

## Declining Waterfowl Usage of DeSoto National Wildlife Refuge as a Fall Migratory Stopover: Influencing Factors.

Waterfowl migratory patterns have been cyclical and evolving as a response to changes in foraging habitat not only in migratory pathways but throughout their life cycle. As a result geese and ducks have evolved differing strategies to cope with change in the environment.

### *Snow Geese*

For the Interior Lesser Snow Goose, that utilizes the central flyway, changes in agricultural practices stimulated a massive increase in the population. During the 1970-80s, the collapse of the cotton industry created a need for a replacement crops in Missouri, Arkansas and Louisiana. Rice and the expansion of the Corn Belt into these areas made energy rich forage available during winter. (Bellrose 1976, Alisauskas 1988, Krapu 1992) Snow geese responded by splintering from the wintering population in the marshlands of Louisiana and Texas and establishing wintering colonies to take advantage of the rice and corn fields now available (Klaas pers. comm., Alisauskas 1998). On an energetics level, the advantages were two-fold, Less energy reserves were needed for fall migration because the distance traveled was lessened, and it required less energy expended during winter to forage for cereal grains than foraging for tubers in the coastal marshlands. The result was increased winter survival and higher fat reserves for the spring migration. Concurrently the corn-belt was expanding into higher latitudes, the Dakotas and prairie Manitoba and Saskatchewan, because of higher corn prices and better seed requiring shorter growing seasons (Urban Lehner pers. comm.). Initially this aided the population by making the flock more vigorous upon arrival at the breeding grounds. As a result, the start of population growth coincided with the beginning of regular overwintering at higher latitudes (Bellrose 1976). Being colonial nesters, as the flock became denser, foraging pressures on fragile arctic and sub arctic tundra increased decimating the plant community that may take decades to recover. Gosling growth, size and survival rates decreased (Abrahams et. al. 2005) resulting in an increased adult to juvenile ratio in the flock over time. The flock that stops over in DeSoto NWR during the fall has nested along the west shores of Hudson Bay, specifically the La Perouse and McConnell region. (neck collar recoveries, Mindy Sheets pers. comm.) Snow Geese maintain flock fidelity throughout the migratory cycle. As a consequence, as the traditional foraging grounds became uninhabitable, the nesters relocate to the edges pioneering new territory and presumably merging with other flocks, in this case the Queen Maud Gulf colony (Abraham, et. al. 2005).

Lesser Snow Goose fall migration patterns have been altered for the same reasons as the explosion in population and in spring migration. Lesser Snow Geese are staging at higher latitudes and staying for longer periods (Klaas pers. comm., Vrtiska pers. comm., Schultz pers. comm.). The expansion of the corn belt into North Dakota, and to a lesser extent into prairie Manitoba, provides the earliest access to high energy fuel for migration. A change in the migration timing also occurred. Snow Geese numbers would peak at DeSoto NWR in October in the 70s but by the mid 80s the peak came in mid November.

(Klaas pers. comm.). Presumably, they are staging longer at higher latitudes to take advantage of the corn harvest. By remaining at northern latitudes longer their stay is only limited by access to forage, i.e. snow cover (Klaas pers. comm.). The advantages are that they shorten the time needed to migrate and migrate in larger flocks thereby lessening predation. By acquiring the necessary fat reserves at higher latitudes they make fewer stopovers on the way to the wintering grounds. Additionally, later migration stimulated by the onset of winter weather forces the Snow Geese to move longer distances southward to find forage. Taken by itself, this would seem to be a strong reason for Snow Geese to be flying over DeSoto NWR. However the timing is wrong. In this scenario taken alone declining stopovers should have begun in the 1980s not in 2003. Other variables are at work. A comparison of Sand Lake NWR and DeSoto's peak fall Snow Goose counts demonstrates possible cyclical variability in their migration patterns. From 1992-1999, Sand Lake fall usage declined while DeSoto's was at an all time high. Conversely, from 1999- 2008 Sand Lake usage numbers made a comeback while DeSoto's usage became practically nonexistent. Further Bill Schultz, the biologist at Sand Lake, stated that this pattern extended to North Dakota and Canada stopovers as well (Bill Schultz pers. comm.). Supporting information comes from a hawk migration monitoring station fifteen miles down river from DeSoto NWR. Since 1998, the station has been monitoring the waterfowl that flies down the valley from 1 September to 20 December every day. Flights of Snow Geese down the valley were consistent with recorded goose counts at DeSoto before 2002. After 2002, 300-500,000 snow geese were recorded migrating in the valley in 2003, 2006, and 2008 even though they didn't stop at the refuge (the author, pers. experience). Clearly, not all of the migration occurs in the daytime or conversely a strictly nighttime migration seems unlikely in the off years. Even though this may be the flock that traditionally stops at Squaw Creek NWR (Queen Maud Gulf flock) but not at DeSoto it demonstrates migration routes can change cyclically sometimes annually. Erv Klaas found this evidence "encouraging" (pers. comm.). If the Snow Geese that stopover at DeSoto are not coming down the Missouri River valley then what route are they taking? Merging of nesting colonies due to expansion could induce longitudinal shifts in migratory route behavior (Klaas pers. comm.). The mostly likely scenario is that the La Peruse flock has shifted westward migrating primarily through central Nebraska (Mark Vrtiska, Guy Zenner, pers. comm.). This has not been adequately documented since, like DeSoto NWR, Snow Geese have been seen flying in numbers over the Rainwater Basin in the fall but not stopping in the basin this decade (Vrtiska pers. comm.).

The higher ratio of adults in the flock in recent years affects the foraging habits of the flock (Hutto 1998, Yong et. al. 1998). Experienced adults have a more efficient foraging strategy thus they are more likely to avoid marginal areas that afford more risk (risk-averse strategy, Klaas, pers. comm.). On the refuge level, during the same period that Snow Goose visitation declined and collapsed, the acreage of grain available for forage on the refuge declined from 2180 acres in 1997 to 1516 acres in 2005 ( DeSoto NWR Annual Narrative Reports). However, an energetics study in the 70s concluded that even though fuel, in the form of corn, was plentiful on the refuge, the geese did not put on much weight during the stopover because it was not needed to complete migration (Klaas pers. comm.). Concurrently, the farming practices surrounding the refuge regularly

disked their fields after harvest forcing Snow Geese to forage at a distance from the refuge (Mindy Sheets pers. comm.). Additionally, Snow Goose numbers using the refuge peaked in the mid to late 1990s (1994 802K, 1996 610K, 1998 630K) respectively before dropping to low usage from 2003 to the present. On a regional level, in the last decade, the only other wetland complex large enough to accommodate a large flock of Snow Geese along the Missouri River corridor between South Dakota and Squaw Creek NWR has discontinued management for Snow Geese in favor of ducks (Carl Priebe pers. comm.). The Riverton/ Forney's WMAs changed management practice is perhaps reinforcing the marginality of future usage of the corridor by Snow Geese.

In summary, the decline of Lesser Snow Geese stopping over at DeSoto seems to be in response to changing habitat conditions originating on the wintering grounds and extending throughout the annual breeding cycle. A myriad of interrelated variables are influencing flock behavior on refuge, regional and flyway scales. Most of the variables are beyond the management influence of DeSoto NWR. Because of the highly adaptable nature of Snow Geese to changes in the environment and that there is some indication that their migratory trends are cyclical, there may come a time when, once again, Snow Geese may whiten the lake at DeSoto National Wildlife Refuge.

### ***Ducks***

Duck species, particularly Mallards, also declined during the same period at DeSoto NWR in the fall. The decline was more gradual and variable. Like the Snow Geese, they came later and stayed for shorter periods (DeSoto waterfowl counts). Mallards do not exhibit flock cohesiveness like Snow Geese. Their individual movement is more random. They flock in migration but are not colonial nesters; therefore individuals within a migratory flock can come from a wide array of geographical breeding locations. Thus, an individual in migration responds to changes in habitat as needed. For example, in a dry fall, the ducks may be concentrated at a few locations where there is ample water. In wet years, they may be spread out in smaller pools over a wide area. Therefore, understanding the decline of duck usage at a specific locale is difficult to quantify.

Is the decline in usage due to a decline in the midcontinent duck population? Apparently not. The midcontinent duck population seems to be stable although it was suggested that waterfowl survey techniques have improved in recent decades and that a decline in population may not be reflected (Mark Vrtiska pers. comm.). The prairie pothole region of the Dakotas has been wet for an unusually long period (Bill Schultz pers. comm.) and numbers are up there. Mallard recoveries from the Rainwater Basin also seem to be stable and there have not been any significant changes in the past decade (Mark Vrtiska pers. comm.). Perhaps there has been a shift in the migratory pattern. Duck usage at eastern and north-central Iowa management areas seems to have declined despite improved management practices (Guy Zenner pers. comm.). Duck usage at Riverton WMA, down river from DeSoto, is up, but this probably due, at least in part, to management changes favoring ducks (Carl Priebe pers. comm.). Guy Zenner suggests that the expansion of the corn-belt into the Dakotas and prairie Manitoba is affecting Mallards in much the same way as it has affected Snow Geese. They are shifting westward away from Iowa and

staying longer at northern latitudes resulting in a greater likelihood of overflying at winter freeze-up and a longitudinal shift westward. There had been dry conditions along the Missouri River corridor in recent years up to 2008 marginalizing the available habitat; however, access to wetlands on the refuge has improved during the same period (Mindy Sheets pers. comm.). The effect could be less ducks using the Missouri River valley corridor.

On the refuge level, human disturbance while the ducks are loafing on the lake may be a factor. In 2002, the gravel road of Center Island was opened to the public during fall migration. Ducks have long favored this associated portion of the lake for loafing and the largest concentrations were usually found there. The result was the public had ready access to the loafing area. A study of human disturbance to diving ducks along the Mississippi River found that in a pool where disturbance was intense, the diving ducks left at sunrise and returned at dusk, whereas in a pool without disturbance the divers loafed all day (Thornburg 1973). Another study at Back Bay NWR (Pease 2005) looked at different forms of disturbance and the proximity of disturbance to seven species of ducks. They found that in the 50-100 meter range 40% of the ducks would fly and even up to 300 meters away from the disturbance they would swim away. Not surprisingly, pedestrians elicited the strongest response, vehicles less so.

### *Literature reviewed in the making of this report*

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### *Knowledgeable Interviewees*

Erv Klaas, professor emeritus, Iowa State University  
Urban Lehner, Editor-DTN Agriculture News Service  
Carl Priebe, manager, Riverton WMA  
Bill Schultz, biologist, Sand Lake NWR  
Mindy Sheets, Biologist, DeSoto NWR  
Mark Vrtiska, Waterfowl specialist Nebraska Game and Parks  
Guy Zenner, Waterfowl Specialist, Iowa DNR

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