

2017 Minnesota August Roadside Survey

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Madelia, Minnesota
5 September 2017



Summary

A decrease in grassland habitat acres (primarily Conservation Reserve Program (CRP) lands) is likely linked to a decrease in Minnesota's 2017 population indices for ring-necked pheasants and gray partridge. The 2017 range-wide pheasant index (38.1 birds/100 miles) was 26% below the 2016 index. Indices for pheasants and gray partridge were both below their 10-year and long-term averages. Range-wide indices for cottontail rabbits and white-tailed deer were similar to 2016. The white-tailed jackrabbit, mourning dove, and sandhill crane indices decreased in 2017 and mourning dove indices remained below their 10-year and long-term averages.

Introduction

This report summarizes the 2017 Minnesota August Roadside Survey (ARS). Since 1955, the ARS has been conducted annually during the first two weeks of August by Minnesota Department of Natural Resources (MN DNR) wildlife and enforcement personnel throughout Minnesota's farmland regions (Fig. 1). The 2017 ARS consisted of 171 25-mile routes (1-4 routes/county); 151 routes were located in the ring-necked pheasant range.

Observers drove each route during the early morning (starting at or near sunrise) at 15-20 miles/hour and recorded the number of pheasants, gray (Hungarian) partridge, 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 annual changes and long-term trends in regional and range-wide populations. Results are reported by agricultural region (Fig. 1) and range-wide; however, population indices for species with low detection rates (e.g., white-tailed jackrabbits) are imprecise and *should be interpreted cautiously*.

Habitat Conditions

In Minnesota's farmland region, total undisturbed grassland habitat decreased in 2017 after a slight increase in 2016. Statewide, 5,244 habitat acres were lost since 2016 (pheasant range: 8,637 acres lost; greater prairie-chicken range: 5,660 acres lost). Conservation Reserve Program (CRP) enrollment decreased by 26,327 acres overall. CRP losses occurred within both the pheasant range (25,428 acres lost) and prairie-chicken range (9,880 acres lost). Acres enrolled in the Conservation Reserve Enhancement Program (CREP) held nearly steady in 2017 while acres enrolled in Reinvest in Minnesota (RIM), Wetlands Reserve Program (WRP), and RIM-WRP increased statewide (5,731 acres, 1,059 acres, and 1,914 acres, respectively). Despite loss of privately-owned undisturbed grassland habitat, publically-owned grassland habitat within the farmland regions increased in 2017. Federally-owned Waterfowl Production Areas (WPA) and U.S. Fish and Wildlife Service (USFWS) refuges increased by 3,040 acres and state-owned Wildlife Management Areas (WMA) increased by 9,269 acres. More WMA acres were gained in the pheasant range (8,492 acres) than the prairie-chicken range (816 acres). The USFWS added 2,422 acres of habitat in the pheasant range and 1,424 acres in the prairie-chicken range. Similar to 2016, remaining protected habitat accounts for 6.1% of the landscape within the pheasant range (range: 3-10%; Table 1).

Grassland and wetland habitat conservation remains a priority concern for Minnesota. Private-land conservation programs, including CRP, continue to make up a large portion of protected grassland habitat in the state (Fig. 2) but approximately 686,800 acres of CRP have been lost since 2007. The 2012 version of the Farm Bill placed a cap of 24 million acres nationwide on CRP, leading to a steady decline of habitat acres in recent years. The Farm Bill is up for renewal in 2018 and many conservation groups are asking for the nationwide cap on CRP to be increased to 40 million acres. Funding from the Legacy Amendment¹ has helped partially offset habitat losses but the pace has not kept up with the rate of CRP losses. Minnesota's [Prairie Conservation Plan](#) and [Pheasant Summit Action Plan](#) both offer a blueprint for moving forward with grassland and wetland habitat conservation strategies in the farmland regions, thereby helping partners prioritize lands acquired with Legacy Amendment funding.

Started in 2012, Minnesota's Walk-in Access (WIA) program continues to provide public hunting opportunities on private land that is already enrolled in existing conservation programs or has high quality natural habitat. In 2015, the U.S. Department of Agriculture (USDA) awarded a 3-year, \$1.67 million grant to assist in the continued funding of the WIA program. As of July 2017, 232 sites totaling 26,756 acres spread across the Farmland regions of Minnesota were enrolled in the program and open to public hunting September 1 – May 31 where boundary signs are present. Hunters must purchase a \$3 WIA Validation to legally access WIA lands. 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,

¹ [Minnesota's Legacy Amendment](#), passed in 2008, is a 25-year constitutional amendment that increases the state sales tax by 3/8 of 1%. A large portion of the funding generated by this amendment is dedicated to protecting drinking water sources and protecting, enhancing, and restoring wetlands, prairies, and other wildlife habitat.

interactive maps, and Global Positioning System (GPS) downloads, visit the [WIA program](#) website. Minnesota DNR is still seeking permanent funding to continue the program into the future.

Weather Summary

Minnesota's winter 2016-2017 (1 December 2016 – 31 March 2017) was warmer across the state with average temperatures 3.4 - 4.0°F above thirty-year normals (Table 2; Minnesota Climatology Working Group [MCWG] 2017a, [Climate Summary](#)). Winter snow cover was variable across the farmland zone, but snow depths exceeding 6 inches lasted several weeks in the Northwest and West Central regions (MCWG 2017b, [MCWG Climate Summary](#)). By March, snow depths of less than 1.5 inches were recorded across the state except for the Northwest.

Spring (1 April – 31 May) temperatures were at or below thirty-year normals statewide and precipitation varied widely across the farmland regions. The Central and East Central regions experienced higher than normal rainfall (>1 inch departure from normal) with 8.1 and 8.4 inches of rain during spring 2017 respectively.

Summer (1 June – 31 July) was warm and dry across the state with temperatures 2.3 – 4.1 °F above thirty-year normal temperatures. Rainfall across the state was near or below average during June and July.

Overall, the conditions for over-winter survival of wildlife were average to above average throughout the farmland zone. Although some localized areas received excessive snowfall during the winter months, these snow events were localized and outside the core pheasant range. Rainfall during May and June (the prime period for nesting birds) was above normal in some areas and normal- to cooler-than-normal temperatures may have impacted nest success and chick survival, especially early in the nesting season.

Survey Conditions

The survey period was extended (28 July – 19 August) to allow survey routes (n=171) to be completed in 2017. Weather conditions during the survey ranged from excellent (calm winds, heavy dew, clear sky) to medium (light dew and overcast skies). Medium to heavy dew conditions were present at the start of 96% of the survey routes which was comparable to 2016 (97%) and slightly above the 10-year average (93%). Similar to 2016, clear skies (<30% cloud cover) were present at the start of 85% of routes. Wind speeds <7 mph were recorded for 97% of the routes.

Species Reports

Ring-necked Pheasant

In 2017, the average number of pheasants observed range-wide (38.1 birds/100 mi) decreased 26% from 2016 and was 32% below the 10-year average and 62% below the long-term average (Table 3, Fig.

3A). Total pheasants observed per 100 mi ranged from 19.2 birds in the Southeast region to 54.6 birds in the South Central region (Table 4). The pheasant index showed substantial decreases in the Central (42%), East Central (61%) and Southwest (46%) regions. The best harvest opportunities will be in the West Central, Southwest, and South Central regions.

The range-wide hen index (5.8 hens/100 mi) decreased 26% from 2016 and was 34% below the 10-year average and 61% below the long-term average (Table 3). The hen index ranged from 2.3 hens/100 mi in the Southeast to 7.9 hens/100 mi in the South Central region. The 2017 hen index in all regions decreased since 2016 with the Southwest (-50.8%), East Central (-42.8%), and Central (-40.4%) regions showing the greatest percent change.

Across their range, the cock index (6.4 cocks/100 mi) increased 11% from 2016 but remained 8% below the 10-year average and 41% below the long-term average (Table 3). The cock index ranged from 1.7 cocks/100 mi in the Southeast to 8.6 cocks/100 mi in the South Central region. The 2017 indices increased in the Central (52.2%) and South Central (43.7%) regions while decreasing in the Southwest region (-29.8%). Indices were similar to 2016 in the West Central, East Central, and Southeast regions.

The 2017 hen:cock ratio (0.9) was less than the 2016 ratio (1.35) and was well below the average (1.40 ± 0.35) for the CRP years (1987-2017).

The 2017 range-wide brood index (5.7 broods/100 mi) decreased 34% from 2016 (Table 3). The index was 35% below the 10-year average and 57% below the long-term average. Regional brood indices ranged from 3.3 broods/100 mi in the Central region to 8.4 broods/100 mi in the Southwest. Brood indices decreased in all regions (range: -17.4% to -55.5%). The average brood size in 2017 (4.5 chicks/brood) was similar to 2016 and the 10-year average. However, the average brood size in 2017 was still 17% below the long-term average of 5.4 chicks/brood. The median estimated hatch date for pheasant broods across their range (8 June 2017, $n = 217$ broods) was slightly earlier than in 2016 (11 June) and the 10-year average (12 June; Table 3).

Although weather can drive year-to-year fluctuations in pheasant numbers, the amount of habitat on the landscape drives the longer term trends. Mild winters and breeding season weather conditions helped increase the pheasant indices over the past few years; however, the gradual but steady loss of habitat, especially CRP, has led to an overall decline in the pheasant population and harvest since the mid-2000s (Fig 2. & 3A).

Gray Partridge

The range-wide gray partridge index (1.3 birds/100 mi) decreased 63% from 2016 and was 60% and 90% below the 10-year and long-term averages, respectively (Table 3, Fig. 3B). No partridge were observed in the Northwest or West Central regions in 2017 (Table 4). Indices in regions where they were observed ranged from 0.5 birds/100 mi in the Central region to 5.1 birds/100 mi in the Southwest region. Intensified agricultural land use (e.g., corn and soybeans) has reduced the amount of suitable habitat for gray partridge in Minnesota. Additionally, gray partridge in their native range (southeastern Europe and

northern Asia) are associated with arid climates and their reproductive success in the Midwest is limited except during successive dry years. Thus, gray partridge are more adversely affected by excessive rainfall during the breeding season compared to pheasants. The Southwest and Southeast regions will offer the best opportunities for harvesting gray partridge in 2017.

Cottontail Rabbit and White-tailed Jackrabbit

Range-wide, the eastern cottontail rabbit index (7.7 rabbits/100 mi) increased 8% from 2016 and was 45% above the 10-year average and 28% above the long-term average (Table 3, Fig. 4A). Regionally, the cottontail rabbit index ranged from 1.3 rabbits/100 mi in the Northwest to 23.1 rabbits/100 mi in the East Central region (Table 4). Good harvest opportunities should exist in the Central, East Central, South Central, and Southeast regions.

At a historic low, the number of white-tailed jackrabbits observed range-wide (0.0 rabbits/100 mi) was 98% below the long-term average (1.7 rabbits/100 mi; Table 3, Fig. 4B). Minnesota's jackrabbit population peaked in the late 1950s, declined to low levels in the 1980s, and has continued to decline since then. The long-term decline in jackrabbits can primarily be attributed to loss of preferred habitats (i.e., pasture, hayfields, and small grains).

White-tailed Deer

The white-tailed deer index (26.6 deer/100 mi) was similar to 2016 and was 52% above the 10-year average and 137% above the long-term average (Table 3, Fig. 5A). Regional roadside indices for deer ranged from 10.7 deer/100 mi in the South Central region to 55.2 deer/100 mi in the Northwest (Table 4).

Mourning Dove

The range-wide mourning dove index (138.9 doves/100 mi) was 6% lower than 2016, 28% below the 10-year average, and 46% below the long-term average (Table 3, Fig. 5B). Regional indices ranged from 60.3 doves/100 mi in the East Central region to 167.1 doves/100 mi in the South Central region (Table 4). The best opportunities for harvesting doves should be in the West Central, Southwest, and South Central regions.

Sandhill Crane

The 2017 roadside index of sandhill cranes was 11.9 total cranes/100 mi which decreased 23% from 2016 (Table 3). Regional indices ranged from 0.0 total cranes/100 mi in the Southeast and Southwest regions to 55.4 total cranes/100 mi in the East Central region (Table 4). The range-wide index of juveniles was 2.4 juvenile cranes/100 mi which increased slightly from 2016 (Table 3).

Other Species

Notable incidental sightings included: alder flycatcher (Polk County), American bittern (Todd County), badger (Swift County), black-billed magpie (Polk and Red Lake Counties), elk (Kittson County), greater prairie chicken (Clay County), green heron (Dodge County), mink (McLeod, Stearns, and Stevens Counties), pileated woodpecker (Red Lake County), red-headed woodpecker (Redwood and Renville Counties), sharp-tailed grouse (Kittson and Red Lake Counties), sora (Murray County), tiger salamander (Freeborn County), trumpeter swan (Kandiyohi County), and upland sandpiper (Pipestone County). American kestrels, American crow, bald eagles, Canada geese, coyotes, domestic cats, northern harrier, red fox, red-tailed hawks, and wild turkeys were also noted in multiple counties.

Acknowledgments

We thank the many cooperators for their help in completing routes. This survey is simply not possible without their efforts. Tonya Klinkner was invaluable in providing logistical assistance and completing data entry. Tabor Hoek of the Minnesota Board of Water and Soil Resources provided enrollment data on cropland retirement programs in Minnesota, Kim Hennings (MN DNR) provided updated MN DNR land acquisition information, and Tamra Adams of the U.S. Fish and Wildlife Service provided federal land acquisition data. John Giudice 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, 2017, by agricultural region (AGREG).

AGREG	Cropland Retirement ^a					Public Lands		Total	% of Landscape	Density ac/mi ²
	CRP ^b	CREP	RIM	RIM-WRP	WRP	USFWS ^c	MNDNR ^d			
WC ^e	246,470	37,755	22,975	14,275	20,124	197,750	110,747	650,096	10.0	61.0
SW	97,103	24,770	20,627	2,553	766	23,444	71,502	240,765	6.0	41.0
C	121,621	14,326	37,575	7,026	3,028	90,520	50,966	325,062	5.0	34.0
SC	86,665	27,633	13,585	10,703	8,981	9,494	36,310	193,371	5.0	31.0
SE	67,119	2,706	7,405	1,070	1,581	36,801	55,259	171,941	5.0	30.0
EC	2,949	0	1,131	0	4	4,993	91,829	100,906	3.0	20.0
Total	621,927	107,190	103,298	35,627	34,484	363,002	416,613	1,682,141	6.1	39.0

^a Unpublished data, Tabor Hoek, BWSR, 16 August 2017.

^b Acres reduced to account for estimated active CREP contracts reported within CREP column.

^c Includes Waterfowl Production Areas (WPA) and USFWS refuges.

^d MN DNR Wildlife Management Areas (WMA).

^e Does not include Norman County.

Table 2. Average temperature, snow depth, and precipitation by season and agricultural region in Minnesota, 2017.

	Agricultural Region							STATE
	NW	WC	C	EC	SW	SC	SE	
Winter (December 1 - March 31)								
Temperature (average °F)	17.4	21.5	22.7	22.7	24.3	25.0	23.4	21.8
Departure from normal (°F) ^a	3.6	3.6	4.0	3.6	3.4	3.9	3.5	3.5
Snow Depth (average inches)	9.0 ^b	2.9 ^b	2.2	2.3	1.8	2.2	3.1	3.9
Spring (April 1 - May 31)								
Temperature (average °F)	48.9	50.7	50.8	50.0	51.4	52.8	50.5	49.8
Departure from normal (°F) ^a	0.1	-0.1	-0.3	-0.4	-0.4	0.5	-0.2	-0.2
Precipitation (total inches)	2.6	5.2	8.1	8.4	7.1	7.6	7.1	7.1
Departure from normal (inches) ^a	-0.8	0.1	1.1 ^c	1.2 ^c	0.4	0.2	0.6	0.6
Summer (June 1 - July 31)								
Temperature (average °F)	56.0	57.1	57.1	56.4	58.7	59.7	58.4	56.9
Departure from normal (°F)	4.1	2.7	2.4	2.3	2.8	3.4	3.2	2.8
Precipitation (total inches)	6.4	7.7	8.4	9.4	7.0	8.3	9.8	8.9
Departure from normal (inches) ^a	-0.3	-0.2	-0.2	0.1	-0.5	-0.5	0.1	0.0

^a Departures calculated using thirty year NOAA average (1981-2010) over respective time period.

^b At least one two-week period with snow depth exceeding 6 inches.

^c Precipitation >1 inch above normal.

Table 3. Range-wide trends (% change) in number of wildlife observed per 100 miles driven, Minnesota August roadside survey, 1955-2017.

Species Subgroup	Change from 2016 ^a					Change from 10-year average ^b				Change from long-term average (LTA) ^c			
	<i>n</i>	2016	2017	%	95% CI	<i>n</i>	2007-16	%	95% CI	<i>n</i>	LTA	%	95% CI
Ring-necked pheasant													
Total pheasants	152	51.4	38.1	-26	±18	148	52.3	-32	±13	149	94.6	-62	±9
Cocks	152	5.8	6.4	11	±25	148	6.9	-8	±17	149	10.7	-41	±13
Hens	152	7.8	5.8	-26	±20	148	8.1	-34	±15	149	13.7	-61	±10
Broods	152	8.6	5.7	-34	±16	148	8.2	-35	±12	149	12.5	-57	±9
Chicks per brood	217	4.4	4.5	4			4.6	-2			5.4	-17	
Broods per 100 hens	152	109.6	98.6	-10			101.1	-2			101.5	-3	
Median hatch date	217	11 June	8 June				12 June						
Gray partridge	171	3.6	1.3	-63	±65	167	3.4	-60	±43	149	14.4	-90	±17
Eastern cottontail	171	7.1	7.7	8	±22	167	5.3	45	±22	149	6.6	28	±22
White-tailed jackrabbit	171	0.1	0.0	-67	±93	167	0.2	-73	±51	149	1.7	-98	±14
White-tailed deer	171	27.2	26.6	-2	±17	167	17.7	52	±20	168	11.3	137	±32
Mourning dove	171	147.0	138.9	-6	±18	167	190.8	-28	±10	149	265.6	-46	±11
Sandhill crane^d													
Total cranes	171	15.4	11.9	-23	±48								
Juveniles	171	2.1	2.4	10	±51								

^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 1955-2016, except for deer (1974-2016). 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 Cranes were added to the survey in 2009; thus, 10-year and long-term averages are not calculated.

Table 4. Regional trends (% change) in number of wildlife observed per 100 miles driven, Minnesota August roadside survey, 1955-2017.

Region Species	Change from 2016 ^a					Change from 10-year average ^b				Change from long-term average (LTA) ^c			
	<i>n</i>	2016	2017	%	95% CI	<i>n</i>	2007-16	%	95% CI	<i>n</i>	LTA	%	95% CI
Northwest^d													
Gray partridge	19	0.0	0.0			19	0.6	-100	±101	19	3.1	-100	±60
Eastern cottontail	19	2.1	1.3	-39	±117	19	0.6	116	±315	19	0.8	50	±197
White-tailed jackrabbit	19	0.0	0.2			19	0.2	-3	±225	19	0.6	-64	±92
White-tailed deer	19	69.0	55.2	-20	±37	19	44.4	24	±33	19	32.9	68	±35
Mourning dove	19	116.2	114.7	-1	±59	19	87.8	31	±82	19	118.3	-3	±64
Sandhill crane ^e	19	65.2	35.6	-45	±102								
West Central^f													
Ring-necked pheasant	39	50.8	43.2	-15	±34	35	59.4	-45	±31	37	96.1	-64	±18
Gray partridge	39	0.0	0.0			35	0.8	-100	±97	37	9.2	-100	±21
Eastern cottontail	39	3.4	4.3	28	±65	35	2.6	66	±89	37	3.9	2	±59
White-tailed jackrabbit	39	0.3	0.0	-100	±114	35	0.2	-100	±66	37	2.2	-100	±19
White-tailed deer	39	31.5	26.7	-15	±35	35	18.1	55	±52	37	10.8	147	±82
Mourning dove	39	189.8	162.1	-15	±28	35	233.9	-31	±19	37	363.5	-55	±13
Sandhill crane	39	1.7	3.2	83	±204								
Central													
Ring-necked pheasant	30	42.7	24.7	-42	±46	30	43.3	-43	±31	29	71.2	-64	±20
Gray partridge	30	2.3	0.5	-77	±151	30	1.5	-63	±42	29	9.0	-94	±41
Eastern cottontail	30	6.7	7.2	8	±69	30	4.4	65	±66	29	6.2	16	±47
White-tailed jackrabbit	30	0.0	0.0			30	0.1	-100	±99	29	1.2	-100	±22
White-tailed deer	30	21.7	33.2	53	±42	30	12.7	161	±83	29	6.8	403	±186
Mourning dove	30	160.8	144.0	-11	±52	30	174.1	-17	±34	29	227.3	-35	±27
Sandhill crane	30	22.9	16.1	-30	±45								
East Central													
Ring-necked pheasant	13	54.1	20.9	-61	±53	13	50.9	-59	±24	13	84.5	-75	±22
Gray partridge	13	0.0	1.2			13	0.0			13	0.1		
Eastern cottontail	13	21.5	23.1	7	±53	13	11.7	97	±66	13	8.9	159	±82
White-tailed jackrabbit	13	0.0	0.0			13	0.0			13	0.2	-100	±64
White-tailed deer	13	30.1	24.6	-18	±43	13	19.2	28	±63	13	10.4	136	±99
Mourning dove	13	62.9	60.3	-4	±33	13	92.4	-35	±29	13	115.5	-48	±29
Sandhill crane	13	42.3	55.4	31	±63								

Table 4. Continued.

Region Species	Change from 2016 ^a					Change from 10-year average ^b				Change from long-term average (LTA) ^c			
	<i>n</i>	2016	2017	%	95% CI	<i>n</i>	2007-16	%	95% CI	<i>n</i>	LTA	%	95% CI
Southwest													
Ring-necked pheasant	19	96.0	51.7	-46	±44	19	95.8	-46	±24	19	113.6	-54	±21
Gray partridge	19	9.7	5.1	-48	±159	19	8.8	-42	±77	19	38.6	-87	±26
Eastern cottontail	19	6.1	5.1	-17	±80	19	5.6	-10	±47	19	8.0	-37	±41
White-tailed jackrabbit	19	0.4	0.2	-50	±185	19	0.6	-66	±103	19	3.6	-94	±21
White-tailed deer	19	27.8	16.6	-40	±46	19	18.6	-11	±35	19	10.2	63	±62
Mourning dove	19	182.1	165.9	-9	±28	19	272.0	-39	±15	19	307.5	-46	±19
Sandhill crane	19	0.0	0.0										
South Central													
Ring-necked pheasant	32	52.6	54.6	4	±35	32	51.1	7	±25	32	123.1	-56	±19
Gray partridge	32	7.5	0.9	-88	±85	32	6.6	-87	±57	32	17.9	-95	±21
Eastern cottontail	32	9.5	9.1	-4	±38	32	8.2	11	±33	32	7.7	18	±38
White-tailed jackrabbit	32	0.1	0.0	-100	±204	32	0.1	-100	±69	32	1.6	-100	±25
White-tailed deer	32	7.5	10.7	43	±63	32	6.1	76	±66	32	4.0	166	±104
Mourning dove	32	144.1	167.1	16	±62	32	249.5	-33	±19	32	254.4	-34	±38
Sandhill crane	32	2.1	1.0	-53	±107								
Southeast													
Ring-necked pheasant	19	17.9	19.2	7	±63	19	13.3	45	±83	19	67.2	-72	±32
Gray partridge	19	6.5	3.8	-42	±171	19	5.5	-31	±171	19	12.6	-70	±67
Eastern cottontail	19	7.5	11.3	50	±60	19	7.4	54	±47	19	7.7	46	±56
White-tailed jackrabbit	19	0.0	0.0			19	0.0			19	0.5	-100	±46
White-tailed deer	19	15.6	25.8	66	±94	19	15.6	65	±63	19	11.4	126	±88
Mourning dove	19	95.2	86.9	-9	±33	19	127.9	-32	±20	19	212.7	-59	±22
Sandhill crane	19	1.5	0.0	-100	±160								

^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 1955-2016, except for Northwest region (1982-2016) and white-tailed deer (1974-2016). Estimates based on routes (*n*) surveyed ≥40 years (1955-2016), 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 Cranes were added to the survey in 2009; thus, 10-year and long-term averages are not calculated.

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

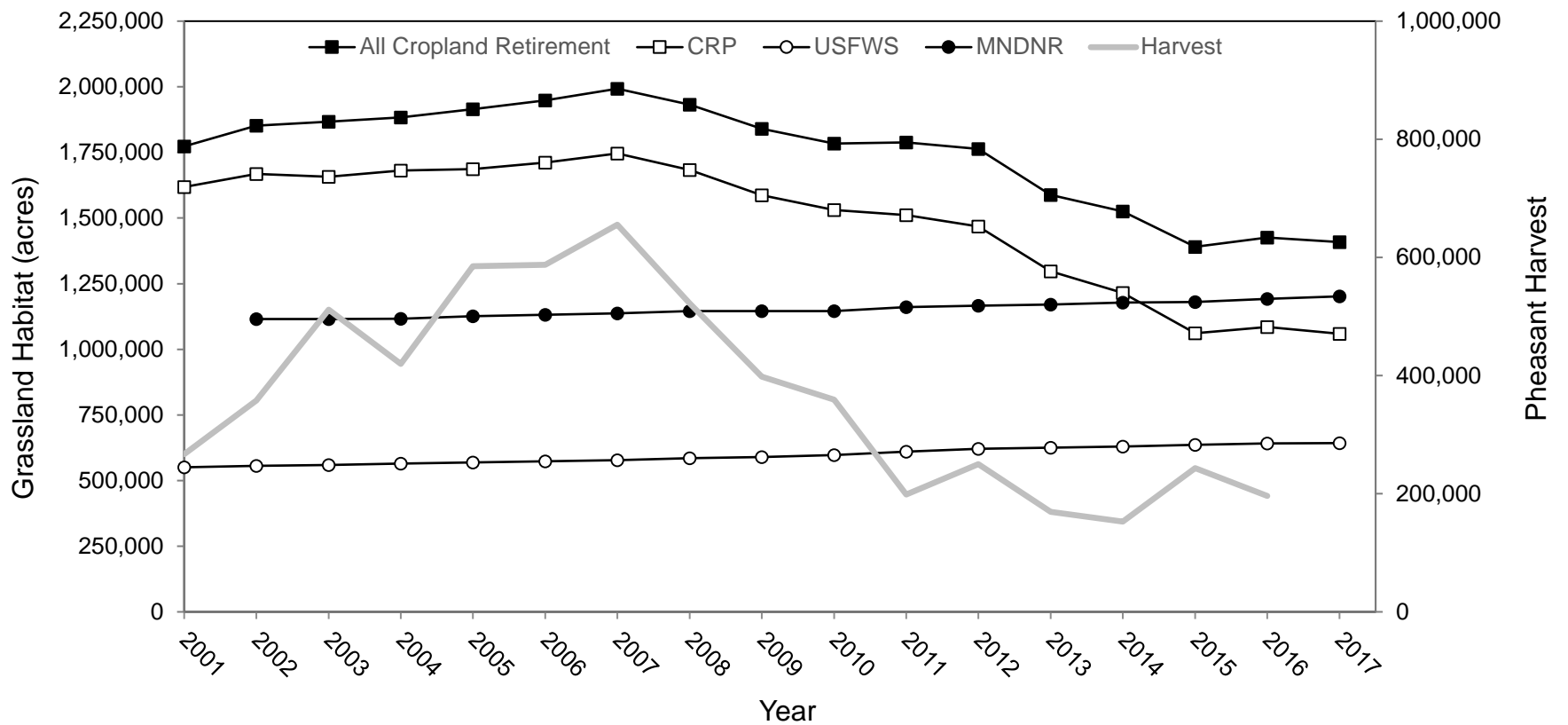


Figure 2. Acres enrolled in private (lines with open and solid squares) and public (lines with open and solid circles) land habitat conservation programs vs. ring-necked pheasant harvest trends (line with no markers) in Minnesota, 2001-2017. Acres represent STATEWIDE totals. All cropland retirement includes Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), Reinvest in Minnesota (RIM), Wetlands Reserve Program (WRP), and RIM-WRP.

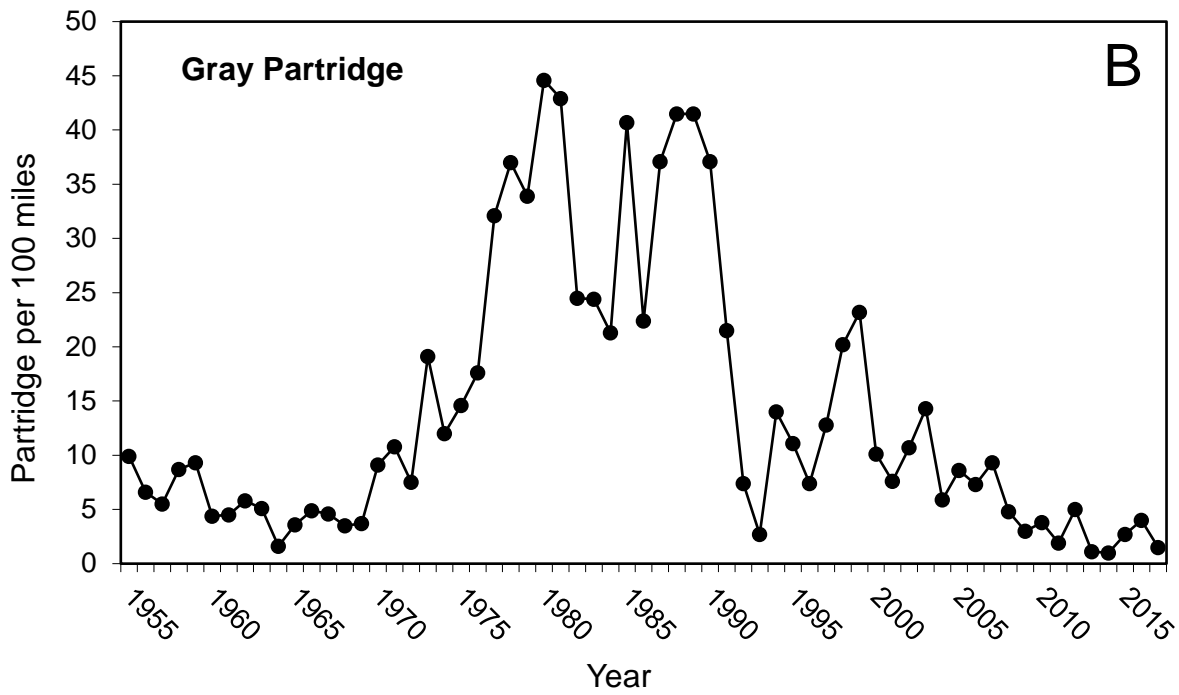
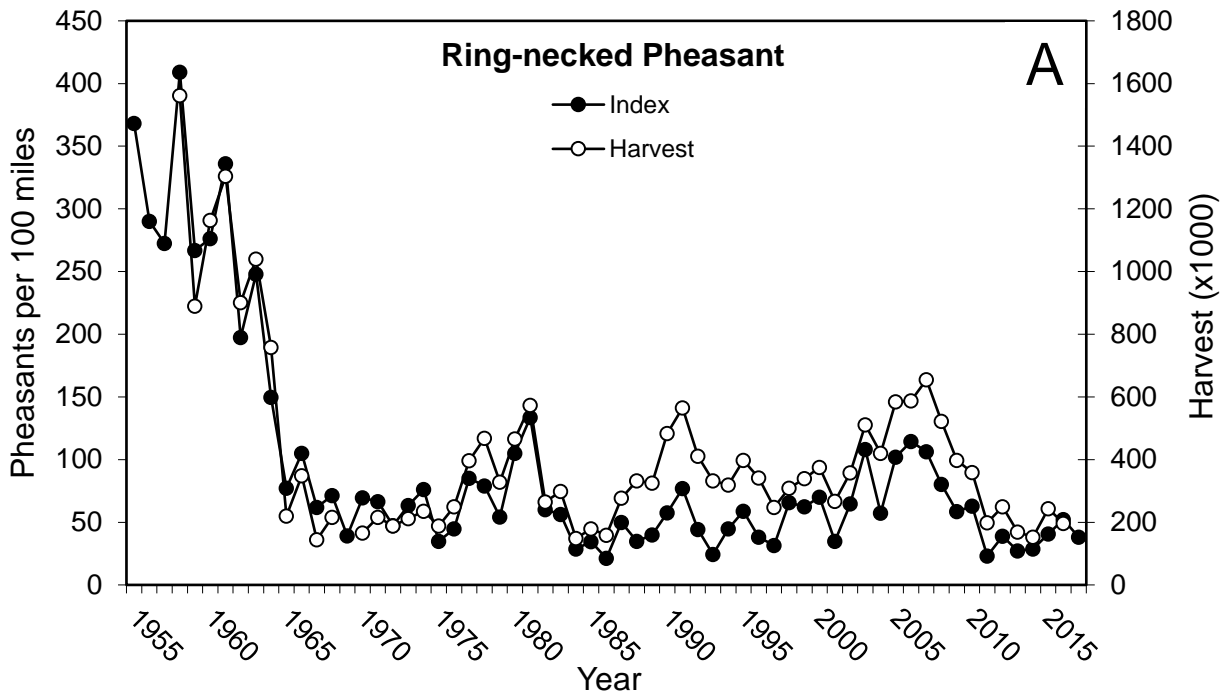


Figure 3. Range-wide index of ring-necked pheasants (A) and gray partridge (B) seen per 100 miles driven in Minnesota, 1955-2017. Does not include the Northwest region. Based on all survey routes completed.

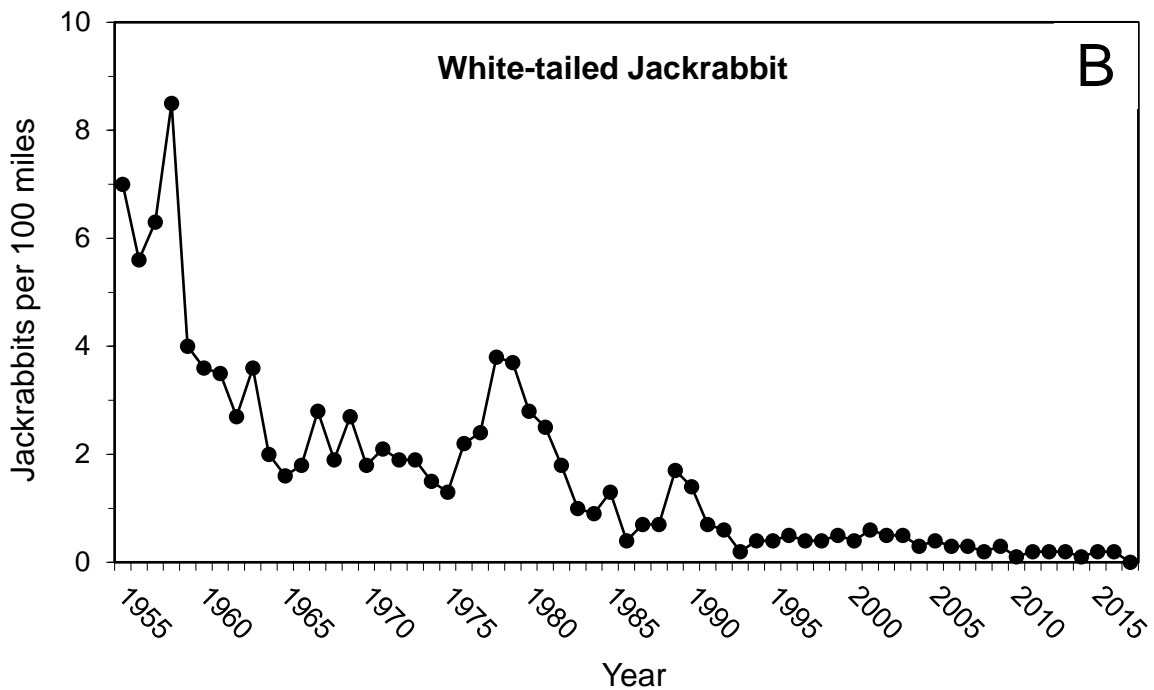
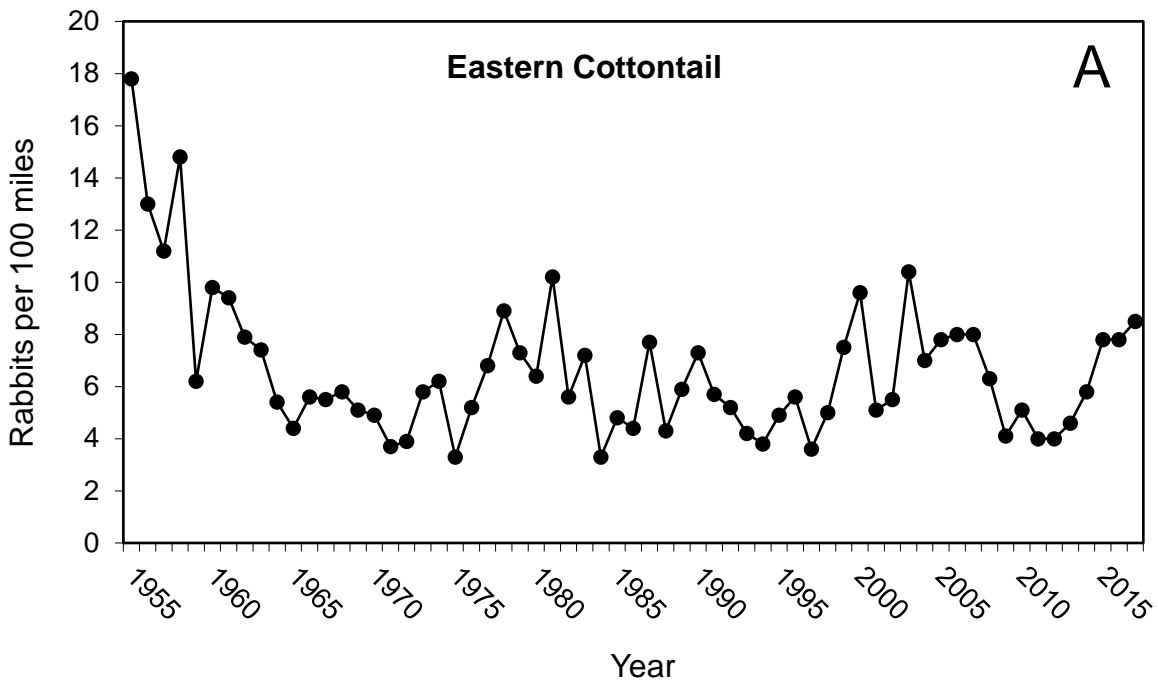


Figure 4. Range-wide index of eastern cottontail (A) and white-tailed jackrabbits (B) seen per 100 miles driven in Minnesota, 1955-2017. Does not include the Northwest region. Based on all survey routes completed.

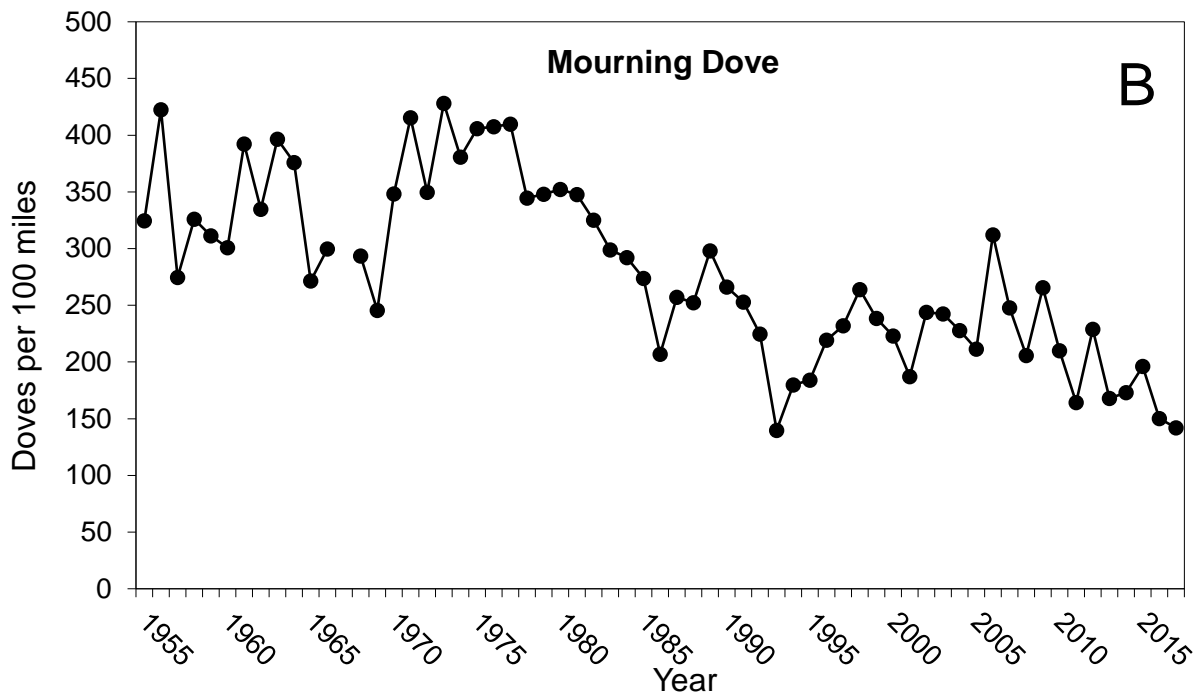
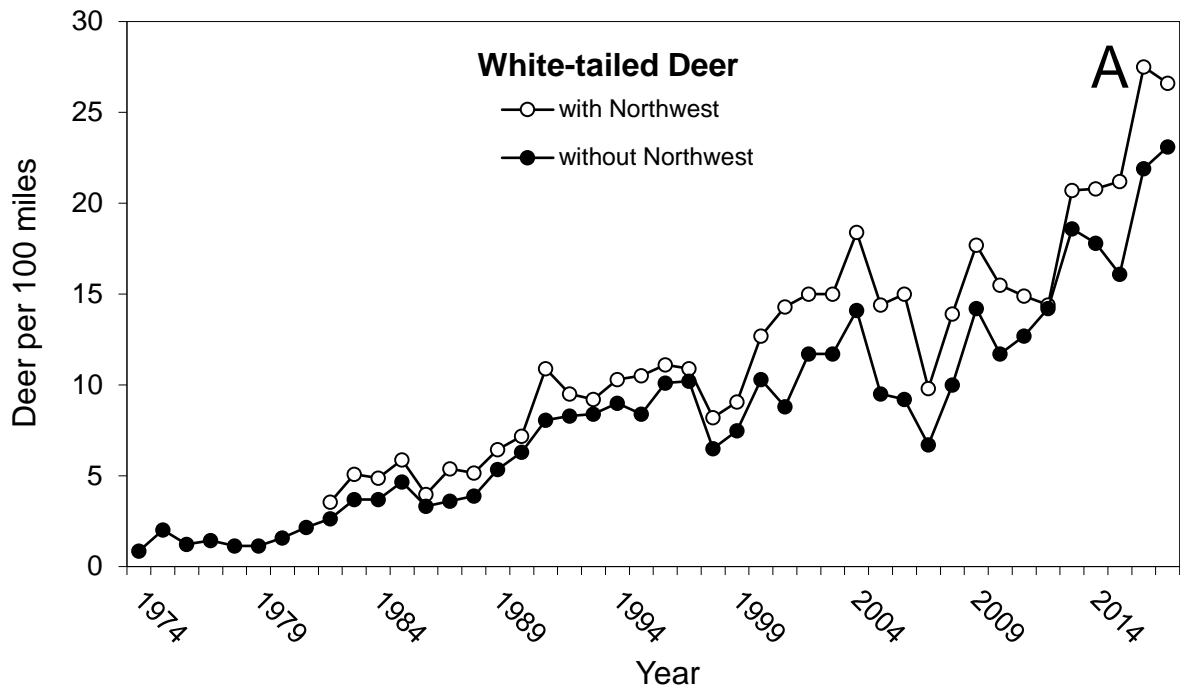


Figure 5. Range-wide index of: (A) white-tailed deer seen per 100 miles driven in Minnesota, 1974-2017, with and without the Northwest region included; and (B) mourning doves seen per 100 miles driven in Minnesota, 1955-2017. Doves were not counted in 1967 and the dove index does not include the Northwest region. Based on all survey routes completed.