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Notes and Discussion

Hatching Chronology of Ducks using Playas in the Southern High Plains of Texas

ABSTRACT.—Breeding pair and brood surveys suggest that duck production in the Southern High Plains can be substantial in some years, particularly for Mallards (*Anas platyrynchos*). Management of habitats used by nesting ducks and brood surveys could be improved with knowledge of hatching chronology. We studied hatching chronology and brood abundance of waterfowl using playa wetlands in the Southern High Plains of Texas in 2005 and 2007 (playas were dry in 2006). Broods were found on 67% (n = 36) and 79% (n = 19) of wet playas in 2005 and 2007, respectively. Broods per playa averaged 1.9 (±0.4 SE) in 2005 and 3.2 (±1.0 SE) in 2007. Hatching peaked during 1–15 Jun. and by 15 Jul. about 90% of broods had hatched. Delaying haying, mowing and other manipulations of upland nesting habitats until 15 Jul. should give 90% of broods a chance to reach playas. Brood abundance peaked during the two Jul. periods; production surveys conducted during Jul. should capture >70% of broods.

INTRODUCTION

Studies of breeding ducks in the Southern High Plains (SHP) have focused on documenting abundance, species composition and production (Traweek, 1978; Rhodes and Garcia, 1981; Berthelsen *et al.*, 1989; Ray *et al.*, 2003). Ray *et al.* (2003) documented 47 breeding pairs per 100 km^2 and Traweek (1978) calculated annual brood densities ranging from 18–52 broods per 100 km^2. The most common habitat used by breeding pairs is playas (Ray *et al.*, 2003), and Mallards tend to be the most common breeding ducks. Mallards represented 29–43% of adults observed by Traweek (1978), 54–66% of the breeding pairs observed by Ray *et al.* (2003) and 61–81% of broods observed by Traweek (1978). Breeding pairs of Blue-winged Teal (*Anas discors*), Cinnamon Teal (*A. cyanoptera*), Gadwall (*A. strepera*), Northern Pintail (*A. acuta*), Northern Shoveler (*A. clypeata*), Redheads (*Aythya americana*) and Ruddy Ducks (*Oxyura jamaicensis*) also occur during spring and summer (Traweek, 1978; Ray *et al.*, 2003).

We contributed information on brood abundance in playas and provided the first information pertaining to hatching chronology in the SHP. Hatching chronology of ducks has not been documented for this region. Because of the regions importance as a production area in many years, knowledge of hatching chronology can be used to make recommendations regarding production surveys (Naugle *et al.*, 2000) and timing of haying and grazing in nesting areas (Dale *et al.*, 1997; McMaster *et al.*, 2005). Our goal was to help habitat managers avoid manipulation of nesting habitats during critical periods and to identify dates best suited for brood surveys.

STUDY AREA

Playas were surveyed in a six county area in the SHP of Texas. Playas comprised about 2.6% of the land area in these counties (Fish *et al.*, 2000). They are the dominant wetland feature in both the counties and the region (Smith, 2003); approximately 3604 playas occur in the six counties and about 19,340 occur in the Texas portion of the SHP (Bolen *et al.*, 1989a, b; Fish *et al.*, 1999). Playas in the six counties averaged 10.9 ha (Fish *et al.*, 1999), which is larger than the average size of 6.3 ha typically referenced for playas (Guthery and Bryant, 1982; Bolen *et al.*, 1989b). Elevation of the eastern most survey playa was 1023 m and elevation of the western most playa was 1250 m.

Playas are shallow, often circular basins that have closed watersheds; they experience largely unpredictable wet/dry cycles (Guthery and Bryant, 1982; Bolen *et al.*, 1989b). They fill intermittently by intense isolated thunderstorms, although some receive water from municipal or agricultural related runoff (Bolen *et al.*, 1989b; Haukos and Smith, 2004). Rainfall in the SHP averages 33–45 cm annually and typically occurs during Apr.–Jun. and Sep.–Oct. (Bolen *et al.*, 1989b).

Playas are the primary wetland habitats used by most breeding, migrating and wintering waterfowl in the SHP (Bolen *et al.*, 1989a; Smith, 2003). Playas also host Sandhill Cranes (*Grus canadensis*), breeding and migrant shorebirds, and other wildlife (Smith, 2003). Upland habitats include irrigated and non-irrigated agricultural lands (cotton, corn, sorghum and winter wheat), shortgrass prairie, and formerly tilled lands now enrolled in the Conservation Reserve Program (*i.e.*, planted back to native or non-native grasses; Haukos and Smith, 1994).

METHODS

Brood surveys were conducted along four survey routes spanning six counties that were established for a study of waterfowl migration chronology on playas (*see* Baar *et al.*, 2008). Routes were established because of their proximity and juxtaposition to wet playas and varied in length. All playas along routes could be viewed from roads with either binoculars or a spotting scope. We assumed that visibility biases related to distance of playas from the road did not affect results related to hatching chronology, so we did not make attempts to correct for distance. At the start of surveys in 2005 the routes included 5–12 wet playas each for a total of 36 wet playas (Fig. 1). In 2006, no brood surveys were conducted due to severe drought and a lack of wet playas. In 2007, only two of the routes were surveyed, as the other two did not have wet playas. These two routes contained eight and 11 playas each; one of them (eastern most route) was modified to include four wet playas that were not included in Baar *et al.* (2008). Although one playa was noted receiving periodic runoff from crop irrigation and one from a confined animal feeding operation, no routes included playas that were permanent due to inflows from agriculture or municipal runoff. Playas were not surveyed when they were dry.

Playas were surveyed for broods once every 2 wk from Apr.–Sep. in 2005 and 2007. Surveys started at sunrise and generally ended around noon. Data recorded for each brood observed included species, brood size and age class (Gollop and Marshall, 1954). The Gollop and Marshall (1954) aging technique is based on plumage development and uses seven age subclasses. Broods of Cinnamon Teal and Blue-winged Teal were combined because it was difficult to consistently differentiate them (Bellrose, 1980; Rhodes and Garcia, 1981). All brood surveys were performed by the authors.

After each brood's age class was determined, the mid-point of that age class, which varies by species, was subtracted from the Julian Date of the brood observation to approximate hatch date (Gollop and Marshall, 1954; Naugle *et al.*, 2000). For example, the mid-point in age for a Stage 1b Mallard brood is 10 d, so if observed on Julian Date 167 its approximate hatch date would be Julian Date 158. Hatch date was not adjusted for brood size because all eggs within a nest hatch synchronously (Afton and Paulus, 1992). If a brood was observed with an approximate hatch date that was similar (±4 d) to a hatch date for a previous brood on the same playa, then the later brood was excluded (Naugle *et al.*, 2000). Because many of the playas went dry during summer, and because all playas on certain routes went dry, no attempts were made to test for playa, route or year-to-year differences in hatching chronology.

To calculate the period of time that each brood was potentially present on a playa, we added the species specific prefledging period (time from hatch to flight) to the approximate hatch date of each brood (Naugle *et al.*, 2000). We then summed broods across playas to obtain total brood abundance by survey period. Prefledging periods are from Bellrose (1980).

RESULTS

After filtering data for broods likely counted more than once, we observed 69 broods on 36 playas in 2005 and 61 broods on 19 playas in 2007. Broods were found on 67% and 79% of wet playas in 2005 and 2007, respectively. Mallards accounted for most observations, followed by Blue-winged Teal and Cinnamon Teal. Broods of Northern Pintail, Gadwall and Northern Shoveler also were observed (Fig. 2). Broods per playa averaged 1.9 (±0.4 SE, range 0–12) in 2005 and 3.2 (±1.0 SE, range 0–19) in 2007.

The period between the first and last brood hatched was 119 d in 2005 and 114 d in 2007. Mallards tended to hatch earlier than other species; the first Mallards hatched ≥50 d before Blue-winged Teal and Cinnamon Teal in both years (Fig. 2). An estimated 27% of all broods observed hatched during 1–15 Jun., which was the peak period of hatch (Table 1). By 15 Jul., 90% of all broods, including 97% of Mallards and 75% of Blue-winged Teal and Cinnamon Teal, had hatched (Table 1). Brood abundance, in terms of percent of total broods occurring on playas in any period, peaked during the Jul. periods (Table 2).

DISCUSSION

Mallards in this study started hatching a month earlier than Mallards in North and South Dakota (Duebbert and Frank, 1984). However, as in the Dakotas, Mallards in our study nested early relative to other species (Sowls, 1955; Duebbert and Frank, 1984); almost all (97%) Mallards hatched before 15

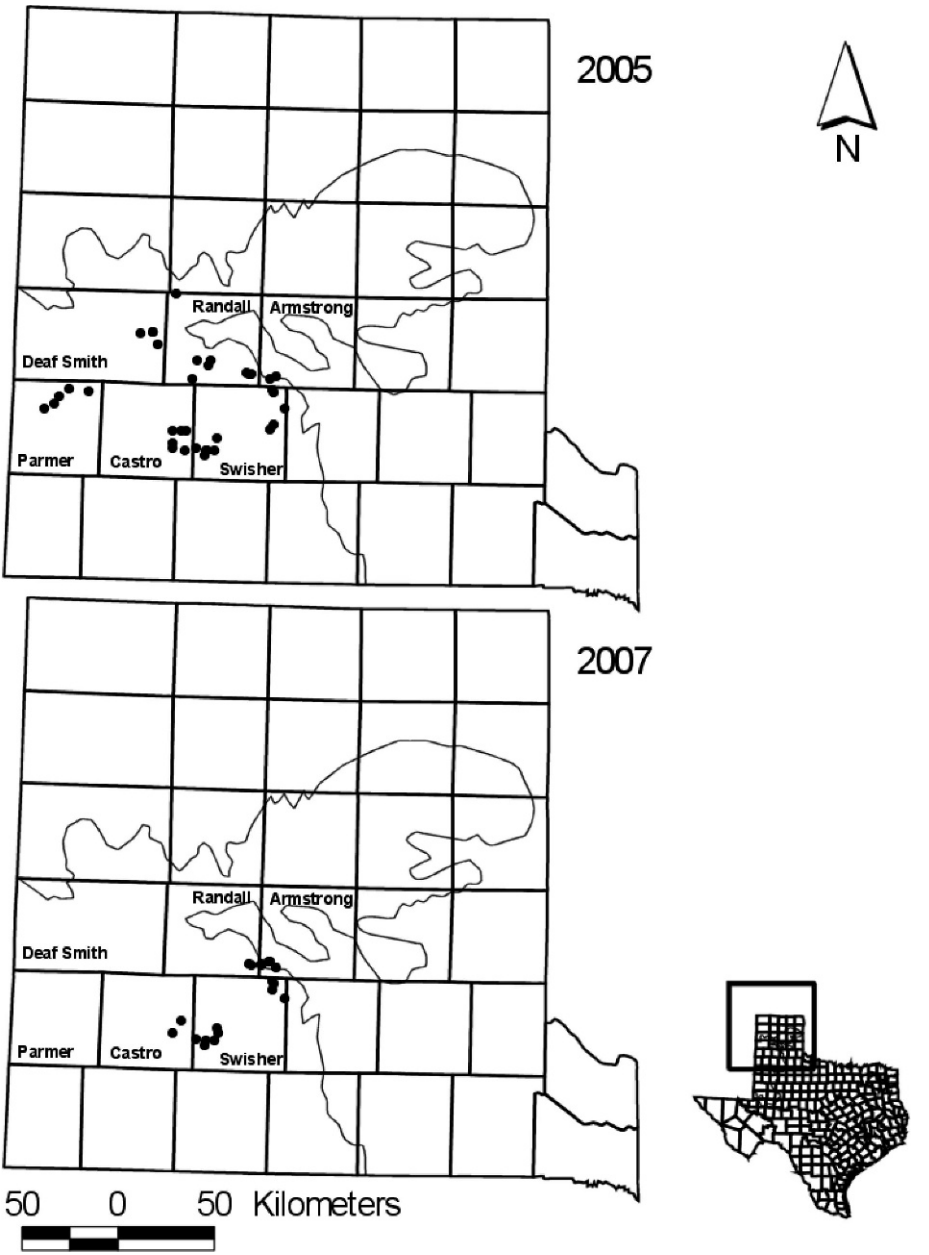

FIG. 1.—Location of survey playas (dots) on the Southern High Plains (irregular solid line) of Texas. Labels indicate county names. Playas were surveyed for broods every 2 wk, Apr.–Sep., during 2005 and 2007

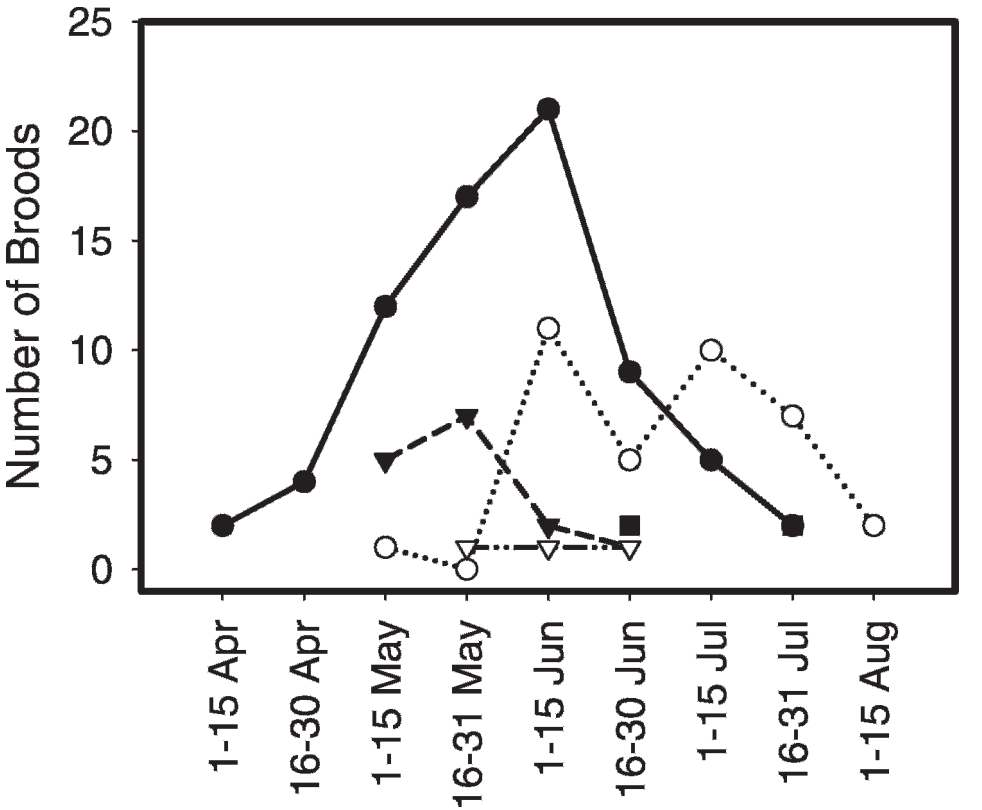

FIG. 2.—The number of Mallard (filled circles), Blue-winged Teal and Cinnamon Teal (open circles), Northern Pintail (filled triangles), Northern Shoveler (open triangles) and Gadwall (filled squares) broods hatching during each 2 wk period in the Southern High Plains of Texas in 2005 and 2007 (years combined)

TABLE 1.—Frequency of hatches within 2 wk periods for broods observed on playas in the Southern High Plains of Texas during 2005 and 2007

Period	2005	2007	Combined	Cumulative percentage
1–15 Apr	1	1	2	1.5
16–30 Apr	2	2	4	4.6
1–15 May	14	4	18	18.5
16–31 May	13	12	25	37.7
1–15 Jun	18	17	35	64.6
16–30 Jun	8	10	18	78.5
1–15 Jul	7	8	15	90.0
16–31 Jul	4	7	11	98.5
1–15 Aug	2		2	100.0

TABLE 2.—Low and high estimates of brood abundance on playas during 2 wk periods in the Southern High Plains in 2005 and 2007 (years combined). The low estimate is the percent of broods present during the entire 2 wk period (total number present at least 1 d during period minus those that either fledged or hatched during period / total number of broods observed in study) and the high estimate is the percent of broods present for at least 1 d of the period (total number present at least 1 d during period / total number of broods observed in study)

	Percent	
Period	Low	High
1–15 Apr.	0	1.5
16–30 Apr.	1.5	4.6
1–15 May	4.6	18.5
16–31 May	18.5	37.7
1–15 Jun.	43.8	63.9
16–30 Jun.	60.0	74.6
1–15 Jul.	71.5	83.1
16–31 Jul.	72.3	79.2
1–15 Aug.	50.8	52.3
16–31 Aug.	12.3	30.8

Jul. Likewise, the late appearance of Blue-winged Teal and Cinnamon Teal broods suggested they follow a pattern similar to those that breed in more northerly areas (Sowls, 1955; Duebbert and Frank, 1984; Gammonley, 1996).

Smith (2003) suggested that the relatively long breeding period in the SHP would make brood surveys problematic and, moreover, would cause production estimates to be underestimated. Smith (2003) noted that Class 1 ducklings (Gollop and Marshall, 1954) were observed on playas from Apr. through Sep. We observed Class 1 ducklings from early Apr. (Class 1a) through the 3rd wk of Aug. (Class 1c). Brood abundance peaked during Jul. survey periods. Surveys during this time should capture >70% of broods that occur annually on playas, which is comparable to production surveys in portions of the Prairie Pothole Region (Naugle *et al.*, 2000). As predicted by Smith (2003), production is underestimated. It is possible that the percentage of broods captured might be <70% for surveys applied across the entire SHP.

Nesting habitat of dabbling ducks (*Anas* spp.) in the SHP is not well documented. It is probable, however, that they use habitats comparable to those used by Ring-necked Pheasants (*Phasianus colchicus*) that nest in the region, such as shortgrass prairie, Conservation Reserve Program land, winter wheat, road right-of-ways and playa margins (Guthery *et al.*, 1984; Berthelsen *et al.*, 1989). Haying, mowing and other such manipulations of these habitats should be delayed until 15 Jul. or later. This will give >90% of duck broods a chance to reach playas.

The species composition of dabbling duck broods we observed was similar to earlier studies (Traweek, 1978; Rhodes and Garcia, 1981). We observed no diving duck (*Aythya* spp. or Ruddy Duck) broods, however. Traweek (1978) detected diving duck broods in all 4 y of his study. We observed adult Redheads and Ruddy Ducks in both years and quantified their numbers in 2005; Redheads averaged 0.6 (±0.2 SE) adults per playa across survey periods and Ruddy Ducks averaged 1.2 (±0.4 SE). It is possible broods were missed, but the SHP may be less attractive now to over-water nesting ducks than during Traweek's (1978) study. Irrigation runoff has declined and, subsequently, there may be less emergent vegetation (Smith, 2003).

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