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Global Ecology and Biogeography

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 3years 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. The SNAPSHOT USA project developed a standard protocol in 2019 to survey mammals > 100g and large identifiable birds (Cove et al. 2021). Cameras are unbaited and set at approximately 50cm height across an array of at least 7 cameras with a minimum distance of 200m and maximum of 5km 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 motionsensitive 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 60s 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 multiclass 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 5km 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

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

Variable	Potential categories	<b>Definition/Meaning</b>
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 photo 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 sequenc

Variable	Potential categories	<b>Definition/Meaning</b>
Age	Text string, options are Adult,Age category of animal observedJuvenile, Unknowndistinguishable by observer. Default is since this was not consistently rece	
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.
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Variable	Potential categories	<b>Definition/Meaning</b>
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)

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<sup>2</sup>) (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<sup>2</sup>.

#### 3.2 | Sampling Effort

Sampling effort, represented by the number of camera trapnights, varied between camera trap arrays and years, with a minimum of 81 trap-nights in a single year, a maximum of

Ecoregion

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.

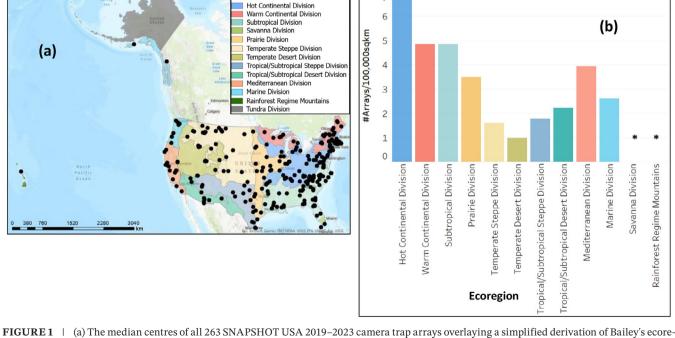
#### 3.3 | Taxonomic Range of Detections

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.

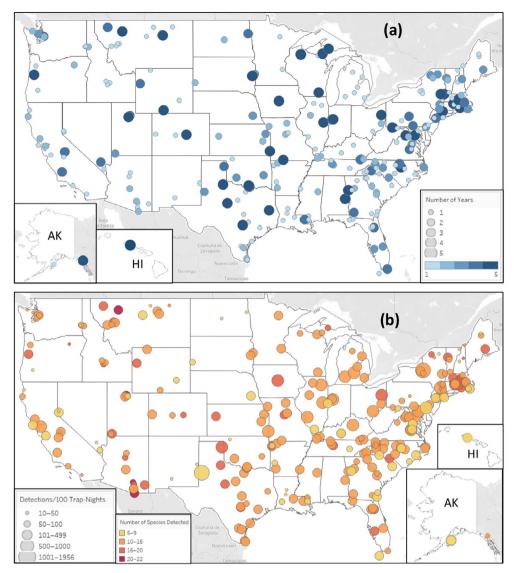
#### 4 | Discussion

7

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



gions (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<sup>2</sup> (\*ecoregions under 100,000 km<sup>2</sup>).



**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://snaps hot-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

State	Array	<b>Camera locations</b>	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
СО	Mesa	17	754	1
СО	USAFA	32	4426	5
СТ	Nye Holman	72	3093	5
СТ	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

 TABLE 3
 Image: 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
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

State	Array	<b>Camera locations</b>	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
МО	Bull Shoals	38	2872	5
МО	HBHMAcres	28	1039	2
МО	MOHansen	36	1161	2

State	Array	<b>Camera locations</b>	Camera trap-nights	Years surveyed
МО	MWSU	8	1056	2
МО	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

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
ОН	Athens	11	425	1
ОН	G3Ranch	23	1056	2
ОН	Huston Brumbaugh	15	2971	5
OK	Ardmore	25	2260	5
OK	Burneyville	17	2067	5
ОК	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

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State	Array	<b>Camera locations</b>	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
ТХ	AandM	14	867	1
ТХ	Abilene	42	3215	5
ТХ	Angelina	56	1730	5
ТХ	Aransas NWR	10	778	1
ТХ	Caesar Kleberg	20	1074	2
ТХ	Freeman	23	2354	5
ТХ	Gene Howe	42	1354	4
ТХ	Kingsville	23	839	2
ТХ	La Copita	27	1131	1
ТХ	LBJ	18	401	1
ТХ	Matador	50	2347	5
ТХ	Military Department	15	788	1
ТХ	San Marcos	32	1646	2
ТХ	Tarleton	7	476	1
ТХ	UHD	9	475	1

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State	Array	<b>Camera locations</b>	Camera trap-nights	Years surveyed
ТХ	USACE	12	384	1
ТХ	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.

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

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

(Continues)

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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

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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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

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

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

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

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

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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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

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

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

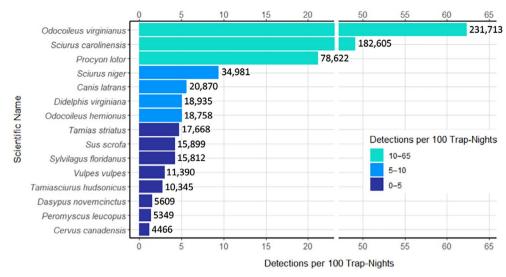
Group	Common name	Species name	Detections	Locations	Arrays
Wild mammal	Abert's squirrel	Sciurus aberti	57	15	3
Wild mammal	Western spotted skunk	Spilogale gracilis	57	26	12
Wild mammal	Carnivora order	Carnivora order	55	49	29
Wild mammal	Swamp rabbit	Sylvilagus aquaticus	55	13	4
Wild mammal	Swift fox	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

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 crowdsourced grassroots model of long-term mammal monitoring.



**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-n7yooU0Rtn11tCJ88Anaknol91k. 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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