

Spatially-balanced landbird surveys within the Craters of the Moon National Monument and Preserve during the 2012 breeding season



**Lava flows, shrubsteppe, and Limber Pine in the northeastern portion of the Craters of the Moon
National Monument and Preserve (grid L5) - photo by Jay Carlisle**

2012 Annual Report

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ABSTRACT: The Idaho Bird Observatory conducted spatially-balanced landbird surveys across the Craters of the Moon National Monument and Preserve in south-central Idaho during late May and early June 2012. Specifically, we conducted surveys at 15, 1km-x-1km grids with 16 survey points in each grid. We distributed effort such that 12 grids were placed in areas not dominated by lava flows and three grids were in lava flows. We followed the spatially-balanced sampling design and the survey protocol of the Integrated Monitoring of Bird Conservation Regions program such that our data are comparable to data collected throughout the region. We detected a total 3,147 individuals of 51 different species on counts during the 2012 breeding season. The 11 most frequently detected species were: Western Meadowlark (n = 797), Horned Lark (725), Brewer's Sparrow (357), Rock Wren (210), Grasshopper Sparrow (173), Vesper Sparrow (135), Brown-headed Cowbird (118), Mourning Dove (115), Common Raven (81), Sage Thrasher (65), and Lark Sparrow (65). Importantly, we detected 14 species listed by the BLM and/or IDFG as species of concern during 2012 surveys, including Greater Sage-grouse; Sage Thrasher; and Brewer's, Grasshopper, Black-throated, and Sage sparrows. Though many species were detected in both lava and non-lava strata, most species differed in relative abundance patterns between strata. In particular, Rock Wren, Mourning Dove, and Brown-headed Cowbird were detected at much higher rates on lava whereas Western Meadowlark, Horned Lark, Brewer's Sparrow, Grasshopper Sparrow, Vesper Sparrow, and Sage Thrasher were much more frequent away from lava.



Extensive grasslands in the southern portion of the CRMO – *photo by Jay Carlisle*

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INTRODUCTION

The Craters of the Moon National Monument and Preserve (CRMO) is located in south-central Idaho and contains a vast extent and impressive diversity of lava flows as well as adjacent habitats composed primarily of shrubsteppe and/or grassy rangeland (USDI-NPS/BLM 2007). The CRMO and the Shoshone Field Office of Bureau of Land Management (BLM) are looking to improve the natural resource dataset across the full extent of the monument and preserve. To gain a better understanding of the distribution and abundance of breeding birds within CRMO, we conducted surveys at 15, 1km-x-1km survey grids during the 2012 breeding season, following up on a survey of 30 grids in 2011. We distributed effort such that 12 grids were placed in areas not dominated by lava flows and three grids were in lava flows. We followed the spatially-balanced sampling design and the survey protocol of the Integrated Monitoring of Bird Conservation Regions program (IMBCR; White et al. 2012) such that data are comparable to data collected across the region.

METHODS

After discussion with BLM Shoshone Field Office personnel prior to the 2011 field season, we developed two strata within which to conduct bird surveys: “lava” and “non-lava”. We decided to distribute effort such that 80% of effort was focused on the more accessible habitats (primarily shrubsteppe and/or grassland) that occur away from the lava flows (non-lava) and 20% of effort in lava flow areas (lava). This follows an 80%:20% ratio used by the IMBCR program in distributing 80% of effort to more accessible “front-country” areas and 20% of effort to the harder to access “back-country” areas.

Methods that follow are drawn extensively from White et al. (2012), with author permission. We used generalized random-tessellation stratification (GRTS), a spatially-balanced sampling algorithm, to select sample units (Stevens and Olsen 2004). White et al. (2012) point out that the GRTS design is well-suited to long-term monitoring of birds. Importantly, all sample units in the sampling frame are ordered, such that any set of consecutively numbered units is a spatially well-balanced sample (Stevens and Olsen 2004). The GRTS design is also robust to fluctuating budgets in that it’s possible to adjust the sampling effort among years within each stratum while still preserving a random, spatially-balanced sampling design (White et al. 2012).

The study design defined sampling units as 1-km² cells that were used to create a uniform grid over the entire study area. Within each grid cell we established a 4 x 4 grid of 16 survey points spaced 250 m apart. In 2012, we were able to conduct surveys at 15 grids (Figure 1); this is half of the effort carried out in 2011 (Carlisle et al. 2012). We used GRTS sampling to create an ordered list for both the lava and non-lava strata and allocated effort such that 12 grids were placed in non-lava areas and three grids were in lava flows. Most non-lava grids were accessed relatively easily using existing roads and 2-tracks, although several occurred in areas of especially rocky roads (requiring high clearance and 4WD) and/or areas that turned very muddy and slick after rain. Thus, we were able to access non-lava grids 1-12 (Table 1, Figure 1). In the case of lava flows, some potential grid sites occur quite far from roads and access rules were pre-determined during consultation with BLM Shoshone Field Office personnel. It was determined that if a lava sample unit selected to be surveyed occurred more than 3 miles (5 km) from an accessible road and/or behind private property for which access could not be granted, we would move to the next ordered sample. Thus, we surveyed lava grid numbers 2, 5, and 6 (Table 1, Figure 1). We surveyed each grid once between May 24 and June 1, 2012.

Field technicians conducted point counts (Buckland et al. 2001) following the protocol established by Rocky Mountain Bird Observatory (RMBO; Hanni et al. 2009). Observers surveyed the transects in the morning, beginning ½-hour before sunrise and concluding their survey no later than 1030. The survey duration at each point was six minutes because an even number of minute intervals facilitated the estimation of site occupancy. For every bird detected during the six minute period, we recorded species, sex, horizontal distance from the observer, minute we detected the bird and type of detection (e.g., call, song, visual). Observers measured distances using laser rangefinders. When it was not possible to measure the distance to a bird, observers estimated distance by measuring to some nearby object. Observers recorded birds flying over but not using the immediate surrounding landscape. The “flyover” detections were not included in the estimates of density, population size or occupancy. Observers also recorded the presence of species which are rare or difficult to detect (i.e., grouse, owls, raptors) while we traveled between points within a grid cell. We used the opportunistic detections of these rare species for distribution mapping purposes only. We considered all non-independent detections

of birds (i.e., flocks or pairs of conspecific birds together in close proximity) as part of a ‘cluster’ rather than as independent observations. Observers recorded the number of birds detected within the cluster along with a letter code to keep track of each distinct cluster.

At the start and end of each transect, observers recorded time, ambient temperature, cloud cover, precipitation and wind speed. Technicians navigated to each point using hand-held Global Positioning System (GPS) units. Before beginning each six-minute count, surveyors recorded vegetation data (within a 50 meter radius) and distance from a road (if within 100 m). We recorded vegetation data including: the dominant habitat type and structural stage; the relative abundance, percent cover and mean height of trees and shrubs (by species); and grass/forb height and groundcover. We recorded vegetation data quietly to allow birds, potentially disturbed by our approach, time to return to their normal habits prior to beginning each count. For more detailed information about survey methods and vegetation data collection protocols, refer to RMBO’s Field Protocol for Spatially-balanced Sampling of Landbird Populations on their Avian Data Center website:

<http://www.rmbo.org/public/monitoring/downloads.aspx>

In this report, we summarize the relative abundance of all species detected during 2012 surveys. In particular, we look at differences in bird communities between the lava and non-lava strata. Following the methodology of White et al. (2012), RMBO staff and other collaborators will conduct multi-scale occupancy analyses and calculate density estimates by strata, including for the CRMO. A detailed, final report containing this information will be made available during March 2013; the 2011 report (White et al. 2012) is available at:

http://www.rmbo.org/v3/Portals/0/Documents/Science/Reports/2011_IMBCR_report.pdf.

We also provide notes about the status of certain species listed by BLM and Idaho Department of Fish and Game based on survey data. Lastly, it is important to point out that because points are 250 m apart, it’s likely that some individuals, especially of larger, louder, and/or more mobile species, were detected from ≥ 2 survey points within a grid. Thus, the raw counts shown in Table 2 likely overestimate slightly the actual number of individuals detected; instead, they represent the total number of detections.

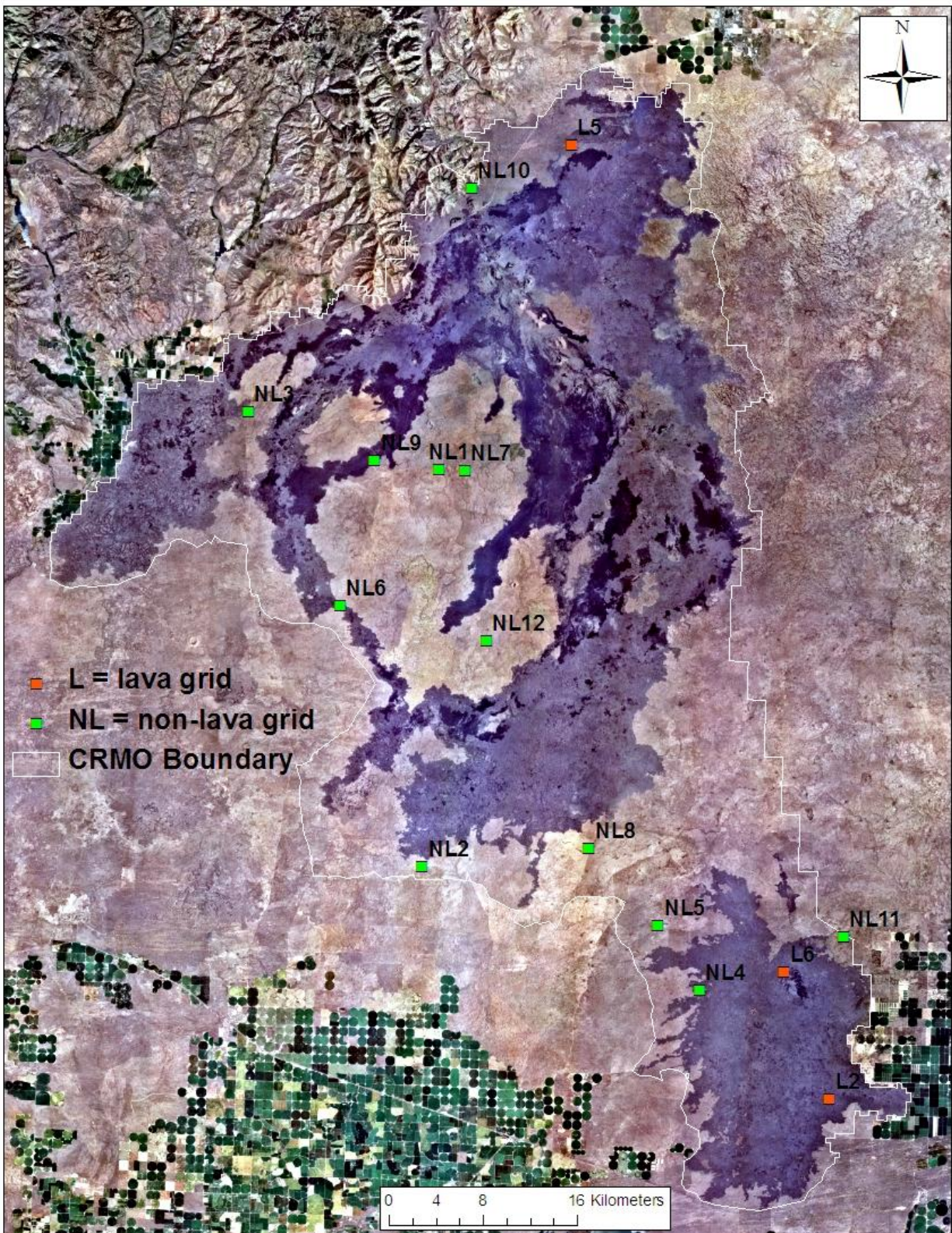
Table 1. Grid center coordinates and survey dates for 2012 spatially-balanced surveys on the Craters of the Moon National Monument and Preserve.

Grid	Zone	X	Y	Date surveyed	Number of points surveyed	Notes
Lava2	11	813562	4744845	5/24/2012	16	
Lava5	11	785830	4824192	5/29/2012	10	missed 6, 7, 11, 13, 14, 16 (time)
Lava6	11	808938	4755369	5/31/2012	16	
Nolava1	11	776568	4795896	5/29/2012	16	
Nolava2	11	777580	4762128	5/31/2012	16	
Nolava3	11	760016	4799661	5/28/2012	16	
Nolava4	11	801886	4753291	5/30/2012	16	
Nolava5	11	797939	4758573	5/30/2012	16	
Nolava6	11	769023	4783767	5/29/2012	16	
Nolava7	11	778758	4795918	5/29/2012	16	
Nolava8	11	791625	4764631	6/1/2012	16	
Nolava9	11	771048	4796266	5/28/2012	16	
Nolava10	11	777685	4819987	5/29/2012	13	missed 1, 4, 15 (time)
Nolava11	11	813798	4758699	5/31/2012	16	
Nolava12	11	781699	4781629	5/30/2012	16	



View from the L6 grid across the Wapi Flow to the Albion Mountains - photo by Jay Carlisle

Figure 1. Location of the 15 spatially-balanced survey grid locations surveyed in 2012 on the Craters of the Moon National Monument and Preserve.



RESULTS and DISCUSSION

Spatially-balanced landbird surveys across the Craters of the Moon National Monument and Preserve in 2012 showed a relatively diverse breeding bird community, especially consisting of species that rely on shrubsteppe, grassland, and/or rocky habitats. We detected a total 3,147 individuals of 51 different species during the 2012 breeding season (Table 2). Many species detected were very likely local breeders but several passage migrants of species that normally breed in wooded and/or higher elevation areas were observed during our surveys in late May and early June – a time when some landbird species are still actively migrating to breeding areas. In order of descending abundance, the 11 most frequently detected species were: Western Meadowlark ($n = 797$), Horned Lark (725), Brewer's Sparrow (357), Rock Wren (210), Grasshopper Sparrow (173), Vesper Sparrow (135), Brown-headed Cowbird (118), Mourning Dove (115), Common Raven (81), Sage Thrasher (65), and Lark Sparrow (65). Importantly, we detected 14 species listed by the BLM and/or IDFG as species of concern during 2012 surveys. In addition to the above-mentioned Brewer's and Grasshopper sparrows and Sage Thrasher, other species of concern included Black-throated Sparrow (26), Brewer's Blackbird (1), Burrowing Owl (3), Ferruginous Hawk (3), Greater Sage-grouse (26), Green-tailed Towhee (40), Long-billed Curlew (8), Loggerhead Shrike (9), Sage Sparrow (9), Short-eared Owl (3), and Swainson's Hawk (6). Though we only conducted half of the survey effort relative to 2011, we detected the most numerous species in very similar relative abundance to 2011 data (Carlisle et al. 2012).

Lava versus non-lava:

Though many species were detected in both lava and non-lava strata, most species differed in both relative abundance patterns between strata (Table 2). The 10 most frequently detected species from ***lava*** counts were: Rock Wren (152), Brown-headed Cowbird (79), Mourning Dove (59), Brewer's Sparrow (28), Black-throated Sparrow (26), Lark Sparrow (26), Common Raven (23), Western Meadowlark (21), Sage Thrasher (8), and Western Tanager (8; Table 2). Rock Wren, Mourning Dove, and Brown-headed Cowbird, in particular, were detected at a much higher rate on lava than away from the lava flows. Also, there were 11 species detected during lava counts that were not found in the non-lava strata. Noteworthy among these are Black-throated Sparrow (2/3 lava grids), Blue-gray Gnatcatcher (1/3), Clark's Nutcracker (1/3), and Mountain Bluebird (1/3); see Carlisle et al. (2012) for interpretation of these observations.

The 10 most frequently detected species from **non-lava** counts were: Western Meadowlark (776), Horned Lark (724), Brewer's Sparrow (329), Grasshopper Sparrow (173), Vesper Sparrow (135), Common Raven (58), Rock Wren (58), Sage Thrasher (57), Mourning Dove (56), and Green-tailed Towhee (40; Table 2). The first five of these species were vastly more numerous away from lava flows than on the lava. Additionally, there were 23 species detected during non-lava counts that were not found in the lava strata. The most noteworthy among these are Burrowing Owl (2/12 non-lava grids), Greater Sage-grouse (5/12), Grasshopper Sparrow (7/12), Long-billed Curlew (2/12), Sage Sparrow (2/12) and Vesper Sparrow (9/12); see Carlisle et al. (2012) for interpretation of these observations.

Table 2. Detections by species and survey grid for 2012 spatially-balanced surveys on the Craters of the Moon National Monument and Preserve. “L” signifies grids *on* lava flows and “NL” signifies grids *away from* lava flows.

Species	L2	L5	L6	NL1	NL2	NL3	NL4	NL5	NL6	NL7	NL8	NL9	NL10	NL11	NL12	Total
American Crow	1															1
American Kestrel		1								1						2
American Robin													1			1
Bank Swallow		2				3										5
Barn Swallow			1		1				1		1					4
Black-billed Magpie							2									2
Black-throated Sparrow ^a	1		25													26
Blue-gray Gnatcatcher		1														1
Brewer's Blackbird ^b		1														1
Brewer's Sparrow ^{c,d}		28		55	14	31	22	16	36	26	2	38	74	13	2	357
Broad-tailed Hummingbird												1				1
Brown-headed Cowbird	47	3	29	1		10	27						1			118
Bullock's Oriole		1														1
Burrowing Owl ^{b,d}					1			2								3
California Quail													1			1
Canada Goose						20										20
Chipping Sparrow	1	3	1	1												6
Clark's Nutcracker		4														4
Cliff Swallow												1				1
Common Nighthawk											1					1
Common Raven	5	3	15		9	5	10	8	3		2	7	8	3	3	81
European Starling												2				2
Ferruginous Hawk ^{c,d}					2					1						3
Grasshopper Sparrow ^{b,d}				7	14			28		19	44			37	24	173
Gray Partridge						1										1
Greater Sage-grouse ^{d,e}									1	2			1	22		26
Green-tailed Towhee ^b													40			40
Horned Lark		1		73	64	18	12	99	29	139	88	8		83	111	725
House Finch	3	1														4
Lark Sparrow	13		13		3	13	10		3	1		7			2	65

Species	L2	L5	L6	NL1	NL2	NL3	NL4	NL5	NL6	NL7	NL8	NL9	NL10	NL11	NL12	Total
Lazuli Bunting		1				1						1				3
Loggerhead Shrike ^c						7			1			1				9
Long-billed Curlew ^{b,d}					1						7					8
Mountain Bluebird		1														1
Mourning Dove	18	15	26		2	13	18	3		4	2	11		3		115
Northern Flicker		4														4
Northern Harrier	1			2	1	1		1			1	1	4	1	1	14
Rock Wren	65	30	57		1	3	37	4	2			6	4	1		210
Sage Sparrow ^c						1			8							9
Sage Thrasher ^b		8		12		6			1	14		6	18			65
Say's Phoebe	3		1													4
Short-eared Owl ^b								2			1					3
Spotted Towhee		6											16			22
Swainson's Hawk ^b	3				1		2									6
Turkey Vulture												1	2			3
Unknown bird			7				1	5		2	2			5		22
Unknown Empidonax												1				1
Unknown raptor				1				2								3
Unknown swallow	1				1		1						5		1	9
Vesper Sparrow				33	5	7			1	37		5	17	3	27	135
Violet-green Swallow		1	2													3
Western Meadowlark		15	6	45	69	86	66	84	70	54	63	88		86	65	797
Western Tanager		5	3			1						2				11
Wilson's Warbler												1				1
Yellow-rumped Warbler*		6				4						3				13
Total	162	141	186	230	189	231	208	254	156	300	214	191	192	257	236	3147

^a BLM Type 4 species (Species of Concern); ^b BLM Type 5 species (Watch List Species)

^c BLM Type 3 species (Regional/State Imperiled Species)

^d Idaho Department of Fish and Game Species of Greatest Conservation Need

^e BLM Type 2 species (Rangewide/Globally Imperiled Species); * Most likely **not** a locally breeding species

SPECIES ACCOUNTS

Here we provide a synopsis of 2012 survey results for individual species. See Appendix 1 for maps of many species.

GREATER SAGE-GROUSE (BLM TYPE 2; IDFG SGCN): One of the characteristic species of the Great Basin shrubsteppe, sage-grouse were found on four of the 12 non-lava grids and the highest numbers were detected on NL-11.

FERRUGINOUS HAWK (BLM TYPE 3; IDFG SGCN): We detected Ferruginous Hawks on NL-2 and NL-7; in 2011 we also detected this species on NL-7 which may suggest this is a breeding territory.

SWAINSON'S HAWK (BLM TYPE 5; IDFG SGCN): Swainson's Hawks nest in or near native grasslands as well as agricultural areas. We observed this species on three of the grids, including one lava grid (L-2) as well as NL-2 and NL-4.

LONG-BILLED CURLEW (BLM TYPE 5; IDFG SGCN): We observed this species on only two of the grids we surveyed in 2012, NL-2 and NL-8.

BURROWING OWL (BLM TYPE 5; IDFG SGCN): We detected Burrowing Owls on two of the non-lava grids, NL-2 and NL-5.

LOGGERHEAD SHRIKE (BLM TYPE 3): We found shrikes on three of the 12 non-lava grids, especially in association with more mature sagebrush communities. They were most numerous on NL-3.

SAGE THRASHER (BLM TYPE 5): Relatively common and widespread, we found thrashers on six of the 12 non-lava grids and one of three lava grids.

GREEN-TAILED TOWHEE (BLM TYPE 5): As with 2011, we found Green-tailed Towhees only on a single grid, NL-10 – the only survey location within the foothills of the Pioneer Mountains.

BREWER'S SPARROW (BLM TYPE 3; IDFG SGCN): Brewer's Sparrow was the 3rd most frequently-detected species during 2012 surveys and we found this species on all 12 non-lava grids and one of three lava grids.

GRASSHOPPER SPARROW (BLM TYPE 5; IDFG SGCN): Grasshopper Sparrow was the 5th most frequently-detected species during 2012 surveys and we found this species on seven of the 12 non-lava grids, especially in areas dominated by grasses.

SAGE SPARROW (BLM TYPE 3): Sage Sparrows were found on only two of the non-lava grids (NL-3 and NL-6), both in the northwestern section of the CRMO where there is a higher proportion of sagebrush cover.

BLACK-THROATED SPARROW (BLM TYPE 4): We detected Black-throated Sparrow on two of the three lava grids, which makes sense because this species tends to use shrubsteppe areas with exposed rocks.

BREWER'S BLACKBIRD (BLM TYPE 5): Relatively rare throughout CRMO, we detected Brewer's Blackbirds on only one lava grid, L-5.

LITERATURE CITED

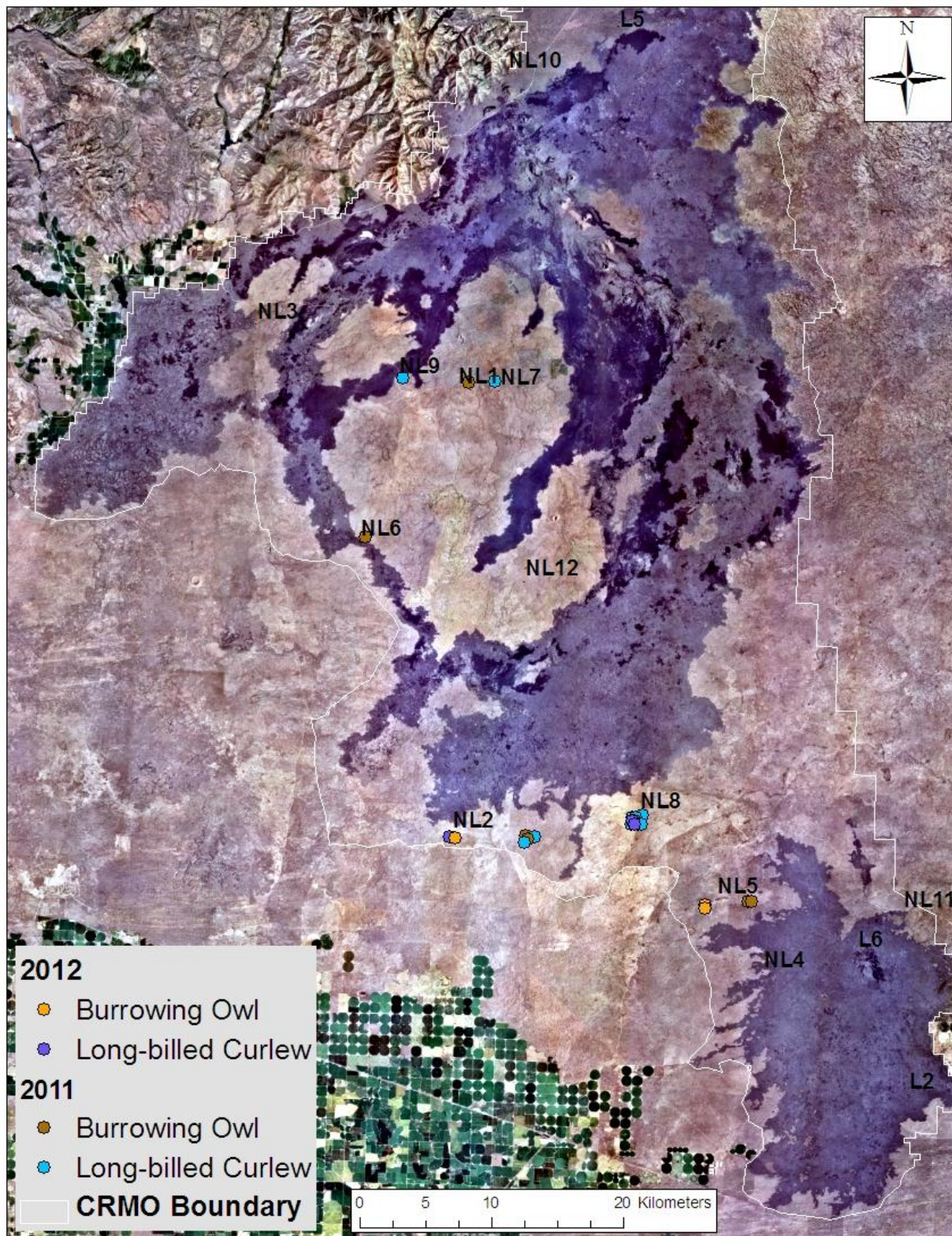
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Appendix 1a. Observations of Greater Sage-grouse during 2012 surveys on the Craters of the Moon National Monument and Preserve (2011 locations shown for comparison).



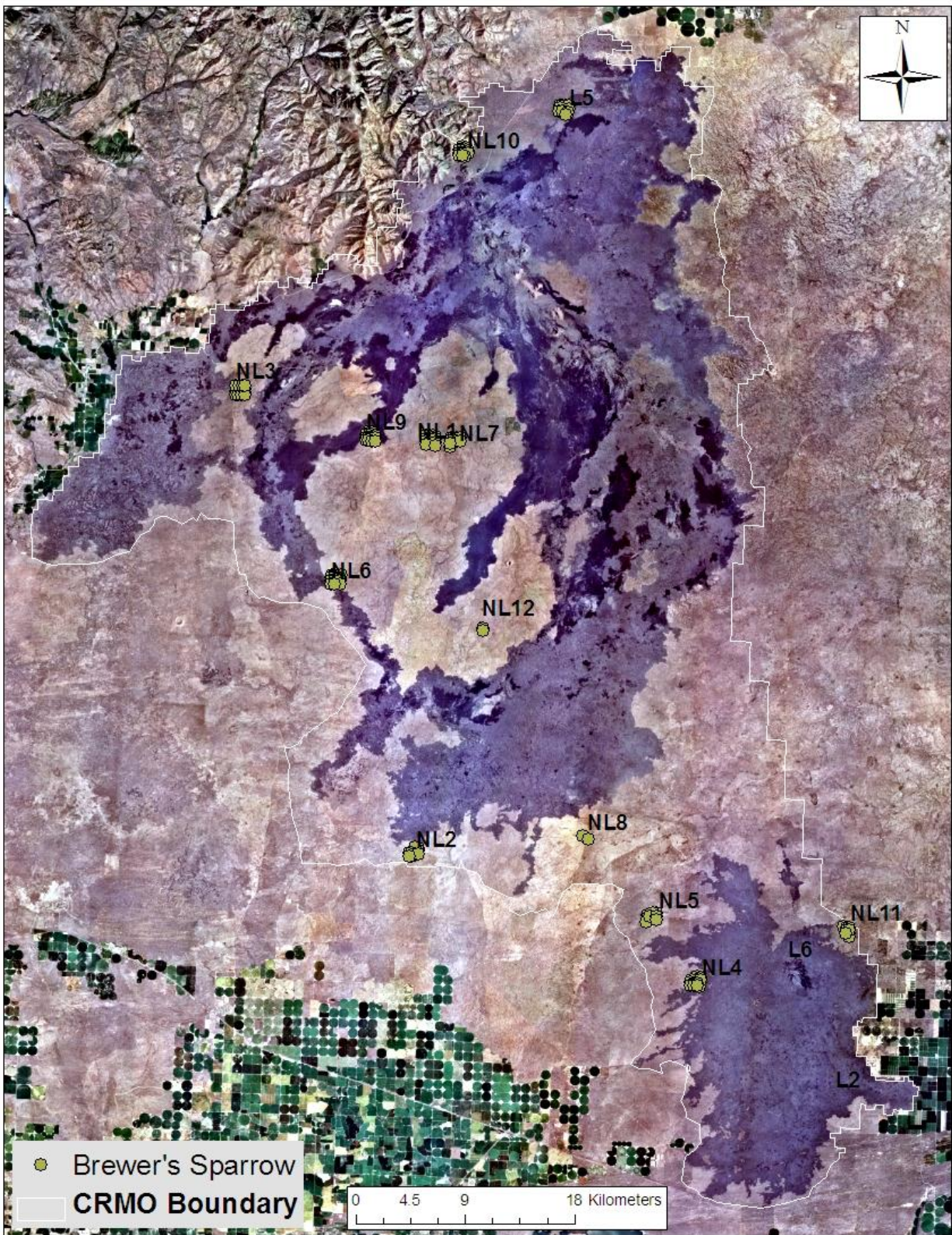
Appendix 1b. Observations of Burrowing Owl and Long-billed Curlew during 2011 and 2012 surveys on the Craters of the Moon National Monument and Preserve (2011 locations shown for comparison).



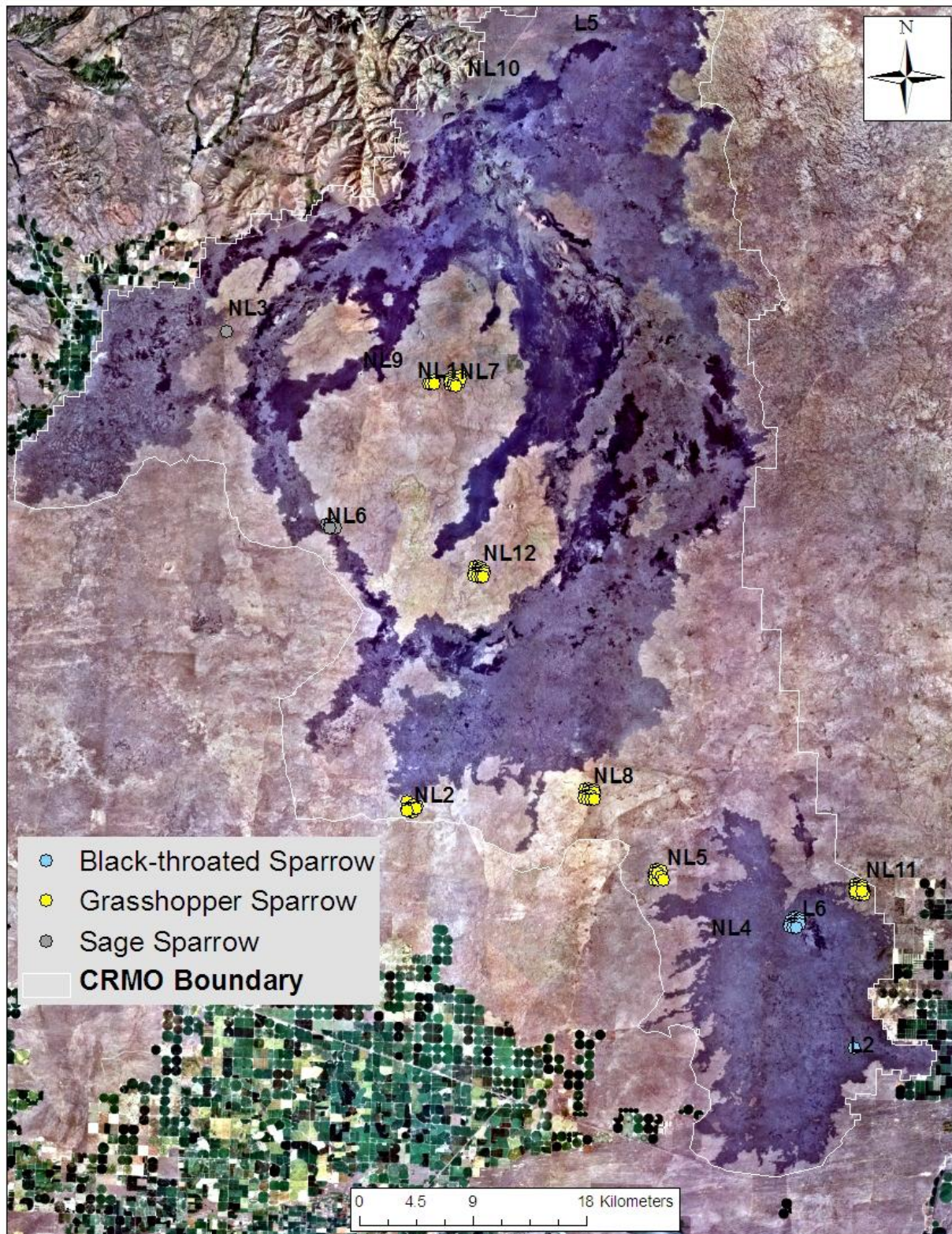
Appendix 1c. Observations of Sage Thrasher during 2012 surveys on the Craters of the Moon National Monument and Preserve.



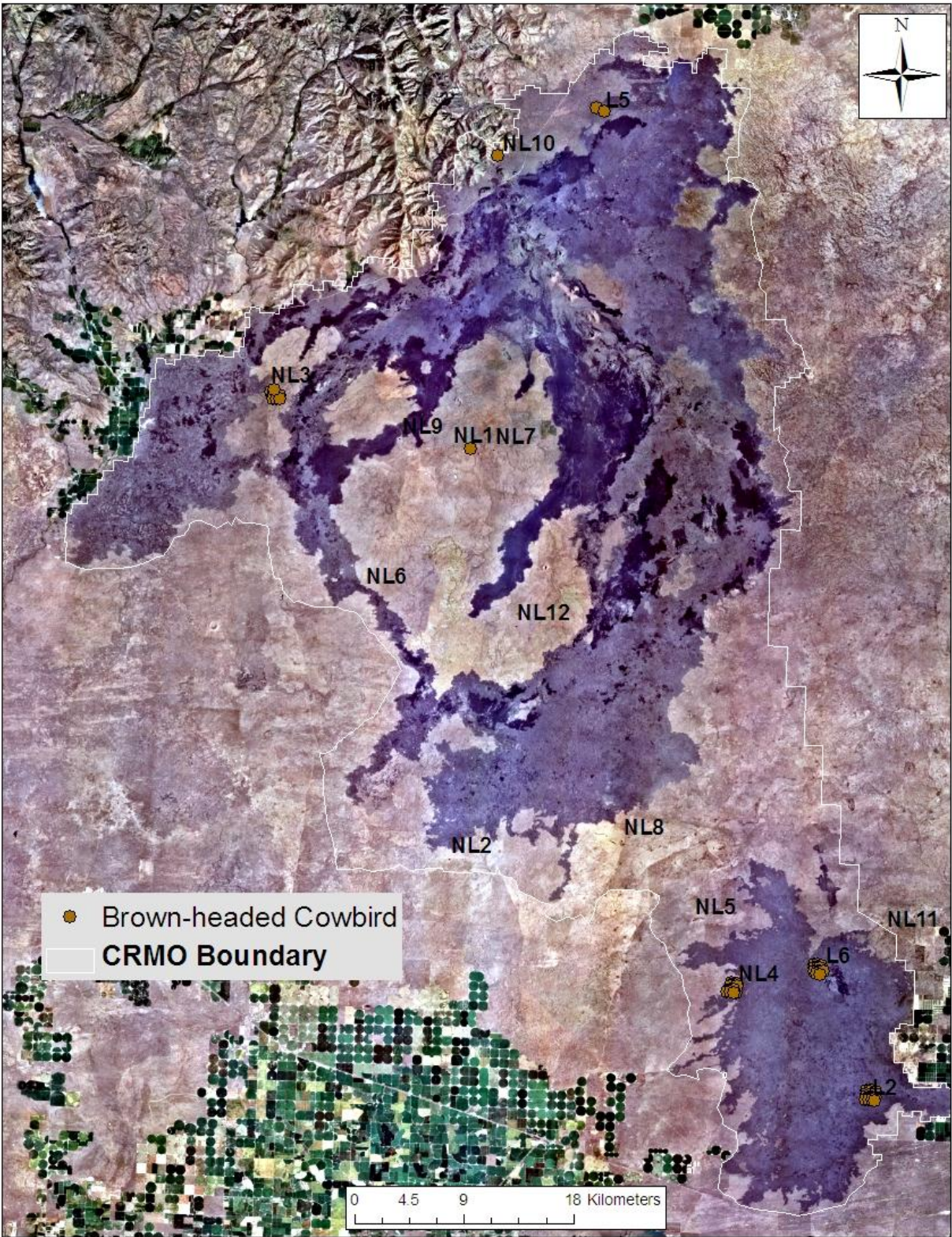
Appendix 1d. Observations of Brewer's Sparrow during 2012 surveys on the Craters of the Moon National Monument and Preserve.



Appendix 1e. Observations of three sparrow species (Black-throated, Grasshopper, and Sage) with different habitat requirements during 2012 surveys on the Craters of the Moon National Monument and Preserve.



Appendix 1f. Observations of Brown-headed Cowbird during 2012 surveys on the Craters of the Moon National Monument and Preserve.



Appendix 1g. Observations of Rock Wren during 2012 surveys on the Craters of the Moon National Monument and Preserve.

