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DATA ARTICLE

SNAPSHOT USA 2019–2023: The First Five Years of Data From a Coordinated Camera Trap Survey of the United States

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ABSTRACT

Motivation: SNAPSHOT USA is an annual, multicontributor camera trap survey of mammals across the United States. The growing SNAPSHOT USA dataset is intended for tracking the spatial and temporal responses of mammal populations to changes in land use, land cover and climate. These data will be useful for exploring the drivers of spatial and temporal changes in relative abundance and distribution, as well as the impacts of species interactions on daily activity patterns.

Main Types of Variables Contained: SNAPSHOT USA 2019–2023 contains 987,979 records of camera trap image sequence data and 9694 records of camera trap deployment metadata.

Spatial Location and Grain: Data were collected across the United States of America in all 50 states, 12 ecoregions and many ecosystems.

Time Period and Grain: Data were collected between 1st August and 29th December each year from 2019 to 2023.

Major Taxa and Level of Measurement: The dataset includes a wide range of taxa but is primarily focused on medium to large mammals.

Software Format: SNAPSHOT USA 2019–2023 comprises two .csv files. The original data can be found within the SNAPSHOT USA Initiative in the Wildlife Insights platform.

1 | Introduction

As global biodiversity continues to decline, it is essential that we accurately monitor the abundance and distribution of wildlife communities through time (O'Connor et al. 2020). Whereas public databases and aggregator platforms can accommodate and collate data from diverse taxa collected by professionals (e.g., North American Breeding Bird Survey [BBS], Global Biodiversity Information Facility [GBIF]) or community crowdsourcing (e.g., iNaturalist), most of these data do not account for survey effort to assess pseudo-absences. Even when some public platforms such as eBird can account for survey effort (Callaghan and Gawlik 2015), in most cases, the species of interest are easily detectable compared to mammals that might be elusive, be nocturnal and exhibit large home ranges—traits that make them difficult to detect. Due to these difficulties, mammal abundance and distribution data are frequently collected by camera traps, as they are now widely used and highly effective survey tools (Wearn and Glover-Kapfer 2019) with the added benefit of accounting for survey effort. However, most camera trap surveys are significantly smaller in spatial and/or temporal scale than those collected by large-scale public platforms (Cove et al. 2021).

The SNAPSHOT USA project was created in 2019 as a grassroots effort to accomplish long-term mammal monitoring goals sustainably by leveraging large-scale collaboration between researchers at diverse institutions across the United States. As the only coordinated and standardised camera trap survey in the United States with data from all 50 states, SNAPSHOT USA is innovative, highly cooperative and a valuable contribution to conservation. The project objectives are to annually collect camera trap data across the country by using a unified protocol and to produce data that can be used to examine nationwide trends of mammal communities in relation to environmental and anthropogenic factors. The data collection period is September through October each year and, although the focus is on mammal species, SNAPSHOT USA contributors identify all species, and these identifications are retained in the dataset.

The project also aims to facilitate collaborations among contributors, foster community engagement in science and conservation and ensure the database is available for public use in research, management and education applications. To date, the project has recorded over 778,000 observations of free-ranging mammals submitted by collaborators from over 150 different institutions across all 50 states. Collaborating institutions include public and private colleges and universities, high schools, federal and tribal government agencies and nonprofit organisations. The resulting data provide a snapshot of the nation's mammal community each year and have already been used to explore a wide variety of research questions, including the responses of diverse mammal species to changes in human activity (Burton et al. 2024), the effects of invasive species abundance on native wildlife activity patterns (Dykstra et al. 2023) and the impact of predator presence on activity patterns of prey species (Clipp et al. 2024).

Here, we present the complete SNAPSHOT USA dataset to date: the result of five consecutive years of this coordinated camera trap survey. Although the first 3 years of data have been previously published (Cove et al. 2021; Kays et al. 2022; Shamon et al. 2024), they are standardised in this dataset to account for changes over the years in species taxonomy, camera array names and camera location names.

2 | Methods

2.1 | Data Collection Protocol and Coordination

The first three annual SNAPSHOT USA surveys were coordinated by Roland Kays, Michael Cove and William McShea. The 2019, 2020 and 2021 datasets are accessible for public use through the Supporting Information of their respective publications. Although the 2019 and 2020 surveys were originally processed and stored in eMammal (https://www.emammal.si.edu), all data are now housed in Wildlife Insights (WI) (Ahumada et al. 2020) within the SNAPSHOT USA Initiative. The two most recent surveys, 2022 and 2023, were coordinated by the SNAPSHOT USA Survey Coordinator Brigit Rooney. This article represents the first publication of 2022 and 2023 SNAPSHOT USA data, and the listed coauthors contributed data to one or both of those surveys.

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The SNAPSHOT USA project developed a standard protocol in 2019 to survey mammals > 100 g and large identifiable birds (Cove et al. 2021). Cameras are unbaited and set at approximately 50 cm height across an array of at least 7 cameras with a minimum distance of 200 m and maximum of 5 km between them. The collection period for SNAPSHOT USA data is between September and October, and the target minimum of camera trap-nights per array is 400. Some contributors to SNAPSHOT USA 2019–2023 started collecting data earlier or deployed cameras later based on locations or logistics, and we chose to include data from 1st August to 29th December each year in this dataset.

The camera trap arrays, referred to as subprojects in the WI camera trap repository, were characterised by one combination of habitat type and development level, as determined by each subproject Principal Investigator. If cameras were set facing roads, trails or water, this is noted in the metadata. SNAPSHOT USA arrays vary in size, the number of cameras deployed in each array and the spatial design of the camera array—a characteristic adopted to encourage contributions by many researchers that might have different goals in their specific study designs. Collaborators are encouraged to sample the same locations every year, but this is not a requirement to participate in the project.

All survey contributors deployed camera traps that are motion-sensitive and infrared, with fast (< 0.5 s) trigger speeds. Cameras were set to take 1–10 photos per trigger and without a quiet period between triggers. Approved cameras were any of the following models, or one of equal or greater quality by that brand: Browning (Strike Force Elite HD, 2017 Strike Force HD Pro), Bushnell (Trophy Cam HD, Essential, Aggressor), Moultrie (M-999I, M-1100i), Primos (Proof Cam 02, Proof Cam 03), Reconyx (all models), Spypoint (Solar, Force 10, Force 11D, Force GM) and Stealth Cam (G45NP Pro, G42NG). Any use of trade, firm or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

2.2 | Data Verification

The first two years of SNAPSHOT USA data incorporated an Expert Review Tool to verify the accuracy of every identification, as that was built in to the eMammal repository. This tool required SNAPSHOT USA project managers (Cove and Kays in 2019, with more taxon-specific reviewers in 2020) to review and confirm all species identifications, in an effort to minimise identification errors. As eMammal automatically grouped all uploaded images into 'sequences' of images taken within 60 s of each other, by using the image timestamps, species identifications were made for individual sequences rather than images. These data have since been transferred to WI, where they underwent opportunistic review and correction by the SNAPSHOT USA Survey Coordinator.

In contrast, SNAPSHOT USA 2021, 2022 and 2023 were managed and identified entirely in WI. All SNAPSHOT USA projects in this repository were created as 'Sequence' projects to enable identification of sequences in the same manner as eMammal. Each 60-s sequence of images was classified to the narrowest taxonomic level possible by three iterations of validation. First, WI's Artificial Intelligence algorithm suggested a taxonomic identification. This algorithm consists of a multi-class classification deep convolutional neural network model that uses pretrained image embedding from Inception, a model used to identify objects (Ahumada et al. 2020). Second, each array's Principal Investigator was responsible for validating the data, fixing Artificial Intelligence identification mistakes and approving the data they contributed to the survey. Lastly, the SNAPSHOT USA Survey Coordinator quality checked the deployment data and as many identified sequences as possible. This was a multistep process that began with checking the sequence metadata for obvious timestamp errors by organising them chronologically in Microsoft Excel and the deployment metadata for location errors by mapping their coordinates and looking for outliers. Next, the coordinator checked the sequence metadata for unlikely identifications, including species detections in places outside their known range, and verified their accuracy by viewing the images in WI. Finally, identifications for the most common species were verified by using the 'Species' filter on WI to look for mistakes, one species at a time.

2.3 | Data Standardisation

When combining the 5 years of SNAPSHOT USA data to create SNAPSHOT USA 2019–2023, several aspects of the data were standardised to ensure consistency across all years. These were camera array names, camera location names and taxonomy classifications. To match protocol requirements, all camera locations less than 5 km apart were classified as one array. This resulted in combining several arrays that were originally recorded under different names and ensuring that arrays in the same place maintained the same name each year. The camera location names were standardised by ensuring that all locations with geographic coordinates that were the same to four decimal places, in Decimal Degrees notation, had the same name. However, the original coordinates were retained in the dataset. Finally, all species taxonomy classifications for the 2019 and 2020 datasets (identified in eMammal) were standardised to match those used by WI. As part of this process, all subspecies of mammals in the dataset were changed to species level (e.g., Florida black bear (*Ursus americanus floridanus*) became American black bear (*Ursus americanus*)).

For mammal taxonomy classifications, WI uses a combination of the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (2023; https://iucnredlist.org) and the American Society of Mammalogists Mammal Diversity Database (2024; https://www.mammaldiversity.org). For bird species, WI uses Birdlife International's taxonomy classifications (2024; https://datazone.birdlife.org/species/search). The WI taxonomy is continually updated in response to public user suggestions, and the taxonomy used in the SNAPSHOT USA 2019–2023 dataset reflects the WI taxonomy used in June 2024.

2.4 | Data Use Guidelines and Data Availability

The SNAPSHOT USA 2019–2023 dataset comprises two .csv files. The first file, 'SNAPSHOT_USA_Sequences.csv', contains the species identification data, including taxonomic information and common name, for all sequences of images contributed to

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TABLE 1 | Variable information for sequence data from SNAPSHOT USA 2019–2023.

Variable	Potential categories	Definition/Meaning
Year	Double precision vector between 2019 and 2023	Each year represents the year the associated data were collected
Project	One of 20 potential text strings representing the different WI project names herein	Each project is managed separately on WI
Camera_Trap_Array	One of 263 potential text strings representing the different camera trap arrays herein	Each camera trap array represents one subproject on WI
Deployment_ID	One of 9694 potential text strings associated with specific camera trap deployments across sites	Unique identifier for a camera trap deployment from WI. Most sites are associated with a single Deployment_ID, but camera photos could be uploaded in batches corresponding with multiple WI deployments from the same site
Sequence_ID	Text string associated with a specific observation from a camera trap site	Unique identifier for a camera trap observation. Observations are a sequence of all camera trap photos within 1 min of a single camera trigger. Multiple species will be identified in separate rows for the same Sequence_ID, so Sequence_ID can repeat
Start_Time	Date and time stamp associated with a camera trap observation provided in the following format: 'YYYY-MM-DD HH:MM:SS'. Start_Time values are between '2019-08-17 00:05:00' and '2023-12-21 14:37:54'	Timestamp of first camera trap photo in each camera trap sequence
End_Time	Date and time stamp associated with a camera trap observation provided in the following format: 'YYYY-MM-DD HH:MM:SS'. End_Time values are between '2019-08-17 00:05:00' and '2023-12-21 14:38:17'	Timestamp of last camera trap photo in each camera trap sequence
Class	One of seven potential text strings associated with different taxonomic classes	Taxonomic class of animal observed in the sequence
Order	One of 37 potential text strings associated with different taxonomic orders	Taxonomic order of animal observed in the sequence
Family	One of 93 potential text strings associated with different taxonomic families	Taxonomic family of animal observed in the sequence
Genus	One of 247 potential text strings associated with different taxonomic genera	Taxonomic genus of animal observed in the sequence
Species	One of 315 potential text strings associated with different specific epithets that distinguish a species within a genus	Taxonomic specific epithet that distinguishes the species within the genus of animal observed in the sequence
Common_Name	Text string of species common names	Common name of the species observed in the sequence

(Continues)

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TABLE 1 | (Continued)

Variable	Potential categories	Definition/Meaning
Age	Text string, options are Adult, Juvenile, Unknown	Age category of animal observed, if distinguishable by observer. Default is unknown since this was not consistently recorded
Sex	Text string, options are female, male, unknown	Sex category of animal observed, if distinguishable by observer. Default is unknown since this was not consistently recorded
Group_Size	Integer between 1 and 50	Number of individuals observed in a single camera trap sequence observation

TABLE 2 | Variable information for deployment data from SNAPSHOT USA 2019–2023.

Variable	Potential categories	Definition/Meaning
Year	Double precision vector between 2019 and 2023	Each year represents the year the associated data were collected
Project	One of 20 potential text strings representing project name on WI	Each project is managed separately on WI
Camera_Trap_Array	One of 263 potential text strings representing the different camera trap arrays herein	Each camera trap array represents a subproject in WI
Site_Name	One of 6712 potential text strings associated with specific camera trap locations within each subproject	Name of each camera trap location in each subproject
Deployment_ID	One of 9694 potential text strings associated with specific camera trap deployments	Unique identifier for a camera trap deployment from WI. Most locations are associated with a single Deployment_ID, but camera photos could be uploaded in batches corresponding with multiple WI deployments from the same location
Start_Date	Date camera was placed provided in the format: 'YYYY-MM-DD'. Start_Date values are between '2019-08-17' and '2023-11-22'	Date of the camera trap deployment
End_Date	Date camera was retrieved provided in the format: 'YYYY-MM-DD'. End_Date values are between '2019-08-28' and '2023-12-21'	Date of the camera trap retrieval
Survey_Nights	Number of nights the camera was active at that site	Number of nights the camera was active at that site
Latitude	Double precision vector between 21.3562 and 59.4526	Latitude value of camera trap site location. All geographic coordinates are provided in decimal degrees (WGS 84)
Longitude	Double precision vector between −157.7496 and −68.6116	Longitude value of camera trap site location. All geographic coordinates are provided in decimal degrees (WGS 84)
Habitat	One of seven potential text strings associated with habitat types	Provided by contributing authors, this indicates if the array was classified as forest, grassland, shrubland, chaparral, desert, wetland or beach
Development_Level	One of four potential text strings associated with development levels	Provided by contributing authors, this indicates if the array was classified as wild, rural, suburban or urban
Feature_Type	One of 18 potential text strings associated with feature types	Denotes any potential features at the camera site, including water source, road (dirt or paved) and trail (game or hiking)

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SNAPSHOT USA from 2019 to 2023 (Table 1). The second file, 'SNAPSHOT_USA_Deployments.csv', contains the camera trap metadata for each SNAPSHOT USA deployment from 2019 to 2023 (Table 2).

The SNAPSHOT USA 2019–2023 data are available for public use and has no copyright restrictions, but please cite this paper when using these data, or a subset of these data, for publication. These data will be accessible through Dryad upon acceptance of this manuscript, while the original data are housed as separate projects within the SNAPSHOT USA Initiative in WI.

3 | Description of the Data

3.1 | Geographic Range of Detections

Data were collected across 263 unique camera trap arrays, consisted of 6712 camera sites from all 50 states and represent most ecoregions (Bailey 2016) across the United States (Figure 1a). Although SNAPSHOT USA aims to sample all ecoregions equally in proportion to their area, the ratio of camera trap arrays to ecoregion size varies significantly (0.99–6.70 arrays per 100,000 km^2) (Figure 1b). The tundra ecoregion in the Alaska interior has not been sampled, while the temperate desert and temperate steppe ecoregions, covering much of the western and midwestern United States, contain the fewest arrays per 100,000 km^2.

3.2 | Sampling Effort

Sampling effort, represented by the number of camera trap-nights, varied between camera trap arrays and years, with a minimum of 81 trap-nights in a single year, a maximum of 3355 trap-nights, a median of 525 trap-nights and a mean of 630 (SD = 401) trap-nights. The number of years each array was surveyed also varied, with 42 arrays having been surveyed all 5 years (Figure 2a). Total effort equalled 371,979 camera trap-nights and resulted in 946,768 observations of wild and domestic mammals, birds and humans. Of these, 778,547 were wild mammals identified to species level. The median start date across years was 9 September and the median end date was 25 October. The number of sites surveyed each year varied between arrays (4–158) and 128 arrays did not reach the target minimum of 400 camera trap-nights, but we included their data in the final dataset. The total sampling effort for each array can be found in Table 3.

3.3 | Taxonomic Range of Detections

Although SNAPSHOT USA is targeted at detecting mammal species, observations of all other animal species were retained in the dataset (Table 4). These include 131 distinct mammal species and 225 bird species. Species richness at arrays ranged from a minimum of 5 to a maximum of 22 mammal and large ground bird species detected in a single year (Figure 2b). The top five species detected per 100 camera trap-nights were white-tailed deer (*Odocoileus virginianus*), eastern gray squirrel (*Sciurus carolinensis*), northern raccoon (*Procyon lotor*), eastern fox squirrel (*Sciurus niger*) and coyote (*Canis latrans*) (Figure 3). Each detection refers to one sequence of camera trap images taken within 1 min of a single camera trigger.

4 | Discussion

The SNAPSHOT USA project protocol has been applied in recent years by other countries and continents, and we hope

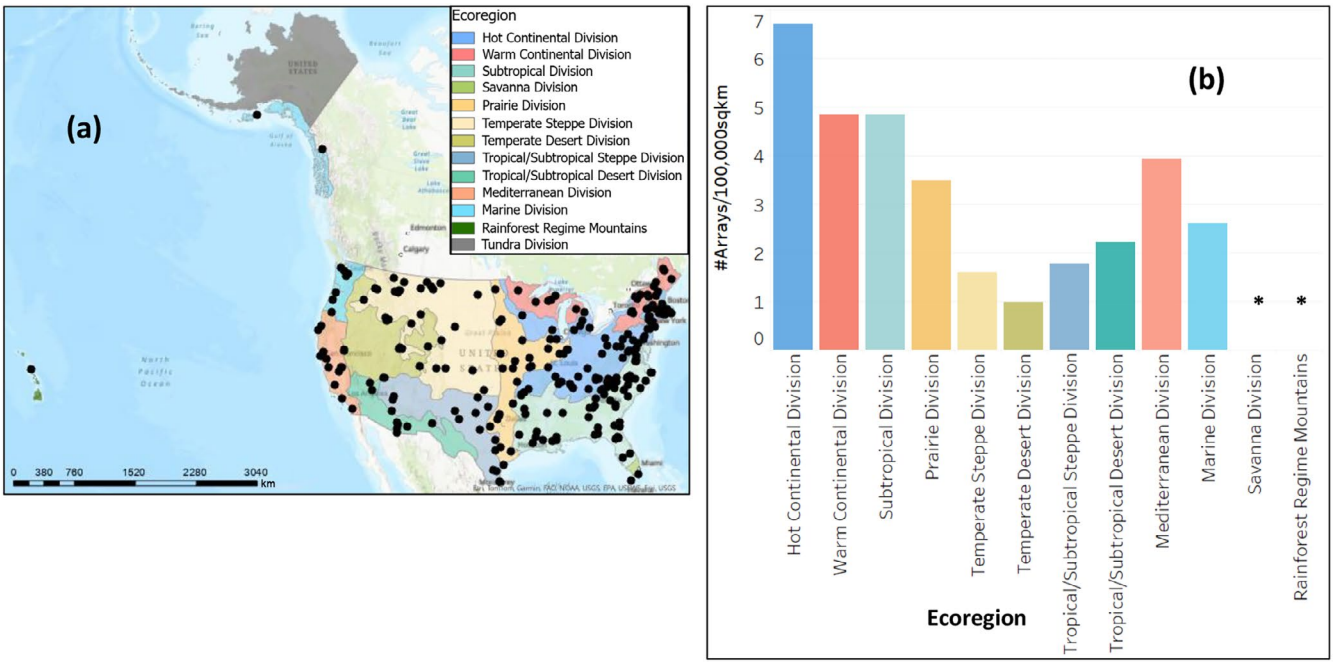

FIGURE 1 | (a) The median centres of all 263 SNAPSHOT USA 2019–2023 camera trap arrays overlaying a simplified derivation of Bailey's ecoregions (Bailey 2016) in the United States; ecoregions currently represented by SNAPSHOT USA are in colour, while ecoregions that lack surveys are in grey. (b) Number of arrays per 100,000 km^2 (*ecoregions under 100,000 km^2).

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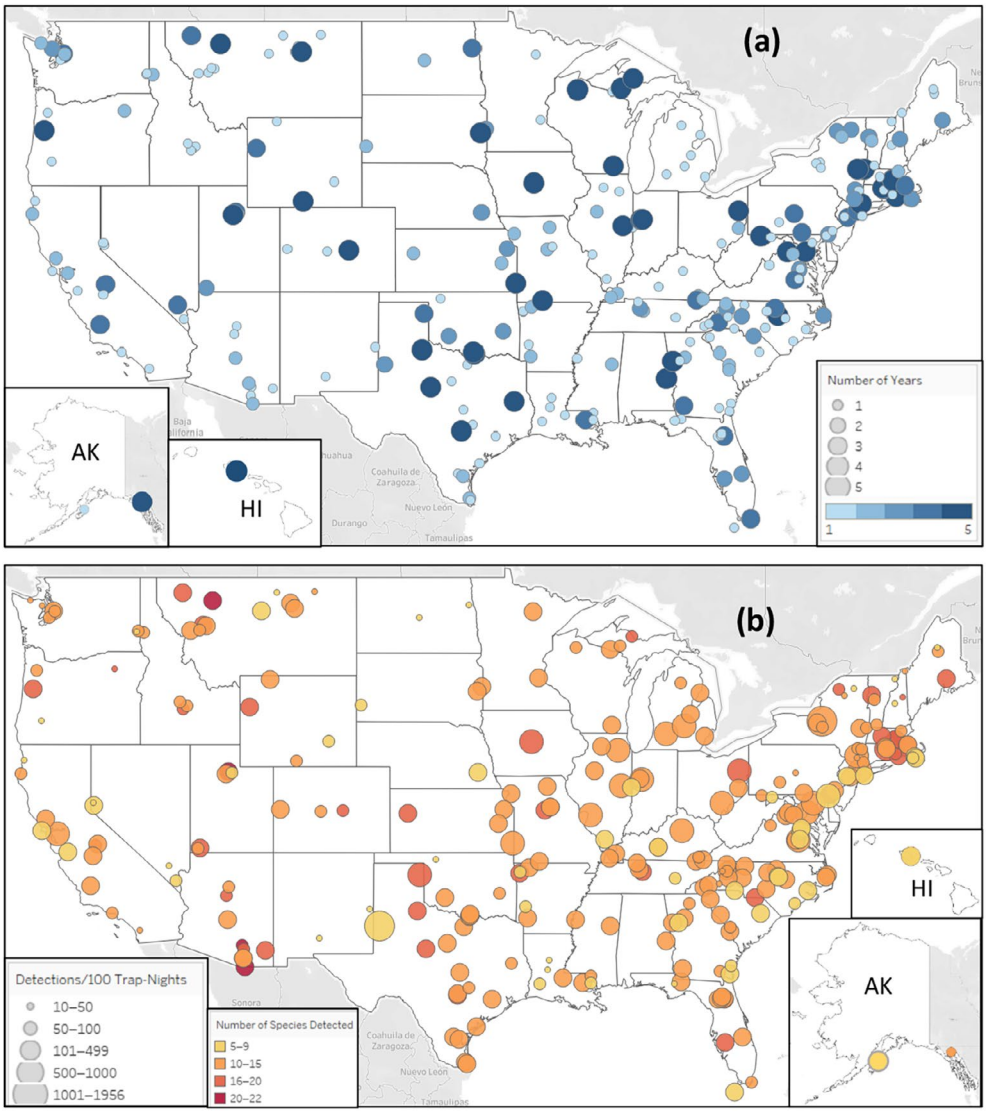

FIGURE 2 | (a) Map of the United States showing all 263 SNAPSHOT USA 2019–2023 camera trap arrays, with their colour and size representing the number of years the array was surveyed. (b) The same map showing all the arrays, with colour representing the maximum number of identified mammal and large ground bird species in a single survey year and size representing the number of detections of those species per 100 camera trap-nights observed within the array that year. Only detections of mammals and large ground birds (wild turkey (*Meleagris gallopavo*), grouse (*Canachites* spp., *Bonasa* spp., *Tympanuchus* spp., *Dendragapus* spp., *Centrocercus* spp.) or quail (*Callipepla* spp., *Oreortyx* spp.)) identified to species level were used to obtain these values, and each detection represents one sequence of images captured by a camera.

these initiatives continue expanding to improve global biodiversity monitoring to meet conservation objectives. The projects SNAPSHOT EUROPE and SNAPSHOT JAPAN have both collected and collated camera trap data from 2021 to 2023 and 2023, respectively. After the successful launch of SNAPSHOT EUROPE, the SNAPSHOT GLOBAL platform (https://snapshot-global.org) was founded in 2022 to reach broader audiences in recruitment and help connect a network of global camera trappers to public data. Other collaborative networks exist, such as the Tropical Ecology Assessment and Monitoring (TEAM) network, UWIN (Urban Wildlife Institute Network) and EUROMAMMALS, and we encourage these groups and others to partner with SNAPSHOT networks to increase our understanding of the impacts of humans on the environment and increase our capacity in biodiversity conservation across the globe.

Despite the diversity of institutions that have contributed to SNAPSHOT USA, the SNAPSHOT USA 2019–2023 data were mostly collected by academic institutions. We are actively working to recruit more contributors within other sectors, including federal and tribal government agencies, to broaden the scope of the project. However, we realise that the large number and diversity of collaborators likely contribute to several nuisance variables that may impact detection probability, such as the experience of field crews deploying cameras and the quality of the camera model(s) used. Therefore, we recommend the use of hierarchical models that accommodate and account for detection bias using standard approaches and guidelines (Goldstein et al. 2024).

In future SNAPSHOT USA surveys, we plan to provide SNAPSHOT USA contributors with the opportunity to

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TABLE 3 | Description of the distribution of sampling effort during SNAPSHOT USA 2019–2023, consisting of 9694 deployments across 263 arrays for a total of 371,979 camera trap-nights of survey effort.

State	Array	Camera locations	Camera trap-nights	Years surveyed
AK	Afognak	13	439	1
AK	Crupi	17	3236	5
AL	Fantle-Lepczyk	84	3882	5
AR	DeGregorio	26	1087	2
AR	Fayetteville	10	400	1
AR	Grandview	24	1135	2
AR	Johans	13	759	1
AR	Tigue	15	880	1
AZ	Cienega	7	468	1
AZ	Harrity	16	2225	2
AZ	McDowell	18	847	2
AZ	NAU	9	579	1
AZ	Sonoran	12	869	2
AZ	SRER1	9	305	1
AZ	SRER2	10	488	1
AZ	Tucson	12	783	1
AZ	Vermilion Cliffs	6	302	1
CA	Carlile	14	1028	2
CA	Carrizo	50	1504	4
CA	Daley Ranch	14	591	1
CA	Humboldt	15	515	1
CA	Osos	11	274	1
CA	Pepperdine	13	585	1
CA	Pepperwood	19	841	2
CA	Point Reyes	9	467	1
CA	Redwoods	16	1836	2
CA	San Joaquin	10	450	1
CA	Sierra Nevada	45	2385	4
CA	SierraNevada2	9	466	1
CO	Goldfarb	10	293	1
CO	Mesa	17	754	1
CO	USAFA	32	4426	5
CT	Nye Holman	72	3093	5
CT	Storrs	21	2917	5
DC	Herrera	266	7662	5
DE	UD Farm	8	237	1
DE	Wilmington	36	1445	3
FL	Alto	16	734	1

(Continues)

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TABLE 3 | (Continued)

State	Array	Camera locations	Camera trap-nights	Years surveyed
FL	Apalachicola	12	497	1
FL	Balu	17	758	1
FL	CoG	40	2462	1
FL	Croc Lake	47	3775	4
FL	DeLuca	45	1900	3
FL	Ellington	58	5674	3
FL	Key Deer Refuge	12	754	1
FL	Melrose	56	3768	4
FL	NFREC	8	468	1
FL	Ordway	40	2861	1
GA	Bear Creek	7	420	1
GA	Carrollton	129	2145	5
GA	Ceylon	6	294	1
GA	Dixon Memorial	19	513	1
GA	Jones Center	37	2526	4
GA	Lower Altmaha	16	504	1
GA	Patterson	8	362	1
GA	Weigel	39	1842	2
HI	Oahu	33	2175	5
IA	Rentz	39	4462	5
ID	Galena	8	340	1
ID	Hailey	9	427	1
ID	Rachlow	60	3285	2
ID	SunValley	11	529	1
IL	Aurora	8	379	1
IL	Deshwal	46	1962	2
IL	Nachusa	10	356	1
IL	SIUE	9	538	1
IL	TON	26	813	1
IL	Urbana	52	2280	5
IL	Vermillion	18	630	1
IN	Brooke	26	1969	5
IN	PWA Martell	16	2795	5
KS	Ahlers	64	1558	2
KS	Fort Hays	30	981	2
KS	Lawrence	27	1314	3
KS	Pittsburg	17	2481	5
KY	Darracq	17	954	2

(Continues)

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TABLE 3 | (Continued)

State	Array	Camera locations	Camera trap-nights	Years surveyed
KY	Green River Preserve	20	1182	2
KY	Kentucky Natural Lands Trust	15	628	2
KY	Marshall County	20	593	2
KY	Sovie	9	471	1
LA	Abita Flats	11	640	1
LA	CCRoad	10	447	1
LA	Hammond	29	1742	4
LA	LSU1	18	1303	1
LA	LSU2	11	701	1
LA	LSU3	12	746	1
LA	LSU4	10	682	1
MA	Amherst	18	523	1
MA	Bak	29	1471	2
MA	Bridgewater State	21	2817	5
MA	EDG	18	1412	3
MA	Grafton	42	2588	5
MA	OB	12	606	1
MA	Tufts	27	2688	5
MA	WT	16	1499	3
MD	Baltimore	16	339	1
MD	Nemes	10	279	1
ME	Mortelliti	6	390	1
ME	Penobscot Forest	27	1499	3
ME	Piscataquis County	7	408	1
MI	Corey Marsh	14	810	1
MI	Detroit	27	263	1
MI	Kellogg	11	451	1
MI	Shiawassee	10	565	1
MI	Tawas	16	717	1
MI	Upper Peninsula	58	7130	5
MI	Upper Peninsula 2	11	3144	5
MI	Upper Peninsula 3	39	481	1
MI	WaWaSum	16	671	1
MN	Chatterjee	16	607	1
MN	Itasca County	16	527	1
MO	Bull Shoals	38	2872	5
MO	HBHMAcres	28	1039	2
MO	MOHansen	36	1161	2

(Continues)

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TABLE 3 | (Continued)

State	Array	Camera locations	Camera trap-nights	Years surveyed
MO	MWSU	8	1056	2
MO	University of Missouri	15	1648	2
MS	Dahomey	11	506	1
MS	Starkville	23	1541	2
MT	AutumnPN	10	85	1
MT	Bandy Ranch	21	915	1
MT	Blackfoot	15	990	1
MT	Fort Belknap	13	163	1
MT	Hebblewhite	31	2534	1
MT	MT Hansen	67	8938	5
MT	MT Urban Wild	14	858	1
MT	River Trail	23	1741	4
MT	Shamon	214	5879	5
MT	Stewart	8	288	1
MT	White Rock	36	416	1
NC	Alamance	31	647	1
NC	ARNWR	37	1760	3
NC	Burke	26	509	1
NC	Cleveland	10	210	1
NC	Craven	14	297	1
NC	Dare	22	550	1
NC	Farris	35	1585	3
NC	GMSF	10	648	1
NC	Haywood	11	204	1
NC	Hill	66	3545	4
NC	Iredell	52	1625	3
NC	M&M Ranch	13	578	1
NC	Moore	33	611	1
NC	MtGlum	22	2234	4
NC	Pender	22	448	1
NC	Roan	12	663	1
NC	Schenck	69	3221	5
NC	Surry	23	487	1
NC	Umstead	120	6458	4
NC	WCU	15	572	1
NC	Yarnall Knob	10	448	1
ND	Coteau Ranch	21	719	2
ND	Oakville Prairie	24	831	5

(Continues)

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TABLE 3 | (Continued)

State	Array	Camera locations	Camera trap-nights	Years surveyed
NE	University of Nebraska	35	998	3
NH	Bartlett	34	5264	3
NH	Lancaster	8	506	1
NH	QPF	8	381	1
NJ	Lathrop	13	712	1
NJ	Rutgers	28	2006	4
NM	ENMU	9	415	1
NM	White Sands	13	187	1
NV	Galena Creek	10	378	1
NV	Mojave	39	1874	4
NV	Truckee Meadows	11	356	1
NV	University of Nevada	12	425	1
NY	Black Rock	23	1938	3
NY	Bogan	31	2318	5
NY	Cary Institute	16	496	1
NY	Cranberry Lake	26	1483	2
NY	Heiberg	8	252	1
NY	Jones Beach	11	783	1
NY	Mianus	100	4799	5
NY	Newburgh	10	508	1
NY	NYC	65	4497	4
NY	Paul Smiths	22	824	3
NY	Scenic Hudson	23	1835	3
NY	Skaneateles	8	233	1
NY	St Lawrence	32	1891	3
NY	Syracuse	9	224	1
NY	Wild Bogan	23	2352	5
OH	Athens	11	425	1
OH	G3Ranch	23	1056	2
OH	Huston Brumbaugh	15	2971	5
OK	Ardmore	25	2260	5
OK	Burneyville	17	2067	5
OK	Falconhead	17	1112	2
OK	James Collins	57	1659	3
OK	Lonsinger	18	1446	3
OK	Selman	7	261	1
OR	Cow Creek	13	280	1
OR	Forrester	43	2208	2

(Continues)

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TABLE 3 | (Continued)

State	Array	Camera locations	Camera trap-nights	Years surveyed
OR	McMinnville	8	369	1
OR	Oregon State University	26	3307	5
PA	Crum Woods	7	372	1
PA	Gettysburg	24	1797	4
PA	Rothrock	51	3000	4
PA	State Game Lands	19	337	1
RI	Arcadia WMA	15	849	1
RI	URI	32	3213	5
SC	Bottomland	39	842	2
SC	Clemson North	21	1701	1
SC	Lynches	16	453	1
SC	Piedmont	8	782	2
SC	SoEights	18	2757	3
SC	SREL	34	904	2
SD	Brookings	26	2472	5
SD	Custer	11	954	2
SD	Oak Lake FS	16	1206	3
TN	Austin Peay	9	448	1
TN	Cheatham	35	1359	3
TN	Cumberland	24	1281	4
TN	Doe	36	1084	2
TN	Jorge	23	1324	2
TN	Soak Creek	11	609	1
TX	AandM	14	867	1
TX	Abilene	42	3215	5
TX	Angelina	56	1730	5
TX	Aransas NWR	10	778	1
TX	Caesar Kleberg	20	1074	2
TX	Freeman	23	2354	5
TX	Gene Howe	42	1354	4
TX	Kingsville	23	839	2
TX	La Copita	27	1131	1
TX	LBJ	18	401	1
TX	Matador	50	2347	5
TX	Military Department	15	788	1
TX	San Marcos	32	1646	2
TX	Tarleton	7	476	1
TX	UHD	9	475	1

(Continues)

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TABLE 3 | (Continued)

State	Array	Camera locations	Camera trap-nights	Years surveyed
TX	USACE	12	384	1
TX	Yoakum Dunes	15	1103	3
UT	Cottonwood Canyon	21	2667	3
UT	Red Cliffs	14	840	1
UT	SLC	72	3716	5
UT	Swaner Preserve	10	390	1
UT	Wasatch	45	2549	4
VA	Anthro Richmond	8	476	1
VA	Art	28	1476	2
VA	Cedars NAP	11	782	2
VA	Fort AP	13	421	1
VA	Pagebrook	31	2043	4
VA	RMC	32	1218	3
VA	SCBI	72	3004	5
VA	Shenandoah	34	888	2
VA	Suburban Richmond	7	642	2
VA	Tamara	12	321	1
VT	Breadloaf	24	1693	2
VT	Brunswick	8	500	1
VT	Lake Raponda	15	717	1
VT	Watershed	59	2976	3
WA	Elwha	26	1585	2
WA	Johnson	16	1652	2
WA	Kamiak Butte	11	244	1
WA	Olympic Peninsula	35	2828	3
WA	Smoot Hill	13	322	1
WA	SUCP	24	2060	4
WA	Vashon	14	756	1
WI	Stenglein	20	2391	5
WI	Whitewater	32	1726	5
WV	University Research Forest	90	3245	5
WY	Alexander	30	2296	4
WY	Baggs	17	2886	5
WY	UoW	10	434	1
WY	Wuensch	20	735	1
	Total	6754	371,979	

Note: Camera trap-nights were calculated by using the timestamps of the first and last images in each deployment. The arrays are sorted alphabetically, first by state abbreviation and then by array name.

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TABLE 4 | Species detected in all years of SNAPSHOT USA 2019–2023, organised by species groups (amphibian, arthropod, bird, domestic/feral mammal, gastropod, human, reptile, wild mammal, unknown animal) and sorted by their total number of detections.

Group	Common name	Species name	Detections	Locations	Arrays
Amphibian	American toad	*Anaxyrus americanus*	5	1	1
Amphibian	Unknown frog	Unknown frog	4	3	3
Amphibian	Unknown amphibian	Unknown amphibian	1	1	1
Arthropod	Unknown insect	Unknown insect	738	144	51
Arthropod	Butterflies and moths	Butterflies and moths	111	58	26
Arthropod	Unknown spider	Unknown spider	20	11	9
Arthropod	Dragonflies and damselflies	Dragonflies and damselflies	4	3	3
Bird	Unknown bird	Unknown bird	14,511	1899	217
Bird	Wild turkey	*Meleagris gallopavo*	9616	1170	156
Bird	American robin	*Turdus migratorius*	4357	499	111
Bird	Gambel's quail	*Callipepla gambelii*	1470	51	11
Bird	Mourning dove	*Zenaida macroura*	893	132	48
Bird	Blue jay	*Cyanocitta cristata*	860	324	88
Bird	Common raven	*Corvus corax*	772	79	19
Bird	Greater roadrunner	*Geococcyx californianus*	573	122	26
Bird	Great blue heron	*Ardea herodias*	557	85	46
Bird	Black-billed magpie	*Pica hudsonia*	541	91	20
Bird	American crow	*Corvus brachyrhynchos*	529	120	49
Bird	Northern flicker	*Colaptes auratus*	487	215	86
Bird	Northern cardinal	*Cardinalis cardinalis*	480	137	53
Bird	Corvidae family	Corvidae family	440	79	36
Bird	California quail	*Callipepla californica*	408	46	11
Bird	Bald eagle	*Haliaeetus leucocephalus*	334	11	6
Bird	*Corvus* species	*Corvus* species	327	57	28
Bird	Strigiformes order	Strigiformes order	306	136	76
Bird	Ruffed grouse	*Bonasa umbellus*	294	113	34
Bird	Canada goose	*Branta canadensis*	287	17	8
Bird	Turdidae family	Turdidae family	272	124	53
Bird	Passeriformes order	Passeriformes order	259	108	52
Bird	Varied thrush	*Ixoreus naevius*	258	39	9
Bird	Turkey vulture	*Cathartes aura*	247	54	30
Bird	Ovenbird	*Seiurus aurocapilla*	180	25	14
Bird	Common grackle	*Quiscalus quiscula*	176	73	26
Bird	Dark-eyed junco	*Junco hyemalis*	172	39	25
Bird	Mexican jay	*Aphelocoma wollweberi*	168	11	2
Bird	Hermit thrush	*Catharus guttatus*	155	33	14

(Continues)

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Bird	Passeridae family	Passeridae family	151	62	39
Bird	White-crowned sparrow	*Zonotrichia leucophrys*	151	22	13
Bird	Ring-necked pheasant	*Phasianus colchicus*	148	32	8
Bird	Northern mockingbird	*Mimus polyglottos*	143	56	19
Bird	Accipitriformes order	Accipitriformes order	130	85	56
Bird	Steller's jay	*Cyanocitta stelleri*	127	49	15
Bird	Mallard	*Anas platyrhynchos*	115	11	10
Bird	Anatidae family	Anatidae family	113	13	12
Bird	Barred owl	*Strix varia*	113	66	35
Bird	Northern bobwhite	*Colinus virginianus*	113	44	15
Bird	Long-billed thrasher	*Toxostoma longirostre*	110	10	4
Bird	Common starling	*Sturnus vulgaris*	101	31	15
Bird	White ibis	*Eudocimus albus*	101	17	6
Bird	Western meadowlark	*Sturnella neglecta*	97	35	13
Bird	White-tipped dove	*Leptotila verreauxi*	96	8	2
Bird	Red-tailed hawk	*Buteo jamaicensis*	92	68	41
Bird	Chihuahuan raven	*Corvus cryptoleucus*	88	4	2
Bird	Columbidae family	Columbidae family	87	45	24
Bird	Spotted towhee	*Pipilo maculatus*	86	26	14
Bird	Common ground dove	*Columbina passerina*	80	16	5
Bird	American kestrel	*Falco sparverius*	79	33	16
Bird	Wood thrush	*Hylocichla mustelina*	79	24	13
Bird	Plain chachalaca	*Ortalis vetula*	77	11	1
Bird	Northern harrier	*Circus hudsonius*	76	39	10
Bird	Brown thrasher	*Toxostoma rufum*	73	32	15
Bird	California scrub-jay	*Aphelocoma californica*	72	25	9
Bird	Accipitridae family	Accipitridae family	71	59	45
Bird	Pileated woodpecker	*Hylatomus pileatus*	65	50	35
Bird	Red-shouldered hawk	*Buteo lineatus*	64	42	21
Bird	Eastern spotted dove	*Spilopelia chinensis*	62	13	2
Bird	Grey catbird	*Dumetella carolinensis*	61	25	18
Bird	Sharp-tailed grouse	*Tympanuchus phasianellus*	58	28	5
Bird	White-throated sparrow	*Zonotrichia albicollis*	56	20	13
Bird	Common pheasant	*Phasianus colchicus*	53	15	5
Bird	Tufted titmouse	*Baeolophus bicolor*	52	34	25
Bird	Brown-headed cowbird	*Molothrus ater*	48	6	5
Bird	White-winged dove	*Zenaida asiatica*	45	7	5
Bird	Wood duck	*Aix sponsa*	45	9	8

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Bird	Red-bellied woodpecker	*Melanerpes carolinus*	43	26	19
Bird	Rusty blackbird	*Euphagus carolinus*	43	4	3
Bird	American black vulture	*Coragyps atratus*	42	14	11
Bird	Great horned owl	*Bubo virginianus*	42	21	15
Bird	Palm warbler	*Setophaga palmarum*	41	10	5
Bird	Sandhill crane	*Antigone canadensis*	41	16	5
Bird	Blue grouse	*Dendragapus obscurus*	39	11	4
Bird	Muscovy duck	*Cairina moschata*	38	1	1
Bird	Downy woodpecker	*Dryobates pubescens*	36	29	19
Bird	Great egret	*Ardea albus*	36	12	8
Bird	Burrowing owl	*Athene cunicularia*	35	11	7
Bird	Song sparrow	*Melospiza melodia*	35	11	9
Bird	Caprimulgiformes order	Caprimulgiformes order	34	1	1
Bird	Troglodytidae family	Troglodytidae family	34	11	7
Bird	Cooper's hawk	*Accipiter cooperii*	31	24	19
Bird	Passerellidae family	Passerellidae family	31	10	6
Bird	Strigidae family	Strigidae family	31	28	26
Bird	Curve-billed thrasher	*Toxostoma curvirostre*	30	6	3
Bird	Olive sparrow	*Arremonops rufivirgatus*	30	2	1
Bird	Tyrannidae family	Tyrannidae family	30	17	14
Bird	Common barn owl	*Tyto alba*	29	8	6
Bird	Hairy woodpecker	*Leuconotopicus villosus*	28	17	13
Bird	Loggerhead shrike	*Lanius ludovicianus*	28	21	9
Bird	*Sturnella* species	*Sturnella* species	28	9	3
Bird	Eastern bluebird	*Sialia sialis*	26	17	12
Bird	Green jay	*Cyanocorax yncas*	26	12	3
Bird	Horned lark	*Eremophila alpestris*	26	13	4
Bird	Phasianidae family	Phasianidae family	26	16	12
Bird	Red-winged blackbird	*Agelaius phoeniceus*	26	8	7
Bird	Swainson's thrush	*Catharus swainsoni*	26	13	7
Bird	Clark's nutcracker	*Nucifraga columbiana*	25	3	2
Bird	Golden-fronted woodpecker	*Melanerpes aurifrons*	25	8	2
Bird	Spruce grouse	*Canachites canadensis*	25	11	6
Bird	Icteridae family	Icteridae family	24	19	14
Bird	Picidae family	Picidae family	23	21	17
Bird	Mountain quail	*Oreortyx pictus*	22	12	3
Bird	Rock wren	*Salpinctes obsoletus*	22	1	1

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Bird	Limpkin	*Aramus guarauna*	21	3	2
Bird	Short-eared owl	*Asio flammeus*	21	4	2
Bird	Carolina wren	*Thryothorus ludovicianus*	20	12	8
Bird	Eastern phoebe	*Sayornis phoebe*	20	8	7
Bird	Galliformes order	Galliformes order	20	12	10
Bird	Myrtle warbler	*Setophaga coronata*	20	8	7
Bird	*Turdus* species	*Turdus* species	20	2	2
Bird	Eastern screech-owl	*Megascops asio*	19	12	10
Bird	Trochilidae family	Trochilidae family	19	16	12
Bird	Ardeidae family	Ardeidae family	18	9	8
Bird	Rufous-sided towhee	*Pipilo erythrophthalmus*	18	13	9
Bird	Tricolored heron	*Egretta tricolor*	18	4	3
Bird	Wren	*Troglodytes troglodytes*	17	3	1
Bird	*Zonotrichia* species	*Zonotrichia* species	17	3	1
Bird	Black phoebe	*Sayornis nigricans*	16	5	2
Bird	Black-capped chickadee	*Poecile atricapillus*	16	15	10
Bird	*Buteo* species	*Buteo* species	16	14	10
Bird	Chipping sparrow	*Spizella passerina*	15	2	1
Bird	Pauraque	*Nyctidromus albicollis*	15	3	2
Bird	Golden eagle	*Aquila chrysaetos*	14	4	3
Bird	Pacific wren	*Troglodytes pacificus*	14	2	2
Bird	Common magpie	*Pica pica*	13	4	2
Bird	Montezuma quail	*Cyrtonyx montezumae*	13	3	1
Bird	Parulidae family	Parulidae family	13	10	9
Bird	Red fox-sparrow	*Passerella iliaca*	13	1	1
Bird	Cactus wren	*Campylorhynchus brunneicapillus*	12	5	3
Bird	*Colaptes* species	*Colaptes* species	12	4	3
Bird	Vesper sparrow	*Pooecetes gramineus*	12	7	1
Bird	White-breasted nuthatch	*Sitta carolinensis*	12	11	11
Bird	Collared dove	*Streptopelia decaocto*	11	3	3
Bird	Great-tailed grackle	*Quiscalus mexicanus*	11	5	2
Bird	Mountain bluebird	*Sialia currucoides*	11	5	3
Bird	Pinyon jay	*Gymnorhinus cyanocephalus*	11	5	2
Bird	Say's phoebe	*Sayornis saya*	11	6	3
Bird	American woodcock	*Scolopax minor*	10	5	5
Bird	House wren	*Troglodytes aedon*	10	8	8
Bird	Lark sparrow	*Chondestes grammacus*	10	8	2

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Bird	Sage thrasher	*Oreoscoptes montanus*	10	4	1
Bird	Savannah sparrow	*Passerculus sandwichensis*	10	3	3
Bird	*Accipiter* species	*Accipiter* species	9	9	6
Bird	American white pelican	*Pelecanus erythrorhynchos*	9	2	1
Bird	Brewer's blackbird	*Euphagus cyanocephalus*	9	7	7
Bird	Yellow-breasted chat	*Icteria virens*	9	4	2
Bird	American bittern	*Botaurus lentiginosus*	8	6	3
Bird	Anseriformes order	Anseriformes order	8	2	2
Bird	Scissor-tailed flycatcher	*Tyrannus forficatus*	8	6	3
Bird	*Catharus* species	*Catharus* species	7	5	4
Bird	Cattle egret	*Bubulcus ibis*	7	4	3
Bird	Grey jay	*Perisoreus canadensis*	7	4	1
Bird	*Larus* species	*Larus* species	7	5	3
Bird	Northwestern crow	*Corvus caurinus*	7	1	1
Bird	Red-shafted flicker	*Colaptes cafer*	7	5	3
Bird	Scaled quail	*Callipepla squamata*	7	4	2
Bird	Swainson's hawk	*Buteo swainsoni*	7	4	3
Bird	Western bluebird	*Sialia mexicana*	7	5	3
Bird	White-tailed hawk	*Geranoaetus albicaudatus*	7	1	1
Bird	Black-and-white warbler	*Mniotilta varia*	6	4	4
Bird	*Callipepla* species	*Callipepla* species	6	3	2
Bird	Cardinalidae family	Cardinalidae family	6	5	5
Bird	Carolina chickadee	*Poecile carolinensis*	6	5	5
Bird	Ferruginous hawk	*Buteo regalis*	6	1	1
Bird	Goosander	*Mergus merganser*	6	1	1
Bird	Green heron	*Butorides virescens*	6	4	4
Bird	House finch	*Haemorhous mexicanus*	6	4	3
Bird	Little blue heron	*Egretta caerulea*	6	3	3
Bird	*Melozone* species	*Melozone* species	6	1	1
Bird	Woodhouse's scrub-jay	*Aphelocoma woodhouseii*	6	3	3
Bird	*Zenaida* species	*Zenaida* species	6	5	1
Bird	American tree sparrow	*Passerella arborea*	5	2	2
Bird	Columbiformes order	Columbiformes order	5	3	3
Bird	Domestic chicken	*Gallus gallus*	5	3	2
Bird	Dusky grouse	*Dendragapus obscurus*	5	4	2
Bird	Emberizidae family	Emberizidae family	5	1	1
Bird	House sparrow	*Passer domesticus*	5	5	2
Bird	Mimidae family	Mimidae family	5	5	4

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Bird	Western spotted dove	*Spilopelia suratensis*	5	3	1
Bird	Yellow-crowned night-heron	*Nyctanassa violacea*	5	4	4
Bird	Black-crowned night-heron	*Nycticorax nycticorax*	4	1	1
Bird	Crested caracara	*Caracara cheriway*	4	3	1
Bird	Eastern meadowlark	*Sturnella magna*	4	4	2
Bird	Great white egret	*Ardea alba*	4	2	2
Bird	Killdeer	*Charadrius vociferus*	4	3	3
Bird	*Meleagris* species	*Meleagris* species	4	4	3
Bird	*Sialia* species	*Sialia* species	4	4	2
Bird	Wilson's snipe	*Gallinago delicata*	4	3	3
Bird	Yellow-bellied sapsucker	*Sphyrapicus varius*	4	4	4
Bird	Bewick's wren	*Thryomanes bewickii*	3	2	2
Bird	Blue-winged teal	*Spatula discors*	3	2	2
Bird	Caprimulgidae family	Caprimulgidae family	3	3	3
Bird	*Columba* species	*Columba* species	3	3	2
Bird	Greater prairie-chicken	*Tympanuchus cupido*	3	1	1
Bird	Orange-crowned warbler	*Leiothlypis celata*	3	2	2
Bird	Pine warbler	*Setophaga pinus*	3	3	3
Bird	Saw-whet owl	*Aegolius acadicus*	3	2	1
Bird	*Sayornis* species	*Sayornis* species	3	2	1
Bird	Sharp-shinned hawk	*Accipiter striatus*	3	2	2
Bird	Sooty grouse	*Dendragapus fuliginosus*	3	2	1
Bird	Trumpeter swan	*Cygnus buccinator*	3	2	2
Bird	American coot	*Fulica americana*	2	2	1
Bird	American redstart	*Setophaga ruticilla*	2	2	2
Bird	*Antrostomus* species	*Antrostomus* species	2	1	1
Bird	Barn swallow	*Hirundo rustica*	2	2	2
Bird	Broad-winged hawk	*Buteo platypterus*	2	2	2
Bird	California thrasher	*Toxostoma redivivum*	2	1	1
Bird	Cassin's sparrow	*Peucaea cassinii*	2	2	1
Bird	*Cathartes* species	*Cathartes* species	2	2	2
Bird	Clay-coloured sparrow	*Spizella pallida*	2	2	2
Bird	*Dendroica* species	*Dendroica* species	2	1	1
Bird	Eastern wood-pewee	*Contopus virens*	2	2	2
Bird	*Euphagus* species	*Euphagus* species	2	1	1
Bird	Falconidae family	Falconidae family	2	1	1

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Bird	Gila woodpecker	*Melanerpes uropygialis*	2	2	2
Bird	Golden-crowned kinglet	*Regulus satrapa*	2	1	1
Bird	Greater sage-grouse	*Centrocercus urophasianus*	2	1	1
Bird	Green-winged teal	*Anas carolinensis*	2	1	1
Bird	Harris's hawk	*Parabuteo unicinctus*	2	2	1
Bird	Hooded warbler	*Setophaga citrina*	2	1	1
Bird	Lark bunting	*Calamospiza melanocorys*	2	1	1
Bird	Lesser prairie-chicken	*Tympanuchus pallidicinctus*	2	1	1
Bird	*Leuconotopicus* species	*Leuconotopicus* species	2	2	2
Bird	*Picoides* species	*Picoides* species	2	2	2
Bird	Quail species	Quail species	2	1	1
Bird	Red-breasted sapsucker	*Sphyrapicus ruber*	2	1	1
Bird	Ruby-throated hummingbird	*Archilochus colubris*	2	1	1
Bird	*Selasphorus* species	*Selasphorus* species	2	2	1
Bird	Townsend's solitaire	*Myadestes townsendi*	2	2	1
Bird	Western kingbird	*Tyrannus verticalis*	2	2	2
Bird	Western screech-owl	*Megascops kennicottii*	2	1	1
Bird	Wilson's warbler	*Cardellina pusilla*	2	2	2
Bird	Zebra dove	*Geopelia striata*	2	1	1
Bird	Abert's towhee	*Melozone aberti*	1	1	1
Bird	Acorn woodpecker	*Melanerpes formicivorus*	1	1	1
Bird	*Aechmophorus* species	*Aechmophorus* species	1	1	1
Bird	Anna's hummingbird	*Calypte anna*	1	1	1
Bird	Belted kingfisher	*Megaceryle alcyon*	1	1	1
Bird	Black-bellied whistling-duck	*Dendrocygna autumnalis*	1	1	1
Bird	Blue grosbeak	*Passerina caerulea*	1	1	1
Bird	Canyon towhee	*Melozone fusca*	1	1	1
Bird	*Cardinalis* species	*Cardinalis* species	1	1	1
Bird	Cathartidae family	Cathartidae family	1	1	1
Bird	Cedar waxwing	*Bombycilla cedrorum*	1	1	1
Bird	Chestnut-backed chickadee	*Poecile rufescens*	1	1	1
Bird	*Columbina* species	*Columbina* species	1	1	1
Bird	Common loon	*Gavia immer*	1	1	1
Bird	Common nighthawk	*Chordeiles minor*	1	1	1
Bird	Common yellowthroat	*Geothlypis trichas*	1	1	1
Bird	*Coragyps* species	*Coragyps* species	1	1	1

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Bird	Domestic turkey	*Meleagris gallopavo*	1	1	1
Bird	Double-crested cormorant	*Phalacrocorax auritus*	1	1	1
Bird	*Dryobates* species	*Dryobates* species	1	1	1
Bird	Eastern osprey	*Pandion cristatus*	1	1	1
Bird	Emu	*Dromaius novaehollandiae*	1	1	1
Bird	Estrildidae family	Estrildidae family	1	1	1
Bird	*Falco* species	*Falco* species	1	1	1
Bird	*Geopelia* species	*Geopelia* species	1	1	1
Bird	Golden-crowned sparrow	*Zonotrichia atricapilla*	1	1	1
Bird	Great crested flycatcher	*Myiarchus crinitus*	1	1	1
Bird	Great kiskadee	*Pitangus sulphuratus*	1	1	1
Bird	Greater sage grouse	*Centrocercus urophasianus*	1	1	1
Bird	Green-tailed towhee	*Pipilo chlorurus*	1	1	1
Bird	Groove-billed ani	*Crotophaga sulcirostris*	1	1	1
Bird	Harris's sparrow	*Zonotrichia querula*	1	1	1
Bird	*Icterus* species	*Icterus* species	1	1	1
Bird	*Junco* species	*Junco* species	1	1	1
Bird	Juniper titmouse	*Baeolophus ridgwayi*	1	1	1
Bird	Laridae family	Laridae family	1	1	1
Bird	Lesser goldfinch	*Spinus psaltria*	1	1	1
Bird	Lesser nighthawk	*Chordeiles acutipennis*	1	1	1
Bird	Long-billed curlew	*Numenius americanus*	1	1	1
Bird	Mangrove cuckoo	*Coccyzus minor*	1	1	1
Bird	*Myiarchus* species	*Myiarchus* species	1	1	1
Bird	Northern oriole	*Icterus galbula*	1	1	1
Bird	Oak titmouse	*Baeolophus inornatus*	1	1	1
Bird	*Otus* species	*Otus* species	1	1	1
Bird	Paridae family	Paridae family	1	1	1
Bird	*Passerina* species	*Passerina* species	1	1	1
Bird	Pelecaniformes order	Pelecaniformes order	1	1	1
Bird	Ptilonorhynchidae family	Ptilonorhynchidae family	1	1	1
Bird	Pyrrhuloxia	*Cardinalis sinuatus*	1	1	1
Bird	*Quiscalus* species	*Quiscalus* species	1	1	1
Bird	Red-headed woodpecker	*Melanerpes erythrocephalus*	1	1	1
Bird	Rock dove	*Columba livia*	1	1	1
Bird	Ruby-crowned kinglet	*Regulus calendula*	1	1	1
Bird	Russet-backed thrush	*Catharus ustulatus*	1	1	1

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Bird	Sagebrush sparrow	*Artemisiospiza nevadensis*	1	1	1
Bird	*Setophaga* species	*Setophaga* species	1	1	1
Bird	Snowy egret	*Egretta thula*	1	1	1
Bird	Swamp sparrow	*Melospiza georgiana*	1	1	1
Bird	*Toxostoma* species	*Toxostoma* species	1	1	1
Bird	Veery	*Catharus fuscescens*	1	1	1
Bird	Virginia rail	*Rallus limicola*	1	1	1
Bird	Western grebe	*Aechmophorus occidentalis*	1	1	1
Bird	White-faced ibis	*Plegadis chihi*	1	1	1
Bird	Wood stork	*Mycteria americana*	1	1	1
Bird	Zone-tailed hawk	*Buteo albonotatus*	1	1	1
Domestic/feral mammal	Domestic cattle	*Bos taurus*	24,507	359	50
Domestic/feral mammal	Domestic dog	*Canis familiaris*	16,802	1324	194
Domestic/feral mammal	Domestic cat	*Felis catus*	9469	681	99
Domestic/feral mammal	Domestic horse	*Equus caballus*	2598	137	38
Domestic/feral mammal	Domestic goat	*Capra aegagrus hircus*	674	13	5
Domestic/feral mammal	Domestic sheep	*Ovis aries*	200	9	4
Domestic/feral mammal	Domestic donkey	*Equus asinus*	74	9	2
Domestic/feral mammal	Domestic pig	*Sus scrofa scrofa*	43	11	4
Domestic/feral mammal	Llama	*Lama glama*	18	1	1
Gastropod	Gastropod	Gastropod	4	1	1
Human	Nonstaff	Nonstaff	66,909	3225	247
Human	Motor vehicle	Motor vehicle	25,877	885	158
Human	Crew member	Crew member	17,879	5101	245
Human	Horseback rider	Horseback rider	101	26	10
Reptile	Unknown reptile	Unknown reptile	477	48	14
Reptile	Common green iguana	*Iguana iguana*	135	9	1
Reptile	Lizards and snakes	Lizards and snakes	63	28	14
Reptile	Gopher tortoise	*Gopherus polyphemus*	42	10	5
Reptile	Turtle order	Turtle order	13	8	7
Reptile	*Sceloporus* species	*Sceloporus* species	7	1	1
Reptile	Cuban brown anole	*Anolis sagrei*	6	5	2

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Reptile	Mojave desert tortoise	*Gopherus agassizii*	5	5	1
Reptile	Green anole	*Anolis carolinensis*	4	3	1
Reptile	Berlandier's tortoise	*Gopherus berlandieri*	3	1	1
Reptile	Ornate box turtle	*Terrapene ornata*	3	2	2
Reptile	American alligator	*Alligator mississippiensis*	1	1	1
Reptile	Common spiny-tailed iguana	*Ctenosaura similis*	1	1	1
Reptile	Eastern racer	*Coluber constrictor*	1	1	1
Reptile	Gila monster	*Heloderma suspectum*	1	1	1
Reptile	Teiidae family	Teiidae family	1	1	1
Reptile	*Thamnophis* species	*Thamnophis* species	1	1	1
Reptile	Three-toed box turtle	*Terrapene triunguis*	1	1	1
Reptile	Tortoise family	Tortoise family	1	1	1
Reptile	Western ribbonsnake	*Thamnophis proximus*	1	1	1
Wild mammal	White-tailed deer	*Odocoileus virginianus*	231,713	4836	215
Wild mammal	Eastern gray squirrel	*Sciurus carolinensis*	182,605	2953	168
Wild mammal	Northern raccoon	*Procyon lotor*	78,622	3469	225
Wild mammal	Eastern fox squirrel	*Sciurus niger*	34,981	759	88
Wild mammal	Coyote	*Canis latrans*	20,870	2932	249
Wild mammal	Virginia opossum	*Didelphis virginiana*	18,935	1948	174
Wild mammal	Mule deer	*Odocoileus hemionus*	18,758	872	68
Wild mammal	Eastern chipmunk	*Tamias striatus*	17,668	648	80
Wild mammal	Wild pig	*Sus scrofa*	15,899	640	51
Wild mammal	Eastern cottontail	*Sylvilagus floridanus*	15,812	1117	144
Wild mammal	Unknown mammal	Unknown mammal	11,424	1998	222
Wild mammal	Red fox	*Vulpes vulpes*	11,390	930	124
Wild mammal	Red squirrel	*Tamiasciurus hudsonicus*	10,345	427	61
Wild mammal	Unknown rodent	Unknown rodent	7252	415	119
Wild mammal	*Peromyscus* species	*Peromyscus* species	6367	292	74
Wild mammal	Nine-banded armadillo	*Dasypus novemcinctus*	5609	792	67
Wild mammal	White-footed mouse	*Peromyscus leucopus*	5349	67	19
Wild mammal	Elk	*Cervus canadensis*	4466	315	29
Wild mammal	Grey fox	*Urocyon cinereoargenteus*	4124	503	102
Wild mammal	American black bear	*Ursus americanus*	4062	819	97
Wild mammal	Sciuridae family	Sciuridae family	3425	570	132
Wild mammal	Bobcat	*Lynx rufus*	3391	1069	174
Wild mammal	Brown bear	*Ursus arctos*	3135	83	8
Wild mammal	American bison	*Bison bison*	2967	173	5

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Wild mammal	Brown rat	*Rattus norvegicus*	2927	70	5
Wild mammal	Striped skunk	*Mephitis mephitis*	2777	655	146
Wild mammal	Desert cottontail	*Sylvilagus audubonii*	2746	113	19
Wild mammal	*Sylvilagus* species	*Sylvilagus* species	2615	246	55
Wild mammal	Douglas's squirrel	*Tamiasciurus douglasii*	2043	116	20
Wild mammal	Collared peccary	*Pecari tajacu*	1633	133	15
Wild mammal	Snowshoe hare	*Lepus americanus*	1601	142	30
Wild mammal	Groundhog	*Marmota monax*	1417	176	45
Wild mammal	California ground squirrel	*Otospermophilus beecheyi*	1359	21	7
Wild mammal	Leporidae family	Leporidae family	1246	246	85
Wild mammal	Black-tailed jackrabbit	*Lepus californicus*	1235	136	24
Wild mammal	*Sciurus* species	*Sciurus* species	1203	188	61
Wild mammal	Pronghorn	*Antilocapra americana*	1172	127	11
Wild mammal	Western gray squirrel	*Sciurus griseus*	1021	86	13
Wild mammal	*Glaucomys* species	*Glaucomys* species	937	175	36
Wild mammal	American beaver	*Castor canadensis*	918	37	23
Wild mammal	White-tailed antelope squirrel	*Ammospermophilus leucurus*	839	48	5
Wild mammal	Moose	*Alces alces*	749	156	23
Wild mammal	Arizona black-tailed prairie dog	*Cynomys ludovicianus*	700	11	3
Wild mammal	*Odocoileus* species	*Odocoileus* species	698	172	36
Wild mammal	White-tailed jackrabbit	*Lepus townsendii*	697	52	14
Wild mammal	Merriam's kangaroo rat	*Dipodomys merriami*	694	26	4
Wild mammal	*Neotoma* species	*Neotoma* species	668	24	11
Wild mammal	Northern flying squirrel	*Glaucomys sabrinus*	630	99	29
Wild mammal	Rock squirrel	*Otospermophilus variegatus*	574	62	11
Wild mammal	North American porcupine	*Erethizon dorsatum*	523	167	39
Wild mammal	Mexican flying squirrel	*Glaucomys volans*	440	112	35
Wild mammal	Canine family	Canine family	418	276	114
Wild mammal	Puma	*Puma concolor*	371	148	27
Wild mammal	Marsh rabbit	*Sylvilagus palustris*	367	46	9
Wild mammal	Black-tailed prairie dog	*Cynomys ludovicianus*	364	15	3
Wild mammal	Fisher	*Pekania pennanti*	341	174	33
Wild mammal	Mountain cottontail	*Sylvilagus nuttallii*	319	33	7
Wild mammal	Grey wolf	*Canis lupus*	298	97	14

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Wild mammal	North American river otter	*Lontra canadensis*	278	57	31
Wild mammal	Cricetidae family	Cricetidae family	261	44	17
Wild mammal	Townsend's chipmunk	*Neotamias townsendii*	231	19	4
Wild mammal	Ord's kangaroo rat	*Dipodomys ordii*	226	13	2
Wild mammal	Brush rabbit	*Sylvilagus bachmani*	212	16	9
Wild mammal	*Rattus* species	*Rattus* species	212	26	10
Wild mammal	Harris's antelope squirrel	*Ammospermophilus harrisii*	198	17	5
Wild mammal	Cervidae family	Cervidae family	191	83	19
Wild mammal	Hooded skunk	*Mephitis macroura*	190	25	6
Wild mammal	Giant kangaroo rat	*Dipodomys ingens*	189	6	1
Wild mammal	*Dipodomys* species	*Dipodomys* species	179	8	3
Wild mammal	American badger	*Taxidea taxus*	177	95	32
Wild mammal	Kit fox	*Vulpes macrotis*	167	44	5
Wild mammal	Javan mongoose	*Urva javanica*	163	23	1
Wild mammal	Desert woodrat	*Neotoma lepida*	160	17	4
Wild mammal	Muskrat	*Ondatra zibethicus*	158	9	7
Wild mammal	American mink	*Neovison vison*	156	70	35
Wild mammal	Bushy-tailed woodrat	*Neotoma cinerea*	151	6	4
Wild mammal	Red wolf	*Canis rufus*	150	24	3
Wild mammal	House rat	*Rattus rattus*	143	10	4
Wild mammal	White-nosed coati	*Nasua narica*	112	17	4
Wild mammal	Long-tailed weasel	*Mustela frenata*	111	69	39
Wild mammal	Mustelidae family	Mustelidae family	103	56	29
Wild mammal	North American deermouse	*Peromyscus maniculatus*	102	15	6
Wild mammal	*Neotamias* species	*Neotamias* species	95	21	10
Wild mammal	Nilgai	*Boselaphus tragocamelus*	95	9	1
Wild mammal	*Canis* species	*Canis* species	94	48	21
Wild mammal	Eastern woodrat	*Neotoma floridana*	91	22	9
Wild mammal	Dusky-footed woodrat	*Neotoma fuscipes*	85	4	2
Wild mammal	Least chipmunk	*Neotamias minimus*	82	9	7
Wild mammal	American marten	*Martes americana*	81	44	13
Wild mammal	Cotton mouse	*Peromyscus gossypinus*	75	9	2
Wild mammal	*Mephitis* species	*Mephitis* species	71	14	4
Wild mammal	*Sorex* species	*Sorex* species	71	2	2
Wild mammal	Golden mantled ground squirrel	*Callospermophilus lateralis*	69	6	3
Wild mammal	Ringtail	*Bassariscus astutus*	64	22	8

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Wild mammal	Abert's squirrel	*Sciurus aberti*	57	15	3
Wild mammal	Western spotted skunk	*Spilogale gracilis*	57	26	12
Wild mammal	Carnivora order	Carnivora order	55	49	29
Wild mammal	Swamp rabbit	*Sylvilagus aquaticus*	55	13	4
Wild mammal	Swift fox	*Vulpes velox*	55	16	4
Wild mammal	Arizona gray squirrel	*Sciurus arizonensis*	52	7	3
Wild mammal	Meadow jumping mouse	*Zapus hudsonius*	52	7	2
Wild mammal	*Mustela* species	*Mustela* species	51	22	14
Wild mammal	White-tailed prairie dog	*Cynomys leucurus*	51	2	1
Wild mammal	Cliff chipmunk	*Neotamias dorsalis*	49	9	3
Wild mammal	Southern plains woodrat	*Neotoma micropus*	47	5	2
Wild mammal	Stoat	*Mustela erminea*	45	27	19
Wild mammal	American hog-nosed skunk	*Conepatus leuconotus*	44	15	4
Wild mammal	*Lepus* species	*Lepus* species	42	18	6
Wild mammal	Mexican woodrat	*Neotoma mexicana*	42	6	2
Wild mammal	Muridae family	Muridae family	39	15	10
Wild mammal	Mephitidae family	Mephitidae family	35	19	9
Wild mammal	Cetartiodactyla order	Cetartiodactyla order	25	20	9
Wild mammal	Mountain beaver	*Aplodontia rufa*	22	11	3
Wild mammal	Eastern spotted skunk	*Spilogale putorius*	20	12	7
Wild mammal	Desert kangaroo rat	*Dipodomys deserti*	14	3	3
Wild mammal	Hispid cotton rat	*Sigmodon hispidus*	13	4	4
Wild mammal	Woodland jumping mouse	*Napaeozapus insignis*	12	3	3
Wild mammal	*Tamias* species	*Tamias* species	11	3	2
Wild mammal	*Ursus* species	*Ursus* species	11	9	7
Wild mammal	Hispid pocket mouse	*Chaetodipus hispidus*	10	1	1
Wild mammal	*Tamiasciurus* species	*Tamiasciurus* species	10	4	3
Wild mammal	Yellow-pine chipmunk	*Neotamias amoenus*	10	3	2
Wild mammal	Unknown bat	Unknown bat	9	9	6
Wild mammal	Soricidae family	Soricidae family	9	3	2
Wild mammal	Appalachian cottontail	*Sylvilagus obscurus*	8	4	2
Wild mammal	Canada lynx	*Lynx canadensis*	8	5	3
Wild mammal	Antelope jackrabbit	*Lepus alleni*	7	5	2
Wild mammal	Felidae family	Felidae family	6	6	6
Wild mammal	Merriam's chipmunk	*Neotamias merriami*	6	2	1
Wild mammal	Allen's chipmunk	*Neotamias senex*	5	1	1

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TABLE 4 | (Continued)

Group	Common name	Species name	Detections	Locations	Arrays
Wild mammal	Uinta chipmunk	*Neotamias umbrinus*	5	4	1
Wild mammal	Lodgepole chipmunk	*Neotamias speciosus*	4	2	2
Wild mammal	White-throated woodrat	*Neotoma albigula*	4	3	1
Wild mammal	Gemsbok	*Oryx gazella*	3	2	1
Wild mammal	Heteromyidae family	Heteromyidae family	3	2	2
Wild mammal	Northern short-tailed shrew	*Blarina brevicauda*	3	2	2
Wild mammal	Sonoma chipmunk	*Neotamias sonomae*	3	3	1
Wild mammal	Southern red-backed vole	*Myodes gapperi*	3	1	1
Wild mammal	Bovidae family	Bovidae family	2	2	1
Wild mammal	Californian sea lion	*Zalophus californianus*	2	1	1
Wild mammal	Fresno kangaroo rat	*Dipodomys nitratoides*	2	1	1
Wild mammal	House mouse	*Mus musculus*	2	1	1
Wild mammal	*Myodes* species	*Myodes* species	2	1	1
Wild mammal	Pygmy rabbit	*Brachylagus idahoensis*	2	1	1
Wild mammal	Richardson's ground squirrel	*Urocitellus richardsonii*	2	1	1
Wild mammal	Round-tailed ground squirrel	*Xerospermophilus tereticaudus*	2	2	2
Wild mammal	Thirteen-lined ground squirrel	*Ictidomys tridecemlineatus*	2	2	2
Wild mammal	Bighorn sheep	*Ovis canadensis*	1	1	1
Wild mammal	Botta's pocket gopher	*Thomomys bottae*	1	1	1
Wild mammal	California chipmunk	*Neotamias obscurus*	1	1	1
Wild mammal	*Myotis* species	*Myotis* species	1	1	1
Wild mammal	Northern grasshopper mouse	*Onychomys leucogaster*	1	1	1
Wild mammal	Panamint chipmunk	*Neotamias panamintinus*	1	1	1
Wild mammal	Prairie vole	*Microtus ochrogaster*	1	1	1
Wild mammal	Red-tailed chipmunk	*Neotamias ruficaudus*	1	1	1
Wild mammal	Three-striped ground squirrel	*Lariscus insignis*	1	1	1
Wild mammal	Uinta ground squirrel	*Urocitellus armatus*	1	1	1
Wild mammal	Wolverine	*Gulo gulo*	1	1	1
Unknown animal	Unknown animal	Unknown animal	12,412	2820	238

Note: Numbers to the right indicate the number of distinct camera locations and arrays that detected the species.

participate in density estimates by using camera trap-based distance sampling (Henrich et al. 2024), which will further improve and strengthen our inferences about species densities and mammal biomass across space and time. As the SNAPSHOT network grows, we welcome additional input and opportunities to collect additional data or incorporate experimental designs housed within our annual surveys. Continuity and expansion will undoubtedly be useful for the next generation of ecologists by providing baseline data and a crowd-sourced grassroots model of long-term mammal monitoring.

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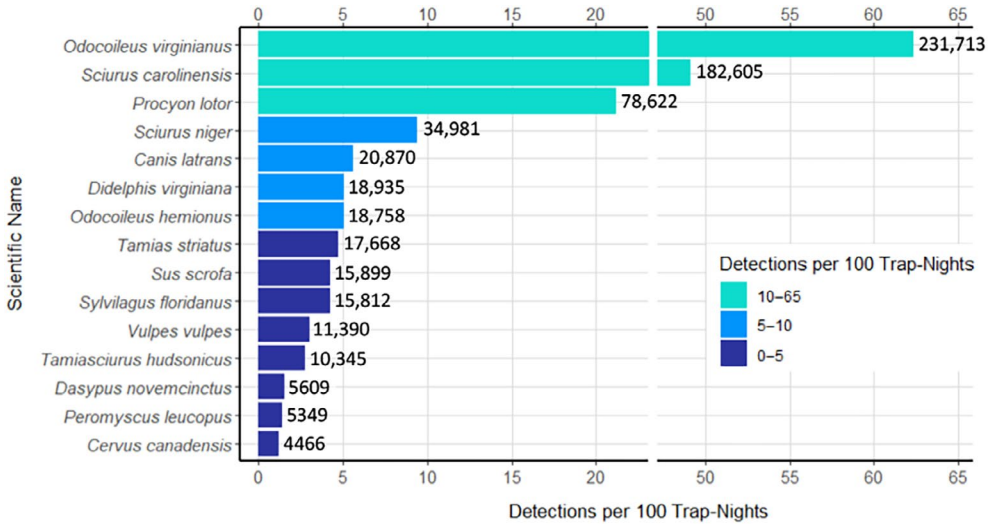

FIGURE 3 | Number of detections per 100 camera trap-nights for the 15 most detected wild mammal species in SNAPSHOT USA 2019–2023, calculated by using the total number of trap-nights across all 5 years. The number of total detections is provided at the end of each species bar.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The curated and standardised SNAPSHOT USA 2019–2023 data will be available for public download from the Dryad repository upon publication: https://doi.org/10.5061/dryad.k0p2ngfhn. The data are available now through this Reviewer Link: http://datadryad.org/stash/share/YCekP1hIrZyG1qO-n7yooU0RtnI1tCJ88Anaknol91k. The original SNAPSHOT USA 2019–2023 data are available from separate SNAPSHOT USA projects on WI within the SNAPSHOT USA Initiative.

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