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VERTEBRATE FAUNA OF THE IDAHO NATIONAL ENVIRONMENTAL RESEARCH PARK

Timothy D. Reynolds¹, John W. Connelly^{1,2}, Douglas K. Halford^{1,3}, and W. John Arthur^{1,4}

ABSTRACT.—The relative abundance, habitat use, and seasonal occurrence are reported for the 6 fish, 1 amphibian, 9 reptile, 164 bird, and 39 mammal species recorded on the Idaho National Environmental Research Park in southeastern Idaho.

The Idaho National Engineering Laboratory (INEL) is an energy research and development site administered by the U.S. Department of Energy (DOE). The Energy Reorganization Act of 1974 ordered the U.S. Energy Research and Development Administration (precursor to DOE) to engage in environmental research related to the development of energy sources to advance the goals of restoring, protecting, and enhancing environmental quality. The INEL was designated the nation's second National Environmental Research Park (NERP) in 1975 to satisfy this directive. The NERP provides a controlled, protected, outdoor laboratory for environmentally related research to help achieve national environmental goals as stated in the National Environmental Policy Act (NEPA) of 1969. The NERP charter presents broad objectives which, in part, require that each NERP serve as a bench mark for quantitatively assessing and predicting the environmental impact of man's activities. The compilation of baseline data, including species lists and identification of ecological communities, is fundamental to the NERP objectives. Much of the research on individual species of wildlife found on the Idaho NERP has been published in the scientific literature or presented in theses, dissertations, or reports (vide Markham 1973, 1978, 1983). This paper represents a consolidation of those findings which, combined with unpublished information, provide baseline data on the abundance, distribution, habitat preference and seasonal

occurrence of the vertebrate species recorded on the Idaho NERP.

STUDY AREA

The INEL was established by the U.S. Atomic Energy Commission as the National Reactor Testing Station in the late 1940s. Since 1949 the land composing the Idaho NERP has been closed to public access, thereby providing wildlife habitat that has remained relatively undisturbed for 35 years.

The NERP occupies about 2,305 km² of sagebrush-dominated rangeland on the upper Snake River Plain in portions of Bonneville, Bingham, Butte, Clark, and Jefferson counties. The INEL is approximately 48 km west of Idaho Falls, Bonneville County, Idaho. With the exception of two large buttes of volcanic origin near the southeastern boundary, and several small cinder cones, craters, and exposed lava ridges scattered over the site, the topography of most of the NERP is flat to gently rolling and typical of the Columbian Plateau Province (Atwood 1970). The mean elevation is 1,490 m ASL. Three predominately north-south mountain ranges, rising to 3,370 m ASL, border the NERP to the north and west (Fig. 1). The intervening valleys and the Snake River Plain itself provide migration corridors to, or across, the Site. Soils are derived mostly from silicic volcanics and Paleozoic rocks from the surrounding mountains. These are primarily aeolian sandy loams and loess underlain by undifferentiated basal

¹Radiological and Environmental Sciences Laboratory, U.S. Department of Energy, 785 DOE Place, Idaho Falls, Idaho 83402.

²Present address: Idaho Department of Fish and Game, 5205 South 5th, Pocatello, Idaho 83201.

³Present address: Waste Management Programs, EG&G Idaho, Inc., P.O. Box 1625, Idaho Falls, Idaho 83415.

⁴Present address: Uranium Mill Tailings Remedial Action Project, U.S. Department of Energy, P.O. Box 5400, Albuquerque, New Mexico 87115.

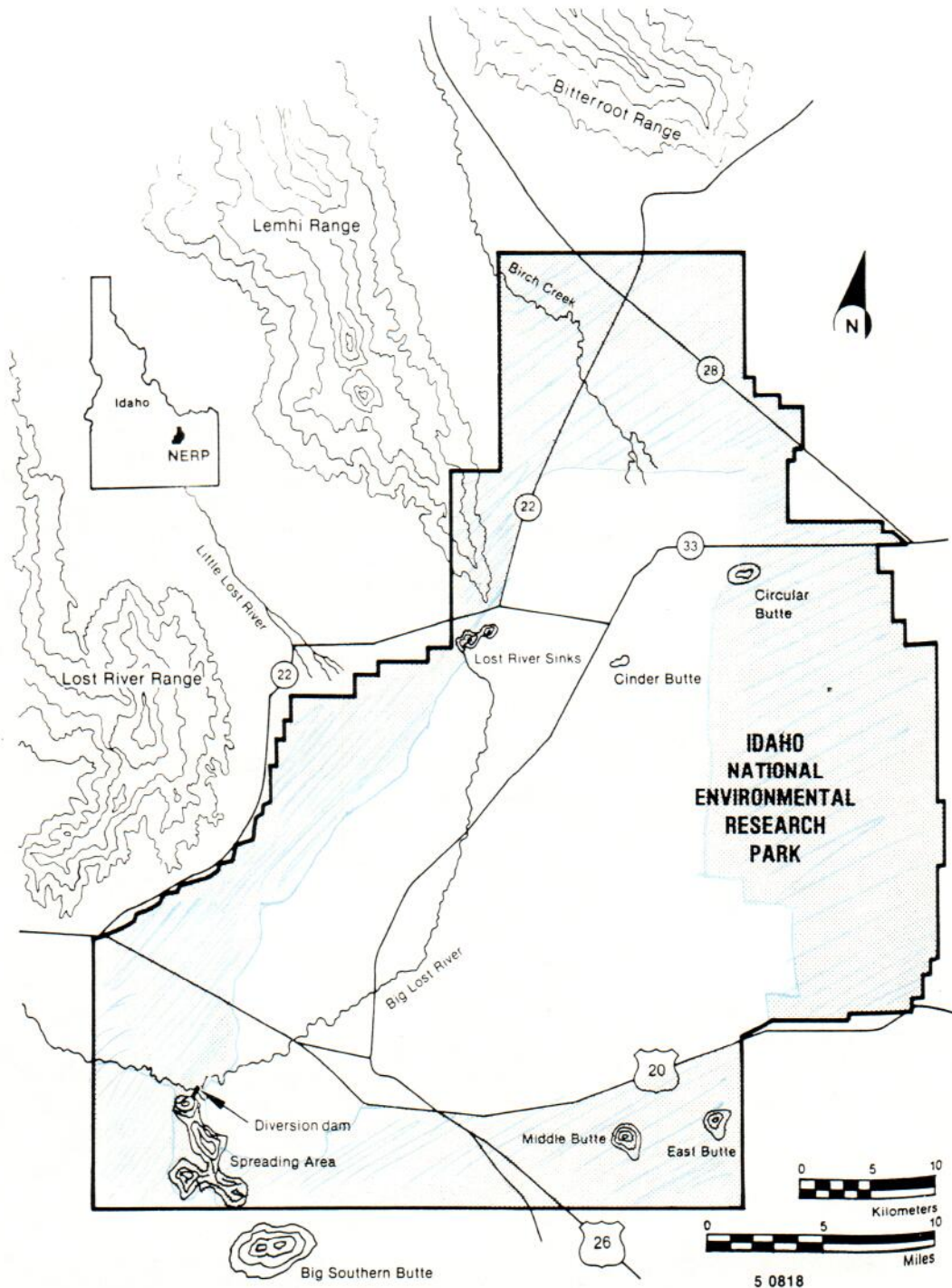


Fig. 1. Landmarks, roadways, and watercourses on the Idaho National Environmental Research Park and environs in southeastern Idaho. The area of the park open to livestock grazing is shaded.

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atop a rhyolite foundation. The climate is characterized by hot summers and cold winters. Maximum and minimum temperatures recorded from 1950 to 1983 are 39 and -44 C, respectively. Annual precipitation over the past 34 years averaged 21.6 cm (Range: 11.4-36.6 cm), coming mostly from spring rain or snow storms in April, May, and June, with a smaller peak resulting from snowfall during December and January.

Surface water is limited on the Idaho NERP. The Big Lost River enters the southwest corner of the INEL, flows northward about 50 km, and ultimately percolates into the Snake River aquifer at the sinks near Howe, Idaho (Fig. 1). When filled, the sinks provide about 260 surface ha of aquatic habitat. Because of annual variations in the snowpack, offsite irrigation demands upstream, and the porosity of the stream bed, the Big Lost River does not flow across the NERP throughout every summer. In some years water never reaches the sinks. Water is also diverted from the Big Lost River into four spreading areas in the southwest corner of the INEL (Fig. 1) to prevent ice jams and flooding of some INEL facilities during the winter and spring runoff. Thus a series of ephemeral shallow lakes of up to 919 ha in total size is generally present during the spring peak of bird migration. Other natural water sources on the Idaho NERP are the Little Lost River and Birch Creek. Both of these streams are currently diverted offsite for agricultural irrigation and only rarely flow onto the INEL. Several 0.2-5.0 ha man-made ponds occur near facilities on site. In aggregate these provide approximately 15 ha of additional aquatic habitat.

Although McBride et al. (1978) described 20 distinct vegetative cover types on the INEL, nearly 87% of the NERP is shrub-steppe habitat. About 7% is grassland, and about 3% is juniper woodland. Aquatic and riparian habitat and irrigated lawns at facility complexes account for the remaining 3%. The dominant and most conspicuous vegetation is big sagebrush (*Artemisia tridentata*). Other locally important shrubs are rabbitbrush (*Chrysothamnus nauseosus* and *C. viciflorus*), winterfat (*Ceratoides lanata*), shadscale saltbush (*Atriplex confertifolia*), Nuttall saltbush (*A. nutallii*), and gray horsebrush

(*Tetradymia canescens*) (Anderson and Holte 1981, Harniss and West 1973). The more abundant grasses include bottlebrush squirreltail (*Elymus elymoides*; formerly *Sitanion hystrix*), needle and thread grass (*Stipa comata*), Indian ricegrass (*Oryzopsis hymenoides*), Great Basin wild rye (*Leymus cinereus*; formerly *Elymus cinereus*), thickspike wheatgrass (*Elymus lanceolatus*; formerly *Agropyron dasystachyum*), and bluebunch wheatgrass (*Elytrigia spicata*; formerly *A. spicatum*). Native tree species are limited to junipers (*Juniperus osteosperma* and *J. scopulorum*) near the southeast and northwest portions of the NERP, and plains cottonwood (*Populus deltoides*), narrow-leaved cottonwood (*P. angustifolia*), and several species of willow (*Salix* spp.) along the Big Lost River and Birch Creek. Russian olive (*Elaeagnus angustifolia*) and several other introduced species of deciduous and evergreen trees have been planted near most of the INEL facilities. Lawns composed of *Poa* spp. are maintained at most of the facility complexes. Approximately 4,000 ha of the INEL were seeded with crested wheatgrass (*Agropyron cristatum* and *A. desertorum*) in the late 1950s and early 1960s. Reinvasion by native shrub-steppe vegetation has been slow, and these plantings persist mostly as monocultures (Marlette 1982). Jeppson and Holte (1978) listed a total of 389 vascular plant species on the INEL. None are classified as threatened or endangered at either the federal or state level (Cholewa and Henderson 1984). The periphery of the NERP, representing nearly 65% of the total area, is open to seasonal cattle and sheep grazing regulated by the U.S. Department of the Interior Bureau of Land Management (Fig. 1).

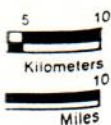
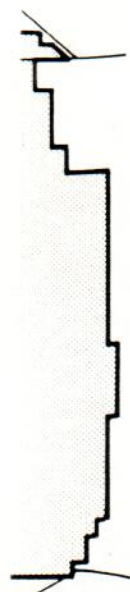
The geology, topography, vegetation, climate, and recent history of Idaho NERP previously have been described in detail (Anderson and Holte 1981, Atwood 1970, Harniss and West 1973, Nace et al. 1972, 1975, McBride et al. 1978).

Public access to the Idaho NERP is restricted. Except for scientific purposes and periodic predator control, the collection of flora and fauna is prohibited.

METHODS

Past and present ecological studies conducted on the INEL and correspondence and interviews with INEL researchers and per-

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TABLE 1. Fishes recorded on the Idaho National Environmental Research Park.

Taxa	Distribution	Abundance ¹
SALMONIFORMES		
Salmonidae		
Kokanee Salmon, <i>Oncorhynchus nerka</i>	Big Lost River	Uncommon
Rainbow Trout, <i>Salmo gairdneri</i>	Big Lost River	Common
Brook Trout, <i>Salvelinus fontinalis</i>	Big Lost River	Uncommon
Mountain Whitefish, <i>Prosopium williamsoni</i>	Big Lost River	Common
CYPRINIFORMES		
Cyprinidae		
Speckled Dace, <i>Rhinichthys osculus</i>	Big Lost River	Uncommon
PERCIFORMES		
Cottidae		
Shorthead Sculpin, <i>Cottus confusus</i>	Big Lost River	Common

¹See text for definitions of abundance terms.

sonnel provided the data presented in this paper. Species inventories and population assessments on the Idaho NERP have been published for small mammals (Allred 1973), herpetofauna (Sehman and Linder 1978), and raptors (Craig 1979). Additional data on these and other taxa were gleaned from numerous sources. Those that provided limited but useful information germane to this paper and not cited elsewhere in the text included theses and dissertations (Craig 1977, Fuller 1981, Gleason 1978, Hoskinson 1977, Johnson 1977, Peterson 1982, and Reynolds 1978) and technical publications (Bailey 1974, Best and Peterson 1982, Craig 1978, Craig and Renn 1977, Halford and Millard 1978, Powers and Craig 1976, and Reynolds and Trost 1980).

Moreover, current and previous NERP researchers were encouraged to record observations of vertebrates encountered incidental to their research activities and, from their experience, to indicate the relative abundance and distribution of these species on the Idaho NERP. Informal interviews with INEL Site services and security personnel provided additional information.

The relative abundance, distribution, and habitat use for all native and introduced vertebrate species recorded on the Idaho NERP are presented. Abundance ratings were used to indicate relative numbers of a species during the season(s) it was recorded on the Idaho NERP. Sehman and Linder (1978) and Overton (1977) provided abundance and residence status for herpetofauna and fishes, respectively.

Abundance ratings for terrestrial homeotherms are often biased in favor of conspicu-

ous and diurnal species, especially when observations incidental to other projects are the source of data. To reduce this bias, former and current INEL ecological researchers subjectively rated the abundance of each bird and mammal species, based on personal experience. Ratings were from 1 to 10, 1 representing a very rare sighting and 10 indicating an abundant species. A mean value for each species was calculated. Because the ratings for some species ranged widely (i.e., from 1 to 9), a category termed *occasional* or *local* was included (cf Stephens and Reynolds 1983). All abundance classes assumed that a qualified biologist exerted a reasonable effort to search or sample the proper habitat at the appropriate time of year.

Abundance ratings were:

1. Abundant—Very numerous and certain to be seen or sampled: a mean rating of 8.1–10.0.
2. Common—Likely but not certain to be observed or sampled: a mean rating of 5.1–8.0.
3. Uncommon—Found in limited numbers, not likely to be sampled or observed: mean rating of 2.1–5.0.
4. Occasional or local—A species that is not always present or is restricted in distribution: a difference between the high and low response of 7 or more.
5. Rare—A species that has a range including all or part of the Idaho NERP but has been documented $\leq$ seven times on site: mean rating of 0.1–2.0.
6. Vagrant or accidental—A species that is not expected to occur on the Idaho NERP but has been recorded there (e.g., Black-legged Kittiwake [*Rissa tridactyla*]).

Habitats listed for each species closely follow those presented by Trost et al. (1977) and Stephens and Reynolds (1983). The designation "sitewide" indicates that a particular species was ubiquitous on the Idaho NERP. Unless otherwise noted, taxonomic nomen-

TABLE 2. Herptiles recorded on the Idaho National Environmental Research Park.

Taxa	Distribution and habitat	Abundance ¹
ANURA		
Pelobatidae		
Great Basin Spadefoot Toad, <i>Spea intermontana</i> ²	Big Lost River and sinks	Common ✓
SQUAMATA		
Iguanidae		
Leopard Lizard, <i>Gambelia wislizenii</i> ³	NE NERP; sandy areas	Local ✓
Short-horned Lizard, <i>Phrynosoma douglassi</i>	CRMO Sitewide; shrub-steppe	Abundant
Sagebrush Lizard, <i>Sceloporus graciosus</i>	CRMO Sitewide; shrub-steppe	Abundant
Scincidae		
Western Skink, <i>Eumeces skiltonianus</i>	CRMO South NERP	Rare
Boidae		
Rubber Boa, <i>Charina bottae</i>	CRMO Unknown	Accidental
Colubridae		
Desert Striped Whipsnake, <i>Masticophis taeniatus</i>	NE NERP; shrub-steppe	Uncommon ✓
Gopher Snake, <i>Pituophis melanoleucus</i>	CRMO Sitewide; shrub-steppe	Common
Western Garter Snake, <i>Thamnophis elegans</i>	Sitewide; all habitats	Uncommon ✓
Viperidae		
Western Rattlesnake, <i>Crotalus viridis</i>	CRMO Sitewide; shrub-steppe	Common

¹See text for definitions of abundance terms.²Collins et al. (1978) list this as *Scaphiophis intermontanus*.³Collins et al. (1978) place this in the genus *Crotaphytus*.

clature for fish, amphibians and reptiles, birds, and mammals follows Simpson and Wallace (1978), Nussbaum et al. (1983), American Ornithological Union (1983), and Jones et al. (1982), respectively.

RESULTS AND DISCUSSION

A total of 219 vertebrate species were recorded on the Idaho NERP. Only six species of fish (Table 1) were identified. Four of these were game fish (all salmonids), and two were nongame species. Species inventories of fish were incidental to a study on the density and distribution of salmonid fishes in the Big Lost River (Overton 1977) and a game fish salvage and transplant operation conducted by the Idaho Department of Fish and Game. Because both of those activities primarily concerned game fish, the records of nongame species actually present in the Big Lost River on the NERP may be incomplete. Contrariwise, the low species richness may indeed be accurate, caused by annual and seasonal fluctuations in the flow rate of the river. Overton (1977) attributed decreases in salmonid populations on the NERP directly to: (1) abnormally high discharge in the spring and (2) low or nonexistent flows during both the winter and summer. Diversion practices to control flooding typically reduce the flow in the win-

ter months, whereas low summer flows result from upstream irrigation demands and are generally accompanied by elevated water temperatures. Additional efforts may be needed to completely inventory fish populations on the Idaho NERP.

One amphibian and nine reptiles were recorded on the Idaho NERP (Table 2). The spadefoot toad (*Spea intermontana*) was reported from the Big Lost River as well as the Lost River Sinks and the diversion spreading area (Fig. 1).

There is only one confirmed record for the rubber boa (*Charina bottae*) on the Idaho NERP. Concentrations of leopard lizards (*Gambelia wislizenii*) and desert stiped whipsnakes (*Masticophis taeniatus*) were only found in the northeast portion of the NERP, near Circular Butte and Cinder Butte, respectively (Linder and Sehman 1978) (Fig. 1). The former species is evidently restricted to areas of sandy soils. The latter is more widespread but limited in numbers away from Cinder Butte (Sehman and Linder 1978). The western skink (*Eumeces skiltonianus*) is confined to isolated locations on the southern half of the NERP, possibly because of increased microhabitat moisture requirements (Sehman and Linder 1978). The remainder of the herptiles species listed are either sitewide in distribution or found in the shrub-steppe habitat that

TABLE 3. Avifauna recorded on the Idaho National Environmental Research Park.

Taxa	Abundance ¹ , season, and breeding status ²	Habitat ³
GAVIIFORMES		
Gaviidae		
Common Loon, <i>Gavia immer</i>	M5	w
PODICIPEDIFORMES		
Podicipedidae		
Pied-billed Grebe, <i>Podilymbus podiceps</i>	S5, M5	w
Horned grebe, <i>Podiceps auritus</i>	M5	w
Eared grebe, <i>P. nigricollis</i>	B5, M3, W3	w
Western Grebe, <i>Aechmophorus occidentalis</i> ⁴	S5, M5	w
PELECANIFORMES		
Pelecanidae		
American White Pelican, <i>Pelecanus erythrorhynchos</i>	M5	w
CICONIIFORMES		
Ardeidae		
American Bittern, <i>Botaurus lentiginosus</i>	S5, M5	w
Great Blue Heron, <i>Ardea herodias</i>	S5, M5	w
Great Egret, <i>Casmerodius albus</i>	S5, M5	w
Green-backed Heron, <i>Butorides striatus</i>	S6, M6	w
Threskiornithidae		
White-faced Ibis, <i>Plegadis chihi</i> ⁵	S5, M5	w
ANSERIFORMES		
Anatidae		
Tundra Swan, <i>Cygnus columbianus</i>	M5	w
Snow Goose, <i>Chen caerulescens</i>	M5	w
Canada Goose, <i>Branta canadensis</i>	S3, M3	w
Wood Duck, <i>Aix sponsa</i>	S6, M5	w
Green-winged Teal, <i>Anas crecca</i>	S5, M5	w
Mallard, <i>A. platyrhynchos</i>	B2, M2, W3	w
Northern Pintail, <i>A. acuta</i>	S3, M3	w
Blue-winged Teal, <i>A. discors</i>	B2, M3	w
Cinnamon Teal, <i>A. cyanoptera</i>	S3, M3	w
Northern Shoveler, <i>A. clypeata</i>	B3, M3	w
Gadwall, <i>A. strepera</i>	S3, M3	w
American Wigeon, <i>A. americana</i>	S3, M3	w
Canvasback, <i>Aythya valisineria</i>	B5, M5	w
Redhead, <i>A. americana</i>	S5, M5, W5	w
Ring-necked Duck, <i>A. collaris</i>	S5, M5	w
Lesser Scaup, <i>A. affinis</i>	S5, M3, W3	w
Common Goldeneye, <i>Bucephala clangula</i>	S5, M3, W3	w
Barrow's Goldeneye, <i>B. islandica</i>	S6, M5	w
Bufflehead, <i>B. albeola</i>	S5, M3	w
Common Merganser, <i>Mergus merganser</i>	S3, M5	w
Ruddy Duck, <i>Oxyura jamaicensis</i>	B5, M3	w
FALCONIFORMES		
Cathartidae		
Turkey Vulture, <i>Cathartes aura</i>	S3, M3, W6	sw
Accipitridae		
Osprey, <i>Pandion haliaetus</i> ⁵	M5	w
Bald Eagle, <i>Haliaeetus leucocephalus</i> ⁶	M5, W3	sw
Northern Harrier, <i>Circus cyaneus</i>	R2	sw
Sharp-shinned Hawk, <i>Accipiter striatus</i> ⁴	S5, M5, W5	sw
Cooper's Hawk, <i>A. cooperii</i>	S3, M5, W5	sw
Northern Goshawk, <i>A. gentilis</i>	S5, M5, W5	sw
Swainson's Hawk, <i>Buteo swainsoni</i>	B3, M3, W5	sw
Red-tailed Hawk, <i>B. jamaicensis</i>	B3, M3, W5	sw
Ferruginous Hawk, <i>B. regalis</i> ^{5,7}	B3, M3, W5	sw
Rough-legged Hawk, <i>B. lagopus</i>	S6, M2, W2	sw
Golden Eagle, <i>Aquila chrysaetos</i>	B3, M4, W2	sw
Falconidae		
American Kestrel, <i>Falco sparverius</i>	B2, M2, W3	sw
Merlin, <i>F. columbarius</i> ⁵	R5	sw

Table 3

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Taxa	Abundance ¹ , season, and breeding status ²	Habitat ³
Peregrine Falcon, <i>F. peregrinus</i> ⁶	S5, M5, W5	sw
Gyr Falcon, <i>F. rusticolus</i> ⁷	M6	sw
Prairie Falcon, <i>F. mexicanus</i> ⁵	R3	sw
GALLIFORMES		
Phasianidae		
Gray Partridge, <i>Perdix perdix</i>	R3	g, ss, f
Chukar, <i>Alectoris chukar</i>	R3	g, ss
Ring-necked Pheasant, <i>Phasianus colchicus</i>	R3	g, ss
Blue Grouse, <i>Dendragapus obscurus</i>	S6	f
Sage Grouse, <i>Centrocercus urophasianus</i>	R2	ss, g, f
GRUIFORMES		
Rallidae		
Sora, <i>Porzana carolina</i>	B5, M5	w, f
American Coot, <i>Fulica americana</i>	R3	w
CHARADRIIFORMES		
Charadriidae		
Killdeer, <i>Charadrius vociferus</i>	B2, M2	sw
Recurvirostridae		
American Avocet, <i>Recurvirostra americana</i>	S2, M3	w
Scolopacidae		
Greater Yellowlegs, <i>Tringa melanoleuca</i>	M5	w
Lesser Yellowlegs, <i>T. flavipes</i>	S5, M5	w
Solitary Sandpiper, <i>T. solitaria</i>	S5, M3	w
Willet, <i>Catoptrophorus semipalmatus</i>	S3, M3	w, ss
Spotted Sandpiper, <i>Actitis macularia</i>	S3, M3	w
Long-billed Curlew, <i>Numenius americanus</i> ^{4,5}	S3, M3	w, ss
Marbled Godwit, <i>Limosa fedoa</i>	S3, M5	w
Least Sandpiper, <i>Calidris minutilla</i>	S5, M5	w
Long-billed Dowitcher, <i>Limnodromus scolopaceus</i>	M5	w
Common Snipe, <i>Gallinago gallinago</i>	S5, M5	w
Wilson's Phalarope, <i>Phalaropus tricolor</i>	S3, M3	w
Red-necked Phalarope, <i>P. lobatus</i>	M5	w
Laridae		
Franklin's Gull, <i>Larus pipixcan</i>	S3, M3	w, ss
Bonaparte's Gull, <i>L. philadelphia</i>	M5	w
Ring-billed Gull, <i>L. delawarensis</i>	S3, M3	w, ss, g
California Gull, <i>L. californicus</i>	S5, M3	w, ss
Herring Gull, <i>L. argentatus</i>	S3, M3	w, ss, g
Black-legged Kittiwake, <i>Rissa tridactyla</i>	W6	w
Caspian Tern, <i>Sterna caspia</i>	M5	w
Forster's Tern, <i>S. forsteri</i>	S5	w
Black Tern, <i>Chlidonias niger</i>	S5, M5	w
COLUMBIFORMES		
Columbidae		
Rock Dove, <i>Columba livia</i>	R2	sw
Mourning Dove, <i>Zenaidura macroura</i>	B1, M3, W5	sw
STRIGIFORMES		
Strigidae		
Great Horned Owl, <i>Bubo virginianus</i>	R3	sw
Snowy Owl, <i>Nyctea scandiaca</i>	W5	sw
Burrowing Owl, <i>Athene cunicularia</i> ⁵	B3, M3, W6	ss, g
Long-eared Owl, <i>Asio otus</i>	B4, M4	d
Short-eared Owl, <i>A. flammeus</i> ⁴	B3, M3	ss, g
Northern Saw-whet Owl, <i>Aegolius acadicus</i>	S6, M6, W6	sw
CAPRIMULGIFORMES		
Caprimulgidae		
Common Nighthawk, <i>Chordeiles minor</i>	B2, M3	sw
APODIFORMES		
Apodidae		
White-throated Swift, <i>Aeronautes saxatalis</i>	S5	d

Table 3 continued.

Taxa	Abundance ¹ , season, and breeding status ²	Habitat ³
Trochilidae		
Rufous Hummingbird, <i>Selasphorus rufus</i>	S3, M3	d
CORACIIFORMES		
Alcedinidae		
Belted Kingfisher, <i>Ceryle alcyon</i>	S3, M3	w
PICIFORMES		
Picidae		
Downy Woodpecker, <i>Picoides pubescens</i>	B5, M5	d
Northern Flicker, <i>Colaptes auratus</i>	B3, M3	d
PASSERIFORMES		
Tyrannidae		
Olive-sided Flycatcher, <i>Contopus borealis</i>	S5, M5	d
Western Flycatcher, <i>Empidonax difficilis</i>	S5	d
Say's Phoebe, <i>Sayornis saya</i>	B3, M3	ss, d, f, j
Ash-throated Flycatcher, <i>Myiarchus cinerascens</i>	S5	d
Western Kingbird, <i>Tyrannus verticalis</i>	B3, M3	f, d, j
Eastern Kingbird, <i>T. tyrannus</i>	B3, M3	f, d, j
Alaudidae		
Horned Lark, <i>Eremophila alpestris</i>	R2	g, ss
Hirundinidae		
Tree Swallow, <i>Tachycineta bicolor</i>	B3, M3	d, j
Violet-green Swallow, <i>T. thalassina</i>	B4, M4	d, j
Northern Rough-winged Swallow, <i>Stelgidopteryx serripennis</i>	B3, M3	d, j
Bank Swallow, <i>Riparia riparia</i>	B5, M3	d, j
Cliff Swallow, <i>Hirundo pyrrhonota</i>	B2, M2	d, j
Barn Swallow, <i>H. rustica</i>	B2, M3	d, j
Corvidae		
Clark's Nutcracker, <i>Nucifraga columbiana</i>	S4, M4, W5	j
Black-billed Magpie, <i>Pica pica</i>	R2	sw
American Crow, <i>Corvus brachyrhynchos</i>	R3	sw
Common Raven, <i>C. corax</i>	R3	sw
Troglodytidae		
Rock Wren, <i>Salpinctes obsoletus</i>	B3, M3	ss
Canyon Wren, <i>Catherpes mexicanus</i>	S5, M5	ss
House Wren, <i>Troglodytes aedon</i>	R3	d
Muscicapidae		
Ruby-crowned Kinglet, <i>Regulus calendula</i>	M3, W6	d
Western Bluebird, <i>Sialia mexicana</i> ⁴	S5, M5	ss
Mountain Bluebird, <i>S. currucoides</i>	S3, M3	ss
Townsend's Solitaire, <i>Myadestes townsendi</i>	S5, M5	d
American Robin, <i>Turdus migratorius</i>	B2, M2	sw
Varied Thrush, <i>Ixoreus naevius</i>	W6	ss
Mimidae		
Northern Mockingbird, <i>Mimus polyglottos</i>	S6	j
Sage Thrasher, <i>Oreoscoptes montanus</i>	B2, M2	ss
Motacillidae		
Water Pipit, <i>Anthus spinoletta</i>	M5	ss
Bombycillidae		
Bohemian Waxwing, <i>Bombycilla garrulus</i>	S3, M2, W3	f, d
Cedar Waxwing, <i>B. cedrorum</i>	S5, M3, W5	f, d
Laniidae		
Northern Shrike, <i>Lanius excubitor</i>	M3, W5	sw
Loggerhead Shrike, <i>L. ludovicianus</i> ⁴	B3	ss

Table 3 con

Taxa

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Fringillidae
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Passeridae
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¹Abundance
²1. Abundant
³2. Common
⁴3. Uncommon
⁵4. Occasional
⁶5. Rare
⁷6. Vagrant
⁸Breeding and
R = Breeding
B = Summer
M = Migration
W = Winter
S = Summer

Table 3 continued

Habitat ³	Taxa	Abundance ¹ , season, and breeding status ²	Habitat ³
d	Sturnidae		
	European Starling, <i>Sturnus vulgaris</i>	R3	sw
	Vireonidae		
w	Warbling Vireo, <i>Vireo gilvus</i>	S5, M5	d
	Emberizidae		
	Yellow Warbler, <i>Dendroica petechia</i> ⁴	B5, M3	d
	Yellow-rumped Warbler, <i>D. coronata</i>	S3, M3	d
d	Townsend's Warbler, <i>D. townsendi</i>	M5	d
d	American Redstart, <i>Setophaga ruticilla</i>	M6	f
	Common Yellowthroat, <i>Geothlypis trichas</i>	S5	d
	Wilson's Warbler, <i>Wilsonia pusilla</i>	S5, M5	d
	Yellow-breasted Chat, <i>Icteria virens</i>	S5	d
d	Western Tanager, <i>Piranga ludoviciana</i>	S3, M3	d
d	Black-headed Grosbeak, <i>Pheucticus melanocephalus</i>	S5, M5	sw
ss, d, f, j	Lazuli Bunting, <i>Passerina amoena</i>	S5, M5	d
d	Green-tailed Towhee, <i>Pipilo chlorurus</i>	S3, M3	ss
f, d, j	Rufous-sided Towhee, <i>P. erythrophthalmus</i>	S3, M3	sw
f, d, j	Chipping Sparrow, <i>Spizella passerina</i>	M5	f, d, ss
	Brewer's Sparrow, <i>S. breweri</i>	B2, M2	ss
g, ss	Vesper Sparrow, <i>Poocetes gramineus</i>	B3, M3	g, ss
	Lark Sparrow, <i>Chondestes grammacus</i>	S3, M5	sw
d, j	Black-throated Sparrow, <i>Amphispiza bilineata</i>	S5, M5	ss
d, j	Sage Sparrow, <i>A. belli</i>	B2, M2	ss
d, j	Lark Bunting, <i>Calamospiza melanocorys</i>	S5, M5	ss
d, j	Savannah Sparrow, <i>Passerculus sandwichensis</i>	S5, M3	d, g
d, j	Song Sparrow, <i>Melospiza melodia</i>	S5, M3	d
d, j	White-crowned Sparrow, <i>Zonotrichia leucophrys</i>	M4	ss
	Dark-eyed Junco, <i>Junco hyemalis</i>	M3	sw
j	Snow Bunting, <i>Plectrophenax nivalis</i>	W5	g, ss
sw	Red-winged Blackbird, <i>Agelaius phoeniceus</i>	B3, M3	w, ss
sw	Western Meadowlark, <i>Sturnella neglecta</i>	B2, M2, W3	g, ss
sw	Yellow-headed Blackbird, <i>Xanthocephalus xanthocephalus</i>	B4, M3	w, d
	Brewer's Blackbird, <i>Euphagus cyanocephalus</i>	B2, M2, W5	sw
ss	Brown-headed Cowbird, <i>Molothrus ater</i>	B3, M3	ss
ss	Northern Oriole, <i>Icterus galbula</i>	S3, M3	d
d	Fringillidae		
	Rosy Finch, <i>Leucosticte arctoa</i>	M5, W5	ss
d	House Finch, <i>Carpodacus mexicanus</i>	S3, M3	f, d
ss	Pine Siskin, <i>Carduelis pinus</i>	S5, M3	f, d
ss	American Goldfinch, <i>C. tristis</i>	M5	d, ss
d	Evening Grosbeak, <i>Coccothraustes vespertinus</i>	S5, M3	d
sw	Passeridae		
ss	House Sparrow, <i>Passer domesticus</i>	B2, M1, W3	f, d

¹Abundance code (see text for definitions of terms):

1. Abundant
2. Common
3. Uncommon
4. Occasional or local
5. Rare
6. Vagrant or accidental

²Breeding and seasonal code:

- R = Breeder and year-round resident
- B = Summer breeder
- M = Migrant
- W = Winter visitor
- S = Summer visitor; no breeding records

³Habitat code (multiple habitats listed for a particular species are given in descending order of preference):

- w = on or near water
- ss = shrub-steppe
- d = deciduous or riparian
- j = juniper woodland
- g = grassland
- sw = sitewide
- f = facility complexes

⁴Audubon Blue List (Tate and Tate 1982)⁵Sensitive Species (USDI Bureau of Land Management)⁶Endangered (Federal Register 1976)⁷Species of Special Concern (Idaho Department of Fish and Game, 1977)

TABLE 4. Mammals recorded on the Idaho National Environmental Research Park.

Taxa	Distribution and Habitat	Abundance ¹
INSECTIVORA		
Soricidae		
Merriam Shrew, <i>Sorex merriami</i>	Sitewide; sagebrush-steppe	Uncommon
CHIROPTERA		
Vespertilionidae		
Little Brown Myotis, <i>Myotis lucifugus</i>	Sitewide; roosts in buildings	Common
Small-footed Myotis, <i>M. leibii</i> <i>Ciliolabrum</i>	Sitewide; rocky outcrops & lava	Abundant
Long-eared Myotis, <i>M. evotis</i>	SE NERP; junipers	Common
Big-brown Bat, <i>Eptesicus fuscus</i>	Sitewide; roosts in buildings & caves	Common
Hoary Bat, <i>Lasiurus cinereus</i>	Patchy; riparian & junipers	Uncommon
Townsend's Big-eared Bat, <i>Plecotus townsendii</i>	Sitewide; caves & lava tubes	Abundant
LAGOMORPHA		
Leporidae		
White-tailed Jackrabbit, <i>Lepus townsendii</i>	Sitewide; sagebrush-steppe	Occasional
Black-tailed Jackrabbit, <i>L. californicus</i>	Sitewide; sagebrush-steppe	Abundant-occasional (cyclic)
Nuttall's Cottontail, <i>Sylvilagus nuttallii</i>	Sitewide; sagebrush-steppe, facilities	Common
Pygmy Rabbit, <i>S. idahoensis</i> ²	Patchy; sagebrush-steppe & rocky outcrops	Common
RODENTIA		
Sciuridae		
Least Chipmunk, <i>Tamias minimus</i>	Sitewide; sagebrush-steppe	Abundant
Yellow-bellied Marmot, <i>Marmota flaviventris</i>	Sitewide; rocky outcrops	Uncommon
Townsend's Ground Squirrel, <i>Spermophilus townsendii</i>	Sitewide; sagebrush-steppe, facilities	Common
Geomyidae		
Northern Pocket Gopher, <i>Thomomys talpoides</i>	Patchy; sagebrush-steppe	Occasional
Heteromyidae		
Great Basin Pocket Mouse, <i>Perognathus parvus</i>	Sitewide; sagebrush-steppe	Uncommon
Ord's Kangaroo Rat, <i>Dipodomys ordii</i>	Sitewide; sagebrush-steppe & grassland	Common
Castoridae		
Beaver, <i>Castor canadensis</i>	Patchy; Big Lost River	Local
Cricetidae		
Western Harvest Mouse, <i>Reithrodontomys megalotis</i>	Sitewide; sagebrush-steppe & grassland	Common
Deer Mouse, <i>Peromyscus maniculatus</i>	Sitewide; all habitats	Abundant
Northern Grasshopper Mouse, <i>Onychomys leucogaster</i>	Sitewide; sagebrush-steppe	Occasional
Bushy-tailed Woodrat, <i>Neotoma cinerea</i>	Sitewide; rocky outcrops	Common
Montane Vole, <i>Microtus montanus</i>	Sitewide; grassland & facilities	Abundant-occasional (cyclic)
Sagebrush Vole, <i>Lagurus curtatus</i> ³	Patchy; sagebrush-steppe	Uncommon
Muskrat, <i>Ondatra zibethicus</i>	Patchy; aquatic	Rare
Muridae		
Norw., facilities	Common	
Podidae		
in Pocket Mouse, <i>Perognathus parvus</i>	Patchy; sagebrush-steppe	Occasional
CARNIVORA		
Canidae		
Coyote, <i>Canis latrans</i>	Sitewide; all habitats	Common
Mustelidae		
Long-tailed Weasel, <i>Mustela frenata</i>	Sitewide; sagebrush-steppe	Common
Badger, <i>Taxidea taxus</i>	Sitewide; all habitats	Uncommon
Western Spotted Skunk, <i>Spilogale gracilis</i>	Sitewide; rocky outcrops	Rare
Felidae		
Mountain Lion, <i>Felis concolor</i>	Sitewide; transient	Vagrant
Bobcat, <i>F. rufus</i>	Sitewide; sagebrush-steppe, juniper	Uncommon

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Table 4

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Abundance ¹	Taxa	Distribution and Habitat	Abundance ¹
ARTIODACTYLA			
Uncommon	Cervidae		
	Wapiti, <i>Cervus elaphus</i>	Sitewide; transient	Vagrant
	Mule Deer, <i>Odocoileus hemionus</i>	Sitewide; sagebrush-steppe, grassland	Uncommon
Common	Moose, <i>Alces alces</i>	Sitewide; transient	Vagrant
	Antilocapridae²		
Abundant	Pronghorn, <i>Antilocapra americana</i>	Sitewide; sagebrush-steppe, facilities	Abundant
Common	Bovidae		
Common	Mountain Sheep, <i>Ovis canadensis</i>	North NERP; transient	Vagrant

¹See text for definition of abundance terms.²Green and Flinders (1980) place this in the genus *Brachylagus*.³Carleton and Musser (1984) place this in the genus *Lemmyscus*.⁴O'Gara and Matson (1975) do not recognize Antilocapridae as a valid family and place pronghorn in the family Bovidae.

dominates the area. Winter hibernacula for several species of snakes have been located and described (Sehman 1977). With the exception of the rubber boa, none of the reptiles recorded on the NERP were unexpected. Two species that were expected but not recorded on the Idaho NERP were the leopard frog (*Rana pipiens*) and the western racer (*Coluber constrictor*). Both have been collected within a few kilometers of the site (Sehman and Linder 1978). With the possible exception of these two species, and the possibility of minor range extensions or the discovery of some species in different habitats, the inventory of the herpetofauna on the Idaho NERP is probably complete.

A total of 164 species of birds were recorded on the Idaho NERP (Table 3). One hundred thirty-five species were recorded during the summer months, but only 59 (49%) of these were reported breeding on the site. Emberizids (mostly sparrows and blackbirds), raptors, waterfowl, and swallows accounted for nearly 50% of the breeding species. Breeding records were lacking for 76 species classified as summer visitors. Most of these were waterfowl, shorebirds, and emberizids (mostly warblers and sparrows) with 13, 15, and 15 species, respectively. Forty-six bird species were recorded on site during the winter. Forty of these were also observed on the NERP during the summer. Six species were recorded during the winter only or during the winter and migration. Nineteen species (mostly shorebirds and emberizids) were observed only during migration.

Thirty percent of the wintering species recorded on the NERP were raptors. The

number of birds of prey wintering on the NERP is tightly coupled to fluctuations in the black-tailed jackrabbit (*Lepus californicus*) population (Craig et al. 1983). During winters of low jackrabbit abundance (i.e., 1974-75 and 1975-76), an average of fewer than 15 raptors were recorded biweekly along a 187 km survey route. Eighty percent of these were Rough-legged Hawks (*Buteo lagopus*). During the winter of 1981-82, when the rabbit population was high, each survey along the same route averaged nearly 142 raptors. Rough-legged Hawks and Golden Eagles (*Aquila chrysaetos*) accounted for 48% and 30% of the sightings, respectively. As many as 108 Golden Eagles and 15 Bald Eagles have been observed on the NERP in a single day (Watson 1984).

Five species of gallinaceous birds were recorded on the NERP. The Sage Grouse (*Centrocercus urophasianus*) was, however, the only common upland game bird on the park (Table 3). The NERP supports both wintering and breeding populations of Sage Grouse (Connelly 1982, Connelly and Markham 1983, Gates 1983). Wintering flocks include birds that are year-round site residents and large numbers of grouse that summer in the mountain valleys and agricultural areas adjacent to the NERP (Connelly 1982). Sixty-seven sage grouse leks have been identified on the site (Connelly and Ball 1983).

Trost et al. (1977) listed 305 bird species in southeast Idaho. Of these, 216 occur in habitats similar to those found on the Idaho NERP. Thus, the avifauna records presented here represent about 75% of the species that potentially could occur on the Idaho NERP.

Increased efforts, especially during the breeding season, are needed to completely inventory the NERP avifauna.

Thirty-nine species of mammals were recorded on the Idaho NERP (Table 4). With the exception of a few transient species (i.e., moose, [*Alces alces*], wapiti [*Cervus elaphus*], mountain sheep [*Ovis canadensis*], and mountain lion [*Felis concolor*]), the majority of the species were resident on the NERP throughout the year. Most chiropterans presumably migrate from the NERP in the winter, but some of the many caves and lava tubes present on site are used as winter hibernacula. The extent of the wintering bat population is currently under investigation.

Several predator-prey (Johnson 1978, Johnson and Hansen 1979, Laundré et al. 1978, MacCracken 1980, MacCracken and Hansen 1982), synecology (Fraley et al. 1982, Gates 1983, R. Johnson 1982), and autecology (Fisher 1979, French et al. 1965, Grant 1983, Wilde 1978) studies conducted on the Idaho NERP addressed rabbits and hares. Although all leporid populations may be cyclic, numbers of black-tailed jackrabbits were the most variable of the four species found on the NERP. Their densities ranged from less than 0.5/km² during population lows to more than 142/km² during the peak phase of the cycle (Stoddart 1983). All four leporids occurred sitewide, but the pygmy rabbit (*Sylvilagus idahoensis*) appeared to be most specific in its habitat preference (Wilde 1978).

Many studies on the NERP directly or indirectly addressed rodent populations (e.g., Allred 1973, Groves 1981, Groves and Keller 1983, Halford 1981, Halford and Markham 1978, M. Johnson 1982, Johnson and Keller 1983, Reynolds 1980). Seventeen species representing seven families were recorded on site (Table 4). No rodent species were particularly novel in their presence or conspicuous in their absence on the Idaho NERP. Most rodents were recorded throughout the research park. The montane vole (*Microtus montanus*) and the western harvest mouse (*Reithrodontomys megalotis*) preferred grassland habitat. Predictably, the porcupine (*Erythron dorsatum*), beaver (*Castor canadensis*), and muskrat (*Ondatra zibethicus*) were most abundant along the Big Lost River, although the latter was occasionally recorded in settling

ponds near facilities and, even less frequently, in sagebrush habitat and agricultural fields.

Six species of carnivores were recorded on the NERP (Table 4). Striped skunks (*Mephitis mephitis*) were recorded within 10 km of the southern and southwestern boundary of the site but to date have not been reported on the NERP. With the exception of the spotted skunk (*Spilogale gracilis*), all occurred throughout the site. Coyotes (*Canis latrans*) and weasels (*Mustela frenata*) were the most abundant mammalian predators. Coyotes on the NERP were the focus of several completed and ongoing studies (e.g., Davison 1980, Johnson 1978, Laundré 1979, Stoddart 1983, Woodruff 1977). Two studies have directly addressed bobcats (Bailey 1972, Knick and Ball 1983). Populations of both species track but lag behind cyclic jackrabbit populations. Studies on the other carnivores of the park are lacking.

Pronghorn antelope (*Antilocapra americana*) were the most abundant and conspicuous of the big game animals on the research park. Populations of pronghorn fluctuate seasonally (Hoskinson and Tester 1980, Reynolds and Rose 1978, 1982). More than 4,500 pronghorn were recorded on the park during the winter of 1977-78. During typical summers, about 750 pronghorn used the research park. Little information was available on the mule deer (*Odocoileus hemionus*) of the NERP. Deer were infrequently observed by NERP biologists and other site personnel. Onsite population densities, seasonal movements, and local habitat preferences have not been studied in detail.

No fishes, amphibians, reptiles, or mammals recorded on the Idaho NERP were classified as threatened or endangered species (U.S. Fish and Wildlife Service 1982). However, both the endangered Peregrine Falcon and Bald Eagle were recorded on the NERP. Sightings of the former were rare during all seasons. The Bald Eagle was a consistent, albeit infrequent, winter visitor to the research park.

Although most of the mammals and herpetofauna were recorded throughout the site, less than 30% of the bird species were registered either in shrub-steppe habitat or sitewide in occurrence. Alternatively, on or

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near water was recorded as the preferred habitat for nearly 40% of the avifauna. Only two species (Clark's Nutcracker [*Nucifraga columbiana*] and Northern Mockingbird [*Mimus polyglottos*]) were recorded in the juniper stands only. Blue Grouse (*Dendragapus obscurus*) and American Redstart (*Setophaga ruticilla*), both accidental species, were the only birds recorded around facilities only.

Although all habitats were not used by wildlife in direct proportion to their availability, all habitats in the park evidently contribute somewhat to the overall diversity of vertebrate species on the NERP. The Idaho NERP provides a protected environment for an unexpected diversity and density of resident and migrant vertebrate species representative of the Snake River Plain and Northern Great Basin ecosystem. Undoubtedly the large expanse of the Idaho National Environmental Research Park, the controlled access requirements, and the relatively undisturbed native habitat are major factors that attract large wintering populations of pronghorn, raptors, and Sage Grouse. Although many ecological studies have been completed on the site since its NERP designation, continued study is required to fully inventory some taxa and to answer some population and distribution questions about others.

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