

**REGIONAL AND LONG-RANGE MOVEMENTS OF FEMALE GADWALLS ALONG THE
GULF COAST – A Pilot Study**

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INTRODUCTION

Greater than 75 percent of the North American gadwall population may annually overwinter in the marshes and flooded agricultural fields along the Louisiana and Texas Gulf Coasts. Gadwalls are one of the most abundant duck species in these areas during winter and typically rank first or second in Louisiana and Texas in terms of numbers harvested. Despite their significance to hunters and habitat managers in this region, waterfowl biologists have a relatively poor understanding of gadwall habitat use, regional and long-range movements, and survival rates during winter. Gadwalls spend extensive time feeding during winter because their diet is dominated by submersed aquatic vegetation that is generally low in nutritional value. Consequently, habitat quality, habitat quantity, and disturbance may be important factors influencing choice of wintering areas, local foraging habitats, regional movements, and winter survival rates of gadwalls. Wetland conservation strategies promoted by Ducks Unlimited and other conservation partners may directly affect each of these factors.

Ducks Unlimited along with other partners of the Gulf Coast Joint Venture (GCJV) including the Louisiana Department of Wildlife and Fisheries, Louisiana State University, Texas Parks and Wildlife Department, and US Fish and Wildlife Service have initiated a cooperative research effort to better understand habitat use, movements, and survival of female gadwalls along the Louisiana and Texas coasts. DU and its partners will use this information to evaluate and possibly refine wetland conservation strategies and priorities for gadwalls and other waterfowl during winter. Because few previous studies of gadwall have been conducted during winter, these partners embarked on a pilot study during autumn – winter 2006 – 2007 to gain insight into logistical and financial needs of a larger, full-scale telemetry study of gadwall wintering ecology. We identified 4 objectives to be addressed by this pilot study: 1) determine if adequate numbers of gadwalls can be captured during autumn – winter for a full-scale study, 2) gain general insight into the extent and timing of regional and long-range movements of female gadwalls during winter, 3) determine whether satellite or conventional (i.e., VHF) telemetry methods are more appropriate for a full-scale study, and 4) use information gained from this pilot study to more precisely estimate financial and logistical needs for a full-scale study.

STUDY AREAS

We attempted to capture gadwalls during this pilot study at Rockefeller State Wildlife Refuge in southwest Louisiana, J. D. Murphree Wildlife Management Area in southeast Texas, and Matagorda Island State Wildlife Management Area along the Texas mid-coast. We believed these sites would provide good opportunities to capture gadwalls and represent the areas in which a full-scale study would likely be conducted.



METHODS

We captured gadwalls using rocket nets fired from portable platforms, and we only marked female gadwalls. We used 22 gram backpack satellite transmitters in this pilot study to monitor movements and survival of radiomarked females. We programmed satellite transmitters such that they would provide 2-3 locations each week for approximately 8 months. Data from satellite transmitters were received once daily by project analysts at the Ducks Unlimited Southern Regional Office, Ridgeland, MS. Project analysts integrated the data into a web-based mapping application (www.ducks.org/gadwallstudy) that enabled research partners, donors, and the general public to monitor the movements and status of marked gadwalls during the pilot study. We monitored radiomarked female gadwalls until the transmitter battery expired, transmissions were not detected for, or females were determined to have died.



RESULTS

Capture success

We captured 17 female gadwalls (9 juveniles, 8 adults) on 8 December 2006 at Rockefeller State Wildlife Refuge. We selected 16 (8 adults and 8 juveniles) of these 17 for radiomarking. We were unsuccessful during November and December capturing gadwalls in Texas, and we consequently resumed efforts during January to capture additional gadwalls in Louisiana. Because of continued difficulty capturing large numbers of gadwalls during late winter when gadwalls became less gregarious, we decided on 26 January 2007 to cease trapping efforts for this pilot study. Although our original plan was to radiomark 25 female gadwalls, we ended our pilot study capture efforts with only 16 radiomarked.



Female survival

Only 11 of our 16 radiomarked females survived long enough to be assigned donor-sponsored names. These included Dorothy, Evelyn Gay, Gadwall 01, Gray, Jamie, Larwen, Lou, Matilda, Melissa, Muriel, and Sandy. We suspect the capture procedure and/or transmitters used in this pilot study were responsible for the large number of early mortalities.

The remainder of this report will provide details of only these 11 females. From 8 December 2006 to 19 June 2007 we confirmed 2 mortalities (i.e., Gadwall 01 and Lou) related to duck hunting and 5 mortalities caused by unknown factors (i.e., Dorothy, Jamie, Matilda, Melissa, and Muriel). We confirmed the 2 hunting mortalities through contact with the responsible hunters. Gadwall 01 was harvested on 27 December 2006 and Lou was harvested on 9 January 2007; both were harvested in coastal marsh habitats of southwest Louisiana.

Of the other 5 mortalities, 2 died during late December (Melissa and Jamie) while the remaining 3 (Dorothy, Matilda, and Muriel) died during spring migration. We strongly suspect that the deaths of Melissa and Jamie were linked to the capture procedure or the backpack transmitters used in this study. Muriel's death appeared to be caused by energetic exhaustion. She died immediately following the arrival (3 – 4 April) of a strong cold front on the northern Great Plains soon after her apparent non-stop 1,300 mile flight from Louisiana to North Dakota (24 – 25 March). We received data on the day after the arrival of the cold front indicating that she had reversed migration and began heading south. It appears she made it no farther than southern North Dakota because we confirmed from subsequent transmissions that she died on approximately 6 April 2007. We lost transmissions from Dorothy during the first week of May and did not receive additional transmissions from her for the life of the pilot study. We are uncertain of the exact cause of mortality, but avian or mammalian predation offers a plausible explanation. We last located Dorothy in south central North Dakota. Matilda apparently died during late April during a brief spring migration stopover in Missouri. We are similarly uncertain of Matilda's cause of death.

Four females (Evelyn Gay, Gray, Larwen, Sandy) remained alive at the time of this report (20 June 2007). Although we could not confidently confirm each mortality, the data we received suggested that 12 (75.0%) of the 16 radiomarked females died during the pilot study (Table 1).

Winter movements and spring departure

Eight of these 11 female gadwalls provided data on movement patterns, and none made significant long-range or erratic movements during winter. Soon after capture these females moved off of Rockefeller Refuge and established localized movement patterns mostly within the coastal marsh areas of Cameron and Vermilion Parish, LA (Figure 1). One female (Matilda) moved on 9 January 2007 from coastal LA to the northern edge of Red River Wildlife Management Area in Concordia Parish, LA (Figure 1). Matilda remained near the Red River Wildlife Management Area until she initiated spring migration on 20 April 2007. Only 7 females survived long enough to provide data on spring departure dates. Those females included Dorothy, Evelyn Gay, Gray, Larwen, Matilda, Muriel, and Sandy. The average date of departure from Louisiana was 22 April 2007. The 2 earliest departures occurred on 23 – 24 March 2007. Four females departed during 20 – 28 April 2007 and the final female departed on 21 May 2007 (Table 1).

Spring migration paths

Seven females (Dorothy, Evelyn Gay, Gray, Larwen, Matilda, Muriel, and Sandy) provided data on spring migration paths. Six females traveled north through Arkansas, Missouri, Iowa, and North and South Dakota (Figure 2). Of these 6 females, at least 3 made temporary stopovers in Iowa and at least 4 made temporary stopovers in North Dakota. One female (Evelyn Gay) departed Louisiana in a northwesterly direction, making brief stopovers in southern Kansas en route to her ultimate destination of central Montana (Figure 2).

Muriel was the only female to make a significant non-stop, long-distance flight during northward migration. We received data on 23 March indicating she was located in Vermilion

Parish, LA, and 3 days later we received data showing her position approximately 10 miles northwest of Devils Lake, ND. Hence, Muriel flew greater than 1,300 miles in less than 72 hours. The northward migration of all other females occurred at a more leisurely pace with periodic stopovers along the way (Figure 2). Of the 4 females that remained alive at the time of this report (20 June 2007), 3 were located in Saskatchewan and 1 in central Montana (Figure 3).

Effects of backpack transmitters on female gadwalls

We encountered evidence during this pilot study that suggested the backpack satellite transmitters adversely affected behaviors and survival of female gadwalls. This included the following: 1) 5 radiomarked females died within 1 week of marking, 2) both female gadwalls killed by hunters were flying as single birds when shot (confirmed via conversation with hunters), 3) one of the harvested females (Gadwall 01) lost 200g of body mass (original body mass = 900g) between the time of radiomarking and harvest (2 week time span – weight loss confirmed by examination of harvested bird), 4) Muriel's mortality presumably caused by energetic exhaustion after 1,300 mile non-stop northward migration, and 5) later than expected mean date of departure from Louisiana. Backpack satellite transmitters have been used successfully with other species of dabbling ducks (e.g., northern pintail, mallard), but this was the first time they had been used on gadwalls. During this pilot study, gadwalls apparently exhibited a high level of sensitivity either to the backpack satellite transmitter, the harness-style attachment method, or some combination thereof.

Status of pilot study

Four satellite transmitters were still providing data at the time this report was written (26 June 2007). We expect these transmitters to continue operating for approximately 1 additional month. We failed to capture and radiomark our intended sample of 25 female gadwalls during autumn – winter 2006 – 2007. Because of this and our retrieval of transmitters from the 2 harvested birds, we have 11 backpack transmitters remaining for use during the autumn –winter 2007 – 2008. Our primary interest in using these transmitters again is in getting a better idea of the impact of backpack transmitters on female gadwalls. This information will help future researchers when planning radiotelemetry studies for gadwalls.

IMPLICATIONS FOR THE FULL-SCALE STUDY

The purpose of this pilot study was to collect data that would better prepare us for planning and implementing a larger, full-scale study. Although we failed to capture our intended sample of 25 females during the pilot study, we still gained valuable information that will ensure a more successful and productive full-scale study.

For example, because of the apparent adverse impact of backpack transmitters on female gadwalls, we have decided to not use backpack transmitters for the full-scale study. Instead, we will use transmitters that are implanted into the bird's abdomen. These transmitters have been used successfully with numerous ducks and geese, and have a smaller impact on the bird's behavior and survival. In addition, we previously were not considering the use of satellite transmitters for the larger, full-scale study because of perceived lower levels of accuracy associated with locations estimated from satellite transmitters. However, our examination of the data received during the pilot study suggests that satellite telemetry can provide locations that are generally as accurate as those obtained from conventional (i.e., VHF) transmitters located from aerial telemetry flights (which would be required of studies in the extensive Gulf Coastal marsh). We now have decided to continue using satellite telemetry for the full-scale study, which means we likely will also maintain the online tracking site during the full-scale study.

FULL-SCALE STUDY

We plan to capture and radiomark 60 female gadwalls each year during autumn 2007 and 2008 on selected sites in southwest Louisiana and southeast Texas. As expressed above, we will use implant satellite transmitters during the full-scale study.

Dr. Alan Afton in the Louisiana Cooperative Fish and Wildlife Research Unit at Louisiana State University will hire and advise a Master of Science candidate to take primary responsibility for implementing the full-scale study. Capture methodology for the full-scale study will be similar to that used in this pilot study.

TIME FRAME FOR FULL-SCALE STUDY

Early August 2007	Graduate student arrives at LSU
Mid-October 2007	Year 1 satellite transmitters delivered
	Year 1 capture efforts begin
December 2007	Year 1 transmitters deployed
December 2007 – May 2008	Year 1 data collection
May 2007 – October 2008	Year 1 data analysis
October 2008	Year 2 satellite transmitters delivered
	Year 2 capture efforts begin
December 2008	Year 2 transmitters deployed
December 2008 – May 2009	Year 2 data collection
May – December 2009	Data analysis and thesis/manuscript writing

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LITERATURE CITED

- LeSchack, C. R., S. K. McKnight, and G. R. Hepp. 1997. Gadwall (*Anas strepera*). In A. Poole and F. Gill, editors. The birds of North America, No. 283. Academy of Natural Sciences, Philadelphia, Pennsylvania, and American Ornithologists' Union, Washington, D. C. 28pp.
- Miller, M. R., J. Y. Takekawa, J. P. Fleskes, D. L. Orthmeyer, M. L. Casazza, and W. M. Perry. 2005. Spring migration of Northern Pintails from California's Central Valley wintering area tracked with satellite telemetry: routes, timing, and destinations. Canadian Journal of Zoology 83:1314-1332.

Table 1. Age, fate, and date of departure from Louisiana of 16 female gadwalls captured on Rockefeller State Wildlife

Refuge in Cameron Parish, LA and equipped with 22g satellite transmitters.

Hen name	Transmitter no.	Date marked	Female age	Fate	Date of fate	Comments	Date of departure from Louisiana
Melissa	33231	8-Dec-06	Juvenile	Likely dead	25-Dec-06	Lost signal	NA ¹
Jamie	33670	8-Dec-06	Adult	Likely dead	27-Dec-06	Lost signal	NA
Matilda	33245	8-Dec-06	Juvenile	Dead	26-Apr-07	Confirmed via sensor	20-Apr-07
Sandy	34293	8-Dec-06	Juvenile	Alive	20-Jun-07	Remains alive	22-Apr-07
Lou	34446	8-Dec-06	Juvenile	Dead	9-Jan-07	Harvested	NA
Dorothy	34447	8-Dec-06	Adult	Likely dead	3-May-07	Lost signal	28-Apr-07
NA	34448	8-Dec-06	Juvenile	Likely dead	14-Dec-06	Lost signal	NA
Gadwall 01	34451	8-Dec-06	Adult	Dead	27-Dec-06	Harvested	NA
Muriel	34452	8-Dec-06	Adult	Dead	6-Apr-07	Confirmed via sensor	24-Mar-07
NA	68110	8-Dec-06	Juvenile	Likely dead	15-Dec-06	Lost signal	NA
NA	68112	8-Dec-06	Juvenile	Likely dead	15-Dec-06	Lost signal	NA
NA	68113	8-Dec-06	Adult	Dead	15-Dec-06	Confirmed via sensor	NA
Evelyn Gay	68114	8-Dec-06	Juvenile	Alive	20-Jun-07	Remains alive	25-Apr-07
Gray	68117	8-Dec-06	Adult	Alive	20-Jun-07	Remains alive	23-Mar-07
Larwen	68119	8-Dec-06	Adult	Alive	20-Jun-07	Remains alive	21-May-07
NA	68120	8-Dec-06	Adult	Dead	15-Dec-06	Confirmed via sensor	NA

¹ Not applicable

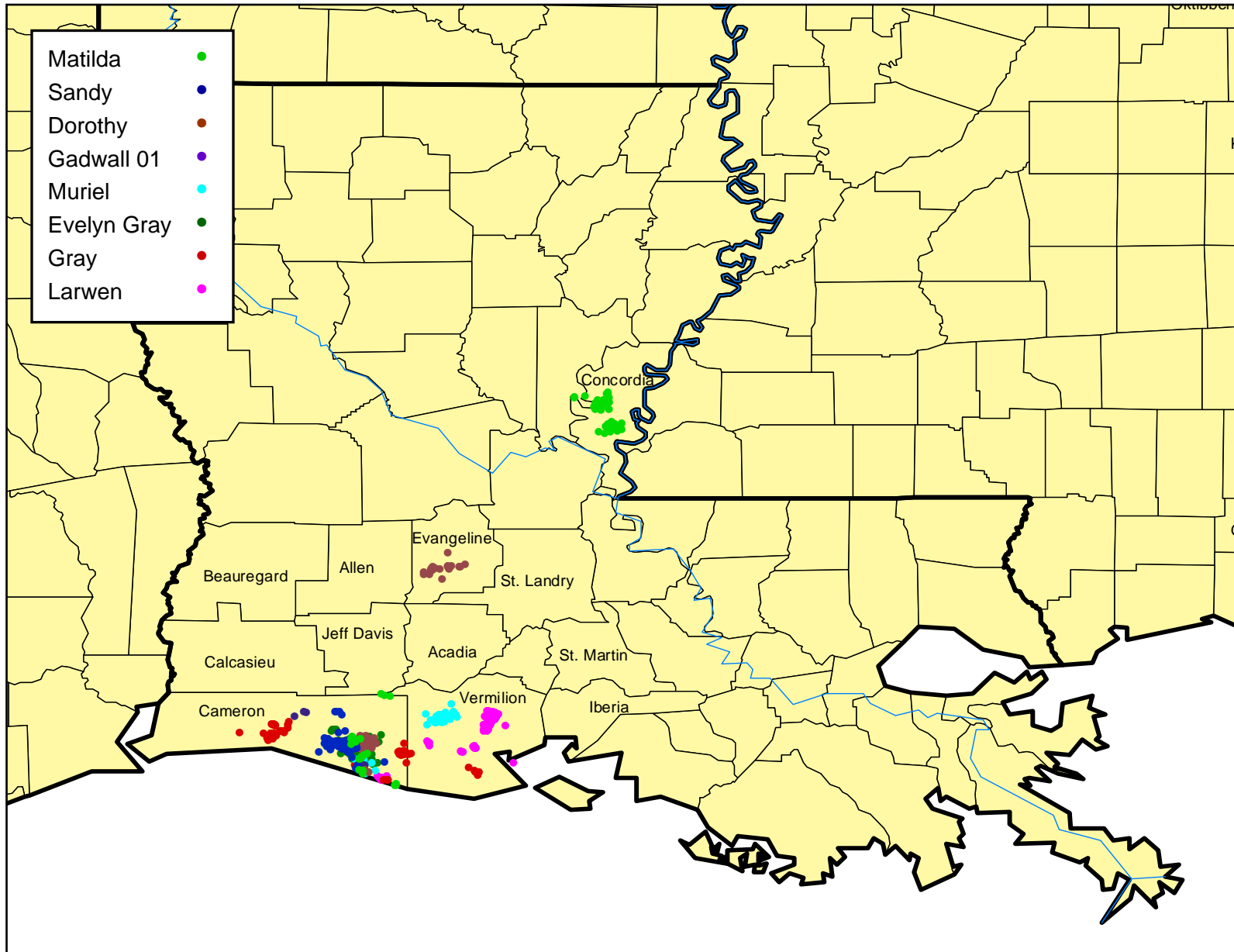


Figure 1. Estimated locations during winter 2006 – spring 2007 of 8 female gadwalls captured at Rockefeller State Wildlife Refuge in Cameron Parish, LA and equipped with 22g satellite transmitters.



Figure 2. Estimated spring migration paths of 7 female gadwalls captured at Rockefeller State Wildlife Refuge in Cameron Parish, LA and equipped with 22g satellite transmitters. Dates of departure from Louisiana varied among individuals but ranged from 24 March – 21 May 2007.



Figure 3. Estimated spring migration paths and current locations of 4 female gadwalls that remained alive at the time of this report (20 June 2007). Females were captured at Rockefeller State Wildlife Refuge in Cameron Parish, LA and equipped with 22g satellite transmitters.