

TECHNICAL SESSIONS

TUESDAY, OCTOBER 7 ♦ 8:00 AM - 12:00 PM

Golden-winged Warbler Conservation and Monitoring

MEETING ROOM: FALSE CAPE B

Session Organizer: *Jeff Larkin, American Bird Conservancy's Golden-winged Warbler Range-wide Breeding Habitat Coordinator*

Overview: The Golden-winged Warbler (*Vermivora chrysoptera*) is a migratory songbird that breeds in young forest and shrubland habitats within forest dominated landscapes of eastern North America. The species has experienced significant population declines over that past 50 years and is currently being considered for listing under the Endangered Species Act. From 2008-12, The Golden-winged Warbler Working Group and its partners developed science-based breeding habitat guidelines, established population and habitat goals, and identified conservation focal areas. All of these actions were important first steps toward reversing Golden-winged Warbler population declines, but we are now faced with the challenges of implementing large-scale habitat projects that are critical for the species' recovery. In recent years, several efforts to implement Golden-winged Warbler breeding habitat guidelines on public and private lands in the Appalachian Mountains have gained traction. Additionally, research and monitoring associated with Golden-winged Warbler wintering grounds and migration are underway. In keeping with the full life cycle approach to conservation, this proposed special session consists of 8 presentations that will 1) provide an introductory overview of the Golden-winged Warbler Conservation Plan and Status Assessment; 2) showcase a successful public and private lands habitat implementation effort; 3) detail the results of breeding grounds research and monitoring associated with Natural Resources Conservation Service's-Working Lands For Wildlife Initiative; 4) review the findings of the Golden-winged Warbler Wintering Grounds threat analysis; 5) characterize Golden-winged Warbler distribution and plant community use on the Central America wintering grounds; and 6) introduce and encourage participation in the Golden-winged Warbler range-wide migration study. This session will provide a valuable overview and update of activities prior to a 4-hour Golden-winged Warbler Working Group meeting that is already scheduled to occur at this conference on Tuesday, Oct. 7th.

8:00 AM

Implementing the Golden-winged Warbler Conservation Plan: A Model for Building an Effective Conservation Partnership

Mike Pruss, Pennsylvania Game Commission; Barry Isaacs, Natural Resource Conservation Service; Andrew Rothman, American Bird Conservancy

The Golden-winged Warbler (*Vermivora chrysoptera*) is a migratory songbird that predominately breeds in young forest and shrubland habitats within forest dominated landscapes of eastern North America. The species is currently being considered for listing under the Endangered Species Act. The completion of the Golden-winged Warbler Conservation Plan, development of science-based breeding habitat guidelines, establishment population and habitat goals, and the identification of conservation focal areas were important first steps toward reversing Golden-winged Warbler population declines. Implementing large-scale habitat restoration projects is the next critical step for the species' recovery. A multi-agency and multi-organization initiative that focuses on Golden-winged Warbler habitat management on public and private lands in Pennsylvania was initiated in 2011. To date, our partnership has resulted in management to benefit the Golden-winged Warbler on over 7,000 acres of private lands within Pennsylvania's portion of the Golden-winged Warbler Conservation Area. Much of these private lands were enrolled in a USDA-NRCS landowner incentive program entitled Working Lands for Wildlife. Additionally, since 2010 over 30,000 acres of young forest that meet GWWA habitat guidelines have been created on public lands via non-commercial and commercial methods. Our strategy is being used as a model for Golden-winged Warbler recovery in other states and we believe it can be adapted for many other of private landowner habitat assistance programs. In this presentation, we will describe our partnership's approach to generate success including landowner outreach and screening, landowner enrollment, site visits and implementation, the value of dedicated funding and staff, and the importance of accompanying tracking and monitoring programs.

8:20 AM	<p>Identification of Focal Areas for Golden-winged Warbler Wintering Grounds Conservation</p> <p><i>Ruth Bennett, Ken Rosenberg, Amanda Rodewald —Cornell Lab of Ornithology; Andrew Rothman, American Bird Conservancy</i></p> <p>One of the challenges to Golden-winged Warbler full life-cycle conservation has been the identification of key areas in the wintering range that provide habitat for non-breeding individuals. Although our understanding of the winter range is still imperfect, we have made advancements in mapping Golden-winged Warbler winter distribution and identifying areas with high abundance. We used a combination of occupancy and abundance models, land cover maps, historic records, and local expert opinion to delineate focal areas for the conservation of Golden-winged Warblers in Central and South America. Within the winter range, the vegetative communities occupied by GWWAs change with latitude and longitude.</p> <p>We will present the delineated focal areas for GWWA winter range conservation and the associated habitats in need of conservation in those areas. These focal areas will form a foundational part of the Golden-winged Warbler Wintering Grounds Conservation Plan, which is currently in development.</p>
8:40 AM	<p>Recent Advances in Migratory Connectivity Research on Golden-winged Warblers</p> <p><i>David A. Buehler, University of Tennessee</i></p> <p>Migration ecology is a research frontier that is essential for understanding population dynamics, informing global conservation plans, and building a framework within which ecological and evolutionary questions about speciation, energetics, disease transmission, effects of climate change, and much more can be addressed. Identifying wintering locations and understanding the timing and routes of migration in songbirds, especially very small birds like Golden-winged Warblers (<i>Vermivora chrysoptera</i>), is a particularly formidable challenge. Recent stable-isotope analysis provided a coarse regional map of migratory connectivity in Golden-winged Warblers, but more precise data on migration routes and winter locations for individual breeding populations are needed to inform global conservation activities.</p> <p>In 2013 we deployed 40 light-level geolocators on adult male Golden-winged Warblers breeding in Tennessee and Minnesota. In 2014, apparent return rates of geo-marked birds (46%) were similar to control birds (44%) and similar to long-term averages. In addition to excellent return rates, we observed no apparent adverse effects on behavior or productivity of geo-marked birds. Geolocators retrieved in May 2014 collected high-quality data during the entire annual cycle, and preliminary analysis is underway.</p> <p>In 2014, we deployed 40 additional geolocators on adult males breeding in Pennsylvania and Minnesota. Plans for our 2015-2016 range-wide (at least 10 sites) study, and our hopes to add Blue-winged Warblers and hybrids to that study will be discussed.</p>
9:00 AM	<p>Golden-winged Warbler Conservation: New Recommendations Based on Emerging Science</p> <p><i>Ron Rohrbaugh, Cornell Lab of Ornithology; Amber Roth, Michigan Tech University; Sara Barker Swarthout, Cornell Lab of Ornithology; David Buehler, University of Tennessee; David King, USFS Northern Research Station; Jeffery Larkin, Indiana University of Pennsylvania; Amanda Rodewald, Cornell Lab of Ornithology; Ken Rosenberg, Cornell Lab of Ornithology; Tom Will, U.S. Fish and Wildlife Service; Eric Wood, Cornell Lab of Ornithology</i></p> <p>Adaptive conservation planning requires standardization to generate measurable and repeatable outcomes, and flexibility so that emerging science can be applied to management strategies. We reviewed the 2012 rangewide Golden-winged Warbler (<i>Vermivora chrysoptera</i>) Status Review and Conservation Plan (Roth et al. 2012) in the context of new, full life-cycle scientific findings that have emerged since its publication. We provide an updated summary of primary population-level threats and offer revised Best Management Practices.</p>

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Golden-winged Warbler Conservation: New Recommendations Based on Emerging Science *continued*

	<p>The primary threat to breeding and wintering Golden-winged Warbler populations is land-use change, resulting in forest conversion to human development and agriculture. In the Great Lakes region, which holds 95% of the global breeding population, we recommend protection and improvement of existing habitat, whereas we recommend critically needed habitat creation in the Appalachian Mountains region. The importance of adequate forest cover and patch-level habitat configuration for successful reproduction and to buffer against negative interactions with Blue-winged Warblers (<i>Vermivora cyanoptera</i>) has been previously underestimated. We recommend landscape-scale forest cover of 50-100% and meso-scale (500-m radius) habitat designs that provide nesting habitat that is bounded by older age-class forest or connected to such forest by a dispersal corridor < 200 m in length. On the wintering grounds, we recommend protection of humid forest at 700-1400 m elevation, establishment of a system of national forest reserves, and promotion of agroforestry, such as Integrated Open Canopy Coffee. Given that Golden-winged Warblers likely use a trans-Gulf migration pathway similar to many other Neotropical migrants, we recommend a general strategy of protecting Gulf Coast stopover locations that are important for these species. Further, protection of inland migration pathways such as ridge tops and riparian forests along major river systems could also confer benefits to Golden-winged Warblers.</p>
<p>9:30 – 10:00 AM</p>	<p>BREAK</p>
<p>10:00 AM</p>	<p>Nesting and Territoriality of Golden-winged Warblers in Vegetation Communities Resulting From Different NRCS Conservation Practices</p> <p><i>Kyle Aldinger, West Virginia Cooperative Fish and Wildlife Research Unit, West Virginia University</i></p> <p>The Golden-winged Warbler (<i>Vermivora chrysoptera</i>) is experiencing population declines throughout the Appalachian Mountains breeding range, partly from loss of shrubland and young forest vegetation communities used for nesting. Golden-winged Warbler conservation requires management of these communities. We evaluated <i>Vermivora</i> spp. (Golden-winged Warbler, Blue-winged Warbler [<i>V. cyanoptera</i>], and hybrid) daily nest survival rate (DSR), clutch size, number of fledglings produced, nest site characteristics, and territory density and size in vegetation communities resulting from conservation practices suggested by the Natural Resource Conservation Service’s Working lands For Wildlife: Golden-winged Warbler Habitat Initiative.</p> <p>During 2012-2013, we measured vegetation characteristics at 191 Golden-winged Warbler nests and 33 other <i>Vermivora</i> spp. nests. Across conservation practices, Golden-winged Warblers consistently selected nest sites with 0-10 canopy trees (>10 cm diameter at breast height) within 11.3 m. Selection for other vegetation characteristics varied based on their availability in each conservation practice. For example, timber harvest sites had limited grass cover and Golden-winged Warblers keyed in on locations with grass cover. For 207 nests that reached at least egg-laying, we used program MARK and model selection among two model suites to rank competing models of DSR.</p> <p>Model suite I had site-level and temporal covariates; the three best-supported models suggested that DSR varied by conservation practice and declined linearly as the nesting season progressed for all species. Livestock grazing sites had higher DSR than brush management, prescribed fire, or timber harvest sites.</p> <p>Model suite II had vegetation covariates; the two best-supported models suggested that DSR was associated positively with the number of saplings and negatively with the number of shrubs >2 m tall within 5 m of the nest. We identified 399 Golden-winged Warbler, 30 Brewster’s Warbler hybrid, 14 Blue-winged Warbler, and 1 Lawrence’s Warbler hybrid territories. Territory density ranged from 0.84 (± 0.13 SE) males/10 ha in prescribed fire sites to 2.60 (± 0.51 SE) males/10 ha in brush management sites.</p> <p>This information, along with data collected in 2014, will be used to determine the initial effectiveness of conservation practices and guide future modifications via adaptive management.</p>

10:20 AM

The Golden-winged Warbler: The Impact of Predation and Hybridization on Recruitment Over Time and Place with Examples From S. West Virginia and S. New York

John L. Confer, Ithaca College, Ithaca, NY; Ron Canterbury, University of Cincinnati, Cincinnati, Ohio; Palisades Interstate Park Commission, New York Department of Environmental Conservation

This presentation describes reasons for large differences in recruitment among habitats and proposes adaptive management to optimize golden-wing recruitment. Nine years of surveys in southern New York in Sterling Forest State Park (SFSP) revealed that nesting success was significantly higher in wetland than upland sites. Upland management sites had very low GWWA recruitment due to hybridization and high nest predation rates due to an abundance of black rat snakes and eastern chipmunks. Annual nesting success in upland sites varied greatly due to irruptions of chipmunks at 3 or 4 year intervals. The lower long term recruitment rate for upland sites may create sink habitats.

Wetland sites within SFSP have a higher proportion of GWWA to Blue-winged Warblers (BWWA) and a lower rate of hybridization than uplands. In SFSP and WV the proportion of hybrid Brewster's Warblers (BRWA) varied across years. Sexual selection against BRWA, which occurs widely, reduces the fitness of hybridizing birds

In SFSP wetland sites are being invaded by non-native Phragmites, which displaces the native sedges used for nesting. In 2013 the Palisades Interstate Park Commission began a 3-yr program to remove Phragmites and to model the occupancy of 1400 wetland sites in the Hudson Highlands. Randomly selected sites with emergent vegetation bordering a swamp forest have 40% occupancy. Phragmites removal by hand, chemical spraying, and mechanical cutting is underway.

In southern West Virginia, surveys since 2003 disclosed that GWWA nesting success varied with habitat with the highest success in old, contour mine benches and upland wetlands. All study habitats had reduced recruitment due to hybridization. In 2009, after 22 years of survey, BWWA arrived at the study sites with highest peaks. The main nest predators on GWWA were black rat and black racer snakes, and the eastern chipmunk.

10:40 AM	<p>Habitat Use and Survival of Golden-winged Warbler Fledglings in the Appalachian Mountains</p> <p><i>Justin A. Lehman, University of Tennessee; Darin J. McNeil, Indiana University of Pennsylvania; Kyle R. Aldinger, West Virginia University, Marja H. Bakermans, Worcester Polytechnic Institute; David A. Buehler, University of Tennessee; John A. Jones, Appalachian State University; Curtis Smalling, Audubon North Carolina; Anna Tisdale, Appalachian State University; Petra Wood, U.S. Geological Survey and West Virginia University; Jeff Larkin, Indiana University of Pennsylvania</i></p> <p>Golden-winged Warbler (<i>Vermivora chrysoptera</i>) populations in the Appalachian Mountains region have plummeted, with approximately 98% of the population being lost since the North American Breeding Bird Survey began in 1966. Although numerous studies have documented nest survival and nesting habitat use, no studies in the region have evaluated post-fledging survival and fledgling habitat use. We hypothesized that post-fledging survival may be an important factor in the population decline. Our objectives, therefore, were to document post-fledging survival and associated habitat use, with the goal of ultimately using these data in population modeling. Our study was conducted in the Cumberland Mountains of eastern Tennessee and in the Pocono Mountains of Pennsylvania. In Tennessee, our study sites are being maintained for Golden-winged Warblers with prescribed burning and herbicide on sites that had been mined for coal and on sites in which forest management has been occurring. In Pennsylvania, we monitored fledglings from nests located in upland timber harvests. We located nests by monitoring females during nest-building, laying, incubation and nestling stages. We radio-tagged nestlings in successful nests and monitored their movements daily until they either died, transmitter dropped or failed, or reached independence from their parents. We also characterized habitat at >500 locations where we located radio-tagged fledglings. Based on preliminary analysis, fledgling survival in 2014 appeared to be relatively low in Tennessee with only 8 of 35 fledglings (22%) surviving the duration of monitoring (approximately 30 days). Whereas fledgling survival in Pennsylvania was higher with 13 of 28 (46%) fledglings surviving the duration of monitoring. Observed predators included several species of snakes, small mammals, and raptors. Based on these preliminary results, we have considered potential management strategies to address this apparent limiting factor on Golden-winged Warbler populations.</p>
11:00 AM	<p>Quantifying Golden-winged Warbler (<i>Vermivora chrysoptera</i>) Density and Avian Community Composition on Lands Treated with NRCS Conservation Practices</p> <p><i>Darin J. McNeil, Indiana University of Pennsylvania; Kyle R. Aldinger, West Virginia University; Marja H. Bakermans, Worcester Polytechnic Institute; David A. Buehler, University of Tennessee; John A. Jones, Appalachian State University; Justin A. Lehman, University of Tennessee; Curtis G. Smalling, Audubon North Carolina; Anna C. Tisdale, Appalachian State University; Petra B. Wood, West Virginia University; Jeffery L. Larkin, Indiana University of Pennsylvania</i></p> <p>Extensive loss of forested landscapes with ample early-successional plant communities has directly led to population declines of Golden-winged Warbler (<i>Vermivora chrysoptera</i>) in the Appalachian Mountains. This species' tenuous population status and recent completion of species-specific habitat guidelines has resulted in several habitat-based conservation efforts. One such effort led by the Natural Resource Conservation Service (NRCS) is the Working Lands for Wildlife: Golden-winged Warbler Habitat Initiative (WLFW). This program provides financial incentive for private landowners to create Golden-winged Warbler breeding habitat through the implementation of various conservation practices. Monitoring sites where conservation practices have been implemented is critical for quantifying Golden-winged Warbler response and refining management guidelines. Monitoring will also provide an opportunity to quantify the potential benefits the WLFW effort has for other bird species of conservation concern. We evaluated avian species assemblages associated with Golden-winged Warbler habitat created using four NRCS conservation practices: brush management, prescribed fire, prescribed grazing, and timber harvests. Specifically, we conducted point count surveys at 215 locations across 68 study sites in North Carolina, Pennsylvania, Tennessee, and West Virginia during 2012-2014. We also compared estimates of Golden-winged Warbler density generated from our distance-based point counts to densities determined via intensive territory-mapping at the same locations. We found no differences in the number of Golden-winged Warbler detections per point count by conservation practice ($P = 0.894$). Density estimates generated from distance-based point count data were similar to those determined from intensive territory mapping. We detected a total of 121 bird species across all study sites. Some species were common and widespread across all states while others were restricted to only a single state. The ten most frequently-detected bird species were similar across all states with a pooled total of 21 species. Of these 21 species,</p>

	<p>over half (n = 11) are experiencing significant population declines. This pattern was repeated when we restricted the analysis to only include data from point count locations where Golden-winged Warblers were detected. Our findings demonstrate that, in addition to use by Golden-winged Warblers, areas treated via NRCS conservation practices are valuable for a host of other imperiled bird species.</p>
<p>11:20 AM</p>	<p>Conspecific Attraction in a Low-Density Population of a Declining Songbird, the Golden-winged Warbler (<i>Vermivora chrysoptera</i>)</p> <p><i>Lesley Bulluck, Daniel Albrecht-Mallinger —Virginia Commonwealth University</i></p> <p>Many organisms use both structural and social cues in selecting habitats. Some species of songbirds have been shown to use the presence of breeding conspecifics as a sign of habitat quality, and can be induced to settle in unoccupied habitats by artificially broadcasting breeding song, a process referred to as conspecific attraction. Such a strategy may be especially important in declining and low density species where there is an abundance of suitable, but unoccupied habitat; however most studies of conspecific attraction to date have focused on high density species and populations. In this study, we tested the response to conspecific attraction in a low-density population of the declining Golden-winged Warbler (<i>Vermivora chrysoptera</i>) in Highland County, VA. Response to broadcast song was observed, with a modest increase in mean male abundance at survey points within 250 meters of treatments, and mean abundance decreasing outside of this range. Recruitment to conspecific playback was lower in our study than observed in previous research in high-density systems. Recruited males tended to be younger than in occupied control sites, and we observed less successful breeding in treatment sites compared with control sites, but this difference was not statistically significant. Our results suggest conspecific attraction may be a viable option for fostering local golden-winged warbler population density with two caveats. Follow up monitoring of whether or not successful breeding is occurring is critical in areas where conspecific attraction is used to recruit individuals to unoccupied areas. Further, deployment of conspecific attraction should be tailored to the spatial and demographic conditions of the managed population such that it is located in the vicinity of established breeding areas; the preferred distance to breeding areas and signal intensity has yet to be determined.</p>
<p>11:40 AM – 12:00 PM</p>	<p>National Audubon’s Golden-winged Warbler work Within the Atlantic Flyway</p> <p><i>Curtis Smalling, Audubon North Carolina; Mark LaBarr, Audubon Vermont; Mike Burger, Audubon New York, Andy Hinickle, Audubon New York; Paul Zeph, Audubon Pennsylvania</i></p> <p>The National Audubon Society is working in four states within the Atlantic Flyway to create and enhance habitat for Golden-winged Warblers using the Golden-winged Warbler Conservation and Business plans to guide the work. Efforts in North Carolina, Pennsylvania, New York and Vermont range from continuing demographic and management research with partners through a Conservation Effects Assessment Program grant to advising management on state lands, federal easements, and private parcels through a National Fish and Wildlife Foundation grants.</p> <p>Audubon North Carolina is a founding member of the Golden-winged Warbler Working Group and has spearheaded these efforts in North Carolina and on wintering grounds in Nicaragua. Its goal is to impact 15,000 acres of habitat in western North Carolina within defined focal areas by 2017 and secure about 75% of the estimated population for that state. New York’s current objective is to increase the available high quality habitat by 2000 acres by 2050, maintaining 7000 acres in the St Lawrence Valley. In Vermont work has focused on determining current population levels and habitat requirements within the Champlain Valley and working directly with landowners and industry to maintain a minimum of 2000 acres within this focus area by 2015. Audubon Pennsylvania is working in partnership with Indiana University of Pennsylvania and the Pennsylvania Game Commission to help identify landowners in the GWWA target areas of the state and direct them to local NRCS offices for enrollment in the federal Working Lands for Wildlife program, and to also develop educational programs to raise public and landowner awareness.</p> <p>Funding and partners are diverse and include the National Fish and Wildlife Foundation, the Cornell Lab of Ornithology, NRCS, the Wildlife Management Institute, Clarkson University, land trusts, NYSDEC, USFWS, state and town-owned parks, state fish and wildlife departments and game commissions, the National Wild Turkey Federation, USDA National Forests, the University of Vermont and the Vermont Electric Power Company.</p>