

# External Review Process

## Southwest Regional Gap Analysis Project

### Background

The Southwest Regional Gap Analysis Project is predicting habitat for 833 vertebrate species that reside, breed, or use habitat in the five-state region for a substantial portion of their life history. The list of species to model was determined by identifying decision rules for taxon inclusion (These rules can be provided upon request). To create the most accurate models possible we are engaging taxon experts to provide a review of these habitat models.

These models are based on the concept of Wildlife Habitat Relationships (WHRs). We have defined WHRs as a statement describing resources and conditions present in areas where a species persists and reproduces or otherwise occurs. Relationships can be modeled to predict habitat composition, and if the relationships are represented in a cartographic plane they can predict the presence of habitat spatially. For each species, these relationships were identified by reviewing the available literature and then generating a spatial representation of habitat within the species known range.

An important factor for model implementation is understanding the objectives of the modeling effort and the assumptions of the models. The objective of the habitat models are to: 1) Provide maps that predict the distribution of terrestrial vertebrate species in the project area to support analysis of conservation status; and 2) Develop a database of geographic range, wildlife habitat relationships, and predicted distribution of each vertebrate species for the long-term utility of GAP and its cooperators (Csuti and Crist 2000). Along with these objectives are several assumptions associated with GAP vertebrate habitat models (Csuti and Crist 1998):

1. Species are assumed to occur within a polygon representing potential habitat but are not predicted to occur at any particular point within that polygon.
2. Species are assumed to be present within a polygon, but no assumptions are made about the abundance of the species in the polygon.
3. Species are assumed to be present in a polygon at least once in the last 10 years but need not be present every year in the last decade.
4. Species are assumed to be present during some portion of their life history, not necessarily during the entire year.

There are many challenges to creating habitat maps. GAP uses expert review and a measure of agreement method in an effort to create the most accurate models possible. This document describes the expert review process within SWReGAP.

We are soliciting habitat model review from knowledgeable individuals on the modeled terrestrial vertebrates across the five-state region.

# Review Approach

The SWReGAP habitat models have three model components that we would like reviewed. These are: 1), Wildlife habitat relationships (Report), 2) range extent and coding (Range); and 3) spatial depiction of predicted habitat (Model).

## Wildlife Habitat Relationships

Review of this section will either substantiate or refute the habitat relationships used in the model. This process should include 1) review of each relationship used in the model, 2) concurrence with the relationships; and 3) review of references to ensure that important citations are not missed. Questions to focus on this part of the review include:

1. Are the habitat relationships (within the limits of available information) correctly identified?
2. Are there additional relationships not identified, which should be included? Knowledge regarding the limitations of the habitat relationships are also requested.

## Range Extent

The second component for the review is to ensure that the range extent accurately depicts the known range of the species. The review should include an evaluation of: 1) extent, and 2) coding (this section is most relevant to migratory taxa, e.g., permanent resident, summer breeder). Some considerations include:

1. Does the range extent, as depicted by hydrologic units, reflect the known range of species?
2. Are the hydrologic units correctly coded?

## Spatial Map Depiction

Review of map depiction is a subjective review based on expert knowledge. The review of this tier should focus on the following questions:

1. Does the depiction look plausible?
2. Does the depiction identify too much habitat?
3. Does the depiction not identify enough habitat?
4. Does the habitat identified appear to be spatially correct?

## Rules for model modification

1. Modifications must be identified based on a reference with associated source code (Table 1).
2. Modifications should allow information to be regionally applied except in special cases. Special cases include species that have specific and relatively well-known habitat associations that can be represented in separate reasonably well-informed models.
3. The lead state in conjunction with the regional lab will decide how to modify the model.

Table 1. Categories of reference information.

Category	Description
1	Information is based on substantive direct investigation and published (printed or electronic) in an outlet subject to peer evaluation.
2	Information is based on direct investigation or general review and is available in any of a variety of general publications that are serial or ad hoc documents of a technical nature subject to uncertain degree of professional review.
3	Information is derived directly or indirectly from individuals with demonstrated limited or broad expert credence; formats include but are not limited to word-of-mouth accounts, field journals, specimen record tags or forms, labeled photographs, etc.
4*	Information is inferred from associations applicable to similar taxa.

\* Though not a preferred reference, because of taxonomy changes this option may be applicable.

## Literature Cited

Csuti, B. and P. Crist. 1998. Methods for Assessing Accuracy of Animal Distribution Maps, Gap Analysis Program, University of Idaho, Moscow, Idaho. <http://www.gap.uidaho.edu/> Date Accessed: 02 July 2003.

# Material for Expert Reviewers

<http://fws-nmcfwru.nmsu.edu/swregap/habitatreview/ModelDocuments.htm>

**Documents to be reviewed:** Pdfs of these documents can be obtained from the website <http://fws-nmcfwru.nmsu.edu/swregap/habitatreview/Review.asp>. Search for your species.

- Range by HUC.
- Model report.
- Spatial depiction.

## Review form

- Example form
- For reviewers that want to submit reviews as hard copies, forms in pdf format can be downloaded from <F:\Inetpub\wwwroot\swregap\habitatreview\SWReGAPHabitatReviewForm.pdf>. Please submit one form for each species reviewed.

## Additional pdf maps:

- <http://fws-nmcfwru.nmsu.edu/swregap/habitatreview/RangeCoding.htm>
  - HUCs, state boundaries, county boundaries
  - HUCs, state boundaries, major highways.
  - HUCS, state boundaries, rivers & lakes.
  - HUCs, state boundaries, plus elevation.

## Document explaining modeling constraints, databases, and fields.

### Range

- HUCs (Hydrologic units) were used to identify species ranges. The intent of the HUC was to constrain the habitat model. In some cases the HUC-depicted range can extend well beyond the known range of the species .
- HUC range coding definitions are available at:

<http://fws-nmcfwru.nmsu.edu/swregap/habitatreview/RangeCoding.htm>

### Models

- Model Approach
  - We take a Boolean approach to modeling with those areas that contain all the model attributes selected identified as being suitable.
  - In some cases we also include “or” statements such that if attribute A or attribute B is present than the habitat is identified as suitable.
- Regional Approach
  - We are working on regional models, thus that we focused on datasets that were available for the 5-state study area. Our intention is that the end-user can modify our models for a subset of the study area if needed.
- List of available modeling attributes and descriptions can be found at [http://fws-nmcfwru.nmsu.edu/swregap/habitatreview/model\\_attributes.htm](http://fws-nmcfwru.nmsu.edu/swregap/habitatreview/model_attributes.htm).

## **Landcover**

- Searchable table of land cover types, codes, and description
- [http://fws-nmcfwru.nmsu.edu/swregap/habitatreview/land\\_cover.asp](http://fws-nmcfwru.nmsu.edu/swregap/habitatreview/land_cover.asp)
- [List of land cover types](#)
- List of land cover types with and NLCD class type
- Amphibian by land cover list
- Birds by land cover list
- Mammals by land cover list
- Reptiles by land cover list

## **List of other resources available on web**

- [Decision Rules for species inclusion](#)
- Species List by group ([Amphibians](#), [Birds](#), [Mammals](#), [Reptiles](#))
- Species List by Range % within [state](#).

## Model Attributes

Below are the model attributes available for use in the SWReGAP Habitat Modeling effort. Many models have been created using only a portion of those shown. The most common attributes used are land cover and elevation with the hydrologic units as the constraining layer.

Description	Dataset Used	Examples	Notes
Land Cover	SWReGAP Derived Landcover	See landcover page	The vegetation map created for SWReGAP. This layer consists of 125 land cover types including natural and disturbed classes.
Elevation	NED	<a href="#">DEM</a>	This is the Digital Elevation Model (DEM) for the region.
Slope	NED Derived	<a href="#">slope</a>	Derived from regional dem. Value is (integer) slope in degrees.
Aspect	NED Derived	<a href="#">aspect</a>	Derived from regional DEM. (integer) Aspect (in degrees) is value and reclassified to SWReGAP categories is in value attribute table.
Distance to Perennial Water	NHD Derived	<a href="#">intlakes</a> <a href="#">Intstream</a>  <a href="#">perennial lakes</a> <a href="#">perennial stream</a>  <a href="#">springs</a> <a href="#">wetlands</a>	Each type of water is selected from the USGS NHD and a grid is created where each pixel is defined as the (integer) euclidean distance (in meters) to nearest water type. Pixels are selected if they are less than the specified distance.  This layer can be used as a riparian surrogate.
Landform	NED Derived	<a href="#">landform</a>	This dataset is a 10-class land form dataset that divides the region into areas based on slope and aspect. <ul style="list-style-type: none"> <li>1. Valley Flats floodplains, basin floors, (alluvial, lacustrine)</li> <li>2. Toe Slopes, bottoms and swales riparian and semi-riparian, moist lower slopes and bottoms (fluvial/alluvial, colluvial, glacial)</li> <li>3. Gently sloping ridges,fans, and hills ridges and moderately dry hills and moraines (residual, glacial, other)</li> <li>4. Nearly level plateaus and terraces upland or terrace flats (residual, alluvial)</li> <li>5. Very moist steep slopes lower north facing valley and mountain sideslopes</li> <li>6. Moderately moist steep slopes northerly facing valley and mountain sideslopes</li> <li>7. Moderately dry steep slopes southerly facing valley and mountain sideslopes</li> <li>8. Very dry steep slopes upper southwest facing valley and mountain sideslopes</li> <li>9. Cool aspects cliffs, scarps, cirques over-steepened, northerly slopes</li> <li>10. Hot aspects cliffs, scarps, cirques. over-steepened, southerly slopes</li> </ul>

Soils	STATSGO Derived	<a href="#">clay</a> <a href="#">silt</a> <a href="#">sand</a> <a href="#">loam</a>  <a href="#">boulders</a> <a href="#">stone</a> <a href="#">gravel</a> <a href="#">cobble</a> <a href="#">rocky</a>  <a href="#">soil depth</a> <a href="#">shallow</a> <a href="#">deep soils</a> <a href="#">pan</a>  <a href="#">outcrop 15</a> <a href="#">outcrop 15-30</a> <a href="#">outcrop 30-65</a> <a href="#">outcrop 65</a>	Derived from STATSGO. Each MUID (statsgo polygon ID) was reclassified to SWRegap soil attributes. Attribute table of coverage swregapstatsgo has the reclassification.
Hydrologic Units			8-digit hydrologic units
Mountain Ranges		<a href="#">Mountain</a>	
Precipitation		Not Used	This dataset is generally considered to be too coarse for modeling. We have collected data on precipitation but will not use it in the current SWReGAP effort.
Temperature		Not Used	This dataset is generally considered to be too coarse for modeling. We have collected data on temperature but will not use it in the current SWReGAP effort.

# Range Coding

8-digit Hydrologic units were used to delineate species ranges. PDF images are found below to provide context in reviewing these species.

Each HUC was coded with a 3-digit code (below).

Character in Code	Biological Relation	Code and Definition
First Character	Historic/Recent Distribution	K = Known (includes repatriated)
		P = Potential
		X = Extirpated
Second Character	Reproductive Use	0 = none
		1 = breeding
		2 = nonbreeding
		3 = both
Third character	Seasonal Use	0 = none
		1 = Migratory (Spring and/or Fall)
		2 = Wintering
		3 = Summering
		4 = Winter and Summer

K34+ = Originally coded as K00.

K34\* = Originally coded as P00. This data was obtained from either CO-GAP, NM-GAP, or species occurrence data from NatureServe.

Example: K13 = for a species that is known in the watershed, breeds and summers in the watershed.

Historical/ Recent Distribution		
	Label	Description
	Known	Species is known to or probable to occur within the watershed. Species may have been repatriated recently in a portion of their historical range.
	Potential	No known locations, but species could be within the watershed based on proximity and habitat characteristics.
	Extirpated	Species with historical occurrence that have been chosen to be modeled.
Reproductive Use		
	Breeding*	Species is known to breed within the watershed.
	Non-Breeding*	Species is known to occur within the watershed.
	Both*	Species is known to occur within the watershed throughout the year.
Seasonal Use		
	Migratory	Species is known to occur within the watershed during its regular migration in Spring and/or Fall.
	Wintering	Species is known to winter within the watershed.
	Summering	Species is known to summer within the watershed.
	Winter and Summer	Species uses watershed during summer and winter

\*Breeding and nonbreeding habitat may apply to bird species, bats, and some other mammal species.