Best Management Practices For

Golden-winged Warbler Habitats in the Appalachian Region

A Guide for Land Managers and Landowners

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A publication of the Golden-winged Warbler Working Group

This document is one of two regional Best Management Practice (BMP) guides for land managers and landowners, each with several two-page supplements dedicated to the management of specific regional habitat types most important to Golden-winged Warblers. The counterpart to this document is called *Best Management Practices for Golden-winged Warbler Habitats in the Great Lakes Region* and can be downloaded at **www.gwwa.org**.

THIS APPALACHIAN BMP GUIDE IS INTENDED TO BE USED WITH THE FOLLOWING HABITAT SUPPLEMENTS:

Deciduous Forests

Minelands

Abandoned Farmlands

Grazed Forest-land/Montane Pastures

Utility Rights-of-Way

Forest and Shrub Wetlands

At landscape and regional scales, forest ecosystems should be managed to generate a shifting mosaic of seral stages that provides habitat for all forest birds. When working at the patch scale, land managers focused on Golden-winged Warbler should strive to create shrubby, young forest with adequate canopy cover that is frequently interspersed with herbaceous openings and includes widely spaced overstory trees for song perches. This basic patch-level configuration often borders more mature forest and is usually set within a landscape matrix of deciduous forest.

Photo credits (from left to right): Jeff Larkin, David Buehler, Lesley Bulluck, Curtis Smalling, Sharon Petzinger, and John Confer.

The regional BMP guides have been produced to compliment and help facilitate the implementation of the *Golden-winged Warbler Status Review and Conservation Plan*. These documents were developed and reviewed under the guidance of the Golden-winged Warbler Working Group, a consortium of more than 140 biologists and managers engaged in research and conservation of this species (**www.gwwa.org**). Funding for the initiative was provided by the National Fish and Wildlife Foundation and U.S. Fish & Wildlife Service, with matching contributions provided by numerous partner organizations including American Bird Conservancy, Appalachian Mountains Joint Venture, Audubon North Carolina, Cornell Lab of Ornithology, Fundacion Proaves-Colombia, Indiana University of Pennsylvania, Ithaca College, Michigan Technological University, Tennessee Wildlife Resources Agency, University of Minnesota, University of Tennessee, West Virginia University, Wisconsin Department of Natural Resources, and Wildlife Management Institute.

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Cover painting of male Golden-winged Warbler by Reyn Ojiri, **www.birds.cornell.edu/artinterns**

Introduction

The purpose of this Best Management Practice (BMP) guide is to provide land managers and landowners with regional, habitat-specific strategies and techniques to begin developing and restoring habitat for Golden-winged Warbler. It includes six separate, habitat supplements dedicated to specific habitat types most important to Golden-winged Warbler in the Appalachian Conservation Region: 1) **Deciduous Forests**, 2) **Minelands**, 3) **Abandoned Farmlands**, 4) **Grazed Forestland/Montane Pastures**, 5) **Utility Rights-of-Way**, and 6) **Forest and Shrub Wetlands**. This document is one of a series distilled from the *Golden-winged Warbler Status Review and Conservation Plan*. Please consult the *Conservation Plan* for full details on Golden-winged Warbler management and population recovery: **www.gwwa.org**.

Golden-winged Warbler in Crisis

Population Decline: During the past 45 years, the Golden-winged Warbler has experienced one of the steepest declines of any North American songbird. The decline in the Appalachian Mountains is especially alarming—a 97.8% population loss from 1966 to 2010 and a 61.7% loss over the last decade (NC -10%, NJ -9%, WV -9%, TN and VA -8%, PA -7%, MD -6%, NY -5% per year) according to the Breeding Bird Survey. The Appalachian population is now largely disjunct from the Great Lakes population (Figure 1). Much of the decline is attributed to habitat loss and land use change, while hybridization with Blue-winged Warbler has exacerbated the declines and added complexity to the development of effective conservation strategies.

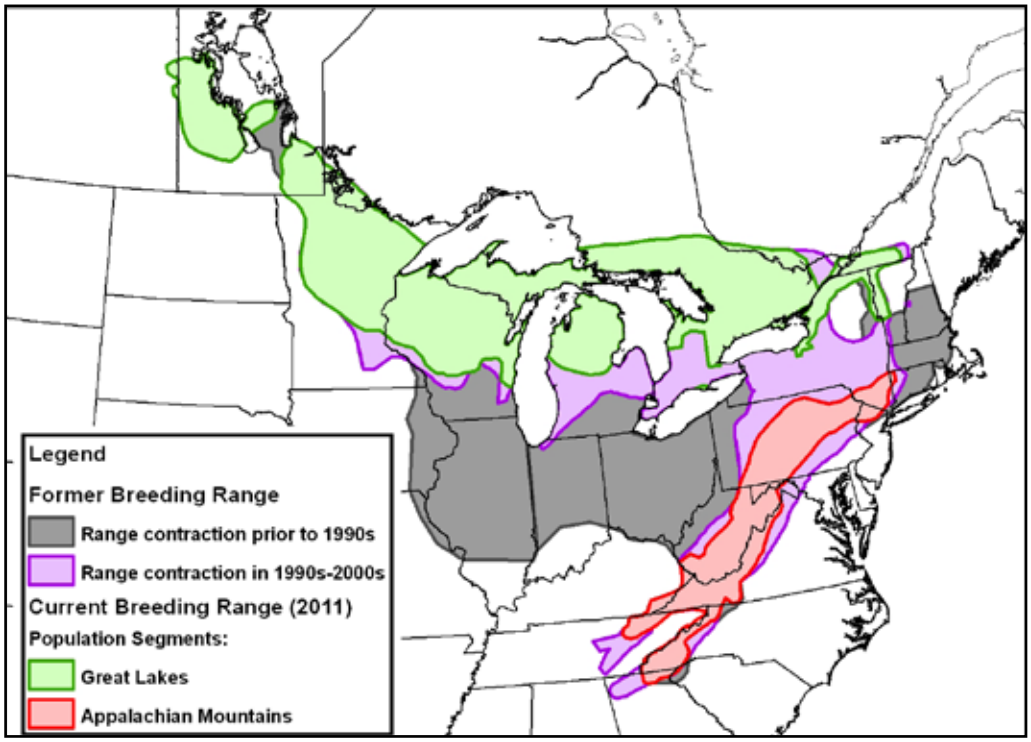


Figure 1. *The Golden-winged Warbler breeding range has two disjunct population segments—Great Lakes and Appalachian Mountains.*

Population/Habitat Goals: The rangewide population goal is to restore the current estimated population of 414,000 breeding individuals to approximately 620,000 birds (similar to population in 1980s). In the Appalachians, the goal is to double the population within 40 years and prevent local extirpations (Table 1).

Table 1. *Golden-winged Warbler population and breeding habitat area estimates and goals. The annual or decadal net gain in breeding habitat needed to attain goals is shown in parentheses. Habitat goals do not account for succession and are likely conservative. Note goals for Great Lakes region are not shown.*

	Population (individuals)/Habitat	Appalachian Conservation Region	Rangewide
Population	Estimated Population (2010)	22,000	414,000
	Population Goal (2020)	27,000	466,000
	Population Goal (2050)	44,000	621,000
Breeding Habitat	Estimated Breeding Habitat (2010)	110,000 ac	2,070,000 ac
	Breeding Habitat Goal (2020)	137,000 ac (+3,000 ac/yr)	2,330,000 ac (+26,000 ac/yr)
	Breeding Habitat Goal (2050)	220,000 ac (+27,000 ac/decade)	3,105,000 ac (+259,000 ac/decade)

Best Management Practices

Where to Work

Focal Areas: Management should be concentrated in the Appalachian Conservation Region, the 18 defined focal areas (Figure 2), or < 5 miles (preferably < 1 mile) from known Golden-winged Warbler populations and < 1 mile from other early successional habitat (ESH) patches. When possible, avoid places where other rare or imperiled resources are higher priority and have conflicting needs, and where Blue-winged Warbler co-occurs and management for Golden-winged Warbler might hasten Blue-winged Warbler invasion, increasing the probability for hybridization. See the *Conservation Plan* for details about individual focal areas.

Scaled Approach to Management: Within appropriate landscape contexts, identify management sites to create, maintain, or restore Golden-winged Warbler habitat (see "Habitat Configuration" sidebar below).

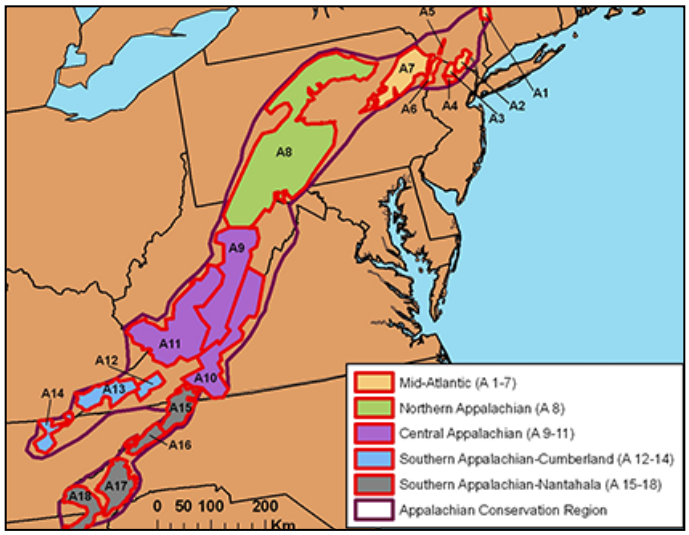


Figure 2. *Subregions and focal areas in the Appalachian Conservation Region.*

Appropriate Landscape Conditions for Management Sites

Macro Landscape Context (within 1.5 miles of a habitat patch)

Elevation:

- Southern and Central Appalachians (GA, KY, NC, TN, VA, WV)—generally above 2,000 ft, varies with site-specific context
- Northern Appalachians (NY, NJ, PA, MD, WV)—generally above 1,300 ft, lower in forested wetlands and heavily forested areas

Forest Cover: > 60% (preferably > 70%)

Forest Type: 80% deciduous; no more than 20% coniferous

Tree Communities: yellow poplar-red oak; sugar maple-beech-yellow birch; aspen-paper birch; mixed oak

Hybridization Risk: avoid valleys and low elevations with areas that have well established populations of Blue-winged Warbler

Micro Landscape Context (within 800 ft of a habitat patch)

Positive Land Cover Associations: forest (60–80% cover), shrub-herbaceous (15–55%), shrub-forest wetlands, and pasture-hay fields (Figure 3)

Negative Land Cover Associations: human development and cropland

Distance Association: when there is a potential for co-occurrence with Blue-winged Warbler, avoid creating habitat adjacent to rivers and streams as these areas are more frequently used by Blue-winged Warbler

HABITAT CONFIGURATION

Decreasing spatial scale

Management site—area where management prescriptions are focused as defined by a management plan.

Patch—area of uniform habitat type or successional stage and defined by a habitat edge.

Habitat edge—distinct boundary between different habitat types or the same habitat but in distinctly different successional stages.

Clump—area of similar vegetation type and height defined by a microedge.

Microedge—readily perceived change in vegetation type or height, such as where grasses change to sedge at the border of a wet area or where a herbaceous opening is bordered by dogwood or *Rubus* shrubs. *Note: due to scale, microedges are not shown.*

Figure 3. *Management site within a forested landscape near a utility right-of-way.*

Suggested Patch Characteristics

Patch Configuration within Management Sites

- Young forest or other ESH with feathered edges leading up to mature deciduous forest boundary
- Patches ≤ 1000 ft from existing breeding habitat should be ≥ 5 acres, while those ≥ 1000 ft should be ≥ 25 acres
- Within large management complexes, 15–20% of area should be maintained in a shifting mosaic of ESH, resulting in a diverse mix of forest ages and types necessary for foraging, post-fledging habitat, and needs of other wildlife

Content within Patches

- Interspersed clumps of shrubs and/or saplings and small herbaceous areas of grasses and forbs (Figure 4)
- Limited canopy cover with widely spaced overstory trees (> 9 inches in diameter) alone or in patches (Figure 5)
- Adjacent mature forest

Configuration of Habitat Components within Patches

- 30–70% shrubs and saplings, 3–13 ft high, unevenly distributed as clumps (see sidebar page 4)
- Shrub and sapling clumps interspersed with small herbaceous openings, primarily composed of native forbs with lesser proportions of grasses and sedges
- Low woody vegetation (< 3 ft), leaf litter, and bare ground can occur in openings but should occupy < 25% of the opening's space
- Infrequent and widely spaced overstory trees as individuals or groups (5–15/acre) resulting in 10–30% canopy cover (20–40 ft ^{2} basal area) throughout patch (Figure 5), with at least 75% deciduous overstory trees
- A high degree of within-patch heterogeneity is important: average distance to microedge (see sidebar page 4) should be less than 20 ft from any point within patch (Figure 6)

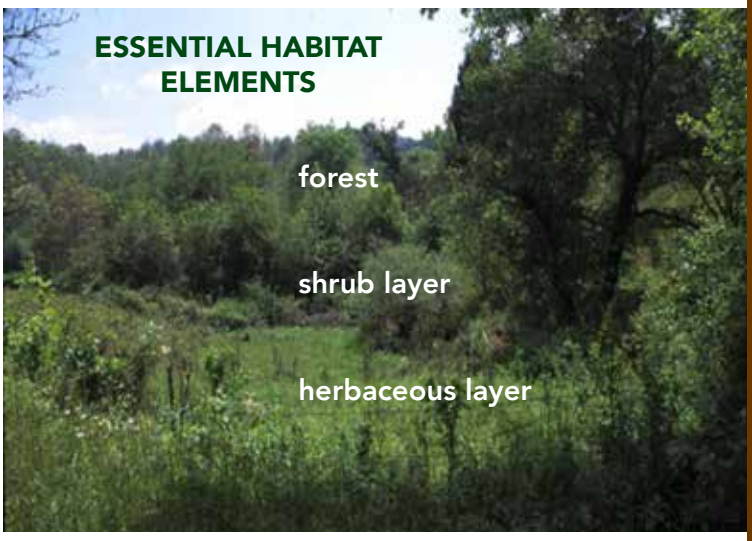


Figure 4. *Structural components of habitat—herbaceous openings interspersed with shurbs and trees bordering more mature forest. Photo by Nathan Klaus.*

Figure 5. *Overstory trees should be infrequent and widely spaced, but are necessary for successful breeding. Photo by Marja Bakermans.*

Figure 6. *High quality habitat with shrubs in clumps interspersed with herbaceous openings (left); poor quality habitat with a contiguous, unbroken shrub layer (right). Photo by Jeff Larkin.*

Management Techniques

A variety of management techniques are available to create, maintain, or restore habitat for Golden-winged Warbler. These techniques can be used to generate the preferred vegetation structure and configuration regardless of habitat type. This can include substantially retarding or advancing succession, or making smaller manipulations to enhance or reduce a given set of conditions (Table 2).

Table 2. *Suggested management techniques to manipulate habitat conditions.*

Symptom	Management Technique	Description of Technique
Excessive canopy cover	Timber Management	Cut to remove canopy trees to achieve 5–15 stems per acre.
	Prescribed Burning	Use fire to kill intolerant trees and reduce canopy cover.
	Restore Natural Disturbances	Restore hydrology on wetland sites to kill non-wetland adapted canopy trees.
Shrubs too evenly distributed	Mechanical Treatment	Mow in irregular patches to create large shrub clumps interspersed with herbaceous openings.
	Prescribed Burning or Grazing	Conduct burns to selectively remove shrubs; graze cattle to reduce shrub density.
	Restore Natural Disturbances	Restore hydrology on wetland sites to kill shrubs and retard re-growth.
Too little herbaceous cover	Timber Management	Harvest canopy trees to create gaps and allow greater sun penetration.
	Mechanical Treatment	Cut or mow in irregular patches; apply herbicide if necessary to retard woody growth; light fall disking.
	Prescribed Burning or Grazing	Use late growing season burns to promote grass/forb growth and frequent (annual) burning to reduce shrub cover.
Too little edge (when residual canopy trees not present)	Timber Management	Create irregular patch margin through timber harvesting.
	Mechanical Treatment	Mow some shrubs and small trees to create feathered edges.
Too few canopy trees	Timber Management	Create feathered edge; retain select saplings and poles of desirable species as future residual trees.
	Plant Desired Species	Plant fast growing native deciduous trees.
High herbaceous cover but low woody cover	Mechanical Treatment	Reduce frequency and/or intensity of mowing.
	Prescribed Burning or Grazing	Reduce frequency and/or intensity of burning/grazing.
	Plant Desired Species	Plant appropriate native shrub and sapling species.

Natural Disturbance Regimes: Promote or restore natural disturbance regimes (fire, beaver activity, and flooding) that create habitat. This is especially relevant in protected areas and wetlands where active management is difficult.

Reclaim and Restore Degraded Sites: Reclaim or restore heavily disturbed sites such as surface mines and gravel pits by planting native grasses with forbs, shrubs, and scattered deciduous trees (plant trees and shrubs in clumps).

Timber Management: Use silviculture treatments such as clearcutting, seed tree harvests, overstory removal with residuals, and shelterwood harvests to provide the proper structural conditions. Retain 10-15 trees/acre, although higher or lower tree density is acceptable under certain conditions (see Deciduous Forests supplement for details).

Mechanical Clearing: Mow and brush-hog in irregular patches to reduce woody growth and promote a patchy woody structure that Golden-winged Warbler prefer (Figure 7).

Prescribed Burning: Use burning to promote or suppress woody vegetation growth by controlling burn intensity and timing (growing season vs. dormant season).

Grazing: Graze pastures and old fields to maintain early-successional conditions by reducing growth of woody vegetation. Graze one animal unit/5–10 acres during the growing season or use higher intensity rotational grazing in the non-breeding season.

Herbicide Application: Apply herbicides that selectively target woody plant growth, especially in combination with other management tools such as fire, grazing, or mowing to retard plant succession and prolong the period of habitat suitability.

See *Conservation Plan* for specifics about each of these management techniques.

Figure 7. *Mechanical clearing or "brush-hogging" can diversify structure, as shown just following management in the left photo and after two growing seasons in the right photo. Photos from left to right: Cathy Johnson; Kyle Aldinger.*

Timing of Management Activities

Whenever possible, habitat management should be conducted during the non-breeding season (mid-July to mid-April), as disturbance during the nesting season can potentially result in "incidental take" of nests, eggs, and young birds.

Associated Species

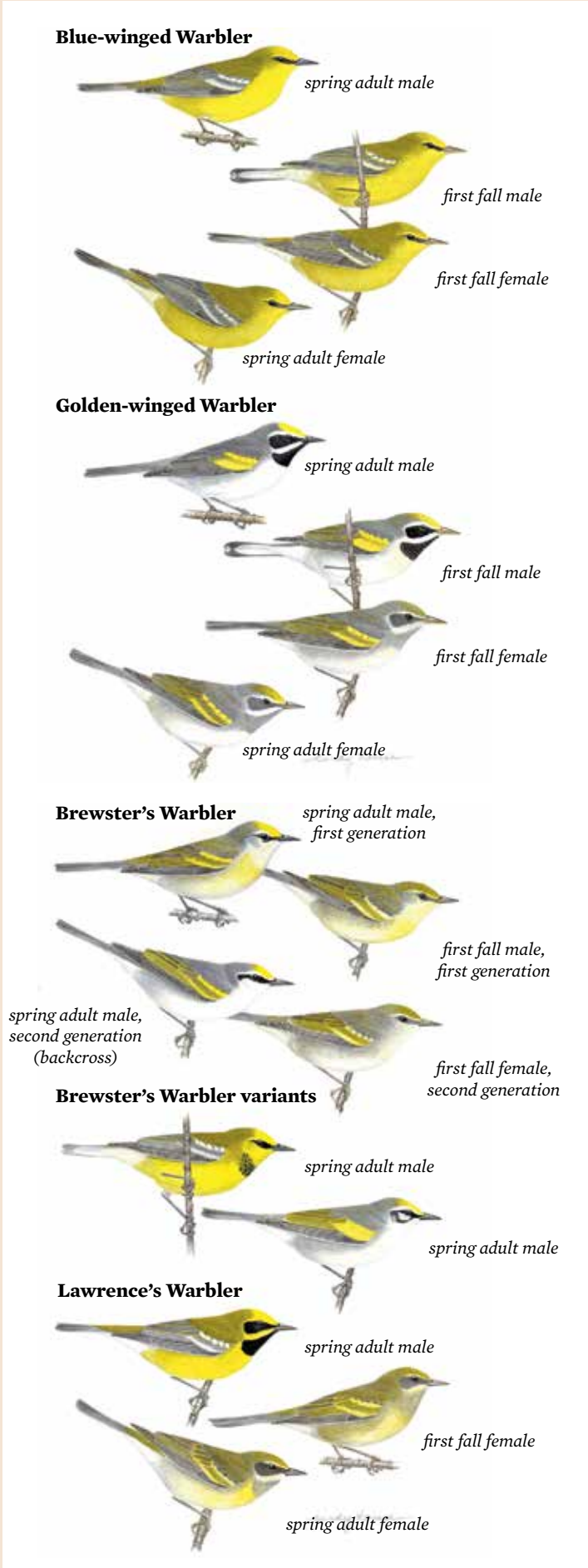
Management for Golden-winged Warbler benefits a host of other wildlife species, including those that rely on ESH and those that will eventually occupy the managed habitat as it succeeds into more mature forest. Many of these associated species have declined since the launch of the USGS North American Breeding Bird Survey in 1966 (see the *Conservation Plan* for a full list of associated species by state). Below is an abbreviated list of species that will benefit from Golden-winged Warbler management:

- American Woodcock
- Blue-winged Warbler
- Prairie Warbler
- Black-billed Cuckoo
- Yellow-billed Cuckoo
- Brown Thrasher
- Field Sparrow
- Eastern Towhee
- Yellow-breasted Chat
- Indigo Bunting

ADDITIONAL RESOURCES

- Golden-winged Warbler Status Review and Conservation Plan, **www.gwwa.org**
- Birds of North America account (requires a subscription or institutional access): **http://bna.birds.cornell.edu/bna/species/020/articles/introduction**
- Golden-winged Warbler Working Group website, **www.gwwa.org**
- Golden-winged Warbler Habitat Best Management Practices for Forestlands in Maryland and Pennsylvania, **www.abcbirds.org/abcprograms/domestic/pdf/GWWA_bmp_FinalSmall.pdf**
- The American Woodcock Management Plan, **www.timberdoodle.org**

When possible, it is important to combine conservation action for Golden-winged Warbler with management for other species, especially when there is potential synergy with partner organizations, such as the Wildlife Management Institute's efforts on behalf of American Woodcock, New England cottontail, and other ESH wildlife species. Clearly there is opportunity to address the needs of a suite of declining species through implementation of these BMPs. Where appropriate, we recommend integrating Golden-winged Warbler management with other wildlife and forest management plans.



Golden-winged Warbler Natural History

Breeding and Wintering Ranges: The breeding range is based on expert knowledge of persistent breeding populations as of 2011. The primary known migratory range is inferred from recent monitoring records; regions with only a few scattered records (e.g., east-central Mexico and Caribbean islands) are excluded. The winter range is based on NatureServe (2011) (Figure 8).

Primary Food: Insects and spiders.

Nesting Habitat: Open woodland; a mosaic of grassy and herbaceous openings, shrubs or saplings, and taller deciduous trees that often borders more mature forest set within a landscape matrix of deciduous forest.

Nest Description: Open cup of grasses, bark, and dead leaves. Leaves may form cap over eggs. Usually on or near ground, often at the base of a small shrub amongst leafy herbaceous growth.

Clutch Size: 3–6 eggs. Single-brooded, with the exception of renesting after early failure of first nests. Eggs are whitish with small streaks of brown near large end.

Threats: Population declines have been attributed to a variety of potential sources including loss of breeding season habitat, interactions with Blue-winged Warbler (both competition and hybridization), Brown-headed Cowbird brood parasitism, and land use changes on the breeding and Neotropical wintering grounds.

Figure 8. *Range map showing breeding and wintering grounds for the Golden-winged Warbler.*