is replaced or substituted with other food. Thirdly, young raptors in nests are frequently depredated by mammals following human scent up the trees, and to place these birds on the ground increases depredation. Peterson and Keir (1976) present suggestions for constructing platforms which should reduce such losses.

Lastly, to hold fledglings in this manner "far past the time that the young would have left their nests, until the adults no longer brought food" as suggested by Errington and Breckenridge (1936) prescribes an uncertain future for these offspring. Most raptors undergo an extensive post-nest departure dependency period during which the family

group travels and may even hunt together as do the Peregrine Falcon (*Falco peregrinus*; Sherrod, in prep.). Preventing this family group association up to the time when the adult deserts the tethered young may delay the development of normal hunting behavior until after offspring can no longer receive additional food from the parents, thus increasing the chance of mortality for such individuals.

The last method is by observation of raptors with prey. This may be accomplished by constructing a blind near the nest and observing the prey that the adults bring in. In some cases, birds may be observed hunting in the field or frightened off kills. Prey brought to the nest is often plucked thoroughly and may be difficult to identify. This method also employs a considerable amount of time. To witness a raptor kill in the field is rare for the proportion of time spent, and gives little quantitatively concerning overall diet.

Whatever the method used, data collected from only one bird or one nest can be highly misleading as to diet of the species since certain individuals may tend to prey on a particular animal which is plentiful in their hunting area or which they have become very adept at catching. The material available for analysis of the diet of wild Falconiformes has been collected by all of the techniques discussed above and is explained for each account under "Methods Information" in the tables. It is presented in the literature in a number of different manners. For some species the material is voluminous, and for others little data exists. In the latter case, I have asked biologists who are working with the species for unpublished data which they have collected. This collection of diet data is presented merely as being representative, but by no means is it inclusive of all information available in the literature. I have generally used the following format in treatment of each species, but have found it necessary to diverge in certain cases. To give some idea of the overall diet, I have consulted collective references (Bent 1937, Brown and Amadon 1968). Accounts related by Bent (1937) are referenced as Bent (1937 or 1938) only. This and other collective references allow the possibility of some duplication of materials. I have then included the percentages of broad classes presented by Snyder and Wiley (1976).

Next I have taken the extensive stomach content records collected throughout the United States and published by Fisher (1893), and recalculated them as percentage diets by numbers. This account is often vague and in some cases expressed in plurals (e.g., insects). In such a case I have calculated these entries to mean two specimens of the species in question. This liberty undoubtedly will result in error since there may have been twenty insects instead of two. However, these samples are usually taken throughout the year and throughout the range of the bird in North America and, I feel, are extremely valuable even with errors included. Considering the opportunistic nature of birds of prey discussed earlier, we may assume, if an item occurs more often than "extremely rarely" in a given sample, that a raptor will feed on it if it is available. In other words, the exact percentages of certain prey species in the diet are without doubt not of an absolute nature. I have classified each item of Fisher's as closely as possible from the material given in his accounts.

Other comprehensive accounts of raptor stomach analyses may be less detailed, cover a lesser geographic range and therefore fewer species, or may present formats which are difficult to integrate with the material presented in this summary. Therefore, the reader is advised to examine the following: Warren 1890, especially Bailey 1918, Hausman 1928, Snyder 1932, May 1935, and McAtee 1935.

Lastly, several specific studies on the bird concerned, preferably from different parts of the range, are given. These are the only accounts, in addition to Fisher (1893) and a few other exceptions, to include the scientific names of prey species. All presentations are made on the basis of numbers and not biomass. Should the reader desire information of the latter nature, he need simply acquire sample weights from museum specimens and make the appropriate calculations. A percentage in parentheses included in the tables gives the proportion which that general class (mammal, bird, reptile and amphibian, fish, invertebrate, other) comprises. The scientific names of the species are given alphabetically by common name in Appendix I.

The nomenclature used in these tables is from the following sources:

Mammals—Jones, Carter, and Genoways 1975

Birds—Monroney, Bock, and Farrand 1975; Robbins, Bruun, Zim, and Singer 1966

Reptiles and Amphibians—Conant 1975; Stebbins 1966

Fishes—Bailey, Fitch, Herald, Lachner, Lindsey, Robins, and Scott 1970

Invertebrates—Borror and White 1970 and other various sources

In some cases where the old nomenclature is unclear, it has been retained.

Bird of Prey Diet Tables

KEY TO METHODS INFORMATION ABBREVIATIONS

C—Account from pellet or casting examination

D—Observations made throughout area of distribution

F—Fall

G—General reference

I—Account from individual bird or individual nest

O—Account from observation of adults bringing in food to young or observations of predation in field

M—Miscellaneous

P—Account from at least two birds or nests (group or population)

R—Account from examination of prey remains at nest, in crop of young, or at plucking perches

S—Account from stomach analysis

Sp—Spring

Su—Summer

ui—Unidentified

W—Winter

Y—Year round

North American Vultures (Cathartidae)

Observation of vultures feeding on carrion rarely seems to be worthy of note since this is their presumed food. As a result of this fact and the difficulty of identification, little is published on this type of food source. The Cathartids do take some live prey as several of the following observations suggest, but to what extent is not known. It is these presumable exceptions to the diet that are currently most frequently published.

Table 1. Turkey Vulture (*Cathartes aura*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Garbage, offal, dead animals including domestic stock, small mammals, skunks, birds, alligators, snakes, turtles, tadpoles. Newly born pigs, nestling herons and ibises, young and weakly chickens, fish, grasshoppers, rotting pumpkins.
Brown and Amadon 1968 G	Carrion and offal of all sorts, road kills, remains around mammal dens, sea lion dung, exceptionally rotting fruit and vegetables including pumpkins and oil palm nuts. Young live animals including nestling ibises, herons, and eggs.
Mueller and Berger 1967 O, I, F Wisconsin	Live, tethered house sparrow
Temple 1969 O, I, Su Ohio	Fish regurgitated by pirated heron, and carrion.
Rea 1973 S, C, P, Sp, Su Arizona, New Mexico	Mammals to include 4 or more young White-throated Woodrats, 2 ui rodents (Rodentia), sheep remains, 2 ui mammals. Birds to include 1 mourning dove, 1 immature bank swallow, and 1 ui bird (Aves). 2 ui snakes (Serpentes). 3 masses putrid flesh. (Sample too small for percentages.)

Table 2. Black Vulture (*Coragyps atratus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Chiefly carrion from dump heaps, sewers, and butcher shops; dead domestic animals; animal excrement. Young pigs, lambs, kids, eyes of newborn calves or laboring cattle. Domestic chicks, and heron and cormorant nestlings.
Brown and Amadon 1968 G	Garbage, offal, carrion, excrement, carcasses of dead animals. Skunks. Live helpless animals such as newborn piglets and calves, birds to include herons and young seabirds, baby sea turtles and turtle eggs. Pungent vegetable matter such as avocados and oil palm fruit.

Steirly 1966 O, P, Sp Virginia	Newborn domestic pigs
Stewart 1974 O, I, Sp Virginia	Animal intestine or placenta

Table 3. California Condor (*Gymnogyps californianus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Dead animals such as deer, bear, and salmon.
Brown and Amadon 1968 G	Entirely carrion—chiefly of large mammals, small mammals where large numbers have been killed. Dead domestic animals to include cattle, calves, sheep, horses, and deer. Ground squirrels.
Koford 1953 G, O	Prehistorically, animals trapped in tar pits and large carnivore kills. Dead whales on coasts, bison (<i>Bison</i>), dwarf elk, and pronghorns. Carcasses of domestic stock and poisoned ground squirrels (<i>Spermophilus</i>), and trapped carnivores (<i>Carnivora</i>).

Kites (Accipitridae)

Table 4. White-tailed Kite (*Elanus leucurus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Many small mammals to include shrews, ground squirrels, pocket gophers, field mice, and wood rats. Few larger mammals and small birds. Lizards, small snakes, and insects to include crickets, grasshoppers, and beetles.
Brown and Amadon 1968 G	Chiefly mice (<i>Microtus</i> spp., <i>Mus</i> spp.) and other small mammals and insects. Occasionally small birds, lizards, and amphibians.
Snyder and Wiley 1976 G, M	Mammals (100%).
Bond, 1940 C, I, Su California	Mammals (100%) to include 26 California voles.

Hawbecker 1942 C, P, Sp-Su California	Mammals (100%) to include 2 ui harvest mice (<i>Reithrodontomys</i> sp.) and 95 ui voles (<i>Microtus</i> sp.).
Dixon, Dixon, and Dixon 1957 C, P, Y, Sp California	Mammals to include 1 ui shrew (<i>Sorex</i> sp.), 1 ui gopher (<i>Thomomys</i> sp.), 13 western harvest mice, 1 deer mouse, 1 ui small mouse (Rodentia), 1 ui woodrat (<i>Neotoma</i>), 134 California voles, and 48 house mice. (Total mammals 99%). Birds to include 2 ui small specimens (Aves). (Total birds 1%).
Stendell and Myers 1973 C, P, Su California	Mammals to include ui pocket gophers (<i>Thomomys</i> sp., 6.3%), California pocket mice (.7%), ui kangaroo rat (<i>Dipodomys</i> sp., 1.3%), western harvest mice (5%), and California vole (85.3%). Birds (Aves). (Total birds .3%). Insects (Insecta). (Total invertebrates 1%).

Table 5. Mississippi Kite (*Ictinia mississippiensis*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mice, young rabbits, lizards, small snakes, toads, frogs, and insects to include dragonflies, locusts, cicadas, grasshoppers, crickets, katydids, and large beetles.
Brown and Amadon 1968 G	Bats, possibly swallows, lizards, frogs, fish. Flying insects including dragonflies.
Snyder and Wiley 1976 G, M	Mammals (0), birds (0), vertebrates (.2%), lower vertebrates (.2%), invertebrates (99.8%)* *% unclear in original publication.
Sutton 1939 S, P, Sp-Su Oklahoma	Fishes to include 1 ui specimen (Pisces). (Total fishes .3%). Almost totally insects to include 4 ui hymenopterans (Hymenoptera), 10 ui short-horned grasshoppers (Acrididae), 5 ui band-winged grasshoppers (Oedipodinae), 3 ui band-winged grasshoppers (<i>Hippiscus</i> sp.), 2 ui short-horned grasshoppers (<i>Trimerotropis</i> sp.), 128 ui grasshoppers (<i>Melanoplus</i> sp.), 60 camel crickets, 1 bill bug, 1 plant bug, 1 ui chinch bug (<i>Geocoris</i> sp.), 1 ui Coreidae, 21 ui leaf-legged bugs (<i>Leptoglossus</i> sp.), 3 ui Pentatomidae, 1 stink bug (<i>Euschistus variolarius</i>), 9 ui stink bugs (<i>Euschistus</i> sp.), 1 stink bug (<i>Chlorochora ligata</i>), 1 stink bug (<i>Periballus limbolarius</i>), 6 ui stink bugs (<i>Nezara</i> sp.), 4 ui tiger beetles (<i>Cincindela</i> sp.), 6 ui ground beetles (Carabidae), 2

ground beetle (*Geopoinus incrassatus*), 13 ui ground beetles (*Selenophorus* sp.), 9 ui ground beetles (*Triplectus* sp.), 2 ui ground beetles (*Harpalus* sp.), 1 ui ground beetle (*Amara* sp.), 3 ui ground beetles (*Calosoma* sp.), 2 ground beetle (*Calosoma obsoletum*), 5 ui ground beetles (*Platynus* sp.), 2 ui diving beetles (Dytiscidae), 1 ui scavenger beetle (*Hister* sp.), 1 water scavenger beetle, 4 ui carrion beetles (*Necrophorus* sp.), 1 ui rove beetle (Staphylinidae), 1 ui scarab beetle (Scarabaeidae), 6 dung beetles, 1 ui tumble bug (Scarabaeinae), 3 ui scarab beetles (*Canthon* sp.), 1 ui dung beetle (*Copris* sp.), 1 ui skin beetle (*Dermestes* sp.), 1 ui May beetle (*Phyllophaga* sp.), 2 ui long-horned beetles (Cerambycidae), 1 ui snout beetle (Curculionidae), 1 ui weevil (*Lixus* sp.), 1 ui lepidopteran (Lepidoptera), 2 ui sphinx moths (Sphingidae), 1 ui fly (Diptera), 2 ui robber flies (Asilidae), 3 ui assassin flies (*Dasyllus* sp.), 2 wasps, 1 ui ant (Formicidae), 1 ui spider wasp (Pompilidae), 1 ui vespid wasp (Vespidae), 1 ui paper wasp (*Polistes* sp.), 2 ui sphecid wasps (Sphecidae), 2 solitary wasps, 1 ui solitary wasp (*Odynerus* sp.), 1 ui bee (Halictidae), and 2 ui bees (probably *Andrena*). (Total invertebrates 99.7%).

Skinner 1962
O, P, Su
Alabama

Insects to include ui May beetles (*Phyllophaga* sp.), Carolina locusts, ui grasshoppers (Orthoptera), and ui dragonflies (Odonata).

Fitch 1963
C, P, Su
Kansas

Invertebrates to include 3 gay-winged locust, 2 short-horned grasshoppers, 1 bird locust, 34 ui short-horned grasshoppers (Acrididae), 1 long-horned grasshopper (*Daihinia* sp.), 3 ui long-horned grasshoppers (Tettigoniidae), 120 ui orthopterans (Orthoptera), 1 cicada, and 15 ui cicadas (Cicadidae), 39 ui ground beetles (Carabidae), 2 tiger beetles (Cicindelidae), 1 water scavenger beetle (*Hydrous* sp.), 18 ui water scavenger beetles (Hydrophilidae), 3 tumblebugs (*Canthon* sp.), 1 ui scarab beetle (Scarabaeidae), 1 carrion beetle (*Necrophorus* sp.), 187 ui beetles (Coleoptera), and 3 ui moths (Lepidoptera). (Total insects 100%).

Parker 1975
R, C, P, Su
Kansas, Oklahoma, Texas

Mammals to include at least 9 specimens such as ui bats (Chiroptera), ui kangaroo rat (*Dipodomys* sp.), deer mouse (*Peromyscus* sp.), and ui cottontail (*Sylvilagus* sp.).
Birds to total 15 specimens between yellow-billed cuckoo, cliff swallow, and ui meadowlark (*Sturnella* sp.).
Reptiles and amphibians to include at least 59 speci-

	mens such as ui box turtle (<i>Terrapene</i> sp.), ui horned lizard (<i>Phrynosoma</i> sp.), ui fence lizard (<i>Sceloporus</i> sp.), ui toad and frog (<i>Anura</i>). Invertebrates to include ui crayfish (Crustacea) and ui insects (Insecta). Carrion. Percentage not applicable.
Glinski, unpublished O, I, Sp-Su Arizona	Reptiles to include ui lizards (<i>Cnemidophorus</i> sp.) (Total reptiles 1%). Amphibians to include leopard frogs (Total amphibians 1%). Insects to include ui assassin bugs (<i>Reduviid</i> sp.), ui cicada (<i>Tibicen</i> sp.), ui June beetles (<i>Cotinus</i> sp.), and others. (Total insects 87%). Other nonidentifiable prey (probably mostly insects). (Total other 11%).

Table 6. Swallow-tailed Kite (*Elanoides forficatus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	An occasional mouse or bird. Mainly small reptiles to include lizards and snakes, amphibians to include frogs and tree toads, and insects to include dragonflies, grasshoppers, locusts, cicadas, crickets, beetles, wasps and bees, and their larva, and cottonworms.
Brown and Amadon 1968 G	Bird nestlings and eggs, small lizards and snakes, possibly small minnows. Generally insects to include wasp grubs and possibly honeycomb.
Snyder and Wiley 1976 G, M	Mammals (.2%), birds (4.6%), vertebrates (35.5%), lower vertebrates (30.7%), invertebrates (64.5%).
Sutton 1955 O, I, Sp-Su Florida	Mammals to include 1 ui specimen (Mammalia). (Total mammals 2.1%). Birds to include 5 ui nestlings (Aves). (Total birds 10.6%). Small reptiles to include 19 ui lizards (<i>Anolis</i> sp.) and amphibians to include 14 ui frogs (<i>Anura</i>). (Total reptiles and amphibians 70.2%). Invertebrates to include 5 ui insects (Insecta). (Total invertebrates 10.6%). Other to include 3 ui items. (Total other 6.4%).
Snyder 1974 O, P, Sp-Su Florida	Birds to include 17 nestlings (Aves) including 1 red-bellied woodpecker. (Total birds 13.2%). Reptiles to include 38 ui lizards (<i>Anolis</i> sp.) and 1 ui

snake (Serpentes) and amphibians to include 58 frogs. (Total reptiles and amphibians 75.2%)

Invertebrates to include 6 insects such as 2 dragonflies (Odonata), 2 tabanid flies (Tabanidae), and 1 paper wasp (Polistinae) nest for larvae. (Total invertebrates 4.7%)

Other to include 9 ui items. (Total other 7%)

Table 7. Everglade Kite (*Rostrhamus sociabilis*) Diet.

Reference/Methods Information	Food
Fisher 1893 G	Exclusively freshwater univalve mollusks; in Florida
Bent 1937 G	Exclusively the snail (<i>Pomacea</i>)
Brown and Amadon 1968 G	Entirely freshwater snails of genus <i>Pomacea</i>
Snyder and Wiley 1976 G, M	Invertebrates (100%).
Murphy 1955 O, P, W Buenos Aires	Freshwater snail (<i>Ampullaria</i> sp.)
Sykes 1974 O, I, Sp, W	Apple snails, ui small mammal (Mammalia), and ui turtle (Testudines) during drought.

Accipiters (Accipitridae)

Table 8. Goshawk (*Accipiter gentilis*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mammals to include small rodents such as chipmunks, squirrels and lemmings, hares and rabbits. Birds to include ducks such as mallards, black ducks, teals, domestic chickens, ruffed grouse, ptarmigan, wild pigeons, hairy woodpeckers, blue jays, crows, robins, blackbirds, and finches.
Brown and Amadon 1968 G	More mammals than most Accipiters to include tree squirrels, lemmings, and those up to the size of young hares. Birds to include nestlings, ducklings, crows, and those up to the size of large grouse. Rarely carrion.

Snyder and Wiley 1976 G, M	Mammals (37%), birds (53.8%), vertebrates (90.9%), lower vertebrates (O), invertebrates (9.1%).
Fisher, 1893 S, P, late Su, F, W, D	Mammals to include 1 ui weasel (Mustelidae), 1 gray squirrel, 4 red squirrels, 1 ui squirrel (Sciuridae), at least 3 ui mice (Rodentia), and 3 ui rabbits (Leporidae). (Total mammals 21.3%) Birds to include 3 ruffed grouse, 1 ui quail (Phasianidae), 1 domestic chicken, 5 ui galliformes, and 1 mourning dove. (Total birds 18%.) Invertebrates to include 3 ui centipedes (Chilopoda), 2 ui locusts (Acrididae), 2 ui beetles (Coleoptera), and 30 sphinx moth (Sphingidae) larvae. (Total invertebrates 60.7%).
Sutton 1927 S, P, W Pennsylvania	Mammals to include 1 ui chipmunk (Sciuridae), 10 eastern gray squirrels, 5 red squirrels, 3 ui voles (Cricetidae), 7 white-footed mice, and 63 eastern cottontails. (Total mammals 37.2%) Birds to include 1 blue-winged teal, 1 ui domestic duck (Anatidae), 55 ruffed grouse, 15 bobwhite, 8 ring-necked pheasants, 36 domestic chickens, 1 guinea fowl, 3 rock doves, 1 hairy woodpecker, 2 blue jays, 1 robin, 2 house sparrows, 1 eastern meadowlark, 1 song sparrow, 19 ui sparrowlike birds (Aves). (Total birds 61.5%) 2 ui snakes (Serpentes). (Total reptiles .8%) Carrion to include 1 domestic sheep. (Total carrion .4%).
Schnell 1958 R, C, I, Sp-Su California	Mammals to include 1 broad-footed mole, 1 ui weasel (Mustelidae), 3 Belding's ground squirrels, 6 golden-mantled ground squirrels, 5 ui chipmunks (<i>Eutamias</i> sp.), 5 Douglas' squirrels, 1 snowshoe hare, and 5 ui mammals (Total mammals 30.7%) Birds to include 3 mallard ducklings, 1 mountain quail, 1 rock dove, 1 Williamson sapsucker, 22 Steller's jays, 27 robins, 1 Audubon's warbler, 1 ui tanager (Emberizidae), 1 ui bird. (Total birds 69.3%).
Meng 1959 R, C, P, Sp-Su New York, Pennsylvania	Mammals to include 3 eastern chipmunks, 4 eastern gray squirrels, 58 red squirrels, and 7 ui cottontails (<i>Sylvilagus</i> sp.). (Total mammals 38.9%) Birds to include 3 American kestrels, 5 ruffed grouse, 7 blue jays, 83 common crows, 15 blackbirds (<i>Euphagus</i> , <i>Quiscalus</i> , <i>Agelaius</i> spp.). (Total birds 61.1%).
Grzybowski and Eaton 1976	Mammals to include 12 eastern chipmunks, 5 gray squirrels, 9 red squirrels, 1 deer mouse, 1 eastern cot-

R, P, Sp-Su New York	tontail, and 2 ui mammals. (Total mammals 39%). Birds to include 14 ruffed grouse, 3 American woodcock, 1 common snipe, 4 common flicker, 9 blue jay, 4 common crow, 2 robin, 2 ui thrushes (<i>Catharus</i> sp.), 1 starling, 1 ui warbler (<i>Parulidae</i>), 3 eastern meadowlark, 1 ui blackbird (<i>Icteridae</i>), 1 scarlet tanager, and 1 ui bird (Total birds 61%).
Root and De Simone 1978 R, C, O, P, Sp-Su Connecticut	Mammals to include 1 hairy-tailed mole, 1 ui small mammal (<i>Insectivora</i>), 22 eastern chipmunk, 7 gray squirrel, 3 red squirrels, 3 eastern cottontails, and 1 ui specimen (<i>Mammalia</i>). (Total mammals 59%). Birds to include 1 wood duck, 4 ruffed grouse, 2 rock dove, 6 mourning dove, 6 blue jay, 1 common crow, 2 gray catbirds, and 4 ui specimens (<i>Aves</i>). (Total birds 39%). Reptiles to include 1 ui snake (<i>Serpentes</i>). (Total reptiles 2%).

Table 9. Cooper's Hawk (*Accipiter cooperi*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mostly birds to include young ducks, young domestic chickens, and rock doves. Rarely minnows in dessicated pools.
Brown and Amadon 1968 G	Mammals to include chipmunks and red squirrels. Medium-sized birds to include ruffed grouse, flickers, robins, starlings, meadowlarks, and blackbirds.
Snyder and Wiley 1976 G, M	Mammals (22.2%), birds (66.8%), vertebrates (97.9%), lower vertebrates (8.9%), invertebrates (2.1%).
Fisher, 1893 S, P, Y, D	Mammals to include 1 California ground squirrel, 1 "Rocky Mountain Chipmunk" (<i>Sciuridae</i>), 2 ui chipmunks (<i>Sciuridae</i>), 1 gray squirrel, 1 red squirrel, 4 ui mice (<i>Rodentia</i>), 1 cotton rat (<i>Sigmodon</i> sp.), and 1 ui rabbit (<i>Leporidae</i>). (Total mammals 12.1%). Birds to include 1 ruffed grouse, 3 Gambel's quail, 4 ui quail (<i>Phasianidae</i>), 21 domestic chickens, 5 rock doves, 1 mourning dove, 1 ui dove (<i>Columbidae</i>), 3 ui flickers (<i>Picidae</i>), 1 ui nuthatch (<i>Sittidae</i>), 1 robin, 1 hermit thrust, 1 ui thrush (<i>Muscicapidae</i>), 3 house sparrows, 2 ui meadowlarks (<i>Sturnella</i> sp.), 1 common grackle, 1 orange-crowned warbler, 1 goldfinch (<i>Carduelis</i> sp.), 2 ui towhees (<i>Emberizidae</i>), 1 Savannah sparrow, 2 juncos (<i>Junco</i> sp.), 1 tree sparrow, 1 field sparrow, 7 song sparrows, 1 snow bunting, 4 ui spar-

	rows (Passeriformes), and 17 ui birds. (Total birds 87.9%.)
McDowell 1941 S, P, Y Massachusetts	Mammals to include 2 eastern chipmunks, 4 gray squirrels, 12 red squirrels, 8 ui mice (<i>Microtus</i> sp. and <i>Peromyscus</i> sp.), 1 Norway rat, 2 ui cottontails (<i>Sylvilagus</i> sp.), and 3 ui specimens (Mammalia). (Total mammals 71.4%). Birds to include 2 ruffed grouse, 1 bobwhite, 4 ring-necked pheasants, 2 gray partridge, 11 domestic chickens, 2 rock doves, 44 ui passerines (Passeriformes), and 14 ui specimens (Aves). (Total birds 28.6%).
Fitch, Glading, House 1946 O, R, P, Sp-Su California	Mammals to include 1 ui ground squirrel (Sciuridae), and 2 ui cottontails (<i>Sylvilagus</i> sp.) (Total mammals 7.3%). Birds to include 7 California quail, 2 acorn woodpeckers, 1 brown towhee, 1 lark sparrow, 1 ui specimen (Aves). (Total birds 29.3%). Reptiles to include 2 fence lizards, 19 ui whiptail lizards (<i>Cnemidophorus</i> sp.), 1 ui skink (Scincidae), and 4 ui lizards (Lacertilia). (Total reptiles 63.4%).
Hamerstrom and Hamerstrom 1951 R, P, Sp-Su Michigan	Mammals to include 1 eastern mole, 2 thirteen-lined ground squirrels, 24 eastern chipmunks, 2 gray squirrels, 1 fox squirrel, 2 red squirrels, 1 southern flying squirrel, 4 ui squirrels (Sciuridae), 1 southern bog lemming, 1 meadow jumping mouse, 1 ui mouse (Rodentia), 2 eastern cottontails. (Total mammals 15.7%). Birds to include 4 ruffed grouse, 1 bobwhite, 12 ring-necked pheasants, 1 killdeer, 12 mourning doves, 3 yellow-billed cuckoos, 1 screech owl, 15 common flickers, 3 hairy woodpeckers, 2 downy woodpeckers, 1 eastern kingbird, 1 bank swallow, 1 purple martin, 16 blue jays, 1 tufted titmouse, 1 white-breasted nuthatch, 3 catbirds, 1 brown thrasher, 10 robins, 1 wood thrush, 5 cedar waxwings, 16 starlings, 4 yellow-throated vireos, 25 house sparrows, 4 eastern meadowlarks, 19 red-winged blackbirds, 1 common grackle, 4 brown-headed cowbirds, 9 Baltimore orioles, 3 scarlet tanagers, 2 cardinals, 2 rose-breasted grosbeaks, 1 rufous-sided towhee, 3 vesper sparrows, 1 song sparrow, and 36 ui birds. (Total birds 84.3%).
Meng 1959 R, C, P, Sp-Su New York	Mammals to include 109 eastern chipmunks, 4 eastern gray squirrels, and 36 red squirrels. (Total mammals 18.2%). Birds to include 4 ring-necked pheasants, 1 spotted sandpiper, 13 rock doves, 5 mourning doves, 1

screech owl, 134 common flickers, 1 pileated woodpecker, 1 red-headed woodpecker, 1 yellow-bellied sapsucker, 5 hairy woodpeckers, 11 blue jays, 1 catbird, 79 robins, 7 wood thrushes, 241 starlings, 5 ovenbirds, 1 bobolink, 118 eastern meadowlarks, 3 red-winged blackbirds, 37 common grackles, 17 brown-headed cowbirds, 9 scarlet tanagers, 1 rose-breasted grosbeak, and 2 rufous-sided towhees. (Total birds 81.8%.)

Duncan 1966
S, P, Y, D

Mammals present in 35% of stomachs to include 2 ui ground squirrels (*Spermophilus* sp.), 2 chipmunks (*Tamias* sp., *Eutamias* sp.), 3 ui squirrels (*Sciurus* sp.), 5 ui mice (*Peromyscus* sp., *Microtus* sp.), and 5 ui specimens (Mammalia).

Birds were present in 68.5% of the stomachs to include 2 bobwhites, 8 ui Galliformes, 13 ui Passeriformes, and 14 ui specimens (Aves).

Reptiles and amphibians were present in 11.1% of the stomachs to include 2 ui anoles (*Anolis* sp.), 2 ui fence lizards (*Sceloporus* sp.), 2 five-lined skinks and 1 ui tree frog (*Hyla* sp.).

Invertebrates were present in 11.1% of the stomachs to include ui grasshoppers (Orthoptera), ui scarab beetles (Scarabaeidae) and ui beetles (Coleoptera).

Table 10. Sharp-shinned Hawk (*Accipiter striatus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Few mammals to include shrews, bats, mice, and young rabbits. Birds to include bobwhites, young domestic chickens, sandpipers, young pigeons, doves, swifts, woodpeckers, flycatchers, horned larks, jays, chickadees, nuthatches, creepers, wrens, mockingbirds, catbirds, thrashers, robins, thrushes, veery nestlings, bluebirds, kinglets, vireos, warblers, meadowlarks, orioles, blackbirds, grackles, cowbirds, towhees, and many sparrows. Reptiles and amphibians to include lizards and frogs. Invertebrates to include grasshoppers, locusts, crickets, large moths, butterflies, caterpillars, and beetles.
Brown and Amadon 1968 G	Occasionally small mammals, almost entirely small birds, occasionally lizards or insects.
Snyder and Wiley 1976 G, M	Mammals (2%), birds (93.1%), vertebrates (95.8%), lower vertebrates (.6%), and invertebrates (4.2%).

Fisher 1893
S, P, Y, D

Mammals to include 1 white-footed mouse, and 8 ui mice (Rodentia). (Total mammals 6.2%.)

Birds to include 3 Gambel's quail, 1 ui quail (Phasianidae), 2 domestic chickens, 1 mourning dove, 1 ui dove (Columbidae), 1 ui swift (Apodidae), 2 common flickers, 1 downy woodpecker, 3 ui chickadees (Paridae), 1 red-breasted nuthatch, 1 Carolina wren, a cactus wren, 1 mockingbird, 1 catbird, 1 crissal thrasher, 6 robins, 1 hermit thrush, 1 ui bluebird (*Sialia* sp.), 1 ui thrush (Muscicapidae), 1 ui kinglet (*Regulus* sp.), 1 ui vireo (Vireonidae), 1 yellow warbler, 2 black-poll warblers, 1 pine warbler, 1 ovenbird, 1 hooded warbler, 1 Wilson's warbler, 1 "yellow-rumped warbler" (Parulidae), 11 ui warblers (Parulidae), 7 house sparrows, 1 common grackle, 1 brown-headed cowbird, 1 ui oriole (*Icterus* sp.), 1 house finch, 4 ui goldfinches (Fringillidae), 1 Abert's towhee, 2 Savannah sparrows, 2 ui juncos (*Junco* sp.), 1 tree sparrow, 2 chipping sparrows, 6 field sparrows, 2 white-throated sparrows, 2 fox sparrows, 6 song sparrows, 1 snow bunting, 12 ui sparrows (Passeriformes), and 24 ui specimens (Aves). (Total birds 87.7%.)

Invertebrates to include 2 ui dragonflies (Odonata), 3 ui grasshoppers (Orthoptera), 2 ui beetles (Coleoptera), and 2 ui insects (Insecta). (Total invertebrates 6.2%.)

Craighead and Craighead
1956
R, C, P, Sp-Su
Wyoming

Mammals to include 3 meadow voles. (Total mammals 6.5%.)

Birds to include 43 small to medium-sized specimens. (Total birds 93.5%.)

Storer 1966
S, M

Mammals to include 27 ui squirrels (*Sciurus* sp.), and 12 ui mice (*Peromyscus* sp.). (Total mammals of known genera 6.2%.)

Birds to include 20 ui swallows (*Tachycineta* sp.), 16 ui mimids (*Dumetella* sp.), 54 ui thrushes (*Turdus* sp.), 43 ui thrushes (*Catharus* sp.), 12 ui bluebirds (*Sialia* sp.), 39 ui vireos (*Vireo* sp.), 153 ui warblers (*Dendroica* sp.), 15 ui warblers (*Geothlypis* sp.), 33 house sparrows, 12 ui finches (*Carpodacus* sp.), 35 ui towhees (*Pipilo* sp.), 14 ui sparrows (*Poocetes* sp.), 17 ui juncos (*Junco* sp.), 41 ui sparrows (*Spizella* sp.), and 91 ui sparrows (*Zonotrichia* sp.). (Total birds of known genera 93.8%.)

Other to include 199 miscellaneous unknown genera.

Harriers (Accipitridae)

Table 11. Harrier (*Circus cyaneus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	<p>Large numbers of mammals to include shrews, moles, young skunks, ground squirrels, squirrels, pocket gophers, mice, voles, cotton rats, rats, young rabbits, and other small mammals.</p> <p>Birds to include bitterns, green herons, teals and other ducks and ducklings, Sparrow Hawks, grouse, domestic chickens, quail, pheasants, partridge, rails, coots, plovers, woodcock, snipe, sandpipers, doves, Screech Owls, flickers, wrens, mockingbirds, catbirds, thrashers, robins, thrushes, bluebirds, starlings, warblers, bobolinks, meadowlarks, blackbirds, grackles, cardinals, towhees, and sparrows.</p> <p>Reptiles and amphibians to include lizards, small snakes, and frogs.</p> <p>Invertebrates to include grasshoppers, locusts, and crickets.</p>
Brown and Amadon 1968 G	<p>Mainly small mammals such as meadow voles and occasionally rabbits but also many birds (up to size of bitterns and ducks), small reptiles, frogs, crustaceans, and insects.</p> <p>Mammals 55%; birds 25%; snakes, frogs, insects 20%. During nesting season mammals, 69%; birds 31%.</p>
Snyder and Wiley 1976 G, M	<p>Mammals (34.8%), birds (47.7%), vertebrates (85%), lower vertebrates (2.5%), invertebrates (15%).</p>
Fisher 1893 S, P, Y, D	<p>Mammals to include 2 ui shrews (Soricidae), 1 water shrew (Soricidae), 2 ui moles (Talpidae), 1 ui skunk (Mustelidae), 8 ui ground squirrels (Sciuridae), 1 ui chipmunk (Sciuridae), 1 red squirrel, 1 ui squirrel (Sciuridae), 2 ui pocket gophers (Geomyidae), 1 ui gopher (Rodentia), 1 ui kangaroo rat (<i>Dipodomys</i> sp.), 25 ui mice (Rodentia), 2 cotton rats (<i>Sigmodon</i> sp.), 77 ui voles (Cricetidae), 3 woodland voles, 4 ui rabbits (Leporidae), and 1 ui small mammal. (Total mammals 21.3%)</p> <p>Birds to include 2 ui ducks (Anatidae), 1 ui young hawk (Falconiformes), 1 ui quail (Phasianidae), 1 domestic chicken, 2 ui fowl (Galliformes), 1 Virginia rail, 1 clapper rail, 1 American woodcock, 1 mockingbird, 1 robin, 1 ui thrush (Muscicapidae), 2 ui war-</p>

blers (Parulidae), 1 house sparrow, 1 common grackle, 1 indigo bunting, 4 Savannah sparrows, 1 grasshopper sparrow, 1 LeConte's sparrow, 2 vesper sparrows, 1 ui junco (*Junco* sp.), 1 tree sparrow, 2 chipping sparrows, 3 field sparrows, 3 swamp sparrows, 2 song sparrows, 1 ui sparrow (Passeriformes), and 12 ui specimens (Aves). (Total birds 8.2%.)

Reptiles and amphibians to include 2 six-lined race-runners, 3 ui lizards (Lacertilia), 3 ui snakes (Serpentes), 2 ui specimens (Reptilia), 3 ui frogs (Anura). (Total reptiles and amphibians 2.1%.)

Invertebrates to include 5 ui grasshoppers (Orthoptera), 249 ui locusts (Orthoptera), 11 ui crickets (Orthoptera), 5 ui beetles (Coleoptera), and 158 ui specimens (Insecta). (Total invertebrates 68.5%.)

Errington 1933
R, C, O, P, Sp-Su
Wisconsin

Mammals to include 1 ui shrew (*Sorex* sp.), 2 ui shrews (*Blarina* sp.), 128 thirteen-lined ground squirrels, 3 ui chipmunks (Sciuridae), 1 juvenile ui squirrel (*Sciurus* sp.), 1 deer mouse, 125 ui voles (*Microtus* sp.), 1 ui jumping mouse (*Zapus* sp.), and 33 juvenile cottontails (*Sylvilagus* sp.). (Total mammals 81.9%.)

Birds to include 1 domestic chicken, 1 common flicker, 1 house wren, 1 catbird, 2 robins, 1 ui bluebird (*Sialia* sp.), 11 ui meadowlarks (*Sturnella* sp.), 5 red-winged blackbirds, 1 brown-headed cowbird, 1 grasshopper sparrow, 1 vesper sparrow, 1 field sparrow, 22 ui specimens (Aves). (Total birds 13.6%.)

Amphibians to include 15 ui frogs (Anura). (Total amphibians 4.2%.)

Other to include 1 carrion ui cottontail (*Sylvilagus* sp.). (Total carrion .3%.)

Errington and
Breckenridge 1936
P, R, Su
Iowa

Mammals to include 177 thirteen-lined ground squirrels, 25 Franklin's ground squirrel, 8 ui ground squirrels (*Spermophilus* sp.), 1 ui mouse (*Peromyscus* sp.), 14 ui voles (*Microtus* sp.), 1 house mouse, 7 white-tailed jackrabbits, 22 eastern cottontails, 11 ui rabbits (Leporidae) and 3 ui specimens (Mammalia). (Total mammals 48%.)

Birds to include 1 ui grebe (Podicipedidae), 1 ui duckling (Anatidae), 24 ring-necked pheasants, 9 gray partridge, 13 domestic chickens, 2 ui gallinaceous birds (Galliformes), 8 Virginia rails, 3 soras, 1 king rail, 1 ui rail (Rallidae), 1 ui shorebird (Charadriidae), 2 Forster's tern, 2 black tern, 1 ui tern (Sternidae), 3 Screech Owls, 11 mourning doves, 19 common flickers, 5 red-headed woodpeckers, 1 eastern kingbird, 4

horned larks, 1 barn swallow, 1 bank swallow, 2 long-billed marsh wrens, 1 ui wren (Troglodytidae), 1 robin, 1 yellowthroat, 1 ui warbler (Parulidae), 1 house sparrow, 1 bobolink, 28 ui meadowlarks (*Sturnella* sp.), 27 yellow-headed blackbirds, 16 red-winged blackbirds, 11 common grackles, 8 ui blackbirds (Icteridae), 1 rose-breasted grosbeak, 4 dickcissels, 1 Savannah sparrow, 3 grasshopper sparrows, 1 LeConte's sparrow, 4 vesper sparrows, 3 swamp sparrows, 19 ui finches (Fringillidae), 2 ui passerines (Passeriformes), and 22 ui birds (Aves). (Total birds 48.8%.)

Amphibians to include 16 ui frogs (*Rana* sp.). (Total amphibians 2.9%.)

Other to include 2 ui specimens (Vertebrata). (Total other .4%.)

Selleck and Glading 1943
R, P, Su
California

Mammals to include 1 ui mole (Talpidae), 1 ui pocket gopher (Geomysidae), 23 ui vole (*Microtus* sp.), 4 ui kangaroo rat (*Dipodomys*), 49 brush rabbits, 1 ui jack-rabbit (*Lepus* sp.). (Total mammals 18%.)

Birds to include 52 California quail, 2 ui rails (Rallidae), 14 ui doves (Columbidae), 1 killdeer, 1 ui woodpecker (Picidae), 6 common bushtits, 2 wrentits, 4 long-billed marsh wrens, 5 California thrashers, 14 western meadowlarks, 100 ui blackbirds (Icteridae), 1 Bullock's oriole, 44 house finches, 17 ui goldfinches (*Carduelis* sp.), 4 rufous-sided towhees, 9 brown towhees, 3 lark sparrows, 3 ui sparrows (*Zonotrichia* sp.), 71 ui passerines (Passeriformes). (Total birds 80.6%.)

Reptiles to include 1 ui horned lizard (*Phrynosoma* sp.) and 5 fence lizards. (Total reptiles 1.4%.)

Wilhelm 1960
C, I, Sp
Arkansas

Mammals to include 9 eastern cottontails. (Total mammals 14.3%.)

Birds to include 16 young red-winged blackbirds, and 2 ui passerines (Passeriformes). (Total birds 28.6%.)

Reptiles and amphibians to include 14 plains garter snakes, 7 ui snakes (Serpentes), 3 leopard frogs, and 1 ui specimen (Amphibia). (Total reptiles and amphibians 39.7%.)

Invertebrates to include 11 crayfish. (Total invertebrates 17.5%.)

Weller, Adams, and Rose
1967
C, P, W
Missouri

Mammals to include ui mice (*Peromyscus* sp.; 3.6%), southern bog lemming (8.1%), prairie vole (84.8%), and eastern cottontail (11.6%).

Birds (ui; 15.8%).

Reptiles to include ui snake (Serpentes) (.4%).

Smith and Murphy 1973 R, C, P, Sp-Su Utah	Mammals to include 6 Townsend's ground squirrels, 2 western harvest mice, 22 deer mice, and 17 blacktail jackrabbits. (Total mammals 62.7%.) Birds to include 1 mourning dove, 11 horned larks, and 4 vesper sparrows. (Total birds 21.3%.) Reptiles to include 1 collared lizard. (Total reptiles 1.3%.) Invertebrates to include 6 ui ground beetles (Carabidae) and 5 ui dermestid beetles (Dermestidae). (Total invertebrates 14.7%.)
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Buteos (Accipitridae)

Table 12. Rough-legged Hawk (*Buteo lagopus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mainly rodents and insects. Seldom birds. Mammals to include prairie dogs, pocket gophers, lemmings, voles, rats, and young rabbits. Birds to include shot-wounded ducks, game birds, western meadowlarks, and snow buntings. Insects to include grasshoppers. Carrion to include that of mammals, birds, and fish.
Brown and Amadon 1968 G	Largely small mammals especially lemmings, voles, young rabbits, etc. Rarely game and small birds.
Snyder and Wiley 1976 G, M	Mammals (61.8%), birds (2.8%), vertebrates (65.4%), lower vertebrates (1.3%), invertebrates (34.6%).
Fisher 1893 S, P, F-W Eastern U.S.	Mammals to include 1 short-tailed shrew, 1 ui weasel (Mustelidae), 1 ui gopher (Rodentia), 4 white-footed mice, 85 ui voles (Cricetidae), 19 ui mice (Rodentia), 4 house mice, 2 ui rabbits (Leporidae). (Total mammals 62.2%.) Reptiles to include 1 ui lizard (Lacertilia). (Total reptiles .5%.) Invertebrates to include 70 ui insects (Insecta). (Total insects 37.2%.)
Errington and Breckenridge 1938 S, D, Sp, F, W	Mammals to include 1 ui shrew (<i>Sorex</i> sp.), 1 Franklin's ground squirrel, 1 ui ground squirrel (Sciuridae), 8 ui mice (<i>Peromyscus</i> sp.), 50 ui vole (<i>Microtus</i> sp.), 5 house mouse, 2 ui mouse (Rodentia), 1 ui carrion jack-rabbit (<i>Lepus</i> sp.), 8 ui cottontail (<i>Sylvilagus</i> sp.), and 3 ui young rabbits (Leporidae). (Total mammals 84.2%.) Birds to include 7 ring-necked pheasants, 3 domestic

	chickens, and 1 ui small bird (Aves). (Total birds 11.6%) Insects to include mainly ui crickets (<i>Gryllus</i> sp.), and ui grasshoppers (Orthoptera). (Total insects 4.2%).
Craighead and Craighead 1956 C, P, W Michigan Wyoming	Mammals to include 10 short-tailed shrews, 11 ui shrews (Soricidae), 170 ui voles (Cricetidae), 6 white-footed mice, 2 Norway rats. (Total mammals 98%) Birds to include 4 ui passerines (Passeriformes). (Total birds 2%).
Sealy 1966 R, P, Su Northwest Territories	Mammals to include arctic ground squirrel, ui lemming (<i>Dicrostonyx</i> sp.), brown lemming (83.3% of all mammals), northern redback vole, and arctic hare. Birds to include Lapland longspur.
Schnell 1967 C, O, P, Sp, W Illinois	Mammals to include 9 short-tailed shrews, 1 mink, 109 ui mice (<i>Peromyscus</i> spp.), 114 meadow voles, 45 house mice, 2 ui mice (Rodentia), and 4 eastern cottontails. (Total mammals 91.9%) Birds to include 1 ring-necked pheasant and 1 gray partridge, but mostly passerines (Passeriformes) to total 24 specimens. (Total birds 7.8%) Invertebrates to include 1 ui beetle (Coleoptera). (Total invertebrates .3%).
White and Cade 1971 R, C, P, Sp-Su Alaska	Mammals to include 6 arctic ground squirrels, 24 ui lemmings (<i>Dicrostonyx</i> sp.), 37 brown lemmings, 7 northern redback voles, 30 tundra voles, 21 ui voles (<i>Microtus</i> sp.), 23 ui voles (Cricetidae). (Total mammals 86.5%) Birds to include 1 ui loon (Caviidae), 1 greater scaup, 1 ui duck (Anatidae), 2 Rough-legged Hawks, 1 willow ptarmigan, 2 ui ptarmigan (<i>Lagopus</i> sp.), 1 northern phalarope, 1 Say's phoebe, 2 bluethroats, 3 yellow wagtails, 4 tree sparrows, 1 Lapland longspur, 3 ui birds (Aves). (Total birds 13.5%).
Springer 1975 R, C, P, Su Alaska	Mammals to include 2 ermine, 1 least weasel, 14 arctic ground squirrels, 23 ui lemmings (<i>Dicrostonyx</i> sp.), 19 brown lemmings, 10 northern redback voles, 99 tundra voles, 68 ui voles (<i>Microtus</i> sp.), and 2 ui hares (<i>Lepus</i> sp.). (Total mammals 79.1%) Birds to include 14 ui ptarmigan (<i>Lagopus</i> sp.), 2 American golden plovers, 1 robin, 1 water pipit, 1 yellow wagtail, 1 fox sparrow, and 43 ui passerines (Passeriformes). (Total birds 20.9%).

Table 13. Ferruginous Hawk (*Buteo regalis*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mammals to include skunks, prairie dogs, pocket gophers, voles, jack rabbits, and cottontail rabbits. Few birds to include sharp-tailed grouse, young magpies, and meadowlarks. Lizards and some snakes. Invertebrates such as grasshoppers, crickets, and beetles.
Brown and Amadon 1968 G	Chiefly small- and medium-sized mammals such as prairie dogs, ground squirrels, mice, and rabbits. Some birds such as meadowlarks. Snakes, swarming locusts, and crickets.
Snyder and Wiley 1976 G, M	Mammals (84.6%), birds (4.2%), vertebrates (90.2%), lower vertebrates (1.4%), invertebrates (9.8%).
Smith and Murphy 1970 R, C, P, Sp-Su Utah	Mammals to include 2 Townsend's ground squirrels, 26 white-tailed antelope squirrels, 4 Great Basin pocket mice, 42 Ord's kangaroo rats, 8 chisel-toothed kangaroo rats, 13 deer mice, 1 northern grasshopper mouse, 202 black-tailed jackrabbits, and 19 ui rabbits (<i>Sylvilagus</i> sp.). (Total mammals 89.5%) Birds to include 1 mourning dove, 23 horned larks, 1 sage thrasher, 3 lark buntings, and 3 vesper sparrows. (Total birds 8.8%) Reptiles to include 1 western whiptail, and 5 gopher snakes. (Total reptiles 1.7%).
Platt 1971 R, C, P, Sp-Su	Mammals to include 2 ui weasels (<i>Mustela</i> sp.), 1 ui pocket gopher (<i>Thomomys</i> sp.), 1 ui kangaroo rat (<i>Dipodomys</i> sp.), 10 ui rabbits (<i>Lagamorpha</i> sp.), and 3 ui specimens (Mammalia). Birds to include ring-necked pheasant, Short-eared Owl, and western meadowlark (Percent not applicable.)
Lokemoen and Duebbert 1976 R, C, P, Su South Dakota	Mammals to include 75 Richardson's ground squirrels, 4 northern pocket gophers, 2 western harvest mice, 8 meadow voles, 1 prairie vole, 1 muskrat, 2 white-tailed jackrabbits, and 1 eastern cottontail. (Total mammals 72.3%) Birds to include 1 ui duck (<i>Anas</i> sp.), 1 ring-necked pheasant, 4 western meadowlarks, 1 ui passerine (Passeriformes), and 1 ui eggshell (Aves). (Total birds 6.2%) Invertebrates to include 28 ui scarab beetles (Scara-

	bidae). (Total invertebrates 21.5%.)
Voelker, unpublished R, P, Sp-Su Oklahoma	Mammals to include 2 black-tailed prairie dogs, 57 thirteen-lined ground squirrels, 13 spotted ground squirrels, 21 hispid cotton rats, 19 black-tailed jack-rabbits, and 8 eastern cottontails. (Total mammals 91.6%) Birds to include 1 mallard, 1 juvenile Swainson's Hawk, and 2 Burrowing Owls. (Total birds 3.1%) Reptiles to include 7 bullsnakes. (Total reptiles 5.3%.)

Table 14. Red-tailed Hawk (*Buteo jamaicensis*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mammals to include shrews, moles, bats, raccoons, weasels, skunks, feral cats, marmots, prairie dogs, ground squirrels, squirrels, gophers, wood mice, voles, house mice, rats, muskrats, porcupines, and rabbits. Birds to include pintails, teals, other wild ducks, Red-tailed Hawks, Red-shouldered Hawks, young turkeys, ruffed grouse, various quail, ring-necked pheasants, gray partridge, domestic poultry, rails, gallinules, doves, Screech Owls, kingfishers, woodpeckers, horned larks, crows, robins, thrushes, bluebirds, starlings, meadowlarks, orioles, grackles, various sparrows and juncos. Reptiles and amphibians to include turtles, lizards, bullsnakes, rattlesnakes, smaller snakes, salamanders, toads, and frogs. Fish to include carp and catfish. Invertebrates to include centipedes, grasshoppers, crickets, caterpillars, fly larvae, beetles, crayfish, spiders, earthworms. Carrion.
Brown and Amadon 1968	Extremely varied. Mammals such as shrews, bats, ground squirrels, chipmunks, voles, and rabbits. Many birds including quail, pheasants, and meadowlarks. Lizards and snakes. Land crabs, grasshoppers, crickets, giant water beetles, and other large insects.
Snyder and Wiley 1976 G, M	Mammals (50.5%), birds (8.5%), vertebrates (63.2%), lower vertebrates (4.2%), and invertebrates (36.8%).
Fisher 1893 S, P, Y, D	Mammals to include 12 short-tailed shrews, 35 ui shrews (Soricidae), 7 ui moles (Talpidae), 1 ui skunk (Mustelidae), 1 rock squirrel, 2 thirteen-lined ground

squirrels, 1 Franklin's ground squirrel, 14 ui chipmunks (Sciuridae), 13 ui gray squirrels (*Sciurus* sp.), 2 Abert's squirrel, 1 Arizona gray squirrel, 14 red squirrels, 5 ui pocket gophers (Geomyidae), 1 ui kangaroo rat (*Dipodomys* sp.), 1 harvest mouse (*Reithrodontomys* sp.), 18 white-footed mice, 1 Mexican woodrat, 2 ui woodrats (*Neotoma* sp.), 3 ui cotton rats (*Sigmodon* sp.), 277 ui voles (Cricetidae), 14 woodland voles, 45 house mice, 1 ui jumping mouse (Zapodidae), 3 ui gopher (Rodentia), 157 ui mice (Rodentia), 7 ui rats (Rodentia), 1 porcupine, 3 ui jackrabbits (*Lepus* sp.), and 28 ui rabbits (Leporidae), and 1 ui specimen (Mammalia). (Total mammals 62.2%.)

Birds to include 1 pintail, 1 ui teal (*Anas* sp.), 1 ui wild duck (Anatidae), 2 ruffed grouse, 2 Gambel's quail, 6 ui quail (Phasianidae), 8 domestic chickens, 33 ui fowl (Galliformes), 1 king rail, 2 mourning doves, 1 Screech Owl, 1 red-headed woodpecker, 6 ui crows (Corvidae), 2 robins, 1 ui bluebird (*Sialia* sp.), 1 ui meadowlark (*Sturnella* sp.), 2 ui orioles (*Icterus* sp.), 1 ui grackle (*Quiscalus* sp.), 6 ui juncos (*Junco* sp.), 5 tree sparrows, 15 song sparrows, 4 ui sparrows (Passeriformes), 14 ui specimens (Aves). (Total birds 10.8%.)

Reptiles and amphibians to include 4 ui lizards (Lacertilia), 4 ui garter snakes (*Thamnophis* sp.), 1 ui ribbon snake (*Thamnophis* sp.), 1 bull snake, 2 ui diamondback rattlesnakes (*Crotalus* sp.), 15 ui snakes (Serpentes), 5 ui toads (Anura), 3 wood frogs, and 16 ui frogs (Anura). (Total reptiles and amphibians 4.7%.)

Invertebrates to include 5 ui centipedes (Chilopoda), 121 ui grasshoppers (Orthoptera), 1 ui mole cricket (Gryllotalpinae), 10 ui crickets (Gryllidae), 1 ui stag beetle (Luconidae), 2 bot flies (Cuterebridae), 1 ui May beetle (Melolonthinae), 1 potato beetle, 13 ui beetles (Coleoptera), 51 ui insects (Insecta), 7 ui insect larvae (Insecta), and 13 ui crayfish (Crustacea). (Total invertebrates 21.1%.)

Carrion to include 13 examples. (Total carrion 1.2%.)

Sutton 1928
S, P, F
Pennsylvania

Mammals to include 4 short-tailed shrews, 1 ui bat (Chiroptera), 3 ui chipmunks (Sciuridae), 1 ui gray squirrel (*Sciurus* sp.), 2 red squirrels, 3 ui redback voles (*Clethrionomys* sp.), 11 ui voles (*Microtus* sp.). (Total mammals 69.4%.)

Birds to include 1 domestic chicken, 1 winter wren, 1 hermit thrush, 1 song sparrow. (Total birds 11.1%.)

Reptiles to include 3 ui garter snakes (*Thamnophis* sp.). (Total reptiles 8.3%.)

Errington 1933 R, O, S, P, Y Wisconsin	Invertebrates to include 1 ui grasshopper (Orthoptera), 2 ui crickets (Orthoptera), and 1 ui click beetle (Elateridae). (Total invertebrates 11.1%.)
English 1934* R, I, Sp-Su Michigan	Mammals to include 1 ui shrew (<i>Sorex</i> sp.), 5 ui shrews (<i>Blarina</i> sp.), 1 ui weasel (Mustelidae), 49 thirteen-lined ground squirrels, 3 Franklin's ground squirrels, 3 ui chipmunks (Sciuridae), 11 ui tree squirrels (Sciuridae), 4 deer mice, 42 ui voles (<i>Microtus</i> sp.), 1 house mouse, 1 Norway rat, and 18 ui cottontails (<i>Sylvilagus</i> sp.). (Total mammals 84.2%) Birds to include 18 domestic chickens, 1 ui gallinule (Rallidae), 1 rock dove, and 1 horned lark. (Total birds 12.7%) Reptiles and amphibians to include 4 ui snakes (Serpentes) and 1 ui frog (Anura). (Total reptiles and amphibians 3%.)
*totals unclear in original publication	
Fitch, Swenson, Tillotson 1946 R, O, P, Sp-Su California	Mammals to include 380 California ground squirrels, 8 Merriam's chipmunks, 2 western gray squirrels, 79 Botta's pocket gophers, 10 Heerman's kangaroo rats, 1 brush mouse, 3 pinon mice, 13 dusky-footed woodrats, 1 California vole, and 62 desert cottontails. (Total mammals 89.4%) Birds to include 11 California quail, 1 roadrunner, 1 Screech Owl, 1 western kingbird, 4 scrub jays, 3 brown towhees, 1 lark sparrow, and 1 ui specimen (Aves). (Total birds 3.7%) Reptiles to include 1 western fence lizard, 8 Gilbert's skinks, 17 checkered whiptails, 14 gopher snakes, 1 long-nosed snake, and 2 western rattlesnakes. (Total reptiles 6.9%.)
Seidensticker 1970 R, C, P, Sp-Su Montana	Mammals to include 105 Richardson's ground squirrels, 1 red squirrel, 3 northern pocket gophers, 2 deer mice, 20 ui voles (<i>Microtus</i> sp.), 1 muskrat, 1 western jumping mouse, 1 white-tailed jackrabbit, and 46 Nut-

	<p>tall's and desert cottontails. (Total mammals 68%.)</p> <p>Birds to include 3 ui ducks (Anatidae), 1 ruffed grouse, 1 sage grouse, 4 gray partridge, 1 ui grouse (Tetraonidae), 1 domestic chicken, 1 Wilson's phalarope, 3 common flickers, 4 eastern kingbirds, 20 black-billed magpies, 5 common crows, 2 robins, 10 starlings, 6 western meadowlarks, 3 Brewer's blackbirds, 1 western tanager, and 8 ui specimens (Aves). (Total birds 27%.)</p> <p>Reptiles to include 2 ui garter snakes (<i>Thamnophis</i> sp.). (Total reptiles 1%.)</p> <p>Fish to include 2 suckers (<i>Catostomus</i> sp.), 2 carp, and 1 ui specimen (Pisces). (Total fish 2%.)</p>
Gates 1972 R, P, Sp-Su Wisconsin	<p>Mammals to include 8 thirteen-lined ground squirrels, 4 fox squirrels, 29 ui voles (<i>Microtus</i> sp.), 4 muskrats, 2 Norway rats, and 19 eastern cottontails. (Total mammals 37.5%.)</p> <p>Birds to include 40 ring-necked pheasants, 5 gray partridge, 9 domestic chickens, 3 mourning doves, 4 common flickers, 2 blue jays, 5 common crows, 2 catbirds, 1 house sparrow, 14 red-winged blackbirds, 3 common grackles, and 14 ui passerines (Passeriformes). (Total birds 58%.)</p> <p>Invertebrates to include 3 ui beetles (Coleoptera) and 5 ui crayfish (Crustacea). (Total invertebrates 4.5%.)</p>
Smith and Murphy 1973 R, C, P, Sp-Su Utah	<p>Mammals to include 5 Townsend's ground squirrels, 9 white-tailed antelope squirrels, 2 least chipmunks, 2 Botta's pocket gophers, 39 deer mice, 23 ui voles (<i>Microtus</i> sp.), 182 blacktailed jackrabbits, 32 ui rabbits (<i>Sylvilagus</i> sp.). (Total mammals 89.1%.)</p> <p>Birds to include 1 western kingbird, 9 horned larks, 7 pinyon jays, 1 mountain bluebird, and 12 starlings. (Total birds 9.1%.)</p> <p>Reptiles to include 1 collared lizard, 3 striped whipsnakes, and 2 gopher snakes. (Total reptiles 1.8%.)</p>
Knight and Erickson 1976 R, P, Su Washington	<p>Mammals to include 16 northern pocket gophers, 8 Great Basin pocket mice, 1 western harvest mouse, 1 deer mouse, 14 sagebrush voles, 4 Montana voles, 1 house mouse, 14 Nuttall's cottontails, and 2 ui specimens (Mammalia). (Total mammals 40.6%.)</p> <p>Birds to include 3 California quail, 4 chukar, 1 ring-necked pheasant, 2 common flickers, 2 cliff swallows, 4 black-billed magpies, 4 western meadowlarks, 1 vesper sparrow, and 6 ui specimens. (Total birds 18.1%.)</p> <p>Reptiles to include 32 yellow-bellied racers, 27 gopher snakes, 1 garter snake (<i>Thamnophis</i> sp.), 2 western rattlesnakes. (Total reptiles 41.3%.)</p>

Voelker, unpublished
R, P, Sp-Su
Oklahoma

Mammals to include 2 Virginia opossums, 16 short-tailed shrews, 34 eastern moles, 17 black-tailed prairie dogs, 212 thirteen-lined ground squirrels, 64 plains pocket gophers, 1 Ord's kangaroo rat, 12 plains harvest mice, 7 northern grasshopper mice, 1 eastern woodrat, 5 southern plains woodrats, 163 hispid cotton rats, 28 prairie voles, 9 Norway rats, 9 black-tailed jackrabbits, 253 eastern cottontails, 11 desert cottontails, 1 domestic cat. (Total mammals 88.2%.)

Birds to include 13 bobwhites, 2 scaled quail, 1 Franklin's gull, 1 Burrowing Owl, 2 common crows, 48 eastern meadowlarks, and 2 brown-headed cowbirds. (Total birds 7.2%.)

Reptiles to include 29 bullsnakes, 2 great plains rat snakes, 12 prairie kingsnakes, and 1 prairie rattlesnake. (Total reptiles 4.6%.)

Table 15. Red-shouldered Hawk (*Buteo lineatus*) Diet.

Reference/Methods Information	Food
Bent 1938 G	<p>Varied diet of mammals, birds, reptiles, amphibians, fish, and invertebrates.</p> <p>Mammals such as opossums, shrews, moles, skunks, ground squirrels, chipmunks, tree squirrels, voles, muskrats, and rabbits.</p> <p>Birds such as Sparrow Hawks, bobwhites, pheasants, chickens, soras, woodcocks, mourning doves, Screech Owls, flickers, crows, robins, meadowlarks, blackbirds, and various sparrows.</p> <p>Turtles, lizards, snakes, salamanders, toads, and various frogs.</p> <p>Centipedes, grasshoppers, cicadas, crickets, mole crickets, katydids, Lepidoptera larvae, beetles, wasps, crayfish, spiders, earthworms, and snails.</p>
Brown and Amadon 1968 G	<p>Small mammals such as voles, small and/or young birds, and birds to size of ruffed grouse.</p> <p>Baby turtles, lizards, snakes, toads, frogs, large insects such as grasshoppers, and crayfish.</p>
Snyder and Wiley 1976 G, M	<p>Mammals (20.2%), birds (2.8%), vertebrates (44.4%), lower vertebrates (21.2%), invertebrates (55.6%).</p>
Fisher 1893 S, P, Y, D	<p>Mammals to include 1 Virginia opossum, 11 short-tailed shrews, 27 ui shrews (Soricidae), 4 ui moles (Talpidae), 1 ui skunk (Mustelidae), 1 ui chipmunk (Sciuridae), 1 white-footed mouse, 1 ui red-back vole (<i>Clethrionomys</i> sp.), 82 ui voles (<i>Microtus</i> sp.), 6</p>

woodland voles, 1 muskrat, 18 house mice, 58 ui mice (Rodentia), 3 ui rabbits (Leporidae), and 3 ui mammals (Mammalia). (Total mammals 24.4%.)

Birds to include 1 ui quail (Phasianidae), 2 domestic chickens, 1 sora, 1 ui dove (Columbidae), 1 Screech Owl, 1 common flicker, 1 ui crow (Corvidae), 1 robin, 1 ui meadowlark (*Sturnella* sp.), 1 ui junco (*Junco* sp.), 1 field sparrow, 1 fox sparrow, 1 song sparrow, 1 ui sparrow (Fringillidae), 2 ui specimens (Aves). (Total birds 1.9%.)

Reptiles and amphibians to include 2 ui turtles (Testudines), 6 ui lizards (Lacertilia), 1 ui water snake (*Natrix* sp.), 3 ui garter snakes (*Thamnophis* sp.), 5 ui ribbon snakes (Serpentes), 1 ui ringneck snake (*Diadophis* sp.), 1 ui green snake (*Opheodrys* sp.), 6 ui snakes (Serpentes), 10 ui salamanders (Caudata), 8 ui toads (Anura), 13 ui tree frogs (*Hyla* sp.), 1 bullfrog, 3 leopard frogs (*Rana* sp.), and 38 ui frogs (Anura). (Total reptiles and amphibians 11%.)

Fishes to include 2 pickerels and 1 ui catfish (Cypriniformes). (Total fish .3%.)

Invertebrates to include 4 ui dragonflies (Odonata), 1 cockroach (Orthoptera), 228 ui grasshoppers (Orthoptera), 7 ui cicadas (Homoptera), 10 ui katydids (Orthoptera), 81 ui crickets (Orthoptera), 7 ui mole crickets (Orthoptera), 1 ui mantis (Orthoptera), 1 squash bug, 31 moth and butterfly larvae (Lepidoptera), 2 ui dung beetles (Scarabaeinae), 1 May beetle (Melolonthinae), 81 ui beetles (Coleoptera), 3 ui beetle larvae (Coleoptera), 2 ui ants (Hymenoptera), 1 ui wasp (Hymenoptera), 24 ui insects (Insecta), 38 ui insect larvae (Insecta), 9 ui crayfish (Crustacea), 22 ui spiders (Araneae), and 1 ui earthworm (Annelida). (Total invertebrates 62.2%.)

Carrion to include 2 specimens. (Total carrion .2%.)

Root and DeSimone 1978
R, C, O, P, Sp-Su
Connecticut

Mammals to include 4 ui shrews (Insectivora), 8 ui small mammals (Insectivora and Rodentia), 17 eastern chipmunks, 2 gray squirrels, 3 southern redback voles, 1 meadow vole, 1 ui lagomorph (Lagomorpha). (Total mammals 53%.)

Birds to include 1 wood thrush, and 7 ui specimens (Aves) (total birds 12%.)

Reptiles and amphibians to include 4 eastern garter snakes, 1 northern ring-neck snake, 3 American toads, 3 bullfrogs, and 13 ui frogs (Anura). (Total reptiles and amphibians 35%.)

Errington 1933
R, C, I, Sp
Wisconsin

Mammals to include 1 ui vole (*Microtus* sp.), much mouse fur in pellets (Rodentia), 1 red-winged blackbird, 1 ui snake and additional snake scales (Serpentes), 1 ui frog (Anura), and crayfish fragments (Crustacea).

Ernst 1945
R, C, O, S, P, Sp-Su
New York

Mice and rats (principally *Microtus* sp.) 58%.
Small birds to include downy woodpecker, horned lark, ui chickadee (*Parus* sp.), and song sparrow 8%.
Reptiles, largely ui water snakes (*Natrix* sp.) and garter snakes (*Thamnophis* sp.) 3%; amphibians, principally salamanders (Caudata) and northern leopard frogs 18%.
Insects, mostly ui grasshoppers (Orthoptera), ui caterpillars (Lepidoptera), and ui beetles (Coleoptera), spiders (Araneae) also included 10%.
Miscellaneous to include ui minnows (Cyprinidae), ui crayfish (Crustacea), and carrion 3%.

Stewart 1949
R, C, P, Sp-Su
Maryland

Mammals to include 1 short-tailed shrew, 2 star-nosed moles, 1 eastern mole, 4 meadow voles, 2 ui mice (Rodentia), 4 eastern cottontails. (Total mammals 32%.)
Birds to include 1 bobwhite, 1 mourning dove, 1 ui bloodstained warbler nest (Parulidae), 2 indigo buntings, 3 ui specimens (Aves). (Total birds 19%.)
Reptiles and amphibians to include 2 snapping turtles, 3 race runners, 1 blue-tailed skink, 1 ui skink (*Eumeces* sp.), 1 ui lizard (Scincidae), 3 ui snakes (Colubridae), 1 ui water snake (*Natrix* sp.), 3 ui snakes (Natricinae), 1 smooth earth snake, 2 American toads, 1 wood frog, 1 ui frog (Anura). (Total reptiles and amphibians 47%.)
Invertebrates to include 1 ui beetle (Coleoptera). (Total invertebrates 2%).

Craighead and Craighead
1956
R, C, P, Sp-Su
Michigan

Mammals to include 12 ui shrews and moles (Insectivora), 22 fox squirrels, 496 ui voles (*Microtus* sp.), 6 muskrats, 32 ui rats (Rodentia), and 15 ui rabbits (Leporidae). (Total mammals 40.8%.)
Birds to include 5 ring-necked pheasants, 223 ui small- and medium-sized specimens (Aves). (Total birds 16%.)
Reptiles and amphibians to include 311 ui snakes (Serpentes) and 68 ui frogs (Anura). (Total reptiles and amphibians 26.5%.)
Invertebrates to include 110 ui insects (Insecta) and 128 ui crayfish (Crustacea). (Total invertebrates 16.7%).

Table 16. Swainson's Hawk (*Buteo swainsoni*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Almost entirely rodents and insects. Mammals to include bats, rodents such as the California ground squirrel, mice, voles and rats. Rarely small birds including longspurs and grouse chicks. Small amounts of reptiles and amphibians. Primarily large insects when available such as Dobson flies, grasshoppers, and crickets.
Brown and Amadon 1968 G	Small amounts of bats, rodents, young or disabled birds, reptiles and amphibians. Primarily large insects when available, especially Orthoptera.
Snyder and Wiley 1976 G, M	Mammals (3.9%), birds (.9%), vertebrates (6.3%), lower vertebrates (1.5%), and invertebrates (93.6%).
Fisher 1893 S, P, Su, F, D	Mammals to include 1 ui ground squirrel (<i>Spermophilus</i> sp.), 1 ui mouse (Rodentia), 3 ui gophers (Rodentia), 3 ui rabbits (Leporidae). (Total mammals 2.4%) Reptiles and amphibians to include 2 ui horned lizards (<i>Phrynosoma</i> sp.), 5 ui lizards (Lacertilia), and 3 ui frogs (Anura). (Total reptiles and amphibians 3%) Invertebrates to include 56 ui grasshoppers (Orthoptera), 129 ui locusts (Orthoptera), 2 ui beetles (Coleoptera) and 123 ui insects (Insecta). (Total invertebrates 94.5%)
Cameron 1913 R, O, P, Sp-Su Montana	Prefer mice, frogs, and grasshoppers. Mammals to include ui rabbits (Leporidae) and ui mice (Rodentia). Small birds including lark buntings. Invertebrates including ui grasshoppers (Orthoptera).
Smith and Murphy 1973 R, C, P, Sp-Su Utah	Mammals to include 1 Townsend's ground squirrel, 9 deer mice, 4 ui voles (<i>Microtus</i> sp.), 57 blacktailed jack rabbits, 9 desert cottontails, and 4 ui rabbits (<i>Sylvilagus</i> sp.). (Total mammals 52.2%) Birds to include 2 Say's phoebes, 11 horned larks, 1 sage thrasher, 3 lark buntings, 1 loggerhead shrike, 1 white-crowned sparrow, 8 ui passerines (Passeriformes). (Total birds 16.8%) Reptiles to include 1 constrictor. (Total reptiles .6%) Invertebrates to include 32 short-horned grasshoppers (Acrididae), 9 ui crickets (Gryllidae), 6 ui ground beetles (Carabidae), and 2 ui darkling beetles (Tenebrionidae). (Total invertebrates 30.4%)

Dunkle 1977
R, C, O, P, Sp-Su
Wyoming

115 small mammals to include long-tailed weasels, white-tailed prairie dogs, Richardson's ground squirrels, thirteen-lined ground squirrels, northern pocket gophers, and desert cottontails. (Total mammals 68%.)
42 birds to include ui ducks (Anatidae), sage grouse, horned larks, ui crows (Corvidae), western meadowlarks, ui blackbirds (Icteridae), and ui sparrows (Passeriformes). (Total birds 25%.)
Reptiles and amphibians to include 1 ui snake (Serpentes) and 4 tiger salamanders.
Fish to include 5 white suckers.
Invertebrates to include ui grasshoppers (Orthoptera) and Jerusalem crickets (*Stenopalmatus* sp.).

Fitzner 1978
R, C, O, P, Sp-Su
Washington

Mammals to include 11 black-tailed jackrabbits, 8 Nuttall's cottontails, 8 Townsend's ground squirrels, 3 pocket gophers, 5 pocket mice and 2 ui small mammals. (Total mammals 21.8%.)
Birds to include 4 black-billed magpies, 4 mallards, 5 meadowlarks, 2 pheasants, 2 sage sparrows, 6 ring-billed gulls, 1 long-billed curlew and 1 starling. (Total birds 14.6%.)
Reptiles and amphibians to include 86 western yellow-bellied racers, 18 gopher snakes, 2 striped whip-snakes and 2 western toads. (Total reptiles 63.6%.)
Mammals to include 96 ui meadow voles (*Microtus spp.*), 5 deer mice, 8 ground squirrels, 8 pocket gophers and 1 cottontail rabbit. (Total mammals 79.3%.)
Birds to include 7 meadow larks, 3 pheasants, 3 gray partridges, 2 magpies, and 2 starlings. (Total birds 11.3%.)
Reptiles and amphibians to include 13 garter snakes. (Total reptiles 8.7%.)
Insects to include 1 Orthoptera. (Total insects 0.7%.)

Voelker, unpublished
R, P, Sp-Su
Oklahoma

Mammals to include 24 thirteen-lined ground squirrels, 6 plains pocket gophers, 32 hispid cotton rats, 3 prairie voles, 2 Norway rats, and 11 young eastern cottontails. (Total mammals 62.4%.)
Birds to include 3 ring-necked pheasants, 2 long-billed curlews, 1 American avocet, 1 black-billed magpie, 12 ui meadowlarks (*Sturnella* sp.), and 1 yellow-headed blackbird. (Total birds 16%.)
Reptiles to include 19 texas horned lizards, 5 bull-snakes, and 3 prairie kingsnakes. (Total reptiles 21.6%.)

Table 17. Broad-winged Hawk (*Buteo platyterus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Small mammals such as shrews, weasels, chipmunks, red squirrels, mice, hares, and rabbits. Birds including flickers, phoebes, brown thrashers, wood thrushes, bluebirds, ovenbirds, and sparrows. Reptiles and amphibians to include lizards, snakes, toads, and frogs. Fish such as minnows. Invertebrates to include millipedes, dragonflies, grasshoppers, locusts, moth larvae, beetles, ants, crayfish, fiddler crabs, spiders, and earthworms.
Brown and Amadon 1968 G	Small mammals, few birds, some nestlings. Snakes, toads, frogs. Large insects and caterpillars, crustaceans.
Snyder and Wiley 1976 G, M	Mammals (6.9%), birds (2.3%), vertebrates (22.3%), lower vertebrates (13.1%), invertebrates (77.7%).
Burns 1911 S, P, Sp-Su-F Eastern U.S.	Mammals to include 1 ui field mouse (<i>Microtus</i> sp.), 3 ui mice (Rodentia), 1 ui rat (Rodentia), and 1 ui specimen (Mammalia). (Total mammals 12.2%) Birds to include 1 ui phoebe (<i>Sayornis</i> sp.), 1 robin, 1 ui warbler (Parulidae), and 1 ui sparrow (Fringillidae). (Total birds 8.2%) Reptiles and amphibians to include 5 ui garter snakes (<i>Thamnophis</i> sp.), 2 ui toads (Anura), 1 ui treefrog (<i>Hyla</i> sp.), 2 bullfrogs, and 2 green frogs. (Total reptiles and amphibians 24.5%) Invertebrates to include 4 ui crayfish (Crustacea), 1 ui fiddler crab (Crustacea), 4 ui grasshoppers (Orthoptera), 1 ui katydid (Tetigoniidae), 5 ui locusts (Acrididae), 2 May beetle larvae (Melolonthinae), 8 ui beetles (Coleoptera), 1 ui caterpillar (Lepidoptera), and 1 ui centipede (Chilopoda). (Total invertebrates 55.1%)
Fisher 1893 S, P, Y, D	Mammals to include 8 short-tailed shrews, 9 ui shrews (Soricidae), 1 ui mole (Talpidae), 1 ui weasel (Mustelidae), 3 ui chipmunks (Sciuridae), 1 red squirrel, 12 ui voles (Cricetidae), 1 woodland vole, 6 ui mice (Rodentia), 1 ui rat (Rodentia), and 1 ui specimen (Mammalia). (Total mammals 11.5%) Birds to include 3 ovenbirds; and 1 ui specimen (Aves). (Total birds 1.2%) Reptiles and amphibians to include 2 ui lizards (Lac-

ertilial), 1 ui water snake (*Natrix* sp.), 1 red-bellied snake, 6 ui garter snakes (*Thamnophis* sp.), 1 ui snake (Serpentes), 4 ui salamanders (Urodela), 6 ui toads (Anura), 2 ui tree frogs (Hylidae), 5 ui frogs (Anura). (Total reptiles and amphibians 8.1%.)

Invertebrates to include 1 ui dragonfly (Odonata), 50 ui grasshoppers (Orthoptera), 22 ui crickets (Orthoptera), 34 ui katydids (Orthoptera), 12 ui cicadas (Homoptera), 1 ui moth (Lepidoptera), 25 ui moth and butterfly larvae (Lepidoptera), 1 ui dung beetle (Scarabaeidae), 5 ui May beetles (Melolonthinae), 21 ui beetles (Coleoptera), 87 ui insect larvae (Insecta), 2 ui insects (Insecta), 4 ui crayfish (Crustacea), 2 ui spiders (Araneae), and 3 ui earthworms (Annelida). (Total invertebrates 77.8%.)

Rusch and Doerr 1972
R, C, P, Sp-Su
Alberta

Mammals to include masked shrew 5%, least chipmunk 1%, red squirrel 1%, deer mouse 6%, meadow vole 19%, ui vole (*Microtus* sp.) 24%, ui jumping mice (Zapodidae) 4%, snowshoe hare 5%. (Total mammals 62%.)

Birds to include ruffed grouse 4%, blue jay 1%, ovenbird 1%, ui warblers (Parulidae) 2%, rose-breasted grosbeak 1%, white-throated sparrow 2%, fox sparrow 1%, and ui specimens (Aves) 15%. (Total birds 27%.)

Amphibians to include ui toads (Anura) 6%, wood frog 2%, and ui leopard frog (*Rana* sp.) 1%. (Total amphibians 9%.)

Invertebrates to include ui grasshoppers (Orthoptera) 2%. (Total invertebrates 2%.)

Fitch 1974
R, C, O, P, Sp-Su
Kansas

Mammals to include 4 red bats, 9 ui shrews (*Blarina* sp.), 3 ui moles (Talpidae), 2 ui harvest mice (*Reithrodontomys* sp.), 9 prairie voles, 2 woodland voles, and 7 ui cottontails (*Sylvilagus* sp.). (Total mammals 26.1%.)

Birds to include 6 yellow-billed cuckoos, 1 tufted titmouse, 2 Kentucky warblers, 2 brown-headed cowbirds, 7 cardinals, and 17 ui specimens (Aves). (Total birds 25.4%.)

Reptiles and amphibians to include 2 collared lizards, 1 ui racerunner (*Cnemidophorus* sp.), 13 five-lined skinks, 2 ui glass lizards, 6 great plains skinks, 13 ui ringneck snakes, 7 blue racers, 2 black rat snakes, 1 prairie kingsnake, 3 American toads, and 1 bullfrog. (Total reptiles and amphibians 37%.)

Invertebrates to include 2 ui grasshoppers (Orthop-

	tera), 2 ui cicadas (Cicadidae), 2 ui caterpillars (Insecta), and 6 ui beetles (Coleoptera). (Total invertebrates 8.7%.) Other 4. (Total other 2.9%.)
Voelker, unpublished R, I, Sp-Su Oklahoma	Mammals to include 1 eastern mole, 3 Norway rats, 4 young ui cottontails (<i>Sylvilagus</i> sp.). (Total mammals 20%.) Birds to include 2 young killdeer. (Total birds 5%.) Reptiles to include 29 young snapping turtles and 1 rough green snake. (Total reptiles 75%.)

Table 18. Harris Hawk (*Parabuteo unicinctus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mammals such as Mexican ground squirrels, mice, wood rats, and cottontails. Birds to include night herons, green-winged teals, soras, gallinules, and flickers. Reptiles to include lizards.
Brown and Amadon 1968 G	Rodents including woodrats, also rabbits. Teal, rails, gallinules, and flickers. Reptiles to include lizards.
Snyder and Wiley 1976 G, M	Mammals (52.6%), birds (39.5%), vertebrates (98.7%), lower vertebrates (6.6%), and invertebrates (1.3%).
Fisher 1893 S, P, Su Arizona	Mammals to include 2 ui ground squirrels (<i>Spermophilus</i> sp.), 2 ui small mammals (Rodentia), and 1 ui rabbit (Leporidae). Invertebrates to include 1 ui robust bot fly (Cutebriidae). (Sample too small for percentages.)
Pache 1974 C, R, O, P, Su, F New Mexico	Mammals to include 1 ui ground squirrel (<i>Spermophilus</i> sp.), 2 ui mice (<i>Peromyscus</i> sp.), 13 southern plains woodrats, 4 white-throated woodrats, 10 hispid cotton rats, and 14 eastern cottontails. (Total mammals 12.6%.) Birds to include 1 ui quail (Phasianidae) and 3 roadrunners. (Total birds 1.1%.) Reptiles to include 1 Texas horned lizard. (Total reptiles .3%.) Invertebrates to include 8 ui centipedes (Scolopendra), 32 ui grasshoppers (Orthoptera), 1 ui bee (Hymenoptera), 95 ui ants (Hymenoptera: Formicidae), 130 ui beetles (Coleoptera), and 34 ui wood ticks (Acarina: Ixodidae). (Total invertebrates 86%.)

Mader 1975
R, O, P, W, Sp-Su
Arizona

Mammals to include 20 Harris' antelope squirrels, 3 round-tailed ground squirrels, 20 desert woodrats, 1 ui mouse (Rodentia), 3 black-tailed jackrabbits, 67 desert cottontails, 4 ui hares and rabbits (Leporidae). (Total mammals 73.8%.)

Birds to include 8 Gambel's quail, 2 mourning doves, 1 roadrunner, 1 gilded flicker, 1 Bendire's thrasher, 7 ui thrashers (*Toxostoma* sp.), 4 cactus wrens, and 4 ui specimens (Aves). (Total birds 1.8%.)

Reptiles to include 1 zebra-tailed lizard, 9 desert spiny lizards, and 4 ui lizards (Lacertilia). (Total reptiles 8.8%.)

Whaley unpublished
1976-77
C, R, P, O, Y
Arizona

Mammals to include 27 Harris' antelope squirrels, 4 round-tailed ground squirrels, 3 ui ground squirrels (Sciuridae), 65 desert woodrats, 2 ui mice (Rodentia), 4 kangaroo rats (*Dipodomys* spp.), 4 black-tailed jackrabbits, 93 desert cottontails, 10 ui hare and rabbits (Leporidae). (Total mammals 87.6%.)

Birds to include 1 Cooper's Hawk, 10 Gambel's quail, 1 gilded flicker, 2 curve-billed thrashers, 1 cactus wren. (Total birds 6.2%.)

Reptiles to include 15 desert spiny lizards. (Total reptiles 6.2%.)

Table 19. Black Hawk (*Buteogallus anthracinus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Small quadrupeds. Young birds such as green-tailed towhees, reptiles, small fish, insects, and crustaceans such as land crabs.
Brown and Amadon 1968 G	Rodents, rarely birds, snakes, frogs, fish, insects and crabs.
Snyder and Wiley 1976 C, M	Mammals (0%), birds (6.1%), vertebrates (21.3%), lower vertebrates (15.2%), and invertebrates (78.7%).
Fisher 1893 S, P, Su, F Arizona	Reptiles and amphibians to include 1 ui snake (Serpentes), and 6 ui frogs (Anura). Fishes to include 3 ui fishes (Pisces). (Sample too small for percentages.)
Glinski, unpublished O, I, Sp-Su Arizona	Mammals to include ui bat (Chiroptera), ui chipmunks (<i>Eutamias</i> sp.), ui mouse (<i>Peromyscus</i> sp.), ui woodrat (<i>Neotoma</i> sp.), ui rat (<i>Rattus</i> sp.) and ui rabbits (<i>Sylvilagus</i> spp.). (Total mammals 3%.) Birds to include ui quail (Phasianidae), ui nestling

doves (Columbidae), and ui passerines (Passeriformes). (Total birds 3%.)

Reptiles and amphibians to include ui earless lizards (*Holbrookia* sp.), spiny lizards (*Sceloporus* spp.), ui lizards (*Urosaurus* sp.), ui whiptails (*Cnemidophorus* spp.), gopher snakes, ui garter snakes (*Thamnophis* spp.), ui toads (*Bufo* sp.), leopard frogs, and bullfrogs. (Total reptiles and amphibians 37%.)

Fish to include rainbow trout, roundtail chub, desert sucker, Sonora sucker, yellow bullhead, ui sunfish (*Lepomis* spp.), and ui perch (*Perca* sp.). (Total fish 40%.)

Invertebrates to include ui insects (Insecta) and ui crayfish (Crustacea). (Total invertebrates 12%.)

Other 5%.

Table 20. Zone-tailed Hawk (*Buteo albonotatus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Few small mammals such as chipmunks and occasional birds such as the desert quail and nestlings, lizards, frogs, small fish.
Brown and Amadon 1937 G	See entry for Bent 1937.
Snyder and Wiley 1976 G, M	Mammals (20%), birds (46.7%), vertebrates (100%), lower vertebrates (33.3%), invertebrates (0).
Fisher 1893 S, P, P Arizona	Reptiles and amphibians to include 4 ui lizards (<i>Lacertilia</i>), 2 ui tree frogs (<i>Hyla</i> sp.), and 4 ui frogs (<i>Anura</i>). Fish to include 1 hump-backed sucker. (Percentages not applicable.)
Glinski, unpublished O, P, Y Arizona	Birds to include 16 specimens such as Gambel's quail, mourning dove, horned lark, curve-billed thrasher, and brown towhee. (Total birds 80%.) Reptiles to include 4 lizards such as chuckwalla, colored lizard, and ui spiny lizards. (<i>Sceloporus</i> sp.). (Total reptiles 20%.)
Matteson, Riley, and Harris, unpublished R, O, P, Sp, Su Texas	Mammals to include 1 white-tailed antelope squirrel, and 1 spotted ground squirrel. (Total mammals 1.5%.) Birds to include 1 harlequin quail, 4 poor wills, 1 common nighthawk, 1 common flicker, 1 acorn woodpecker, 1 Cassin's kingbird, 1 western wood pewee, 3 horned larks, 4 scrub jays, 2 cactus wrens, 6 mockingbirds, 1 brown thrasher, 2 western bluebirds, 3 ui meadowlarks (<i>Sturnella</i> sp.), 1 brown-headed cowbird,

1 summer tanager, 1 black-headed grosbeak, 2 brown towhees, and 2 rufous-crowned sparrows. (Total birds 27.5%.)

Reptiles to include 97 crevice spiny lizards and 1 ui snake (Serpentes). (Total reptiles 71%.)

Snyder and Snyder,
unpublished
O, I, Sp-Su
Arizona

Birds to include ui quail (Phasianidae), canyon wren, Audubon's warbler, house sparrow, ui meadowlark (*Sturnella* sp.), and 3 ui specimens (Aves).

Reptiles to include ui spiny lizards (*Sceloporus* sp.) and 4 ui lizards (Lacertilia).

Table 21. White-tailed Hawk (*Buteo albicaudatus*) Diet.

Reference/Methods Information	Food
Fisher 1893 G	Squirrels, rabbits, snakes, and frogs.
Bent 1937 G	Wood rats, cotton rats, rabbits, quail, lizard, snakes, frogs, grasshoppers, and beetles.
Brown and Amadon 1968 G	See entry for Bent 1937
Snyder and Wiley 1976 G, M	Mammals (9.8%), birds (2%), vertebrates (19.6%), lower vertebrates (7.8%), and invertebrates (80.4%).

Table 22. Short-tailed Hawk (*Buteo brachyurus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Probably small mammals, birds, lizards, snakes, and frogs.
Brown and Amadon 1968 G	Rodents, birds, lizards, and insects to include grasshoppers and wasps.
Ogden 1974 O, R, C, P Florida	Mammals to include 1 hispid cotton rat, and 2 ui rodents (Rodentia). (Total mammals 3.8%) Birds to include 3 bobwhites, 1 killdeer, 1 mourning dove, 1 ground dove, 3 yellow-billed cuckoos, 1 common flicker, 3 tree swallows, 1 tufted titmouse, 1 robin, 1 blue-gray gnatcatcher, 1 cedar waxwing, 2 white-eyed vireos, 1 black-whiskered vireo, 1 black-poll warbler, 2 American redstarts, 2 eastern meadowlarks, 23 red-winged blackbirds, 3 cardinals, 4 American goldfinches, 2 rufous-sided towhees, 2 seaside sparrows, 1 Bachman's sparrow and 17 ui specimens (Aves). (Total birds 96.3%).

Ogden 1974 G, M	Mammals to include 1 ui cotton rat (<i>Sigmodon</i> sp.) and 1 ui rodent (Rodentia). Birds to include 1 Sharp-shinned Hawk, 1 American redstart, 1 ui warbler, 1 red-winged blackbird and 1 ui specimen (Aves). Reptiles to include 1 ui small snake (Serpentes). (Percentages not applicable.)
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Table 23. Gray Hawk (*Buteo nitidus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mammals such as squirrels, mice, other rodents, and rabbits. Birds including young chacalacas, quail, young chickens, and young doves. Lizards, small snakes, and fish. Large grasshoppers, beetles, and other insects.
Fisher 1893 G	Small rodents to include ground squirrels and mice; birds; small reptiles such as lizards; fish; insects to include beetles.
Brown and Amadon 1968 G	Mammals to include rodents and cottontails. Birds to include parakeets. Lizards and small snakes, large grasshoppers and beetles.
Snyder and Wiley 1976 G, M	Mammals (5%), birds (20%), vertebrates (100%), lower vertebrates (75%), and invertebrates (0%).
Amadon and Phillips 1939 S, P, Su Arizona	Reptiles to include 4 desert spiny lizards.
Stensrude 1965 O, I, W, Sp Arizona	Rodents third in preference. Birds second in preference including adult brown towhees and fledglings of other species. Clark's spiny lizards were first in preference.
Glinski, unpublished	Mammals to include ui mice (<i>Peromyscus</i> sp.), ui woodrats (<i>Neotoma</i> sp.), and ui rabbits (<i>Sylvilagus</i> sp.). (Total mammals 10%). Birds to include adult and nestling Gambel's quail, white-winged doves, mourning doves, and ui kingbirds (<i>Tyrannus</i> sp.). (Total birds 11%). Reptiles to include ui earless lizards (<i>Holbrookia</i> spp.), ui spiny lizards (<i>sceloporus</i> spp.), ui lizards (<i>Urosaurus</i> sp.), ui whiptails (<i>Cnemidophorus</i> spp.), ui whipsnakes

(*Masticophis* sp.), and ui garter snakes (*Thamnophis* spp.). (Total reptiles 79%).

Eagles (Accipitridae)

Table 24. Golden Eagle (*Aquila chrysaetos*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mammals to include opossums, moles, raccoons, martens, weasels, skunks, foxes, dogs, cats, prairie dogs, marmots, ground squirrels, tree squirrels, pocket gophers, mice, rats, porcupines, rabbits, hares, young pigs, deer and their fawns, antelopes, goats and kids, domestic calves, lambs of mountain sheep, and domestic lambs. Birds to include great blue herons, geese, ducks, goshawks, red-tailed hawks, turkeys, quail, grouse including sage grouse and ptarmigan, domestic poultry, plovers, curlews, short-eared owls, band-tailed pigeons, kingfishers, crows, thrushes, and meadowlarks. Reptiles to include an occasional tortoise and many snakes: Also carrion.
Brown and Amadon 1968 G	Strong preference for mammals to include odd items such as weasels, mink, foxes, deer, fawns, pronghorns, and rarely domestic kids and lambs. Also strong preference for game birds, but other birds included such as jays and crows. Lizards, snakes, fish, and carrion also eaten.
Snyder and Wiley 1976 G, M	Mammals (72.3%), birds (27.7%), vertebrates (100%), lower vertebrates (0%), invertebrates (0%).
Fisher 1893 S, P, W, D	Mammals to include 1 Abert's squirrel, and 1 ui rabbit (Leporidae). Birds to include 1 ui specimen (Aves). Carrion in 2 cases (1 of pig, Suidae). (Sample not large enough for percentages.)
Carnie 1954 R, P, Sp-Su California	Mammals to include 2 Virginia opossums, 1 broad-footed mole, 2 raccoons, 3 long-tailed weasels, 17 striped skunks, 1 gray fox, 4 domestic cats, 133 California ground squirrels, 7 gray squirrels, 3 Botta's pocket gophers, 4 dusky-footed woodrats, 3 California voles, 144 black-tailed jackrabbits, 1 desert cottontail, and 64 mule deer fawns. (Total mammals 77.3%) Birds to include 1 great blue heron, 3 turkey vultures,

	<p>1 red-tailed hawk, 1 American kestrel, 2 mallards, 4 California quail, 2 roadrunners, 1 barn owl, 7 great horned owls, 1 common flicker, 1 Lewis' woodpecker, 2 Steller's jays, 1 scrub jay, 30 yellow-billed magpies, 3 common crows, and 8 western meadowlarks. (Total birds 13.5%.)</p> <p>Reptiles to include 26 gopher snakes, 1 common king-snake and 1 western rattlesnake. (Total reptiles 5.6%.)</p> <p>Fish to include 1 Sacramento sucker and 17 Sacramento perch. (Total fish 3.6%.)</p>
<p>McGahan 1968 P, R, C, Sp-Su Montana</p>	<p>Mammals to include 10 long-tailed weasels, 1 striped skunk, 5 black-tailed prairie dogs, 70 yellow-bellied marmots, 44 Richardson's ground squirrels, 1 bushy-tailed woodrat, 9 ui voles (<i>Microtus</i> spp.), 1 muskrat, 1 porcupine, 319 Nuttall's and desert cottontails, 24 mule deer fawns, 3 pronghorn fawns, and 1 domestic sheep lamb. (Total mammals 87.1%.)</p> <p>Birds to include 1 marsh hawk, 1 American kestrel, 1 ui hawk nestling (<i>Falconiformes</i>), 19 blue grouse, 1 sharp-tailed grouse, 10 sage grouse, 4 ring-necked pheasants, 26 gray partridge, 1 long-billed curlew, 1 rock dove, 6 Great Horned Owls, 1 Long-eared Owl, 2 Short-eared Owls, 4 common flickers, and 44 black-billed magpies. (Total birds 12.5%.)</p> <p>Reptiles to include 2 prairie rattlesnakes and 2 ui snakes (<i>Serpentes</i>). (Total reptiles .4%.)</p>
<p>Smith and Murphy 1973 R, C, P, Sp-Su Utah</p>	<p>Mammals to include 2 long-tailed weasels, 12 white-tailed antelope squirrels, 1 long-tailed pocket mouse, 223 black-tailed jackrabbits, 78 ui rabbits (<i>Sylvilagus</i> sp.). (Total mammals 96.9%.)</p> <p>3 Swainson's Hawks, 1 Short-eared Owl, 2 mourning doves, 3 horned larks, and 1 lark sparrow. (Total birds 3.1%.)</p>
<p>Olendorff 1976 M, D</p>	<p>Mammals to include 3 Virginia opossums, 1 broad-footed mole, 3 raccoons, 13 ringtails, 1 ermine, 22 long-tailed weasels, 1 badger, 25 striped skunks, 2 eastern hog-nosed skunks, 3 ui skunks (<i>Mustelidae</i>), 4 coyotes, 1 kit fox, 2 gray foxes, 2 bobcats, 8 domestic cats, 3 woodchucks, 261 yellow-bellied marmots, 37 hoary marmots, 42 black-tailed prairie dogs, 54 Gunnison's prairie dogs, 87 ui prairie dogs (<i>Cynomys</i> sp.), 159 California ground squirrels, 101 rock squirrels, 55 Townsend's ground squirrels, 132 Richardson's ground squirrels, 544 Arctic ground squirrels, 5 thirteen-lined ground squirrels, 12 white-tailed antelope squirrels, 1 Texas antelope squirrel, 59 ui ground squirrels (<i>Sciurus</i></p>

ridae), 1 ui chipmunk (Sciuridae), 10 western gray squirrels, 6 fox squirrels, 3 Botta's pocket gophers, 1 northern pocket gopher, 2 Townsend's pocket gophers, 1 yellow-faced pocket gopher, 2 ui pocket gophers (*Geomyidae*), 1 long-tailed pocket mouse, 5 Ord's kangaroo rats, 7 ui mice (*Peromyscus* sp.), 5 desert woodrats, 5 dusky-footed woodrats, 7 bushy-tailed woodrats, 8 ui woodrats (*Neotoma* sp.), 3 California voles, 41 ui voles (*Microtus* sp.), 6 ui voles (Crice-tidae), 17 muskrats, 2 porcupines, 13 ui rodents (Rodentia), 542 white-tailed jackrabbits, 6 snowshoe hares, 1,736 black-tailed jackrabbits, 126 ui hares (*Lopus* sp.), 338 desert cottontails, 805 ui cottontails (*Sylvilagus* sp.), 275 ui rabbits (Leporidae), 127 mule deer, 2 white-tailed deer, 24 caribou, 7 ui deer (Cervidae), 21 pronghorns, 4 domestic cattle calves, 18 mountain sheep, 15 Dall's sheep, 13 domestic sheep, 84 ui domestic sheep and goats (Bovidae) and 21 ui specimens (Mammalia). (Total mammals 83.9%.)

Birds to include 6 great blue herons, 3 trumpeter swans, 14 mallards, 4 pintails, 1 ui green-winged teal, 1 cinnamon teal, 16 ui waterfowl (Anseriformes), 5 turkey vultures, 1 Cooper's hawk, 2 red-tailed hawks, 1 red-shouldered hawk, 2 Swainson's hawks, 2 prairie falcons, 7 American kestrels, 2 ui hawks (Falconiformes), 3 turkeys, 32 blue grouse, 7 ruffed grouse, 11 sharp-tailed grouse, 177 sage grouse, 21 ui ptarmigan (*Lagopus* sp.), 18 ui grouse (Tetraonidae), 6 California quail, 29 chukar, 219 ring-necked pheasants, 46 gray partridge, 5 domestic chickens, 3 American coots, 1 willet, 49 rock doves, 4 mourning doves, 2 roadrunners, 10 barn owls, 27 great horned owls, 2 long-eared owls, 5 short-eared owls, 2 common nighthawks, 8 common flickers, 2 Lewis' woodpeckers, 3 horned larks, 2 Stellar's jays, 1 scrub jay, 141 black-billed magpies, 30 yellow-billed magpies, 2 Common Ravens, 18 common crows, 5 robins, 1 varied thrush, 1 Townsend's solitaire, 2 starlings, 14 western meadowlarks, 1 lark sparrow, 6 ui passerines (Passeriformes), and 58 ui specimens (Aves). (Total birds 14.7%.)

Reptiles to include 1 ui horned lizard (*Phrynosoma* sp.), 2 racers, 1 coachwhip, 52 gopher snakes, 1 common kingsnake, 1 western rattlesnake, 1 ui rattlesnake (Crotalinae), and 13 ui snakes (Serpentes). (Total reptiles 1%.)

Fish to include 1 Sacramento sucker, 17 Sacramento perch, 1 ui perch (Percidae), and 7 ui specimens (Pisces). (Total fish .4%.)

Voelker, unpublished R, P, Sp-Su Oklahoma and New Mexico	Mammals to include 5 black-tailed prairie dogs, 31 black-tailed jackrabbits, 46 ui cottontails (<i>Sylvilagus</i> sp.), and 1 mule deer fawn. (Total mammals 78.3%.) Birds to include 2 shovellers, 1 mallard, 1 turkey, and 1 common raven. (Total birds 4.7%.) Reptiles to include 17 bullsnakes and 1 western box turtle. (Total reptiles 17%.)
Voelker, unpublished R, P, Sp-Su Wyoming	Mammals to include 2 black-tailed prairie dogs, 7 white-tailed prairie dogs, 4 Richardson's ground squirrels, 87 white-tailed jackrabbits, 29 ui cottontails (<i>Sylvilagus</i> sp.), 1 badger, and 52 pronghorn fawns. (Total mammals 83.5%.) Birds to include 26 sage grouse. (Total birds 11.9%.) Reptiles to include 10 bullsnakes. (Total reptiles 4.6%.)

Table 25. Bald Eagle (*Haliaeetus leucocephalus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mammals to include opossums, raccoons, weasels, foxes, prairie dogs, ground squirrels, tree squirrels, mice, rats, porcupines, rabbits, piglets, fawns, and lambs. Birds to include horned grebes, pied-billed grebes, cormorants, snowy egrets, little blue herons, brant, other geese, black ducks, pintails, lesser scaup, other ducks, ptarmigan, grouse, chickens, coots, killdeer, waders, gulls, terns, murre, guillemots, puffins, auklets, murrelets, other alcids, crows, rosy finches, fox sparrows, longspurs, and savannah sparrows. Reptiles to include turtles. Fish to include herring, salmon, pike, carp, catfish, black bass, crevalle, pompano, sheepshead, mullet. Invertebrates such as crabs. Carrion.
Brown and Amadon 1968 G	Mammals to include Arctic fox kits and domestic and mountain sheep lambs. Birds to include geese and other waterfowl. Fish such as salmon. Carrion.
Snyder and Wiley 1976	Mammals (4.5%), birds (18.8%), vertebrates (98%), lower vertebrates (74.7%), and invertebrates (2%).
Fisher 1893 S, P, F, W, D	Mammals to include 2 ui prairie dogs (<i>Cynomys</i> sp.), 2 ui mice (Rodentia), 2 ui rats (Rodentia), 1 mule deer,

	and 1 ui specimen (Mammalia). (Total mammals 36.4%) Birds to include 1 ui duck (Anatidae). (Total birds 4.5%) Fish to include 2 eels (Anguilliformes), 2 goldfish, 1 white catfish, 1 striped bass, 1 sunfish (Centrarchidae), and 4 ui specimens (Pisces). (Total fish 50%) Other to include 2 carrion specimens. (Total carrion 9%)
Herrick 1924 O, R, Sp-Su Ohio	Birds to include 12 domestic chickens. (Total birds 11.9%) Fish to include 87 ui specimens (Pisces). (Total fish 86.1%) Other to include 2 ui specimens. (Total other 2%)
Wright 1953 R, O, P New Brunswick	Mammals to include 1 snowshoe hare. (Total mammals .7%) Birds to include 6 black ducks, 3 ui ducks (Anatidae), 1 ui crow (<i>Corvus</i> sp.), and 2 ui birds (Aves). (Total birds 8.7%) Fish to include 18 alewife, 16 ui pickerel (<i>Esox</i> sp.), 12 ui chub (Cyprinidae), 12 white suckers, 23 brown bullheads, 30 ui perch (Percidae), and 11 ui fish (Pisces). (Total fish 88.4%) Carrion to include 1 beaver, 1 sea lamprey, and 1 ui sturgeon (Acipenseridae). (Total carrion 2.2%)
Imler and Kalmbach 1955 R, P, Sp-Su Maryland and Virginia	Mammals to include 3 muskrats. (Total mammals 4.7%) Birds to include 2 horned grebes, 1 great blue heron, 2 mallards, 4 black ducks, 1 pintail, 2 ring-necked ducks, 2 lesser scaups, 1 ui duck (Anatidae), 2 Bald Eagles, 1 ui gallinaceous bird (Galliformes), 1 American coot, 1 rock dove, and 1 long-eared owl. (Total birds 33.3%) Reptiles to include 3 mud turtles, and 1 painted turtle. (Total reptiles 6.3%) Fish to include 1 ui herring (<i>Clupeidae</i>), 3 carp, 1 cyprinidae (other than carp), 6 channel cat, 19 ui catfish (<i>Ictalurus</i> sp.), 1 ui bass (Centrarchidae), 2 ui fish (Pisces). (Total fish 52.4%) Other items 2. (Total other 3.3%)
Retfalvi 1970 R, P, Y Washington	Mammals to include 13 ui rabbits (Leporidae). (Total mammals 21.3%) Birds to include 2 surf scoters, 2 ui gulls (Laridae), 2 common murre, and 11 ui specimens (Aves). (Total birds 27.9%) Fish to include 17 striped bass, 8 lingcod, 3 giant scul-

	pin (Cottidae), 1 red Irish lord, 2 arrowtooth flounder. (Total fish 50.8%).
Dunstan and Harper 1975 R, P, Su Minnesota	Mammals to include 4 muskrats. (Total mammals 1.3%). Birds to include 14 ducks (Anatidae) such as mallards, wood ducks, ring-necked ducks, and lesser scaup, and 6 gulls such as herring gulls, and ring-billed gulls and 4 ui specimens (Aves). (Total birds 7.9%). Fish to include 42 northern pike, 88 suckers such as white suckers and shorthead redhorses, 106 bullheads, such as black bullheads, yellow bullheads, and brown bullheads, 12 rock bass, 15 largemouth bass, and 9 other specimens such as bowfins, ciscos, ui whitefish (<i>Coregonus</i> sp.), black crappie, white crappie, yellow perch, and walleye. (Total fish 90.1%). Invertebrates to include 1 ui clam (<i>Lampsilis</i> sp.) and 1 ui crayfish (<i>Cambarus</i> sp.). (Total invertebrates .7%).
Platt 1976 C, P, W Utah	Mammals to include road-killed and hunter-shot ui cottontails (<i>Sylvilagus</i> sp.) and black-tailed jack rabbits.
Sherrod, White, and Williamson 1977 R, P, Y Aleutian Islands	Mammals to include 31 Norway rats, 80 sea otter pups. (Total mammals 23.3%). Birds to include 58 northern fulmars, 10 short-tailed shearwaters, 2 fork-tailed petrels, 4 pelagic cormorants, 9 ui cormorants (<i>Phalacrocorax</i> sp.), 4 Canada geese, 4 emperor geese, 4 mallards, 3 pintails, 3 green-winged teal, 1 harlequin duck, 8 common eiders, 3 ui ducks (Anatidae), 2 bald eagle chicks, 17 rock ptarmigan, 2 rock sandpipers, 26 glaucous-winged gulls, 3 black-legged kittiwakes, 12 common murrelets, 1 pigeon guillemot, 27 ancient murrelets, 1 parakeet auklet, 35 crested auklets, 12 least auklets, 6 ui auklets (Alcidae), 5 horned puffins, 16 tufted puffins, 8 ui puffins (Alcidae), 1 ui cuckoo (<i>Cuculus</i> sp.), 3 ui birds (Aves). (Total birds 60.9%). Fish to include 1 dolly varden trout, 5 longnose lancetfish, 3 Pacific cod, 2 Pacific ocean perch, 36 rock greenling, 1 red Irish lord, 1 armorhead sculpin, 6 smooth lumpsuckers, 15 ui fish (Pisces), 2 masses of fish eggs (Pisces). (Total fish 15.1%). Invertebrates to include 3 ui octopi (<i>Octopus</i> sp.). (Total invertebrates .6%).
Osprey (Pandionidae)	

Table 26. Osprey (*Pandion haliaeetus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Possibly domestic piglets, young ducks, and chickens, turtles, snakes, frogs, and beetles. Fish almost exclusively to include bowfin, eels, herring, shad, menhaden, salmon, trout, pickerel, pike, goldfish, carp, suckers, brown bullheads, other catfish, tomcod, flying fish, sunfish, perch, bluefish, squeeteague, mullet, whitefish, bonito, flounder, and other fish.
Brown and Amadon 1968 G	Rarely birds to include storm petrels, ducks, and sandpipers. Also frogs, but almost entirely fish. Occasional crustacean.
Snyder and Wiley 1976 G, M	Mammals (0%), birds (0%), vertebrates (98.4%), lower vertebrates (98.4%), invertebrates (1.6%).
Fisher 1893 S, P, Y, D	Fish to include 1 goldfish, 2 bonytails, 1 humpback sucker, 2 ui suckers (<i>Catostomidae</i>), 1 ui tomcod (<i>Urophycis</i> sp.), 3 ui sunfish (<i>Centrarchidae</i>), 1 yellow perch, 1 ui mullet (<i>Mugilidae</i>), and 6 ui specimens (<i>Pisces</i>). (Total fish 100%.)
Koplin 1971 Oregon	Fish to include ui salmon (<i>Salmonidae</i> , 37%), mountain whitefish (6%), and tui chub (57%). (Total fish 100%.)
Garber 1971-1972 R, P California	Fish to include Eagle Lake trout (34%), Tui chub (48%), and Tahoe suckers (18%). (Total fish 100%.)
French 1972 California	Fish to include surf smelt and night smelt (98%), and ui surfperches (<i>Embiotocidae</i> , 2%). (Total fish 100%.)
MacCarter 1972 O, P Montana	Fish to include ui salmon (<i>Oncorhynchus</i> spp.), peamouths, pumpkinseeds, and yellow perch (14.5%); ui whitefish (<i>Coregonus</i> and <i>Prosopium</i> spp., 26.1%), and largescale suckers (59.4%).
Ureoka and Koplin 1973 O, P, Sp-Su California	Fish to include ui herring (<i>Clupeidae</i> , 2%), ui anchovies (<i>Engraulidae</i> , 3%), ui silversides (<i>Atherinidae</i> , 2%), ui surfperch (<i>Embiotocidae</i> , 63%), ui sculpins (<i>Cottidae</i> , 1%), and ui fish (<i>Pisces</i> , 29%). (Total fish 100%.)
Wiley and Lohrer 1973 R, O, P Florida	In addition to fish, 3 hispid cotton rats, 5 ui small mammals (<i>Mammalia</i>), 1 wood duck, 1 ui passerine (<i>Passeriformes</i>), and 1 Florida red-bellied turtle.

Caracara (Falconidae)

Table 27. Caracara (*Polyborus plancus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mainly carrion to include dead mammals, birds, and reptiles. Also kills opossums, skunks, prairie dogs, squirrels, mice, rats and other rodents, rabbits, birds, young alligators, turtles, lizards, snakes, frogs, and fish. Also grasshoppers, beetles, insect larvae and other insects, crayfish, crabs, and worms.
Brown and Amadon 1968 G	All sorts of animal and perhaps vegetable matter. All classes of vertebrates and also beetle larvae, other insects, and worms.
Fisher 1893 S, I, W Mexico Arizona	Mammals to include 1 ui specimen (Mammalia). 1 specimen of carrion and maggots. (Percentages not applicable.)
Sprunt 1946 O, P Florida	Reptiles to include ui turtles (Testudines), ui turtle eggs (Testudines), ui lizards (Lacertilia), and ui snakes (Serpentes). Carrion. (Percentages not applicable.)
Haverschmidt 1947 O, P, Su, F Dutch Guiana	Coconuts. (Percentages not applicable.)
Glazener 1964 O, P, Y Texas	Road kills to include Virginia opossums, raccoons, ui skunks (Mustelidae), coyotes, ui rodents (Rodentia), ui rabbits (<i>Leporidae</i>), armadillos, a variety of birds (Aves), and snakes (Serpentes). Also disgorged food of vultures. (Percentages not applicable.)
Richmond 1976 O, I, W Costa Rica	Mammals to include 1 hispid cotton rat, 1 peccary. (Total mammals 9.5%). Birds to include 3 jacanas, and 1 ui small birds (Aves). (Total birds 19%). Reptiles to include 2 tails of black iguanas, 2 tails of common iguanas, and 4 ui ameivas lizards (<i>Ameivas</i> sp.). (Total reptiles 38.1%). Amphibians to include 1 large frog (Anura). (Total amphibians 4.8%). Fish to include 2 ui specimens (Eleotridae). (Total fish 9.5%). Invertebrates to include 1 ui specimen (probably ta-

rantula or large insect (Arthropoda). (Total invertebrates 4.8%.)

Carrion in 3 instances. (Total carrion 14.3%.)

Falcons (Falconidae)

Table 28. Gyrfalcon (*Falco rusticolus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mammals to include weasels, squirrels, lemmings, rats, snowshoe hares, arctic hares, and rabbits. Birds to include geese, eiders, other ducks, spruce grouse, prairie chickens, ptarmigan, poultry, American golden plovers, ringed plovers, ruddy turnstones, purple sandpipers, dunlins, phalaropes, common snipe, seabirds, kittiwakes, murres, dovebies, guillemots, puffins, pigeons, and snow buntings.
Brown and Amadon 1968 G	Mammals including lemmings. Chiefly birds including those from large ducks and even geese down to passerines, grouse, and arctic ptarmigan, and many sea birds.
Snyder and Wiley 1976 G, M	Mammals (40.9%), birds (59.1%), vertebrates (100%), lower vertebrates (0%), invertebrates (0%).
Cade 1960 R, C, D, Su Alaska	Mammals to include 263 arctic ground squirrels, 3 ui redbacked voles (<i>Clethrionomys</i> sp.), 70 ui voles (<i>Cricetidae</i>), and 2 brown lemmings. (Total mammals 58.2%) Birds to include 5 ui scaup (<i>Aythya</i> sp.), 3 oldsquaws, 2 ui ducks (<i>Anatidae</i>), 161 ui ptarmigan (<i>Lagopus</i> sp.), 1 American golden plover, 1 Hudsonian godwit, 1 upland plover, 3 pectoral sandpipers, 1 western sandpiper, 2 parasitic jaegers, 18 Lapland longspurs, and 45 ui passerines (<i>Passeriformes</i>). (Total birds 41.8%.)
Cade 1960 R, C, P, Su Colville River	Mammals to include 6 arctic ground squirrels and 8 brown lemmings. (Total mammals 13.6%) Birds to include 6 pintails, 1 oldsquaw, 3 harriers, 2 rough-legged hawks, 51 ui ptarmigan (<i>Lagopus</i> spp.), 2 American golden plovers, 3 long-tailed jaegers, 20 short-eared owls, and 1 ui passerine (<i>Passeriformes</i>). (Total birds 86.4%.)
White and Springer 1965 R, I, Su Coastal Alaska	Birds to include 1 American green-winged teal, 1 red-breasted merganser, 3 ui ducks (<i>Anatidae</i>), 9 ui ptarmigan (<i>Lagopus</i> sp.), 1 pectoral sandpiper, 1 dunlin, 2 western sandpipers, 1 northern phalarope, 1

	common snipe, 5 ui shorebirds (Charadriiformes), 1 long-tailed jaeger, 1 mew gull, 2 Sabine's gull, 1 arctic tern, 2 ui gulls (Laridae), 1 ui redpoll (<i>Carduelis</i> sp.), 1 Savannah sparrow, and 4 ui passerines (Passeriformes). (Total birds 100%.)
Platt, unpublished O, I, Su Yukon Territory	Mammals to include 14 arctic ground squirrels, and 6 ui voles (<i>Microtus</i> sp.). (Total mammals 37%.) Birds to include 21 ui ptarmigan (<i>Lagopus</i> sp.), 2 ui sandpipers (Scolopacidae), and 7 ui passerines (Passeriformes). (Total birds 55.6%.) Other to include 4 specimens. (Total other 7.4%.)
Roseneau, unpublished R, C, P, Sp-Su Alaska	Mammals to include 1 ermine, 1 mink, 170 arctic ground squirrels, 24 collared lemmings, 6 brown lemmings, 8 ui lemmings (Cricetidae), 44 northern red-backed voles, 1 tundra vole, 5 ui voles (Cricetidae), and 2 ui microtines (Microtinae). (Total mammals 17.2%.) Birds to include 1 black brant, 7 pintails, 1 ui green-winged teal, 5 oldsquaw, 8 ui waterfowl (Anseriformes), 876 willow and rock ptarmigan, 30 American golden plovers, 1 semipalmated plover, 11 whimbrels, 6 bar-tailed godwits, 1 wandering tattler, 1 lesser yellowlegs, 2 ruddy turnstones, 13 common snipe, 1 ui sandpiper (Scolopacidae), 1 parasitic jaeger, 155 long-tailed jaegers, 3 ui jaegers (Stercorariidae), 14 black-legged kittiwakes, 14 ui shorebirds (Charadriiformes), 4 pigeon guillemots, 7 tufted puffins, 1 parakeet auklet, 4 ui alcids (Alcidae), 12 short-eared owls, 1 Say's phoebe, 11 robins, 1 varied thrush, 3 gray-cheeked thrushes, 1 water pipit, 2 ui redpolls (<i>Carduelis</i> spp.), 2 tree sparrows, 1 fox sparrow, 5 Lapland longspurs, 2 snow buntings, 29 ui passerines (Passeriformes), and 23 ui specimens (Aves). (Total birds 82.7%.) Other 1. (Total other .1%.)

Table 29. Prairie Falcon (*Falco mexicanus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mammals to include prairie dogs, ground squirrels, tree squirrels, pocket gophers, mice and other rodents, jack rabbits, and other rabbits. Birds to include mallards, teals, and other ducks, sharp-tailed grouse, prairie chickens, Gambel's and other quail, ring-necked pheasants, gray partridge, domestic poultry, coots, waders, gulls, band-tailed pi-

geons, rock doves, mourning doves, jays, house sparrows, meadowlarks, yellow-headed blackbirds, Brewer's blackbirds, white-crowned sparrows, other sparrows, and chestnut-collared longspurs.

Reptiles to include lizards.

Invertebrates to include grasshoppers, crickets, and other insects.

Brown and Amadon 1968 G	Mammals and birds of small and medium size. Rarely lizards and large insects.
Snyder and Wiley 1976 G, M	Mammals (21.6%), birds (33.3%), vertebrates (54.9%), lower vertebrates (0%), invertebrates (45.1%).
Enderson 1964 R, P, Sp-Su Colorado	Mammals to include Richardson's ground squirrels and thirteen-lined ground squirrels. Birds to include white-throated swift, black-billed magpie, loggerhead shrike, western meadowlark, vesper sparrow, and McCown's longspur.
Leedy 1972 Sp-Su Montana	Mammals to include Richardson's ground squirrel and mountain cottontail rabbit. Birds to include horned lark, western meadowlark, vesper sparrow, black-billed magpie, and Brewer's blackbird.
Ogden 1973 R, P, Su Idaho	Mammals to include Townsend's ground squirrel, white-tailed antelope squirrel, ui kangaroo rats (<i>Dipodomys</i> sp.), ui woodrats (<i>Neotoma</i> sp.), and desert cottontail. Birds to include California quail, chukar, ring-necked pheasant, rock dove, mourning dove, Burrowing Owl, ui nighthawk (<i>Chordeiles</i> sp.), horned lark, cliff swallow, rock wren, starling, western meadowlark, red-winged blackbird, and western tanager. Reptiles to include collared lizard, leopard lizard, ui horned lizard (<i>Phrynosoma</i> sp.), and spotted whiptail. Invertebrates to include ui grasshoppers (Orthoptera) and ui scorpions (Scorpionida).
Porter and White 1973 R, C, P, Su Utah	Mammals to include 2 Uinta ground squirrels, 2 rock squirrels, 1 ui ground squirrel (<i>Spermophilus</i> sp.), and 1 ui vole (<i>Microtus</i> sp.). (Total mammals 7.9%.) Birds to include 2 ui ducks (Anatidae), 1 California quail, 2 ring-necked phasants, 6 American avocets, 9 killdeer, 5 willets, 1 sanderling, 1 rock dove, 2 mourning doves, 1 common flicker, 1 western kingbird, 1 horned lark, 7 robins, 9 house sparrows, 18 western meadowlarks, 1 Brewer's blackbird, 1 ui blackbird (Icteridae), and 2 rufous-sided towhees. (Total birds 92.1%.)

Smith and Murphy 1973 R, C, P Utah	Mammals to include 5 white-tailed Antelope squirrels, 1 deer mouse, and 2 young black-tailed jackrabbits. (Total mammals 30.8%) Birds to include 7 horned larks, 3 starlings, 1 western meadowlark, 1 green-tailed towhee, and 1 vesper sparrow. (Total birds 50%) Invertebrates to include 5 ui locusts (Acrididae). (Total invertebrates 19.2%).
Denton 1975 R, P, Su Oregon	Mammals to include Townsend's ground squirrel, Belding's ground squirrel, golden-mantled ground squirrel, and least chipmunk. Birds to include mourning dove, horned lark, starling, western meadowlark, and red-winged blackbird.
Marti and Brown 1975 C, R, I, Su Colorado	Mammals to include 1 yellow-bellied marmot, 2 golden-mantled ground squirrels, 4 northern pocket gophers, 2 deer mice, 3 long-tailed voles, and 23 pikas. (Total mammals 39.3%) Birds to include 3 white-tailed ptarmigan, 8 horned larks, 5 mountain bluebirds, 3 water pipits, 19 rosy finches, and 16 ui small birds (Aves). (Total birds 60.7%).
Platt, unpublished C, P, Sp-Su New Mexico	Mammals to include 18 thirteen-lined ground squirrels, 21 spotted ground squirrels, 38 plains pocket gophers, 3 Ord's kangaroo rats, and 6 desert cottontails. (Total mammals 65.6%) Birds to include 2 scaled quail, 4 mourning doves, 1 Lewis's woodpecker, 20 horned larks, 3 western meadowlarks, and 13 ui specimens (Aves). (Total birds 32.8%) Invertebrates to include 2 ui beetles (Coleoptera). (Total invertebrates 1.5%).
Voelker, unpublished R, C, P, Sp-Su Oklahoma	Mammals to include 7 rock squirrels. (Total mammals 8.4%) Birds to include 4 scaled quail, 25 mourning doves, 9 black-billed magpies, and 38 ui meadowlarks (<i>Sturnella</i> sp.). (Total birds 91.6%).
McKinley, unpublished R, P, Su Colorado	Mammals to include 36 thirteen-lined ground squirrels, 11 Richardson's ground squirrels. (Total mammals 55.3%) Birds to include 12 horned larks, 5 western meadowlarks, 5 mourning doves, 1 lark sparrow, 1 blue jay, 2 Brewer's blackbirds, 1 common nighthawk. (Total birds 44.7%).

Table 30. Peregrine Falcon (*Falco peregrinus*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Minimally mammals to include marmots, squirrels, mice, hares, and rabbits. Primarily birds to include grebes, petrels, small herons, ducks from mallards to teals, harriers, American kestrels, grouse, ptarmigan, pheasants, quail, poultry, rails, coots, plovers, killdeer, woodcock, snipe, sandpipers, gulls, terns, auklets, murrelets, rock doves, mourning doves, cuckoos, whip-poor-wills, night hawks, chimney swifts, kingfishers, flickers and other woodpeckers, kingbirds, phoebes, swallows, purple martins, jays, crows, nuthatches, catbirds, thrashers, robins, bluebirds, thrushes, starlings, warblers, bobolinks, meadowlarks, blackbirds, orioles, grackles, tanagers, grosbeaks, goldfinches, crossbills, juncos, and other sparrows. Rarely fish, dragonflies, and beetles.
Brown and Amadon 1968 G	Few small mammals to size of young rabbit. Mainly birds from small wild geese and ducks to finches. Grouse, rarely poultry; waders, small seabirds, and nestlings. Pigeons are favorites. Odd frog and even live fish and insects.
Snyder and Wiley 1976 G, M	Mammals (3.4%), birds (76.7%), vertebrates (80.2%), lower vertebrates (0%), invertebrates (19.8 %).
Fisher 1893 S, P, Y Eastern and Southwestern U.S.	Mammals to include 2 ui mice (Rodentia). (Total mammals 6.9%) Birds to include 1 cinnamon teal, 2 ui ducks (Anatidae), 1 Gambel's quail, 2 domestic chickens, 1 ui fowl (Galliformes), 2 mourning doves, 1 catbird, 1 crissal thrasher, 1 robin, 1 gray-cheeked thrush, 1 ui warbler (Parulidae), 1 ui meadowlark (<i>Sturnella</i> sp.), 1 ui sparrow (Passeriformes), and 7 ui specimens (Aves). (Total birds 79.3%) Invertebrates to include 2 ui dragonflies (Odonata) and 2 ui beetles (Coleoptera). (Total invertebrates 13.8%)
Errington 1933 R, P, Sp-Su Wisconsin	Birds to include 1 horned grebe, 1 green heron, 1 green-winged teal, 1 American kestrel, 4 domestic chickens, 1 killdeer, 1 black tern, 74 rock doves and mourning doves, 1 whip-poor-will, 1 ui nighthawk (<i>Chordeiles</i> sp.), 1 chimney swift, 3 common flickers, 1 red-headed woodpecker, 1 yellow-bellied sapsucker, 1

	hairy woodpecker, 1 purple martin, 10 blue jays, 2 robins, 1 ui bluebird (<i>Sialia</i> sp.), 1 bobolink, 1 ui meadowlark (<i>Sturnella</i> sp.), 2 red-winged blackbirds, and 7 ui small birds (<i>Aves</i>). (Total birds 100%).
Bond 1936 R, C, O, I, W California	Pellets or castings of the following numbers: Mammals to include 1 brush rabbit. Birds to include 13 eared grebes (probably), 1 ruddy duck, 11 American coots, 1 killeer, and 1 of ui yellowlegs (<i>Tringa</i> sp.) (Percentages not applicable.)
Cade, White, and Haugh 1968 R, P, Sp-Su	Mammals to include 5 dusky shrews, 1 arctic ground squirrel, 8 ui voles (<i>Cricetidae</i>), 2 ui redback voles (<i>Clethrionomys</i> sp.), and 3 snowshoe hares. (Total mammals 5.8%). Birds to include 2 red-necked grebes, 3 horned grebes, 1 black brant, 8 pintails, 16 green-winged teals, 2 blue-winged teals, 2 ui teal (<i>Anas</i> sp.), 2 American widgeons, 7 shovelers, 1 canvasback, 4 ui scaup (<i>Aythya</i> sp.), 1 harlequin duck, 1 white-winged scoter, 3 surf scoters, 21 ui ducks (<i>Anatidae</i>), 1 American kestrel, 2 spruce grouse, 1 ruffed grouse, 40 common snipes, 33 spotted sandpipers, 1 upland plover, 32 lesser yellowlegs, 9 solitary sandpipers, 1 pectoral sandpiper, 2 semipalmated sandpipers, 4 northern phalaropes, 10 ui shorebirds (<i>Charadriiformes</i>), 14 mew gulls, 7 Bonaparte's gulls, 1 Sabine's gull, 1 arctic tern, 4 ui larids (<i>Laridae</i>), 1 hawk-owl, 1 boreal owl, 24 common flickers, 2 ui woodpeckers (<i>Picidae</i>), 8 ui flycatchers (<i>Empidonax</i> sp.), 1 olive-sided flycatcher, 1 Say's phoebe, 2 bank swallow, 1 cliff swallow, 87 gray jays, 1 black-capped chickadee, 1 boreal chickadee, 17 robins, 26 varied thrushes, 1 hermit thrush, 3 Swainson's thrushes, 23 ui thrushes (<i>Catharus</i> sp.), 1 Townsend's solitaire, 12 Bohemian waxwings, 2 orange-crowned warblers, 3 yellow warblers, 2 ui warblers (<i>Parulidae</i>), 8 rusty blackbirds, 1 ui redpoll (<i>Carduelis</i> sp.), 2 pine grosbeaks, 5 white-winged crossbills, 8 dark-eyed juncos, 17 fox sparrows, 2 white-crowned sparrows, and 13 ui passerines (<i>Passeriformes</i>). (Total birds 94.2%).
Cade 1960 R, P, Sp-Su Alaskan Tundra	Mammals to include 2 arctic ground squirrels and 3 ui voles (<i>Cricetidae</i>). (Total mammals 4.2%). Birds to include 5 pintails, 1 oldsquaw, 19 ui ptarmigan (<i>Lagopus</i> spp.), 7 common snipes, 2 pectoral sandpipers, 3 American golden plovers, 1 black-bellied plover, 6 semipalmated sandpipers, 2 northern

phalaropes, 9 red phalaropes, 6 ui sandpipers (Scolopacidae), 1 parasitic jaeger, 1 long-tailed jaeger, 2 robins, 3 gray-cheeked thrushes, 1 arctic warbler, 2 yellow wagtails, 7 tree sparrows, 4 fox sparrows, 30 Lapland longspurs, and 2 ui passerines (Passeriformes). (Total birds 95.8%.)

White and Cade 1971
R, P, Sp-Su
Colville River

Mammals to include 1 arctic ground squirrel, 1 tundra vole, 2 ui microtines (Microtinae). (Total mammals .9%.)

Birds to include 1 young arctic loon, 4 Canada geese goslings, 3 pintails, 2 green-winged teals, 1 American widgeon, 2 greater scaups, 4 red-breasted mergansers, 1 ui scoter (*Melanitta* sp.), 3 ui ducks (Anatidae), 4 rough-legged hawks, 2 peregrine falcons, 14 ui ptarmigan (*Lagopus* sp.), 9 semipalmated plovers, 30 American golden plovers, 37 common snipes, 3 spotted sandpipers, 2 lesser yellowlegs, 4 pectoral sandpipers, 9 long-billed dowitchers, 1 semipalmated sandpiper, 1 bar-tailed godwit, 12 northern phalaropes, 18 ui shorebirds (*Charadriiformes*), 42 parasitic jaegers, 9 long-tailed jaegers, 1 pomarine jaeger, 17 ui jaegers (*Stercorarius* sp.), 2 Sabine's gulls, 3 ui gulls (Laridae), 2 arctic terns, 7 short-eared owls, 3 Say's phoebes, 2 gray jays, 20 gray-cheeked thrushes, 1 blue-throat, 6 arctic warblers, 34 yellow wagtails, 1 water pipit, 2 northern shrikes, 4 yellow warblers, 2 ui redpolls (*Carduelis* sp.), 22 tree sparrows, 4 white-crowned sparrows, 20 fox sparrows, 22 Lapland longspurs, 40 ui passerines (Passeriformes) (Total birds 99.1%.)

Porter and White 1973
R, C, P, Su
Utah marshes

Mammals to include 1 big brown bat and 2 ui bats (Chiroptera). (Total mammals 2.8%.)

Birds to include 3 ui young ducks (Anatidae), 2 killdeer, 10 willets, 3 greater yellowlegs, 2 long-billed dowitchers, 22 American avocets, 1 black-necked stilt, 6 Wilson's phalaropes, 1 Franklin's gull, 13 mourning doves, 5 rock doves, 8 common flickers, 1 scrub jay, 2 robins, 2 Bohemian waxwings, 9 western meadowlarks, 4 red-winged blackbirds, 3 Brewer's blackbirds, 5 ui blackbirds (Icteridae), and 2 green-tailed towhees. (Total birds 97.2%.)

Porter and White 1973
R, C, P, Su
Utah deserts

Birds to include 1 Chukar, 1 American coot, 2 mourning doves, 1 common nighthawk, 2 ash-throated flycatchers, 1 Say's phoebe, 3 horned larks, 1 pinyon jay, 1 western meadowlark, 3 yellow-headed blackbirds, 2

	red-winged blackbirds, and 1 lark sparrow. (Total birds 100%.)
White, Emison, and Williamson 1973 R, O, P, Y Alaskan Aleutian Islands	Mammals to include 5 Norway Rats. (Total mammals 0.91%.) Birds to include 1 scaled petrel, 19 fork-tailed petrels, 20 Leach's petrels, 2 ui petrels (<i>Oceanodroma</i> sp.), 3 mallards, 1 pintail, 28 common teals, 1 common goldeneye, 1 harlequin duck, 1 red-breasted merganser, 22 rock ptarmigan, 2 American golden plover, 1 ruddy turnstone, 1 wandering tattler, 1 wood sandpiper, 8 rock sandpipers, 4 red phalaropes, 1 black-headed gull, 2 black-legged kittiwake, 12 arctic terns, 7 Aleutian terns, 2 pigeon guillemots, 2 horned puffins, 2 tufted puffins, 85 ancient murrelets, 17 parakeet auklets, 131 crested auklets, 105 least auklets, 7 whiskered auklets, 32 ui auklets (<i>Aethia</i> sp.), 7 gray-crowned rosy finches, 13 Lapland longspurs and 7 snow buntings. (99.1%)
Enderson and Craig 1974 R, O, P Rocky Mountains	Birds to include rocks dove, mourning doves, white-throated swifts, pinyon jays, Clark's nutcracker, Brewer's blackbirds, and other ui small birds (Aves). (Percentages not applicable.)
Hunt, Rogers, and Slowe 1975 R, O, P, F Texas	Mammals to include 2 ui specimens (Mammalia). (Total mammals 2.2%.) Birds to include 2 snowy egrets, 1 cattle egret, 2 green herons, 1 black-crowned night heron, 4 shovellers, 1 green-winged teal, 1 redhead, 1 lesser scaup, 1 ui duck (Anatidae), 1 American kestrel, 1 king rail, 1 American coot, 1 American golden plover, 3 willets, 1 herring gull, 1 ring-billed gull, 1 laughing gull, 2 ui gulls (<i>Larus</i> spp.), 2 royal terns, 7 ui small shorebirds (see reference), 1 rock dove, 1 white-winged dove, 12 mourning doves, 2 common flickers, 2 horned larks, 1 gray catbird, 4 eastern meadowlarks, 1 rusty blackbird, 1 great-tailed grackle, 4 brown-headed cowbirds, 11 ui sparrows (Passeriformes), and 12 ui passerines (Passeriformes). (Total birds 97.8%.)

Table 31. Merlin (*Falco columbarius*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Few mammals to include bats, squirrels, pocket gophers and mice. Mainly birds to include Leach's petrel, green-winged teal, ptarmigan, California quail, small domestic

chickens, woodcock, snipe, plovers, Eskimo curlews, sandpipers, pigeons, doves, black swifts, chimney swifts, flickers, swallows, jays, nuthatches, brown creepers, robins, thrushes, gnatcatchers, waxwings, vireos, kinglets, pipits, warblers, bobolinks, meadowlarks, blackbirds, grackles, and various sparrows. Lizards, snakes, toads, dragonflies, grasshoppers, crickets, butterflies, moths, caterpillars, beetles, crayfish, spiders, and scorpions.

Brown and Amadon 1968
G

Some small mammals even up to size of small rabbits. Chiefly small birds, especially those of ground or low vegetation. Rarely larger birds such as teal or ptarmigan. Some smaller waders. More often larks, pipits, and small finches. Few small lizards, snakes, toads, frogs, dragonflies, and other insects.

Fox 1964
M, P, W, F, D

Birds to include spotted sandpiper, common flicker, horned lark, starling, western meadowlark, red-winged blackbird, house sparrow, house finch, ui goldfinch (*Carduelis* sp.), dickcissel, Savannah sparrow, tree sparrow, Lincoln's sparrow, and snow bunting. Invertebrates to include ui grasshoppers (Orthoptera), ui crickets (Orthoptera), ui caterpillars (Insecta), and ui beetles (Coleoptera).

Snyder and Wiley 1976
G, M

Mammals (.5%), birds (25.2%), vertebrates (25.9), lower vertebrates (.2%), and invertebrates (74.1%).

Fisher 1893
S, P, Y, D

Mammals to include 4 ui voles (Cricetidae). (Total mammals 3.4%.)
Birds to include 1 young domestic chicken, 1 ui poultry (Galliformes), 1 rock dove, 1 ui swift (Apodidae), 1 common flicker, 1 ui swallow (Hirundinidae), 1 brown creeper, 1 ui thrush (Muscicapidae), 3 red-eyed vireos, 1 ui vireo (Vireonidae), 4 ui warblers (Parulidae), 7 house sparrows, 1 bobolink, 1 indigo bunting, 2 ui goldfinches (*Carduelis* sp.), 3 chipping sparrows, 1 field sparrow, 3 swamp sparrows, 2 song sparrows, 1 snow bunting, 10 ui sparrows (Passeriformes), and 14 ui birds (Aves). (Total birds 43.2%.)
Invertebrates to include 19 ui dragonflies (Odonata), 8 ui grasshoppers (Orthoptera), 25 ui crickets (Orthoptera), 1 ui caterpillar (Insecta), 6 ui beetles (Coleoptera), and 4 ui insects (Insecta). (Total invertebrates 53.4%.)

McLean 1928 S, P, W California	Birds to include 1 common flicker, 1 scrub jay, 4 robins, 4 ui pipits (<i>Motacillidae</i>), 1 ui bird (probably Audubon's warbler, 1 ui meadowlark (<i>Sturnella</i> sp.), and 2 ui juncos (<i>Junco</i> sp.). (Total birds 100%).
Breckenridge and Errington 1938 C, O, S, Sp-Su Minnesota	Birds to include common flickers, ui small flycatcher (probably <i>Empidonax</i> sp.), tree swallows, ui thrushes (<i>Muscicapidae</i>), house sparrows, and ui finches (<i>Passeriformes</i>). Invertebrates to include ui dragonflies (<i>Odonata</i>).
Fox 1964 R, I, Sp-Su Saskatchewan	Birds to include horned lark 53.5%, brown-headed cowbird 13.3%, Baird's sparrow 6.2%, vesper sparrow 6.7%, song sparrow 6.7%, chestnut-collared longspur 13.6%. (Total birds 100%). Also starling, red-winged blackbird, ui fringillid sparrows (<i>Passeriformes</i>), and ui dragonflies (<i>Odonata</i>).
Johnson and Coble 1967 R, C, I, Su Michigan	Mammals to include 1 ui bat (<i>Myotis</i> sp.), and 1 red bat. (Total mammals 6.7%). Birds to include 2 ui rails (<i>Rallidae</i>), 1 common nighthawk, 2 common flickers, 3 ui woodpeckers (<i>Picidae</i>), 1 red-breasted nuthatch, 1 yellowthroat, 1 ui warbler (<i>Parulidae</i>), 1 red crossbill, and 1 ui sparrow (<i>Passeriformes</i>). (Total birds 43.3%). Invertebrates to include 15 ui dragonflies (<i>Odonata</i>). (Total invertebrates 50%).
Oliphant and McTaggart 1977 R, O, P, Su Saskatchewan	Birds to include 1 ui flycatcher (<i>Empidonax</i> sp.), 10 horned larks, 2 tree swallows, 6 robins, 1 hermit thrush, 2 Swainson's thrushes, 2 ruby-crowned kinglets, 7 Bohemian waxwings, 4 cedar waxwings, 2 red-eyed vireos, 112 house sparrows, 1 western meadowlark, 1 Savannah sparrow, 3 slate-colored juncos, 1 white-throated sparrow, 1 Lincoln's sparrow, 2 song sparrows, 2 chesnut-collared longspurs, 2 lapland longspurs and 14 ui specimens (<i>Aves</i>). (Total birds 100%).

Table 32. American Kestrel (Sparrow Hawk) (*Falco sparverius*) Diet.

Reference/Methods Information	Food
Bent 1937 G	Mammals to include small bats, white-footed mice, and other mice. Birds such as domestic chicks, nesting swallows, young robins, and house sparrows. Reptiles such as small snakes and amphibians. Insects to include grasshoppers, crickets, Jerusalem

	crickets, and ants.
Brown and Amadon 1968 G	Mice and small birds including sandpiper chicks. Reptiles including lizards and amphibians. Mostly insects, especially grasshoppers. Also scorpions.
Heintzelman 1964 G, M	Mammals to include big brown bats, Brazilian free-tailed bat, short-tailed shrews, ui shrews (<i>Soricidae</i>), thirteen-lined ground squirrels, ui gophers (<i>Geomysidae</i>), deer mice, white-footed mice, ui cotton rats (<i>Sigmodon</i> sp.), ui woodrats (<i>Neotoma</i> sp.), meadow voles, prairie voles, ui voles (<i>Microtus</i> sp.), ui voles (<i>Cricetidae</i>), house mice, meadow jumping mice, and ui rabbit (<i>Leporidae</i>). Birds to include ground doves, horned larks, cliff swallows, winter wrens, Carolina wrens, robins, eastern bluebird, ui vireo (<i>Vireonidae</i>), hermit warblers, ui warblers (<i>Parulidae</i>), English sparrows, eastern meadowlarks, ui meadowlarks (<i>Stumella</i> sp.), red-winged blackbird, common grackle, brown-headed cowbird, ui blackbirds (<i>Icteridae</i>), cardinals, grasshopper sparrows, vesper sparrows, ui juncos (<i>Junco</i> sp.), tree sparrows, chipping sparrows, field sparrows, ui sparrows (<i>Spizella</i> sp.), Gambel's sparrow, song sparrows, and ui sparrows (<i>Zonotrichia</i> sp.). Reptiles to include ui anoles (<i>Anolis</i> sp.), six-lined racerunner, and five-lined skinks. Invertebrates to include ui aeshnic dragonflies (<i>Libellulidae</i>), ui Libellulid dragonflies (<i>Libellulidae</i>), lesser migratory grasshoppers, grasshoppers, ui crickets (<i>Gryllus</i> sp.), Jerusalem crickets, periodical cicada, ui bugs (<i>Hemiptera</i>), acraea moths, ui lepidopterans (<i>Lepidoptera</i>), ui fly larvae (<i>Diptera</i>), ui ground beetles (<i>Carabidae</i>), ui click beetles (<i>Elateridae</i>), ui beetles (<i>Coleoptera</i>), and ui ants (<i>Hymenoptera</i>). Other to include bread.
Snyder and Wiley 1976 G, M	Mammals (2.4%), birds (1.2%), vertebrates (4.3%), lower vertebrates (.7%) and invertebrates (95.7%).
Fisher 1893 S, P, Y, D	Mammals to include 1 ui bat (<i>Chiroptera</i>), 7 short-tailed shrews, 4 ui shrews (<i>Soricidae</i>), 2 ui gophers (<i>Rodentia</i>), 5 white-footed mice, 1 ui cotton rat (<i>Sigmodon</i> sp.), 42 ui voles (<i>Cricetidae</i>), 24 house mice, 37 ui mice (<i>Rodentia</i>), 1 ui rabbit (<i>Leporidae</i>), and 1 ui specimen (<i>Mammalia</i>). (Total mammals 6.7%.) Birds to include 1 ui quail (<i>Phasianidae</i>), 1 ground dove, 1 Carolina wren, 1 ui vireo (<i>Vireonidae</i>), 4 ui warblers (<i>Parulidae</i>), 3 ui meadowlarks (<i>Stumella</i> sp.),

1 red-winged blackbird, 3 house sparrows, 1 vesper sparrow, 5 ui juncos (*Junco* sp.), 5 tree sparrows, 1 field sparrow, 7 song sparrows, 13 ui sparrows (Passeriformes), and 14 ui specimens (Aves). (Total birds 3.3%.)

Reptiles and amphibians to include 11 ui lizards (Lacertilia), 7 ui snakes (Serpentes), and 2 ui frogs (Anura). (Total reptiles and amphibians 1.1%.)

Other to include 1 specimen. (Total other .1%.)

Invertebrates to include 1 ui centipede (Chilopoda), 7 ui dragonflies (Odonata), 525 ui grasshoppers (Orthoptera), 351 ui crickets (Orthoptera), 8 ui locusts (Orthoptera), 14 ui katydids (Orthoptera), 1 ui moth (Lepidoptera), 1 ui butterfly (Lepidoptera), 54 lepidopterous larvae (Lepidoptera), 2 ui flies (Diptera), 2 ui dung beetles (Scarabaeidae), 8 ui dung beetle larvae (Scarabaeidae), 92 ui beetles (Coleoptera), 429 ui insects (Insecta), 99 ui insect larva (Insecta), 52 ui spiders (Araneae). (Total invertebrates 88.8%.)

Errington 1933
R, I, Sp-Su
Wisconsin

Mammals to include 10 ui young ground squirrels (Sciuridae), 4 ui voles (Cricetidae), and 7 deer mice.

Birds to include 5 house sparrows.

Invertebrates to include an incalculable number of ui grasshoppers (Orthoptera), ui June beetles (Melolonthinae), etc.

(Percentages not applicable.)

Knowlton and
Telford 1947
S, P, Su-F
Utah

Mammals to include 11 mice (Rodentia). (Total mammals 1%.)

Reptiles to include 1 sagebrush lizard. (Total reptiles .1%.)

Invertebrates to include 1 ui dragonfly (Odonata), 479 ui grasshoppers (Orthoptera), 291 crickets (Orthoptera), 169 ui Orthopterans (Orthoptera), 5 ui stink bugs (Pentatomidae), 4 ui bugs (Hemiptera), 23 Lepidopteran larvae (Lepidoptera), 1 ui crane fly (Tipulidae), 4 Dipteran larvae (Diptera), 10 ground beetles (Carabidae), 4 ui click beetles (Elateridae), 1 ui borer (Coleoptera), 8 June beetles (Melolonthinae), 41 ui beetles (Coleoptera) and 2 ui spiders (Araneae). (Total invertebrates 98.9%.)

Heintzelman 1964
R, C, P, Sp-Su
Pennsylvania

Mammals to include 1 short-tailed shrew, 14 meadow voles, 118 ui voles (*Microtus* sp.), and 2 meadow jumping mice. (Total mammals 54%.)

Birds to include 1 eastern meadowlark, 8 common grackles, 7 ui blackbirds (Icteridae), 3 brown-headed

cowbirds, 1 cardinal, 1 grasshopper sparrow, 2 ui finches (Fringillidae), and 12 ui passerines (Passeriformes). (Total birds 14%.)

Reptiles to include 1 five-lined skink. (Total reptiles .4%.)

Invertebrates to include 3 Libellulid dragonflies (Libellulidae), 6 short-horned grasshoppers (Acrididae), 11 periodical cicadas, 54 ui ground beetles (Carabidae), and 5 ui beetles (Coleoptera). (Total invertebrates 31.6%.)

Smith and Murphy 1973
R, C, P, Sp-Su
Utah

Mammals to include 25 deer mice and 5 ui voles (*Microtus* sp.). (Total mammals 27.3%.)

Birds to include 6 horned larks, 2 mountain bluebirds, 5 starlings, and 5 house sparrows. (Total birds 16.4%.)

Reptiles to include 4 side-blotched lizards and 1 desert horned lizard. (Total reptiles 4.5%.)

Invertebrates to include 42 ui short-horned grasshoppers (Acrididae), 2 ui beetles (Coleoptera), 11 ui snout weevils (Curculionidae), and 2 ui spiders (Araneae). (Total invertebrates 51.8%.)

Young and Blome 1975
R, P, Sp-Su
Ontario

Mammals to include 1 big brown bat, 1 eastern chipmunk, 1 least chipmunk, 1 red squirrel, 3 meadow voles, and 2 meadow jumping mice. (Total mammals 2.6%.)

Birds to include 2 American kestrel, 1 common snipe, 2 common flickers, 2 catbirds, 4 starlings, 1 yellow-throat, 1 red-winged blackbird, 6 common grackles, 15 brown-headed cowbirds, 1 swamp sparrow, and 36 ui specimens (Aves). (Total birds 20.5%.)

Reptiles and amphibians to include 1 eastern garter snake, and 1 ui leopard frog. (Total reptiles and amphibians .6%.)

Invertebrates to include 18 ui dragonflies (Corduliidae), 68 red-legged grasshoppers, 1 band-winged grasshopper, 15 ui crickets (Gryllidae), 12 ui cicadas (Cicadidae), 5 ui tiger beetles (Cicindelidae), 107 ui ground beetles (Carabidae), 2 ui click beetles (Elatecidae), 2 ui metallic wood-boring beetles (Buprestidae), 1 ui ladybird beetle (Coccinellidae), 1 ui darkling beetle (Tenebrionidae), 5 ui scarab beetles (Scarabaeidae), 13 ui June beetles (*Phyllophaga* sp.), 1 poplar borer, 5 ui long-horned beetles (Cerambycidae), 6 ui small beetles (Coleoptera), 1 ui spider (Araneae), and 1 ui snail (Gastropoda). (Total invertebrates 76.3%.)

Table 33. Aplomado Falcon (*Falco femoralis*) Diet.

Reference/Methods Information	Food
Fisher 1893 G	Mammals, small birds, and insects.
Bent 1937	Mammals to include mice and other rodents. Occasionally birds such as quail, ground doves, horned larks, lark buntings and lark sparrows. Small reptiles and insects of various kinds such as dragonflies, grasshoppers, and crickets.
Brown and Amadon 1968 G	Few small mammals and lizards. Chiefly birds and large insects.
Hector and Langford, unpublished R, O, P Mexico	Birds to include 1 killdeer, 6 white-winged doves, 28 mourning doves, 6 ground doves, 1 red-billed pigeon, 7 yellow-billed cuckoos, 3 squirrel cuckoos, 19 groove-billed anis, 2 ui caprimulgids (Caprimulgidae), 1 green kingfisher, 8 ui woodpeckers (Picidae), 2 great kiskadees, 3 ui flycatchers (Tyrannidae), 2 ui wrens (Troglodytidae), 2 robins, 1 Swainson's thrush, 6 ui meadowlarks (<i>Sturnella</i> sp.), 3 melodious black- birds, 2 bronzed cowbirds, 1 giant cowbird, 10 great- tailed grackles, 2 ui orioles (Icteridae) 1 indigo bun- ting, 2 Aztec parakeets, and 22 ui specimens (Aves). Also a high percentage of insects to include ui locusts (Acrididae), ui butterflies (Lepidoptera), and ui bee- tles (Coleoptera). (Percentages not applicable.)

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Appendix I

MAMMALS

Abert's Squirrel
Sciurus aberti
Arctic Ground Squirrel
Spermophilus parryii
Arctic Hare
Lepus arcticus

Armadillo (Nine banded)
Dasypus novemcinctus
Arizona Gray Squirrel
Sciurus arizonensis

Badger
Taxidea taxus
Beaver
Castor canadensis
Belding's Ground Squirrel
Spermophilus beldingi

Belding's Ground Squirrel <i>Spermophilus beldingi</i>	Dusky Shrew <i>Sorex obscurus</i>	Long-tailed Pocket Mouse <i>Perognathus formosus</i>
Big Brown Bat <i>Eptesicus fuscus</i>	Dwarf Elk <i>Cervus nannodes</i>	Long-tailed Vole <i>Microtus longicaudus</i>
Black-tailed Jackrabbit <i>Lepus californicus</i>	Eastern Chipmunk <i>Tamias striatus</i>	Long-tailed Weasel <i>Mustela frenata</i>
Black-tailed Prairie Dog <i>Cynomys ludovicianus</i>	Eastern Cottontail <i>Sylvilagus floridanus</i>	Meadow Jumping Mouse <i>Zapus hudsonius</i>
Bobcat <i>Felis rufus</i>	Eastern Gray Squirrel <i>Sciurus carolinensis</i>	Meadow Vole <i>Microtus pennsylvanicus</i>
Botta's Pocket Gopher <i>Thomomys bottae</i>	Eastern Hog-nosed Skunk <i>Conepatus leuconotus</i>	Merriam's Chipmunk <i>Eutamias merriami</i>
Brazilian Free-tailed Bat <i>Tadarida brasiliensis</i>	Eastern Mole <i>Scalopus aquaticus</i>	Mexican Woodrat <i>Neotoma mexicana</i>
Broad-footed Mole <i>Scapanus latimanus</i>	Eastern Woodrat <i>Neotoma floridana</i>	Mink <i>Mustela vison</i>
Brown Lemming <i>Lemus sibiricus</i>	Ermine <i>Mustela erminea</i>	Montane Vole <i>Microtus montanus</i>
Brush Mouse <i>Peromyscus boylii</i>	Fox Squirrel <i>Sciurus niger</i>	Mountain Sheep <i>Ovis canadensis</i>
Brush Rabbit <i>Sylvilagus bachmani</i>	Franklin's Ground Squirrel <i>Spermophilus franklinii</i>	Mule Deer <i>Odocoileus hemionus</i>
Bushy-tailed Woodrat <i>Neotoma cinerea</i>		Muskrat <i>Ondatra zibethicus</i>
California Ground Squirrel <i>Spermophilus beecheyi</i>	Golden-mantled Ground Squirrel <i>Spermophilus lateralis</i>	Northern Grasshopper Mouse <i>Onychomys leucogaster</i>
California Pocket Mouse <i>Perognathus californicus</i>	Gray Fox <i>Urocyon cynereoargenteus</i>	Northern Pocket Gopher <i>Thomomys talpoides</i>
California Vole <i>Microtus californicus</i>	Great Basin Pocket Mouse <i>Perognathus parvus</i>	Northern Red-backed Vole <i>Clethrionomys rutilus</i>
Caribou <i>Rangifer tarandrus</i>	Ground Squirrel <i>Spermophilus columbianus</i>	Norway Rat <i>Rattus norvegicus</i>
Chisel-toothed Kangaroo Rat <i>Dipodomys microps</i>	Gunnison's Prairie Dog <i>Cynomys gunnisoni</i>	Nuttall's Cottontail <i>Sylvilagus nuttalli</i>
Collared Lemming <i>Dicrostonyx torquatus</i>		Ord's Kangaroo Rat <i>Dipodomys ordii</i>
Coyote <i>Canis latrans</i>	Hairy-tailed Mole <i>Parascalops breweri</i>	Peccary <i>Tayassii pecari</i>
Dall's Sheep <i>Ovis dalli</i>	Harris' Antelope Squirrel <i>Ammospermophilus harrisi</i>	Pika <i>Ochotona princeps</i>
Deer Mouse <i>Peromyscus maniculatus</i>	Heerman's Kangaroo Rat <i>Dipodomys heermanni</i>	Pinon Mouse <i>Peromyscus truei</i>
Desert Cottontail <i>Sylvilagus audubonii</i>	Hispid Cotton Rat <i>Sigmodon hispidus</i>	Plains Harvest Mouse <i>Reithrodontomys montanus</i>
Desert Woodrat <i>Neotoma lepida</i>	Hoary Marmot <i>Marmota caligata</i>	Plains Pocket Gopher <i>Geomys bursarius</i>
Domestic Pig <i>Sus scrofa</i>	House Mouse <i>Mus musculus</i>	Porcupine <i>Erethizon dorsatum</i>
Domestic Cat <i>Felis domesticus</i>	Kit Fox <i>Vulpes macrotis</i>	Prairie Vole <i>Microtus ochrogaster</i>
Domestic Cattle <i>Bos taurus</i>	Least Chipmunk <i>Eutamias minimus</i>	Pronghorn <i>Antilocapra americana</i>
Douglas Squirrel <i>Tamiasciurus douglasii</i>	Last Weasel <i>Mustela nivalis</i>	
Dusky-footed Woodrat <i>Neotoma fuscipes</i>		

- Raccoon
Procyon lotor
- Red Bat
Lasiurus borealis
- Red Squirrel
Tamiasciurus hudsonicus
- Richardson's Ground Squirrel
Spermophilus richardsonii
- Ringtail
Bassariscus astutus
- Rock Squirrel
Spermophilus variegatus
- Round-tailed Ground Squirrel
Spermophilus tereticaudus
- Sagebrush Vole
Lagurus curtatus
- Sea Otter
Enhydra lutris
- Sheep
Ovis aries
- Short-tailed Shrew
Blarina brevicauda
- Snowshoe Hare
Lepus americanus
- Southern Bog Lemming
Synaptomys cooperi
- Southern Flying Squirrel
Glaucomyx volans
- Southern Plains Woodrat
Neotoma micropus
- Southern Red-backed Vole
Clethrionomys gapperi
- Spotted Ground Squirrel
Spermophilus spilosoma
- Star-nosed Mole
Condylura cristata
- Striped Skunk
Mephitis mephitis
- Texas Antelope Squirrel
Ammospermophilus interpres
- Thirteen-lined Ground Squirrel
Spermophilus tridecemlineatus
- Townsend's Ground Squirrel
Spermophilus townsendii
- Townsend's Pocket Gopher
Thomomys townsendii
- Tundra Vole
Microtus oeconomus
- Uinta Ground Squirrel
Spermophilus armatus
- Virginia Opossum
Didelphis virginiana
- Western Gray Squirrel
Sciurus griseus
- Western Harvest Mouse
Reithrodontomys megalotis
- Western Jumping Mouse
Zapus princeps
- White-footed Mouse
Peromyscus leucopus
- White-tailed Antelope squirrel
Ammospermophilus leucurus
- White-tailed Deer
Odocoileus virginianus
- White-tailed Jackrabbit
Lepus townsendii
- White-tailed Prairie Dog
Cynomys leucurus
- White-throated Woodrat
Neotoma albigula
- Woodchuck
Marmota monax
- Woodland Vole
Microtus pinetorum
- Yellow-bellied Marmot
Marmota flaviventris
- Yellow-faced Pocket Gopher
Pappogeomys castanops
- BIRDS**
- Abert's Towhee
Pipilo aberti
- Acorn Woodpecker
Melanerpes formicivorus
- Aleutian Tern
Sterna aleutica
- American Avocet
Recurvirostra americana
- American Coot
Fulica americana
- American Golden Plover
Pluvialis dominica
- American Goldfinch
Carduelis tristis
- American Kestrel
Falco sparverius
- American Redstart
Septophaga ruticilla
- American Widgeon
Anas americana
- American Woodcock
Scolopax minor
- Ancient Murrelet
Synthliboramphus antiquus
- Arctic Loon
Gavia arctica
- Arctic Tern
Sterna paradisaea
- Arctic Warbler
Phylloscopus borealis
- Ash-throated Flycatcher
Myiarchus cinerascens
- Audubon's Warbler
Dendroica auduboni
- Aztec Parakeet
Aratinga astec
- Bachman's Sparrow
Aimophila aestivalis
- Baird's Sparrow
Ammodramus bairdii
- Bald Eagle
Haliaeetus leucocephalus
- Baltimore Oriole
Icterus galbula
- Bank Swallow
Riparia riparia
- Barn Owl
Tyto alba
- Barn Swallow
Hirundo rustica
- Bar-tailed Godwit
Limosa lapponica
- Bendire's Thrasher
Toxostoma bendirei
- Black-bellied Plover
Pluvialis squatarola
- Black-billed Magpie
Pica pica
- Black Brant
Branta bernicla
- Black-crowned Night Heron
Nycticorax nycticorax
- Black Duck
Anas rubripes
- Black-headed Grosbeak
Phaeocephalus melanocephalus
- Black-headed Gull
Larus ridibundus
- Black-legged Kittiwake
Larus tridactylus
- Black-necked Stilt
Himantopus mexicanus
- Black-poll Warbler
Dendroica striata
- Black Tern
Chlidonias niger
- Black-whiskered Vireo
Vireo altiloquus
- Blue-gray Gnatcatcher
Poliotilia caerulea
- Blue Grouse
Dendragapus obscurus

- Blue Jay
Cyanocitta cristata
 Blue Throat
Erithacus vesticus
 Blue-winged Teal
Anas discors
 Bobolink
Dolichonyx oryzivorus
 Bobwhite
Colinus virginianus
 Bohemian Waxwing
Bombycilla garrulus
 Bonaparte's Gull
Larus philadelphia
 Boreal Chickadee
Parus hudsonicus
 Boreal Owl
Aegolius funereus
 Brewers Blackbird
Euphagus cyanocephalus
 Bronzed Cowbird
Molothrus aeneus
 Brown Creeper
Certhia familiaris
 Brown-headed Cowbird
Molothrus ater
 Brown Thrasher
Toxostoma rufum
 Brown Towhee
Pipilo fuscus
 Bullock's Oriole
Icterus galbula
 Burrowing Owl
Athene cunicularia

 Cactus Wren
Campylorhynchus brunneicapillus
 California Quail
Lophortyx californicus
 California Thrasher
Toxostoma redivivum
 Canada Goose
Branta canadensis
 Canvasback
Aythya valisineria
 Canyon Wren
Salpinctes mexicanus
 Cardinal
Cardinalis cardinalis
 Carolina Wren
Thryothorus ludovicianus
 Cassin's Kingbird
Tyrannus vociferans
 Catbird
Dumetella carolinensis
 Cattle Egret
Bulbulcus ibis

 Cedar Waxwing
Bombycilla cedrorum
 Chesnut-collared Longspur
Calcarius ornatus
 Chimney Swift
Chaetura pelagica
 Chipping Sparrow
Spizella passerina
 Chukar
Alectoris chukar
 Cinnamon Teal
Anas cyanoptera
 Clapper Rail
Rallus longirostris
 Clark's Nutcracker
Nucifraga columbiana
 Cliff Swallow
Hirundo pyrrhonota
 Common Bush-tit
Psaltriparus minimus
 Common Crow
Corvus brachyrhynchos
 Common Eider
Somateria mollissima
 Common Flicker
Colaptes auratus
 Common Goldeneye
Bucephala clangula
 Common Grackle
Quiscalus quiscula
 Common Murre
Uria aalge
 Common Nighthawk
Chordeiles minor
 Common Raven
Corvus corax
 Common Snipe
Gallinago gallinago
 Common Teal
Anas crecca
 Cooper's Hawk
Accipiter cooperi
 Crested Auklet
Aethia cristatella
 Crissal Thrasher
Toxostoma dorsale
 Curve-billed Thrasher
Toxostoma curvirostre

 Dark-eyed Junco
Junco hyemalis
 Dickcissel
Spiza americana
 Domestic Chicken
Gallus gallus
 Downy Woodpecker
Picoides pubescens

 Dunlin
Calidris alpina

 Eared Grebe
Podiceps caspicus
 Eastern Bluebird
Sialia sialis
 Eastern Kingbird
Tyrannus tyrannus
 Eastern Meadowlark
Sturnella magna
 Emperor Goose
Anser canagica

 Field Sparrow
Spizella pusilla
 Fork-tailed Petrel
Oceanodroma furcata
 Forster's Tern
Sterna forsteri
 Fox Sparrow
Zonotrichia iliaca
 Franklin's Gull
Larus pipixcan

 Gambel's Quail
Lophortyx gambelii
 Gambel's Sparrow
Zonotrichia leucophrys gambelii
 Gilded Flicker
Colaptes auratus chrysoides
 Giant Cowbird
Scaphidura oryzivora
 Glaucous-winged Gull
Larus glaucescens
 Grasshopper Sparrow
Ammodramus sacannarum
 Gray Catbird
Dumetella carolinensis
 Gray-cheeked Thrush
Catharus minima
 Gray-crowned Rosy Finch
Leucosticte arctoa
 Gray Jay
Perisoreus canadensis
 Gray Partridge
Perdix perdix
 Great Blue Heron
Ardea herodias
 Greater Scaup
Aythya marila
 Greater Yellowlegs
Tringa melanoleucus
 Great Horned Owl
Bubo virginianus
 Great Kiskadee
Pitangus sulphuratus

Great-tailed Grackle <i>Quiscalus mexicanus</i>	Kentucky Warbler <i>Geothlypis formosus</i>	Mountain Quail <i>Oreortyx pictus</i>
Green Heron <i>Butorides striatus</i>	Killdeer <i>Charadrius vociferus</i>	Mourning Dove <i>Zenaida macroura</i>
Green Kingfisher <i>Chloroceryle americana</i>	King Rail <i>Rallus elegans</i>	Northern Fulmar <i>Fulmarus glacialis</i>
Green-tailed Towhee <i>Pipilo chlorura</i>	Lapland Longspur <i>Calcarius lapponicus</i>	Northern Phalarope <i>Lobipes lobatus</i>
Green-winged Teal <i>Anas crecca</i>	Lark Bunting <i>Calamospiza melanocorys</i>	Northern Shrike <i>Lanius excubitor</i>
Ground Dove <i>Columbina passerina</i>	Lark Sparrow <i>Chondestes grammacus</i>	Oldsquaw <i>Clangula hyemalis</i>
Groove-billed Ani <i>Crotophaga sulcirostris</i>	Laughing Gull <i>Larus atricilla</i>	Olive-sided Flycatcher <i>Contopus borealis</i>
Guinea Fowl <i>Numida meleagris</i>	Least Auklet <i>Aethia pusilla</i>	Orange-crowned Warbler <i>Vermicora celata</i>
Hairy Woodpecker <i>Picoides villosus</i>	LeConte's Sparrow <i>Ammodramus leconteii</i>	Ovenbird <i>Seiurus aurocapillus</i>
Harlequin Duck <i>Histrionicus histrionicus</i>	Leach's Petrel <i>Oceanodroma leucorhoa</i>	Parakeet Auklet <i>Cyclorhynchus psittacula</i>
Harlequin Quail <i>Cyrtonyx montezumae</i>	Lesser Scaup <i>Aythya affinis</i>	Parasitic Jaeger <i>Stercorarius parasiticus</i>
Harrier <i>Circus cyaneus</i>	Lesser Yellowlegs <i>Tringa flavipes</i>	Pectoral Sandpiper <i>Calidris melanotos</i>
Hawk Owl <i>Surnia ulula</i>	Lewis' Woodpecker <i>Melanerpes lewis</i>	Pelagic Cormorant <i>Phalacrocorax pelagicus</i>
Hermit Thrush <i>Catharus guttatus</i>	Lincoln's Sparrow <i>Zonotrichia lincolni</i>	Peregrine Falcon <i>Falco peregrinus</i>
Hermit Warbler <i>Dendroica occidentalis</i>	Loggerhead Shrike <i>Lanius ludovicianus</i>	Pied-billed Grebe <i>Podilymbus podiceps</i>
Herring Gull <i>Larus argentatus</i>	Long-billed Curlew <i>Numenius americanus</i>	Pigeon Guillemot <i>Cepphus columba</i>
Hooded Warbler <i>Wilsonia citrina</i>	Long-billed Dowitcher <i>Limnodromus scolopaceus</i>	Pileated Woodpecker <i>Dryocopus pileatus</i>
Horned Grebe <i>Podiceps auritus</i>	Long-billed Marsh Wren <i>Cistothorus palustris</i>	Pine Grosbeak <i>Pinicola enucleator</i>
Horned Lark <i>Eremophila alpestris</i>	Long-eared Owl <i>Asio otus</i>	Pine Warbler <i>Dendroica pinus</i>
Horned Puffin <i>Fratercula corniculata</i>	Long-tailed Jaeger <i>Stercorarius longicaudus</i>	Pinyon Jay <i>Gymnorhinus cyanocephalus</i>
House Finch <i>Carpodacus mexicanus</i>	Mallard <i>Anas platyrhynchos</i>	Pintail <i>Anas acuta</i>
House Sparrow <i>Passer domesticus</i>	Marsh Hawk (See Harrier) <i>Circus cyaneus</i>	Pomarine Jaeger <i>Stercorarius pomarinus</i>
House Wren <i>Troglodytes aedon</i>	McCown's Longspur <i>Calcarius mcconni</i>	Poor-Will <i>Phalaenoptilus nuttalli</i>
Hudsonian Godwit <i>Limosa haemastica</i>	Melodius Blackbird <i>Dices dives</i>	Prairie Falcon <i>Falco mexicanus</i>
Indigo Bunting <i>Passerina cyanea</i>	Mew Gull <i>Larus canus</i>	Purple Martin <i>Progne subis</i>
Jacana <i>Jacana spinosa</i>	Mockingbird <i>Mimus polyglottos</i>	Red-bellied Woodpecker <i>Melanerpes carolinus</i>

- Red-billed Pigeon
Columba flavirostris
- Red-breasted Merganser
Mergus serrator
- Red-breasted Nuthatch
Sitta canadensis
- Red Crossbill
Loxia curvirostra
- Red-eyed Vireo
Vireo olivaceus
- Redhead
Aythya americana
- Red-headed Woodpecker
Melanerpes erythrocephalus
- Red-necked Grebe
Podiceps grisegna
- Red Phalarope
Phalaropus fulicarius
- Red-shouldered Hawk
Buteo lineatus
- Red-tailed Hawk
Buteo jamaicensis
- Red-winged Blackbird
Agelaius phoeniceus
- Ring-billed Gull
Larus delawarensis
- Ring-necked Duck
Aythya collaris
- Ring-necked Pheasant
Phasianus colchicus
- Roadrunner
Geococcyx californianus
- Robin
Turdus migratorius
- Rock Dove
Columba livia
- Rock Ptarmigan
Lagopus mutus
- Rock Sandpiper
Calidris pilicnemis
- Rock Wren
Salpinctes obsoletus
- Rose-breasted Grosbeak
Phœticus ludovicianus
- Rosy Finch
Leucosticte arcata
- Rough-legged Hawk
Buteo lagopus
- Royal Tern
Sterna maximus
- Ruby-crowned Kinglet
Regulus calendula
- Ruddy Duck
Oxyura jamaicensis
- Ruddy Turnstone
Arenaria interpres
- Ruffed Grouse
Bonasa umbellus
- Rufous-crowned Sparrow
Aimophila ruficeps
- Rufous-sided Towhee
Pipilo erythrophthalmus
- Rusty Blackbird
Euphagus carolinus
- Sabine's Gull
Larus sabini
- Sage Grouse
Centrocercus urophasianus
- Sage Sparrow
Amphispiza belli
- Sage Thrasher
Oreoscoptes montanus
- Sanderling
Calidris alba
- Savannah Sparrow
Ammodramus sandwichensis
- Say's Phoebe
Sayornis saya
- Scaled Petrel
Pterodroma inexpectata
- Scaled Quail
Callipepla squamata
- Scarlet Tanager
Piranga olivacea
- Screech Owl
Otus asio
- Scrub Jay
Aphelocoma coerulescens
- Seaside Sparrow
Ammodramus maritimus
- Semipalmated Plover
Charadrius semipalmatus
- Semipalmated Sandpiper
Calidris pusillus
- Sharp-shinned Hawk
Accipiter striatus
- Sharp-tailed Grouse
Tympanuchus phasianellus
- Short-eared Owl
Asio flammeus
- Short-tailed Shearwater
Puffinus tenuirostris
- Shoveler
Anas clypeata
- Snow Bunting
Plectrophenax nivalis
- Snowy Egret
Egretta thula
- Solitary Sandpiper
Tringa solitaria
- Song Sparrow
Zonotrichia melodia
- Sora
Porzana carolina
- Spotted Sandpiper
Actitis macularia
- Spruce Grouse
Dendragapus canadensis
- Squirrel Cuckoo
Piaya cayana
- Starling
Sturnus vulgaris
- Stellar's Jay
Cyanocitta stelleri
- Summer Tanager
Piranga rubra
- Surf Scoter
Melanitta perspicillata
- Swainson's Hawk
Buteo swainsoni
- Swainson's Thrush
Catharus ustulata
- Swamp Sparrow
Zonotrichia georgiana
- Townsend's Solitaire
Myadestes townsendi
- Tree Sparrow
Spizella arborea
- Tree Swallow
Tachycineta bicolor
- Trumpeter Swan
Cygnus buccinator
- Tufted Puffin
Lunda cirrhata
- Tufted Titmouse
Parus bicolor
- Turkey
Meleagris gallopavo
- Turkey Vulture
Cathartes aura
- Upland Plover
Bartramia longicauda
- Varied Thrush
Zoothera naevius
- Vesper Sparrow
Poocetes gramineus
- Virginia Rail
Rallus limicola
- Wandering Tattler
Heteroscelus icanus
- Water Pipet
Anthus spinoletta
- Western Bluebird
Sialia mexicana

Western Kingbird <i>Tyrannus verticalis</i>	Yellow-bellied Sapsucker <i>Sphyrapicus varius</i>	Desert Spiny Lizard <i>Sceloporus magister</i>
Western Meadowlark <i>Sturnella neglecta</i>	Yellow-billed Cuckoo <i>Coccyzus americanus</i>	Eastern Garter Snake <i>Thamnophis sirtalis sirtalis</i>
Western Sandpiper <i>Calidris mauri</i>	Yellow-billed Magpie <i>Pica nutalli</i>	Fence Lizard <i>Sceloporus undulatus</i>
Western Tanager <i>Piranga ludoviciana</i>	Yellow-headed Blackbird <i>Xanthocephalus xanthocephalus</i>	Five-lined Skink <i>Eumeces fasciatus</i>
Western Wood Pewee <i>Contopus sordidulus</i>	Yellowthroat <i>Geothlypis trichas</i>	Florida Red-bellied Turtle <i>Chrysemys nelsoni</i>
Whimbrel <i>Numenius phaeopus</i>	Yellow-throated Vireo <i>Vireo flavifrons</i>	Frog (Green Treefrog, Squirrel Tree-frog) <i>Hyla cinerea</i> <i>H. squirella</i>
Whip-poor-will <i>Caprimulgus vociferus</i>	Yellow Wagtail <i>Motacilla flava</i>	Gilbert's Skink <i>Eumeces gilberti</i>
Whiskered Auklet <i>Aethis pygmaea</i>	Yellow Warbler <i>Dendroica petechia</i>	Glass Lizard <i>Ophisaurus attenuatus</i>
White-breasted Nuthatch <i>Sitta carolinensis</i>		Gopher Snake <i>Pituophis melanoleucus catenifer</i>
White-crowned Sparrow <i>Zonotrichia leucophrys</i>	REPTILES AND AMPHIBIANS	Great Plains Rat Snake <i>Elaphe guttata emoryi</i>
White-eyed Vireo <i>Vireo griseus</i>	American Toad <i>Bufo americanus</i>	Great Plains Skink <i>Eumeces obsoletus</i>
White-tailed Ptarmigan <i>Lagopus leucurus</i>	Black Iguana <i>Ctenosaura similis</i>	Green Frog <i>Rana clamitans</i>
White-throated Sparrow <i>Zonotrichia albicollis</i>	Black Rat Snake <i>Elaphe obsoleta obsoleta</i>	Leopard Frog <i>Rana pipiens</i>
White-throated Swift <i>Aeronautes saxatalis</i>	Blue Racer <i>Coluber constrictor foxi</i>	Leopard Lizard <i>Crotaphytus wislizeni</i>
White-winged Crossbill <i>Loxia leucoptera</i>	Blue-tailed Skink <i>Eumeces fasciatus</i>	Long-nosed Snake <i>Rhinocelilus lecontei</i>
White-winged Dove <i>Zenaida asiatica</i>	Bullfrog <i>Rana catesbiana</i>	Milksnake <i>Lampropeltis triangulum</i>
White-winged Scoter <i>Melanitta deglandi</i>	Bullsnake <i>Pituophis melanoleucus sayi</i>	Mud Turtle <i>Kinosternon subrubrum</i>
Willet <i>Catoptrophorus semipalmatus</i>	Checkered Whiptail <i>Cnemidophorus tessellatus</i>	Painted Turtle <i>Chrysemys picta</i>
Williamson's Sapsucker <i>Sphyrapicus thyroideus</i>	Chuckwalla <i>Sauromalus obesus</i>	Plains Garter Snake <i>Thamnophis radix</i>
Willow Ptarmigan <i>Lagopus lagopus</i>	Coachwhip <i>Masticophis flagellum</i>	Prairie Kingsnake <i>Lampropeltis calligaster calligaster</i>
Wilson's Phalarope <i>Steganopus tricolor</i>	Collared Lizard <i>Crotaphytus collaris</i>	Prairie Rattlesnake <i>Crotalis viridis viridis</i>
Wilson's Warbler <i>Wilsonia pusilla</i>	Common Iguana <i>Iguana iguana</i>	Racer <i>Coluber constrictor</i>
Winter Wren <i>Troglodytes troglodytes</i>	Common Kingsnake <i>Lampropeltis getulus</i>	Race Runner <i>Cnemidophorus sexlineatus</i>
Wood Duck <i>Aix sponsa</i>	Constrictor <i>Pituophis melanoleucus</i>	Red-bellied Snake <i>Storeria occipitomaculata</i>
Wood Sandpiper <i>Tringa glareola</i>	Crevice Spiny Lizard <i>Sceloporus poinsetti</i>	Ring-necked Snake <i>Diadophis punctatus</i>
Wood Thrush <i>Catharus mustelina</i>		
Wrentit <i>Chamaea fasciata</i>	Desert Horned Lizard <i>Phrynosoma platyrhinos</i>	

- Rough Green Snake
Opheodrys aestivus
- Sagebrush Lizard
Sceloporus graciosus
- Side-blotched Lizard
Uta stansburiana
- Six-lined Racerunner
Cnemidophorus sexlineatus
- Smooth Earth Snake
Virginia valeriae
- Snapping Turtle
Chelydra serpentina
- Spotted Whiptail
Cnemidophorus gularis
- Striped Whipsnake
Masticophis taeniatus
- Texas Horned Lizard
Phrynosoma cornutum
- Tiger Salamander
Ambystoma tigrinum
- Western Box Turtle
Terrapene ornata
- Western Fence Lizard
Sceloporus occidentalis
- Western Rattlesnake
Crotalus viridis
- Western Toad
Bufo boreas
- Western Whiptail
Cnemidophorus tigris
- Wood Frog
Rana sylvatica
- Yellow-bellied racer
Cotuber constrictor
- Zebra-tailed Lizard
Callisaurus draconoides
- FISH**
- Alewife
Alosa pseudoharengus
- Armorhead Sculpin
Gymnocephalus galeatus
- Arrowtooth Flounder
Atheresthes stomias
- Black Bullhead
Ictalurus melas
- Black Crappie
Pomoxis nigromaculatus
- Bonytail
Gila elegans
- Bowfin
Amia calva
- Brown Bullhead
Ictalurus nebulosus
- Carp
Cyprinus carpio
- Channel Catfish
Ictalurus punctatus
- Cisco
Coregonus artedii
- Desert Sucker
Catostomus clarkii
- Dolly Varden
Salvelinus malma
- Eagle Lake Trout
Salmo gairdneri aquilarium
- Goldfish
Carassius auratus
- Hump-backed Sucker
Xyrauchen texanus
- Largemouth Bass
Micropterus salmoides
- Largescale Sucker
Catostomus machrocheilus
- Lingcod
Ophiodon elongatus
- Longnose Lancetfish
Alepisaurus ferax
- Mountain Whitefish
Prosopium williamsoni
- Night Smelt
Spirinchus starksii
- Northern Pike
Esox lucius
- Pacific Cod
Gadus macrocephalus
- Pacific Ocean Perch
Sebastes alutus
- Pickereel
Esox lucius
- Peamouth
Mylocheilus caurinus
- Pumpkinseed
Lepomis gibbosus
- Rainbow Trout
Salmo gairdneri
- Red Irish Lord
Hemilepidotus hemilepidotus
- Rock Bass
Ambloplites rupestris
- Rock Greenling
Hexagrammos lagocephalus
- Roundtail Chub
Gila robusta
- Sacramento Perch
Archoplites interruptus
- Sacramento Sucker
Catostomus occidentalis
- Sea Lamprey
Petromyzon marinus
- Shorthead Redhorse
Moxostoma macrolepidotum
- Smooth Lumpsucker
Aptocyclus ventricosus
- Sonora Sucker
Catostomus insignis
- Striped Bass
Morone saxatilis
- Surf Smelt
Hypomesus pretiosus
- Tahoe Sucker
Catostomus tahoensis
- Tui Chub
Gila bicolor
- Walleye
Stizostedion vitreum vitreum
- White Catfish
Ictalurus catus
- White Crappie
Pomoxis annularis
- White Sucker
Catostomus commersoni
- Yellow Bullhead
Ictalurus natalis
- Yellow Perch
Perca flavescens
- INVERTEBRATES**
- Acraea Moth
Estigmene acraea
- Apple Snail
Pomacea paludosa

Band-winged Grasshopper <i>Circotettix ferrugulatus</i>	Gay-winged Locust <i>Arphia crassa</i>	Potato Beetle <i>Chrysomela loidea</i>
Bill Bug <i>Rhodobaenus tridecompunctatus</i>	<i>Xanthippus corallipes</i>	
Bird Locust <i>Shistocerca lineata</i>	Grasshopper <i>Melanoplus devastator</i>	Red-legged Grasshopper <i>Melanoplus femurubrum</i>
	Ground Beetle <i>Geopinus incrassatus</i>	
	<i>Calosoma obsoletum</i>	Short-horned Grasshopper <i>Melanoplus differentialis</i>
Camel Cricket <i>Dalmanella brevipennis</i>	Japanese Mystery Snail <i>Vicparus japonica</i>	Solitary Wasp <i>Stizus unicolor</i>
Carolina Locust <i>Dissosteira carolina</i>	Jerusalem Cricket <i>Stenopelmatus irregularis</i>	Squash Bug <i>Anasa tristis</i>
Cicada <i>Tibicen pruinosa</i>		Stink Bug <i>Euschistus variolarius</i>
Crayfish <i>Cambarus diogenes</i>	Lesser Migratory Grasshopper <i>Melanoplus atlantis</i>	<i>Chlorochroa ligata</i>
		<i>Peribalus limbolarius</i>
Dung Beetle <i>Phanaeus difformis</i>	Periodical Cicada <i>Magicicada septendecim</i>	Wasp <i>Elis quincequincta</i>
	Plant Bug <i>Thyanta custator</i>	Water Scavenger Beetle <i>Tropisternus lateralis</i>
Freshwater Univalve Mollusc <i>Ampullaria depressa</i>	Poplar Borer <i>Saperda calcarata</i>	

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EFFECTS OF HANDLING-DISTURBANCE STRESS ON HEART RATE IN THE FERRUGINOUS HAWK (*BUTEO REGALIS*)*

by

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Abstract

The heart rate (HR) of a female Ferruginous Hawk was monitored continuously by telemetry under different handling-disturbance conditions. HR increased approximately threefold when the handler was outside the cage, and invariably reached a maximum (490-502 beats/min) when the handler was inside the cage. Near-maximal HR's were observed when the Hawk was restrained on the ground or held by the handler. On the other hand, hooding the bird during restraint resulted in a slowing of HR to 51-66% of the maximal rate.

Introduction

Concern for the status of many raptorial species has led to a proliferation of programs dealing with rehabilitation and captive breeding of the birds of prey. Physiological stress involved with the day-to-day care and handling of these birds is an unfortunate and mostly unavoidable by-product of raptor conservation efforts. In spite of this, little has been done to quantify various physiological factors related to stress experienced by the raptors during daily maintenance.

With the advancement of radio-telemetry techniques, remote sensing of physiological parameters such as heart rate (HR) and body temperature is now possible. Studies of HR fluctuations have been especially promising because evidence (summarized in Johnson and Gessaman 1973) has shown that HR can be a valid indicator of overall metabolic rate. While Lund and Folk (1976) have shown that the HR-metabolic rate relationship is stable regardless of the rate of change and for a variety of behaviors, these authors concur with the majority opinion that HR is only a valid indicator of metabolism at low levels of exercise and when the animal is not under stress (Jones and Wang 1976, Morhardt and Morhardt 1971). Despite this apparent drawback, telemetered HR has been used to show effects of disturbance or restraint in both poultry (Cogger et al. 1974) and game birds (Wooley and Owen, 1977), but to this point, research of this nature has been very limited in raptors. In this report we show the extent of HR elevation resulting from various types of handling-disturbance in a Ferruginous Hawk and how such disturbance may be mitigated.

*A portion of this work was submitted in partial fulfillment of requirements for the M.A. degree in biology at the University of Nebraska at Omaha by D. E. Busch.

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Methods

The female Ferruginous Hawk used in this study was considered nonreleasable because of a broken wing but was healthy in all other respects.

The study was conducted in an isolated section of the Henry Doorly Zoo (Omaha, NE) where the bird was housed in a large (64m² × 5 m high) flight cage. A tent outside the cage served as an observation blind and housing for telemetry instruments.

Silver ring ECG electrodes were implanted on the dorsal surface of the bird's sternum using a modification of the surgical method of Sawby and Gessaman (1974). The telemetry transmitter consisted of a 130-g "backpack" fitted to the bird with one harness passing anterior to, and another posterior to, the bird's wings. The Technical Institute of the University of Nebraska at Omaha built the telemetry transmitter designed to cue on the QRS complex of the hawk's ECG, then to amplify and transmit this signal on the FM radio band (Van Slyke 1976). A conventional FM receiver picked up the transmitted signal, and the resulting data were stored on magnetic tape, using a cassette tape recorder. Because of the impracticality of counting the audio "clicks" that represented the actual HR, these stored data were later converted to an analog format in the laboratory using a Physiograph-Cardiotach (Narco Bio-Systems) apparatus.

Data collection involved one "observer" operating the tape recorder and radio in the blind while another "handler" disturbed the bird first by approaching her, then by performing a series of handling operations. HR data during the bird's normal activities and in the undisturbed condition were collected at various times, far removed from the handling-disturbance testing.

Results and Discussion

A summary of the results is presented in table 1. The slight elevation in HR associated with sound-stimulus is not remarkable as it falls completely within the range for

Table 1. Effects of disturbances associated with handling and effects of some normal activities on HR.

Activity	Heart Rate (Range, beats/min.)	% of Maximal
Undisturbed	112-235	22.4-47.0
Disturbed		
Sound: whistle	185-235	37.0-47.0
Handler outside cage	397-502	79.4-100.0
Handler inside cage	490-502	94.0-100.0
Bird held in hands	483-500	98.6-99.0
Bird restrained on ground	400-475	80.0-95.0
Bird hooded	255-329	51.0-65.8
Hood removed	352-502	70.4-100.0
Normal		
Preening	138-227	27.6-45.2
Visual stimuli (e.g. squirrel, birds, etc.)	200-393	40.0-78.3
After flight	188-480	37.6-95.6

the undisturbed bird. The actual record for this type of disturbance did show a quite moderate and transitory increase in HR, lasting no more than 5 seconds following sound stimulus.

In contrast, the dependence of the Ferruginous Hawk on its sense of vision is demonstrated by the greatly elevated HR that occurred when the bird first glimpsed the approaching handler. Although there was some variability to the higher HR when the handler was at a distance, the tachycardia became constant, remaining at a near-maximal value as the handler approached the hawk closely. The cardiac performance then remained essentially unchanged as the handler caught and held the bird.

By holding birds on their back, falconers often report that a so-called hypnotic calming occurs. This effect is, in reality, a part of the overall stress response, and it does appear in the Ferruginous Hawk, but it is interesting to note that the HR in this state remained quite high.

Elevated HR associated with care in the Ferruginous Hawk is presumably brought about by stimulation of the heart's sympathetic innervation in response primarily to visual stimuli. The dependence of the hawk's cardiac physiology under stress on visual stimuli was vividly demonstrated in the tremendous reduction in HR that occurred when the bird's eyes were covered.

HR's associated with some of the normal activities in the hawk's behavior repertoire may also be examined in table 1. The locomotor activity associated with preening did not seem to require circulatory adjustment in the form of elevated HR. On the other hand, when the presence of animals, such as squirrels or smaller birds, outside the hawk's cage could be linked with her behavior, a rather marked tachycardia was invariably associated with the presence of these potential prey species. Even in short flights, e.g., when the hawk hopped from the ground to a perch, a twofold elevation in HR was observed.

The case for hooding a hawk's eyes when working with it is clearly strengthened by these results, while the calming effects of holding a bird on its back are nil as far as metabolic response is concerned. Little can probably be done to lessen the stress response upon approaching a captive raptor, other than to make sure that this phase of handling proceeds rapidly.

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WILD TAKEN PEREGRINES BREED IN THE MELBOURNE, AUSTRALIA, ZOO

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The fact that the Peregrine (*Falco peregrinus macropus*) bred in the Melbourne Zoo in 1976, 1977, and 1978 is by itself no remarkable event. We feel, however, that the circumstances and conditions under which this pair of falcons bred is for several reasons noteworthy. These data were gathered while working on a Peregrine research project sponsored by the Fisheries and Wildlife Division, Victoria, and we are indebted to Mr. Roy Dunn, curator of reptiles at the zoo, for his help and information.

It is now rather well documented that Peregrines will breed in a variety of enclosures, but there has been considerable speculation and discussion, especially at Raptor Research Foundation meetings, as to the optimum age for taking Peregrines for breeding purposes and the conditions that will best promote breeding. Speculation revolves around the question of whether they breed most easily if taken as small nestlings, as fledglings, as first-year migrants, etc., and what sort of disturbances they will withstand. Most would agree that first-year falcons taken on migration are difficult, if not impossible, to breed, and that falcons taken as fledglings kept in relatively secure and isolated conditions are the easiest to induce to breed (cf. Cade et al. 1977). Although we also agree, the data given herein suggest that factors necessary for breeding may vary more widely than expected, but that the "psychological disposition" of the falcons may still be one of the major overriding factors.

The pair of falcons discussed herein arrived at the Melbourne Zoo in about 1972 as adults after having been found injured. They were from different locations and were not mates. The male had a severely broken wing, which left him flightless. The female had a grotesquely deformed mandible that may have been the result of a collision with utility wires, and she probably had other injuries not readily visible. They were placed in a pen constructed of a mixture of chain-link and chicken-wire fencing. The enclosure is rectangular in shape, about 3 m wide on the narrow end by 6.1 m on the long side by 6.1 m high. The pen has walkways on two sides (the narrow ends) that pass immediately next to it. On one side (the long dimension) is a pen containing several little Eagle (*Hieraaetus morphnoides*) and Laughing Kookaburra (*Dacelo gigas*) and on the other side, a pen with several Whistling Kite (*Haliastur sphenurus*) and Australasian Harrier (*Circus aeruginosus*).

The series of pens in this particular row are open on all sides, with a piece of corrugated tin covering about 20% of the roof. Both pens adjacent to the Peregrine pen are

separated from it by chain-link type wire; otherwise there is clear visibility between the pens (see fig. 1). The three chambers with raptors are the same size. The Peregrine pen has two small trees growing at one narrow end opposite the nest box location. A nest box of wood 28 cm by 38 cm by 38 cm is closed, except for the front, on all sides and the top and is placed 1.8 m from the ground against the back wall. The box is at eye level and adjacent to a walkway. On the portion of the pen between the nest and the walk is a series of slatlike branches against the wire to form a screen effect (fig. 1) but with spaces a few mm wide between each slat. These slats were about 2 m high.

The pen containing the Whistling Kites had a perch the same level as the Peregrine nest box and only 1.2 m away. This was a favored perch for one of the kites, and from the perch the kite could look directly in on the incubating Peregrine. The female falcon apparently laid eggs in 1975, as eggshell fragments were found in the pen; subsequently, the nest box was erected. In 1976 the female laid four eggs, three of which hatched, and the two young that survived fledged on 8 November, the day prior to our visit to the zoo. The fledging date is similar to that of the wild population of Victoria. Two young were raised in both 1977 and 1978.

On the occasion of our 1976 visit, we entered the pen to view the adults more closely, and the moment we were fully inside the pen, both adults began to give alarm calls. We moved outside the pen, and, although we were totally visible through the wire, the calls stopped. The falcons clearly knew the boundaries of their "territory," which were the limits of the wire pen. We were at the pen for about 20 minutes, and some ten people passed along the walk less than 0.6-0.9 m from the nest and the recently fledged young. The adults gave no alarm calls at the people, nor did the young move away.

The foregoing facts bring to mind several items worthy of consideration. Both parent birds were adults and were injured when placed in the pen. Because of the injuries they could not get away from people, and we feel that they were "psychologically" committed, as it were, to the fact that people were a regular part of their environment and would not harm them. The continued presence of people passing them was thus of no concern. (Taped or tied outer primaries on some particularly wild females may produce a similar result.) Other falcons capable of flight in large pens, unless relatively tame, never quite seem to adjust as well, and each time a person enters the pen they fly and thus "escape" from the potential danger. The female laid eggs and hatched young in a wooden box placed at eye level and less than 2 m from where perhaps 200 or more people pass on a busy spring day. The incubating female was visible, however, only from the opposite end of the pen, 6.1 m away. In this position she was still somewhat protected by a loose screen of vegetation furnished by the trees.

A kite frequently sat 1.2 m away and looked in on the fully visible incubating female, eliciting no response. Again, however, the kite was on the other side of the wire and was therefore out of the falcons' territory.

These facts taken together tend to modify the speculation that some of the factors conducive to breeding success, such as isolation, height of the nest, and age of falcons when taken, are not altogether essential. Unless this case is the exception, and we do not feel that it is, we suggest that these and other injured adult falcons (notably the one used by Waller [1962] in one of the first recorded incidents of successful captive breeding of Peregrines) adjust "psychologically" to their captivity. Such falcons, having already had experience at breeding, need only to be supplied with compatible mates and the correct physiological timing (photoperiod) to achieve breeding. It is worthy of note that the

only other captive Peregrine breeding record known to us for Australia involved an injured (broken-winged) female found in the wild in immature plumage about three months post-fledging (cf: Robinson 1976).

We realize that this is additional speculation, but we feel the foregoing facts should be taken into consideration when attempting to derive "formulae" necessary to achieve successful breeding in captive Peregrines. Injured adult falcons that have presumably bred in the wild can form valuable breeding stock. Although they may look poorly in pens and take a year or so longer than nestling-taken birds to breed, they may nonetheless do so very readily.

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Figure 1. View showing the general relationship of several pens to each other, the wire, and the walkway. Roy Dunn, left; Steve Jones, right.



Figure 2. View of adult female (note deformed bill), recently "fledged" young, nesting box, and slatlike branches forming the back wall of the pen. Female and box are at eye level.

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