NOTES

TRENDS IN A GREATER PRAIRIE CHICKEN POPULATION ESTABLISHED BY TRANSLOCATION IN NORTH DAKOTA —In 1992, an effort was undertaken by the North Dakota Game and Fish Department (NDGFD), U.S. Fish and Wildlife Service, and North Dakota Chapter of the Wildlife Society to reestablish a viable population of greater prairie chickens (*Tympanuchus cupido pinnatus*; hereafter prairie chickens) in northeast North Dakota. The release area was centered on the Prairie Chicken Wildlife Management Area located 22.5 km northwest of Grand Forks, North Dakota, in the northern part of Grand Forks County. Topography consists of poorly drained, saline flats and swells separated by poorly drained swales and sloughs in the Red River Valley (Beringer 1995). Permanent grasslands in the release area at the time of the first translocations in 1992 were wildlife areas managed by the state of North Dakota (1,908 ha) and federally owned waterfowl production areas and Kellys Slough National Wildlife Refuge (3,106 ha). Within 9.6 km of the release sites, there were approximately 14,000 ha of grasslands on private lands enrolled in the Conservation Reserve Program (CRP) (Beringer 1995, Kobriger 1999).

The release area had populations of both prairie chickens and sharp-tailed grouse (*Tympanuchus phasianellus*; hereafter sharp-tails) in the past. NDGFD census data that began in 1954 showed that prairie chickens disappeared in 1980. Sharp-tails peaked in 1981 at 118 males but were down to four by 1989, and none were observed in 1992 (Beringer 1995, Kobriger 1999). Since the 1980's, grassland cover in the area increased through state and federal acquisition and the CRP. Management activity (tree removal, prescribed burning, and brush control) on the state and federal lands also increased. A viable prairie chicken population exists 50 to 70 km away in northwest Minnesota. These factors, and a past history of prairie chickens inhabiting the area made this a viable site to reestablish a breeding population of prairie chickens (Kobriger 1999).

Three hundred sixty prairie chickens were translocated to the release area between 1992 and 1998 (Beringer 1995, Svedarsky et al. 1997, Kobriger 1999, Toepfer 2003) (Fig. 1). Between 1992 and 1995, birds were trapped on booming grounds (prairie chicken leks) in northwest Minnesota during spring (April and May) with walk-in traps (Toepfer et al. 1988), radio-marked, and released at the capture site. Birds were recaptured in summer (late July and August) by night lighting, radios replaced, and transported by vehicle to the release area in North Dakota. Sex ratio of released birds was about equal and most of the females were documented by telemetry to have lost nests or broods. Two hens with broods of three were translocated with the brood. These summer-released birds stayed in the desired area and established booming grounds the following spring near the release sites. In 1996, birds came from both Minnesota and South Dakota (Crow Creek Indian Reservation and Ft. Pierre National Grassland). These birds were also captured in spring, radio-marked, and later recaptured and translocated in summer except four males that were translocated in spring. In 1997 and 1998, birds were obtained from the Sandhills area near Burwell, Nebraska. These birds were captured in spring on booming grounds and translocated immediately to the North Dakota release area to bolster populations on the newly established booming grounds.

An annual census of prairie grouse in the release area was conducted by making booming and dancing ground (sharp-tail lek) surveys following procedures established by Hamerstrom and Hamerstrom (1973) and NDGFD protocols. Spotting scopes and binoculars were used to count and sex birds on leks. Due to the flat terrain and tall grass, many of the leks were not reliably counted unless birds were flushed. Prior to making a flush count, male activity was assessed for the presence of females. Flush counts were conducted later in the morning when males were not active or whooping to avoid the presence of females. Birds that flushed from a greater distance well ahead of the main flush of birds were considered females. Booming grounds were located by listening at stops 1.6 to 3.2 km apart on section line roads and trails. Dancing grounds were located incidental to searching for booming grounds or by listening in areas where sharp-tails had been observed. A systematic search for dancing grounds with listening stops 0.8 to 1.6 km apart was not conducted and dancing grounds may have been missed.

The population peak for prairie chickens was 330 males in 2004 (Fig. 1). During this peak time period, prairie chickens occupied at least 3.5 to 4 townships (32,635 to 37,297 ha) and covered an area 32 km north to south and approximatley13 km east to west. After the peak in 2004, a precipitous decline began; by 2018 only one booming ground with nine prairie chicken males was observed on Kellys Slough National Wildlife Refuge and four single prairie chicken males were observed with sharp-tails on dancing grounds. Numbers of sharp-tails naturally increased in the area and the population peak was 309 males in 2008 (Fig. 1). Sharp-tails declined after 2010 but not as dramatically as prairie chickens; in 2018 173 males were observed.

The reason for the steep decline in prairie chickens is not readily apparent. Private lands enrolled in CRP in Grand Forks County reached a peak in 2007 (U.S. Department of Agriculture-Farm Services Agency, Grand Forks County Office) and have gradually declined since (Fig. 1). The prairie

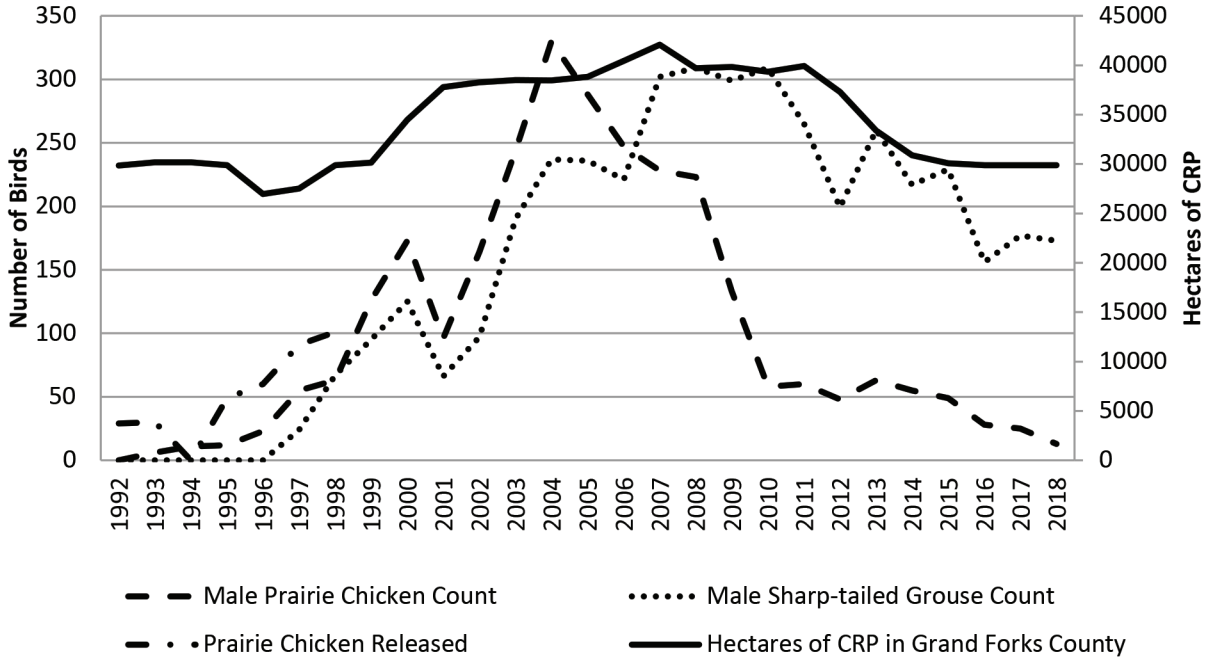

Figure 1. Trends in numbers of male greater prairie chickens and male sharp-tailed grouse counted on the Prairie Chicken Wildlife Management Area and surrounding area of Grand Forks County, North Dakota, USA; number of greater prairie chickens translocated to the Prairie Chicken Wildlife Management Area; and hectares of grassland on private lands enrolled in the Conservation Reserve Program (CRP) in Grand Forks County, North Dakota, 1992–2018.

chicken population decline began before the decrease in CRP grasslands and continued to decline at a much faster rate than the hectares of private lands enrolled in CRP (Fig. 1). In contrast, trends in the sharp-tail population closely followed the amount of grass in CRP.

Weather variables generally affect prairie chicken and sharp-tail production similarly (Flanders-Wanner et al. 2004) and probably do not account for the difference in population trends observed. Winter weather may affect adult survival differently between the species. Snow cover can limit access to the corn, soybeans, and grains that make up most of the winter prairie chicken diet in the northern states and has less effect on the availability of shrub and tree buds that comprise the winter diet of sharp-tails (Johnson et al. 2020). Differences in how the two species deal with winter could be a factor in the observed population trends.

The number of crowing and observed male ring-necked pheasants (*Phasianus colchicus*) was recorded while conducting the prairie grouse census. There were never more than five males heard and or observed in any year. At this low density, we do not believe competition from ring-necked pheasants was an issue in this area as reported in other places with high densities of ring-necked pheasants (Vance and Westemeier 1979, Kimmel 1988, Westemeier et al. 1998, Toepfer 2003).

There were several instances where a dancing ground became established within 100 to 500 m of a booming ground. After the prairie chicken population peaked in 2005, the number of prairie chicken males on the booming ground would diminish to zero over a 3–4 year period. The sharp-tail dancing ground was maintained or sometimes the dancing ground moved to the location of the original booming ground. An example of each is presented in Table 1. Direct confrontation between males of the two species was occasionally observed on leks, but it is unknown if inter-specific competition occurred between females for nesting territories. Hybrid males between prairie chickens and sharp-tails were observed on leks in eight of the years beginning in 2005. The most hybrids observed in one year was three. More hybrids may have been present, but most of the leks in this area do not lend themselves to the close observation required to differentiate hybrids. Hybrids have been documented since the late 1800s where sharp-tails and prairie chickens overlap (Johnsgard and Wood 1968) but are thought to have been rare prior to the expansion of prairie chickens following European settlement. Johnsgard and Wood (1968) stated that sharp-tails are the intruder species onto prairie chicken booming grounds more frequently than the reverse. While the possibility of sharp-tails dominating and causing prairie chicken populations to decline in marginal range for prairie chickens has been informally discussed, there is a lack of documentation of the mechanism or "quantification of the

Table 1. Number of male greater prairie chicken (PC) and male sharp-tailed grouse (ST) observed on leks of different species in close proximity to each other. Mekinock booming ground and dancing ground are approximately 100 m apart. Tire booming ground and Stewart dancing ground are approximately 450 m apart.

	Mekinock booming ground		Mekinock dancing ground		Tire booming ground		Stewart dancing ground	
Year	PC	ST	PC	ST	PC	ST	PC	ST
2004	11	0	0	22	26	0	0	20
2005	5	0	0	16	21	0	0	15
2006	2	0	0	16	2	0	0	8
2007	0	0	0	8	4	0	0	12
2008	0	0	0	22	10	0	0	14
2009	0	0	1	24	5	0	0	17
2010	0	0	1	35	0	4	0	9
2011	0	0	0	25	0	12	0	0

degree of hybridization and the potential loss of fitness with the breakdown of reproductive isolation between the species" (Johnson et al. 2020). Augustine and Trauba (2015) looked at hybridization in a prairie chicken population in west-central Minnesota that was established by translocation. They found that the only mechanism acting to keep the species reproductively isolated was behavioral differences; however, there was 8% incidence of hybrids in the population they examined and they did observe one backcross. Toepfer (pers. obs.) documented radio-marked hybrid and backcross hens successfully fledging broods. We offer our hybridization and observations of the take-over by dancing grounds as a plausible factor in this prairie chicken decline that should be examined in future studies where the two species overlap.

Although disputed by Ross et al. (2006) based on DNA analysis, prairie chickens were not considered indigenous to North Dakota prior to European settlement based on accounts of early explorers and settlers (Johnsgard and Wood 1968, Johnson and Knue 1989, Kobriger 1999, Houston 2002). Houston (2002) does present one account of several chickens killed by David Douglas in 1827 between Pembina and the Red River, which is northeast of our study area. Johnson et al. (2020) acknowledge Ross et al.'s (2006) assertion that prairie chicken range extended across pre-settlement North Dakota but also state that it is unknown if the prairie chickens were restricted by sharp-tails in this northern range. If prairie chickens were found in North Dakota prior to European settlement, it likely was at very low densities. Prairie chickens have been maintaining booming grounds 70 km east of the study area in Minnesota (personal observations, 2005, 2013). However, these booming grounds represent the northern limit of the larger extant prairie chicken population in Minnesota

(Svedarsky et al. 1997) and, other than a few individuals (personal observations and personal communications with Minnesota Department of Natural Resource personnel), have not extended further north into what is considered primary sharp-tail range (Berg 1997). The factors that limited prairie chickens in North Dakota prior to European settlement might still be at work, and additional translocation efforts should be carefully considered. Funding for the census was provided by the NDGFD and Society of Tympanuchus Cupido Pinnatus, Ltd. We thank J. Kobriger, S. Kohn, and A. Robinson with the NDGFD for their support and coordination. We thank P. Beringer for helping with the census and field work during the first years of the translocation project.—*Gary Huschle, retired Fish and Wildlife Service, Leonard, Minnesota, USA 56652; John E. Toepfer (Deceased, 7 September 1948–11 October 2018). Corresponding author's email address: honkerharmony@gvtel.com.*

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