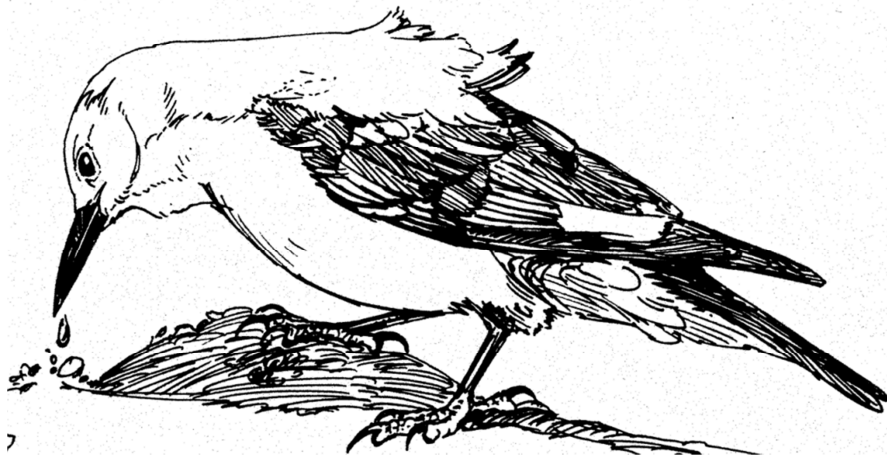


Summary of Bird Monitoring at Craters of the Moon National Monument and Preserve 2010



Prepared by:
Michael Munts
Resource Management Division
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Executive Summary

Bird surveys were run on 10 point count transects during June of 2010. The breeding season surveys were performed on ten routes in both the Monument and the Preserve. There were a total of 1797 individuals of 70 species observed on 175 point counts. The 10 most numerous birds were Brewer's Sparrow, Western Meadowlark, Rock Wren, Spotted Towhee, Western Tanager, Brewer's Blackbird, Lazuli Bunting, Sage Thrasher, Chipping Sparrow, and Mourning Dove. The Brewer's Sparrow, Mourning Dove, Rock Wren, Western Tanager, Common Ravens, Spotted Towhee, Vesper Sparrow, Brewer's Blackbird and Western Meadowlark were all recorded on seven or more of the transects.

A total of 152 species were recorded at CRMO during 2010. Two of these (Gray Jay and Solitary Sandpiper) had not been previously documented at CRMO. Forty-six percent (69 of 152) of the species recorded are listed as sensitive by the state of Idaho, the BLM, the USFWS, or are a Partners in Flight priority species (Table 5).

Sage-grouse lek counts were continued in 2010 and a high total count of 112 male birds were observed on the Golden Chariot lek complex in the northwest portion of the preserve. For the first time since its discovery, the rolling 5 year average dropped slightly but not significantly.

The Christmas Bird Count was restarted at Craters of the Moon in 2005. The 2010 count was done on 17 December. Nine participants including volunteers and park staff participated in the count. A total of 87 birds of 21 species were recorded during the count day. One species (Gray Jay) was recorded at CRMO for the first time on this count.

Long term monitoring of Clark's Nutcracker was initiated in 2010. Surveys were designed to mesh with limber pine stand monitoring. Eleven pilot transects were done in August and September 2010. The counts ranged from 2 to 35. The mean count was 12.7 birds per kilometer.

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Craters of the Moon National Monument and Preserve Bird Monitoring 2010

BREEDING BIRD MONITORING

Introduction and Methods

Ten bird survey routes were surveyed during June of 2010. Methods were based on the North American Breeding Bird Survey and modified to be usable as trail based survey instead of a road based one. The methods used are described in the document Standard Operating Procedures for Breeding Season Bird Surveys at Craters of the Moon National Monument and Preserve. The Standard Operating Procedures also contains descriptions and maps of the individual survey routes.

Results

In 2010 an annual total of 71,370 meters were surveyed, consisting of 175 survey points, as listed in Table 1. The total number of individuals was 1797. The greatest number (333) were on Goodale's Cutoff 1 and the least (29) on the Caves Trails (Table 1). The mean number of birds per point ranged from 5.8 to 13.3. The number of species recorded per transect ranged from 10 on the Caves Trail to 36 on Goodale's Cutoff 1. The total number of species observed on all transects was 70. The mean number of species per point ranged from 3.2 to 7.4 with an average for all sites of 5.3.

The Brewer's Sparrow had the greatest number with 504 individuals recorded in 2010. They accounted for 28% of all individuals recorded. A record 16 species had total counts of 25 or more (table 2). In addition to Brewer's Sparrow these were Rock Wren (n = 155), Western Meadowlark (n = 158), Spotted Towhee (n = 119), Western Tanager (n = 58), Brewer's Blackbird (n = 54), Lazuli Bunting (n = 49), Canada Goose (n = 50), Sage Thrasher (n = 48), Chipping Sparrow (n = 46), Mourning Dove (n = 45), Clark's Nutcracker (n = 41), Common Raven (n = 40), American Coot (n = 36), Blue-gray Gnatcatcher (n = 29), and Rock Pigeon (n = 28).

Rock Wrens and Common Ravens were recorded on all ten transects. Mourning Dove and Brewer's Sparrows were recorded on nine transects. Western Tanagers, Vesper Sparrow and Spotted Towhee were recorded on eight transects. Brewer's Blackbirds were recorded on seven transects. Sage Thrasher, Violet-green Swallow, American Robin, Lazuli Bunting, Brown-headed Cowbird, and Western Meadowlark were recorded on six transects. Northern Flicker, Mountain Bluebird, and Lark Sparrow were recorded on five transects.

Ten species were recorded on 25 or more points. These were Brewer's Sparrow at 128 points (73% of total), Rock Wren at 106 points (61% of total), Spotted Towhee at 80 points (46% of total), Western

Meadowlark at 73 points (42% of total), Western Tanager at 44 points (25% of total), Sage Thrasher at 42 points (24% of total), Mourning Dove at 35 points (20% of total), Lazuli Bunting at 27 points (19% of total), Vesper Sparrow at 28 points (16% of total) and Chipping Sparrow at 26 points (15% of total).

One species had not been previously recorded during any surveys. A small group of Cinnamon Teal was observed on the Goodale's Cutoff route. This species has been observed at the same location but had not been previously recorded on the breeding surveys.

The aspen groves and riparian areas around Little Cottonwood Creek and Goodale's Cutoff not only had the highest number of species but also had several species that were not found elsewhere in the monument. These include Dusky Flycatcher, House Wrens, Song Sparrow, Fox Sparrow, Warbling Vireo, and several warblers.

Table 1. Craters of the Moon National Monument's 2010 Breeding Season Survey route summary

ROUTE	LENGTH (m)	# of stops	habitat types	# of indv. (N)	avg. birds per point	# of species on transect	avg.# species per point
Walking Routes							
Carey Kipuka	4250	18	2, 8, 9, 11, 31	113	11.3	13	3.94
Caves Trail	1000	5	2, 21	29	5.8	10	3.20
Little Cottonwood	3000	13	4, 5, 7, 18, 20, 2 4, 25, 26, 29	156	12.0	35	7.38
Sunset Flow	5750	24	4, 29, 34	233	9.7	15	3.54
Tree Molds	2250	10	2, 16, 22	82	8.2	16	5.10
Wood Road	3500	15	2, 34, 36, 41	157	7.1	22	5.80
Wilderness Trail	6000	25	1, 2, 6, 7, 16, 21, 22	225	9.0	28	5.28
Driving Route							
Goodale's Cutoff	19310	25	3, 4, 5, 20, 25, 26, 33, 34, 35, 36	333	13.3	36	6.44
Goodale's Cutoff 2	19310	25	2, 3, 25, 29, 33, 34, 36, 37	285	11.4	29	5.56
Loop Drive	7000	15	1, 2, 4, 16, 21, 22, 27	179	11.9	22	6.64
TOTALS	71370	175		1797	10.76	70	5.28

Habitat Codes:

1 = Cinder Gardens
 2 = Low Vegetation Density Lava Flows
 3 = Medium Vegetation Density Lava Flows
 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
 11 = Three-tip Sagebrush/Idaho Fescue
 18 = Bluebunch Wheatgrass/Idaho Fescue
 20 = Great Basin Wildrye
 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
 27 = Developed Areas
 29 = Rock outcrops
 31 = Isolated trees
 33 = Misc. Wetlands
 34 = Misc. Big Sagebrush
 41 = Misc. juniper woodland

Table 2. Species recorded during 2010 Breeding Season Surveys

Species	No. of birds	% of total	Rts. detected on	# of stops	% of stops
Mallard	4	0.23	GC2	1	0.6
Cinnamon Teal	5	0.28	GC2	1	0.6
Canada Goose	50	2.8	WR	1	0.6
Chukar	7	0.39	GC,GC2	5	2.8
Gray Partridge	2	0.11	LC	1	0.6
Dusky Grouse	2	0.11	LC	1	0.6
Turkey Vulture	7	0.39	SF,WT	2	1.2
Northern Harrier	3	0.17	GC	2	1.2
Red-tailed Hawk	2	0.11	WR	2	1.2
Golden Eagle	2	0.11	GC	1	0.6
American Kestrel	5	0.28	GC,GC2,SF,WT	5	2.8
Prairie Falcon	2	0.11	LP,WT	2	1.2
American Coot	36	2.03	GC,GC2	2	1.2
Rock Pigeon	28	1.58	CA,SF	2	1.2
Mourning Dove	45	2.45	CK,GC,GC2,LC,LP,SF,TM,WT,WR	35	20.0
Common Poorwill	2	0.11	GC2,WT	2	1.2
Common Nighthawk	4	0.23	CK,GC2,WR	4	2.4
Calliope Hummingbird	1	<0.1	LC	1	0.6
Lewis' Woodpecker	4	0.23	GC	4	2.4
Hairy Woodpecker	3	0.17	LP,WT	3	1.7
Northern Flicker	9	0.51	GC,LC,LP,WT,WR	8	4.6
Western Kingbird	6	0.34	WR	3	1.7
Gray Flycatcher	1	<0.1	TM	1	0.6
Hammond's Flycatcher	3	0.17	GC,LC	3	1.7
Dusky Flycatcher	11	0.62	GC,GC2,LC	10	5.7
Western Wood-Pewee	7	0.39	GC,LC,LP,WT	5	2.9
Loggerhead Shrike	4	0.23	CK,SF,WR	4	2.4
Solitary Vireo	1	<0.1	GC	1	0.60
Warbling Vireo	12	0.68	GC,LC	8	4.6
Clark's Nutcracker	41	2.31	CA,LP,TM,WT	23	13.1
Black-billed Magpie	5	0.28	GC,GC2,LC,WR	6	3.4
Common Raven	30	1.69	CA,CK,GC,GC2,LC,LP,SF,TM,WT,WR	20	11.4

Route codes: CA = Caves Trail, CK = Carey Kipuka, GC = Goodale's Cutoff, GC2 = Goodale's Cutoff 2, LC = Little Cottonwood Road, LP = Loop Road, SF = Sunset Flow, TM = Tree Molds Trail, WT = Wilderness Trail, WR = Wood Road Trail

Table 2 (cont.) Species recorded during 2010 Breeding Season Surveys

Species	No. of birds	% of total	Rts. detected on	# of stops	% of stops
Horned Lark	1	0.06	GC2	1	0.60
Violet-green Swallow	32	1.8	CA,CK,GC2,LP,SF,WT	12	6.9
Red-breasted Nuthatch	6	0.34	LC,LP,WT	6	3.4
Rock Wren	155	8.73	CA,CK,GC,GC2,LC,LP,SF,TMWT,WR	106	61.6
House Wren	23	1.3	GC,LC,LP	10	5.7
Blue-gray Gnatcatcher	29	1.63	LP,TM,WR	16	9.1
Mountain Bluebird	18	1.01	CA,CK,LP,TM,WT	15	8.6
American Robin	18	1.01	CK,GC,LC,LP,WT,WR	12	6.9
Northern Mockingbird	5	0.28	WR	3	1.7
Sage Thrasher	48	2.70	CK,GC,GC2,LC,SF,WT	42	24.0
Orange-crowned Warbler	8	0.45	GC,LC,WR	8	4.6
Yellow Warbler	6	0.34	CA,GC2,LC	6	3.4
MacGillivray's Warbler	5	0.28	LC	3	1.7
Wilson's Warbler	8	0.45	GC,LC	7	4.0
Green-tailed Towhee	11	0.62	GC,LC,SF,TM	7	4.0
Spotted Towhee	119	6.7	CA,GC,GC2,LC,LP,SF,TM,WT	80	45.7
Chipping Sparrow	46	2.59	LP,TM,WT,WR	26	14.9
Brewer's Sparrow	504	28.17	CK,GC,GC2,LC,LP,SF,TM,WT,WR	128	73.1
Vesper Sparrow	37	2.08	CA,GC,GC2,LC,LP,SF,TM,WT	28	16.0
Lark Sparrow	22	1.24	CK,GC,GC2,WT,WR	17	9.7
Fox Sparrow	1	0.06	LC	1	0.60
Song Sparrow	4	0.23	LC	4	2.3
Dark-eyed Junco	8	0.45	LC	3	1.7
Western Tanager	58	3.27	CA,GC,GC2,LC,LP,TM,WT,WR	44	25.1
Lazuli Bunting	49	2.76	GC,GC2,LC,LP,SF,TM	34	19.4
Bullock's Oriole	10	0.56	GC,LC,WR	6	3.4
Red-winged Blackbird	11	0.62	GC,GC2	4	2.3
Western Meadowlark	158	8.90	CK,GC,GC2,SF,WT,WR	73	41.7
Yellow-headed Blackbird	1	<0.1	GC2	1	0.60
Brewer's Blackbird	54	3.04	CA,CK,GC,GC2,LP,WT,WR	22	12.6
Brown-headed Cowbird	16	0.90	GC,GC2,LC,TM,WT,WR	13	7.4

Route codes: CA = Caves Trail, CK = Carey Kipuka, GC = Goodale's Cutoff, GC2 = Goodale's Cutoff 2, LC = Little Cottonwood Road, LP = Loop Road, SF = Sunset Flow, TM = Tree Molds Trail, WT = Wilderness Trail, WR = Wood Road Trail

Table 2 (cont.) Species recorded during 2010 Breeding Season Surveys

Species	No. of birds	% of total	Rts. detected on	# of stops	% of stops
Cassin's Finch	10	0.56	GC,LP,TM,WT	6	3.4
House Finch	7	0.39	GC,LP,WT	3	1.7
Pine Siskin	5	0.28	GC2,LC	2	1.2
American Goldfinch	3	0.17	LC	2	1.2

Route codes: CA = Caves Trail, CK = Carey Kipuka, GC = Goodale's Cutoff, GC2 = Goodale's Cutoff 2, LC = Little Cottonwood Road, LP = Loop Road, SF = Sunset Flow, TM = Tree Molds Trail, WT = Wilderness Trail, WR = Wood Road Trail

*Birds in **bold** were not previously recored during breeding season surveys.

CONCLUSION

The total number of birds observed was 1797. Although it was a 10% decrease over 2009 ($n = 2011$), it is not significantly different from the four years prior to 2009 (fig 1). It was also a 33% increase over 2002 ($n = 1357$) which was the first year the full complement of surveys was done (fig 1). Most of that increase was in the period 2002 to 2005.

When only those routes that have been monitored for the entire 12 years of the program are examined a similar but more erratic pattern is seen. A declining pattern is seen starting in 2000 (fig 2). And continuing through 2004 was seen. This may have been related to these years being a drought period. With the return to near average rainfall in the period from March thru June of 2005 and 2006 overall numbers again increased with a record number of birds in 2008 with counts in 2009 and 2010 only slightly below that year.

The number of species recorded showed a similar pattern to the overall numbers increasing. Like the total number of birds the rate of increase has slowed since 2004 (fig 3). Although, dropping in 2010 numbers were consistent with the period from 2004 to 2007. For only those six routes surveyed the entire six years the trend was pretty level from 2000 to 2006 with a slight increase the last three years. One additional observation of note was that four species which have been recorded in at least low numbers most years the surveys have been done, were not observed in either 2009 or 2010. These were Black-capped Chickadee, Mountain Chickadee, Barn Swallow, Yellow-rumped Warbler. Each of these species was observed through incidental observations during the survey period but none were recorded during the actual surveys. Additionally, Cinnamon Teal were recorded during surveys which have not been recorded previously during the surveys.

The breeding surveys show that CRMO still provides habitat for many sensitive species. Many of these species are either sagebrush obligate or sagebrush dependent species. This includes the most numerous species on the monument, the Brewer's Sparrow, which is on both the BLM and IDFG sensitive lists (Table 5). Most of these species have experienced substantial declines in either part or all of their range including the Snake River Plain. The count of Brewer's Sparrow peaked in 2006 with annual fluctuations less than 10% of that peak. Short term fluctuations this small are likely a result of short term impacts such as weather and is unlikely to indicate a change in density. The major changes in figure 5 coincide with increases in the monitoring effort in the Preserve in 2001 and 2002. The continued increases in numbers since 2004 coincide with a return to average or higher precipitation in the April to June period which has likely resulted in improved forage and cover. Patterns can also be seen in some other sagebrush associated species. The Loggerhead Shrike like the Brewer's Sparrow appears to have been quite stable in the period of the monitoring (fig 6). Shrikes however are found in much lower numbers and to determine accurate trends for this species would require additional effort through targeted surveys and collection of productivity data. Sage Thrashers, which are also a sagebrush obligate, are shown in figure 7. They show a different pattern to the Brewer's Sparrow with a significant dip in 2004 and numbers decreasing since 2005. Followed by a rise again in 2010. Thrashers are insectivorous and are more likely to respond to short term conditions than are the sparrows which will feed on seeds as well as insects. Two other species (Green-tailed Towhee and Vesper Sparrow) which are sagebrush dependent but not obligate, also show a gradual increasing trend over the last 10 years (figure 8). This is particularly noticeable in the 3 year rolling average.

One species for which a trend can be seen after 10 years of surveys is the Blue-gray Gnatcatcher. They were not detected in 1997 or 1998. Three birds were then observed in 1999 with numbers steadily increasing until 2008 (figure 9). This species was considered quite rare in the monument prior to this period (NPS 1997). In the western United States it is generally associated with pinyon/juniper woodlands (Cornell 2004). The use of other pines is not well documented in this species. The limber pine stands where gnatcatchers occur at Craters of the Moon are unique and in many ways resemble pinyon stands in their structure and function. Other pinyon/juniper woodlands species have been documented using these stands including Bushtit and Pinyon Jays. The colonization of the northern portions of Craters of the Moon by gnatcatchers may also be further indications of their continued northward expansion over the 20th century (Cornell 2004, Ellison 1992). This range expansion is thought to have been influenced by both fire suppression during the 1900s and climate change (Ellison 1992). Although numbers dropped following the 2007 peak but have been more consistent since that year (figure 9). This may indicate that the suitable habitat is now occupied and the population is reaching equilibrium. Like gnatcatchers the Northern Mockingbird is also expanding its range northward. This species is abundant in the Southwest United States but less than 5 occurrences were documented at Craters of the Moon prior to 2010. Five different mockingbirds were recorded on the survey of the Wood Road Trail. The previous high count for the species was two in 2008.

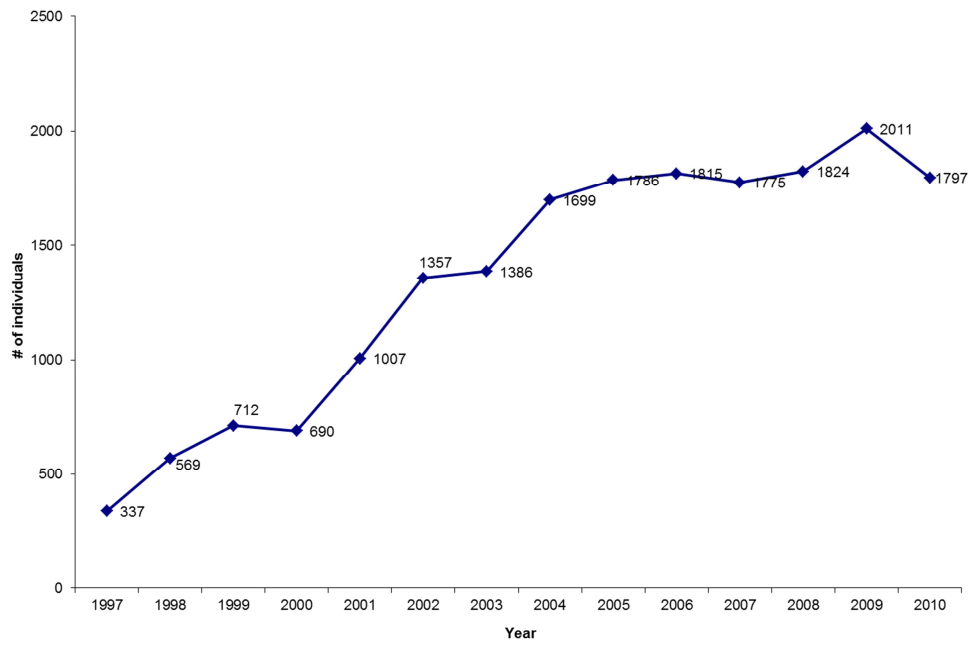


Figure 1. Total numbers of birds recorded during breeding season surveys 1997-2010

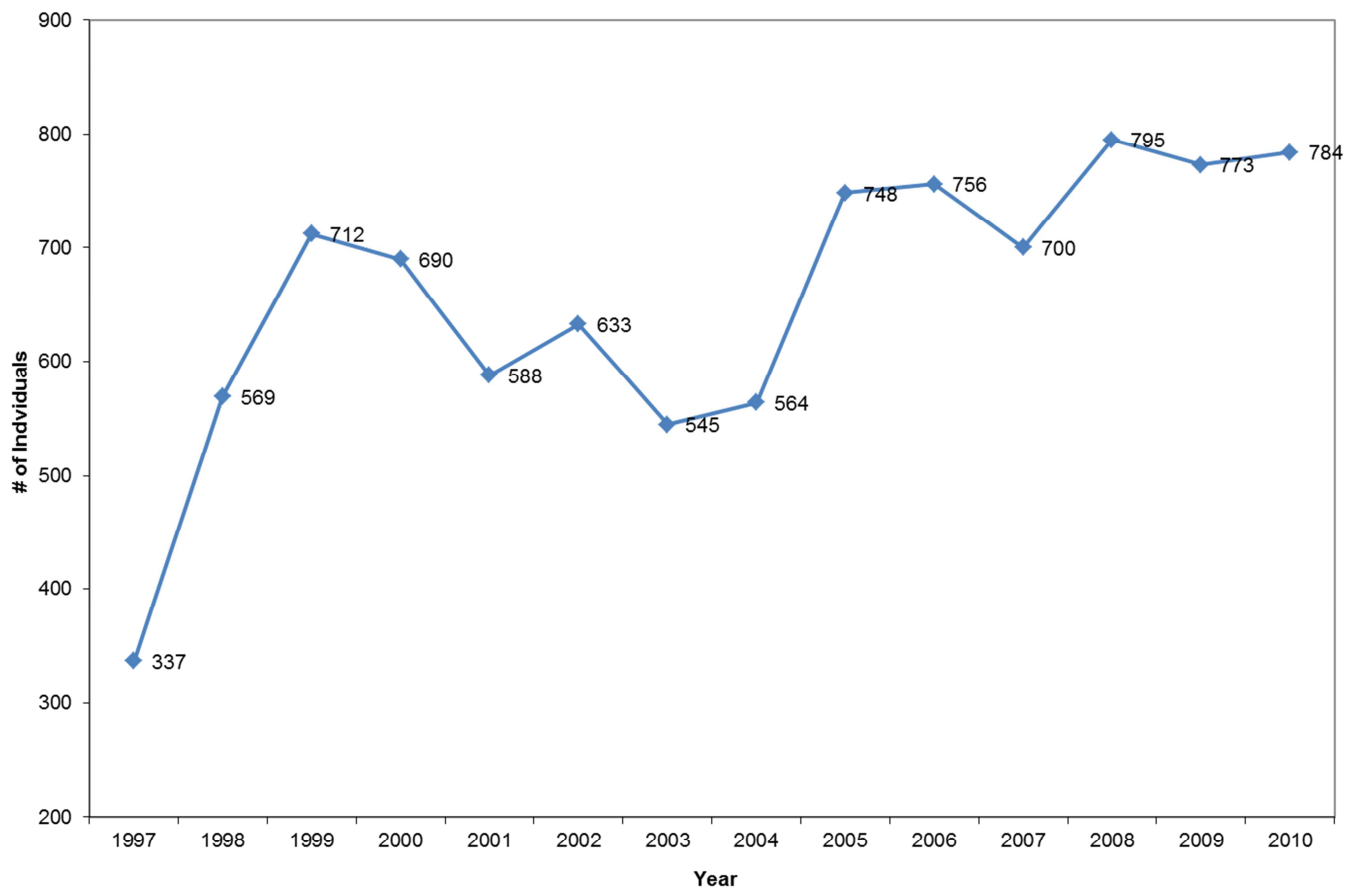


Figure 2. Numbers of birds recorded during breeding season surveys on the six routes surveyed during the years 1997-2010

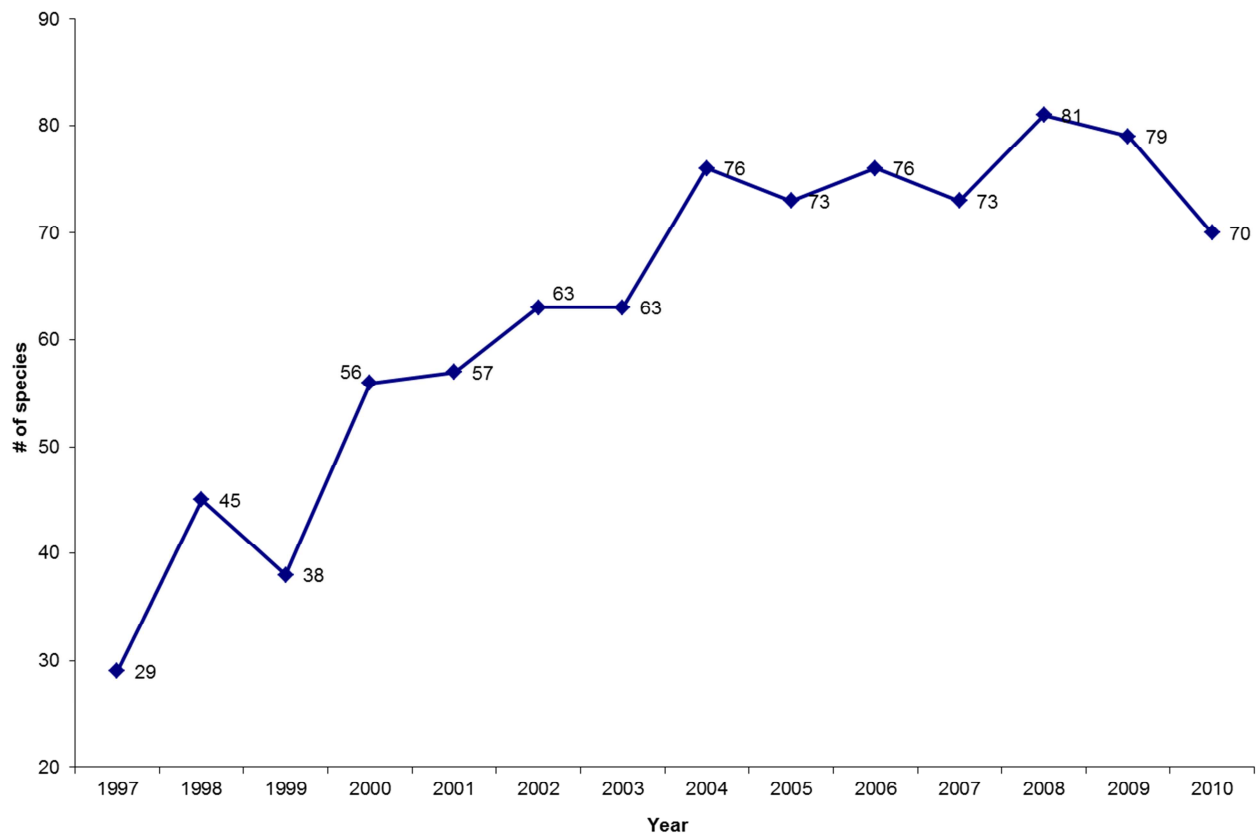


Figure 3. Number of species detected during breeding season surveys 1997-2010

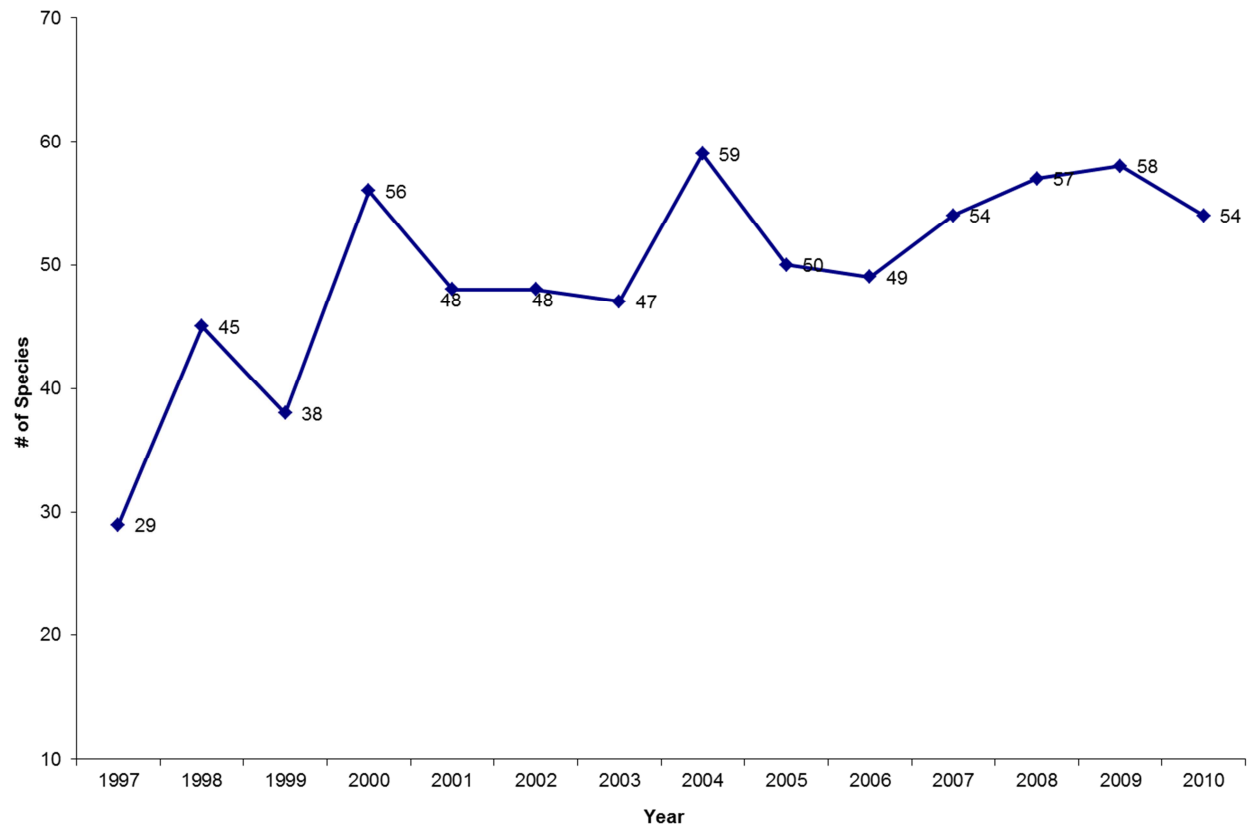


Figure 4. Number of species detected on the six routes surveyed during the years 1997-2010

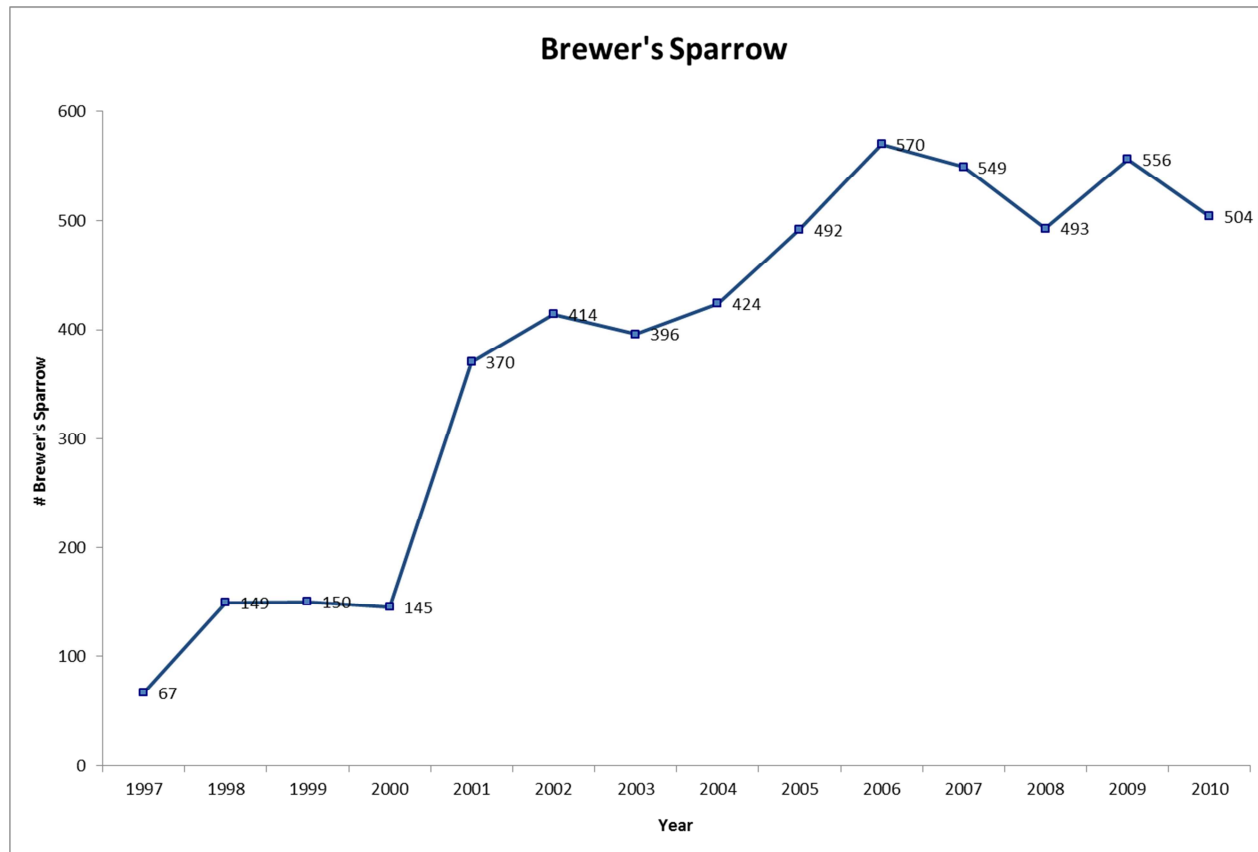


Figure 5. Numbers of Brewer's Sparrows observed in Breeding Season Surveys 1997-2010

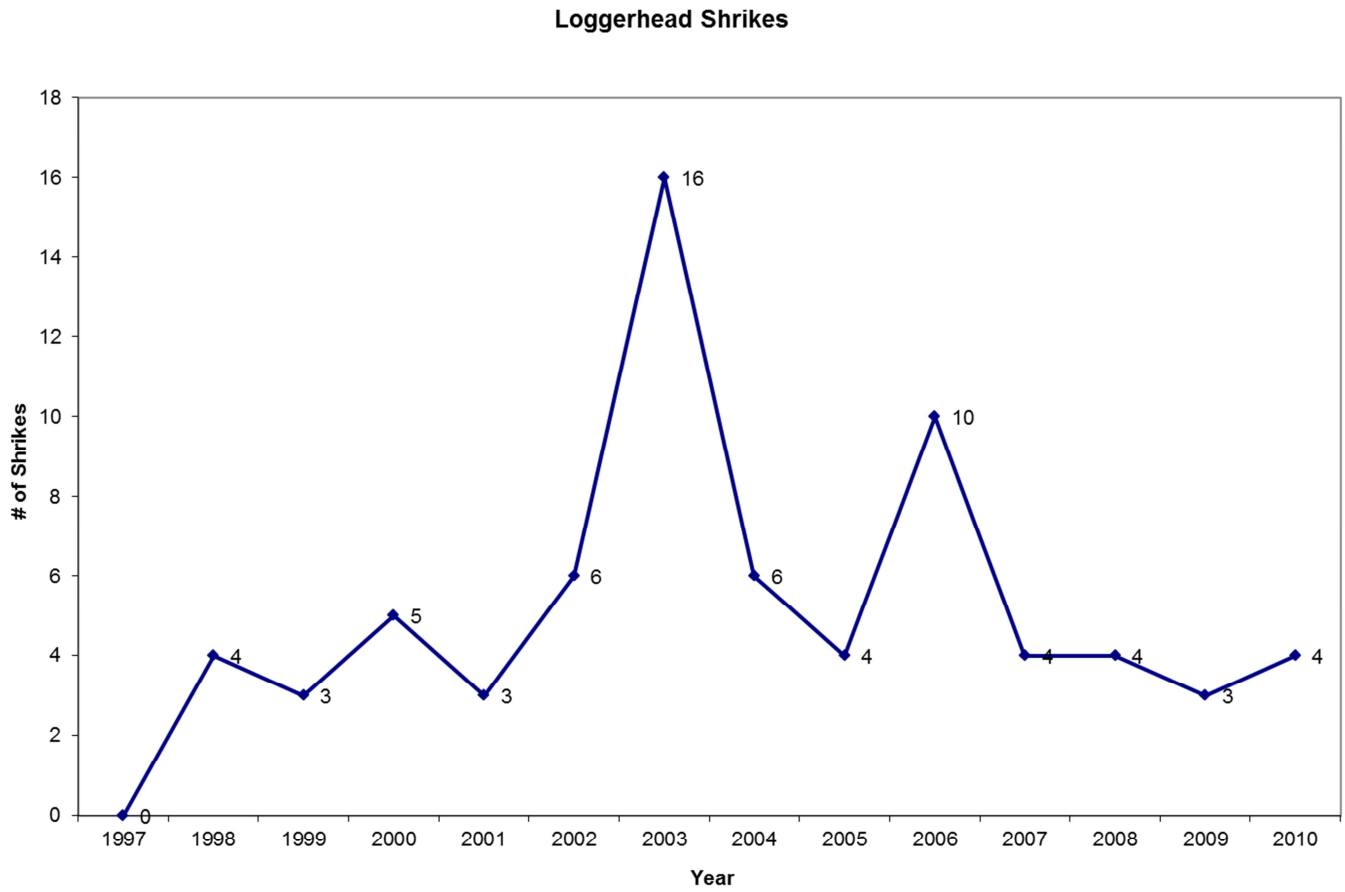


Figure 6. Numbers of Loggerhead Shrikes observed in Breeding Season Surveys 1997-2009

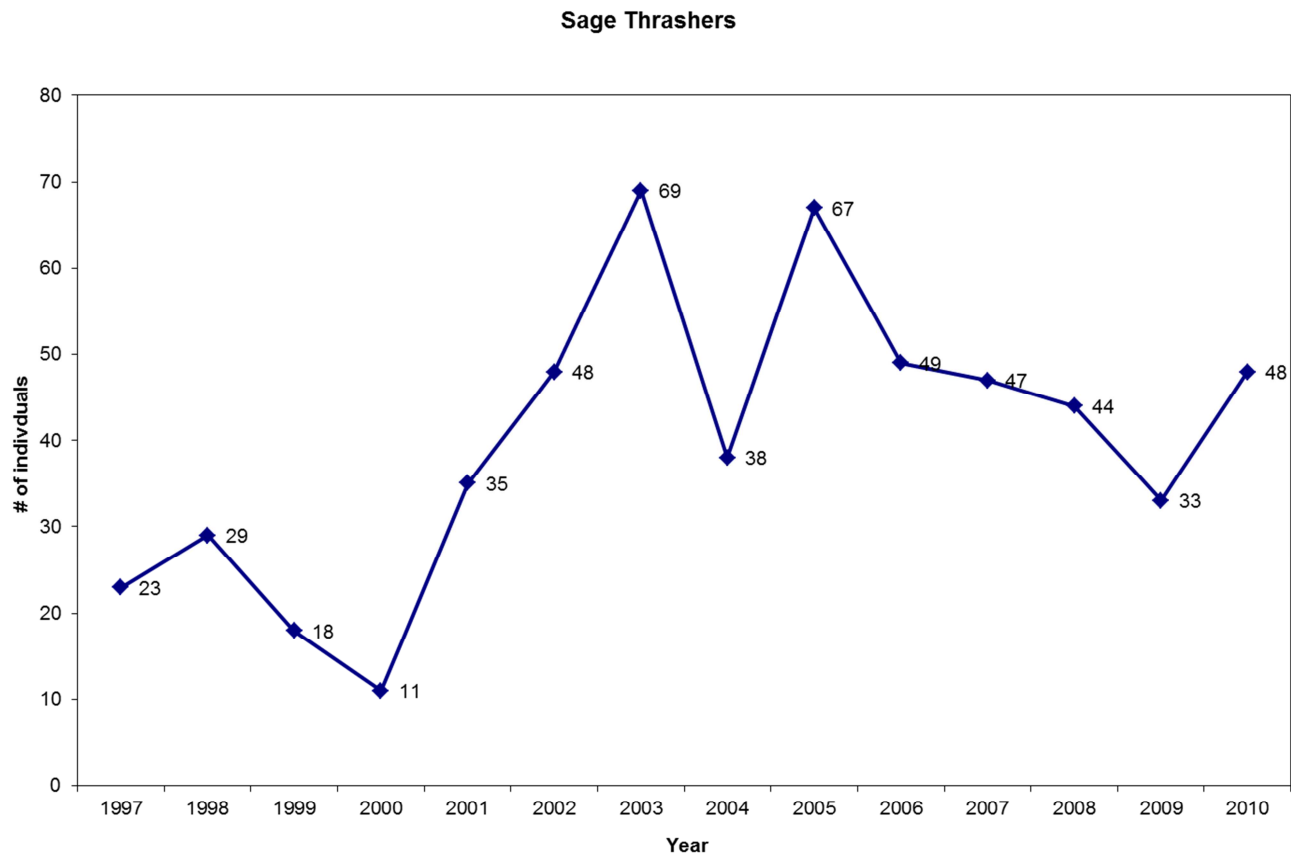


Figure 7. Numbers of Sage Thrashers observed in Breeding Season Surveys 1997-2010

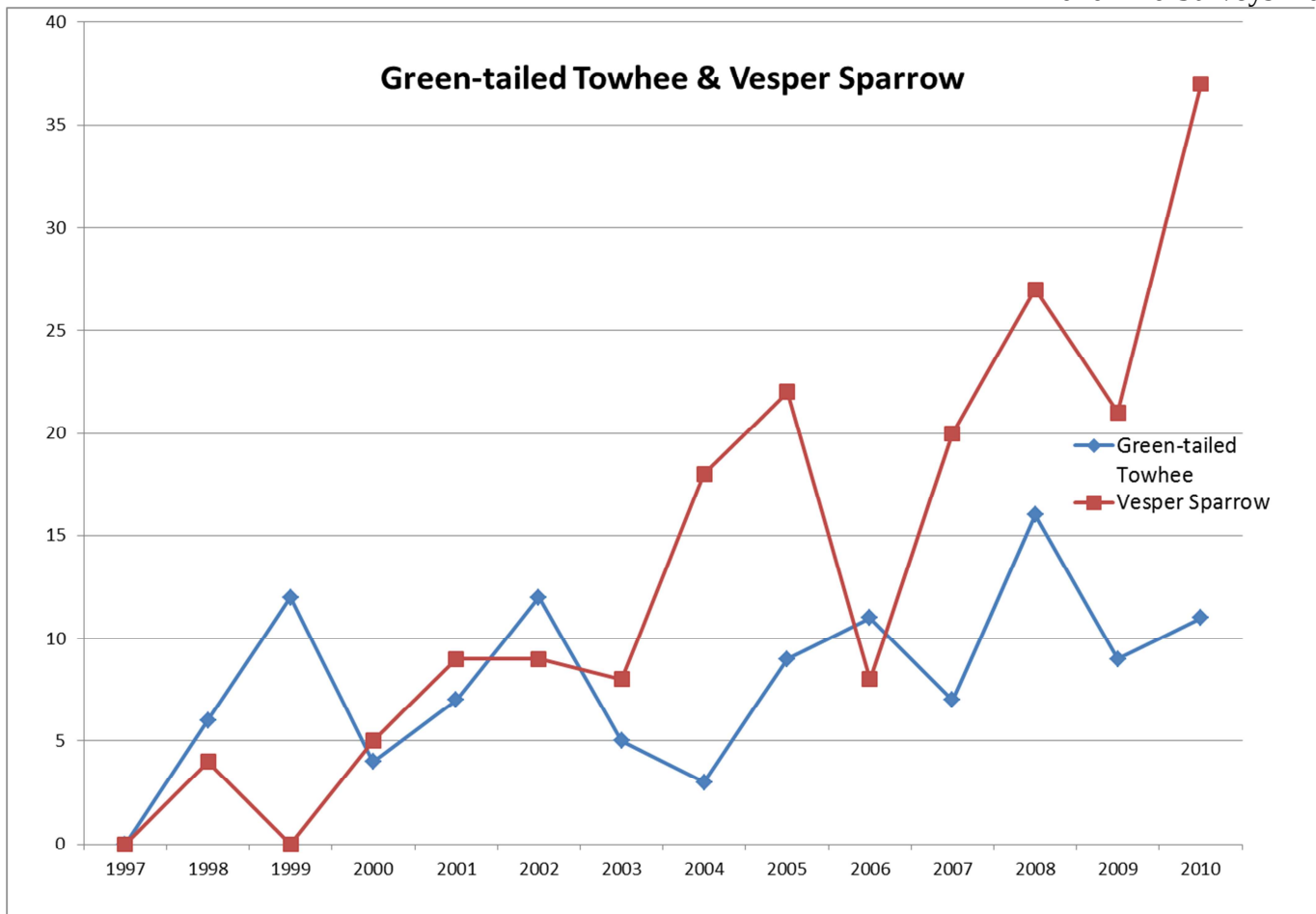


Figure 8. Numbers of Green-tailed Towhees and Vesper Sparrows.

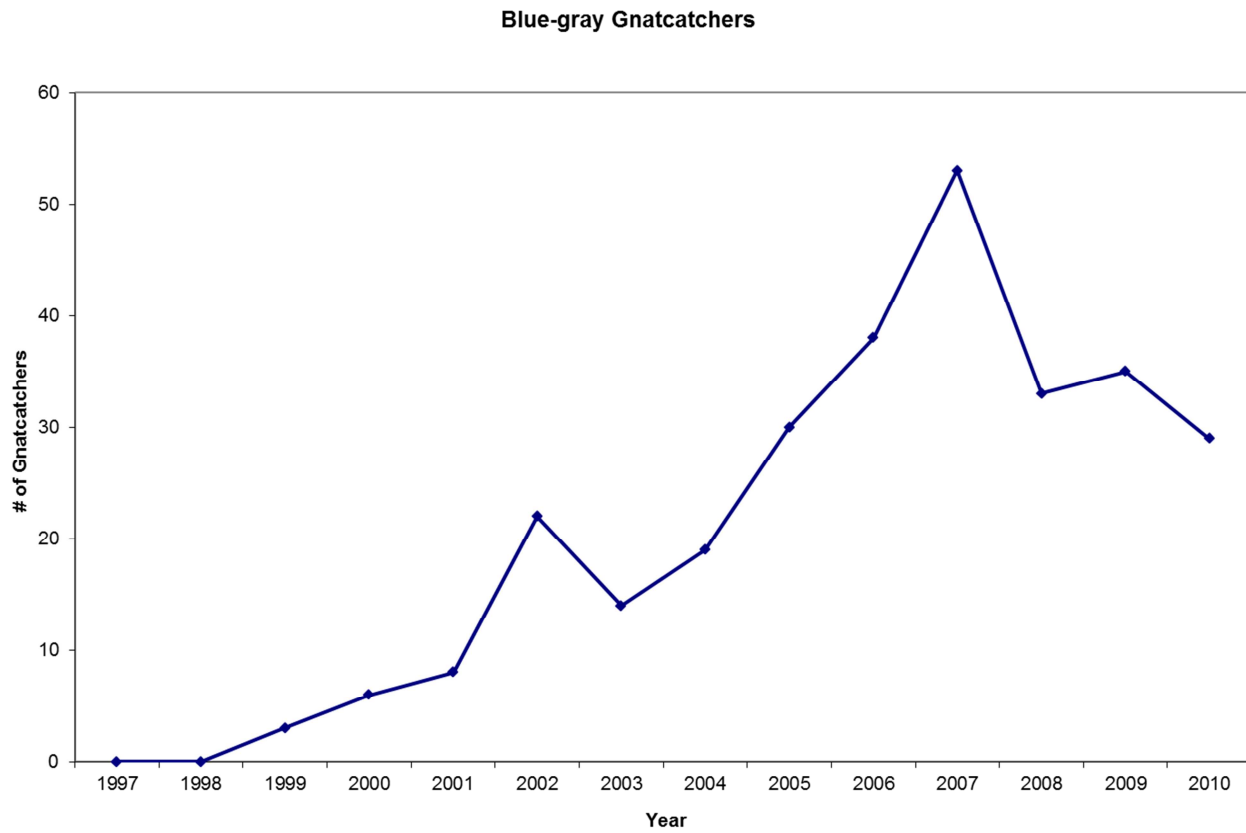


Figure 9. Numbers of Blue-gray Gnatcatchers observed in Breeding Season Surveys 1997-2009

GREATER SAGE-GROUSE MONITORING

Introduction and Methods

In April of 2004 monument staff initiated monitoring of Greater Sage-grouse leks on NPS managed lands. Lek surveys were performed using established methods used by the ID Department of Fish and Game (IDFG) and the BLM. These surveys consisted of three or four visits to designated leks within the Preserve during the month of April. Counting started as soon as light conditions allowed in the morning. Do to access conditions counts were done on foot and from an observation point near but outside the leks. When close enough together multiple leks were counted in a single morning but all counts were completed within 1.5 hours of sunrise. The standard lek forms in use by IDFG were used and copies were sent to IDFG for inclusion in the statewide database. A compilation of NPS and IDFG datasets shows 23 leks have been identified on NPS managed lands. From those 23 IDFG has classified 15 as inactive. This criteria is based on at least 10 years with no detections. No leks with status unknown are found on NPS managed lands at CRMO. During the period from 2004 to 2006 half of inactive historic leks were visited and no sage-grouse were detected on any visit. The remaining eight were not accessible without extended backpacking or aircraft. With over ten years of no observations these sites were then dropped from routine monitoring. One lek (New Lava #3 on the Grassy Flow near the edge of Little Park) is surveyed every other year and was last surveyed in 2009. Six of the remaining seven leks are all on the Sunset Flow and are in close proximity to each other. These leks are counted every year as a lek route which is used by the Idaho department of Fish and Game to determine trend data for the region. The group is called the Golden Chariot Complex for the largest of the leks. The Golden Chariot complex includes the Golden Chariot, MP 237, Lower Big Lost-Circular Water tank, Pressure Ridge, Blizzard Mountain Road, and Brodie Ranch leks. In 2010 theses leks were visited during the period from April 2 to April 27. Each lek was visited four times during this period. One additional lek was discovered on the Grassy Flow adjacent to the highway in late April 2009. This lek was surveyed to the full number of visits for the first time in 2010.

Results

The six lek sites of the Golden Chariot Complex were visited and counted four times each during the month of April. The Pressure Ridge and MP 237 leks were visited but had no grouse observed on any visit. Both of these are associated with the highway and disturbance by vehicles was high. Since both of these are within ½ mile of either the Golden Chariot or the Brodie Ranch lek is assumed that these birds may have moved to the higher quality sites. The Brodie Ranch lek was discovered in 2006 while moving between two other leks on the route. In 2010 this lek had a peak count of 11 male birds on the first visit on 2 April. This lek had a peak 21 males when it was discovered in 2006 and 42 in 2008. The Lower Big Lost-Circular Water Tank lek had a peak count of 51 males. This was slightly above the 10 year average of 41 for this lek. This lek is partially in the preserve and about 2/3 on private land and is often subject to heavy grazing of the private lands during the last half of the normal leking season. The Golden Chariot lek continued to be the largest count in the area. Counts ranged from a low of 26 on April 2 to a high of 134 on April 8. The peak count of 112 males was recorded on four of the six leks of the Golden Chariot complex. This compares to a ten year average of 99 and record high 202 in 2007.

Conclusions

For only the second time since its discovery the male count on the Golden Chariot lek dropped significantly in 2010. The last three years have seen a 39% drop in 2008 followed by a 14% increase in 2009 then a 19% drop in 2010 (figure 10). The winter of 2007-8 was unusually cold and sage-grouse counts declined throughout Idaho. The rebound in 2009 suggests that much of the previous year's decline may be weather related given the more mild winter in 2008-9. The spring of 2010 was unusually cool and wet. This likely depressed numbers and annual fluctuations are common in sage-grouse populations.

Lek routes run by the Idaho Department of Fish and Game in the north half of the Magic Valley region showed a 65% decline in numbers from 2006 to 2008. Counts then stabilized in 2009-10. While only a one year snap shot, this is also a 55% decline from the five year average. By contrast the lek surveys in the Preserve showed 60% increase in male counts during the last five years. This change may likely have been influenced by winter conditions and survival. The rolling five year average declined for the first time since the discovery of the lek complex in 2010 (fig 11).

The importance of CRMO to sage-grouse can be seen in these surveys. Not only is the Golden Chariot the largest count in the region but few lek routes in Idaho and no other route in the region have showed a continuous increase during the current 10 year period. None showed percentage increases of this size. The number of Greater Sage-grouse and other sagebrush obligates was cited as a primary factor in Craters of the Moon meeting the criteria and being designated as an Important Bird Area of global significance during 2009.

Given the significance of the Golden Chariot lek complex there is additional information that is needed to preserve the population. Leks counts are an excellent way to measure the population but account for only a brief period in the annual life cycle of the birds. Nesting, brood rearing, and wintering areas are critical for the survival of the species. Yet, none of these areas have been identified for the birds that lek in the Golden Chariot complex. Given this lack of information additional research needs to be conducted in order to protect the population in the future.

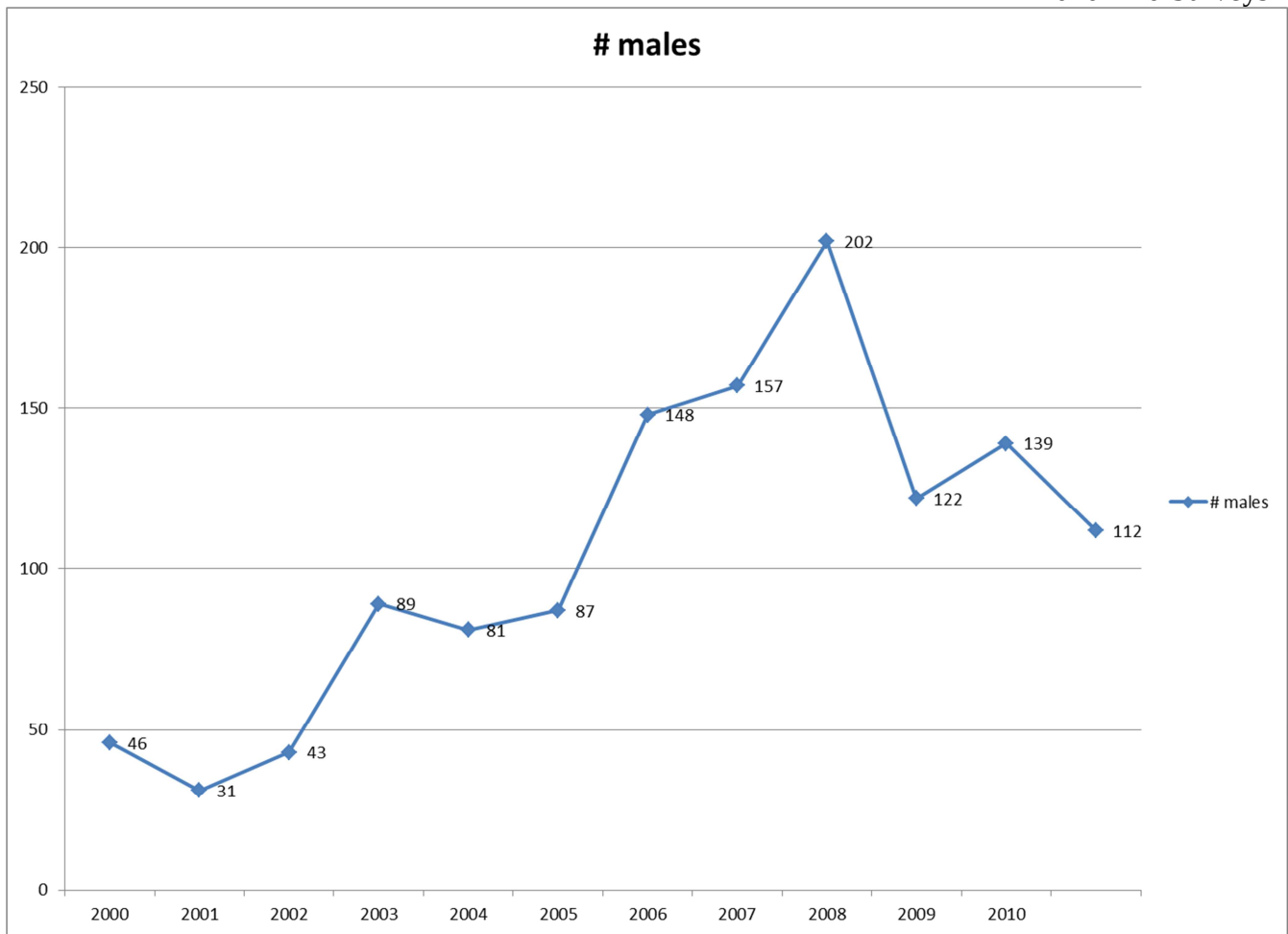


Figure 10. Number of male Greater Sage-grouse on the Golden Chariot Lek Complex 2000-2010.

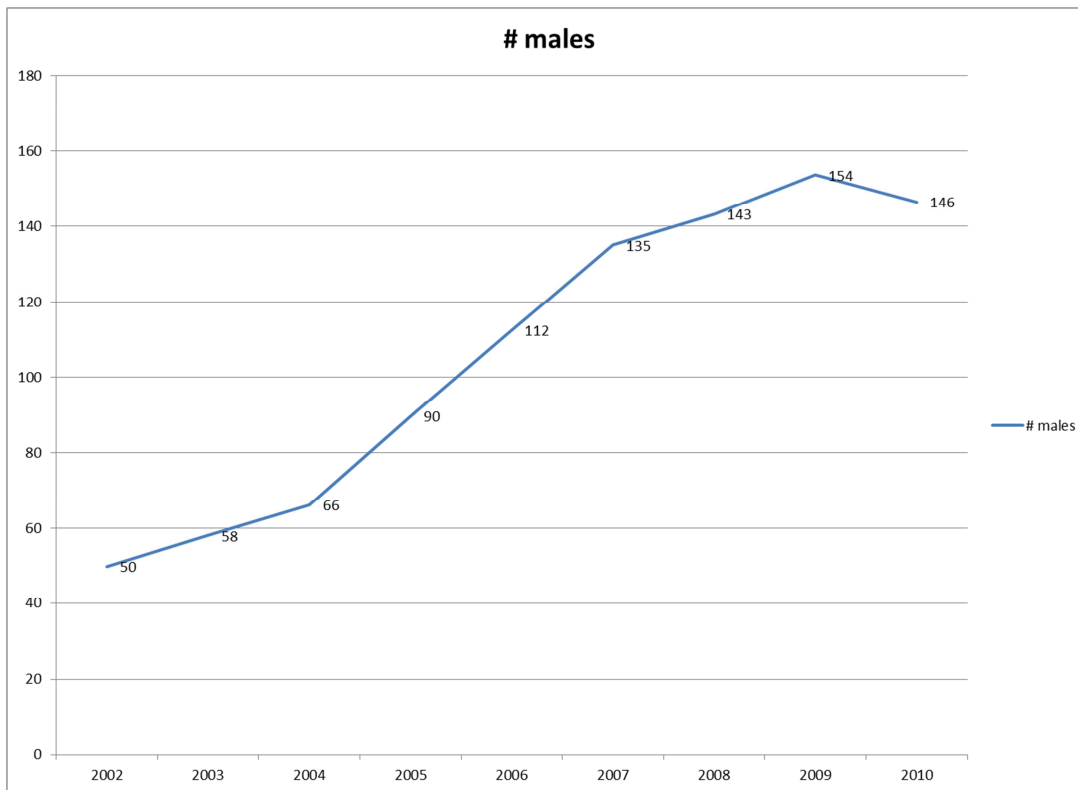


Figure 11. Rolling Five Year Average Count on the Golden Chariot Lek Complex.

CLARK'S NUTCRACKER MONITORING

Introduction

Limber pine are a critical component of the ecosystem at Craters of the Moon. It is the only tree species in much of the park and provides habitat for dozens of plant and animal species that would not otherwise occur here. Limber pine and the closely related whitebark pine are under significant stress throughout their range (Mckinney et. al. 2011). During 2009 and 2010 field personnel from the NPS Upper Columbia Basin Inventory and Monitoring Network (UCBN) field tested protocols for forest health monitoring in limber pine stands in CRMO. Limber pine seeds are the primary food source for Clark's Nutcrackers and nutcrackers are in turn the primary dispersal agent for the pines (Tombeck 1998). In order to gather baseline information and to initiate long term data for Clark's Nutcracker status and trend, park staff field tested nutcracker surveys during the fall of 2010.

Methods

Surveys were conducted in the fall to coincide with peak seed gathering of nutcrackers. During this time period nutcrackers typically in family groups and are highly vocal. These behaviors lend themselves to readily observing and counting nutcrackers. In order to facilitate interpretation of data, transects were done using the sampling frame generated by the UCBN for monitoring of limber pine stands. Random points were generated within the sampling areas to conduct the pine monitoring (Mckinney et. al. 2011). By using these locations trends in nutcrackers populations can be tied to limber pine monitoring parameters. Transects were drawn connecting these points. Transects were one kilometer in length and as many as possible were created as random end points were available while avoiding overlapping or adjacent transects. Adjacent transects were considered to be within 500 meters. Nutcrackers can be easily seen at distances of 500 meters in open stands so transects were placed a minimum of 500 meters apart. Twelve counts were completed during the August to October time period. See figure 12 for a map of transects surveyed.

Parameters recorded included date and start and end times. Weather variables recorded included temperature, wind speed, cloud cover and precipitation. Cone status was also recorded at the time of the survey. Pine cone parameters recorded were: cones open or closed and whether cones were hardened or still green. A single stand may have cones in several stages so several trees were examined and the dominant state of the mature (2nd year) cones was recorded. The field form used is attached as appendix 3.

Results and Discussion

Twelve transects were counted during the period of 8/25/10 to 10/1/10. The counts ranged from 2 to 35. The mean count was 12.7 birds per km. The two highest counts were both conducted on September 10. All counts that were conducted after September 15 had less than 5 birds recorded. A close examination of the cones along the transect done on October 1 showed most cones examined had very few seeds left in the cones. This was also the lowest elevation site and it is likely additional nutcrackers may have been foraging here earlier in the season. It is recommended that in following years the surveys be completed earlier. Completion by the third week of September is recommended for 2011. If nutcrackers numbers again show a shift the count period may need to be shifted again for subsequent years.

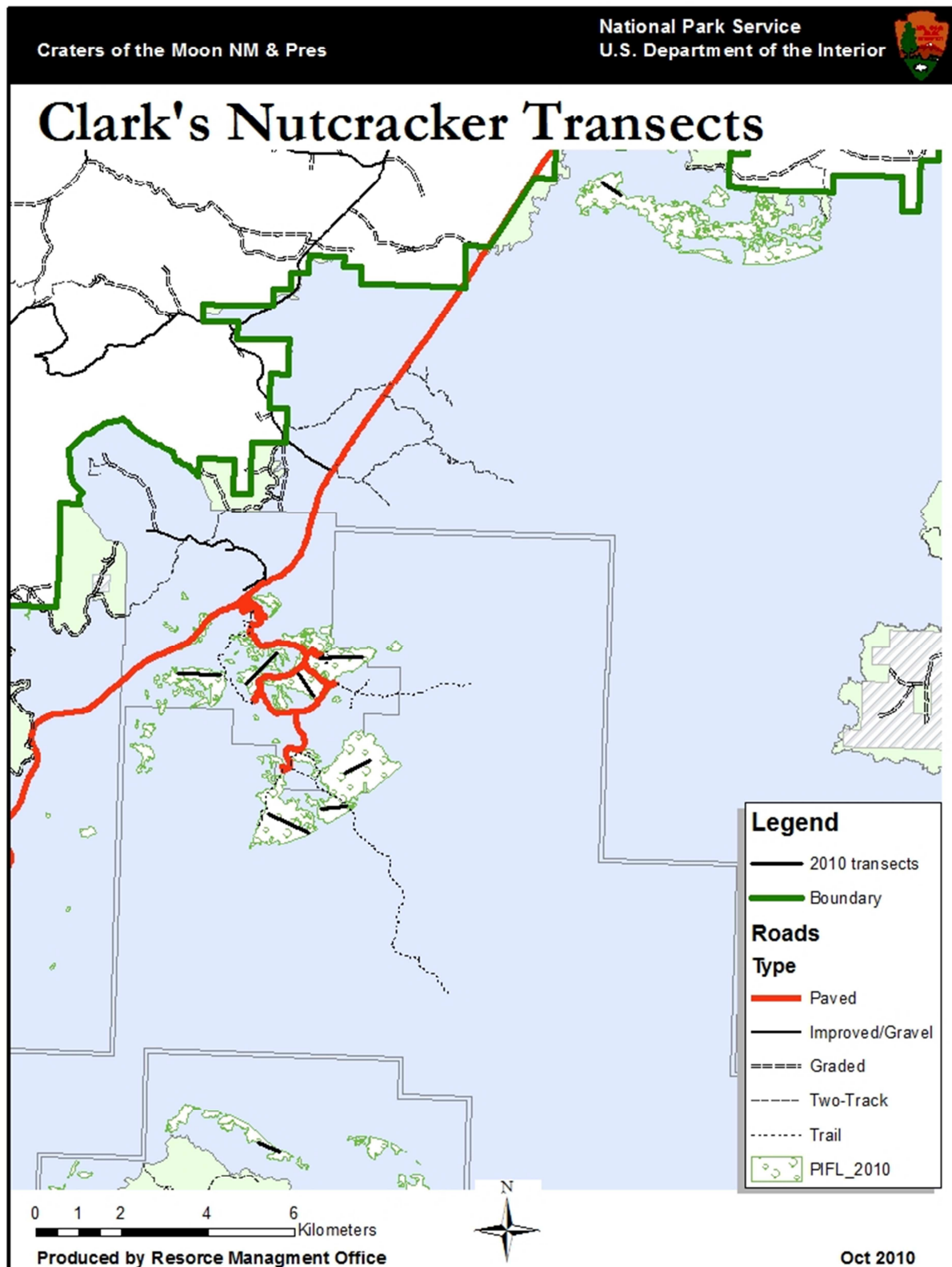


Figure 12. Map of Clark's Nutcracker Monitoring Transects.

MIGRANT SURVEYS

Introduction and Methods

Starting in 2002 migrant and spot surveys were also performed in habitats of interest. During 2010 these were Lava Lake and the adjacent lava flow, including the Preserve and all of Lava Lake; the hot springs cluster and the associated wetland, the survey included that portion of the marsh inside the livestock exclusion fence. One additional survey was conducted in the Little Cottonwood drainage in May. The hot springs marsh and Little Cottonwood were conducted as a walking transect. Lava Lake was performed as a long point count. Counts were generally performed until the observer felt all birds in the area were recorded. Counts were generally performed in the morning and the number of visits was opportunistic and varied between locations. During 2010 the number of visits was: 2 to the hot springs, 3 to Lava Lake, and 1 to Little Cottonwood.

Results and Conclusions

As in previous years the migrant surveys focused on water resources adjacent to the highway. A total of 43 species were seen on the migrant surveys at Lava Lake and the Hot Springs area (table 3). For the migrant surveys 12 species were recorded at the hot springs area, 23 species at Lava Lake, 25 species at Little Cottonwood. The number of species was reduced this year. This is likely due to a reduced survey effort in 2010. These surveys are conducted sporadically as time allows and only 6 surveys were done in 2010.

Table 3. Species observed during migrant surveys during 2010

Species	Survey area			Species	Survey area		
	CHS	LL	LC		CHS	LL	LC
Canada Goose		X		Mountain Chickadee			X
Gadwall		X		House Wren			X
American Wigeon		X		Rock Wren			X
Mallard	X	X		Marsh Wren	X		
Green-winged Teal		X		Ruby-crowned Kinglet			X
Redhead		X		Mountain Bluebird			X
Ring-necked Duck		X		Swainson's Thrush			X
Lesser Scaup		X		Hermit Thrush			X
Ruddy Duck		X		American Robin			X
Pied-billed Grebe		X		Orange-crowned Warbler			X
Osprey		X		Yellow-rumped Warbler	X		
Northern Harrier	X	X		Brewer's Sparrow			X
American Kestrel			X	Lark Sparrow			X
Virginia Rail	X			Green-tailed Towhee			X
American Coot		X		Spotted Towhee		X	X
Spotted Sandpiper		X		Song Sparrow	X		X
Killdeer		X		Dark-eyed Junco			X
Mourning Dove	X			Lazuli Bunting			X
Northern Flicker			X	Red-winged Blackbird	X	X	
Hairy Woodpecker			X	Yellow-headed Blackbird		X	
Plumbeous Vireo			X	Brown-headed Cowbird		X	X
Warbling Vireo			X	Western Meadowlark	X	X	
Black-billed Magpie	X	X		House Finch			X
American Crow		X	X	Cassin's Finch	X		
Common Raven		X		American Goldfinch	X		
Barn Swallow			X				

Area codes: CHS = The marsh and area adjacent to the hot springs near Carey Hot Springs, LL = Lava Lake, LC = the Little Cottonwood Drainage

DAILY SPECIES LISTING

Starting in 1999 daily species lists of bird species observed have been compiled. This is not a formal survey but a list of species that were identified within CRMO each day. Species are observed in the course of other work so effort varies substantially from day to day or season to season. Even informal data collection of this nature can yield useful information. It provides a list of species that are observed from day to day or month to month. It provides information on first arrival and last departure date for migrant species. This project can also provide an early warning to problems with particularly species that may be showing significant shifts in the number of days a year is observed or shifts in the time of year it may be observed. This type of presence information is expected to be the first observable response to climate change by migrant populations.

For example the most abundant migrant bird species is the Brewer's Sparrow. The total number of birds detected in the breeding season surveys has been increasing over the last ten year period (figure 5). However the total number of days the species is observed has been contracting over the same time period (figure 13). Prior to 2008 the first observed arrival in the spring had been getting earlier. In 2008 and 2009 the first arrival again retracted to mid-May (figure 13). This is presumably related to a return to cooler spring temperatures in April and May in 2008 and 2009. In 2010 they were again seen arriving in April.

The second most common species recorded in the shrubsteppe during the breeding season surveys is the Spotted Towhee. Unlike the Brewer's Sparrow which is a sagebrush obligate the towhee is a shrub generalist. They can be found in a variety of habitats from coastal scrub to alpine shrublands. They will also occupy closed canopy forest if they have a significant shrub layer. They also have a more varied diet than many other sparrow species. This enables them to respond more rapidly to weather fluctuations. Like the Brewer's Sparrow the Towhee has declined in the number of days per year it has been recorded at CRMO (figure 14). Arrival dates are much more erratic and are presumably more closely tied to local snow pack than continent wide temperatures (figure 15). This coincides with count numbers from the breeding season surveys which have been very stable over the course of the project (figure 16).

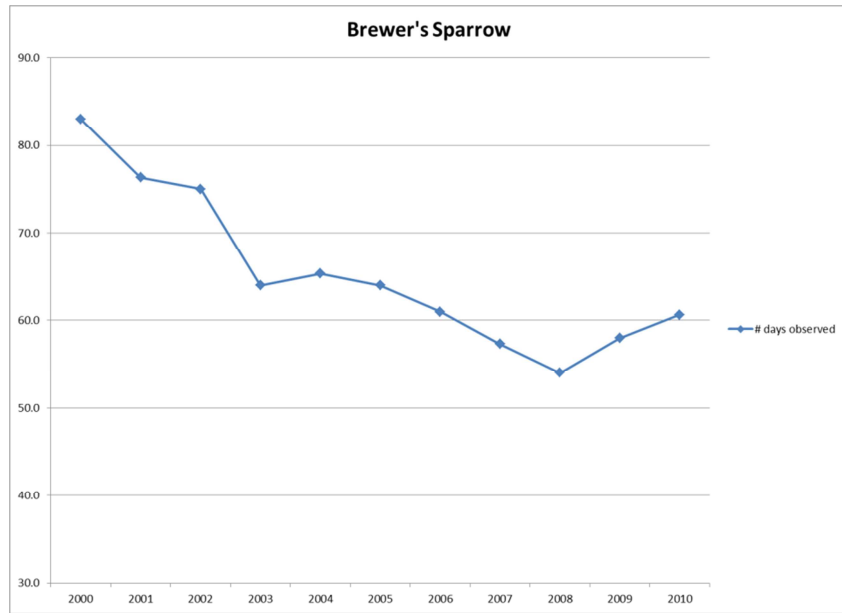


Figure 13. Three Year Rolling Average of the Numbers of Days Brewer's Sparrows Were observed

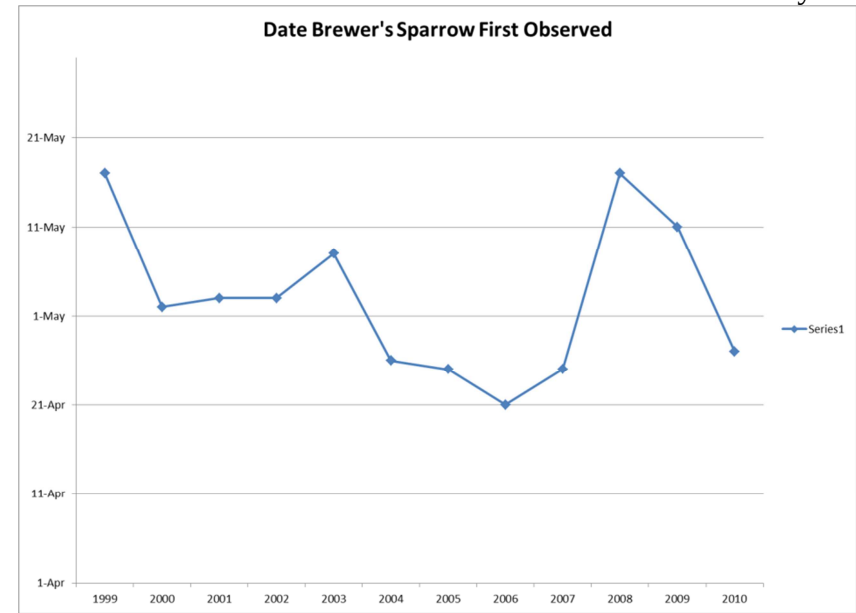


Figure 14. First Recorded Arrival Dates for Brewer's Sparrow

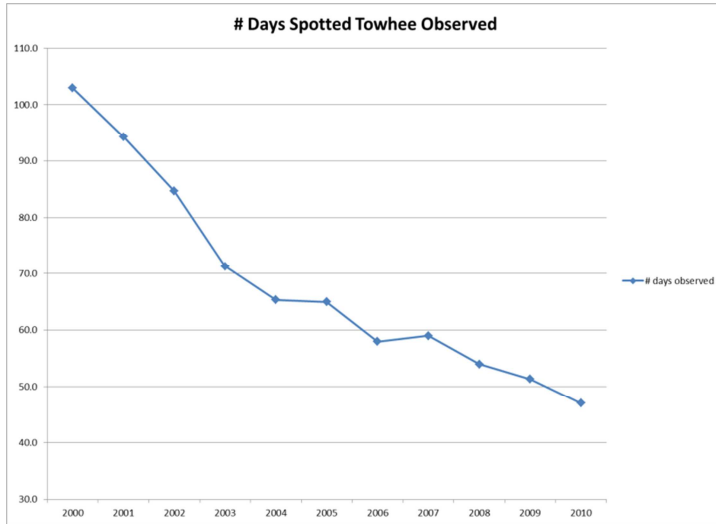


Figure 15. Three Year Rolling Average of the Numbers of Days Spotted Towhees Were observed

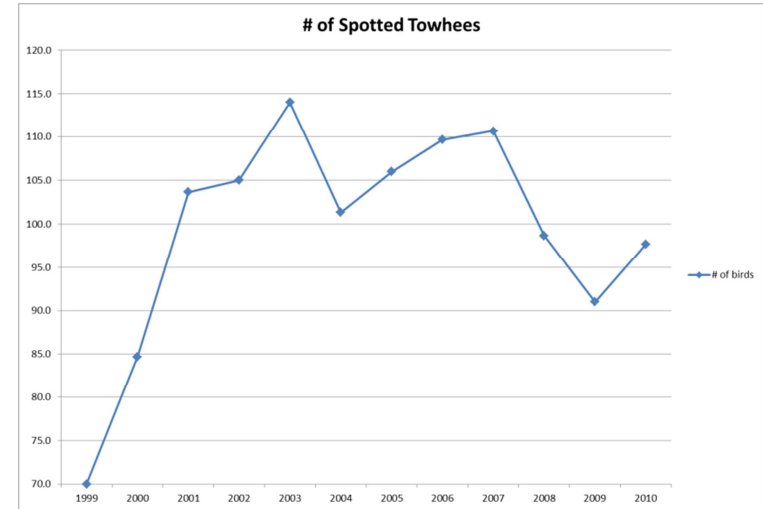


Figure 16. Number of Spotted Towhees Recorded in Breeding Season Survey

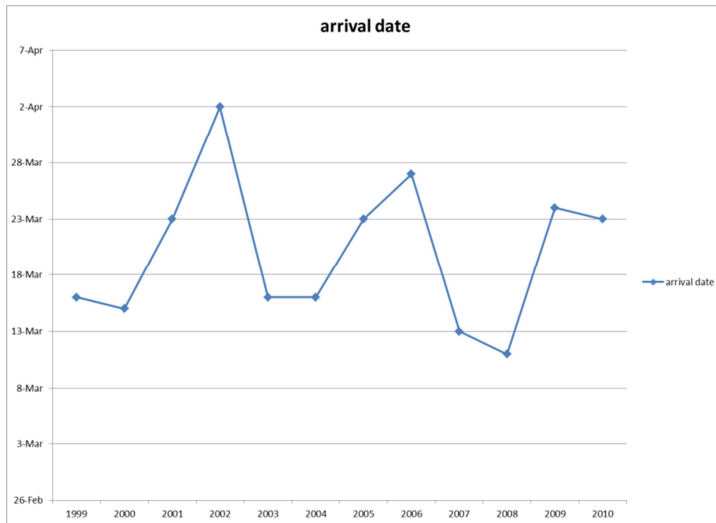


Figure 17. First Recorded Arrival Date for Spotted Towhee

WINTER MONITORING

Introduction and Methods

In December of 2005 a Christmas Bird Count (CBC) was restarted in the area around the park headquarters. This count had not been done since 1969. The 2010 count was performed on December 17. The CBC is the continent wide winter bird survey program sponsored by the National Audubon Society. The count is performed in 15 diameter circle. All birds observed within the circle during a single day are recorded. Detailed criteria and methods have been published by the National Audubon Society and available at the NAS web site at <http://www.audubon.org/bird/cbc/index.html>. It is a volunteer count and 9 people including the public and park staff participated in the Craters of the Moon count. A map of the count circle is in appendix 2. Each group has at least one person experienced in bird identification. The count was conducted on December 17, 2010 from 0820 to 1700. The group was split into 3 parties. The number of party hours was 19. Number of participants was 9.

The other winter project is the Craters/Big Lost route of the Mid-winter Eagle Count. Although a US Fish and Wildlife Service (USFWS) administered program this route has been counted by NPS personnel since its inception. In 2009 this count was conducted on January 7 using standard procedures published by the USFWS. In addition to eagles other birds of prey and raven and shrikes are also recorded

Results and Conclusions

Christmas Bird Count

Number of species detected was 21 and number of individuals was 87. This annual survey has been conducted 7 times in the past. The 21 species recorded in 2010 is the third highest species count yet recorded (table 5). For the complete list of birds counted see table 4. For a summary of the 7 years see Table 5. Eight of species were not recorded on any other survey at CRMO in 2010. Five of these species are either wintering birds or most common in winter and are highly unlikely to be recorded in other monitoring. The number of species has remained relatively stable since the count was restarted in 2005. When the count week species are included the number of species detected was 26. This is the highest number of species found during the 8 years of this survey. One species the Gray Jay had not been previously recorded at Craters of the Moon. The Gray Jay is a conifer obligate that has been observed in Douglas-fir stands in the Pioneer Mountains to the west of CRMO and is not unexpected here.

Mid-winter Eagle Count

The count was performed on January 8, 2010. Two eagles were observed during the count. There was a single adult Golden Eagle and an immature Bald Eagle. Several additional raptors were observed. These included 17 Rough-legged Hawks, five Red-tailed Hawks, 37 Common Raven, and one Prairie Falcon. Several common species were not located during the count. These include American Kestrel, Northern Harrier, and Northern Shrike. This may have been influenced by heavy snow fall in December.

Table 4. Birds recorded on the Craters of the Moon Christmas Bird Count 2010

Species	Number counted
Mallard	3
Bald Eagle, adult	1
Rough-legged Hawk	3
Golden Eagle, adult	2
Golden Eagle, immature	1
Virginia Rail	1
American Coot	1
Wilson's Snipe	1
Rock Pigeon	CW
Great Horned Owl	1
Downy Woodpecker	1
Hairy Woodpecker	1
Northern Shrike	CW
Gray Jay	1
Clark's Nutcracker	9
Black-billed Magpie	30
American Crow	2
Common Raven	14
Horned Lark	CW
Mountain Chickadee	8
Marsh Wren	1
European Starling	1
Song Sparrow	4
Dark-eyed Junco	1
Snow Bunting	CW
Gray-crowned Rosy-finch	CW
House Finch	CW

CW = species was recorded during the count week but not on the count day

Species in bold names are species not recorded on other surveys at CRMO

Table 5. Summary of Craters of the Moon Christmas Bird Count 1967-2010.

Year	Number of Species	Number of Individuals	Party Hours	Participants
1967	16	111	16	4
1969	9	49	10	1
2005	16	80	18	11
2006	20	258	15	8
2007	24	203	25	9
2008	22	128	17	10
2009	20	213	8.5	3
2010	21	87	19	9

General Conclusion and Summary

In all a total of 152 species were detected in 2010 (table 6). This record number of species documented in the park. The previous record of 146 species was observed in 2009. Of these, 70 were seen during the regular breeding season surveys and 149 were recorded on the daily species tally. Two species were seen only on surveys. The Northern Mockingbird was recorded on the breeding season survey on the Wood Road Trail. A Gray Jay was observed during the Christmas Bird Count. This was the first record for this species at CRMO. It is a conifer obligate while not common can be regularly found in the Pioneer Mountains to the west of the park. It is well known for making irruptions to the south or lower elevations in poor food winters and was expected to occur at Craters.

A few incidental observations are particularly noteworthy. One was the observation of a Solitary Sandpiper at the visitor center. This sighting is the first documentation of this species at CRMO. Although it is a shore that is normally associated with wetlands like many water birds they are known to land on asphalt especially during migration.

Another observation of note was an Olive-sided Flycatcher heard singing in the Douglas-fir stand on Grassy Cone in June. This species is a mature conifer associate. The North American Breeding Bird Survey has shown a 60% decline in this species throughout North America since the year 2000. As a result the Canadian Wildlife Service listed the species as endangered in the fall of 2007. The US Fish and Wildlife Service has been petitioned to list the species as threatened but has postponed a full status review pending higher priority reviews. In 2008 a singing male was observed for the first record at CRMO since 2000. At least one male was heard singing in the same stand in both 2009 and 2010. Additional survey work targeting coniferous forest at CRMO may be necessary to determine if this species still breeds in the park.

Sixty-seven species (47% of species detected in 2008) have been listed as a priority species by Idaho Partner's in Flight (IDPIF 2002), are identified by the Idaho Department of Fish and Game (IDFG 2005) as species of with the greatest conservation need, or as sensitive by the Bureau of Land Management (USBLM 2003) (Table 5).

Table 6. List of bird species identified at Craters of the Moon during 2010

Species	Survey Detected On			
	Breed	CBC	Migrant	Daily
Canada Goose	X		X	X
Snow Goose				X
Gadwall			X	X
American Wigeon			X	X
Mallard	X	X	X	X
Green-winged Teal			X	X
Northern Pintail				X
Northern Shoveler				X
Cinnamon Teal	X			X
Canvasback				X
Redhead			X	X
Ring-necked Duck			X	X
Lesser Scaup			X	X
Common Goldeneye				X
Bufflehead				X
Ruddy Duck			X	X
Turkey Vulture	X			X
Osprey			X	X
Northern Harrier	X		X	X
Sharp-shinned Hawk				X
Northern Goshawk				X
Cooper's Hawk				X
Swainson's Hawk				X
Red-tailed Hawk	X			X
Ferruginous Hawk				X
Rough-legged Hawk		X		X
Bald Eagle		X		X
Golden Eagle	X	X		X

Species	Survey Detected On			
	Breed	CBC	Migrant	Daily
American Kestrel	X		X	X
Merlin				
Prairie Falcon	X			X
Chukar	X			X
Gray Partridge	X			X
Dusky Grouse	X			X
Greater Sage-grouse				X
Eared Grebe				X
Pied-billed Grebe			X	X
American Coot	X	X	X	X
Virginia Rail		X	X	
Sandhill Crane				X
Wilson's Snipe		X		X
Solitary Sandpiper				X
Spotted Sandpiper			X	X
Killdeer	X		X	X
Long-billed Curlew				X
Rock Pigeon	X	X		X
Eurasian Collared-dove				X
Mourning Dove	X		X	X
Burrowing Owl				X
Great Horned Owl		X		X
Long-eared Owl				X
Short-eared Owl				X
Northern Saw-whet Owl				
Common Nighthawk	X			X
Common Poorwill	X			X
Black-chinned Hummingbird				X
Broad-tailed Hummingbird				X
Rufous Hummingbird				X
Calliope Hummingbird	X			X

Species	Survey Detected On			
	Breed	CBC	Migrant	Daily
Belted Kingfisher				X
Lewis' Woodpecker	X			X
Hairy Woodpecker	X	X	X	X
Downy Woodpecker		X		X
Red-naped Sapsucker				X
Northern Flicker	X		X	X
Western Wood-pewee	X			X
Unidentified <u>Empidonax</u> sp.	X			
Hammond's Flycatcher	X			X
Gray Flycatcher	X			X
Dusky Flycatcher	X			X
Cordilleran Flycatcher				X
Say's Phoebe				X
Western Kingbird	X			X
Eastern Kingbird				X
Northern Shrike		X		X
Loggerhead Shrike	X			X
Warbling Vireo	X		X	X
Plumbeous Vireo			X	X
Cassin's Vireo				X
Gray Jay		X		
Steller's Jay				X
Clark's Nutcracker	X	X		X
Black-billed Magpie	X	X	X	X
American Crow		X	X	X
Common Raven	X	X	X	X
Horned Lark	X	X		X
Violet-green swallow	X			X
N. Rough-winged Swallow				X
Tree Swallow				X
Barn Swallow			X	X

Species	Survey Detected On			
	Breed	CBC	Migrant	Daily
Black-caped Chickadee		X		X
Mountain Chickadee		X	X	X
Red-breasted Nuthatch	X			X
White-breasted Nuthatch		X		X
Rock Wren	X		X	X
House Wren	X		X	X
Pacific Wren				X
Marsh Wren		X	X	X
Golden-crowned Kinglet				X
Ruby-crowned Kinglet			X	X
Blue-gray Gnatcatcher	X			X
Mountain Bluebird	X		X	X
Western Bluebird				X
Townsend's Solitaire				X
American Robin	X		x	X
Hermit Thrush			X	X
Swainson's Thrush			X	
Varied Thrush				X
Northern Mockingbird	X			X
Gray Catbird				X
Sage Thrasher	X			X
European Starling		X		X
Cedar Waxwing				X
Bohemian Waxwing				X
Orange-crowned Warbler	X		X	X
Yellow Warbler	X			X
Yellow-rumped Warbler			X	X
Townsend's Warbler				X
MacGillivray's Warbler	X			X
Nashville Warbler				X
Wilson's Warbler	X			X

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Species	Survey Detected On			
	Breed	CBC	Migrant	Daily
Western Tanager	X			X
Green-tailed Towhee	X		X	X
Spotted Towhee	X		X	X
Dark-eyed Junco	X	X	X	X
Chipping Sparrow	X			X
Brewer's Sparrow	X		X	X
Vesper Sparrow	X			X
Lark Sparrow	X		X	X
Lark Bunting				X
Grasshopper Sparrow				X
Fox Sparrow	X			X
Song Sparrow	X	X	X	X
Lincoln's Sparrow				X
White-crowned Sparrow				X
Black-headed Grosbeak	X			X
Snow Bunting		X		X
Lazuli Bunting	X		X	X
Red-winged Blackbird	X		X	X
Western Meadowlark	X		X	X
Yellow-headed Blackbird	X		X	X
Brewer's Blackbird	X			X
Brown-headed Cowbird	X		X	X
Bullock's Oriole	X			X
Gray-crowned Rosy-finch		X		X
Cassin's Finch	X		X	X
House Finch	X	X	X	X
Red Crossbill				X
Common Redpoll				X
American Goldfinch	X		X	X
Pine Siskin	X			X
Evening Grosbeak				X

Species	Survey Detected On			
	Breed	CBC	Migrant	Daily
House Sparrow				X

Breed are species detected during the breeding season survey.

CBC are species detected during the Christmas Bird Count

Migrant are species detected during the migrant survey.

Incident are species from incidental observations during the year.

Species in Bold are species not previously recorded at CRMO

Table 7. List of special status species recorded during surveys.

Species	BLM	Idaho	FWS	PIF
Cinnamon Teal				P
Northern Pintail		C		
Redhead				P
Lesser Scaup		C		
Northern Harrier				P
Swainson's Hawk	W	C	CC	P
Ferruginous Hawk	S	C	CC	P
Bald Eagle	S	C		
Golden Eagle			CC	P
Peregrine Falcon	S	C,T	CC	P
Prairie Falcon	S			P
Dusky Grouse	W			P
Greater Sage-grouse	S	C	CC	P
Sandhill Crane		C		P
Killdeer				P
Long-billed Curlew	W	C	CC	P
Burrowing Owl	S	C		P
Short-eared Owl	W	C		P
Black-chinned Hummingbird				P
Rufous Hummingbird				P
Lewis' Woodpecker	S	C	CC	P
Red-naped Sapsucker	W			P
Hammond's Flycatcher	S			P
Gray Flycatcher				P
Dusky Flycatcher				P

Species	BLM	Idaho	FWS	PIF
Cordilleran Flycatcher	W			P
Olive-sided Flycatcher		C	CC	P
Loggerhead Shrike	S	C	CC	P
Plumbeous Vireo				P
Black-billed Magpie				P
Brown Creeper				P
Rock Wren				P
Sage Thrasher	W		CC	P
MacGillivray's Warbler				P
Western Tanager				P
Green-tailed Towhee	W		CC	P
Brewer's Sparrow	S	C	CC	P
Lark Sparrow				P
Sage Sparrow	S		CC	P
Grasshopper Sparrow	W	C		P
Lazuli Bunting				P
Tree Swallow				P
Northern Rough-winged Swallow				P
Red-breasted Nuthatch				P
Mountain Chickadee				P
Marsh Wren				P
Ruby-crowned Kinglet				P
Blue-gray Gnatcatcher				P
Mountain Bluebird				P
Townsend's Solitaire				P
Say's Phoebe				P
Western Kingbird				P

Species	BLM	Idaho	FWS	PIF
Wilson's Warbler				P
Warbling Vireo				P
Clark's Nutcracker				P
Spotted Towhee				P
Chipping Sparrow				P
Grasshopper Sparrow	S			P
Black-headed Grosbeak				P
Blue Grosbeak		C		
Yellow-headed Blackbird				P
Bullock's Oriole				P
Western Meadowlark				P
Brewer's Blackbird	W			P
Black Rosy-finch				P
Cassin's Finch	S		CC	P
Gray-crowned Rosy-finch				P

BLM species are listed as sensitive "S" or Watch "W"

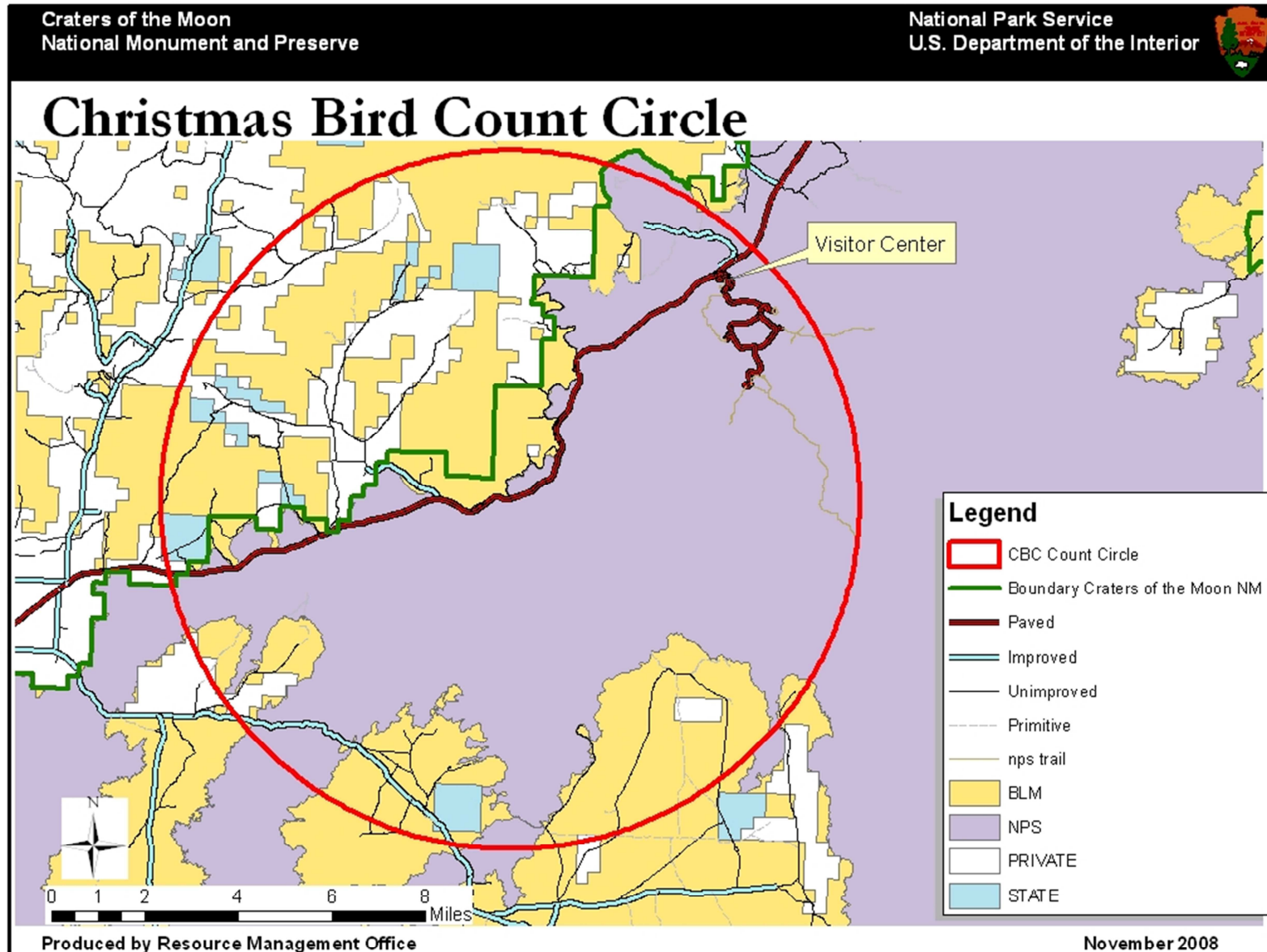
Idaho species are listed as a species of Greatest Conservation Need "C" or as threatened "T" by the state of Idaho

PIF species are species listed as Priority species in the Idaho Partners in Flight Idaho Bird Conservation Plan "P"

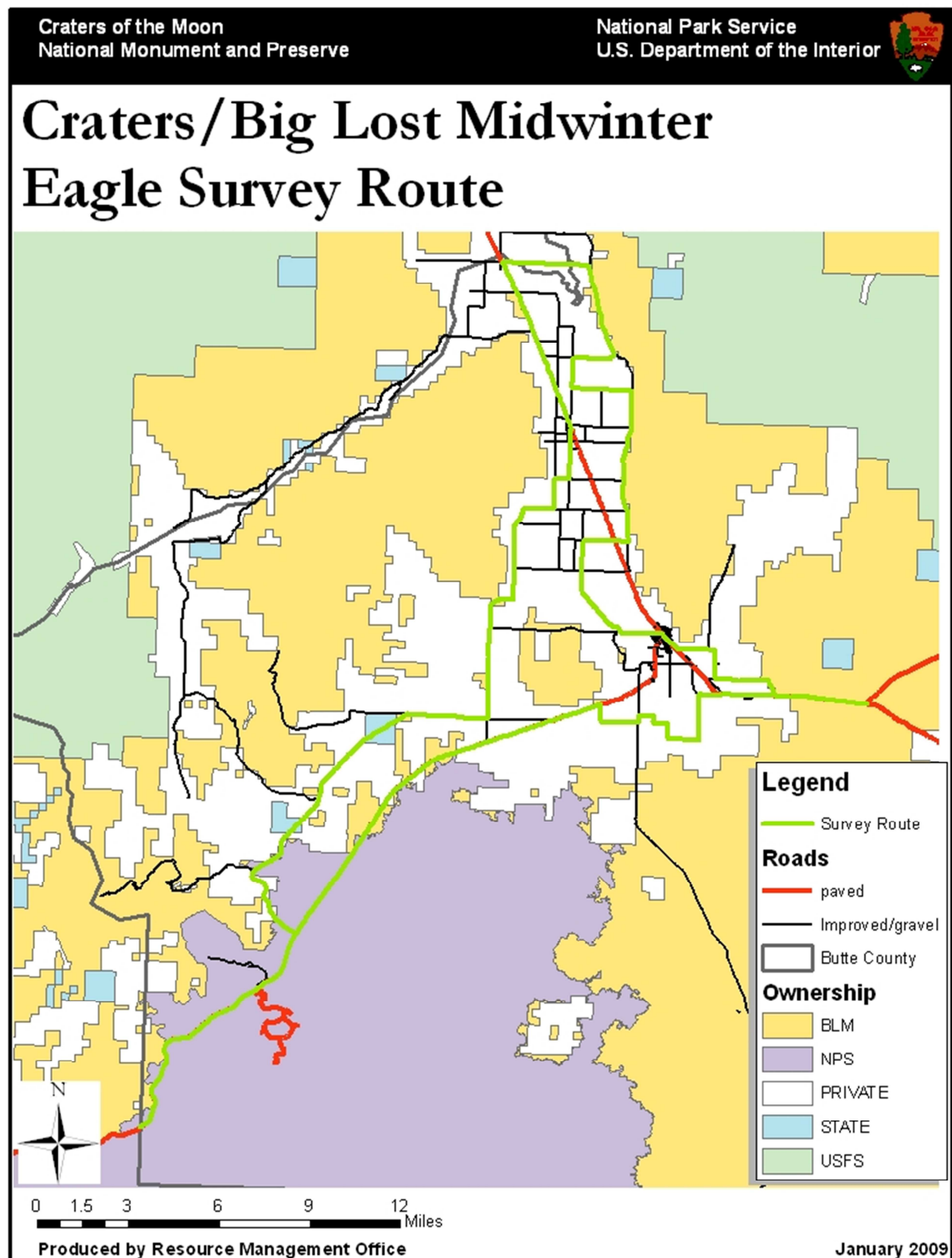
USFWS species listed as Birds of Conservation Concern by the US Fish and Wildlife Service "CC"

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Appendix 1. Location of the Craters of the Moon Christmas Bird Count



Appendix 2. Location of Craters/Big Lost Midwinter eagle Count Survey Route.

