



## 0-6263: Study of the Potential Impacts of Highway Construction on Selected Birds with Emphasis on the Golden-Cheeked Warbler

### Background

This report is the final summary of the 2008–2011 field seasons for the State Highway (SH) 71 impact assessment of highway construction noise and activity on golden-cheeked warblers (*Setophaga chrysoparia*), conducted between the Texas Department of Transportation (TxDOT) and the Texas A&M Institute of Renewable Natural Resources. The goal of this research was to determine if construction activity and noise altered the reproductive success and behavior of birds, with an emphasis on the golden-cheeked warbler. Funding under this contract ended with little construction data gathered and no post-construction data. The researchers compared differences in productivity measures and behavioral responses relative to distance from right-of-way (ROW) and used a before-after impact assessment study design in which they designated study areas as impacted by construction or roads, or control (i.e., non-impact) sites. If highway construction noise impacted warbler productivity and behavior, there was an initial expectation that there would be different productivity and behavioral responses within the construction site, relative to the road-noise-only and control sites.

### What the Researchers Did

Study sites were located within the Barton Creek Habitat Preserve, managed by the Nature Conservancy. These study sites included a section of SH 71 and Southwest Parkway, west of Austin. Preconstruction data collection started in 2008, and in 2011, the researchers began collecting the first year of construction data at the study site.

Three types of sites were identified for this study:

- Treatment impact (construction and preconstruction).
- Road noise only (no construction).
- Control (no road or construction influence).

Starting in late 2010 after the breeding season, TxDOT initiated construction along a half-mile portion of SH 71 in the northern part of this study site. Therefore, the northern part of the treatment site experiencing construction disturbance in 2011 was referred to as the construction site, whereas the southern portion of the treatment site that did not undergo construction during this study remained the preconstruction site. The treatment (construction and preconstruction sites) and the road-noise-only sites extended approximately 1 km from the ROW. The control sites were located greater than 1 km from any ROW.

The researchers conducted surveys along transects at the beginning of each breeding season to locate golden-cheeked warbler territories. After locating territorial birds, productivity surveys were conducted at least once every seven days, and measures of reproductive success were obtained for warbler territories. Warbler territories were mapped using minimum convex polygons to determine territory density and territory distance from the ROW.

**Research Performed by:**  
Texas A&M University

**Research Supervisor:**  
Michael L. Morrison, TAMU

**Researchers:**  
Dianne H. Robinson, TAMU  
Heather A. Mathewson, TAMU

**Project Completed:**  
8-31-2012

Starting in 2009, warbler nests were monitored at a subsample of surveyed territories, and nest cameras were used to examine adult behavior and predation events at nests. Ambient noise level measurements were obtained to examine the hypothesis that noise levels associated with construction were different from road-noise-only and control sites. Warbler song recordings were collected to determine vocalization adjustments due to construction noise. Starting in 2009, the researchers conducted playback experiments to evaluate behavioral changes due to construction noise.

Territory placement was monitored in relation to the ROW and within each study site. Territories were placed closer to the ROW in 2010 than other years, across study sites.

In 2009, eight adult males were banded. None of these eight birds were resighted in 2010 or 2011 within the study area. In 2010, two adult males were banded. In 2011, both birds were resighted within 100 m of the 2010 banding location. In 2008 and 2011, no birds were banded.

The researchers monitored a subsample of nests using video cameras, within each study site. There were no effects on adult visiting rates from year or study site.

Recordings of road construction noise were played to golden-cheeked warblers to examine their immediate behavioral response to introduced construction noise, and no effects were found on behavioral responses by year, study site, or distance from the ROW.

## What They Found

Ambient noise levels were significantly higher in 2011 than 2010 across study sites, and decreased significantly as distance from ROW increased. Ambient noise levels

were louder 512 m from the ROW in the construction site when compared to levels at 256 m and 512 m in the preconstruction site.

Pairing success was significantly lower in the control site in 2010 than in any other site and year combinations. Fledging success was significantly lower in 2009 than in other years, across all study sites.

For song type A, there were significant differences between years within phrase 2 and 3 in that there was a larger mean bandwidth in phrase 2 for 2010 than 2009, and a larger bandwidth in 2009 than 2011 across study sites. This was likely due to lower minimum frequencies in 2009 and 2011, and higher maximum frequencies in 2009. There was a larger mean bandwidth in phrase 3 for 2009 than 2010 and 2011 across study sites. This was likely due to lower minimum frequencies in 2009. Finally, there was a higher maximum frequency for phrase 3 in the control site for 2011 than the control site and preconstruction sites for 2009.

For song type B, there were significant differences between years for all three phrases. There was a smaller mean bandwidth for phrase 1, 2, and 3 in 2011 than 2009 across study sites. This was likely due to lower minimum frequencies in 2009 than 2011 across all phrases. There was also a smaller mean bandwidth for phrase 1 and 2 in 2011 than 2010 across study sites. This was likely due to lower minimum frequencies in 2010 than 2011 for both phrases. The researchers also found an interaction between study site and distance from the ROW for all years in phrase 2. Finally, a higher minimum frequency was found at 0–300 m from the ROW within the construction site than the preconstruction site.

### For More Information

#### Project Manager:

Wade Odell, TxDOT, (512) 416-4737

#### Research Supervisor:

Michael L. Morrison, TTI, (979) 204-3015

Technical reports when published are available at <http://library.ctr.utexas.edu>.

Research and Technology Implementation Office  
Texas Department of Transportation  
125 E. 11th Street  
Austin, TX 78701-2483

[www.txdot.gov](http://www.txdot.gov)

Keyword: Research