

CRATERS OF THE MOON NATIONAL MONUMENT 1996 BIRD CENSUS

Natalene Cummings - Resource Management Specialist, Craters of the Moon National Monument, P.O. Box 29, Arco, Idaho, 83213.

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 1996 census is the eighth and last in the series of censuses conducted since 1988, excluding 1989 when a lack of qualified personnel prevented any censusing. The bird census has been revised for the 1997 field season to meet the National protocol for Breeding Bird Surveys, and, as a result, will not include the same sites or techniques.

This census is scheduled to begin in early May and run to the 15th of June. The 1996 census began May 8 and ended June 20. The censuses were conducted by Natalene Cummings - Resource Management Specialist, Jason (Jake) Rindfleisch - Resource Technician and Richard Schneider - Interpreter/Resource Technician.

METHODS

At the start of the season, before heading into the field, each field person was required to take and pass the Craters of the Moon National Monument's Bird Identification Skills Evaluation that was incorporated into the bird census in 1993.

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 impossible to visit all sites during the census season. To accommodate this constraint, four priority vegetation types have been selected that are to be censused each year while visits to the remaining vegetation types are split into two groups that are rotated every other year. (Appendix II).

During the 1996 season, 10 vegetation types were censused, resulting in a total of 20 sites being visited (two sites/vegetation type). 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

All field staff completed the bird skills evaluation at the start of the 1996 season and achieved scores of 75% or greater.

Natalene Cummings	90%
Richard Schneider	96%
Jason Rindfleisch	90%

INDIVIDUALS

In all 20 sites visited in 1996, 454 **individual** birds were counted, totaling an average of 45 individuals per VT; the range consisting of 37 in VT 4 to 63 in VT 22. In the four priority VT's alone, the total number of individuals decreased by 8 this season to a total of 188. (Table I). The total number of individuals in the four priority sites has decreased consistently from year to year since the start of the census in 1988 with the exception of 1993 season.

Table I. Comparative total number of INDIVIDUALS in each of the four priority vegetation types for each of the bird census years, 1988, 1990-96, 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
1995	31	33	75	57	196
1996	38	44	43	63	188

* = missing data

SPECIES RICHNESS

In all 20 sites visited in 1996, **species richness** (the number of species) was 45; the range consisting of 9 in VT 5 to 20 in VT 23. Figures from all 20 sites were less than in 1994 when the same VT's were surveyed.

The four priority VT's alone contained 39 species. The priority sites were up from last year (1995) by 4 species, but also showed a decreased when compared with the 1994 data. (Table II).

Table II. Comparative SPECIES RICHNESS for all vegetation types for each of the bird census years (1988, 1990-1996) 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	
1995	11	20	26	19	35	-	-	15	-	10	13	14	-	-	-	14	15	15	45	
1996	15	19	20	18	39	18	19	-	13	-	-	-	10	9	11	-	-	-	45	
AVERAGE SPECIES RICHNESS FOR PRIORITY VT's FOR ALL YEARS					41	AVERAGE SPECIES RICHNESS FOR ALL VT's FOR ALL YEARS														52

(+) = 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 1996 averaged 2.242. The greatest diversity was 2.921, occurring in VT 23 while the lowest was 1.228 in VT 21. Since the identical VT's are not censused each year, comparisons between all 20 VT's need to be made between years when the same VT's are censused. As a result of this comparison, species diversity demonstrated a decrease of .380 between the 1996 and 1994 census years.

When comparing the four priority VT's, the 1996 census average of 2.719 was lower than both the 1995 and the 1994 (Table III).

Table III. Comparative species DIVERSITY (H') for the all vegetation types for each of the bird census years, (1988, 1990-1996) 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	
1995	2.313	2.920	3.018	2.776	2.757	-	-	2.156	-	2.067	2.539	2.392	-	-	-	2.415	2.480	2.532	2.510	
1996	2.601	2.783	2.921	2.571	2.719	2.832	1.228	-	1.817	-	-	-	1.830	2.055	1.777	-	-	-	2.242	
AVERAGE DENSITY OF PRIORITY VT'S FOR ALL YEARS					2.811	AVERAGE DIVERSITY FOR ALL VT'S FOR ALL YEARS														2.436

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

Although previously recorded in the monument, three species were new to the census, including the Merlin, Western Wood Pewee and Killdeer. Three other species were found in VT's where they had not previously been recorded. There were no birds new to the monument recorded during the census. (Table IV).

Table IV. Birds detected during the 1995 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
Anserini										
Canada Goose							16			
Accipitridae										
Northern Harrier								6	5	
Red-tailed Hawk				23						
Falconidae										
American Kestrel	26									
Merlin**				23**						
Charadriidae										
Killdeer**										4
Columbidae										
Morning Dove		25	24	23	22	21	16	6	5	
Picidae										
Downy Woodpecker		25								
Northern Flicker*	26		24	23	22	21	16	6	5*	4
Tyrannidae										
Western Wood-Pewee**					22**					
Hammond's Flycatcher		25	24				16			
Dusky Flycatcher*	26	25		23		21*				
Gray Flycatcher*			24*							
Hiruninidae										
Violet-gr. Swallow				23	22	21				
Corvidae										
Clark's Nutcracker		25	24	23	22	21	16	6		4
Black-billed Magpie	26									
Common Raven					22	21	16		5	
Paridae										
Bl.-capped Chickadee						21				
Mountain Chickadee		25			22	21				
Sittidae										
Red-br. Nuthatch			24	23	22	21				
Troglodytidae										
Rock Wren		25	24	23	22	21	16	6	5	
N. House Wren	26	25	24							
Musciapidae										
Bl.-gray Gnatcat.		25		23						
Ruby-crnd. Kinglet	26		24	23	21					
Mountain Bluebird				23	22	21				4
American Robin	26		24							
Mimidae										
Sage Thrasher		25					16	6	5	4
Vireonidae										
Warbling Vireo	26	25								
Emberizidae										
Yel.-rumped Warb.	26		24			21				
MacGill.'s Warb.	26									
Wilson's Warbler	26	25	24							
Thraupinae										
Western Tanager		25		23	22					

Table IV continued. Birds detected during the 1996 bird census in the ten 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
Cardinalinae										
Black-headed Grosbeak		25			22					
Lazuli Bunting	26									
Emberizidae										
Grn-tailed Towhee	26				22	21	16	6		4
Rufus-sided Towhee	26		24	23	22		16	6	5	4
Chipping Sparrow		25		23	22	21	16			4
Brewer's Sparrow					22		16	6	5	4
Vesper Sparrow		25							5	4
Wh-crowned Sparrow							16			
Dark-eyed Junco				23	22	21				
Icterinae										
Br.- Hded Cowbird				23				6		
Fringillidae										
Cassin's Finch		25	24	23	22	21				4
Pine Siskin			24	23		21				

* = first time noted in particular vegetation type

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

The Northern Harrier was absent from the 1995 census for the first time since the census started in 1988, but was again recorded during the 1996 season, however, no nesting was observed in the former territories in the lower Little Cottonwood Drainage. The Golden Eagle nesting site in the Douglas Fir site in the north end of the monument had no fresh sign indicating occupation. The nest fledged 2 young in the 1994 season.

Weather can be a prominent factor influencing many other factors, including the availability of food. The winter/spring of 1995-96 was warmer and wetter than the 38 year average for Craters of the Moon National Monument (Appendix IV). The 1996 season was warmer and dryer than as compared to the previous winter/spring that experienced an unusually higher amount of precipitation and cooler early summer temperatures.

CONCLUSION

Although species diversity and richness have fluctuated from year to year, the apparent consistent decrease in the # of individuals counted in the censuses since the start of the census in 1988 gives reason for some concern. It isn't possible to determine the cause of this trend without further study. Comparisons with neighboring land management agencies conducting bird censuses, however, could assist with determining whether this pattern is limited to populations within the monument boundaries or a regional occurrence.

In the past couple of years, attempts have been made by park resources staff to interpret exactly what the Shannon-Weaver Diversity Index tells us with respect to what is happening to the bird populations. It is difficult to determine what degree of change in the index value is considered significant. Information has been located to assist with comparing the indexes from one year to another, but it still needs to be applied to the annual bird census data that has been collected over the past eight seasons.

The bird census methodology will be revised for the 1997 field season. The new SOP's will allow for censusing of all the sites every season, minimizing

the need for a great number of skilled personnel. The revised census will follow national bird censusing standards, allowing for the tracking of species of concern, ie: neo-tropical migrants and sagebrush obligates; and making the data collected more compatible with other regional and national data.

Appendix I.

The 10 vegetation types and the 20 individual site locations surveyed in 1996.

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
22.1	Limber Pine/Antelope Bitterbrush (high density cover)	W of caves road, E side Inferno Cone
22.2	" "	E of Tree Molds, NW side of Big Cinder
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	Between Coyote & Crescent Buttes
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	'95	in'96
1	26	x	x	x	x	x	x	x	x
2	25	x	x	x	x	x	x	x	x
3	23	x	x	x	x	x	x	x	x
4	22	x	x	x	x	x	x	x	x
5	21	x	x	x			x		x
6	24	x	x	x			x		x
7	5	x	x	x			x		x
8	4	x	x	x			x		x
9	16	x	x	x			x		x
10	6	x	x	x			x		x
11	13	x		x		x		x	
12	8	x		x		x		x	
13	17	x		x		x		x	
14	11	x		x		x		x	
15	3	x				x		x	
16	2	x				x		x	
17	1	x				x		x	

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 1995-1996 winter and spring seasons compared to the 3-- year average (December 01, 1958 -). Taken from Craters of the Moon National Monument NOAA Weather Records Database.

Precipitation (Inches)

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
37 yr avrg	1.44	1.87	2.07	1.55	1.35	1.04	1.69	1.34
95-96 seas.	.99	2.80	3.75	.02	1.46	1.15	1.99	.15
prev. seas.	1.98	1.67	2.84	.66	3.44	1.16	4.46	3.85

Temperature (Fahrenheit)

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
37 yr avrg	30.1	20.7	19.3	23.9	31.0	40.9	50.7	59.5
95-96 seas.	38.5	25.9	20.4	27.2	33.7	41.7	51.0	63.9
prev. seas.	23.0	21.7	21.4	30.7	32.3	41.9	48.7	56.2

Table 1. 1996 Craters of the Moon National Monument Annual Bird Census Data Summary.

Vegetation Type	Number of Species	"N"	Shannon-Weaver Diversity Index	Total number of individuals
4	11	20	1.777	37 (Lo)
5	9 (Lo)	20	2.055	43
6	10	20	1.830	44
16	13	33	1.817	42
21	19	39	1.228	61
24	18	25	2.832	39
Priority Sites				
22	18	38	2.571	63 (Hi)
23	20 (Hi)	29	2.921	43
25	19	30	2.783	44
26	15	25	2.601	38
TOTALS	45			45 avrg