

Craters of the Moon National Monument's 1997 Annual Breeding Bird Survey

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INTRODUCTION

Monitoring of bird species began at Craters of the Moon National Monument (CRMO) in 1988 with the implementation of an annual bird census, consisting of 34 sites located in 17 of the 26 vegetation types described in the monument (Day, T. A. & R. G. Wright, 1985). This census required a number of skilled staff and, due to the number of sites, a tremendous amount of days in the field.

Sites were widely dispersed and many required a great amount of traveling by foot to reach, making it impossible to complete more than 2 sites a day by one individual.

Additionally, the former census was established primarily to measure the health of the habitat, using avian species diversity as indicators. It is the purpose of the revised survey to make the bird species the focus of the study while the health of the habitat would become second with the implementation of the MAPS mist-netting program in the near future.

Lastly, the data collected in the former bird census was not compatible with data being collected by neighboring land management agencies or state bird monitoring programs. The focus of the CRMO census was species diversity, while other programs focus on the individual species populations, with special attention being given to species of concern, ie: threatened and endangered, neotropical migrants (neotrops) and sagebrush-steppe obligates.

The CRMO bird census was revised in January of 1997 with the input and assistance from professionals conducting surveys on neighboring lands and Idaho State Partners in Flight Program members, and was implemented during the 1997 field season.

METHODS

The new bird survey for CRMO was designed in accordance with the nationally accepted bird census standard protocols defined by the United States Fish and Wildlife Service's Breeding Bird Survey (BBS), however, it does incorporate some minor modifications. Since a 25 mile driving route does not exist in the monument, shorter routes were selected and include primarily trails that are censused on foot. The loop road is surveyed by vehicle, but is only 4.7 miles in length from the VC to the point where the one-way loop ends (spur roads not included in census).

The survey's Standard Operating Procedures (SOP's) recommend beginning the survey in mid-May after the arrival of the Brewer's Sparrow, and completing it by the end of June. The 1997 late spring/early summer season was wet and cool compared to the

average (Appendix 1), appearing to delay the arrival of a number of species of birds by approximately 2 weeks. As a result, the survey did not begin until 06/09/97 and ended 07/14/97.

The SOP's required that the observers complete and pass with a minimum score of 75%, the monument's Bird Skills Evaluation. Natalene Cummings, Resource Management Specialist conducted the 1997 survey after scoring a 98% on the evaluation.

The survey consists of five routes:

- 1 -LOOP DRIVE, starts at the stop sign where residential road joins the loop road at the end of the southern VC parking lot, and ends where the one-way loop ends.
- 2 -TREE MOLDS TRAIL, starts at the sign at the head of the trail.
- 3 -WILDERNESS TRAIL, starts at the sign at the head of the Broken Top/Wilderness trail.
- 4 -CAREY KIPUKA, starts at the North stake of the monument's Vegetation Trends Monitoring Transect, circling the kipuka half way between the top of the kipuka and the edge of the lava flows in a counter-clockwise direction.
- 5 -NORTH END ROAD, starts where Goodale's Cut-off separates Little Cottonwood road and follows the little Cottonwood Creek past Martin Mine to the end of the road near the top of the drainage.

Surveys begin a 1/2 hour before sunrise, with the exception of the North End Road Route. This route begins at sunrise to account for the light that is delayed by the ridge-tops of the drainage which, from former census observations, affects when birds become active and begin singing.

A walking wheel is used to measure out the distance between station stops on the walking routes at 250 meters (825 feet), with the exception of Carey Kipuka. Due to the thick vegetation and lack of a trail, use of the wheel is nearly impossible, making it necessary to pace out the distances. The odometer in the vehicle is used to measure the distance between station stops on the loop road at 500 meter (.31/mile) intervals.

The survey begins immediately upon arrival to the station (getting out of the vehicle on the Loop Road route) and lasts 3 minutes. A second individual was present when one was available to help keep the time and record data, however, only the surveyor's observations were transcribed. All birds heard or observed were recorded during each station stop. Although flyovers were separated from other observations, birds less than or greater than 50 meters were not separated. Future surveys

should separate these observations as well. Birds flushed while in route between stations were also counted. All transects were completed before the allowed maximum of 3.5 hours was reached. Attempts were made to avoid counting the same bird.

The vegetation types (Appendix 3) for each station were identified and recorded on the field form, using the Vegetation Types Map for reference.

All surveys were conducted under acceptable conditions as described in the bird survey SOP's.

RESULTS

A total of 19,500 meters were surveyed, consisting of 63 station stops, as is listed in Table 1. Vegetation types 1, 2, 3, 4, 6, 8, 11, 16, 21, 20, 21, 22, 24, 25, 26 & 27 were each surveyed in one or more of the routes.

The total number of individuals was 336 with the greatest number (133) on the wilderness trail and 33 on the North End road (Table 1). The average number of birds per stop ranged from 3.3 - 6.0 with an average of 5.2. Species richness ranged from 8 - 18 with the total number of species represented in all transects being 30. The average number of species at each stop ranged from 2.73 to 4 with an average for all sites at 3.6.

Table 1.

Craters of the Moon National Monument's 1997 Breeding Bird Survey route length, number of stops, habitat types, number of individuals per stop, species richness and average species per stop.

ROUTE	LEN-GTH	# of stp	habitat types	# ind (N)	avg bird per stop	spec richness	avg spc per stop
Walking Routes							
Wilderness	5,500	22	1,2,16,21,22	133	6.0	18	4.0
Tree Molds	2,750	7	2,16,22	41	5.9	8	3.9
Carey Kipuka	2,000	8	8,11	40	5	8	3.1
North end Road	2,750	11	2,4,20,24,25,26	34	3.3	12	2.7
Driving Route							
Loop Drive	7,500	15	1,2,3,21,22,27	89	5.9	16	4.5
TOTALS	19,500	63	1,2,3,4,8,11,16,17,21,22,24,25,26,27	336	5.2	30	3.6

The Brewer's Sparrow had the greatest % of total individuals with 20% followed by the Rock Wren with 18% and the Rufus-sided Towhee with 11% (Table 2).

The rock wren, Brewer's sparrow and the rufus-sided towhee were found on all five transects, and were present on the greatest number of stops - rock wren on 43 stops (68.2%), the Brewer's sparrow on 42 stops (66.7%) and the rufus-sided towhee on 24 stops (38.1%).

The sagebrush obligates as a whole made up 27% of the total number of individuals, while both the shrub-steppe neotropical and neotropical migrants made up 37%.

Table 2. Craters of the Moon National Monument's 1997 Breeding Bird Survey Species List, total number of individuals, percent of the total number of individuals, routes present on, the number of stops present on and the percent of the total stops.

Species	tot. no. of indi	% of tot. indi	Routes species found on	# of stops prsnt	% of stops
SAGEBRUSH OBLIGATES					
Sage Thrasher	23	6.9	LP, CK, WD	16	25.4
Brewer's Sparrow	67	20.0	NE, LP, TM, CK, WD	42	66.7
SHRUB-STEPPE NEOTROPICAL MIGRANTS					
Mourning Dove	25	7.5	NE, LP, TM, WD	17	27.0
Horned Lark	1	0.3	CK	1	1.6
NEOTROPICAL MIGRANTS					
Rock Wren	61	18.2	NE, LP, TM, CK, WD	43	68.2
Mountain Bluebird	10	3.0	LR, CK, WD	14	22.2
Warbling Vireo	3	0.9	NE	3	4.8
Western Tanager	7	2.1	NE, LP, WD	6	9.5
Lazuli Bunting	5	2.0	NE	4	6.3
Green-tailed Towhee	17	5.1	NE, LP, TM	14	22.2
Cassin's Finch	1	.3	LP	1	1.6
OTHER					
Red-tail Hawk	1	0.3	WD	1	1.6
American Kestrel	4	1.2	TM, WD	3	4.8
Northern Flicker	8	2.4	TM, CK, WD	8	12.7
Western Wood Pewee	1	0.3	LP	1	1.6
Dusky Flycatcher	4	1.2	NE, WD	3	4.8
Say's Phoebe	1	0.3	LP	1	1.6

Species	tot. no. of indi	% of tot. indi	Routes species found on	# of stops prsnt	% of stops
Violet-green Swallow	1	0.3	LP	1	1.6
Clark's Nutcracker	16	4.8	NE, LP, WD	10	15.9
Mountain Chickadee	6	1.8	LP, WD	6	9.5
House Wren	2	0.6	NE	1	1.6
Blue-gray Gnatcatcher	2	0.6	TM	2	3.2
American Robin	4	1.2	LP	2	3.2
MacGillivray's Warbler	1	0.3	NE	1	1.6
Black-headed Grosbeak	2	0.6	WD	2	3.2
Rufus-sided Towhee	37	11.0	NE, LP, TM, CK, WD	24	38.1
Chipping Sparrow	6	1.8	LP, WD	6	9.5
Western Meadowlark	14	4.2	CK	6	9.5
Brown-headed Cowbird	5	2.0	WD	3	4.8

TOTAL NUMBER OF INDIVIDUALS = 335

TOTAL NUMBER OF SPECIES = 29

Both of the sagebrush obligate species residing at CRMO; sage thrasher and Brewer's sparrow, and the mourning dove - a shrubsteppe neotropical migrant, were found in all of the general vegetation types, including lavas, sagebrush communities, "other" shrub-steppe communities, grasslands and forested areas (Table 3). The horned lark, a shrubsteppe neotropical migrant, however, was found only in sagebrush communities (8 & 11).

Of the neotropical migrants of concern, the rock wren was found in all but the other shrub-steppe communities, while the mountain bluebird and western tanager were in all but the sagebrush and "other" shrub steppe communities. The green-tailed towhee was in all but the sagebrush communities, while the Cassin's finch was in the lavas and riparian communities. The lazuli bunting found only in the riparian zone.

Table 3.a

CRATERS OF THE MOON NATIONAL MONUMENT

Arco, Idaho

BREEDING BIRD SURVEY -

Species list of the number of individuals found in each vegetation type

VEG TYPE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
SPECIES	LAVAS			SAGEBRUSH														OTHER			FORESTED						
SATH	X	X	X	X				X								X						X				X	
BRSP	X	X		X		X		X			X					X				X	X	X				X	X
<i>modo</i>	X	X						X								X						X				X	
<i>hola</i>								X			X																
<i>rowr</i>	X	X	X	X				X			X					X						X					X
<i>mobl</i>	X	X	X													X					X	X					
<i>wavi</i>																								X		X	
<i>weta</i>	X	X																				X		X			
<i>labu</i>																									X		X
<i>gtto</i>	X	X														X				X	X	X					X
<i>cafi</i>	X																					X					
RTHA	X	X																									
AMKE		X														X						X					
NOFL	X							X								X					X						
WEWP	X																					X					

BOLD CAPS = Sagebrush obligate species*italic* = neotropical migrants of concern**bold italic** = shrubsteppe neotropical migrants

Table 3.b

CRATERS OF THE MOON NATIONAL MONUMENT

Arco, Idaho

BREEDING BIRD SURVEY -

Species list of the number of individuals found in each vegetation type

VEG TYPE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
SPECIES	LAVAS			SAGEBRUSH												OTHER				FORESTED							
DUFL																					X				X	X	
SAPH			X																								
VGSW																					X						
CLNU																				X							
MOCH	X																				X						
HOWR																									X		
BGGN		X														X					X						
AMRO	X	X														X					X						
MAWA																							X				
BHGR	X	X																			X						
RSTO	X	X		X							X					X					X	X			X	X	X
CHSP	X	X														X					X						
WEME								X			X																
BHCO	X	X														X					X						
TOTAL	17	15	4	4		1		7			5					13				2	6	19		3	4	6	5

BOLD CAPS = Sagebrush obligate species*italic* = neotropical migrants of concern***bold italic*** = shrubsteppe neotropical migrants

See Appendix 2 for Vegetation Type descriptions

Individually, Vegetation type 1 (Cinder Gardens) made up the greatest percent of vegetation types represented in total number of stops on all routes with 20%. Vegetation type 16 followed with 15.9%, while 22, 26 and 2 represented 14.3, 14.3 and 12.6 respectively. Vegetation type 8 represented 11.1% while the remaining vegetation types made up less than 10% each (Table 3).

Generally, the forested communities made up 68.1% of the vegetation types represented in the total number of stops on all routes, the Lavas made up 34.9%, the sagebrush communities together made up 22.2%, followed by the "other" shrub communities at 15.9%, grasses at 4.8% and lastly, the developed areas at 3.2%.

Table 3. The percent vegetation type included on each of the Craters of the Moon Breeding Bird Survey routes.

Veg Types	Number of Stops on Trail						% of stops
	LP	TM	WD	CK	NE	Ttl	
Lavas							34.9
1	4	-	9	-	-	13	20.6
2	2	3	3	-	-	8	12.6
3	1	-	-	-	-	1	1.6
Sagebrsh							22.2
4	-	-	-	-	3	3	4.8
6	-	-	2	-	-	2	3.2
8	-	-	-	7	-	7	11.1
11	-	-	-	2	-	2	3.2
Otr.shrb							15.9
16	-	3	7	-	-	10	15.9
Grasses							4.8
20	-	-	-	-	3	3	4.8
Forests							68.1
21	5	-	-	-	-	5	7.9
22	3	1	5	-	-	9	14.3
24	-	-	-	-	2	2	3.2
25	-	-	-	-	2	2	3.2
26	-	-	-	-	7	2	14.3
Developd							3.2
27	2					2	3.2

LP = Loop Road CK = Carey Kipuka WD = Wilderness Trail
 NE = North End Rd TM = Tree Molds Trail

****Note - The total number of stops on each trail totaled 63, and that is the number used above to figure % of stops. However, the total number of stops in the vegetation types listed above is greater (76) due to the multiple vegetation types present at a number of the stops.****

CONCLUSION

The first run of the revised Breeding Bird Survey went well and proved to be much more efficient, requiring only one skilled observer, an individual to record data (when there was one available) and only 5 field days. In addition, the start points are easily and more quickly accessed, with the exception of Carey Kipuka which requires either a very early morning start, or an overnight camp at the trail head for a more reasonable

It is important to note that although the temperatures were within range of the 39 year average from November 1996 to June 1997, precipitation was double the average for November and December, but then drop dramatically in February through May before returning to "normal". Additionally, it was noted by park personnel and other bird census personnel on adjacent lands that some birds species were as much as 2-3 weeks late in their arrival; Western tanagers and house wrens in particular. It may be possible that the weather affected the arrival of birds, however, it seems more likely that wetter, cooler winter/spring seasons would deter their arrival. And, in spite of the dryer spring, it was very annoyingly obvious that the insect populations were bigger than they had been in many years, providing plenty of food for insect eating birds and nestlings.

Although it is not possible to compare data to former survey years, as it is the first year of this particular survey, observations made by experienced staff noted that the number of house wrens, vesper sparrows and morning doves calling this season was down from previous years when the former bird census was being conducted. It will be important to keep an eye on these species, as well as, other species of concern (neotrops and sagebrush obligates) in future surveys.

Appendix 1.

Precipitation (inches) and average monthly temperature values (degrees Fahrenheit) at Craters of the Moon National Monument for the 1996-1997 winter and spring seasons compared to the 39 year average (December 01, 1958 - July 31, 1997). Taken from Craters of the Moon National Monument NOAA Weather Records Database.

Precipitation (Inches)

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
39 yr avrg	1.47	1.93	2.07	1.54	1.35	1.04	1.69	1.34
96-97 seas	2.33	4.25	2.12	.02	.02	.66	.35	1.46

Temperature (Fahrenheit)

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
39 yr avrg	30.2	20.8	19.3	24.0	31.0	40.9	50.7	59.5
96-97 seas.		34.1	21.6	20.3	24.9	34.6	38.8	56.3
	60.9							

Appendix 2.

Code list for Birds Found at
Craters of the Moon National Monument's

AMCR AMERICAN CROW	EAGR EARED GREBE
AMDI AMERICAN DIPPER	EAKI EASTERN KINGBIRD
AMGO AMERICAN GOLDFINCH	EUST EUROPEAN STARLING
AMKE AMERICAN KESTREL	EVGR EVENING GROSBEAK
AMPI AMERICAN PIPIT	FEHA FERRUGINOUS HAWK
AMRO AMERICAN ROBIN	FISP FIELD SPARROW
AMRE AMERICAN REDSTART	FOSP FOX SPARROW
ATFL ASH-THROATED FLYCATCHER	GBHE GREAT BLUE HERON
BAEA BALD EAGLE	GCKI GOLDEN-CROWNED KINGLET
BAOW BARRED OWL	GCSP GOLDEN-CROWNED SPARROW
BASW BARN SWALLOW	GHOW GREAT HORNED OWL
BBMA BLACK-BILLED MAGPIE	GOEA GOLDEN EAGLE
BBWP BLACK-BACKED WOODPECKER	GRCA GRAY CATBIRD
BCCH BLACK-CAPPED CHICKADEE	GRJA GRAY JAY
BCHR BLACK-CHINNED HUMMINGBIRD	GRPA GRAY PARTRIDGE
BGGN BLUE-GRAY GNATCATCHER	GTTO GREEN-TAILED TOWHEE
BHCO BROWN-HEADED COWBIRD	GWTE GREEN-WINGED TEAL
BHGR BLACK-HEADED GROSBEAK	HAFL HAMMONDS FLYCATCHER
BLGR BLUE GROUSE	HASP HARRIS' SPARROW
BOWA BOHEMIAN WAXWING	HAWO HAIRY WOODPECKER
BRBL BREWER'S BLACKBIRD	HEGU HERRING GULL
BRCR BROWN CREEPER	HETH HERMIT THRUSH
BRSP BREWER'S SPARROW	HOFI HOUSE FINCH
BTGW BLACK-THROATED GRAY	HOLA HORNED LARK
WARBLER	HOSP HOUSE SPARROW
BTPI BAND-TAILED PIGEON	KILL KILLDEER
BTSP BLACK-THROATED SPARROW	LABU LAZULI BUNTING
BUOW BURROWING OWL	LASP LARK SPARROW
BWTE BLUE-WINGED TEAL	LEOW LONG-EARED OWL
CAFI CASSIN'S FINCH	LEWO LEWIS' WOODPECKER
CAGO CANADA GOOSE	LISP LINCOLN'S SPARROW
CAGU CALIFORNIA GULL	LOSH LOGGERHEAD SHRIKE
CAHU CALLIOPE HUMMINGBIRD	MALL MALLARD
CEWA CEDAR WAXWING	MAWA MACGILLIVRAY'S WARBLER
CHRA CHIHUAHUA RAVEN	MERL MERLIN
CHSP CHIPPING SPARROW	MOBL MOUNTAIN BLUEBIRD
CHUK CHUKAR	MOCH MOUNTAIN CHICKADEE
CLNU CLARK'S NUTCRACKER	MODO MOURNING DOVE
COFL CORDILLERAN FLYCATCHER	NAWA NASHVILLE WARBLER
COGR COMMON GRACKLE	NHWR NORTHERN HOUSE WREN
COHA COOPER'S HAWK	NOFL NORTHERN FLICKER
CONE COMMON NIGHTHAWK	NOGO NORTHERN GOSHAWK
COPO COMMON POORWILL	NOHA NORTHERN HARRIER (MARSH HAWK)
CORA COMMON RAVEN	NOOR NORTHERN ORIOLE
CORE COMMON REDPOLL	NOSH NORTHERN SHRIKE
COSN COMMON SNIPE	NSWO NORTHERN SAW-WHET OWL
DEJU DARK-EYED JUNCO	OCWA ORANGE-CROWNED WARBLER
DOWO DOWNY WOODPECKER	OSFL OLIVE-SIDED FLYCATCHER
DUFL DUSKY FLYCATCHER	

PIGR PINE GROSBEAK
PIJA PINYON JAY
PISI PINE SISKIN
PRFA PRAIRIE FALCON
RBGU RING-BILLED GULL
RBNU RED-BREASTED NUTHATCH
RCKI RUBY-CROWNED KINGLET
RECR RED CROSSBILL
REVI RED-EYED VIREO
RHWO RED HEADED WOODPECKER
RLHA ROUGH-LEGGED HAWK
RNPH RING-NECKED PHEASANT
RNSA RED-NAPED SAPSUCKER
RODO ROCK DOVE
ROFI ROSY FINCH
ROWR ROCK WREN
RSTO RUFOUS-SIDED TOWHEE
RTHA RED-TAILED HAWK
RUGR RUFFED GROUSE
RUHU RUFOUS HUMMINGBIRD
RWBL RED-WINGED BLACKBIRD
SAGR SAGE GROUSE
SAPH SAY'S PHOEBE
SATH SAGE THRASHER
SEOW SHORT-EARED OWL
SGSP SAGE SPARROW
SNBU SNOW BUNTING
SNGO SNOW GOOSE
SOSP SONG SPARROW
SOVI SOLITARY VIREO
SPSA SPOTTED SANDPIPER
SSHA SHARP-SHINNED HAWK

STJA STELLER'S JAY
SVSP SAVANNAH SPARROW
SWHA SWAINSON'S HAWK
TEWA TENNESSEE WARBLER
TOSO TOWNSEND'S SOLITAIRE
TOWA TOWNSEND'S WARBLER
TRSW TREE SWALLOW
TTWO THREE-TOED WOODPECKER
TUSW TUNDRA SWAN
TUVU TURKEY VULTURE
VATH VARIED THRUSH
VEER VEERY
VESP VESPER SPARROW
VGSW VIOLET-GREEN SWALLOW
WAVI WARBLING VIREO
WBNU WHITE-BREASTED NUTHATCH
WCSP WHITE-CROWNED SPARROW
WEBL WESTERN BLUEBIRD
WEKI WESTERN KINGBIRD
WEME WESTERN MEADOWLARK
WETA WESTERN TANAGER
WEWP WESTERN WOOD-PEWEE
WIFL WILLOW FLYCATCHER
WISA WILLIAMSON'S SAPSUCKER
WIWR WINTER WREN
WTSP WHITE-THROATED SPARROW
WTSW WHITE-THROATED SWIFT
YBCH YELLOW-BREASTED CHAT
YBSA YELLOW-BELLIED SAPSUCKER
YEWY YELLOW WARBLER
YHBL YELLOW-HEADED BLACKBIRD
YRWA YELLOW-RUMPED WARBLER

Appendix 3.

Craters of the Moon National Monument
Vegetation Types

LAVAS

- 1* Cinder Gardens
- 2* Low Vegetation Density Lava Flows
- 3* Medium Vegetation Density Lava Flows

SAGEBRUSH COMMUNITIES

- 4* Mountain Big Sagebrush/Bluebunch Wheatgrass
- 5 Mountain Big Sagebrush/Sandberg Bluegrass
- 6* Mountain Big Sagebrush/Needlegrass
- 7 Mountain Big Sagebrush/Needle-and-thread/Cheatgrass
- 8* Mountain Big Sagebrush/Idaho Fescue
- 9 Big Sagebrush/Cheatgrass
- 10 Complex of 4 and 8
- 11* Three-tip Sagebrush/Idaho Fescue
- 12 Early Low Sagebrush/Idaho Fescue
- 13 Low Sagebrush/Sandberg Bluegrass
- 14 Low Sagebrush/Idaho Fescue
- 15 Complex of 13 and 14

OTHER SHRUB COMMUNITIES

- 16* Antelope Bitterbrush
- 17* Antelope Bitterbrush/Great Basin Wildrye

GRASSLANDS

- 18 Bluebunch Wheatgrass/Idaho Fescue
- 19 Bluebunch Wheatgrass/Sandberg Bluegrass
- 20* Great Basin Wildrye

FOREST COMMUNITIES

- 21* Limber Pine/Bitterbrush (low total cover)
- 22* Limber Pine/Bitterbrush (high total cover)
- 23 Limber Pine/Bitterbrush (high density Limber Pine)
- 24* Douglas-fir/Mountain Snowberry
- 25* Upland Quaking Aspen
- 26* Riparian

DEVELOPED AREAS

- 27* Visitor Center and Residences

Bold* = Vegetation types present in the BBS routes

Appendix 4.a

CRATERS OF THE MOON NATIONAL MONUMENTBREEDING BIRD SURVEY-INDIVIDUAL ROUTE SPECIES LIST, ABUNDANCE
AND VEGETATION TYPE PRESENT INRoute Carey KipukaDate 06/25/97

SPECIES	ABUNDANCE	VEGETATION TYPE
Rock wren	2,2,1,1,1,1,1 /9	8, 8/11, 11
Meadow lark	3,1,1,3,3,3 /14	8, 8/11, 11
Rufus-sided towhee	1 /1	11
Mourning dove	1,2 /3	8
Sage thrasher	2,2,1,1 /6	8, 8/11
Horned lark	1 /1	8/11
Brewer's sparrow	1,2,1 /4	8, 8/11
Northern Flicker	1,1 /2	8

TOTAL: 8 species 40 individuals

Appendix 4.b

CRATERS OF THE MOON NATIONAL MONUMENTBREEDING BIRD SURVEY - INDIVIDUAL ROUTE SPECIES LIST, ABUNDANCE
AND VEGETATION TYPE PRESENT INRoute Tree Molds TrailDate 06/09/97

SPECIES	ABUNDANCE	VEGETATION TYPE
Northern flicker	1 /1	16
Rock wren	5,2,1,2,1,2,2 /15	16, 16/22, 2/16/22
Brewer's sparrow	1,1,3,1,2 /8	16, 16/22, 2/16/22
Green-tailed towhee	1,1,1 /3	16, 2/16/22
Mourning dove	1,2,2,1,1 /7	16, 16/22, 2/16/22
Rufus-sided towhee	1,1,1 /3	16, 2/16/22
Blue-gray gnatcatcher	1,1 /2	2/16/22
American kestrel	2 /2	2/16/22

TOTAL: 8 species 41 individuals

Appendix 4.c

CRATERS OF THE MOON NATIONAL MONUMENT
BREEDING BIRD SURVEY-INDIVIDUAL ROUTE SPECIES LIST, ABUNDANCE
AND VEGETATION TYPE PRESENT IN

Route Wilderness TrailDate 06/12/97

SPECIES	ABUNDANCE	VEGETATION TYPE
Rock wren	2,1,1,1,1,1,2,2,1,2,1,1,1,1,2 /20	1, 2, 16, 22, 2/1, 16/2
Rufus-sided towhee	1,1,1,1,1,1,1,3,2,2,1,1,1,1,1 /19	1, 16, 22, 1/22
Green-tailed towhee	1,3,1,2,1,1 /9	1, 2, 16, 22
Brewer's sparrow	1,1,1,1,1,2,3,1,1,2,2,1,2,1,2,3,3,4 /32	1, 2, 6, 16, 22, 2/16, 1/22
Mountain chickadee	1,1,1 /3	1, 22, 1/22
Northern flicker	1,1,1,1,1 /5	1, 16, 1/21
American kestrel	1,1 /2	16
Brown-headed cowbird	2,1,2 /24	1, 22, 2/16
Mourning dove	1,2,1 /4	1, 22, 2/16
Clark's nutcracker	1,2,1 /4	2, 16, 22
Black-headed grosbeak	1,1 /2	22, 1/2
Red-tailed hawk	1 /1	1/2
Chipping sparrow	1,1,1,1,1 /5	16, 22, 1/2, 1/22
Dusky flycatcher	1 /1	22
Western tanager	1,2,1,1 /5	22, 1/22
Sage thrasher	2,1,1,2,1,1,3,2 /13	1, 16, 22
Mountain bluebird	2,1 /3	16, 1/22

TOTAL: 17
species

133
individuals

CRATERS OF THE MOON NATIONAL MONUMENT
BREEDING BIRD SURVEY-INDIVIDUAL ROUTE SPECIES LIST, ABUNDANCE
AND VEGETATION TYPE PRESENT IN

Route Loop Road Date 07/02/97

SPECIES	ABUNDANCE	VEGETATION TYPE
American robin	3,1 /4	2/27
Brewer's sparrow	1,3,1,1,2,2,2,1,1,1,2, /18	1, 22, 1/21, 1/22, 2/27
Rufus-sided towhee	1,1,1,1,2,1 /7	21, 22, 1/22, 2/27
Western tanager	1 /1	2
Mountain bluebird	1,1,1,1,1,1,1 /7	21, 22, 2/3
Rock wren	3,3,2,1,1,1,1,1,1,2 /16	1, 3, 21, 22, 1/22
Says phoebe	1 /1	3
Sage thrasher	1,1,1,1 /4	3, 22, 1/22
Mountain chickadee	1,1,1 /3	22, 1/22
Clark's nutcracker	2,1,1,1,2,1,2 /10	1, 22, 1/21, 1/22
Mourning dove	1,1,2,1,1,1,1,2	1, 22, 1/22
Green-tailed towhee	1,1,1,1 /4	21, 22, 1/22
Western Wood-pewee	1 /1	1/22
Cassin's finch	1 /1	1/22
Chipping sparrow	1 /1	1/22
Violet-green swallow	1 /1	22

TOTAL: 16 89
species individuals

CRATERS OF THE MOON NATIONAL MONUMENT
BREEDING BIRD SURVEY-INDIVIDUAL ROUTE SPECIES LIST, ABUNDANCE
AND VEGETATION TYPE PRESENT IN

Route North End Road Date 07/14/97

SPECIES	ABUNDANCE	VEGETATION TYPE
Rock wren	1 /1	4, 2/26
Rufus-sided towhee	1,1,1,1,1,1 /6	4, 25, 26
Brewer's sparrow	2,3,1,1, /7	4, 20/26
Green-tailed towhee	1 /1	20/26
Lazuli Bunting	1,1,2,1 /5	24, 26
Warbling vireo	1,1,1,1 /4	26, 24/26
Mourning dove	1 /1	26
Dusky flycatcher	1,1,1 /3	25, 26
House wren	2 /2	25
Clark's nutcracker	1,1 /2	24
Western tanager	1 /1	24
MacGillvray's warbler	1 /1	24

TOTAL: 12 34
species individuals