

2021 Minnesota August Roadside Survey

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Summary

The 2021 range-wide pheasant index (40.7 birds/100 mi) decreased 25% from 2020 (54.5 birds/100 mi) and is similar to the 10-year average (37.7 birds/100 mi). Weather conditions overwinter and during the early nesting season were very favorable, but widespread drought may have adversely affected nesting or brood rearing conditions. Additionally, weather conditions during the 2021 survey were suboptimal which may have reduced detection of target species. Regionally, pheasants declined in all but the Southeast region and declines were greatest in the West Central and Central regions. Still, the core pheasant range (West Central, Southwest, and South Central regions) indices all exceeded the statewide average and were similar to or greater than their respective 10-year averages. The range-wide indices for gray partridge, mourning doves, white-tailed, deer, eastern cottontail rabbits, and sandhill cranes were equivalent to 2020 indices, but like pheasants, exhibited regional variation in trends. Compared to 10-year averages, only mourning doves and deer showed any meaningful difference with doves decreasing 27% and deer increasing 32%.

Introduction

This report summarizes the 2021 Minnesota August Roadside Survey (ARS). Since 1955, the Minnesota Department of Natural Resources (MN DNR) wildlife and enforcement personnel have conducted the annual ARS during the first two weeks of August throughout Minnesota's farmland regions (Figure 1). The 2021 ARS consisted of 163 25-mile routes (1-4 routes/county); 148 routes were located in the ring-necked pheasant range. Routes were surveyed 31 July – 22 August 2021.

Observers drove each route during the early morning (starting at or near sunrise) at 15-20 mi/hr and recorded the number of pheasants, gray (Hungarian) partridge, eastern cottontail rabbits, white-tailed jackrabbits, white-tailed deer, mourning doves, sandhill cranes, and other wildlife they observed including information on sex and age of these species. Counts conducted on cool, clear, calm mornings with heavy dew yield the most consistent results because wildlife (especially pheasants, gray partridge, and rabbits) move to warm, dry areas (e.g., gravel roads) during early-morning hours. These data

provide an **index of relative abundance** that are used to monitor long-term trends in regional and range-wide populations. Results are reported by agricultural region and range-wide; however, population indices for species with low detection rates (e.g., white-tailed jackrabbits) are imprecise and unreliable.

Habitat Conditions

Habitat on private lands showed mixed trends in 2021. Conservation Reserve Program (CRP) lands declined approximately 5,000 acres but was offset by an increase in lands enrolled in the Conservation Reserve Enhancement Program (CREP; approximately 10,000 acres) and Reinvest in Minnesota (RIM; approximately 2,000 acres). Lands enrolled in Wetland Reserve Program (WRP) and RIM-WRP did not change. Publically owned habitat also increased in 2021. Federally managed U.S. Fish and Wildlife Service (USFWS) Waterfowl Production Areas (WPA), wildlife refuges, and conservation easements increased by almost 10,000 acres. Habitat managed by the DNR as Wildlife Management Areas (WMA) increased approximately 14,000 acres to 442,113 acres within the pheasant range. Protected habitat accounts for 6.5% of the landscape within the pheasant range and is greatest in the West Central and Southwest regions (range by agricultural regions: 3.3-9.5%; Table 1).

Minnesota's Walk-in Access (WIA) program continues to provide public hunting opportunities on private land already enrolled in existing conservation programs or has natural habitat. The program has grown each year since inception, and in 2021, features more than 260 sites totaling more than 30,000 acres, primarily in the South Central, Southwest, and West Central regions. In 2021, the program was expanded to include additional counties within the Central, East Central and Southeast regions. Sites are open to public hunting 1 September – 31 May where boundary signs are present. Hunters must purchase a \$3 WIA Validation which allows access to all WIA lands statewide. For more information on the [WIA program](#), including the code of conduct for WIA lands, a printable atlas of enrolled sites by county, aerial photos of each site, interactive maps, and Global Positioning System (GPS) downloads, visit the WIA program website. The WIA program is currently funded through a grant from the Natural Resource Conservation Service of the U.S. Department of Agriculture. Other funding sources are provided through a surcharge on nonresident hunting licenses, a one-time appropriation from the Minnesota Legislature in 2012, and donations from hunters.

Weather Summary

Following National Oceanic and Atmospheric Administration conventions, the 30-year period used to calculate normal temperatures now includes 1991-2020. Weather conditions for pheasants were mixed in 2020-2021. Winter conditions were milder, with above average temperatures throughout most of the winter and lower than typical snow depths throughout the state (Table 2). The major exception was February, during which temperatures were 7-10 degrees below normal and when snow depths reached their maximum throughout the state. Spring temperatures were near normal, while summer temperatures were 3-4 degrees above average (Table 2). Spring and summer precipitation was below normal and led to widespread drought conditions throughout most of the pheasant range (Table 2)

Survey Conditions

Weather conditions during surveys were challenging in 2021. Surveyors reported drier conditions, slightly more wind, but similar temperatures compared to previous years. Greater cloud cover than average as well as smoke from wildfires further complicated survey conditions. Consequently, detection of pheasants may have been lower in 2021 than in previous years.

Species Reports

Ring-necked Pheasant

The pheasant index decreased approximately 25% in 2021 (40.7 birds/100 mi) compared to 2020 (54.5 birds/100 mi; Table 3, Figure 2A). Indices of adult pheasants were similar to the previous year but number of broods and chicks declined slightly. Still, indices among all age and sex classes remained equivalent to the 10-year average (Table 3). Counts of pheasants among all classes remained below the long-term average (range: -49%, -56%; Table 3, Figure 2A). The ratio of broods per 100 hens, an indicator of breeding success, was down slightly compared to 2020 (-9%) and the 10 year average (-4%) but remained near the long-term average (+9%; Table 3). The number of chicks per brood in 2021 (4.8) remained constant compared to 2020 (5.0) and the 10-year average (4.6) but remained 17% below the long-term average (5.7; Table 3). Generally, this suggests that breeding success, not chick survival or overwinter survival, drove apparent declines this year.

Annual changes in roadside counts among regions generally mirrored statewide trends. Proportional declines were greatest in the West Central (-33%), Southwest (-30%) and Central (-38%) regions, but indices remained similar to 2020 in the South Central and East Central regions (Table 4). Only the Southeast saw an increase in the pheasant index in 2021, though counts are lowest there (Table 4). Despite the apparent annual declines, indices among all regions remained at or greater than their respective 10-year averages and the South Central, Southwest, and West Central regions all reported indices that were greater than the statewide average (Tables 3 and 4).

Gray Partridge

The 2021 range-wide gray partridge index (2.5 birds/100 mi) was similar to 2020 and the 10-year average but remained below the long-term average (-80%; Table 3, Figure 2B). Partridge are generally rare throughout the state, but may be locally abundant. The Southwest, South Central, and Southeast regions provide the best opportunities for harvesting gray partridge in 2021 (Table 4).

Cottontail Rabbit and White-tailed Jackrabbit

The 2021 eastern cottontail rabbit index (4.7 rabbits/100 mi) was unchanged from 2020 (4.8 rabbits/100 mi) but remains below the 10-year average (-16%) and the long-term average (-22%; Table 3, Figure 3A). Annual changes in the cottontail index varied among regions, but differences were small which suggests that the index remained relatively constant (Table 4). The best rabbit hunting opportunities will be in the East Central, South Central, and Southeast regions (Table 4).

Single white-tailed jackrabbits were observed on three routes in the Central region (Table 3). Jackrabbits are rarely detected, making annual or short-term trend comparisons difficult. Still, the jackrabbit index remains >90% below the long-term average (Table 3, Figure 3B). Minnesota's jackrabbit population peaked in the late 1950s, declined to low levels in the 1980s, and has remained at low levels since then. The long-term decline in jackrabbits can primarily be attributed to loss of preferred habitats (e.g., pasture, hayfields, and small grains).

White-tailed Deer

The 2021 white-tailed deer index (30.2 deer/100 mi) remained similar to 2020 (29.6 deer/100 mi) but remained above the 10-year average (+32%) and the long-term average (+138%; Table 3, Figure 4A). Regional indices for deer declined in the Northwest and West Central regions, increased among the Central, Southwest, and Southeast regions, and showed no change in the South Central and East Central regions (Table 4).

Mourning Dove

The 2021 range-wide mourning dove index (110.9 doves/100 mi) was unchanged compared to 2020 (111.4 doves/100 mi) but remained below the 10-year (-27%) and long-term averages (-54%; Table 3, Figure 4B). The dove index showed small decreases in the West Central, Central, and South Central regions, stayed relatively constant in the Northwest region, and increased in all other regions (Table 4). The dove index was greatest in the Southwest, South Central, and West Central regions; opportunities for harvesting doves should be greatest there as well.

Sandhill Crane

The 2021 roadside index of sandhill cranes (13.5 cranes/100 mi) was similar to the 2020 index (Table 3). The indices of all cranes and juveniles among the farmland regions remained stable near the 10-year average. Though the West Central, South Central, and Southeast regions reported either no substantial changes or minor decreases, the crane index is generally low in these regions (Table 4). The majority of cranes are reported in the Northwest, Central, and East Central regions which exhibited an increase, no change, and a decline in 2021 (range: -43%, +68%; Table 4). The Northwest and Central region indices were above the 10-year average, though the East Central region remains below. Cranes have not yet been reported in roadside counts in the Southwest region.

Other Species

Notable incidental sightings recorded by observers included: Osprey (Wright county), prairie chickens (Polk County), red-headed woodpecker (Mower, Redwood, Renville, and Watonwan counties), sharp-tailed grouse (Red Lake, Roseau, and Polk counties), Eurasian-collared doves (Goodhue, Wabasha, and Nicollet counties) and red fox (Dodge and Yellow Medicine counties).

Acknowledgments

We thank the many cooperators for completing the routes required for this survey; without their efforts, this survey would not be possible. Tonya Klinkner and Katie Steffl were invaluable in providing logistical assistance and entering route data. Jason Beckler (Minnesota Board of Water and Soil Resources) provided enrollment data on cropland retirement programs in Minnesota and Allison McCluskey (U.S. Fish and Wildlife Service) provided federal land acquisition data. John Giudice, Nicole Davros, and Seth Goreham (MN DNR Wildlife Research) reviewed an earlier draft of this report. This work was funded in part through the Federal Aid in Wildlife Restoration Act.

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Table 1. Abundance (total acres) and density (acres/mi²) of undisturbed grassland habitat within Minnesota's pheasant range, 2021, by agricultural region (AGREG).

AGREG	Cropland Retirement (private lands) ^a					Public Lands		Total	% of landscape	Density ac/mi ²
	CRP	CREP	RIM	RIM-WRP	WRP	USFWS ^b	MNDNR ^c			
WC ^d	255,502	41,456	24,920	18,092	20,934	215,054	124,868	700,826	9.5	61.0
SW	122,333	32,982	20,800	2,553	766	26,014	67,875	273,323	7.2	46.2
C	125,159	19,247	44,300	7,265	2,997	93,425	55,327	347,720	5.8	36.8
SC	101,789	33,882	13,665	10,779	9,108	11,894	38,153	219,270	5.4	34.7
SE	75,702	3,517	7,294	1,070	1,578	37,134	58,712	185,006	5	31.9
EC	2,174	0	1,139	0	4	4,994	97,178	105,489	3.3	21.0
Total	682,659	131,084	112,118	39,759	35,387	388,515	442,113	1,831,634	6.5	41.7

^a Unpublished data, Jason Beckler, BWSR, 25 August 2021.

^b Includes Waterfowl Production Areas (WPA), USFWS refuges, & USFWS conservation easements.

^c MN DNR Wildlife Management Areas (WMA). Comparisons to previous years are not valid.

Table 2. Average temperature, snow depth, and precipitation by season and agricultural region in Minnesota, 2021.

	Agricultural Region							STATE
	NW	WC	C	EC	SW	SC	SE	
Winter (December 1 - March 31)								
Temperature (average °F)	18.6	22.2	22.0	20.8	23.9	23.8	23.4	22.1
Departure from normal (°F) ^a	4.6	4.1	2.9	2.4	2.9	2.3	1.6	3.0
Snow Depth (average inches)	4.0	2.9	3.8	5.8	2.8	3.9	3.4	3.8
Spring (April 1 - May 31)								
Temperature (average °F)	47.1	50.3	50.6	48.8	50.8	52.0	51.5	50.2
Departure from normal (°F) ^a	-0.2	0.4	0.5	0.2	-0.2	0.2	0.3	0.2
Precipitation (total inches)	1.4	2.2	2.3	2.4	2.2	2.1	2.7	2.2
Departure from normal (inches) ^a	-0.8	-0.5	-0.8	-0.8	-1.2	-1.8	-1.4	-1.0
Summer (June 1 - July 31)								
Temperature (average °F)	70.8	72.7	72.3	70.2	72.8	72.8	72.1	72.0
Departure from normal (°F)	4.4	4.1	3.7	3.4	3.2	2.8	3.0	3.5
Precipitation (total inches)	1.3	2.0	1.7	1.9	1.8	2.2	3.4	2.0
Departure from normal (inches) ^a	-2.5	-2.1	-2.6	-2.6	-2.4	-2.5	-1.5	-2.3

^a Departures calculated using 30-year NOAA average (1991-2020) over respective time period.

Table 3. Range-wide trends (% change) in number of wildlife observed per 100 miles driven, Minnesota August roadside survey, 1955-2021.

Species	Change from 2020 ^a					Change from 10-year average ^b				Change from long-term average (LTA) ^c				
	Subgroup	<i>n</i>	2020	2021	%	95% CI	<i>n</i>	2011-2020	%	95% CI	<i>n</i>	LTA	%	95% CI
Ring-necked pheasant														
Total pheasants	148	54.5	40.7	-25	±16	146	37.7	7	±15	146	90.6	-56	±9	
Cocks	148	7.0	5.1	-27	±22	146	5.5	-8	±17	146	10.4	-52	±12	
Hens	148	7.6	6.4	-15	±17	146	5.7	10	±16	146	13.2	-52	±12	
Broods	148	8.3	6.4	-23	±16	146	5.8	6	±15	146	12.0	-49	±9	
Broods per 100 hens	148	104.6	95.0	-9			100.8	-4			88.7	9		
Chicks per brood ^d	221	5.0	4.8	-5			4.6	2			5.7	-17		
Median hatch date ^d	221	8-Jun	16-Jun				11-Jun				8-Jun			
Gray partridge	163	3.8	2.5	-34	±52	163	2.4	14	±83	153	13.2	-80	±15	
Eastern cottontail	163	4.8	4.7	-2	±42	163	5.6	-16	±35	153	6.4	-22	±31	
White-tailed jackrabbit^e	163	0.1	0.1			163	0.1			153	1.5	-95		
White-tailed deer	163	29.6	30.2	2	±7	163	22.9	32	±9	164	12.9	138	±15	
Mourning dove	163	111.4	110.9	0	±2	163	150.7	-27	±1	153	249.5	-54	±1	
Sandhill crane^f														
Total cranes	163	12.6	13.5	7	±16	163	12.6	10	±16					
Juveniles	163	1.6	2.2	35	±122	163	1.7	30	±118					

^a Includes Northwest region, except for pheasants. Estimates based on routes (*n*) surveyed in both years.

^b Includes Northwest region, except for pheasants. Estimates based on routes (*n*) surveyed at least 9 of 10 years.

^c LTA = long-term average during years 1955-2019, except for deer (1974-2019). Estimates for all species except deer based on routes (*n*) surveyed ≥40 years; estimates for deer based on routes surveyed ≥25 years. Thus, Northwest region (8 counties in Northwest were added to survey in 1982) included only for deer.

^d Sample size is the total number of broods observed across all surveys rather than the number of routes run in 2019.

^e White-tailed jackrabbits are too rare to make annual or 10-year comparisons.

^f Sandhill cranes were added to the survey in 2009; thus, long-term averages are not calculated.

Table 4. Regional trends (% change) in number of wildlife observed per 100 miles driven, Minnesota August roadside survey, 1955-2021.

Region Species	Change from 2020 ^a					Change from 10-year average ^b				Change from long-term average (LTA) ^c			
	<i>n</i>	2020	2021	%	95% CI	<i>n</i>	2011-2020	%	95% CI	<i>n</i>	LTA	%	95% CI
Northwest^d													
Gray partridge	15	2.7	0	-100	±80	17	0.8			18	2.5	-30	±83
Eastern cottontail	15	1.3	1.1	-20	±161	17	0.9			18	0.9	0	
White-tailed jackrabbit ^e	15	0	0			17	0.1			18	0.5		
White-tailed deer	15	64.5	55.3	-14	±3	17	52.2	5	±4	18	37	57	±6
Mourning dove	15	67	65.2	-3	±3	17	81.3	-23	±3	18	110.2	-36	±2
Sandhill crane ^f	15	30.9	51.8	68	±7	17	41.4	19	±5				
West Central^e													
Ring-necked pheasant	38	64.1	43.3	-33	±3	36	42.6	-5	±5	36	93.6	-57	±2
Gray partridge	38	0.2	0.2			36	0.3			36	8.6	-97	±24
Eastern cottontail	38	2.2	1.6	-29	±92	36	2.5	-33	±83	36	3.8	-56	±54
White-tailed jackrabbit ^e	38	0.1	0			36	0.1			36	2		
White-tailed deer	38	33.6	29.6	-12	±6	36	25	13	±8	36	12.6	125	±16
Mourning dove	38	147.2	126.7	-14	±1	36	193.3	-34	±1	36	351.9	-64	±1
Sandhill crane ^f	38	5	4.4	-11	±41	36	2.3	96	±90				
Central													
Ring-necked pheasant	30	55.4	34.1	-38	±34	30	33.1	3	±6	30	67.3	-49	±3
Gray partridge	30	2.8	0.4	-86	±73	30	1.6	-75	±126	30	8.1	-95	±25
Eastern cottontail	30	5.5	4.9	-10	±37	30	5.1	-3	±40	30	6.2	-20	±33
White-tailed jackrabbit ^e	30	0	0.4			30	0.1			30	1.1		
White-tailed deer	30	35.1	44.1	26	±6	30	21.3	108	±10	30	8.8	399	±23
Mourning dove	30	95.8	84.3	-12	±2	30	134	-37	±2	30	214.7	-61	±1
Sandhill crane ^f	30	26.9	28.3	5	±8	30	22.1	28	±9				
East Central													
Ring-necked pheasant	10	34	32.4	-5	±7	10	36.2	-11	±6	10	79.8	-59	±3
Gray partridge	10	0	0			10	0.3			10	0.2		
Eastern cottontail	10	9.1	9.6	5	±25	10	13.1	-27	±17	10	9.6	0	±24
White-tailed jackrabbit ^e	10	0	0			10	0			10	0.1		
White-tailed deer	10	31.5	30.4	-4	±7	10	27.5	10	±8	10	12.8	137	±18
Mourning dove	10	47.1	62	32	±5	10	64.6	-4	±4	10	109.3	-43	±2
Sandhill crane ^f	10	44.7	25.6	-43	±5	10	53.3	-52	±4				

Table 4. Continued.

Region Species	Change from 2020 ^a					Change from 10-year average ^b				Change from long-term average (LTA) ^c			
	<i>n</i>	2020	2021	%	95% CI	<i>n</i>	2011-2020	%	95% CI	<i>n</i>	LTA	%	95% CI
Southwest													
Ring-necked pheasant	19	90.5	63.2	-30	±2	19	59	7	±4	19	109.4	-42	±2
Gray partridge	19	9.5	5.3	-44	±22	19	4.9	8	±43	19	36	-85	±6
Eastern cottontail	19	5.5	4.4	-19	±38	19	5.3	-17	±40	19	7.7	-42	±27
White-tailed jackrabbit ^e	19	0.4	0			19	0.3			19	3.3		
White-tailed deer	19	15.6	20.6	32	±14	19	19.7	5	±11	19	10.9	89	±19
Mourning dove	19	123.6	155.8	26	±2	19	200.9	-22	±1	19	294.9	-47	±1
Sandhill crane ^f	19	0	0			19	0						
South Central													
Ring-necked pheasant	31	54	49.8	-8	±4	31	39.5	26	±5	31	118.9	-58	±2
Gray partridge	31	7.2	5.7	-21	±28	31	4.9	15	±41	31	16.7	-66	±12
Eastern cottontail	31	4.4	7	59	±47	31	7.5	-7	±27	31	7.7	-10	±27
White-tailed jackrabbit ^e	31	0	0			31	0.1			31	1.5		
White-tailed deer	31	14.3	11.9	-17	±14	31	8.8	35	±23	31	4.7	150	±43
Mourning dove	31	141.4	130.6	-8	±1	31	187.3	-30	±1	31	246.7	-47	±1
Sandhill crane ^f	31	4.3	3.6	-15	±48	31	2.2	66	±94				
Southeast													
Ring-necked pheasant	20	11.8	14.4	22	±18	20	13.3	8	±16	20	64.1	-78	±3
Gray partridge	20	4.2	5.6	33	±50	20	3.3	69	±63	20	12.3	-55	±17
Eastern cottontail	20	8.8	7	-21	±24	20	9.4	-25	±22	20	8	-13	±26
White-tailed jackrabbit ^e	20	0	0			20	0			20	0.5		
White-tailed deer	20	23.4	28.8	23	±9	20	19.3	49	±11	20	12.4	132	±17
Mourning dove	20	74.5	106.6	43	±3	20	96.7	10	±2	20	202.2	-47	±1
Sandhill crane ^f	20	0.8	2.2			20	0.4						

^a Based on routes (*n*) surveyed in both years.

^b Based on routes (*n*) surveyed at least 9 of 10 years.

^c LTA = long-term average during years 1955-2021, except for Northwest region (1982-2019) and white-tailed deer (1974-2021). Estimates based on routes (*n*) surveyed ≥40 years (1955-2021), except for Northwest (≥20 years) and white-tailed deer (≥25 years).

^d Eight Northwestern counties (19 routes) were added to the August roadside survey in 1982.

^e White-tailed jackrabbits are too rare to calculate regional trends.

^f Sandhill cranes were added to the survey in 2009; thus, long-term averages are not calculated.

^g Two routes were added to the West Central region in 2014.

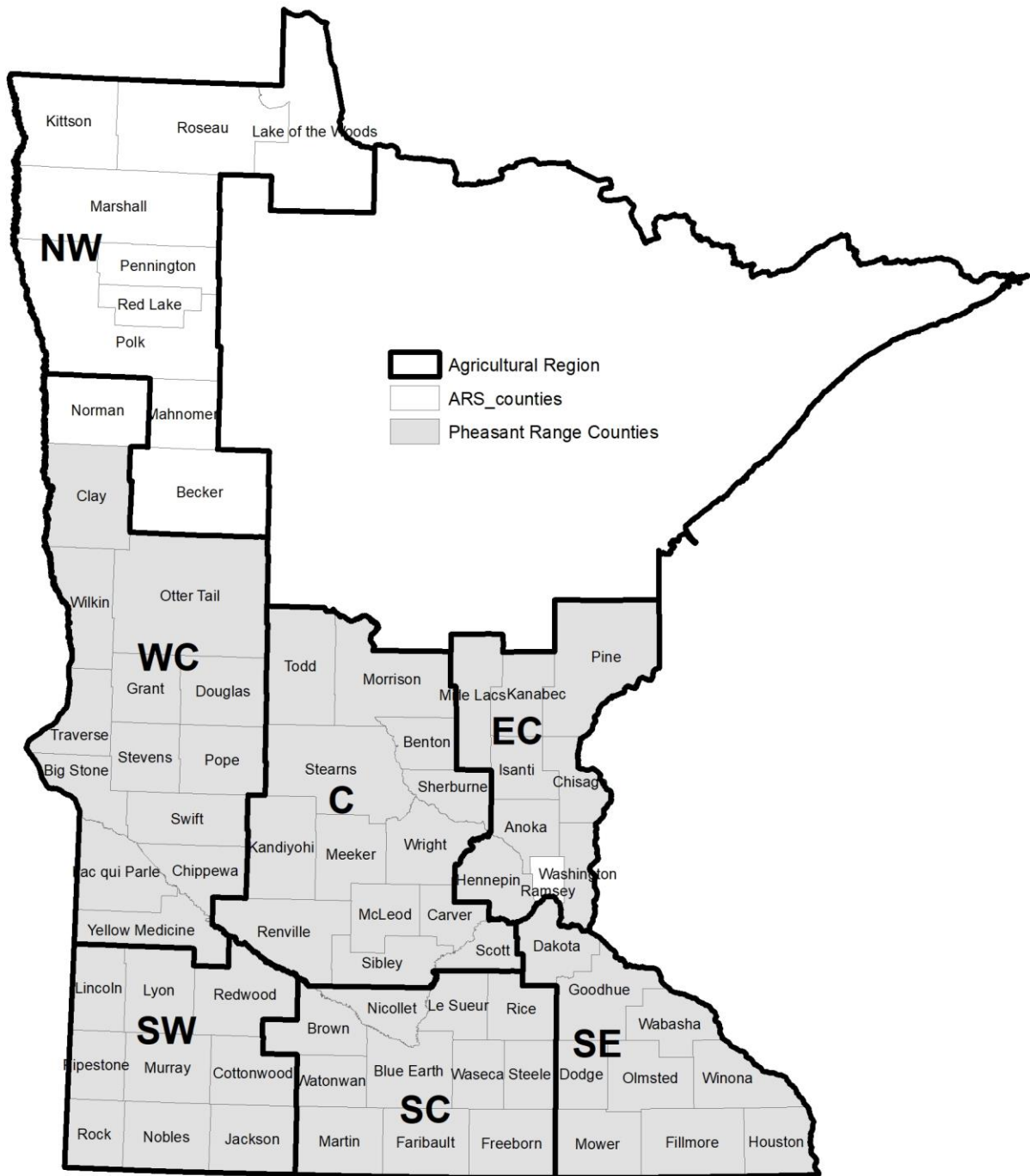


Figure 1. Survey regions and ring-necked pheasant range delineation for Minnesota's August roadside survey, 2021

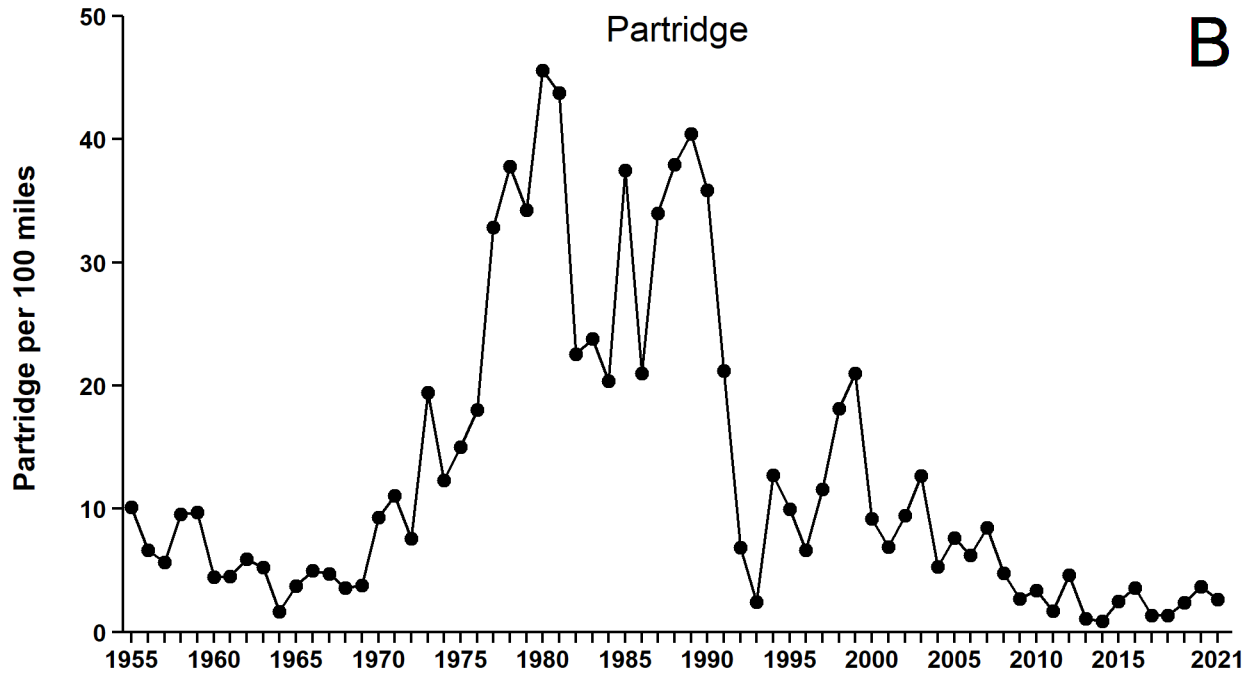
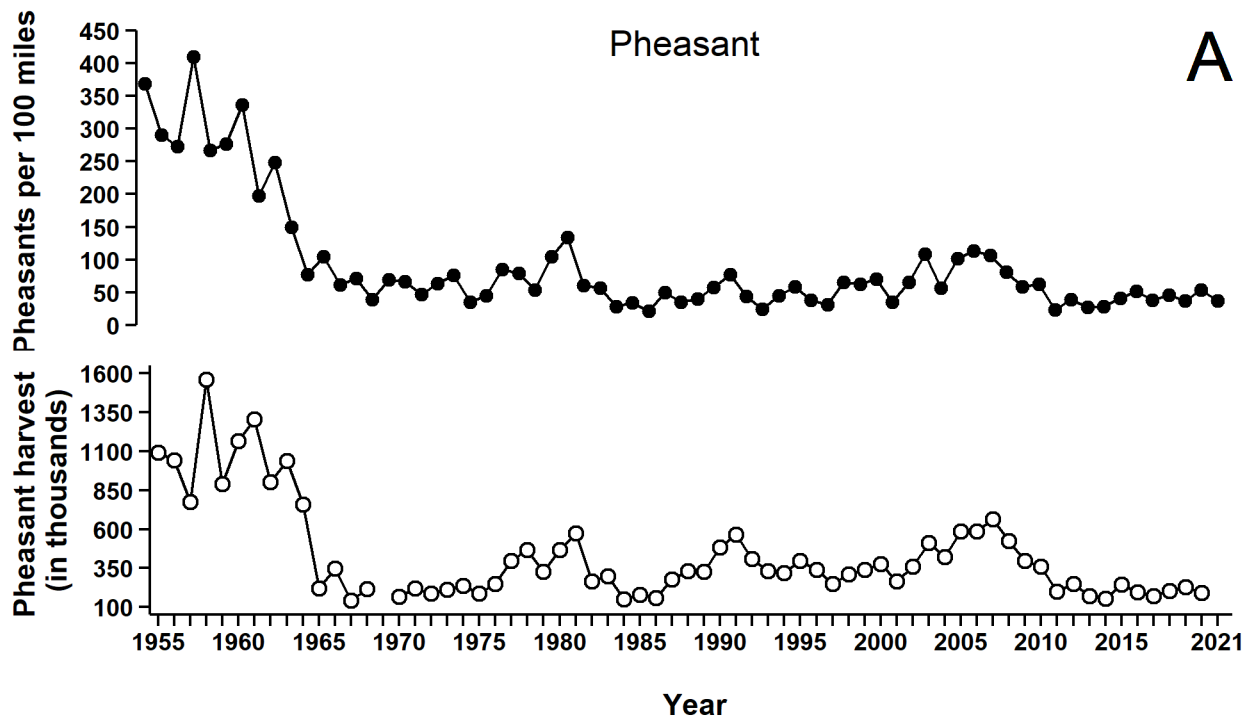


Figure 2. Range-wide index of ring-necked pheasants (A) and gray partridge (B) seen per 100 miles driven in Minnesota, 1955-2021. Based on all survey routes completed.

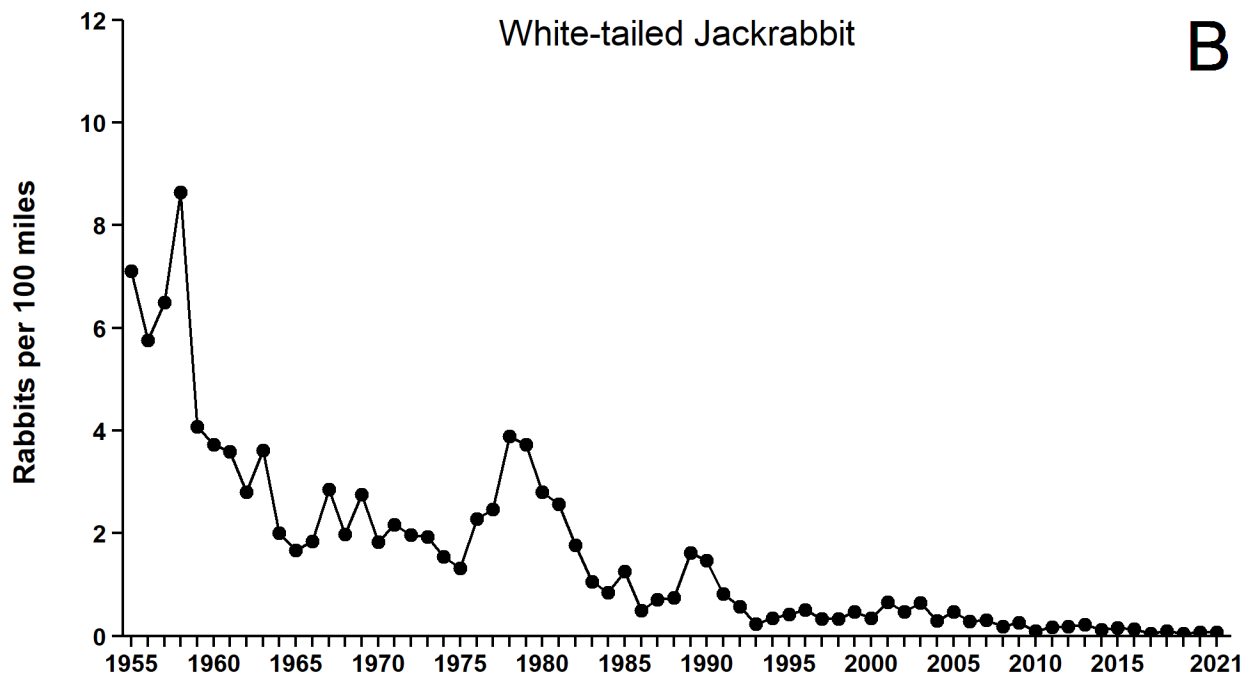
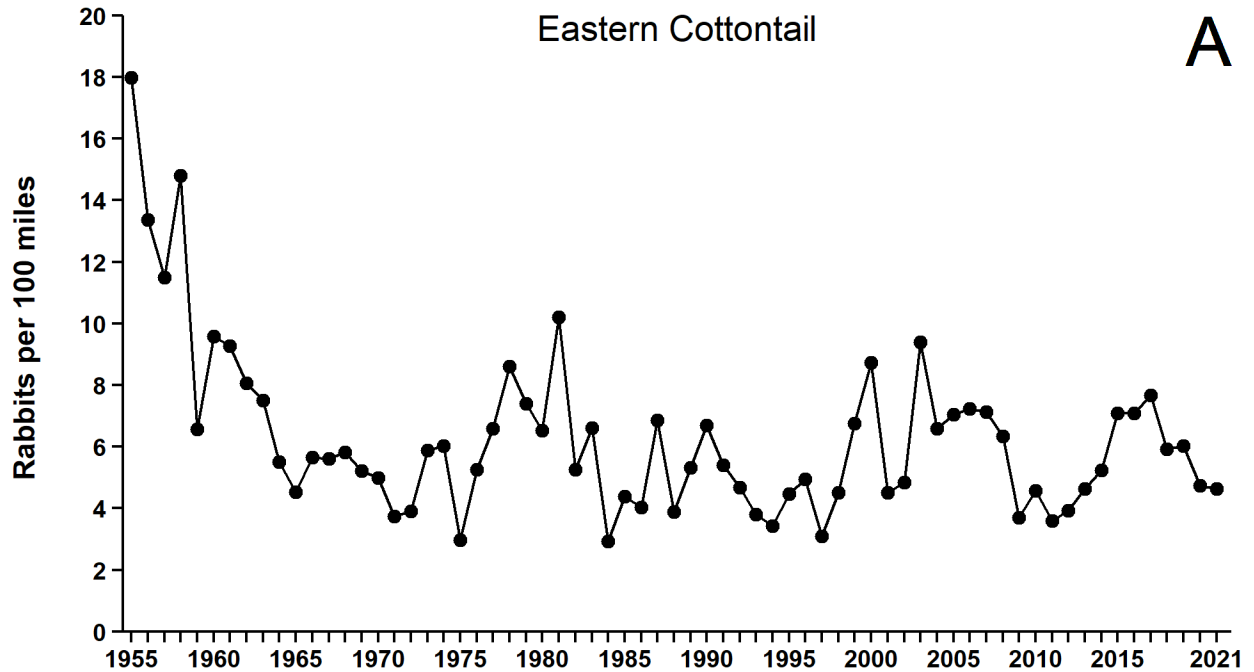


Figure 3. Range-wide index of eastern cottontail (A) and white-tailed jackrabbits (B) seen per 100 miles driven in Minnesota, 1955-2021. Based on all survey routes completed.

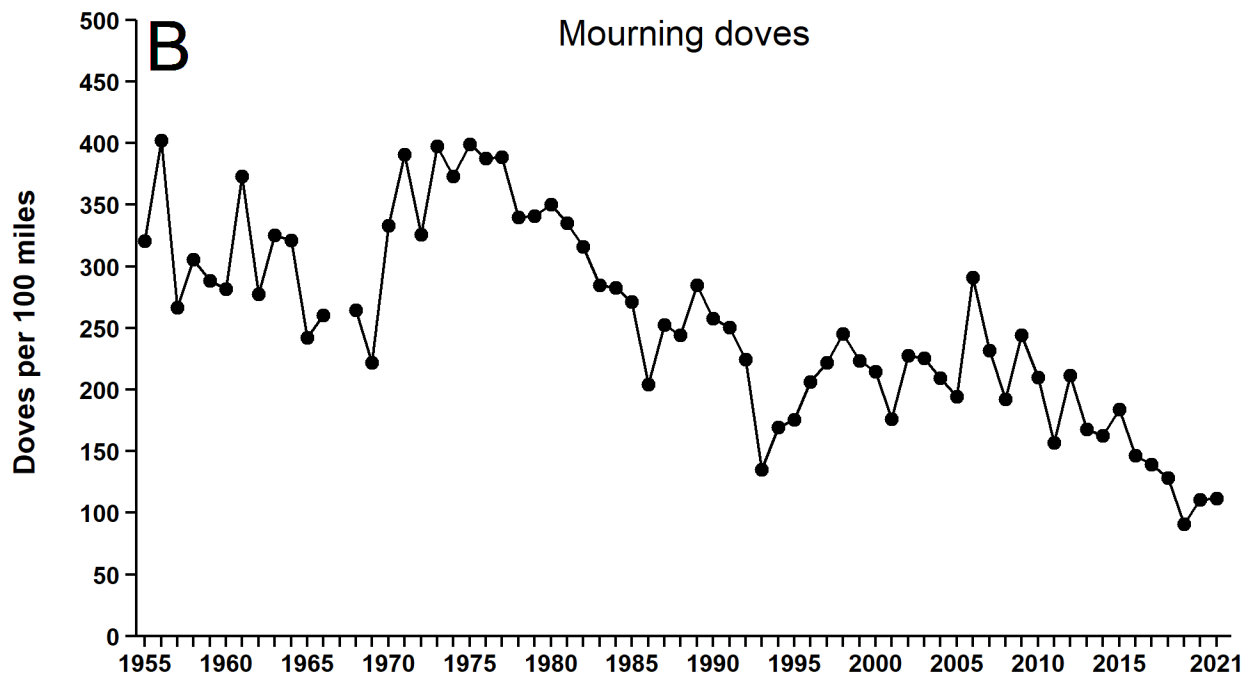
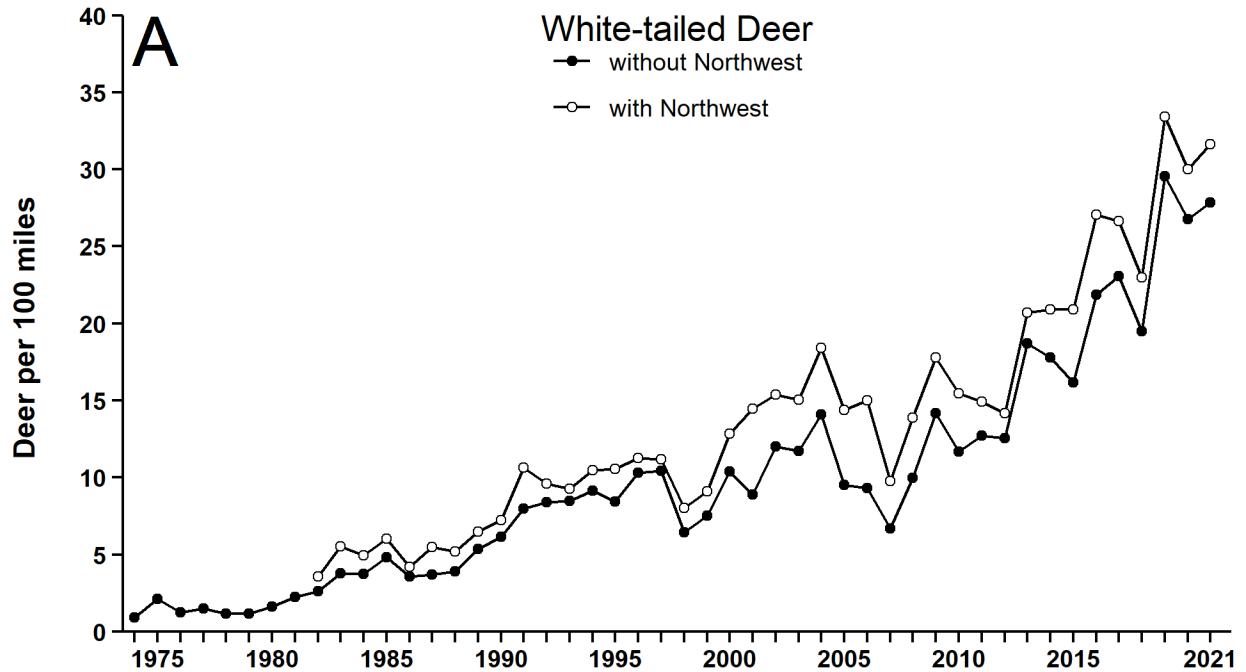


Figure 4. Range-wide index of: (A) white-tailed deer seen per 100 miles driven in Minnesota, 1974-2021, with and without the Northwest region included; and (B) mourning doves seen per 100 miles driven in Minnesota, 1955-2021. Doves were not counted in 1967. Based on all survey routes completed.