

CRATERS OF THE MOON NATIONAL MONUMENT 1994 BIRD CENSUS

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INTRODUCTION

Bird censuses at Craters of the Moon NM (CRMO) began in 1988 as part of an ongoing effort to assess the biological value, richness, uniqueness and health of the area. The 1994 census is the sixth in the series of censuses conducted since 1988, excluding 1989 when a lack of qualified personnel prohibited any censusing.

Censuses are scheduled to begin in early May and run to the 15th of June. The 1994 census began May 9 and ended June 1. The censuses were conducted by Natalene Cummings - Biological Technician and Richard Schneider - Interpreter/Resource Technician.

In years past, it was difficult not to attribute some error in the data due to the varying skill levels of the individuals conducting the censusing from year to year. In 1993, a bird identification skills evaluation was implemented in an effort to eliminate the possible influence skill level may have on data. It appears, at this time, that a score of 75% (69 correct out of 93) or greater suggests the individual is knowledgeable enough to accurately identify most of the birds found within the monument.

METHODS

At the start of the season, before heading into the field, each field person was asked to take the Bird Identification Skills Evaluation.

Of 26 vegetation types (VT's) identified in the monument, 17 are included in the bird census (Appendix I). Census locations consist of two sites per vegetation type, totalling 34 sites. Since time and staffing are limited, it is probable that all sites will not be visited during the census season. To accommodate this constraint, four priority vegetation types have been selected that are to be censused each year. The four priority types were selected based on the higher number of birds that reside there. The remaining vegetation types are divided in half and rotated, allowing each of these sites to be visited every other year (Appendix II).

During the 1994 season, 10 vegetation types were censused, resulting in a total of 20 sites being visited (two sites/vegetation site). Those sites included the four priority VT's (marked with *) and the following:

- 26* - Riparian
- 25* - Upland Quaking Aspen
- 23* - Limber Pine/Antelope Bitterbrush - high overall cover
- 22* - Limber Pine/Antelope Bitterbrush - high limber pine
- 24 - Douglas Fir/Mountain Snowberry
- 21 - Limber Pine/Antelope Bitterbrush - low density cover
- 16 - Antelope Bitterbrush
- 6 - Mountain Big Sagebrush/Needlegrass
- 5 - Mountain Big Sagebrush/Sandberg Bluegrass
- 4 - Mountain Big Sagebrush/Bluebunch Wheatgrass

Standard Operating Procedures (SOP's) for the bird census requires that censusing be conducted during the first two hours after sunrise. Observers are to wait ten minutes after arrival to the site before beginning the 30 minute censusing period. During the censusing period, observers identify all species by sight and by call/song and record each individual observed.

Data is compiled and species diversity is calculated through the application of the Shannon-Weaver Estimate of Diversity formula (Appendix III).

RESULTS

Both field staff completed the bird skills evaluation at the start of the 1993 season and achieved scores of 75% or greater. Having completed the evaluation the year prior to this year's census, it was felt unnecessary for the field staff to take the evaluation again this season.

Natalene Cummings	76%
Richard Schneider	96%

INDIVIDUALS

In all 20 sites visited in 1994, 323 **individual** birds were counted, totaling an average of 32.3 individuals per VT; the range consisting of 20 in VT 6 to 53 in VT 26. In the four priority VT's alone, the total number of individuals decreased this season to 158, nearly half as many individuals compared to 306 in 1993. This figure is the lowest of any census year thus far. (Table I).

Table I. Comparative total number of INDIVIDUALS in each of the four priority vegetation types for each of the bird census years, 1988, 1990-94, at Craters of the Moon National Monument, Arco, Idaho.

VEGETATION TYPES

YEAR	26	25	23	22	Total
1988	*	*	*	*	*
1990	60	71	86	11	327
1991	64	49	67	60	240
1992	70	42	69	67	248
1993	49	88	76	93	306
1994	54	31	41	32	158

* = missing data

SPECIES RICHNESS

In all 20 sites visited in 1994, **species richness** (the number of species) was 55; the range consisting of 37 in VT 23 to 9 in VT 5. The four priority VT's alone contained 48 species. The total species richness in all the sites censused in 1994 compared well with previous year's and placed on the higher end of the yearly ranges (Table II).

Table II. Comparative SPECIES RICHNESS for all vegetation types for each of the bird census years (1988, 1990-1994) at Craters of the Moon National Monument, Arco, Idaho.

	VEGETATION TYPES																				
YEAR	+26	+25	+23	+22	+TOT	24	21	17	16	13	11	8	6	5	4	3	2	1	TOTAL		
1988	26	25	26	20	48	34	20	11	14	14	16	13	14	13	15	12	12	4	64		
1990	17	20	18	19	38	24	16	-	12	-	-	-	9	11	13	-	-	-	51		
1991	18	16	16	16	35	22	17	13	14	9	9	14	14	9	21	-	-	-	49		
1992	20	17	20	21	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1993	19	30	27	27	47	-	-	23	-	6	10	11	-	-	-	10	10	14	56		
1994	26	21	27	20	48	20	16	-	12	-	-	-	12	9	13	-	-	-	55		
AVERAGE SPECIES RICHNESS FOR PRIORITY VT's FOR ALL YEARS					41	AVERAGE SPECIES RICHNESS FOR ALL VT's FOR ALL YEARS														55	

(+) = a top four priority site
 (-) = not censused

NOTE: All figures taken from Craters of the Moon National Monument Annual Bird Census Reports.

SPECIES DIVERSITY

The Shannon-Weaver Species diversity estimate (H') for the 10 VT's censused in 1994 averaged 2.6229. The greatest diversity was 3.161 occurring in VT 26 while the lowest was 1.777 in VT 4. This season's average is the highest recorded since the census began in 1988, however, since the identical VT's are not censused each year, the comparisons may not be entirely accurate.

When comparing the four priority VT's which are done every year, 1994's average of 2.180 was the lowest of any year previous, following a record high average of 2.973 in just the year prior (1993) (Table III).

Table III. Comparative species DIVERSITY (H') for the all vegetation types for each of the bird census years, (1988, 1990-1994) at Craters of the Moon National Monument, Arco, Idaho.

	VEGETATION TYPES																			
YEAR	+26	+25	+23	+22	+AVG.	24	21	17	16	13	11	8	6	5	4	3	2	1	AVERG	
1988	2.999	2.843	2.807	2.475	2.781	3.102	2.760	1.908	1.944	2.172	2.418	2.113	1.949	2.213	2.204	1.858	1.903	1.277	2.291	
1990	2.654	2.726	2.735	2.725	2.710	2.998	2.452	-	2.315	-	-	-	1.863	2.283	2.283	-	-	-	2.507	
1991	2.759	2.678	2.552	2.497	2.622	2.900	2.602	2.354	2.293	1.954	1.732	2.402	2.437	1.926	2.430	-	-	-	2.394	
1992	2.807	2.691	2.898	3.001	2.849	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1993	2.850	2.729	3.169	3.142	2.973	-	-	2.615	-	1.662	2.126	2.198	-	-	-	2.194	2.194	2.502	2.489	
1994	3.161	3.106	3.154	2.888	3.077	2.842	2.574	-	2.314	-	-	-	2.347	2.052	1.777	-	-	-	2.622	
AVERAGE DENSITY OF PRIORITY VT'S FOR ALL YEARS					2.835	AVERAGE DIVERSITY FOR ALL VT's FOR ALL YEARS														2.461

(+) = a top four priority site
 (-) = not censused

Although previously recorded in the monument, five species were new to the census, including the Bullock's (northern) Oriole, white-breasted nuthatch, cedar waxwing, western wood pewee and prairie falcon. The gray flycatcher, observed in sites 25 and 23, is a new species observation for the monument. A total of 16 other species were found in VT's where they had not previously been recorded (Table IV).

Table IV. Birds detected during the 1994 census in the eleven priority vegetation types surveyed at Craters of the Moon National Monument, Arco, Idaho.

Family Species	Vegetation Types									
	26	25	24	23	22	21	16	6	5	4
Anatinae										
Mallard	26									
Accipitridae										
Northern Harrier	26									4
Red-tailed Hawk				23						
Golden Eagle	26		24							
Falconidae										
American Kestrel	26			23						
Prairie Falcon**								6**		
Phasianidae										
Blue Grouse		25								
Columbidae										
Morning Dove	26	25	24	23	22	21	16	6		4
Caprimulgidae										
Common Nighthawk				23						
Trochilidae										
Rufus Hummingbird			24	23						
Picidae										
Hairy Woodpecker*	26*		24*							
Northern Flicker*	26	25	24	23	22	21	16	6		
Tyrannidae										
W. Wood Pewee**								16**		
Dusky Flycatcher	26	25		23						
Gray Flycatcher#		25		23#						
Say's Phoebe*									5	
Hiruninidae										
Violet-gr. Swallow				23		21		6*		4
Barn Swallow*					22*					
Corvidae										
Clark's Nutcracker*		25	24	23	22	21	16		5	4*
Black-Billed Magpie*	26*									
Common Raven*		25*			22	21		6	5	
Paridae										
Black-capped Chick.					22					
Mountain Chickadee		25		23	22	21				
Sittidae										
Red-br. Nuthatch*				23	22	21*				
White-br. Nuthatch**		25		23**		21				
Troglodytidae										
Rock Wren				23	22	21	16	6	5	4
N. House Wren	26	25								
Musciapidae										
Bl.-gray Gnatcat.*	26*	25*								
Ruby-crnd. Kinglet	26									
Mountain Bluebird				23	22	21	16		5	4
American Robin	26	25	24		22					
Mimidae										
Sage Thrasher							16	6	5	4
Bombycillidae										
Cedar Waxwing**			24**							
Vireonidae										
Solitary Vireo				23						
Warbling Vireo	26	25	24							
Emberizidae										
Or.-crwnd Warb.*	26	25	24*	23*						
Yellow Warbler	26									
Yel.-rumped Warb.*	26*		24	23						

Table IV continued. Birds detected during the 1994 bird census in the ten vegetation types surveyed at Craters of the Moon National Monument, Arco, Idaho.

Family Species	Vegetation Types										
	26	25	23	22	17	13	11	8	3	2	1
MacGill.'s Warb.	26										
Wilson's Warbler	26		24								
Thraupinae											
Western Tanager	26	25	24	23	22						
Cardinalinae											
Blk.-hded Grosbeak			24								
Lazuli Bunting	26										
Emberizidae											
Grn-tailed Towhee	26	25		23	22	21	16	6			4
Rufus-sided Towhee	26		24	23	22	21	16	6	5		4
Chipping Sparrow		25	24	23	22	21					
Brewer's Sparrow					22	21	16	6	5		4
Vesper Sparrow		25						6			4
Dark-eyed Junco				23							
Icterinae											
Western Meadowlark											4
Brewer's Bl.bird*	26		24	23*	22						4
Br.- Hdcd Cowbird*	26	25	24	23	22		16	6	5*		4
Bullock's Oriole**	26**										
Fringillidae											
Cassin's Finch*		25	24	23	22*	21	16				
Red Crossbill*			24*								
Pine Siskin*		25		23		21*					

* = first time noted in particular vegetation type

** = first time noted on Craters of the Moon National Monument bird census

= first time ever sighted at Craters of the Moon National Monument

CONCLUSION

It is difficult to make accurate comparisons between the census years when different vegetation types are censused each year. Some VT's naturally have lower species richness and diversity than others based on the fewer number of vegetative species and decreased cover, and, depending on which VT's are surveyed, the total average for the year will be influenced by this bias. Also, the number of VT's surveyed has an effect on the total average; those years with fewer VT's surveyed have higher averages while the years with a greater number of VT's surveyed have lower averages. For this reason, it seems only logical, at this point in time, to compare the four priority VT's for data that is best representative of any trends. The same four priority VT's are visited each year and the number of sites is consistent. However, important information can still be gleaned from the other sites by comparing species richness and diversity within a single VT from one year to the next.

When examining the data for the priority VT's, the total number of individuals decreased by half, species richness remained approximately the same and the Shannon-Weaver Diversity Index decreased to it's lowest value in all the years of the census.

The drop in individuals may be due to a number of factors, including weather and availability of food both here at the monument and at the birds wintering grounds. It will be necessary to watch the number of individuals in the next couple of census' to determine if this drop is just a normal cyclic drop or if there is a downward trend occurring.

The winter and spring seasons of November 1993 through June of 1994 at Craters of the Moon National Monument was dryer than the 37 year average. Winter and spring temperatures for this same period, however, were within the 37 year average range. This decrease in precipitation may have limited the availability of food for both the seed and the insect eaters. (Appendix IV.)

When comparing species richness and diversity from year to year within the non-priority sites, values remained relatively level with the exception of sites 17 (Antelope bitterbrush/Great Basin Wildrye) and 1 (Cinder Garden). Both species richness and diversity nearly doubled in both of these sites from the 1988 census to the one conducted in 1993. However, since only three census' were conducted in VT 7 and two in VT 1, there is insufficient data to determine why such a variation occurred.

Appendix I.

The ten vegetation types and the 20 individual site locations surveyed in 1994.

Site Number	Vegetation Type	Location
26.1	Riparian	Below Martin mine
26.2	"	Above Martin mine
25.1	Upland Quaking Aspen	Big Cinders-E. side
25.2	"	Research Camp
24.1	Douglas Fir/Mountain Snowberry	N.E. side Grassy Cone
24.2	"	W. side Little Cottonwood, above Martin Mine
23.1	Limber pine/Antelope bitterbrush (high density pine)	Silent Cone-E. side
23.2	"	Half Cone-E. side
21.1	Limber Pine/Antelope Bitterbrush (low density cover)	N.E. of Devil's Orchard parking lot
21.2	"	N. of Caves parking lot
16.1	Antelope Bitterbrush	N.W. of Tree Mold Parking lot
16.2	"	W. of Lava Trees, S.E. of Big Cinder
6.1	Mtn Big Sagebrush/Needlegrass	
6.2	"	N.E. of Echo Crater
5.1	Mtn Big Sagebrush/Sandberg Bluegrass	Grassy Flow, W. of Sunset Cone
5.2	"	S.E. of Crescent Cone, E. of Yellowjacket Waterhole
4.1	Mtn Big Sagebrush/Bluebunch Wheatgrass	N. of road, E. of saddle between Sunset Cone and Pioneer Mtns
4.2	"	W. side of Silent Cone

Appendix II.

Checklist of vegetation types, the years they were censused and the sites recommended for next season's bird census at Craters of the Moon National Monument.

Priority	Veg.Type	'88	'90	'91	'92	'93	'94	Do in '95
1	26	x	x	x	x	x	x	1
2	25	x	x	x	x	x	x	1
3	23	x	x	x	x	x	x	1
4	22	x	x	x	x	x	x	1
5	21	x	x	x			x	3
6	24	x	x	x			x	3
7	5	x	x	x			x	3
8	4	x	x	x			x	3
9	16	x	x	x			x	3
10	6	x	x	x			x	3
11	13	x		x		x		2
12	8	x		x		x		2
13	17	x		x		x		2
14	11	x		x		x		2
15	3	x				x		2
16	2	x				x		2
17	1	x				x		2

1=priority, 2=second priority, 3=third priority

Appendix III.

Shannon-Weaver estimate of diversity

$$H' = - \sum_{i=1}^S p_i \ln p_i$$

H' = Shannon-Weaver estimate of diversity

S = the number of species

i = individual

p_i = the proportion of the total number of individuals consisting of the ith species.

p_i is estimated by n_i/N

N = the total number of individuals detected

n_i = the number of individuals of species i

Appendix IV.

Precipitation (inches) and average monthly temperature values (degrees Fahrenheit) at Craters of the Moon National Monument for the 1993-1994 winter and spring seasons compared to the 37 year average (December 01, 1958 - December 31, 1994). Taken from Craters of the Moon National Monument NOAA Weather Records Database.

Precipitation (Inches)

	Nov93	Dec93	Jan94	Feb94	Mar94	Apr94	May94	Jun94
37 yr avrg	1.46	1.84	2.02	1.6	1.38	1.05	1.72	1.37
93-94 seas.	.18	.72	.57	1.57	0.0	.93	1.29	1.29

Temperature (Fahrenheit)

29.9	20.6	19.3	23.9	30.8	41.0	50.5	59.3
26.7	21.2	26.1	23.5	38.2	45.9	56.2	64.0