



MEMORANDUM

DATE: October 7, 2010

TO: Andy Winter, Bexar County  
Richard Heilbrun, Texas Parks and Wildlife Department

FROM: Clifton Ladd and Amanda Aurora

SUBJECT: Approaches for Updating GCW Habitat Information

The Service has requested that the status of the golden-cheeked warbler (GCW) in the Southern Edwards Plateau Habitat Conservation Plan (SEP-HCP) Plan Area be evaluated with respect to the amount, distribution, and configuration of currently available habitat (i.e., current as of Year 2010) and indicated that 2010 aerial photography is available to update existing habitat models.

The consultant team, in consultation with GIS analysts at the Missouri Resource Assessment Program (MoRAP), has identified additional data that could be used to update the predictions of the existing habitat models and present alternative approaches for addressing the Service's request.

As background, the following GCW habitat models and maps may be available for review and analysis:

Name	Author	Source Data and Notes
Model C	MoRAP (Diamond 2007)	2001 NLCD land use/land cover
Model L	Loomis Partners (2009)	2001 NLCD % canopy cover
SWCA	SWCA on behalf of TXDOT	Aerial photo interpretation of 2004 imagery; habitat data not released publicly
Model C2 - LOE	MoRAP (unpublished)	Classification of 2005/2006 satellite imagery; prepared for TPWD; includes stands composed primarily of live oak as potential GCW habitat
Model C2 - LOD	MoRAP (unpublished)	Classification of 2005/2006 satellite imagery; does NOT include stands composed primarily of live oak as potential GCW habitat (the author's recommended model)
TAMU	TAMU IRNR (2010)	Classification of 2007/2008 satellite imagery; report available, but habitat data not yet released

Current data sources that could be used to update the predictions of the existing models include:

- 2010 NAIP color infra-red aerial photography
- 2010 Landsat 5 multi-spectral satellite imagery
- 2009/2010 county appraisal district parcel and land use data



Brief descriptions of possible approaches to updating the existing models:

**1) 2010 Landsat 5 Update (MoRAP)**

- a) Create a basic forest / not forest land cover classification from 2010 Landsat 5 data (most recent data available are from August and October 2010).
- b) Remove clusters of "not forest" from the existing habitat models to approximate habitat loss since the time period of the model.
- c) Create a randomly distributed set of verification points (constrained to the extent of habitat identified by the original model) and compare the updated results to a visual interpretation of the 2010 NAIP aerial photography. Report error rates.

Approx. Schedule: 6 weeks

**2) Combined 2010 NAIP and Landsat 5 Update (MoRAP)**

- a) Use software to create image objects from the NAIP photos published in June 2010 (creates polygons delineating relatively homogeneous areas of image) and select objects that occur in areas identified as habitat by the existing models.
- b) Create a basic forest / not forest land cover classification from 2010 Landsat 5 data and classify the selected image objects as forest / not forest.
- c) Remove "not forest" image objects from the habitat identified by the existing models as an approximation of habitat loss since the time period of the model.

Approx. Schedule: 6 months

**3) County Appraisal District Parcel and Land Use Data Update (Loomis)**

- a) Identify parcels with developed land uses from 2009/2010 CAD parcel data. Make general assumptions about the developed nature of parcels or areas without identified land use information (determine whether areas with gaps are generally representative of developed areas or undeveloped areas)
- b) Use road information to delineate areas affected by roads and rights-of-way.
- c) Combine developed parcel information and road right-of-way information into a single "developed areas" coverage
- d) Remove developed areas from existing habitat models
- e) Create a randomly distributed set of verification points (constrained to the extent of habitat identified by the original model) and compare the updated results to a visual interpretation of the 2010 NAIP aerial photography. Report error rates.

(1) Approx. Schedule: 2 weeks

Comments on these possible approaches:

None of these approaches result in a complete habitat determination for 2010 conditions, since they do not identify areas of habitat generation since the time period of the models. However, a preliminary review of the differences between Model C and Model C2 (which were created using a similar processing approach) suggest that habitat generation may be substantial in some portions of the Plan Area.

The difference between an updated model (using any of these methods) and the original version may not represent actual habitat loss. The original models were created with methodologies that differ from the update methods proposed herein. Therefore, some of the changes may represent differences in methods, rather than true habitat loss.



Visual interpretation of aerial photography (particularly to delineate areas of habitat or not habitat by hand) is not an appropriate method for a large scale habitat analysis. This approach has considerable problems with consistency, accuracy, and repeatability, in addition to being impractically labor intensive. The approaches suggested above limit visual interpretation of aerial photography to a minimum.

Statistically valid on-the-ground verification of model results is not practicable given expected constraints associated with access to private lands, the large scale of the project, and the narrow project schedule.

The consultant team recommends the following course of action:

1. Rely on the 2005/2006 Model C2 - LOD as the basis for GCW analysis. This model is more up-to-date than the 2000-era models and is based on a land use/land cover classification adopted by TPWD and a process method described in a Service-commissioned study by MoRAP. Other models may be summarized and used for comparison in the plan.
2. Use Option #1 described above to identify possible habitat losses since 2005/2006. Problems associated with habitat generation are likely to be less of a concern if this more recent model is used as the basis for analysis.