2018 Minnesota August Roadside Survey

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Summary

Despite late-season snowstorms and excessive spring and summer rainfall across some regions, the 2018 range-wide pheasant index (45.5 birds/100 mi) increased 19% from 2017 and was similar to the 10-year average of 44.7 birds/100 mi. Grassland habitat on private, state, and federally-owned lands increased by 82,519 acres statewide since 2017 and may have helped mitigate the extreme weather conditions in certain regions; however, nearly 297,000 acres of Conservation Reserve Program (CRP) are under contracts set to expire by September 2019. The range-wide indices for eastern cottontail rabbits and white-tailed deer declined slightly, whereas the indices for mourning doves and cranes were similar to 2017. Gray partridge and white-tailed jackrabbit observations continue to be historically low across our survey area.

Introduction

This report summarizes the 2018 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 (Figure 1). The 2018 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 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 annual changes and long-term trends in regional and range-wide populations. Results are reported by agricultural region (Figure 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 increased in 2018 after a slight decrease in 2017. Statewide, 82,519 habitat acres were gained; the pheasant range gained 77,876 of those acres. Undisturbed grassland acres were primarily gained on private lands with Conservation Reserve Program (CRP) enrollment (72,412 acres) accounting for a majority of these gains. Nearly all CRP gains occurred within the pheasant range (72,387 acres gained). Acres enrolled in Reinvest in Minnesota (RIM) increased by 4,306 acres in 2018 while acres enrolled in the Conservation Reserve Enhancement Program (CREP), Wetlands Reserve Program (WRP), and RIM-WRP remained relatively stable. Additionally, publically-owned grassland habitat within the farmland region also increased slightly in 2018. Federally-owned U.S. Fish and Wildlife Service (USFWS) Waterfowl Production Areas (WPA) and wildlife refuges increased by 3,664 acres and state-owned Wildlife Management Areas (WMA) increased by 6,067 acres statewide. In the pheasant range in particular, 3,015 acres of USFWS land and 3,510 acres of WMAs were added. Similar to 2017, remaining protected habitat accounts for 6.4% of the landscape within the pheasant range (range: 3.2-10.0%; 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 (Figure 2). Despite the gain in private land habitat conservation programs in 2018, approximately 614,348 acres of CRP have been lost since 2007 and an additional 296,855 acres are under contracts set to expire by September 30, 2019. The 2008 and 2014 versions of the Farm Bill placed a cap of 24 million acres nationwide on CRP and this cap remains in effect at the present time. As a result, there has been a steady decline of federally-incentivized habitat acres in recent years. The Farm Bill is up for renewal by September 30, 2018 and many conservation groups are asking for the nationwide cap on CRP to be increased (up to 40 million acres). Funding from the Legacy Amendment[1] has helped partially offset habitat losses but the pace has not kept up with the rate of CRP losses in the last decade. 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 2011, 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. The program has grown each year since inception, and in 2018 features >250 sites totaling nearly 30,000 across 47 counties in the farmland region of Minnesota. Sites are open to public hunting 1 September – 31 May where boundary signs are present. Hunters must purchase a $3

[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.

WIA Validation to 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. Availability of funding sources will determine the future of this program as federal grant funding expires after 2018.

Weather Summary

Minnesota's winter 2017-2018 (1 December 2017 – 31 March 2018) was slightly cooler across the state with average temperatures 1.3-2.4 °F below thirty-year normals (Table 2; Minnesota Climatology Working Group [MCWG] 2018, Climate Summary). Winter snow cover was variable across the farmland zone, with snow depths exceeding 6 inches for at least one 2-week period in every agricultural region except the Southwest and Southeast. Also notable were early and mid-April snowstorms which deposited several inches of snow (3-8 inches/storm) across much of the farmland zone. By April 26, 2018, snow was absent over the entire survey region.

Spring 2018 (1 April – 31 May) temperatures were 1.7-3.0 °F below thirty-year normals statewide and precipitation varied widely across the farmland regions. The West Central and Northwest regions were drier than normal whereas the South Central and Southeast regions were wetter than normal (>1 inch departure from normal). In particular, the South Central and Southeast regions had 9.1 and 9.8 inches of rain, respectively, during spring 2018.

Summer 2018 (1 June – 31 July) temperatures were near normal statewide with temperatures ≤1.2 °F above thirty-year normals across all regions. Rainfall across the state was at or above thirty-year normals in June and July (-0.3-2.0 inches from normal). Notably, the Southwest and South Central regions received significant rainfall amounts (15.0 and 13.1 inches of rain, respectively) during this season.

Overall, the conditions for over-winter survival of wildlife were average to below average throughout the farmland zone. Notably, some localized areas, including much of the core pheasant range, received excessive snowfall during the winter months, and snow events and measurable snow depths lingered into mid- to late April, potentially impacting nest initiation for many bird species. Rainfall during May and June (the prime period for nesting birds) was above normal in many areas. Combined with cooler-than-normal spring temperatures, nest success and chick survival were likely impacted.

Survey Conditions

The survey period was extended (28 July – 18 August) to allow survey routes (*n* = 171) to be completed in 2018. Weather conditions during the survey ranged from excellent (calm winds, heavy dew, clear sky) to moderate (light dew and overcast skies). Medium to heavy dew conditions were present at the start of 89% of the survey routes, which was down from 2017 (96%) and below the 10-year average (94%). Clear skies (<30% cloud cover) were present at the start of 80% of routes which was down slightly from 2017 (85%). Wind speeds <7 mph were recorded for 92% of the routes compared to 97% in 2017. Overall, survey conditions in 2018 were slightly drier, more overcast, and windier than in 2017 but similar to conditions over the long-term and were unlikely to have adversely impacted detection rates.

Species Reports

Ring-necked Pheasant

In 2018, the average number of pheasants observed range-wide (45.5 birds/100 mi) increased 19% from 2017 (38.2 birds/100 mi) and was similar to the 10-year average of 44.7 birds/100 mi. The index was 52% below the long-term average of 93.7 birds/100 mi (Table 3, Figure 3A). Total pheasants observed per 100 mi ranged from 23.6 birds in the Southeast region to 65.1 birds in the West Central region (Table 4). The pheasant index varied greatly statewide with significant increases in the Central (95%) and West Central (51%) regions while the Southwest region, a core area of Minnesota's pheasant range, increased only 5% from 2017. The South Central region was the only region that decreased (-36%) since 2017. The best harvest opportunities will be in the West Central, Southwest, and Central regions.

The range-wide hen index (7.6 hens/100 mi) increased 31% from 2017 (5.8 hens/100 mi) and was 10% above the 10-year average (6.9 hens/100 mi) but still 45% below the long-term average (13.6 hens/100 mi; Table 3). The hen index ranged from 4.0 hens/100 mi in the Southeast to 10.6 hens/100 mi in the West Central region. All regions showed at least an 18% increase (Central region increased 100%) in their hen index except the South Central region which decreased by 30%.

The range-wide cock index (6.5 cocks/100 mi) did not change from 2017 and the 10-year average but remained 40% below the long-term average of 10.7 cocks/100 mi (Table 3). The cock index ranged from 1.3 cocks/100 mi in the Southeast to 9.8 cocks/100 mi in the West Central region. The 2018 cock index varied greatly range-wide with increases in the Central (40%), West Central (30%), and Southwest (21%) regions and decreases in the South Central (-49%), Southeast (-25%), and East Central (-23%) regions.

The 2018 hen:cock ratio (1.16) was greater than the 2017 ratio (0.90) but still below the long-term average (1.33 ± 0.37) and the average (1.39 ± 0.35) for the CRP years (1987-2017).

The 2018 range-wide brood index (7.3 broods/100 mi) increased 28% from 2017 (5.7 broods/100 mi; Table 3). The index was similar to the 10-year average (6.9 broods/100 mi) but still 42% below the long-term average (12.4 broods/100 mi). Regional brood indices ranged from 3.7 broods/100 mi in the East

Central region to 10.3 broods/100 mi in the West Central region. Brood indices increased in all regions (range: 8% to 112%) except in the East Central (-0.3%) and South Central (-28%) regions. The average brood size in 2018 (4.3 chicks/brood) was similar to 2017 but slightly below the 10-year average (4.6 chicks/brood) and below the long-term average of 5.4 chicks/brood. The median hatch date (assigned using estimated brood ages from broods observed during the survey) for pheasant broods across their range was 14 June 2018 (*n* = 277 broods), which was nearly a week later than 2017 (8 June) and a few days later than the 10-year average (12 June; Table 3).

Late-winter snowstorms (which extended into April) followed by locally heavy spring and summer rains likely impacted nesting cover and affected nesting and brood-rearing during the 2018 breeding season. In particular, median hatch dates in the Southwest (26 June) and South Central (23 June) regions were 20 and 8 days later, respectively, than 2017 and 1-2 weeks later than the 10-year and long-term averages. Although hatching in these regions was delayed, the Southwest region still increased in all indices measured compared to 2017. However, this was not the case for the South Central region which decreased in each index assessed compared to last year. The South Central region not only experienced late winter snowstorms, but also had poorly-timed and excessive rainfall during the typical period of peak hatch. Although weather typically drives year-to-year fluctuations in pheasant numbers, available grassland habitat on the landscape is correlated with longer-term population indices and can help mediate the impacts of annual variation in weather on local populations. Minnesota has experienced a gradual but steady loss of habitat, especially CRP, and the impact of these losses correlates well with an overall decline in the pheasant population and harvest since the mid-2000s (Figures 2 & 3A).

Gray Partridge

The 2018 range-wide gray partridge index (1.3 birds/100 mi) was similar to 2017 but remained 50% and 93% below the 10-year and long-term averages, (2.7 birds/100 mi and 14.4 birds/100 mi, respectively; Table 3, Figure 3B). Indices for partridge ranged from 0.1 birds/100 mi in the West Central region to 3.8 birds/100 mi in the Northwest region (Table 4). 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 Midwestern United States 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, Southeast, and Northwest regions will offer the best opportunities for harvesting gray partridge in 2018.

Cottontail Rabbit and White-tailed Jackrabbit

Range-wide, the 2018 eastern cottontail rabbit index (5.8 rabbits/100 mi) decreased 23% from 2017 (7.5 rabbits/100 mi) but was 13% above the 10-year average (5.3 rabbits/100 mi) and comparable to the long-term average (6.6 rabbits/100 mi; Table 3, Figure 4A). Regionally, the cottontail rabbit index ranged from 0.6 rabbits/100 mi in the Northwest to 12.9 rabbits/100 mi in the East Central region (Table 4). Good harvest opportunities should exist in the East Central and Southeast regions.

Remaining at a historic low, the number of white-tailed jackrabbits observed range-wide (0.1 rabbits/100 mi) was 95% below the long-term average of 1.6 rabbits/100 mi (Table 3, Figure 4B). 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 (i.e., pasture, hayfields, and small grains).

White-tailed Deer

The white-tailed deer index (23.1 deer/100 mi) decreased 13% from 2017 (26.7 deer/100 mi) but was still 19% above the 10-year average and 99% above the long-term average (19.4 deer/100 mi and 11.6 deer/100 mi, respectively; Table 3, Figure 5A). Regional roadside indices for deer ranged from 7.3 deer/100 mi in the South Central region to 50.8 deer/100 mi in the Northwest region (Table 4).

Mourning Dove

The 2018 range-wide mourning dove index (129.2 doves/100 mi) was 7% lower than 2017 (139.1 doves/100 mi), 30% below the 10-year average (181.1 doves/100 mi), and 52% below the long-term average (264.2 doves/100 mi; Table 3, Figure 5B). Regional indices ranged from 61.8 doves/100 mi in the East Central region to 180.6 doves/100 mi in the Southwest region (Table 4). The best opportunities for harvesting doves should be in the Southwest, South Central, and West Central regions.

Sandhill Crane

The 2018 roadside index of sandhill cranes was 13.4 total cranes/100 mi, an 18% increase from 2017 (11.3 total cranes/100 mi; Table 3). Regional indices ranged from 0.0 total cranes/100 mi in the Southwest region to 38.0 total cranes/100 mi in the Central region (Table 4). The range-wide index of juveniles was 1.3 juvenile cranes/100 mi, which decreased 39% from 2017 (Table 3).

Other Species

Notable incidental sightings recorded by observers included: bobcat (Pope County), Eurasian collared dove (Watonwan County), ground squirrel sp. (Red Lake County), black-billed magpie (Red Lake County), purple martin (Kandiyohi County), Eastern meadowlark (Lincoln County), osprey (Todd County), river otter (Becker County), red-headed woodpecker (Kittson, Mower, and Watonwan Counties), sharp-tailed grouse (Marshall, Polk, and Red Lake Counties), striped skunk (Houston County), upland sandpiper (Murray and Norman Counties), and American woodcock (Nobles County). American kestrel, American crow, Canada goose, coyote, northern harrier, red fox, red-tailed hawk, and wild turkey were noted in multiple counties.

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Literature Cited

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Table 1. Abundance (total acres) and density (acres/mi^2) of undisturbed grassland habitat within Minnesota's pheasant range, 2018, by agricultural region (AGREG).

	Cropland Retirement[a]					Public Lands			% of	Density
AGREG	CRP[b]	CREP	RIM	RIM-WRP	WRP	USFWS[c]	MNDNR[d]	Total	Landscape	ac/mi^2
WC[e]	273,503	37,951	22,928	14,275	20,121	201,358	111,682	681,818	10.0	64.2
SW	114,563	24,784	20,573	2,553	766	24,067	71,955	259,261	6.9	43.9
C	131,043	14,380	39,917	7,026	3,078	91,621	51,378	338,443	5.6	35.8
SC	102,436	27,633	13,585	10,775	8,943	10,875	36,811	211,058	5.2	33.4
SE	69,820	2,702	7,405	1,070	976	36,988	55,619	174,580	4.7	30.1
EC	2,949	0	1,134	0	4	4,994	92,678	101,759	3.2	20.3
Total	694,314	107,450	105,542	35,699	33,887	369,903	420,123	1,766,918	6.4	41.0

[a] Unpublished data, Tabor Hoek, BWSR, 9 August 2018.

[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, 2018.

	Agricultural Region							
	NW	WC	C	EC	SW	SC	SE	STATE
Winter (December 1 - March 31)								
Temperature (average °F)	12.1	16.9	16.9	16.6	18.9	18.6	20.1	16.1
Departure from normal (°F)[a]	-1.6	-1.3	-1.9	-2.4	-2.1	-2.4	-1.6	-2.1
Snow Depth (average inches)	9.6[b]	2.8[b]	3.3[b]	5.9[b]	3.1	3.9[b]	3.1	4.5
Spring (April 1 - May 31)								
Temperature (average °F)	47.1	48.8	48.1	48.1	49.0	49.3	49.8	47.6
Departure from normal (°F)[a]	-1.7	-2.0	-3.0	-2.3	-2.9	-2.9	-2.0	-2.3
Precipitation (total inches)	2.2	2.6	4.0	4.0	6.4	9.1	9.8	5.5
Departure from normal (inches)[a]	-1.0	-1.3	-1.1	-1.0	0.1	1.1[c]	1.2[c]	-0.2
Summer (June 1 - July 31)								
Temperature (average °F)	54.1	57.0	56.3	55.9	58.6	58.3	58.4	55.9
Departure from normal (°F)	0.8	1.0	0.0	0.2	1.2	0.5	1.0	0.5
Precipitation (total inches)	7.6	11.5	10.3	10.4	15.0	13.1	10.4	11.0
Departure from normal (inches)[a]	-0.3	1.0	0.2	0.1	2.0[c]	0.6	-0.3	0.3

[a] Departures calculated using 30-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, 1955-2018.

Species	Change from 2017[a]					Change from 10-year average[b]				Change from long-term average (LTA)[c]			
Subgroup	*n*	2017	2018	%	95% CI	*n*	2008-2017	%	95% CI	*n*	LTA	%	95% CI
Ring-necked pheasant													
Total pheasants	151	38.2	45.5	19	±25	148	44.7	2	±16.2	149	93.7	-52	±10
Cocks	151	6.4	6.5	1	±22	148	6.4	1	±15	149	10.7	-40	±13
Hens	151	5.8	7.6	31	±30	148	6.9	10	±18	149	13.6	-45	±12
Broods	151	5.7	7.3	28	±26	148	6.9	5	±17	149	12.4	-42	±12
Chicks per brood[d]	277	4.5	4.3	-5			4.6	-7			5.4	-20	
Broods per 100 hens	151	98.6	96.5	-2			100.2	-4			101.5	-5	
Median hatch date[d]	277	8 June	14 June				12 June						
Gray partridge	170	1.3	1.3	0	±114	167	2.7	-50	±50	149	14.4	-93	±16
Eastern cottontail	170	7.5	5.8	-23	±20	167	5.3	13	±24	149	6.6	0	±23
White-tailed jackrabbit	170	0.0	0.1	100	±280	167	0.2	-37	±78	149	1.6	-95	±15
White-tailed deer	170	26.7	23.1	-13	±17	167	19.4	19	±18	168	11.6	99	±32
Mourning dove	170	139.1	129.2	-7	±20	167	181.1	-30	±12	149	264.2	-52	±8
Sandhill crane[e]													
Total cranes	170	11.3	13.4	18	±61								
Juveniles	170	2.2	1.3	-39	±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 1955-2017, except for deer (1974-2017). 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 2018.
[e] 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, 1955-2018.

Region	Change from 2017[a]				Change from 10-year average[b]				Change from long-term average (LTA)[c]			
Species	*n*	2017	2018	%	95% CI	*n*	2008-2017	%	95% CI	*n*	LTA	%	95% CI
Northwest[d]													
Gray partridge	19	0.0	3.8			19	0.5	723	±1745	19	3.0	25	±244
Eastern cottontail	19	1.3	0.6	-49	±180	19	0.7	-3	±170	19	0.9	-24	±136
White-tailed jackrabbit	19	0.2	0.2	0	±305	19	0.2	-12	±187	19	0.6	-64	±83
White-tailed deer	19	55.2	50.8	-8	±39	19	46.5	9	±43	19	33.4	52	±53
Mourning dove	19	114.7	120.0	5	±59.3	19	89.2	35	±53	19	118.2	2	±43
Sandhill crane[e]	19	35.6	24.3	-32	±45								
West Central[f]													
Ring-necked pheasant	39	43.2	65.1	51	±62	35	50.2	37	±32	37	95.0	-32	±22
Gray partridge	39	0.0	0.1			35	0.6	-100	±101	37	9.1	-99	±21
Eastern cottontail	39	4.3	2.5	-43	±50	35	2.5	-10	±49	37	3.9	-45	±32
White-tailed jackrabbit	39	0.0	0.2			35	0.1	62	±345	37	2.1	-90	±30
White-tailed deer	39	26.7	29.2	9	±45	35	20.4	50	±44	37	11.2	161	±98
Mourning dove	39	162.1	162.4	0	±31.8	35	227.8	-32	±21	37	360.2	-55	±16
Sandhill crane[e]	39	3.3	3.4	3	±72								
Central													
Ring-necked pheasant	30	24.7	48.1	95	±76	30	38.5	25	±36	29	70.4	-31	±22
Gray partridge	30	0.5	0.7	25	±187	30	1.2	-44	±79	29	8.9	-92	±44
Eastern cottontail	30	7.2	7.2	0	±57	30	4.5	59	±69	29	6.2	21	±49
White-tailed jackrabbit	30	0.0	0.0			30	0.1	-100	±113	29	1.1	-100	±22
White-tailed deer	30	33.2	13.9	-58	±29	30	15.6	-11	±37	29	6.9	100	±104
Mourning dove	30	144.0	103.5	-28	±45	30	166.9	-38	±28	29	225.9	-58	±14
Sandhill crane[e]	30	16.1	38.0	136	±221								
East Central													
Ring-necked pheasant	12	21.3	23.9	12	±58	12	45.8	-48	±34	12	84.3	-72	±24
Gray partridge	12	1.3	0.7	-50	±255	12	0.2	300	±870	12	0.2	325	±826
Eastern cottontail	12	22.3	12.9	-42	±49	12	10.8	20	±85	12	8.6	50	±88
White-tailed jackrabbit	12	0.0	0.0			12	0.0			12	0.2	-100	±65
White-tailed deer	12	24.7	26.9	9	±42	12	20.6	30	±61	12	11.0	145	±100
Mourning dove	12	56.6	61.8	9	±42	12	83.4	-26	±25	12	116.4	-47	±28
Sandhill crane[e]	12	50.0	34.6	-31	±81								

Table 4. Continued.

Region / Species	Change from 2017[a]				Change from 10-year average[b]				Change from long-term average (LTA)[c]			
	n	2017	2018	%	95% CI	*n*	2008-2017	%	95% CI	*n*	LTA	%	95% CI
Southwest													
Ring-necked pheasant	19	51.7	54.1	5	±57	19	78.7	-31	±34	19	112.5	-52	±21
Gray partridge	19	5.1	3.2	-38	±154	19	6.7	-53	±72	19	38.1	-92	±19
Eastern cottontail	19	5.1	3.8	-25	±78	19	5.6	-32	±50	19	7.9	-52	±40
White-tailed jackrabbit	19	0.2	0.2	0	±305	19	0.5	-58	±76	19	3.5	-94	±26
White-tailed deer	19	16.6	17.3	4	±55	19	19.4	-11	±33	19	10.4	67	±66
Mourning dove	19	165.9	180.6	9	±37	19	253.3	-29	±22	19	305.2	-41	±22
Sandhill crane[e]	19	0.0	0.0										
South Central													
Ring-necked pheasant	32	54.6	35.1	-36	±33	32	44.4	-21	±36	32	121.9	-71	±18
Gray partridge	32	0.9	0.3	-71	±104	32	5.3	-95	±63	32	17.6	-99	±21
Eastern cottontail	32	9.1	6.0	-34	±33	32	7.8	-23	±26	32	7.7	-22	±30
White-tailed jackrabbit	32	0.0	0.0			32	0.1	-100	±67	32	1.6	-100	±25
White-tailed deer	32	10.7	7.3	-33	±43	32	6.7	8	±42	32	4.1	77	±70
Mourning dove	32	167.1	128.6	-23	±70	32	235.1	-45	±35	32	253.0	-49	±12
Sandhill crane[e]	32	1.0	3.5	250	±339								
Southeast													
Ring-necked pheasant	19	19.2	23.6	23	±79	20	12.3	82	±115	20	67.4	-67	±37
Gray partridge	19	3.8	2.9	-22	±240	20	4.2	-34	±113	20	13.0	-79	±46
Eastern cottontail	19	11.3	12.8	14	±58	20	7.9	69	±86	20	7.9	70	±98
White-tailed jackrabbit	19	0.0	0.0			20	0.0			20	0.6	-100	±42
White-tailed deer	19	25.8	27.8	8	±58	20	17.0	55	±62	20	11.5	129	±99
Mourning dove	19	86.9	102.6	18	±28	20	112.0	-13	±22	20	210.0	-53	±22
Sandhill crane[e]	19	0.0	0.6										

[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 1955-2017, except for Northwest region (1982-2017) and white-tailed deer (1974-2017). Estimates based on routes (*n*) surveyed ≥40 years (1955-2017), 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.

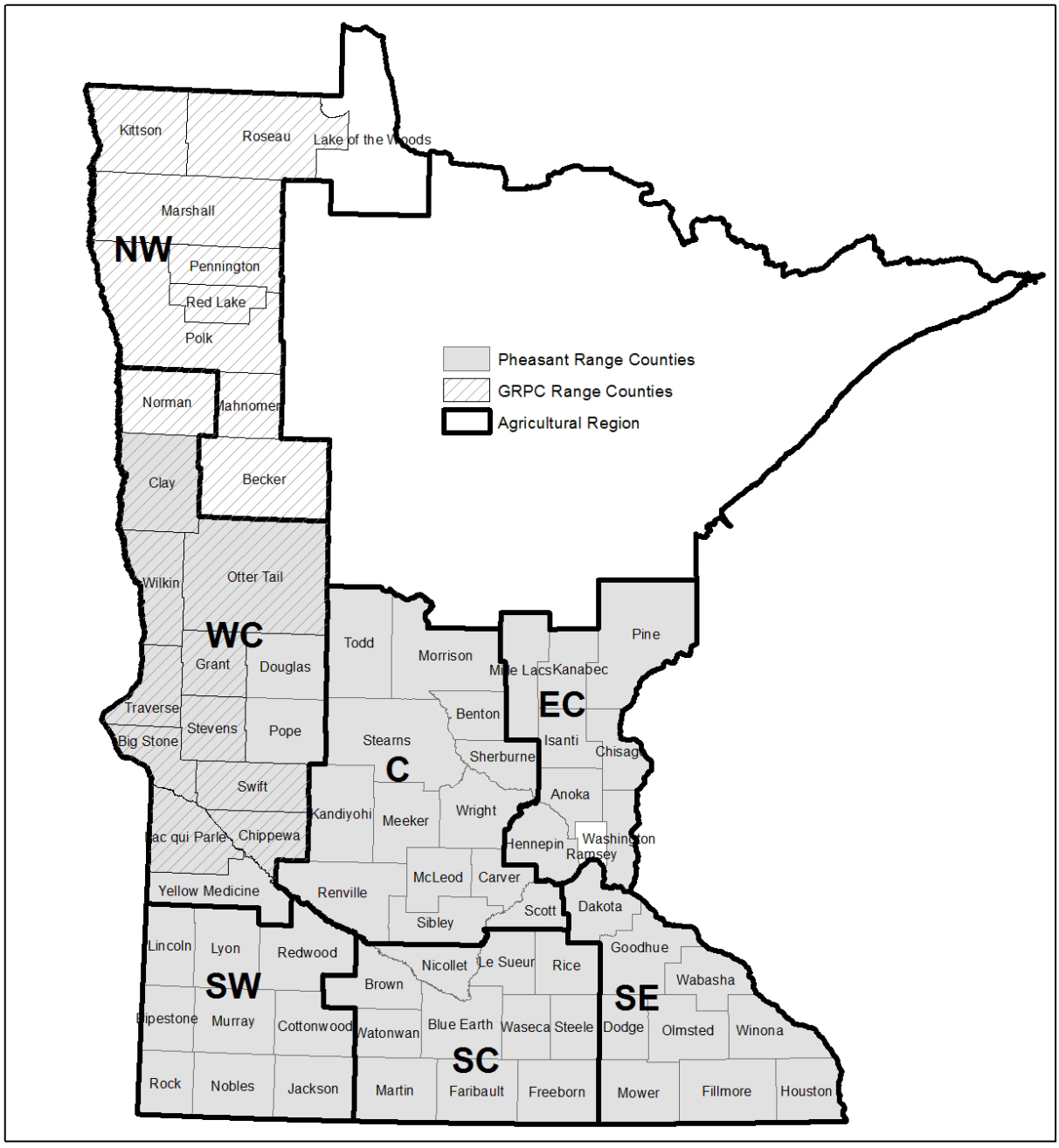

Figure 1. Survey regions and ring-necked pheasant range delineation for Minnesota's August roadside survey, 2018. The greater prairie-chicken range delineation is also shown.

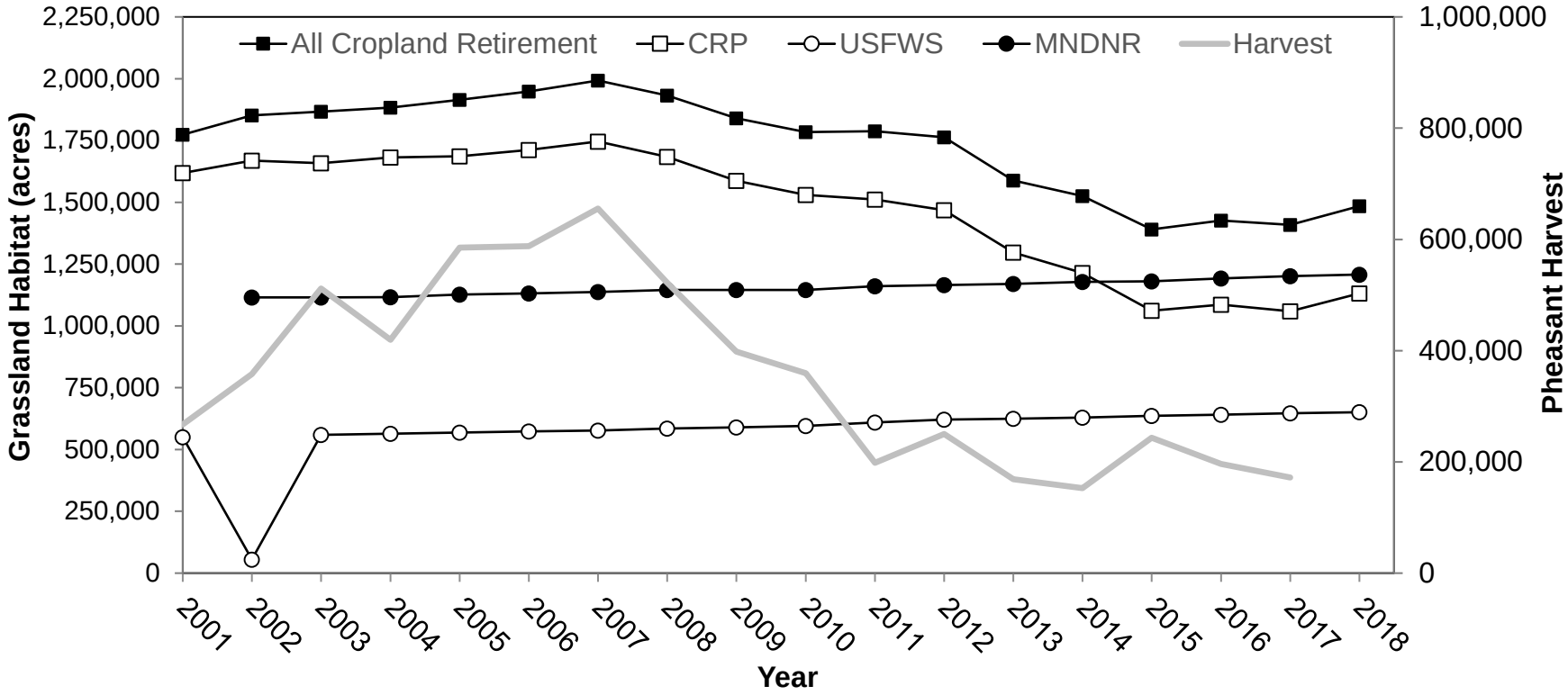

Figure 2. Acres enrolled in private (black lines with open and solid squares) and public (black lines with open and solid circles) land habitat conservation programs vs. ring-necked pheasant harvest trends (gray line with no markers) in Minnesota, 2001-2018. Acres represent STATEWIDE totals. All cropland retirement includes Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), Reinvest in Minnesota (RIM), Wetlands Reserve Program (WRP), and RIM-WRP.

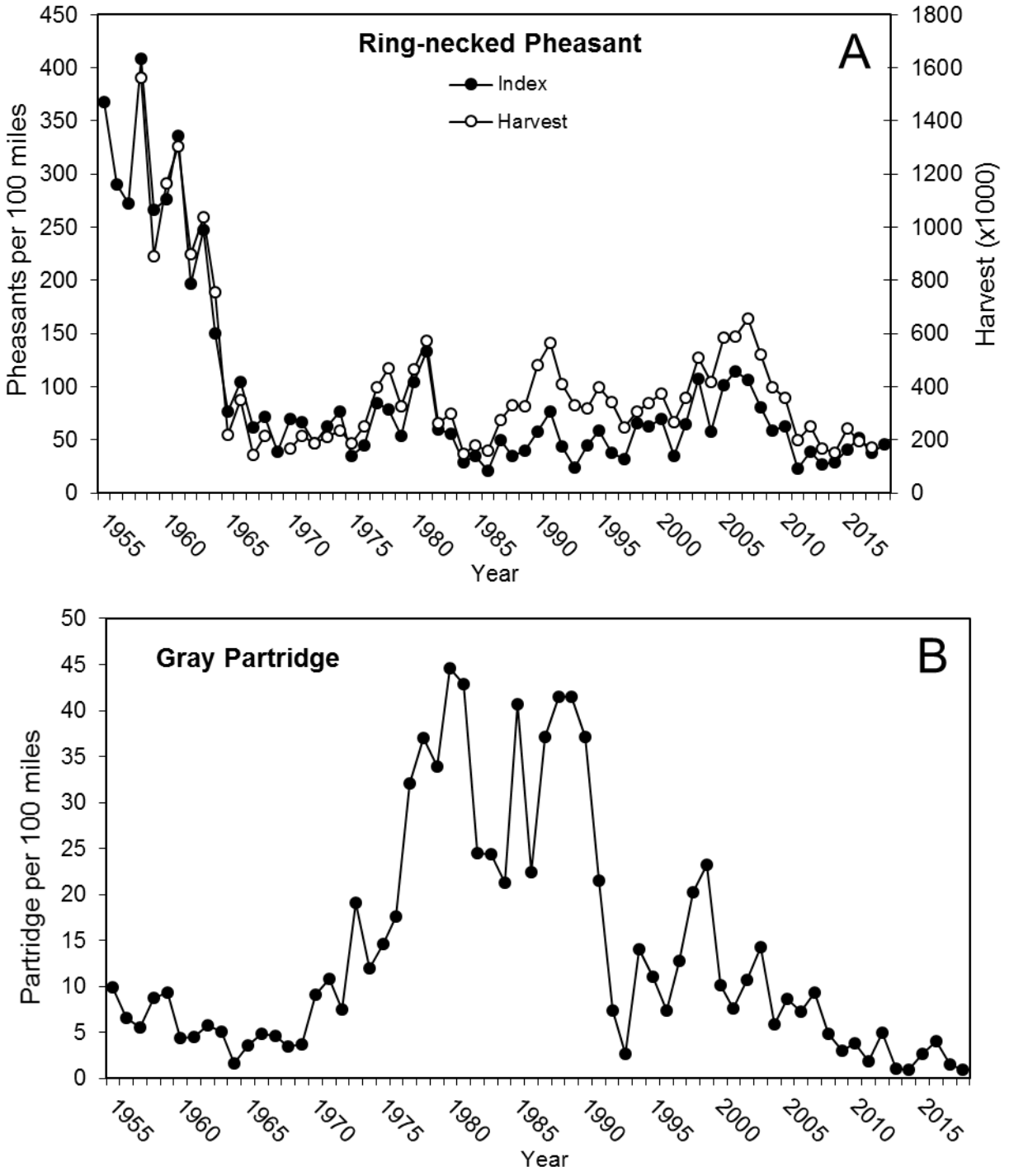

Figure 3. Range-wide index of ring-necked pheasants (A) and gray partridge (B) seen per 100 miles driven in Minnesota, 1955-2018. Does not include the Northwest region. Based on all survey routes completed.

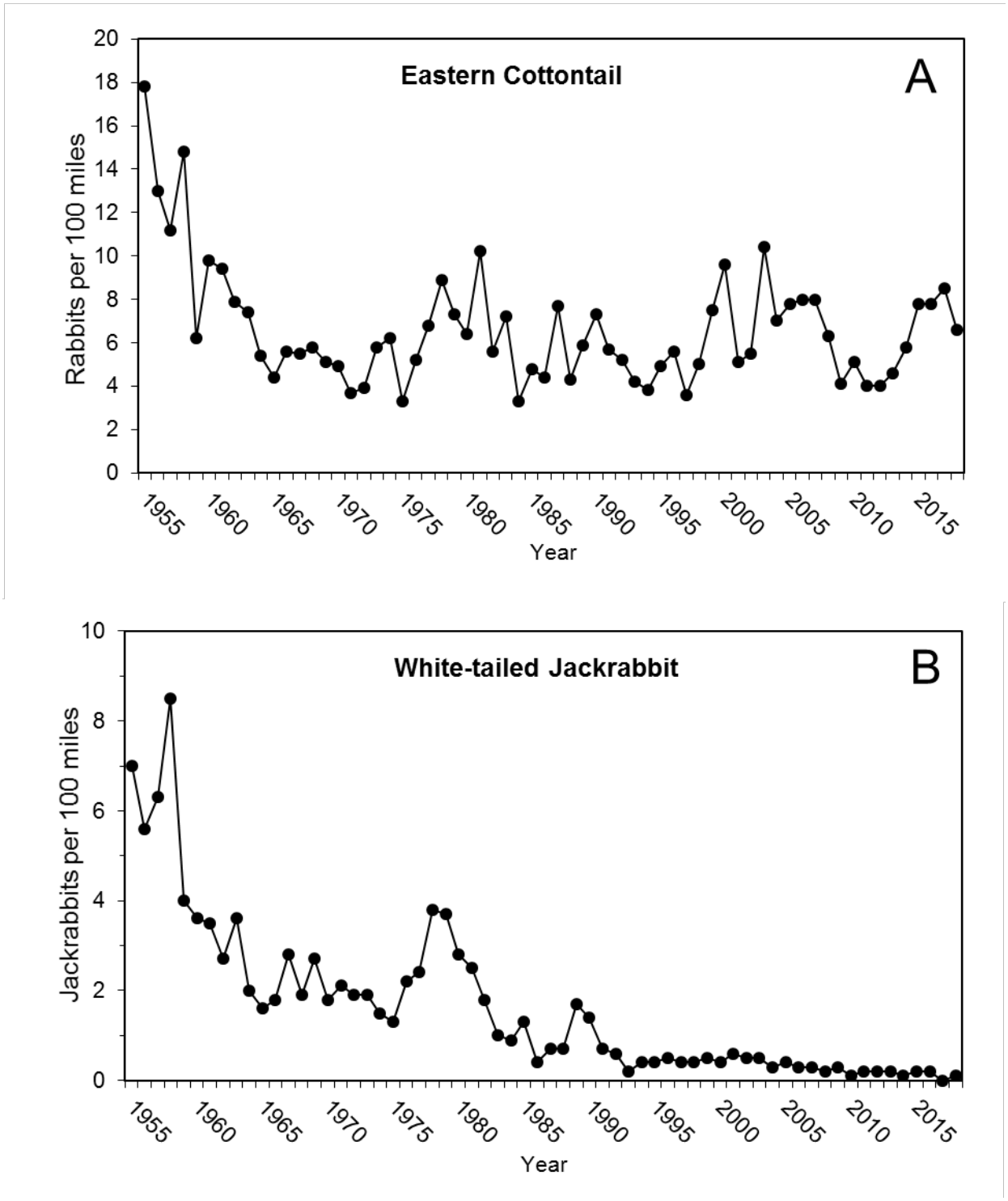

Figure 4. Range-wide index of eastern cottontail (A) and white-tailed jackrabbits (B) seen per 100 miles driven in Minnesota, 1955-2018. Does not include the Northwest region. Based on all survey routes completed.

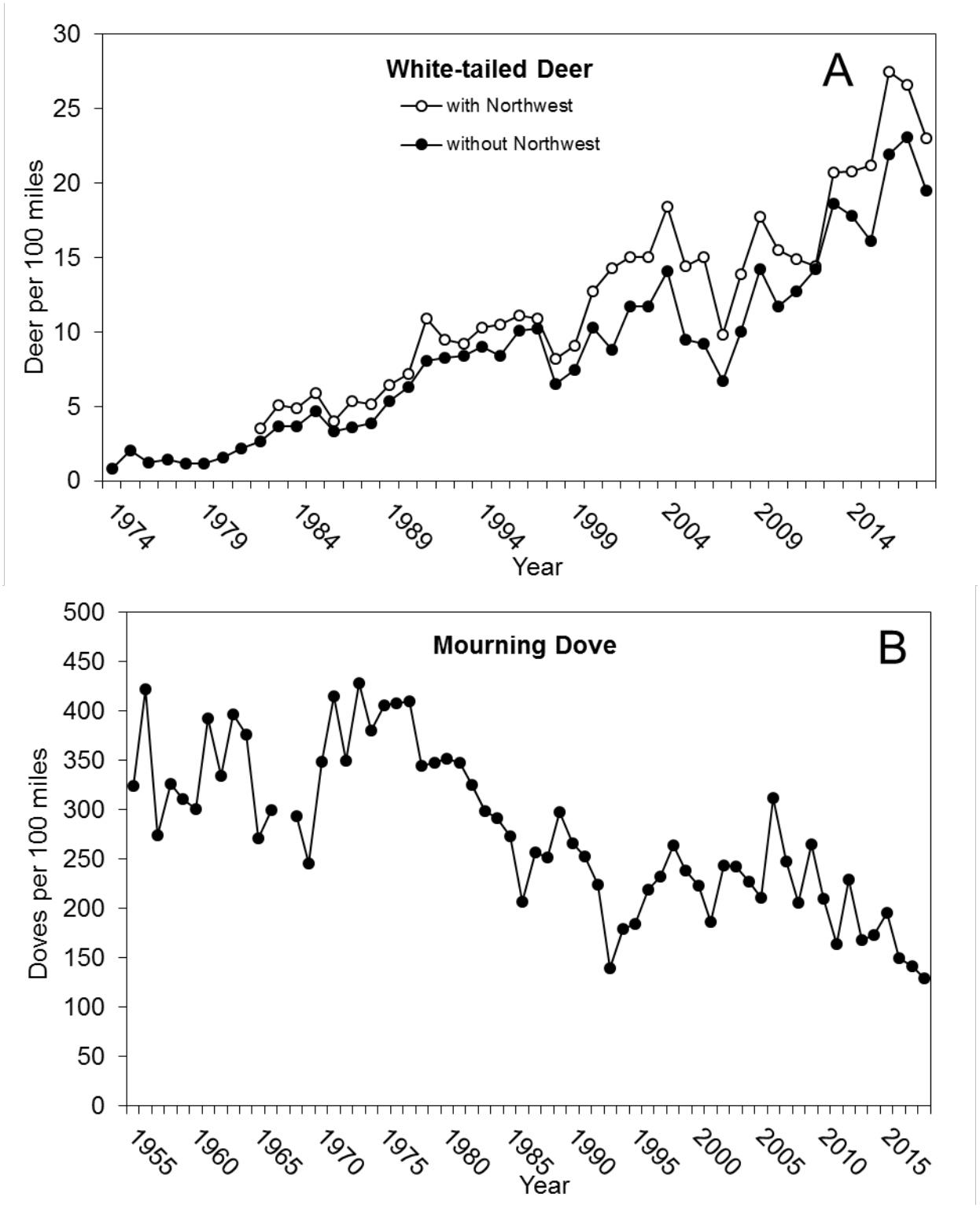

Figure 5. Range-wide index of: (A) white-tailed deer seen per 100 miles driven in Minnesota, 1974-2018, with and without the Northwest region included; and (B) mourning doves seen per 100 miles driven in Minnesota, 1955-2018. Doves were not counted in 1967 and the dove index does not include the Northwest region. Based on all survey routes completed.