Camp W.G. Williams

Faunal Survey

April, 1996

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and

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INTRODUCTION

The Camp Williams faunal survey is part of an attempt to integrate the science of several disciplines into the working context of Ecosystem Management. It is an outgrowth of the Department of Defense's Integrated Training Area Management (ITAM) and the Land Condition Trend Analysis (LCTA) programs that are designed to monitor the health of ecosystems on Federally owned military installations.

Camp W.G. Williams is a military training facility of the Utah National Guard and has been used for manuevers and training exercises since 1914. In this time period, relatively little regard was been given to land health and resource management, and practically no ecological information had been collected. Other land use practices such as livestock grazing and agriculture have also had a long history at the Camp, but no information is available to document the influence of these land use practices on the ecosystems of Camp Williams.

In 1992, the Utah National Guard and Utah State University's College of Natural Resources launched a collaborative research effort to inventory, monitor, and manage the Camp's natural resources. Studies on fire ecology, range ecology, and plant ecology commenced and inventories of soil types, flora, and fauna were also conducted. This report documents the findings of the faunal survey conducted from June 1993 - July 1994 by personnel of the Department of Fisheries and Wildlife, Utah State University.

OBJECTIVES

The objectives of this investigation were to:

1 Inventory the distribution, abundance, and diversity of the avian, mammalian, and herpetofaunas occurring on the military base;
2. Identify species of special State or Federal status including all Endangered, Threatened, and Sensitive species found occurring on the base.
3 Quantify the effort required to inventory the faunas for undertaking future surveys at other military installations;
4 Provide management recommendations based on survey results to maintain and/or improve the wildlife habitats existing on the base.

STUDY AREA

Camp W.G. Williams is located in the Transverse mountains straddling Salt Lake and Utah Counties, Utah and approximately 40 km southwest of Salt Lake City. Topography is gently rolling to steep and ranges from 1373 to 2213 m in elevation. The Camp is approximately 10,000 ha and is bordered on the east by the Jordan River and on the west by the Oquirrh Mountains. The climate is temperate with hot, dry summers and cold winters.

The major vegetation types are characteristic of the shrub-steppe habitats of the Great Basin. Sagebrush (*Artemesia tridentata*)-grass (*Poa* spp.) habitats make up approximately 50% of the vegetation on the base, oakbrush (*Quercus gambeli*)-mountain brush (*Amelanchier alnifolia*) and (*Cercocarpus* spp.) habitats comprise approximately 40%, and juniper (*Juniperus utahensis*) woodlands interspersed with a few pinyon pines (*Pinus monophyla*) account for about 10% of the landscape. Habitats of special interest to wildlife include numerous rock outcrops, riparian zones, and moist canyons forested with Rocky Mountain maple (*Acer* spp.).

METHODS

Data on the bird, mammal, and herpetofaunas were collected from October 1992 through June 1994, with intensive field work occurring during the spring and summer months of 1993 and 1994. Songbirds were surveyed along transects consisting of eight fixed-distance circular plots (Reynolds et al. 1980), spaced at intervals of 200 m and stratified according to the proportional occurrence of various habitat types on the base. A total of 291 plots were censused between 21 June and 30 July 1993 and 5 May and 6 June 1994. An additional census was conducted in late April of 1995. Points were censused for 5 minutes and every bird seen or heard out to a distance of 50 m was recorded. Surveys were generally conducted during the period of peak songbird activity (i.e. between sunrise and 0930 h). Nocturnal birds were surveyed at points around the base using tape recording playback (Marion et al. 1981). Incidental observations of bird species were also employed to complement the "total" avian species list. Nests of high profile species such as raptors were located and monitored to determine breeding success during the survey.

Small mammals were trapped using a web design and distance sampling theory (Anderson et al. 1983, Wilson and Anderson 1985). Trapping was conducted between August 8 - September 24 1993 using Sherman live traps and each web was trapped for 3 consecutive nights. A total of 7 webs were trapped and each consisted of 8 rays 60 m long radiating from a center point. Ten traps were spread 6 m apart along each ray for a total of 80 traps/web. Webs were set in each of the three major habitat types.

Special habitat types such as riparian zones and rock outcrops were trapped using both Sherman live traps and wire squirrel-sized live traps. These traps were placed in likely locations and monitored for 3 consecutive nights. Traps were baited with peanut butter and rolled oats and slices of apple and carrot. Bats were captured on three occasions with mist nets set up during the evening hours at the Tickville Gulch spring.

Scent station lines were created to survey the relative abundance and diversity of predators (Linhart and Knowlton 1975, Conner et al. 1983). We established a series of 24 stations, spaced at intervals of approximately 1.6 km. Stations consisted of a 1 m diameter circle of sifted earth with a fatty acid scent disk used to attract predators. Predators visiting the station left tracks in the sifted dirt. Scent station lines were operated 22-25 October 1993 for 3 consecutive nights, for a single night on 29 June 1994, and again for 3 consecutive nights 17-19 November 1994. The locations of bird transects, mammal trapping sites and scent station lines

are shown in Fig. 1

Mule deer herd composition counts were conducted seasonally to determine sex ratios, doe:fawn ratios, and relative abundance of the Camp's deer herd. Early morning, evening, and spotlight counts all were used on standard road transect routes. Pellet plot counts were conducted by other researchers studying range utilization and provide a relative index to habitat use.

The only standardized method used to survey reptiles and amphibians were road transects in late afternoons and early evenings. This method proved largely unsuccessful however, as very few snakes were found on road ways for the distance driven. This method was abandoned in favor of directly searching likely areas for reptiles and amphibians. Areas searched included rocky slopes and outcrops, grassy meadows, and riparian zones. A noose of monofilament fishing line was used to catch lizards for identification.

RESULTS

At the completion of the faunal survey, a total of 130 terrestrial vertebrate species were found to exist at least seasonally on the Camp Williams property. This total included 95 birds, 25 mammals, 7 reptiles, and 3 amphibians. A checklist of vertebrates, information on taxonomy, distribution and abundance, and historical records is provided in the Appendix. The sampling effort expended for bats was relatively limited, and thus the mammalian species total may be conservative. Fish were not surveyed directly but there are potentially 8 species that exist in the Jordan River. These weaknesses could be rectified with further sampling. Results of each particular sampling method are presented in individual databases.

Of the 62 passerine (songbird) species documented, 67.8% were observed in both years of the study. The results of the bird transect surveys are summarized in Table 1. Increasing the number of plots by approximately 40% in 1994 resulted in a 100-125% increase in the total number of species encountered. However, the number of species observed on transects accounted for a maximum of 68% of the total number of species documented on the facility. Of the three principal vegetation types oakbrush harbored a slightly higher species richness (30), but the Shannon-Wiener species diversity index (H') was comparable to values calculated for either sagebrush or juniper. This is due to the fact that a single species, the rufous-sided towhee comprised >35% of the total number of individuals encountered in oakbrush. Riparian areas showed the highest diversity index in 1994.

The mammalian fauna comprised 56% rodents and lagomorphs, 16% bats and 24% carnivores and ungulates. Deer mice comprised 89.1% of the small mammals trappedin live traps, with Great Basin pocket mouse accounting for an additional 9.7%. In a parallel study that examined the effect of fire on small mammals in the oakbrush type deer mice comprised 94.1% of the animals captured in snap traps Godfrey (1995). Montane voles, pocket mice and least chipmunk accounted for 3.8%, 1.6% and 0.5% of the captures respectively. The western harvest

mouse (*Reithrodontomys megalotis*) was not encountered in the trapping efforts, although specimens exist in the Utah Museum of Natural History that were collected on or in the immediate vicinity of CW in 1947. The absence of shrews in the small mammal data probably reflects an artifact of not using pitfall traps.

The scent station surveys, yielded a weighted mean visitation rate of 0.32 visits per day for the three occasions on which the stations were operated. As indicated by Table 2, mule deer accounted for the largest proportion (48.8%) of the visits documented. House cats comprised approximately 8% of the visits recorded, and on some occasions may have been confused with bobcats.

Camp Williams is occupied by a large population of mule deer. We did not have the opportunity to conduct an aerial winter census of the herd. However, in April 1994 Capt. Robert Dunton counted approximately 2,000 animals in a single day. Given that the animals were probably concentrated within a single elevational zone to forage on spring green-up of cheatgrass (*Bromus tectorum*), it is not unreasonable to assume that this number represented 80-85% of the population on the base at that time. Herd composition counts conducted during the preceding fall indicated a ratio of 6♂♂:55♀♀:39 fawns. The winter of 1993-94 had been comparatively short and mild, likely producing minimimal overwinter fawn mortality. Population reconstruction estimates obtained from these figures suggest that the population on the CW property prior to the severe winter of 1992-93 may have numbered >2,500 animals.

One endangered species, the bald eagle, occasionally winters on or near the base but this is a time of reduced military activity and so conflicts do not arise. The reach of the Jordan River bordering the Camp Williams property is not particularly well suited for winter roosting of bald eagles, mainly due to the absence large cottonwood trees (*Populus deltoides*). However, at least one eagle used the Tickville Gulch area during the winter of 1992-93. It is noteworthy that the nearby Cedar and Rush Valleys have been the location of major concentrations of wintering bald eagles (Platt 1976).

Five Utah sensitive species also occur on the base. The American White Pelican is classified as sensitive, but only occasionally stops on the Jordan River and is not of major concern due to its infrequent visits to the eastern most boundary of the base. The Swainson's hawk and the loggerhead shrike are two migratory birds classified as sensitive species that do breed on the base in Spring and Summer. Both require large areas of open habitat to hunt small rodents and insects and the base provides nesting habitat and foraging areas for a limited number of each species. Two other sensitive species, Botta's pocket gopher and the northern pocket gopher are underground dwellers that occur year round at the base. These animals are estimated to be fairly common on the base due to the presence of many areas containing gopher mounds.

DISCUSSION

In spite of continuing disturbance resulting from military activities and associated recurrent fires as well as a long history of grazing, the CW vertebrate fauna appears to be moderately intact. The results of this investigation are not directly comparable with those of other faunal surveys in the general area, due to differences in location, elevational gradient and the spectrum of vegetation types represented. For example, studies in Red Butte Canyon in the Wasatch Range near Salt Lake City revealed a greater richness of both avian and mammalian species (Ehleringer et al. 1992). However, that site has been protected from most human-impact activities (including grazing), and features a well-developed riparian community as well as two additional vegetation associations not occurring on the CW property, namely aspen (*Populus tremuloides*) and conifer.

Determination of the species of amphibians and reptiles present in an area is problematical and nay require multiple sampling methods. Pitfall traps, often set in triads connected by drift fencing, are frequently employed (Bury and Raphael 1983, Quinney et al. 1991). However, this survey technique requires intensive effort and is difficult to apply on an extensive basis because of budgetary constraints. Moreover, pitfalls must remain open for long periods of time before accumulation of new species plateaus. Our surveys were similar to the "visual encounter surveys" described by Crump and Scott (1994) and the time-constrained variant of these surveys (Morrison et al. 1995), with particular emphasis on areas of special concern (i.e riparian corridors, springs, meadows and rock outcrops). As noted by Morrison et al. (1995), it is unlikely that such surveys will provide complete quantification of the amphibians and reptiles in a given location. The Utah milk snake (*Lampopeltis triangulum*), a Utah-sensitive (S1) species, may occur on the CW property (B. Bartholomew, pers. comm. June 1993). However, reptile surveys at Dugway Proving Ground have failed to document the occurrence of this species as well.

Although not documented directly as a part of of this study, a long history of grazing at Camp Williams may have led to degradation of the vegetation and riparian zones. An extensive body of literature exists on the ecological effects of grazing in western North America. Although not universally negative, the impacts of moderate to heavy stocking rates are usually detrimental. In a recent comprehensive review, Fleischner (1994) identified three overarching effects of grazing on ecosystems, namely: (1) alteration of community species composition; (2) disruption of ecosystem function; and (3) alteration of ecosystem structure.

The loss of vegetative structural diversity due to grazing is important for several reasons. It often results in decreased nesting cover for ground-nesting birds thereby increasing the vulnerability of the nests to predation (Gregg et al. 1994). Loft et al. (1987) observed that cattle grazing significantly reduced hiding cover for mule deer fawns during the first 2 months of life, thereby presumably increasing their vulnerability to predation. Secondly, altered vegetation structure may result in reduced abundance of insects, upon which many birds depend for food.

Bock et al. (1993) reviewed the effect of grazing on neotropical migratory landbirds in various western ecosystem types. In the shrubsteppe type, six times as many bird species showed negative responses to grazing as had positive responses. Bock et al. (1984) suggested that birds may be better able to cope with grazed landscapes than mammals due to their mobility and visual orientation.

Certain indirect effects of grazing may have significant impacts on the CW fauna. The most important of these are predator control efforts directed at mountain lions and coyotes. During the period covered by this investigation, it is estimated that six mountain lions were removed from the CW property by Animal Damage Control personnel (Dunton pers. comm.); the number of coyotes removed is unknown. A probable consequence of these removals is the reduction of predation pressure on the deer herd. This may be important, because the herd is not subject to annual removals by hunting.

Based on the results of the faunal survey, we make the following recommendations. Concerning grazing by domestic livestock

- Implement a rest-rotation system for cattle
- Create new water developments in each pasture
- Fence off Tickville and Oak Springs, and riparian areas to allow for vegetation recovery
- Improve husbandry practices for sheep to reduce incidence of predation by coyotes and mountain lions

Habitat Protection and Restoration

- Exclude grazing and military manuevers from areas with tall maple and oak trees, especially Oak Springs and canyons, because of the importance of these areas as unique habitat
- Plant willows and native vegetation in riparian zones to retore vegetation, stop runoff, and halt bank erosion
- Eliminate creation of unnecessary and haphazard firebreaks which destroy already fragmented sagebrush habitats
- Do not rotate training sites, and leave Beef Hollow and Wood Hollow undisturbed
- Limit additional road construction unless absolutely necessary
- Discourage additional attempts to stock Tickville pond with trout; it is too small, too

warm, and lacks sufficient oxygen, as well as adequate depth to overwinter game fish

Other Recommendations

- Place deer crossing signs along highway in front of cantonment area
- Do not disclose locations of nesting raptors and prohibit disturbance in these areas
- Commence a raptor banding program to monitor raptor populations on the Base
- Count deer, predators, and birds annually to index populations

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[1]Includes references on identification and distribution

Table 1 Results of breeding bird surveys conducted at Camp Willaims, Utah, 1993-1995

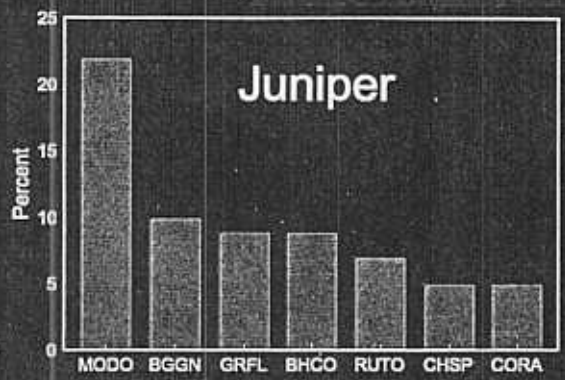
	Year		
	1993	1994	1995
Total plots	120	170	189
Total birds observed	236	593	519
Total number of species observed	29	65	57
Species richness and diversity (*H'*)			
Oakbrush	22 (2.27)	29 (2.67)	30 (2.49)
Juniper	7 (1.81)	23 (2.68)	26 (2.80)
Sagebrush	16 (2.19)	26 (2.74)	27 (2.65)
Agriculture - sagebrush		17 (2.54)	10 (2.06)
Riparian		28 (3.04)	21 (2.67)

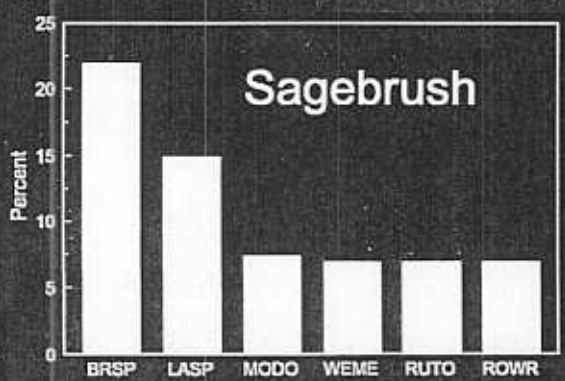
Table 2. Visitation statistics for scent station surveys conducted at Camp William, 1993-1994.

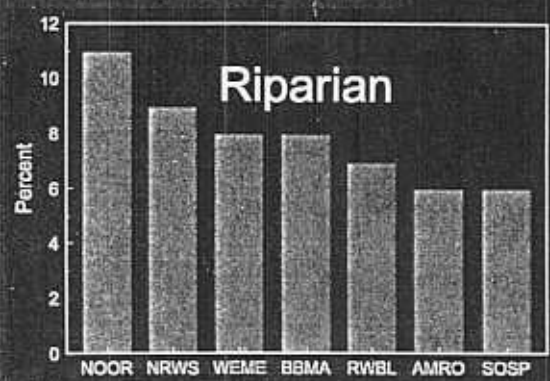
Statistic	Survey Dates		
	Oct. 1993	June 1994	Nov. 1994
Station "nights"	43	28	59
Total number of visits	17	8	16
Visitation rate (visits/24-hr period)	0.40	0.29	0.27
% visitation by species or taxon			
Mule deer	58.8	25.0	50.0
Bobcat	0	12.5	6.2
Coyote	0	12.5	6.2
Cougar	0	0	6.2
Skunk	0	0	6.2
House cat	5.9	12.5	6.2
Rodent	1 7	0	18.2
Other / unkonown[a]	23.5	37.5	6.2

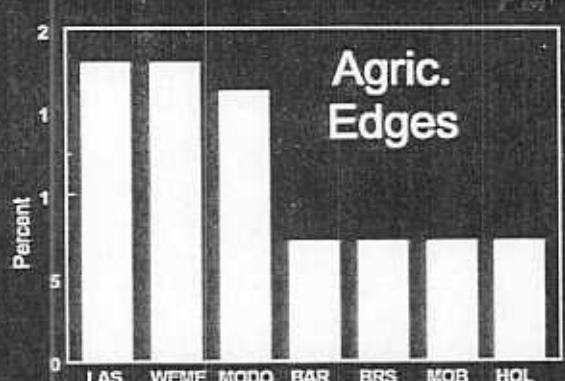
[a]Other includes magpie, cow and sheep

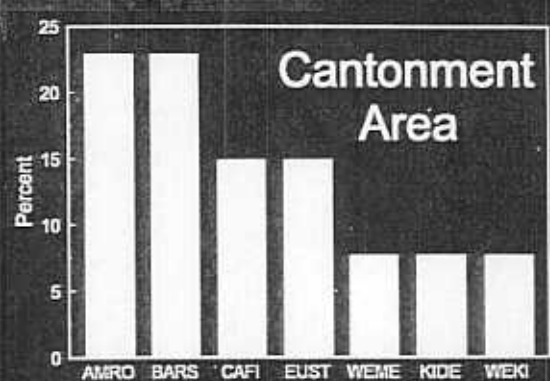
Relative Bird Species Abundance in Various Habitats











Species Abbreviations

AMRO = American Robin
BARS = Barn Swallow
BBMA = Black-billed Magpie
BGGN = Blue-gray Gnatcatcatcher
BHCO = Br.-headed Cowbird
BRSP = Brewer's Sparrow
CAFI = Cassin's Finch
CHSP = Chipping Sparrow
CORA = Common Raven
EUST = European Starling
GRFL = Gray Flycatcher
HOLA = Horned Lark
KIDE = Killdeer
LABU = Lazuli Bunting
LASP = Lark Sparrow
MOBL = Mountain Bluebird
MODO = Mourning Dove
NOOR = Northern Oriole
NRSW = N.Rough-winged Swallow
ROWR = Rock Wren
RSTO = Rufous-sided Towhee
RWBL = Red-winged Blackbird
VIWA = Virginia Warbler
WAVI = Warbling Vireo
WEKI = Western Kingbird
WEME = Western Meadowlark

Checklist of Vertebrates Species Known to Occur at Camp W.G. Williams National Guard Base June 21 1993 - July 1 1994

BIRDS

	Common Name	Scientific Name
1.	Canada Goose	(*Branta canadensis*)
2.	Mallard	(*Anas platyrhynchos*)
3.	Northern Pintail	(*Anas acuta*)
4.	Northern Shoveler	(*Anas clypeata*)
5.	Cinnamon Teal	(*Anas cyanoptera*)
6.	American Coot	(*Fulica americana*)
7.	Am. White Pelican	(*Pelecanus erythrorhynchos*)
8.	Great Blue Heron	(*Ardea herodias*)
9.	Snowy Egret	(*Egretta thula*)
10.	White-faced Ibis	(*Plegadus chihi*)
11.	California Gull	(*Larus californicus*)
12.	Ring-billed Gull	(*Larus delawarensis*)
13.	Forster's Tern	(*Sterna forsteri*)
14.	Killdeer	(*Charadrius vociferus*)
15.	Spotted Sandpiper	(*Actitis macularia*)
16.	Sage Grouse	(*Centrocercus urophasianus*)
17.	Ring-necked Pheasant	(*Phasianus colchicus*)
18.	Blue Grouse	(*Dendragapus obscurus*)
19.	Northern Harrier	(*Circus cyaneus*)
20.	Sharp-shinned Hawk	(*Accipiter striatus*)
21.	Cooper's Hawk	(*Accipiter Cooperii*)
22.	Red-tailed Hawk	(*Buteo jamaicensis*)
23.	Swainson's Hawk	(*Buteo swainsoni*)
24.	Rough-legged Hawk	(*Buteo lagopus*)
25.	Golden Eagle	(*Aquila chrysaetos*)
26.	Bald Eagle	(*Haliiaeetus leucocephalus*)
27.	Turkey Vulture	(*Cathartes aura*)
28.	American Kestrel	(*Falco sparverius*)
29.	Great Horned Owl	(*Bubo virginianus*)
30.	Long-eared Owl	(*Asio otus*)
31.	Belted Kingfisher	(*Ceryle alcyon*)
32.	Mourning Dove	(*Zenaida macroura*)
33.	Common Nighthawk	(*Chordeiles minor*)
34.	Common Poorwill	(*Phalaenoptilus nuttallii*)
35.	Broad-tailed Hummingbird	(*Selasphorus platycercus*)
36.	Black-chinned Hummingbird	(*Archilochus alexandri*)
37.	Hairy Woodpecker	(*Picoides villosus*)
38.	Northern Flicker	(*Colaptes auratus*)
39.	Eastern Kingbird	(*Tyrannus tyrannus*)
40.	Western Kingbird	(*Tyrannus verticalis*)
41.	Gray Flycatcher	(*Empidonax wrightii*)
42.	Western Flycatcher	(*Empidonax occidentalis*)
43.	Horned Lark	(*Eremophila alpestris*)
44.	Bank Swallow	(*Riparia riparia*)
45.	Northern Rough-winged Swallow	(*Stelgidopteryx serripennis*)

46. Cliff Swallow (*Hirundo pyrrhonota*)
47. Barn Swallow (*Hirundo rustica*)
48. Common Raven (*Corvus corax*)
49. Scrub Jay (*Aphelocoma coerulescens*)
50. Pinyon Jay (*Gymnorhinus cyanocephalus*)
51. Black-billed Magpie (*Pica pica*)
52. Black-capped Chickadee (*Parus atricapillus*)
53. Plain Titmouse (*Parus inornatus*)
54. House Wren (*Troglodytes aedon*)
55. Rock Wren (*Salpinctes obsoletus*)
56. Blue-gray Gnatcatcher (*Polioptila caerulea*)
57. Northern Mockingbird (*Mimus polyglottos*)
58. Sage Thrasher (*Oreoscoptes montanus*)
59. American Robin (*Turdus migratorius*)
60. Hermit Thrush (*Catharus guttatus*)
61. Mountain Bluebird (*Sialia currucoides*)
62. Loggerhead Shrike (*Lanius ludovicianus*)
63. European Starling (*Sturnus vulgaris*)
64. Solitary Vireo (*Vireo solitarius*)
65. Warbling Vireo (*Vireo gilvus*)
66. Yellow-rumped Warbler (*Dendroica coronata*)
67. Townsend's Warbler (*Dendroica townsendi*)
68. Black-throated Gray Warbler (*Dendroica nigrescens*)
69. Yellow Warbler (*Dendroica petechia*)
70. Virginia's Warbler (*Vermivora virginae*)
71. Orange-crowned Warbler (*Vermivora celata*)
72. Wilson's Warbler (*Wilsonia pusilla*)
73. Brewer's Blackbird (*Euphagus cyanocephalus*)
74. Red-winged Blackbird (*Agelaius phoeniceus*)
75. Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)
76. Western Meadowlark (*Sturnella neglecta*)
77. Brown-headed Cowbird (*Molothrus aeneus*)
78. Northern Oriole (*Icterus gularis*)
79. Western Tanager (*Piranga ludoviciana*)
80. White-crowned Sparrow (*Zonotrichia leucophrys*)
81. Lark Sparrow (*Chondestes grammacus*)
82. Chipping Sparrow (*Spizella passerina*)
83. Brewer's Sparrow (*Spizella breweri*)
84. Song Sparrow (*Melospiza melodia*)
85. Vesper Sparrow (*Pooecetes gramineus*)
86. Rufous-sided Towhee (*Pipilo erythrophthalmus*)
87. Green-tailed Towhee (*Pipilo chlorurus*)
88. Dark-eyed Junco (*Junco hyemalis*)
89. Black-headed Grosbeak (*Pheucticus melanocephalus*)
90. Lazuli Bunting (*Passerina amoena*)
91. House Finch (*Carpodacus mexicanus*)
92. Cassin's Finch (*Carpodacus cassinii*)
93. American Goldfinch (*Cardeulis tristis*)
94. Pine Siskin (*Carduelis pinus*)
95. House Sparrow (*Passer domesticus*)

MAMMALS

1.	California myotis	(*Myotis californicus*)
2.	Long-eared myotis	(*M. evotis*)
3.	Long-legged Myotis	(*M. volans*)
4.	Hoary Bat	(*Lasiurus cinereus*)
5.	Mountain Cottontail	(*Sylvilagus nuttallii*)
6.	Black-tailed Jackrabbit	(*Lepus californicus*)
7.	Least Chipmunk	(*Eutamias minimus*)
8.	Yellow-bellied Marmot	(*Marmota flaviventris*)
9.	Rock Squirrel	(*Spermophilus variegatus*)
10.	Botta's Pocket Gopher	(*Thomomys bottae*)
11.	Northern Pocket Gopher	(*Thomomys talpoides*)
12.	Great Basin Pocket Mouse	(*Perognathus parvus*)
13.	Chisel-toothed Kangaroo Rat	(*Dipodomys microps*)
14.	Beaver	(*Castor canadensis*)
15.	Deermouse	(*Peromyscus maniculatus*)
16.	Bushy-tailed Woodrat	(*Neotoma Cinerea*)
17.	Montane Vole	(*Microtus montanus*)
18.	House Mouse	(*Mus musculus*)
19.	Coyote	(*Canis latrans*)
20.	Raccoon	(*Pryocon lotor*)
21.	Long-tailed Weasel	(*Mustela frenata*)
22.	Striped Skunk	(*Mephitis mephitis*)
23.	Bobcat	(*Felis rufus*)
24.	Mountain Lion	(*Felis concolor*)
25.	Mule Deer	(*Odocoileus hemionus*)

REPTILES and AMPHIBIANS

1.	N. Sagebrush Lizard	(*Sceloporus graciousus*)
2.	Short-horned Lizard	(*Phrynosoma douglassii*)
3.	N. Side-blotched Lizard	(*Uta stansburiana*)
4.	Western Yellowbelly Racer	(*Coluber constrictor*)
5.	Striped Whipsnake	(*Masticophis taeniatus*)
6.	Great Basin Gopher Snake	(*Pituophis melanoleucus*)
7.	Great Basin Rattlesnake	(*Crotalus viridis*)
8.	Woodhouse's Toad	(*Bufo woodhousii*)
9.	Great Basin Spadefoot Toad	(*Scaphiopus intermontana*)
10.	Northern Leopard Frog	(*Rana pipiens*)

FISH

1.	Carp	(*Cyprinus carpio*)
2.	*Utah Sucker	(*Catostomus utahensis*)
3.	*Bluegill	(*Lepomis macrochirus*)
4.	*White Bass	(
5.	*Walleye	(*Stizostedion vitreum*)
6.	*Channel Catfish	(*Ictalurus punctatus*)
7.	*Bullhead Catfish	(*Ictalurus nebulosus*)

* denotes probably exsist but not verified

Key to Bird Species Abbreviations in Database

Abbrev.	Bird Species	Database Column
AMGO	American Goldfinch	F
AMKE	American Kestrel	G
AMRO	American Robin	H
BARS	Barn Swallow	I
BBMA	Black-billed Magpie	J
BCCH	Black-capped Chickadee	K
BGGN	Blue-gray Gnatcatcher	L
BHCO	Brown-headed Cowbird	M
BHGR	Black-headed Grosbeak	N
BLGR	Blue Grouse	O
BRBL	Brewer's Blackbird	P
BRSP	Brewer's Sparrow	Q
BTLH	Broad-tailed Hummingbird	R
CITE	Cinnamon Teal	S
CHSP	Chipping Sparrow	T
CONI	Common Nighthawk	U
CORA	Common Raven	V
DEJU	Dark-eyed Junco	W
GHOW	Great Horned Owl	X
GOEA	Golden Eagle	Y
GTTO	Green-tailed Towhee	Z
HETH	Hermit Thrush	AA
LABU	Lazuli Bunting	AB
LASP	Lark Sparrow	AC
MALL	Mallard Duck	AD
MOBL	Mountain Bluebird	AE
MODO	Mourning Dove	AF
NOHA	Northern Harrier	AG
NRWS	Northern Rough-winged Swallow	AH
OCWA	Orange-crowned Warbler	AI
PINT	Northern Pintail	AJ
PISI	Pine Siskin	AK
RNPH	Ring-necked Pheasant	AL
RSTO	Rufous-sided Towhee	AM
RTLH	Red-tailed Hawk	AN
RWBL	Red-winged Blackbird	AO
SOSP	Song Sparrow	AP
UISP	Unidentified Sparrow	AQ
VESP	Vesper Sparrow	AR
WAVI	Warbling Vireo	AS
WCSP	White-crowned Sparrow	AT
WEFL	Western Flycatcher	AU
WEME	Western Meadowlark	AV
WETA	Western Tanager	AW
YHBL	Yellow-headed Blackbird	AX
YWAR	Yellow Warbler	AY
BTGW	Black-throated Gray Warbler	AZ
GRFL	Gray Flycatcher	BA
VIWA	Virginia's Warbler	BB

ROWR	Rock Wren	BC
PLTI	Plain Titmouse	BD
SSHA	Sharp-shinned Hawk	BE
SCjA	Scrub Jay	BF
CAFI	Cassin's Finch	BG
SOVI	Solitary Vireo	BH
KIDE	Kill Deer	BI
EUST	European Starling	BJ
WEKI	Western Kingbird	BK
HOLA	Horned Lark	BL
NOOR	Northern Oriole	BM
WIWA	Wilson's Warbler	BN
SWHA	Swainson's Hawk	BO
BCHU	Black-chinned Hummingbird	BP
NOMO	Northern Mockingbird	BQ
LOSH	Loggerhead Shrike	BR
SATH	Sage Thrasher	BS
COHA	Cooper's Hawk	BT

GPS Locations for Scent Stations and Trapping Webs

Note - Any Station or Web that does not have a GPS File has been marked on the topo maps

Note - GPS Files taken on 10/24 and 10/25 are misplaced. They are probably in Joel's GPS Directory

Scent Station	Location	GPS File	Corrected	Averaged	ASCII
	---	---			
1	Base-Canal	A092300C	X	X	
Wood Hollow					
2	Rollerloop	A092301A	X	X	
3	Wood Hollow Road				
4	Wood Hollow Road				
5	WH Crossroads				
6	On Top Slope-WHR				
7	Below S Mtn-WHR				
Tickville Gulch					
8	Curve into TVGulch				
9	Turnoff to Bk Ridge				
Impact Area					
10	Impact Area				
11	Impact Area				
12	Oak Springs	A102415A			
13	Impact Area				
14	Junipers				
15	M60 Range	A102416B			
16	Rock	A102416D			
17	Demo Range				
Tickville Gulch					
18	S Gate Tickville	A102416A			
19	Region V				
20	Lower Tickville				
21	Upper Tickville	A102415B			
Watts Road					
22	100 Series F. Pt.	A102417A			
23	Cedar Point	A102417B			
24	Sheep Point	A092301F	X	X	
25	200 Series F. Pt.	A092301F	X	X	
26	Southeast Point	A092301D	X	X	
27	Refuse Point	A092301B	X	X	
Beef Hollow					
28	400 Series F. Pt.	A092118A	X	X	
29	Upper Beef Hollow	A102517A			
30	Lower Beef Hollow	A092119C	X	X	

Trapping Web	Location	Habitat	GPS File	Corrected	Averaged
Web 1	JordanRiver	Grass		X	X
Web 2	WattsRoad	Sage		X	X
Web 3	Tickville	Juniper			
Web 4	Beefhollow	Oak	A092119B	X	X
Web 5	Beefhollow	Oak	A092119A	X	X
Web 6	JordanRiver	Sage	A092300B	X	X
Web 7	400series Road	Grass	A092116A	X	X

Outcrops	Location	Habitat	GPS File	Corrected	Averaged
Eagle's Nest	Beef Hollow	Rock			
Eagle's Nest	Wood Hollow	Rock			
Outcrop/Meadow	Beef Hollow	Rock			
Outcrop	300 Series Road	Rock			

Species of State and Federal Concern Known to Occur at Camp W.G. Williams National Guard Base

Status	Season of Use	Abundance
Endangered		
Bald Eagle (Haliaeetus leucocephalus)	Winter	Occasional
Sensitive		
S1: due to declining populations		
Loggerhead Shrike (Lanius ludovicianus)	Migration-Summer	Common
Botta's Pocket Gopher (Thomomys bottae)	Yearlong	Common
Northern Pocket Gopher (T. talpoides)	Yearlong	Common
S1/S2: Due to declining populations and limited distribution		
Swainson's Hawk (Buteo swainsoni)	Migration-Summer	Common
White Pelican (Pelecanus erythrorhynchos)	Migration	Rare