

## Mottled Duck Breeding Population Survey

### Relationship to Gulf Coast Joint Venture (GCJV) Habitat Conservation:

**Priority Species:** Mottled duck (*Anas fulvigula*)

**Planning Objective:** The current GCJV mottled duck population objective is based on the average of midwinter survey counts from 1971-2004. The objective consists of 3 equally significant components: 1) GCJV-wide abundance of 105,816; 2) Texas abundance of 35,322; and 3) Louisiana abundance of 70,132. Currently, the relationship between the mottled duck breeding population survey and the midwinter survey is unknown. We anticipate estimating the relationship between the two surveys as additional data from the mottled duck breeding population survey becomes available, such that the current GCJV objective can be translated to and subsequently assessed using breeding population survey data.

**Type of Monitoring:** Population/Vital Rate

**Monitoring Metric:** Mottled duck breeding population in the western Gulf Coast

**Monitoring Objective:** Estimate the breeding population of mottled ducks in the western Gulf Coast, determine population trend, and assess population status relative to GCJV objectives. Population levels below objectives provide impetus for intensifying the promotion and delivery of conservation actions described in the GCJV Mottled Duck Conservation Plan (Wilson 2007).

**Brief Methodology:** The mottled duck breeding population survey is a visibility-corrected aerial survey covering 26,677 km<sup>2</sup> (10,300 mi<sup>2</sup>) in Louisiana and 43,253 km<sup>2</sup> (16,700 mi<sup>2</sup>) in Texas (including the Laguna Madre region). Airplanes fly each transect (Figure 1) at approximately 161 kmph (100 mph) at 30-50 m (98.4-164.0 ft) altitude. Two observers, one in the front-right seat and the other behind the pilot, record all mottled ducks seen on each side of the plane within 200 m of the transect. A subset of segments are re-flown by helicopters the day after the airplane survey, using a “beat out” pattern of flying tight curves low to the ground (K. Fleming and M. Otto, USFWS, unpublished report). Data from the helicopter segments are used to calculate a visibility correction factor to account for mottled ducks undetected during airplane surveys. Visibility corrected counts are used to estimate the mottled duck breeding population size across the surveyed area.

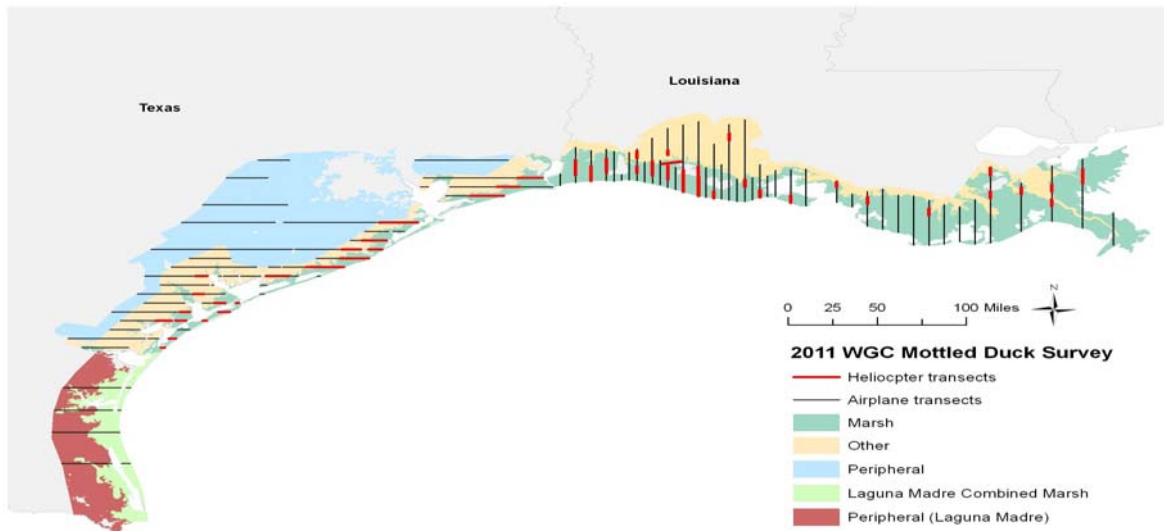


Figure 1. Locations of survey transects for the western Gulf Coast mottled duck breeding population survey (K. Fleming, USFWS, unpublished report).

### Monitoring Responsibilities:

**Data Collection:** Surveys are conducted by staff from the Louisiana Department of Wildlife and Fisheries (LDWF) and Texas Parks and Wildlife Department (TPWD), with funding provided by LDWF, TPWD, and U.S. Fish and Wildlife Service (USFWS) Division of Migratory Bird Management (DMBM).

**Data Compilation and Analysis:** Survey data are compiled and analyzed to generate a mottled duck population estimate by the DMBM, Population and Habitat Assessment Branch. Results are reported by DMBM via an annual report to survey stakeholders.

**Report Development:** Population estimates and associated measures of variance, taken from the DMBM report(s), are compiled in a chronological database, recorded by individual state and pooled over states, by the GCJV Monitoring Coordinator. Tables and graphs, with appropriate acknowledgments to DMBM, are produced by the GCJV Monitoring Coordinator, with specific comparison to GCJV population objectives.

**Report Distribution:** Data, tables, and graphs are made available upon request to the GCJV Monitoring Coordinator. Annually updated tables and graphs may be posted on the GCJV website.

### **Timing and Frequency:**

**Data Collection:** Field data collection is conducted annually during the second and third weeks of April.

**Data Analysis:** Field data is compiled, analyzed, and annual report sent from DMBM by mid-July, annually.

**Report Development:** Data, tables, and graphs depict the relationships to GCJV objectives and are updated by early August, annually.

### **Detailed Methodology:**

TPWD, the LDWF, and the USFWS DMBM jointly developed an operational aerial survey to estimate the breeding population of mottled ducks in Texas and Louisiana. The primary objectives of this survey are to (1) provide an annual estimate of the breeding mottled duck population along the western Gulf Coast; (2) determine the trend of this population over time; and (3) provide a standardized protocol for estimating mottled duck population abundance in Texas and Louisiana.

The survey is scheduled annually for the second week of April, which represents the middle of the nesting period for mottled ducks. The survey is conducted throughout the day whenever visibility and flying conditions are optimal. Two aerial platforms are used to count mottled ducks along transects. Transects comprised of uniquely identified segments are oriented east to west in Texas and north to south in Louisiana. Transects (and segments) are allocated among 2 survey strata (core and peripheral [Only in TX]), representing perceived areas of high and low mottled duck density (Figure 1). Barring delays (e.g., bad weather, aircraft malfunction, etc.), the airplane requires ~3 days (6-8 hrs of flight time/day) per state to complete all transects and the helicopter requires ~2 days per state to fly all relevant segments.

The airplane flies each transect at an altitude of 30-50 m (98.4-164.0 ft) and speed of approximately 161 kmph (100 mph). The airplane pilot uses a global positioning system (GPS) to navigate and maintain a straight flight path over each transect. Two observers, one in the front-right seat and the other behind the pilot, record all mottled ducks seen on each side of the plane within 200 m (656.2 ft) of the transect.

A subset of segments (all within the high-density stratum) is re-flown by the helicopter the day after the airplane survey began. When flying over wetland habitat the helicopter uses a “beat-out” pattern of flying tight curves low to the ground (<30 m; <98.4 ft) to flush all ducks. Observers on each side of the helicopter record all ducks seen within the transect strip width (400 m; 1,312.3 ft). The helicopter pilot uses a GPS to navigate the transect strip boundaries.

Helicopter observations are used to calculate a visibility-correction factor to account for birds undetected during the airplane survey (K. Fleming and M. Otto, USFWS, unpublished report).

Each observer (airplane and helicopter) uses a laptop computer interfaced with a microphone and a GPS to record counts of mottled ducks. Software specifically designed for surveys record each count spoken by the observer to a digital audio file. In addition, spatial data (coordinates) from the GPS are collected and “linked” simultaneously with each recorded observation. Observed mottled ducks are recorded as singles, pairs, or groups (flock of 3 or more ducks). Sex is not recorded because males are virtually indistinguishable from females when observed from aircraft.

Total indicated birds are calculated as  $(2 \times \text{number of pairs}) + (2 \times \text{number of single birds}) + (\text{total number of birds in groups})$ . The observer also records the beginning and end of each uniquely identified transect (airplane) or segment (helicopter). The survey software produces a “moving map” display that provides the observer with a real-time location relative to a transect (or segment) and landscape features. This feature enables observers to more accurately discern whether ducks flushed from inside or outside the transect boundary. Audio files and spatial data saved to the laptops during the aerial survey are taken back to the office for observers to transcribe to a single data file that will be used to generate population estimates.

#### Population Estimates

Due to substantial differences in bird density between marsh and upland (agriculture) habitats, densities are calculated separately for each habitat type, and scaled to the total area of that habitat within the area surveyed. In Louisiana, densities are calculated within two habitat strata: marsh, consisting of both freshwater-intermediate and salt-brackish marsh, and “other,” consisting mostly of agriculture. In Texas, five habitat strata are used: core marsh, consisting of the two marsh types; core “other,” consisting mostly of agriculture; peripheral, consisting mostly of agriculture, but located farther from the coast than the core strata; and in the Laguna Madre region, a marsh stratum (Laguna Madre combined marsh) and a peripheral stratum. Urban areas are excluded from the analysis in both states. Bird densities, visibility correction factors (VCFs), and overall population estimates are calculated following Smith (1995).

#### **Data and Report Archival**

Y:\Monitor

- Contains a readme.doc file that describes directories and the files within them.

Y:\Monitor\MODU\Data

- Contains compiled data (Excel spreadsheets), tables (Word documents), and graphs relating to population monitoring for mottled ducks.

Y:\Monitor\MODU\FedReports

- Contains annual reports received from the USFWS DMBM, Population and Habitat Assessment Branch.

### **Monitoring Related Issues to Consider**

Survey does not include GCJV portions of Alabama or Mississippi.

### **References**

Smith, G. W. 1995. A critical review of the aerial and ground surveys of breeding waterfowl in North America. U.S. Department of Interior Biological Science Report 5, Washington, D.C.

Wilson, B. C. 2007. North American Waterfowl Management Plan, Gulf Coast Joint Venture: mottled duck conservation plan. North American Waterfowl Management Plan, Albuquerque, New Mexico. 27 pages and appendices.