

# BEST MANAGEMENT PRACTICES FOR Golden-winged Warbler Habitat on Minelands in the Appalachians

A publication of the Golden-winged Warbler Working Group, [www.gwwa.org](http://www.gwwa.org)



This supplement for Minelands accompanies *Best Management Practices for Golden-winged Warbler Habitats in the Appalachian Region*, which includes general information that applies to all habitat types in the area. Users should refer to both documents to develop a comprehensive management strategy. The following are guidelines and not absolute rules for the creation of breeding habitat, thus prescriptions outside the numerical ranges presented can provide habitat, too.

Coal mining has an extensive footprint in the Appalachians with 30% of the Golden-winged Warbler range overlapping with coal reserves (Figure 1). Reclaimed minelands compose a significant portion of the total Golden-winged Warbler habitat available within the region. Because reclamation is required under the Surface Mining Control and Reclamation Act of 1977, reclaimed minelands provide an opportunity to create habitat in the future if designed with Golden-winged Warbler habitat requirements in mind.

## Reclaim and Restore Minelands for Golden-winged Warbler in Landscapes:

- within defined focal areas or < 5 miles (preferably < 1 mile) from known breeding populations and < 1 mile from other early successional patches
- with > 60% (preferably > 70%) deciduous forest cover within a 1.5-mile radius of the site, preferably < 1 mile from other early successional patches
- at elevations > 2,000 ft in KY, TN, VA, WV and > 1,300 ft in PA and MD
- in areas largely lacking Blue-winged Warbler based on recent Golden-winged Warbler Atlas data



Figure 1. Coal reserves and Golden-winged Warblers in the Appalachians.

## How to Manage Golden-winged Warbler Breeding Habitat for New Reclamation Projects

The Appalachian Regional Reforestation Initiative recommends the five-step Forestry Reclamation Approach (see Resources):

1. Create a suitable rooting medium for trees no less than 4 ft deep and comprised of topsoil, weathered sandstone, or the best available material.
2. Loosely grade the topsoil to create non-compacted soil.
3. Use ground covers that are compatible with growing trees.
4. Plant two types of trees: a) early successional species for wildlife and soil stability and b) commercially valuable trees.
5. Use proper tree planting techniques.

Plant easily established, fast-growing native trees (e.g., tulip poplar and black locust), native shrubs (e.g., dogwood and viburnum), and commercially valuable trees (e.g., white oak). Incorporate patches of diverse native grasses and forbs along with reforestation. The spatial layout of the reclamation is very important (see Appalachian BMP guide). The individual species selected need to match site and soil characteristics (Table 1). For example, black locust, black and pin cherries, and white oak are well adapted for Pennsylvania and provide quality foraging habitat.

Table 1. Plant species useful for reclamation for Golden-winged Warbler. Tree species with asterisks are typically early successional.

Trees	Shrubs and Small Trees	Grasses
white oaks ( <i>Quercus</i> spp.)	hawthorn ( <i>Crataegus</i> spp.)	broomsedge ( <i>Andropogon virginicus</i> )
tulip poplar ( <i>Liriodendron tulipifera</i> )*	elderberry ( <i>Sambucus</i> spp.)	little bluestem ( <i>Schizachyrium scoparium</i> )
black locust ( <i>Robinia pseudoacacia</i> )*	beaked hazel ( <i>Corylus cornuta</i> )	Virginia wildrye ( <i>Elymus virginicus</i> )
American chestnut ( <i>Castanea dentata</i> )*	viburnums ( <i>Viburnum</i> spp.)	sideoats grama ( <i>Bouteloua curtipendula</i> )
black cherry ( <i>Prunus serotina</i> )	beautyberry ( <i>Callicarpa americana</i> )	panicgrass ( <i>Panicum</i> spp.)
pin cherry ( <i>Prunus pensylvanica</i> )*	strawberry bush ( <i>Euonymus americana</i> )	Forbs
flowering dogwood ( <i>Cornus florida</i> )*	blackberry/raspberry ( <i>Rubus</i> spp.)	partridge pea ( <i>Chamaecrista fasciculata</i> )
white ash ( <i>Fraxinus americana</i> )	dogwood shrubs ( <i>Cornus</i> spp.)	goldenrod ( <i>Solidago</i> spp.)
sugar maple ( <i>Acer saccharum</i> )	smooth sumac ( <i>Rhus glabra</i> )	perennial sunflowers ( <i>Helianthus</i> spp.)
hickories ( <i>Carya</i> spp.)	wild plum ( <i>Prunus americana</i> )	tick-trefoils ( <i>Desmodium</i> spp.)
American beech ( <i>Fagus grandifolia</i> )	serviceberry ( <i>Amelanchier</i> spp.)	Joe-pye weed ( <i>Eupatorium fistulosum</i> )

Variable survival of individual trees and shrubs is expected and will contribute to the patchy habitat preferred by Golden-winged Warblers (Figure 2). The grass-forb ground cover is desirable because it will provide nesting sites. The mature forest edge of the site is also an important component, providing song perches, foraging habitat, and post-fledging brood habitat.

### Reforestation of Non-forested (Legacy) Minelands For Golden-winged Warbler

Coal mines reclaimed in the past 30 years (legacy mines) can provide habitat when plant succession reaches the stage where trees and shrubs have colonized the site and reached appropriate height and densities (10–30% cover in mature trees, 20–30% cover in saplings and shrubs). Thousands of acres of legacy mines are currently providing Golden-winged Warbler habitat. In some cases, reclamation for pasture/hayland land use has been so successful in establishing stable grass/forb plant communities, colonization by trees and shrubs hasn't occurred (Figure 3). These sites may not become suitable for decades. Management intervention in the form of ripping the substrate and planting trees and shrubs is recommended to speed up succession. When plant succession closes the tree canopy, habitat suitability declines and Golden-winged Warblers abandon the site. In this case, management intervention can restore suitable conditions (Table 2). Prescribed burning has been used successfully to restore habitat in Tennessee (Figure 4), while bush-hogging in irregular patches has worked in Pennsylvania.

**Table 2.** Management options to restore Golden-winged Warbler habitat on legacy minelands.

Condition	Timber Harvest	Mechanical Treatment	Prescribed Burning	Grazing	Herbicide Use	Tree/shrub plantings
Maturing trees, canopy closing	Irregular patch cutting	Irregular brush-hogging	X		X	
Too much herbaceous cover, too little woody cover, soil compaction		Ripping, disking		X	X	X
Limited edge	Irregular patch cutting	Irregular brush-hogging	X	X	X	X



**Figure 2.** This site will be suitable within the next 2–5 years.



**Figure 3.** Pasture/hayland reclamation will not undergo succession for many years and will not be suitable unless there is management intervention.



**Figure 4.** Prescribed burning on one Tennessee site has led to a five-fold increase in Golden-winged Warbler territories.

### Four Key Steps for Successful Reforestation of Legacy Mines (Burger and Zipper 2011, Figures 5 and 6)

1. Site assessment and planning—vegetation and soil conditions are inventoried and treatments are prescribed.
2. Site preparation to be addressed—soil chemical properties (lime and fertilizer), soil physical properties (deep tillage), and undesirable vegetation removal (mechanical or herbicide treatment).
3. Native trees, shrubs, grasses, and forbs are planted.
4. Follow-up—additional management actions may be required to ensure the long-term success of the restoration.



**Figures 5 and 6.** (Left) A site that has been ripped is ready for planting of native trees, shrubs, grasses, and forbs. (Right) A reforested site might grow into Golden-winged Warbler habitat within 4–5 years.

### Resources/References

- Golden-winged Warbler Conservation Plan, [www.gwwa.org](http://www.gwwa.org). Working Group members are available for assistance in each state.
- For a more detailed version of this document see: Buehler, D., K. Percy, and P. Angel. 2012. Management Guidelines for Golden-winged Warblers on Reclaimed Coal Minelands. University of Tennessee. [www.gwwa.org](http://www.gwwa.org)
- The Appalachian Regional Reforestation Initiative (ARRI) – techniques for reclaiming minelands into forest. <http://arri.osmre.gov/>
- NRCS Working Lands for Wildlife provides technical and financial assistance to landowners interested in managing for Golden-winged Warblers [www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/whip/?&cid=stelprdb1046975](http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/whip/?&cid=stelprdb1046975)
- Angel, P.N., J.A. Burger, V.M. Davis, C.D. Barton, M. Bower, S.D. Eggerud, and P. Rothman. 2009. The forestry reclamation approach and the measure of its success in Appalachia. Proceedings of the National Meeting of the American Society of Mining and Reclamation 26:18-36. [http://arri.osmre.gov/FRA/Advisories/FRA\\_No.1.7-18-07.Revised.pdf](http://arri.osmre.gov/FRA/Advisories/FRA_No.1.7-18-07.Revised.pdf)
- Burger, J., D. Graves, P. Angel, V. Davis, and C. Zipper. 2005. The forestry reclamation approach. The Appalachian Reforestation Reclamation Initiative, U.S. Office of Surface Mining, Forest Reclamation Advisory No. 2. 4 pp. <http://arri.osmre.gov/Publications/Publications.shtm>
- Burger, J.A. and C.E. Zipper. 2011. Reforestation guidelines for unused surface mined lands in the eastern United States. Virginia Cooperative Extension Publication 460-144. <http://pubs.ext.vt.edu/460/460-144/460-144.html>