

Cerulean Warbler Summit 2: Development and Implementation of Conservation Actions

February 13-15, 2007

Morgantown, WV



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Introduction

The Cerulean Warbler Technical Group convened a meeting in Morgantown, West Virginia, from 13-15 February 2007 to discuss the development and implementation of conservation actions that will address concerns about the long-term population declines and future status of Cerulean Warblers. The work shop was attended by 66 participants ([Appendix 1](#)), primarily biologists and land managers, from the United States, Canada, Colombia, Ecuador, and Bolivia. The participants represented a wide range of organizations including state and federal agencies (management and research), non-government conservation organizations, universities, and industry. The workshop agenda ([Appendix 2](#)) was designed to solicit feedback from participants on a draft conservation action plan for Cerulean Warblers through a series of facilitated discussions, some of which involved the entire group and some of which took place in small group breakouts. Through this process, the CWTG was asked to provide input on population objectives (global and regional), critical limiting factors and threats (range-wide and within geographic regions), critical information gaps, most important management activities and other conservation actions for addressing limiting factors, and key partners for implementing those actions

TUESDAY, FEBRUARY 13

Welcome, Overview of Cerulean Warbler Technical Group, and Introduction to Workshop

Pat Keyser and Randy Dettmers provided an introduction and overview of the workshop. Highlights include:

- The Cerulean Warbler Technical Group (CWTG) is a multi-stakeholder coalition of scientists and managers from government agencies, academia, non-government organizations, and industries. It formed in 2001, shortly after USFWS was petitioned to list the Cerulean Warbler as a threatened species. The Group's goal is to develop a comprehensive, technically sound approach to Cerulean Warbler conservation outside of a regulatory setting.
- The first Cerulean Warbler Summit was held in December 2002, and resulted in the formation of four working groups within the CWTG: 1) Breeding Season Research, 2) Breeding Season Conservation, 3) Survey and Monitoring, and 4) Non-breeding Season Research and Conservation. Action items were identified and prioritized for each working group.
- Significant progress has been made in the last four years on increasing our knowledge about Cerulean Warblers and in addressing the highest priority actions identified by the various working groups. This workshop is an opportunity to review the current state of knowledge regarding Cerulean Warblers and to provide input into the process of developing a comprehensive conservation plan for this species. Although the USFWS ultimately decided that Cerulean Warblers do not warrant listing under the Endangered Species Act at this time, there continues to be great concern about the long-term declines of this species and the implications if those

trends do not improve in the future. This situation provides a unique opportunity for the CWTG to demonstrate the ability of multi-stakeholder partnerships to achieve successful conservation outcomes outside of a regulatory framework.

- The goal of the workshop is to take another collective step in the process of developing a comprehensive plan of action for the conservation of Cerulean Warblers. The workshop is set up so that participants will use their our collective knowledge to: identify conservation targets for Cerulean Warblers, identify critical limiting factors, describe conservation actions, and identify key partners for implementation (see Figure 1).

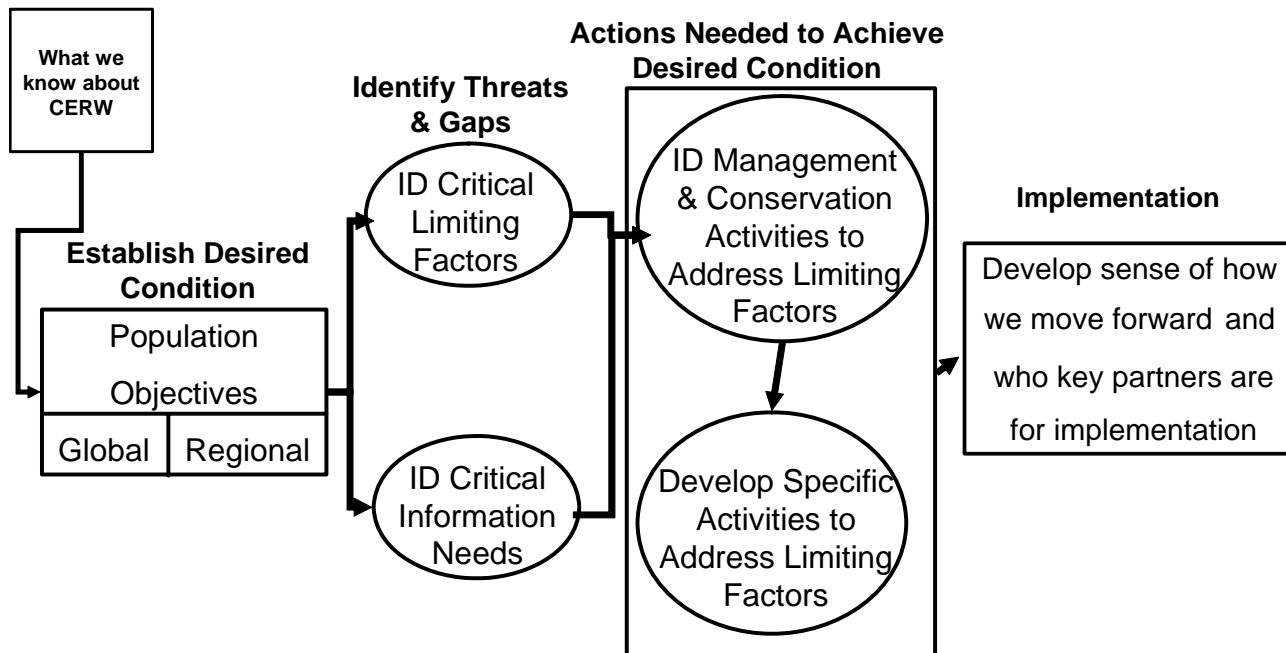


Figure 1. Schematic diagram illustrating the components of the workshop and how information from one section is intended to inform subsequent sections, resulting in descriptions of conservation actions to address critical limiting factors and information gaps.

Presentations to review progress on priority activities identified during 2002 Cerulean Warbler Summit and provide updates on our current state of knowledge

The first morning of the workshop was devoted to presentations, organized around the four CWTG working groups and moderated by the working group chairs. Each working group had the opportunity to inform the audience on progress it had made on the list of action items identified during the 2002 Cerulean Warbler Summit and to relate any new information that had been uncovered in the last few years. The presentations given during the first morning of the workshop are listed in [Appendix 3](#) and will be made available for download in PDF format from a website in the near future.

Breeding Season Surveys and Monitoring (Ken Rosenberg, Chair)

Ken Rosenberg gave the presentation for the Survey and Monitoring Working Group. His presentation included information on the current breeding distribution, population trends, and a review of the work that has been accomplished since 2002. This work including expanding surveys for Cerulean Warblers in the core of their range especially on private industrial forest lands, the development of a number of modeling approaches for predicting where high breeding densities occur, and enhancements to analysis and credibility of the Breeding Bird Survey as an adequate tool for monitoring range-wide breeding populations.

Breeding Season Research (Dave Buehler, Chair)

Paul Hamel began this session by reviewing the current state of knowledge and recent progress in understanding the characteristics of breeding habitat. Paul's presentation covered Cerulean Warbler habitat associations at a variety of spatial scales, from range-wide and regional to forest stand and home range, and summarized what some of the common themes as well as differences that are seen across these scales and among geographic regions of the breeding range.

Dave Buehler gave the next presentation, which covered information that has been learned from studies of Cerulean Warblers in association with forest management. Dave provided updates on the current state of knowledge regarding Cerulean Warbler occurrence, abundance, and reproductive success in relation to forest management, and also described the forest management experiment that currently is being conducted in the core of the breeding range.

Petra Wood provided a recap of information that has been learned regarding the response of Cerulean Warblers to alteration of habitat from surface mining. Petra presented a summary of information on the occurrence and abundance of Cerulean Warblers relative to numerous habitat characteristics that are altered by surface mining, such as landscape-level habitat amounts and configurations, forest patch size, slope position, and edge types. Petra also presented information from Ron Canterbury's work including banding information on male age ratios and nest success information in relation to different mine types. Petra also covered recent several efforts to model Cerulean Warbler habitat in relation to areas that are known or predicted to be altered by surface mining in the relatively near future.

Jason Jones finished the breeding season research session with a presentation on Cerulean Warbler demography and population structure. Jason reviewed the efforts that have been made at demographic population modeling based on data from 5 study sites across the breeding range, as well as looking at annual and monthly survival during the breeding and non-breeding periods. Jason also reviewed information on dispersal, migratory connectivity, genetic and morphological variability, and issues for which we still need better information (e.g., fecundity, survival, immigration/emigration).

Breeding Season Conservation (session organized by Ben Wigley and Pat Keyser)

Ben Wigley provided an update on conservation activities that have occurred on the

breeding grounds since the first Cerulean Warbler Summit. He recapped the efforts of the Cerulean Warbler Conservation Initiative (CWCI), which is a set of projects that contribute to Cerulean Warbler conservation by implementing research/survey priorities of the CWTG for both the breeding and wintering grounds. The CWCI involves multiple partners with funding from the National Fish and Wildlife Foundation and matching contributions from non-federal partners. The activities that have been funded under the CWCI include work on developing habitat management guidelines, forest management research, breeding ground surveys, analysis and modeling using breeding ground survey data, summaries and analysis of historical breeding ground data, habitat assessment and surveys in South America, and studies of non-breeding ecology and demographics. The CWTG also convened conservation coordination meetings in March 2006 to discuss forestry-related and mining-related issues with representatives from those two industries. These meetings were productive and established a number of areas of agreement and collaboration among CWTG members and industry representatives, including some draft examples of forestry and mining practices that could be beneficial to Cerulean Warblers. Summaries of these meetings are included in [Appendix 4](#).

Patrick Angel, with the U.S. Department of the Interior - Office of Surface Mining (OSM), gave a presentation on the Appalachian Regional Reforestation Initiative (ARRI), which is a joint effort between OSM and the states in the Appalachian Mountains with coal reserves. ARRI is a cooperative conservation initiative promoting establishment of high quality forests on lands that have been mined. The goals of ARRI are to plant more high-value hardwood trees on reclaimed surface mines in the Appalachians, to increase the survival and growth rates of those trees, and expedite the establishment of forest habitat through natural succession. These goals clearly have potential benefits for Cerulean Warblers and their breeding habitat. ARRI is a broad partnership with participation from OSM, state mining regulatory authorities, academia, environmental groups, mining industry, and private landowners. Patrick described the Forestry Reclamation Approach, which is the reclamation method being recommended by ARRI for reforesting mined lands. Patrick invited the CWTG show its support for ARRI by signing the ARRI Statement of Mutual Intent.

El Grupo Cerúleo: Non-breeding Season Research & Conservation (Paul Hamel, Chair)
Paul Hamel led off the non-breeding session with an introduction to El Grupo Cerúleo, the working group addressing non-breeding issues. He reviewed the history of this working group and its participants. He summarized the action items that El Grupo had identified during the first Cerulean Summit and mentioned some of the progress that has been accomplished on those tasks, including the habitat model that has been developed for South America and the efforts to survey for migrating Cerulean Warblers in Central America. Paul then introduced the other speakers who would be giving presentations during this session.

Sebastian Herzog and Victor Hugo Garcia presented results from their surveys for Cerulean Warblers in the southern portions of the non-breeding range in Bolivia and

Peru. Esteban Guevara presented results from surveys in northern Ecuador. David Caro reviewed activities of ProAves for Cerulean Warbler research and conservation in Colombia. Diego Calderon-Franco presented information from studies of Cerulean Warbler behavioral ecology in Colombia. Jorge Botero talked about Cerulean Warblers in the coffee-growing region of Colombia. Tomás Cuadros introduced the idea of “silvopasture” management to benefit Cerulean Warblers in the Colombian Andes. Gabriel Colorado discussed the predictive habitat model in more detail and plans for evaluating the accuracy of the model throughout the South American range of Cerulean Warblers. Pablo Andrade was scheduled to present results from studies of Cerulean Warblers in southern Ecuador but was delayed in arriving at the conference due to travel problems. Melinda Welton presented more detailed results from survey efforts for migrating Cerulean Warblers in Central America, an initial predictive model of migratory stop-over habitat in that region, and plan for additional surveys based on the model.

Overview of the draft Cerulean Warbler Conservation Action Plan

Randy Dettmers provided a brief overview of the draft conservation action plan for Cerulean Warblers, which had been developed primarily for the purposes of satisfying reporting requirements for the U.S. Fish and Wildlife Service’s Focal Species program. The draft plan represents a broad overview of some of the key activities that are likely to be needed for conservation of this species and was circulated to meeting participants via email before the workshop. However, significant additional input on the plan, especially in terms of more detailed description of actions and recommendations as well as defining the conservation goal for this species, is needed from the CWTG. The rest of this workshop is designed to get that input from the meeting participants. The draft conservation action plan is available from Randy Dettmers.

Developing population and habitat objectives at multiple scales

Ken Rosenberg began this session with a short presentation ([Appendix 5](#)) on developing population objectives, to get the group thinking about this exercise. His presentation covered some of the different conceptual approaches that are commonly used for developing population objectives, including population-based approaches, population-as-surrogate approaches, and human-oriented approaches. Ken also reviewed the Partners in Flight approach to population estimation, including the estimate for Cerulean Warblers, and use of those estimates to inform development of conservation targets. He ended the presentation by proposing five alternative global population objectives for the workshop participants to consider:

- 1) Prevent extinction: maintain minimum viable population in core of range
- 2) Prevent endangerment: maintain sustainable population(s) over a significant portion of present range
- 3) No net loss: stop population declines and maintain current population levels and distribution
- 4) Historic baseline of 1980s (Partners in Flight goal): would require doubling the current population and restoring distribution to 1980s levels
- 5) Historic baseline of 1960s (pre-Breeding Bird Survey): would require a four-fold increase of the current population and restoring distribution to 1960s levels

Next, Tom Will led the whole group in a discussion of the concepts and the specific alternative Cerulean Warbler population objectives that Ken had presented. Participants had an opportunity to discuss and express opinions about which approaches to setting population objectives were most appropriate for Cerulean Warblers, the usefulness of having population objectives, and the realities of setting objectives for a species such as the Cerulean Warbler. A lively round of discussion ensued, but in the end, the group was not inclined to alter the five alternative population objectives that Ken had proposed.

During the afternoon break, participants were asked to participate in a group scoring exercise using Survey Monkey, a web-based program for capturing and summarizing individual responses from large groups. The workshop participants were asked the following three questions in the Survey Monkey exercise:

- 1) Select the answer that best represents your choice for a global population objective for Cerulean Warblers over the next 50 years.
 - a) Prevent extinction: maintain minimum viable population in core of range
 - b) Prevent endangerment: maintain long-term, sustainable population(s) over significant portion of present range (allows some continued declines)
 - c) Status quo - No net loss: stop population declines and maintain current population levels and distribution
 - d) Historic baseline (PIF): restore to 1980s levels
 - e) Historic baseline (pre-BBS): increase population four-fold and restore distribution to 1960s levels

- 2) Which area from the list below do you feel most aligned with in your Cerulean Warbler conservation efforts?
 - a) Range-wide
 - b) South America
 - c) Northeast (PA, NY, NJ, New England, Ontario)
 - d) Cumberland Plateau and Ohio Hills physiographic regions
 - e) Portions of Alleghenian BCR and Central Hardwoods BCR (excluding Cumberland Plateau and Ohio Hills)
 - f) Lower Mississippi Valley and Midwest

- 3) What is the affiliation are you representing at this meeting?
 - a) federal government
 - b) state government
 - c) academia
 - d) regional/national/international Non-Governmental Organization
 - e) local Non-Governmental Organization
 - f) industry
 - g) other

Results of scoring exercise on global population objectives

The overall results for the question inquiring about a global population objective for Cerulean Warbler were as follows:

- 0% (0 of 54) - Prevent extinction: maintain minimum viable population
- 6% (3 of 54) - Prevent endangerment: maintain sustainable population
- 17% (9 of 54) - Status quo - No net loss
- 70% (38 of 54) - Historic baseline (PIF): restore to 1980s levels
- 7% (4 of 54) - Historic baseline (pre-BBS): restore to 1960s levels

These results indicated a noticeable amount of variability in responses, but a clear majority of participants selected the alternative for doubling the population and restoring to 1980s levels. Given these results, the group agreed to move forward with a global population objective of doubling the current population, even though there was not unanimous support for this objective as indicated in the results of the survey.

A break down of these results by regions and organizations is provided in [Appendix 5](#). One interesting result from the regional and organizational information is that only 12% (4 of 33) of the participants identifying themselves with one of the regions on the breeding grounds chose a population objective of either “status quo” or “prevent endangerment.” Thirty-eight percent (8 of 21) of the participants identifying with the South American portion of the range or with the entire range chose “status quo” or “prevent endangerment” as their preferred population objective.

Breakouts by geographic regions to determine regional population and/or habitat objectives

Following the large group discussion and scoring exercise to arrive at a global population objective, participants broke into groups based on geographic regions to develop regional population and/or habitat objectives. The five regions for these breakouts were: South America, Northeast (PA, NY, NJ, New England, Ontario), Cumberland Plateau and Ohio Hills physiographic regions, Other Portions of Appalachian BCR and Central Hardwoods BCR (excluding Cumberland Plateau and Ohio Hills), and Lower Mississippi Valley and Midwest. The North American regions followed the delineations depicted in Figure 2.

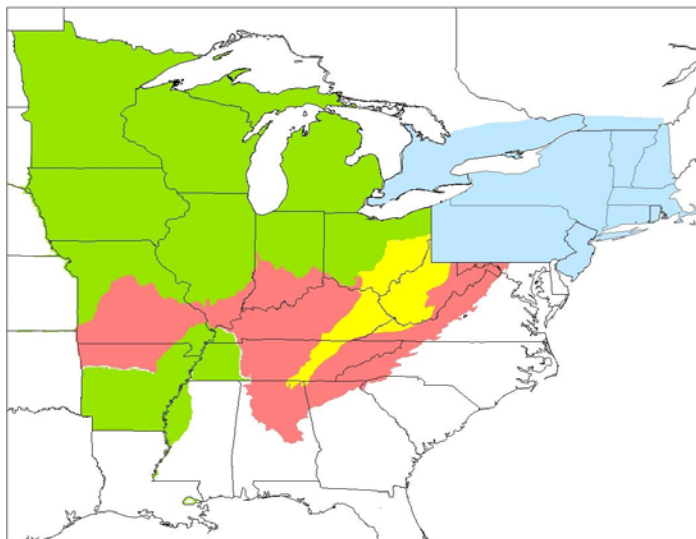


Figure 2. North American geographic regions used for forming breakout groups for sessions on regional population objectives and limiting factors. The regions are the Northeast (light blue), the Cumberland Plateau and Ohio Hills (yellow), Other Portions of the Appalachian Mountains BCR and the Central Hardwoods BCR (red), and the Lower Mississippi Valley and Midwest (green).

Each regional breakout group was tasked with developing a regional objective that represents an appropriate contribution toward the global Cerulean Warbler objective of restoring the population to 1980s levels. The groups were told that regional objectives could be defined in terms of populations and/ or habitat metrics, with options for allowing those metrics to take a variety of forms (e.g., population size, population trend, demographic parameter, habitat quantity, habitat quality). Each group was encouraged to consider what it thought was the most significant contribution their region could make toward the global objective and to discuss what the most appropriate metric would be for describing and defining that contribution to the overall objective. They were also encouraged to keep notes on additional information that might be helpful or necessary to develop meaningful regional objectives. The groups had approximately 1hr 15min for this breakout session.

The notes captured during each of these breakout sessions are included in [Appendix 5](#). These results were reviewed during the evening and a short presentation summarizing the outcomes from each region was prepared for delivery the next morning.

WEDNESDAY, FEBRUARY 14

Review of outcomes on regional objectives from previous afternoon

Randy Dettmers gave a short presentation summarizing the results for regional objectives from products of the five regional breakout groups. Since almost all of the material in the presentation was pulled directly from the breakout session notes, which are included in [Appendix 5](#), this presentation is not included as part of this document in order to save some space. A very brief summary of the results includes these points:

- In South America, the objectives are to 1) maintain existing amounts of primary forest, and 2) improve the quality and quantity of other suitable habitats (e.g. shade coffee and other shade plantation agriculture)
- In North America, all of the regions accepted a straight translation of the global objective to their regional scale and set their objective at restoring breeding populations to 1980s levels. To accomplish those objectives, the following strategies were suggested:
 - Improve habitat quality in the core of the breeding range, especially around areas of high Cerulean Warbler density
 - Outside of the core breeding area, increase the amount and quality of forest patches around existing centers of abundance to build on existing local source populations.
 - A note of interest: most regions that are not within the current core breeding area felt that sufficient amounts of habitat already exist to support twice as many birds as currently occur in those regions.

Introductions to and instructions for the two breakout sessions scheduled for the rest of the morning (one before and one after the morning coffee break) were given. The first breakout session focused on identifying limiting factors within geographic regions and

the second session was used to identify important information gaps in our knowledge about Cerulean Warblers.

Identifying critical limiting factors within geographic regions

The working definition for “critical limiting factor” in this exercise was a threat or agent that will likely impede our ability to meet our population objectives for reversing Cerulean Warbler declines (i.e., will have a large effect on future Cerulean Warbler trends). In some cases, these limiting factors may be identical with or related to the suspected causes for historical population declines; in other cases, these may be factors which may not have operated in the past but which will likely make it difficult to achieve positive results for Ceruleans in the future. The focus will be on addressing factors that will prevent effective future Cerulean conservation; we seek to address historical causes of declines only to the extent that they are likely to affect future conservation actions. For the purposes of this exercise, we assume multiple limiting factors and do not necessarily ask for the ONE factor that constitutes the Cerulean bottleneck. Nonetheless, the term “critical” implies that these threats are important enough that Cerulean populations are unlikely to increase if these threats are not ameliorated.

Participants broke into groups based on the same geographic regions as used Tuesday afternoon and were asked to develop lists of critical limiting factors within their region. To do this task, the groups were asked to generate “cause and effect” propositions under five general categories: habitat quality, habitat quantity, direct mortality, atmospheric phenomenon, and links with other regions. Each propositional statement was to identify a casual factor and describe the proposed effect it will have on the Cerulean Warbler population. The importance of maintaining parity among these propositional statements with regard to the ecological levels they addressed was stressed. Maintaining similarity in the ecological levels of the propositions makes ranking the propositions easier within regions and comparing the results among regions easier. Each proposition was also to be scored based on three supplemental scores for magnitude of effect, level of certainty, and range-wide applicability. These supplemental scores were designed to help the groups rank their propositions and identify what they felt were the most critical limiting factors in each region.

The worksheets with the complete results from each breakout out group are included in [Appendix 6](#). A summary of the top limiting factors identified by each group includes:

- Northeast: forestry practices (e.g., high grading, diameter limit cuts) that remove the largest trees and the primary canopy structure; management trends toward no action in some forests is resulting in high stand stocking and small stem diameters; urban sprawl and ex-urban development is causing removal forest patches and forest fragmentation
- Cumberland Plateau/Ohio Hills: reduction of overall forest cover to below 70% caused by cumulative effects; lack of silvicultural disturbance that improves canopy heterogeneity in mature hardwood forests; human development/urbanization removes and fragments breeding habitat; surface mining removes and fragments breeding habitat

- Appalachians/Central Hardwoods: human development/urbanization reduces and fragments available breeding habitat; high proportion of existing forestland lacks appropriate structural diversity; some silvicultural techniques don't produce suitable habitat within the region
- Midwest and Lower Mississippi Valley: decreased breeding habitat availability due to land use patterns (development, agricultural conversion); overabundant cowbird populations reduce breeding productivity; poor productivity and survival in small and isolated forest patches; altered hydrologic regimes will reduce the availability, condition, and structure of mature forest habitat
- South America: continued loss and degradation of suitable secondary habitat (e.g., shade-coffee) at altitudes where Cerulean Warblers are found; loss of primary forest impacts overall landscape context and overall suitability of surrounding habitats; loss of primary forest directly limits habitat availability

During a break after the limiting factors breakout session, the workshop participants were asked to take part in another Survey Monkey exercise to solicit individual's opinions about the overall most critical limiting factors across the entire species' range. Each participant was asked to respond to the following: "Choose the 4 range-wide factors from the list below that you think are the most important in limiting CERW populations."

The overall results (Table 1) showed the factor that the most participants felt was involved in limiting Cerulean Warbler populations was loss of non-breeding habitat quantity due to land use changes in the Andes Mountains. Loss of breeding habitat quality due to forest fragmentation and decreased patch size (including secondary effects such as increased predation) was another factor that more than half the participants identifies as limiting overall populations. Large-scale habitat alterations on the breeding grounds, land use changes along the migratory route, human development/urbanization, and incompatible forest management also were identified as critical limiting factors by at least 35% of the people who participated in the survey.

Table 1. Results from the group-wide survey of workshop participants' opinions on which range-wide factors are the most important in limiting Cerulean Warbler populations.

Survey Instructions: Choose the 4 range-wide factors from the list below that you think are the most important in limiting CERW populations.		
Limiting Factor	% of Respondants	# of Respondants
Loss of non-breeding habitat (i.e., native forest and shade plantations) QUANTITY due to land use changes in the Andes	73%	37
Loss of breeding habitat QUALITY due to fragmentation and decreased patch size (including secondary effects such as predation)	59%	30

Loss of breeding habitat QUANTITY due to landscape-scale alterations (e.g., mining, agriculture, etc.)	47%	24
Loss of QUALITY of non-breeding habitat due to land use changes in the Andes	45%	23
Loss of breeding habitat QUANTITY due to development/urbanization	41%	21
Loss of breeding habitat QUALITY due to CERW-incompatible forest management	39%	20
Loss of non-breeding habitat QUANTITY along the migration route due to land use changes	37%	19
Loss of breeding habitat QUALITY due to lack of natural disturbance	22%	11
Mortality during migration due to increased severity and frequency of weather events	20%	10
Lack of suitable post-fledging habitat due to land use changes in North America	10%	5
Decline in food availability due to global climate phenology changes	8%	4
Direct mortality due to collisions with human-made structures	2%	1
Total Respondants	100%	51

Identifying critical information needs that limit our ability to develop effective conservation actions

During the second session of the morning, participants were asked to generate lists of information needs that are important to address in order for the group to move forward with understanding the limiting factors for this species and to develop effective conservation actions. Breakout groups were formed around five topical issues: site specific demography (e.g., fecundity, survival), “movement” demography (e.g., dispersal, migratory connectivity), survey and monitoring tools, behavioral characteristics (e.g., habitat selection, dietary flexibility, sociality), and broader non-bird information (e.g., fluctuating timber and agricultural markets, projections of coal supply and demand, changes in land ownership patterns). Participants self-selected among these groups. The groups were encouraged to do some basic brainstorming of critical information needs associated with these topics, then discuss and refine their lists of ideas, and ultimately to have each group identify their top five information needs.

The complete lists of information need ideas generated during these breakout sessions are presented in [Appendix 7](#). The top five information needs from the groups are as follows:

- Site-specific demographics:
 - Improve estimates of adult & juvenile survival on breeding grounds
 - Better delineate distribution and abundance on wintering grounds, including temporal patterns
 - Better defining specific habitat parameters on wintering grounds
 - Site specific knowledge of “important areas” on the wintering grounds
 - Survival rates by habitat specific parameters on the wintering grounds

- Movement demographics
 - What habitat are used during the post-fledging/pre-migration period (both adults and juveniles)?
 - At what time period are birds most vulnerable to mortality?
 - What is the extent of the spring migration staging/stop-over area in Central America?
 - How strong is non-breeding site fidelity between and within seasons?
 - Are there any age- or sex-specific differences in movements?

- Survey and monitoring tools
 - Link monitoring efforts to address habitat conditions and drivers of population change
 - Conduct more standardized surveys, including training and better materials, plus exploration of new areas in Central & South America
 - Development of longer term trend monitoring in South America
 - Explore and use modeling approaches to better integrate monitoring and trend information
 - Monitoring of migration pathways and potential hotspots
 - Improve sampling methodology to increase confidence that we’re finding existing populations and identify hotspots
 - Improve sampling methodology to increase confidence that existing populations and hotspots are being found

- Behavioral characteristics
 - Habitat preferences (females/juveniles/males) on wintering grounds
 - Individual responses to area sensitivity across geographic areas
 - Sensitivity to fragmentation and effects of fragmentation on productivity
 - Is there a sex/age difference in habitat selection or use? If so, what are the mechanisms?
 - Strength of site fidelity, especially in response to habitat loss

- Non-bird information
 - Better information on land-use patterns in Andes & Central America
 - Economic or cultural factors influencing management of cafetales
 - Understanding wood products market forecast projections
 - Factors driving conversion of forestland to non-forest uses
 - Understanding coffee market forecast projections
 - Understanding energy (coal, oil, gas, wind) market forecast projections

Identifying and describing conservation actions to address critical limiting factors

Results from the survey of participants' opinions on range-wide limiting factors were presented to the entire group, as well as a short summary of the limiting factors identified in the regional breakout groups. These results were used to develop five broad categories of limiting factors, which served as the issues for forming the afternoon breakout groups. These broad categories of limiting factors were:

- Habitat loss (quantity) due to land use changes and human development on the breeding and non-breeding grounds
- Degradation of habitat quality due to land use changes on the breeding and non-breeding grounds
- Loss of and inability to restore breeding habitat due to large-scale habitat alterations (also asked this group to address issue of potential decreased reproductive success due to increase in frequency of severe weather events)
- Degradation of breeding habitat quality due to inappropriate management of forests, natural disturbance, and wildlife
- Factors associated with migratory periods

For each of these groups, at least two more specifically identified limiting factors under the broad categories were provided for the group to discuss. Participants self-selected the groups they would take part in. The groups were instructed to first brainstorm a list of conservation actions that could be used to address each of the more specific limiting factors assigned to the group under their broad category. For each conservation action, the groups were asked to provide a score (from 1-3, with 3 being the highest) for the urgency of need for implementing a given action, the magnitude of effect the action would have, and the certainty that each action would have the intended effect if implemented. These scores were used in helping groups identify the highest priority actions for addressing their limiting factors.

The highest priority actions coming out of the first part of the afternoon session on conservation actions were then used in the second half of the session as targets for developing as detailed descriptions as possible regarding what these conservation actions are and how they are to be implemented. In addition to detailed descriptions of the actions, the groups were asked to identify key partners and contributing partners for getting the actions implemented, the regions in which it is most important for the actions to be implemented, and a cost for implementing the actions (if possible to estimate).

Complete results from the exercises to brainstorm lists of conservation actions and then develop detailed descriptions of the highest priority actions are included in [Appendix 8](#) for all five of the breakout groups. The products from this session were extensive and provided many good ideas. Distilling them into a short summary is difficult, but the following are some of the highlights:

- For addressing loss and degradation of non-breeding habitat:
 - Maintain existing natural forest areas and restore degraded areas where possible
 - Identify & protect sites that support high densities of Cerulean Warblers
 - Continue research to determine characteristics of 'quality' habitat

- Promote shade-grown coffee and increase amount of agro-forestry
- Promote conversion of pasture to forested habitats
- Increase education of land managers & stewards
- Provide information to certification bodies so they could include criteria beneficial to Cerulean Warblers in the certification process
- Encourage tax incentives to promote forest protection
- Identify and create appropriate post-fledging/pre-migration habitat
- Identify, monitor, and protect important migratory stopover and staging sites
- Reduce potential mortality issues with human-made structures during migration
- To address loss and degradation of breeding habitat:
 - Develop better characterization of 'quality' habitat in relation to demographics
 - Identify & protect 'high quality' Cerulean Warbler breeding sites
 - Fully develop and adopt the draft forestry & mining guidelines crafted during the Charleston, WV meetings in March 2006
 - Develop outreach methods that continue to educate the public & mining industry, and develop partnerships
 - Develop region-specific forest management guidelines (engaging forest industry/mgrs in the process to assist with this)
 - Engaging /educating forest managers and certification programs in using Sustainable Forest Management techniques applicable to Cerulean Warbler
 - Develop silvicultural surrogates of natural disturbance regimes
 - Foster the reforestation of surface mines
 - Create & implement Cerulean Warbler-friendly Reclamation Plans with "boiler plate" permit language for surface mine operators to use as a specific post-mining land use
 - Investigate ways to reduce re-mining of reclaimed habitat by creating incentives to remove all coal at once
 - Protect large forest patches near development and increase amount of buffer between forest and development/edge
 - Improve forest stand stocking to approximate 'quality' habitat
 - Develop economic forecasting tools to predict impact of forestry & energy development on Cerulean Warbler habitat
 - Influence what happens to vast landholdings that encompass Cerulean Warbler habitat that are sold by forest products industries
 - Education/outreach to professional regional planners

THURSDAY, FEBRUARY 15

Presentations of conservation actions developed by breakout groups on Wednesday afternoon

On Thursday morning, each of the five breakout groups from Wednesday afternoon had the opportunity to present their results to the entire group as an opportunity for everyone to review the recommended activities, ask questions, and provide additional input.

Most of the breakout groups simply projected their results as captured in the Excel worksheets and highlighted the activities that came out as most important as well as some of the thoughts behind why. So the worksheets provided in [Appendix 8](#) reflect

most of the information that was presented to the group, with the exception of the group that worked on issues associated with loss of habitat quality on the breeding and non-breeding grounds. That group developed a short PowerPoint for presenting their results to the group, and that presentation is included in [Appendix 8b](#) (and will be available on a website soon). Some notes of the discussions that occurred in association with these presentations were captured by Teresa Woods, and those notes are also included at the end of [Appendix 8c](#).

Synthesis presentation on management recommendations and other conservation actions as identified through the breakout sessions

Randy Dettmers gave a short presentation ([Appendix 9](#)) that Teresa Woods, Randy, and Tom Will had developed to illustrate the kinds of synthesis that is possible to pull out of all the information that had been collected during the previous two days. They used an example related to limitations of habitat quality and quantity in South America to tie together the population objectives and limiting factors that were identified during the regional breakout sessions and the conservation actions that were identified by the groups that focused on non-breeding issues. Promoting shade-grown coffee and other shade-plantation products was one of the key activities that was identified, along with a rather large group of key partners necessary for accomplishing that activity. This result highlighted the importance and necessity of continuing to foster partnerships among diverse stake holders in order to achieve many of the conservation actions that had been identified during the breakout sessions on Wednesday afternoon. Developing mine reclamation guidelines that would benefit Cerulean Warblers was another activity that was highlighted and for which clear interest for pursuing this activity was expressed.

Maintaining communication within the CWTG and among partners, including opportunities for reviewing products from this workshop

Randy Dettmers provided a short discussion of means for maintaining communications among people involved in Cerulean Warbler conservation efforts. One means of supporting such communication is through the structure of the CWTG with its Steering Committee and working groups. The working groups will continue to be: Breeding Season Research (chaired by Dave Buehler), Breeding Season Monitoring and Surveys (chaired by Ken Rosenberg), Breeding Season Conservation (no current chair), and Non-breeding Season Research, Monitoring, and Conservation (chaired by Paul Hamel). Anyone with an interest in actively participating in these working groups should contact the working group chair or one of the Steering Committee members. The current Steering Committee is composed of the following people:

Deanna Dawson, Co-Chair	Paul Hamel
Ben Wigley, Co-Chair	Jason Jones
Dave Buehler	Pat Keyser
Jimmy Bullock	Ken Rosenberg
Greg Butcher	Brian Smith
Carol Croy	Tom Will
Dean Demarest	Petra Wood
Randy Dettmers	

Another means of supporting communication within the CWTG is a website that is being developed. The website will primarily serve as an Internet-based version of a Cerulean Warbler conservation action plan, but also provide some basic information on the CWTG, background on the bird, links to partners, and opportunities for posting accomplishments reports from partners. The site will be WWW.CERWARBLER.ORG We anticipate that the site will be up and running by July 2007.

Product from this workshop will be circulated to all participants for review and will then be used to update the draft conservation action plan that had been distributed by Randy Dettmers prior to the workshop. The timeline for review workshop products and revising the action plan is as follows:

March 2007 – products from CERW Summit 2 sent out to participants

April 2007 – comments due on workshop products

July 2007 – revised CERW Conservation Action Plan circulated to all CWTG participants for comment; CERWARBLER.ORG gets launched

September 2007 – comments due on revised Action Plan

October 2008 – comments incorporated and revised Action Plan released, with associated updates to CERWARBLER.ORG

Closing Talk

Pat Keyser closed the workshop with an excellent talk on the importance of continuing the work that the CWTG has begun, as well as the unique opportunity that this group represents for showing how broad-based, multi-partner conservation initiatives can be instrumental in maintaining healthy populations of neotropical migratory songbirds. The following excerpts were captured by Teresa Woods during Pat's talk and provide a good sense of the ideas Pat communicated to the group.

“This (Cerulean Warbler conservation) is a long process. It started with a phone call between two people, and has grown to what it is now. The fieldwork, in North America and South America, is extremely critical. This isn't just about meetings--it is about getting things done. We have reached a milepost at CERW Summit 2. We have taken 5000 steps, now we take step 5001. Even after peer review, the plan we are working on will have some missing parts. This plan is a tool to communicate to decision makers. It is extremely important. In retrospect, we may find some of our action items are silly, but we will learn this as we go.

The USFWS recently made a decision not to list this bird as federally threatened. But recognition that we still have a few 100,000 birds is not a signal to go home. We have the opportunity to engage in conservation without regulation. We can engage stakeholders with freedom from regulation. Perverse incentives – such as those associated with the Red Cockaded Woodpecker listing—created a massive penalty for owning large pine trees. The message for landowners was don't have large trees. How can a guy in West Virginia with a \$15,000 income can still make a living and feed his three kids? How can we help?

Healthy viable forests is our goal. The CERW is helping us recognize what a healthy forest is. The process is painful. It is painful, but it is important. Planning a reasonable approach is hard, slow, and we are getting closer to the goal. Let's not stop.

What we do is for the future. Look back and see how far we have come. We have more forest in eastern North America now than we have had any other time in the past century. Water quality is better here. Forests are returning. There is reason for optimism. This group must find a way, with human dignity, to convince decision makers, legislator, and landowners that this is worth the effort. If not us, then no one else will.”

Invitation for next Cerulean Warbler Summit

At the close of the workshop, El Grupo Cerúleo extended an invitation to the entire Cerulean Warbler Technical Group to hold its next Summit in Colombia during November 2008.

Appendix 1. Cerulean Summit 2 workshop participants

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Appendix 2. Agenda for the Cerulean Summit 2 workshop

Tuesday, February 13

8:30am

Welcome, Overview of Cerulean Warbler Technical Group, and Introduction to Workshop Objectives

8:45am

Review of progress on priority activities identified during 2002 CERW Summit and update on our current state of CERW knowledge

- Breeding Season Monitoring:
(30 min total – Ken Rosenberg, session leader – Chair of Survey and Monitoring group)
- Breeding Season Research:
(1 hr total – David Buehler, session leader – Chair of Breeding Season Research group)

MORNING BREAK (10:15am – 10:30am)

- Breeding Season Conservation:
(30 min total – Ben Wigley, session leader w/assistance from Pat Keyer)
- Non-breeding Season Research & Conservation:
(1.5 hrs total – Paul Hamel, session leader – Chair of Non-breeding Season group – El Grupo Cerúleo)

12:30pm – 1:30pm

LUNCH

1:30pm

Overview of draft CERW conservation action plan

1:45pm

Developing Population and Habitat Objectives at Multiple Scales

- a. short presentation on where estimates of population trend and size come from and a set of potential global population objectives for the participants to consider (20-30 minutes total)
- b. group discussion to elicit different perspectives on the proposed global population objectives, followed by a scoring exercise (30 minutes)
- c. AFTERNOON BREAK (20 minutes)

- d. Present results of scoring exercise to entire group and establish agreement on a global population objective for CERW (30 minutes)
- e. Break out by geographic regions to determine regional population and/or habitat objectives that will support the global population objective (1.5 hrs)
**NOTE: regional objectives might be defined by different metrics or currencies and don't have to be the same as the global objective – just need to be appropriate for that region's contribution to the global objective*
*** Proposed REGIONS: a) Northeast (PA, NY, New England, Ontario, NJ,) , b) Cumberland Plateau and Ohio Hills physiographic regions, c) other portions of Appalachian BCR and Central Hardwoods BCR, d) Lower Miss. Valley and Midwest, e) South America*

5:00pm ADJOURN FOR THE DAY

Wednesday, February 14

8:30am

Review of outcomes from previous afternoon; Introduction today's activities/exercises and intended outcomes (*i.e., what will need to be done to reach the objectives developed during the previous afternoon?*)

9:00am

Breakout by geographic regions

- Develop lists of factors limiting our ability to reach the population objectives in each region; provide scores for magnitude of effect and confidence for each factor; uses scores to help identify the most critical limiting factors for each region
- followed by a voting exercise to elicit participants' input on which limiting factors are most critical at the global scale (voting occurs during the break)

10:15am – 10:45am

MORNING BREAK

10:45am

Breakouts by topical issues to identify critical information needs hindering our ability to develop effective conservation actions – proposed issues for breakout groups:

- 1) "site specific" demographic factors: *e.g., fecundity, survival*
- 2) "movement" demographic factors: *e.g., dispersal (juvenile & adult), migratory connectivity*
- 3) *survey and monitoring tools: e.g., improving population size & trend estimates at multiple scales, appropriate parameters for assessing progress toward population goals*
- 4) *behavioral characteristics: scale-dependent habitat selection, non-breeding dietary flexibility, breeding season semi-coloniality, non-breeding season territoriality or sociality*
- 5) *broader non-bird information needs: changes in land-tenure patterns, fluctuating timber markets, projections of coal supply and demand, second-home developments in the Appalachian Bird Conservation Region*

- brainstorm a list of the critical information needs under each topical issue – what information are we lacking for making effective progress on conservation goals?
- from the brainstormed list, select the five most critical information needs

12:00pm – 1:00pm

LUNCH

1:00pm

Presentation to entire group of products/outcomes from morning breakouts to develop a common sense of what the most critical limiting factors are – set the stage for afternoon breakouts where management recommendations are developed to address those limiting factors. Discussion from entire group and opportunity to refine or enhance list of most critical limiting factors, if needed

2:00pm

Breakouts by critical limiting factors as identified through morning breakouts

a) develop list of management recommendations or other conservation activities that could be developed to reduce impacts to CERW under each critical limiting factor;
b) within each breakout group, provide scores (from 1 to 3) for the level of urgency of need, magnitude of its effect, and certainty of effect for each of the brainstormed actions that was just created; use scores to help identify high priority actions for further development after the break

3:15pm – 3:30pm

AFTERNOON BREAK

3:30pm

Breakouts by limiting factors (continued)

c) within each breakout group: for the management recommendations or conservation activities that were just identified as highest priority by that group, develop detailed management recommendations, prescriptions or other conservation actions that can be used to reduce the impacts to CERW from limiting factors

5:00pm ADJOURN FOR THE DAY

Thursday, February 15

8:30am

Presentations of conservation actions developed by each breakout group from Wednesday afternoon (15-20 min per group) – opportunity for everyone to review recommended activities, ask questions, and provide additional input

10:00am

Synthesis presentation on management recommendations, including summary of activities by regions and for which various organizations are identified as key partners for implementation

10:30am – 10:45am
MORNING BREAK

10:45am
Introduce Cerulean Warbler Technical Group website, including tools for tracking progress toward conservation goals and maintaining communication among partners; Also discuss opportunities for reviewing product from this workshop and the next steps for the Cerulean Warbler Technical Committee

11:10am
Closing Presentation – The Future of Cerulean Warbler Conservation

11:30am ADJOURN

Appendix 3. PDF versions of PowerPoint presentations given during the opening session of Cerulean Warbler Summit 2.

Appendix 3a: Ken Rosenberg – Cerulean Warbler: Population Status and Breeding Season Monitoring

Appendix 3b: Paul Hamel – Cerulean Warbler Habitat Characteristics

Appendix 3c: David Buehler, Petra Wood, Paul Hamel – Relationships between Cerulean Warblers and Forest Management on the Breeding Grounds

Appendix 3d: Petra Wood, David Buehler, Ron Canterbury – Cerulean Warbler Breeding Ground Perturbations from Surface Mining

Appendix 3e: Jason Jones and numerous collaborators – Cerulean Warbler Demography and Population Structure

Appendix 3f: Ben Wigley and Pat Keyser – Breeding Season Conservation

Appendix 3g: Patrick Angel – Appalachian Regional Reforestation Initiative

Appendix 3h: Paul Hamel – Nonbreeding Season Research and Conservation

Appendix 3i: Sebastian Herzog and Victor Hugo Garcia – Cerulean Warbler Research in Northwest Bolivia and Extreme Southeast Peru

Appendix 3j: Esteban Guevara, Tatiana Santander, & Santiago Burneo – Cerulean Warbler Distribution and Ecology Notes on Eastern Ecuador

Appendix 3k: David Caro, Maria Isabel Moreno, Paul Salaman, and Alonso Quevedo – Conservation Efforts for the Cerulean Warbler in Colombia

Appendix 3l: Diego Calderón-Franco – Cerulean Warbler foraging behavior in the Western Andes of Colombia

Appendix 3m: Jorge Botero – Cerulean Warblers in Coffee-producing Regions of Colombia

Appendix 3n: Tomás Cuadros – Cerulean Warbler Habitat in Colombia: an adaptive plan of sustainable management to maintain the tree cover

Appendix 3o: Gabriel Colorado, Paul Hamel, David Mehlman, Amanda Rodewald, and Wayne Thogmartin – Assessment of a GIS model of the non-breeding range of the Cerulean Warbler in South America

Appendix 3p: Melinda Welton, David Anderson, Edgar Selvin Pérez, Gabriel Colorado, David Mehlman – Cerulean Warbler: in search of critical migratory habitat

Appendix 4a. Summary of draft recommendations from a meeting between members of the forest products industry in the Appalachians and members of the CWTG, held in Charleston, West Virginia, during March 2006.

*DRAFT Consensus Cerulean Warbler Conservation Guidelines for Forestry
Charleston, West Virginia – March 29, 2006*

1. Information relating to Cerulean Warblers has substantial gaps. The forestry community will work with the Cerulean Warbler Technical Group (CWTG) as appropriate and practical for each respective forestry organization to improve our understanding of this species in 3 specific areas:
 - A. Develop an understanding of the role of non-breeding (wintering grounds and migration period) factors on population status and trends;
 - B. Enhance our ability to monitor range wide and regional trends on the breeding grounds;
 - C. Improve our understanding of breeding habitat relationships at the stand and landscape levels with particular emphasis on silvicultural practices.Opportunities to advance this understanding may include access to lands, support of research on fee lands, and in-kind or financial support.
2. Full conservation success for Cerulean Warblers will require broad support and participation of forest landowners and managers. The forestry community will work with CWTG as appropriate and practical to engage forestry and landowner associations, forestry professionals, resource agencies, trade associations, and loggers in conservation activities, education, and training opportunities relevant to Cerulean Warblers.
3. Forest management that provides incentives for ownership and management of private lands, where the bulk of the Cerulean Warbler breeding population occurs, is essential to maintaining healthy forests with diverse structural characteristics important to the species on the breeding grounds. The forestry community will work with CWTG as appropriate and practical for each respective forestry organization to encourage application of forest management practices deemed beneficial to Cerulean Warbler habitat, particularly treatments that promote the development of complex canopy structures, such as:
 - A. leave scattered, generally subcommercial, stems in even-aged regeneration units;
 - B. implement precommercial crop-tree release;
 - C. implement thinnings and other intermediate harvest treatments;
 - D. retain some super-canopy stems during thinning or other intermediate harvests, particularly oaks and hickories;
 - E. favor two-aged regeneration systems;
 - F. within the context of landscape-level management (e.g., shifting mosaic concept), encourage forest regeneration to ensure replacement of economically or biologically mature stands with those that can continue to provide quality breeding habitat over the long term;
 - G. apply these guidelines preferentially on northerly aspects, upper slope positions, and broad alluvial bottoms due to the value of these sites to this species.

Appendix 4b. Summary of draft recommendations from a meeting between members of the coal mining industry in the Appalachians and members of the CWTG, held in Charleston, West Virginia, during March 2006.

*DRAFT Consensus Cerulean Warbler Conservation Guidelines for Mining
Charleston, West Virginia – March 30, 2006*

1. Information relating to Cerulean Warblers has substantial gaps. The mining community will work with the Cerulean Warbler Technical Group (CWTG) as appropriate and practical for each respective mining organization to improve our understanding of this species in 3 specific areas:
 - A. Develop an understanding of the role of non-breeding (wintering grounds and migration period) factors on population status and trends;
 - B. Enhance our ability to monitor range wide and regional trends on the breeding grounds;
 - C. Improve our understanding of habitat relationships associated with reclamation activities.

Opportunities to advance this understanding may include access to lands, support of research on fee lands, and in-kind or financial support.

2. Full conservation success for Cerulean Warblers will require broad support and participation of many stakeholders, particularly those that impact forest land cover. The mining community will work with CWTG as appropriate and practical to engage such stakeholders in conservation activities, particularly those that contribute to reforestation or mitigation for converted forest acreage.
3. Reclamation of surface mined areas may be an important strategy for maintaining healthy forests with diverse structural characteristics important to Cerulean Warblers on the breeding grounds. The mining community will work with CWTG as appropriate and practical to encourage application of surface mine reclamation practices deemed beneficial to Cerulean Warbler habitat, particularly treatments that promote the restoration of forests, especially those with complex canopy structures. These include:
 - A. site grading to incorporate steep terraces that mimic ridge lines often used by Cerulean Warblers;
 - B. site grading to maximize northerly aspects on reclaimed sites;
 - C. maintain areas with surface rock on final grades to mimic natural systems and promote tree growth, particularly on or near ridgetops;
 - D. favor forestry as the preferred post-mining land use and coordinate closely with the Appalachian Regional Reforestation Initiative and other critical species' needs (e.g., Indiana bat, Allegheny woodrat);

- E. manage vegetation in planting programs to create soft edges where post-mining land use is not going to be forestry.

Additionally, CWTG will work with the mining community to reduce institutional barriers to implementation of these reclamation practices, including streamlining regulatory bottlenecks.

- 4. Some mining activities cannot practically avoid impacts to high value Cerulean Warbler habitat. In such cases, mitigation should be considered as an option. Mitigation should be contemplated at the local (immediate surroundings of mine site) or regional scale (e.g, watershed or Partners in Flight physiographic areas), including Abandoned Mine Lands and other non-forested sites (e.g., pasture or haylands), and on the wintering grounds. Further, strategies involving credits and banking should be explored.

Appendix 5. PDF versions of PowerPoint presentations and results from breakout groups during session on establishing conservation objectives

Appendix 5a: Ken Rosenberg and Randy Dettmers – Cerulean Warbler: Population Objectives

**Cerulean Warbler:
Population Objectives**



Ken Rosenberg, Cornell Lab of Ornithology
Randy Dettmers, USFWS
Cerulean Warbler Technical Group
February 13, 2007

How many Cerulean Warblers do we want to save? (Sanderson 2006)

- Population-based approaches
- Population-as-surrogate approaches
 - Place or landscape representation (focal species)
 - Ecosystem representation (umbrella species)
 - Environmental health indicator (“canary in coal mine”)
 - Rally point for conservation (flagship species)
- Human-oriented approaches
 - Economic benefits (sustainable harvest, ecotourism)
 - Cultural and spiritual benefits (traditional uses)
 - Aesthetic benefits (bird-watchers)

How many Cerulean Warblers do we want to save? (Sanderson 2006)

- Population-based approaches
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 - Place or landscape representation (focal species)
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 - Environmental health indicator (“canary in coal mine”)
 - Rally point for conservation (flagship species)
- Human-oriented approaches
 - Economic benefits (sustainable harvest, ecotourism)
 - Cultural and spiritual benefits (traditional uses)
 - Aesthetic benefits (bird-watchers)

How many Cerulean Warblers do we want to save? (Sanderson 2006)

- Population-based approaches
 - Demographic sustainability (self-sustaining MVP)
 - Evolutionary potential (maintain genetic diversity)
 - Ecological Function (density, social relationships)
 - Historic baselines (restore historic conditions)
 - Maximum (as many as we can get)
 - Status quo (maintain present state)

Characteristics of Useful Conservation Objectives

- Easy to Communicate - Understandable
- Easy to Measure and Assess Progress
- Easily Translated into Action
- Linked to overall Goal / Vision



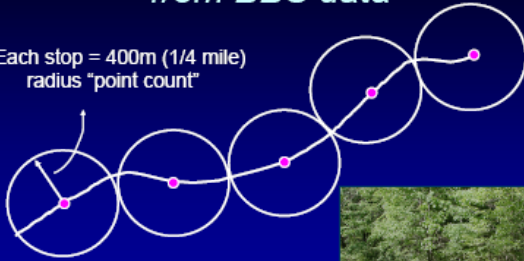
PIF North American Landbird Conservation Plan



- Population estimates for 448 breeding landbirds
- Derived population objectives at continental scale based on BBS
- Step down population estimates and objectives to states and BCRs
http://www.fishwildlife.org/allbird_landbird.html

Estimating Population Size from BBS data

Each stop = 400m (1/4 mile) radius "point count"



50 stops = 25.1 km²

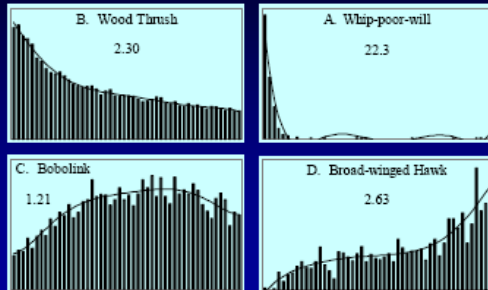


Assumptions: detectability

- Species have relatively fixed average detection distances at BBS stops
- For visually detected species, full radius of BBS stops – total sample area of 25.1 km² per BBS route
- Average maximum detection distance for forest birds = 128 m (Emlen and DeJong 1981) – total sample area of 2.5 km² per BBS
- Intermediate species (Bobolink, meadowlark) – detection distance = 200m – total sample area of 6.3 km² per BBS route



Corrections – e.g. Time of Day



Example: Cerulean Warbler

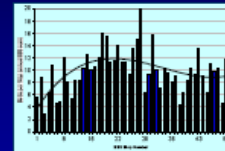
Occurs on 234 BBS Routes (1990-99)

Detectable to 125 m (area = 2.5 km²)

Time of day correction = 1.35

Pair correction = 2.0

Pop size = SUM (across BCRs):
(rel abund/2.5km² X BCR km² X 1.35 X 2.0)



Total population estimate for Cerulean Warbler = 570,000 individuals (285,00 pairs)

Population Estimates by BCR

Appalachian Mountains (BCR28)	80% = 228,000 pairs
Central Hardwoods (BCR24)	12% = 34,000 pairs
Great Lakes/St. Lawrence (BCR13)	4% = 11,400 pairs
Prairie Hardwood Transition (BCR 23)	2% = 5,700 pairs
Eastern Tallgrass Prairie (BCR22)	1% = 2,300 pairs
Lower Mississippi Valley (BCR26)	<1% = 200 pairs?
New England/Mid-Atlantic (BCR30)	<1% = 100 pairs?
Piedmont (BCR29)	< 1% = 100 pairs?

Reconstructing Time Series

- Ratio of index in 1995 to index at time t

1995	0.348	560000.0	1.000
1996	0.367	590341.3	1.054
1997	0.336	540079.0	0.964
1998	0.290	466786.7	0.834
1999	0.261	419557.9	0.749
2000	0.257	412438.0	0.736
2001	0.253	406499.6	0.726
2002	0.255	409745.3	0.732
2003	0.281	451212.6	0.806
2004	0.260	417685.1	0.746
2005	0.243	390954.4	0.698

Population Size Scoring Exercise

What was the true Cerulean Warbler population size range-wide in the 1990s?

Population Size Rangewide	Score
Much less than the PIF estimate (< 300,000)	
Lower half of ~ PIF estimate range (300,000 - 600,000)	
Upper half of ~ PIF estimate range (600,000 - 900,000)	
Much greater than the PIF estimate (>900,000)	

Population Size - Results

The experts expressed a belief that the true population size in the 1990s was most likely within the upper and lower bounds of the available estimate.

Population Size Rangewide										
Much less than the PIF estimate (< 300,000)	0	0	5	0	5	5	0	5	0	0
Lower half of ~ PIF estimate range (300,000 - 600,000)	5	20	40	30	10	30	20	70	10	30
Upper half of ~ PIF estimate range (600,000 - 900,000)	70	80	40	40	70	40	60	25	70	55
Much greater than the PIF estimate (>900,000)	25	0	15	30	15	25	20	0	20	15

Refining Population Estimates

- Thogmartin et al. Review (Auk 2006)
- Pair correction factor
- Using distance-based survey data
- Bottom-up comparisons
- Modeling approach



Using population estimates to set conservation targets

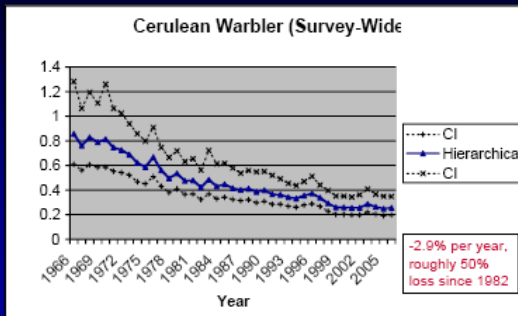
Assumption: return populations to pre-BBS levels

- Use BBS trend data to calculate % loss
 - If > 50% loss, double population
 - If 15-50% loss, increase 50%
 - If stable or increasing, Maintain population

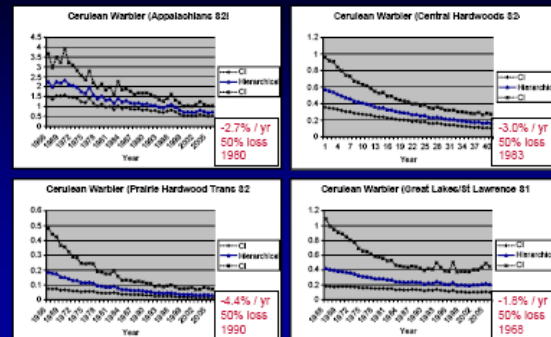
Habitat goal = population target * w/in habitat density (assumes habitat limiting)

Evaluation: Use BBS index to measure success; (or stratified approach for sites)

Population Trend (BBS –2006)



Consistency in Regional Trends



Population Objectives for Cerulean Warbler:

1. Prevent extinction: maintain minimum viable population in core of range (allows significant declines);
2. Prevent endangerment: maintain long-term, sustainable population(s) over significant portion of present range (allows some continued declines);
3. Status quo - No net loss: stop population declines and maintain current population levels and distribution;
4. Historic baseline (PIF): double current population and restore distribution to 1980s levels;
5. Historic baseline (pre-BBS): increase population four-fold and restore distribution to 1960s levels.

Appendix 5b - Break down by regions and organizations of the results from the Survey Monkey exercise on global population objectives

Which area from the list below do you feel most aligned with in your Cerulean Warbler conservation efforts?

What is the affiliation are you representing at this meeting?

Select the answer that best represents your choice for a global population objective for Cerulean Warblers over the next 50 years.

Response	Response	Response
Cumberland Plateau & Ohio Hills regions	State Government	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Cumberland Plateau & Ohio Hills regions	Academia	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Cumberland Plateau & Ohio Hills regions	Industry	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Cumberland Plateau & Ohio Hills regions	Academia	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Cumberland Plateau & Ohio Hills regions	Academia	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Cumberland Plateau & Ohio Hills regions	Local NGO	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Cumberland Plateau & Ohio Hills regions	Academia	Status quo - No net loss: stop population declines and maintain current population levels and distribution
Cumberland Plateau & Ohio Hills regions	Academia	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Cumberland Plateau & Ohio Hills regions	Academia	Historic baseline (PIF): double current population and restore distribution to 1980s levels

Cumberland Plateau & Ohio Hills regions	Federal government	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Cumberland Plateau & Ohio Hills regions	Regional/National/International NGO	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Lower Mississippi Valley and Midwest	Academia	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Lower Mississippi Valley and Midwest	Federal government	Prevent endangerment: maintain long-term, sustainable population(s) over significant portion of present range (allows some continued declines)
Lower Mississippi Valley and Midwest	State Government	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Northeast (PA, NY, NJ, New England, Ontario)	Academia	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Northeast (PA, NY, NJ, New England, Ontario)	State Government	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Northeast (PA, NY, NJ, New England, Ontario)	Federal government	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Northeast (PA, NY, NJ, New England, Ontario)	Federal government	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Northeast (PA, NY, NJ, New England, Ontario)	Federal government	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Northeast (PA, NY, NJ, New England, Ontario)	Federal government	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Northeast (PA, NY, NJ, New England, Ontario)	Local NGO	Historic baseline (pre-BBS): increase population four-fold and restore distribution to 1960s levels
Portions of Appalachian BCR and Central	Regional/National/International	Historic baseline (pre-BBS): increase population

Range-wide	Regional/National/International NGO	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Range-wide	Other (please specify)	Historic baseline (pre-BBS): increase population four-fold and restore distribution to 1960s levels
Range-wide	Regional/National/International NGO	Status quo - No net loss: stop population declines and maintain current population levels and distribution
Range-wide	Federal government	Prevent endangerment: maintain long-term, sustainable population(s) over significant portion of present range (allows some continued declines)
Range-wide	Academia	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Range-wide	Regional/National/International NGO	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Range-wide	Federal government	Status quo - No net loss: stop population declines and maintain current population levels and distribution
Range-wide	Regional/National/International NGO	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Range-wide	Federal government	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Range-wide	Federal government	Historic baseline (PIF): double current population and restore distribution to 1980s levels
Range-wide	Federal government	Historic baseline (PIF): double current population and restore distribution to 1980s levels

South America	Academia	Historic baseline (PIF): double current population and restore distribution to 1980s levels
South America	Regional/National/International NGO	Historic baseline (PIF): double current population and restore distribution to 1980s levels
South America	Federal government	Historic baseline (pre-BBS): increase population four-fold and restore distribution to 1960s levels
South America	Academia	Prevent endangerment: maintain long-term, sustainable population(s) over significant portion of present range (allows some continued declines)
South America	Other (please specify)	Historic baseline (PIF): double current population and restore distribution to 1980s levels
South America	Local NGO	Status quo - No net loss: stop population declines and maintain current population levels and distribution
South America	Regional/National/International NGO	Status quo - No net loss: stop population declines and maintain current population levels and distribution
South America	Regional/National/International NGO	Status quo - No net loss: stop population declines and maintain current population levels and distribution
South America	Other (please specify)	Historic baseline (PIF): double current population and restore distribution to 1980s levels
South America	Local NGO	Prevent endangerment: maintain long-term, sustainable population(s) over significant portion of present range (allows some continued declines)

Recorder: Molly McDermott

Facilitator: Jason Jones

What is the most significant contribution your region can make toward the global population objective?

Is it possible to increase the population of the CERW by doing something on the wintering grounds? Maybe not, but need to think about:

1. is there enough habitat to support doubling of the population – do you see habitat that looks good but absent of birds? In Venezuela, perhaps not? Need to survey other habitats. Are there natural habitats where ceruleans are found? In Colombia, ceruleans not found at all shade coffee plantations. CERWs harder to keep track of in primary forest.

2. Is there a way to improve the quality of habitat for CERWs and PRESUMABLY other birds? Need to consider the balance of shade-coffee plantations and natural habitat (primary habitat). Endemic and endangered species are priority.

Main contributions:

- ❖ maintain primary forest,
- ❖ improve other available habitat (e.g. increase shade-coffee plantations relative to other agriculture, mixture of habitats? connectivity) including maintaining shade-coffee plantations – incentives needed for locals not to switch to sun plantations. Connectivity will increase utility of these habitats.
- ❖ how to improve quality at the patch size? Specific species of foraging substrate? Diversity of (vegetative) species important. Complex canopies within a plantation important. Bromeliads seem to be important for ceruleans.

What types of metrics are appropriate for defining a population and/or habitat objective for your region?

- ❖ Population size – info still very lacking. How many more Ceruleans can habitat support in the wintering ground?

- ❖ Foraging behavior and flowering phenology of plants.
- ❖ Reproductive success may be driven by foraging success on wintering grounds (carry-over effects).
- ❖ Survival...what drives survival on wintering grounds?
- ❖ Describing regional population and/or habitat objectives

How to answer these questions depends on the context: region dependent. Also landscape dependent.

Other notes (for tomorrow?):

Much discussion about the conflicts between conserving CERW and other species that prefer other habitats. Does there need to be a conflict? There are 2 extremes...Is the CERW an effective marketing goal (e.g. CERW reserve/ CERW coffee)? Yes, according to the ABC.

Threats – population increases in Colombia often coincide with prime habitat for this species. In Peru there is still a lot of intact primary forest habitat at the altitudes where CERW are found. It's a bad idea to convert good (natural) habitat to shade plantations. In Venezuela, not many habitat types, CERWs prefer shade coffee plantations esp near strips of forest. Economic incentives needed to grow shade vs. sun coffee. Certification can help.

Recorder: Matthew Shumar

Facilitator: Greg Butcher

What is the most significant contribution your region can make toward the global population objective?

NOTES for central hardwood zones, the population goal should be that of the 1980s (doubling the population). Setting this population goal will help drive policy. Affecting the structure of the forest is very important, as opposed to simply doubling the habitat. Core area is also key, and landscape conditions are critical. Keeping forested landscapes forested is of importance.

-There is a large portion of forest that will mature and become good Cerulean Habitat

-Other areas will benefit from selective cutting to develop into quality habitat

-Efforts need to be directed towards areas with current Cerulean Warbler populations.

-Concentrate efforts to improve landscapes. Limit fragmentation.

What types of metrics are appropriate for defining a population and/or habitat objective for your region?

Given that we don't know much about demography, population trends and habitat availability will be important metrics.

NOTES

Describing regional population and/or habitat objectives

NOTES

40 year time frame may not be long enough for projects such as reforestation, however it is something that we can relate to

What was the characteristic in the 60s that made the CERW so abundant. At

60s, forest composition may have been relatively even due to massive forest practices around the turn of the century.

Forest conversion is a larger threat than individual forest practices. Sprawl is a large threat. Size of core area is diminishing because of large companies subdividing.

Why is there large areas of seemingly suitable habitat that is not being occupied?

It is hard to quantify how individual concepts are affecting population numbers.

Habitat is what we are shooting at, but do concepts like conspecific attraction also drive the system.

Climate change may also be driving the shift in distribution, and the rate of vegetation movement with climate change isn't in sync with ceruleans.

Demographic information in the core breeding habitat is key information that we are lacking.

In Indiana, there seems to be a sink dynamic, but brood parasitism is not a real problem. Habitat is good, there are lots of bird, but they are producing. Wind events and other circumstances may be having large effects, but why is this having more of an effect recently. However, with the population numbers of Cerulean Warblers, wind effects, etc shouldn't be having such a large impact.

The temporal scale of studies may not be providing enough information.

Stabilizing the decline is not really a "status quo". This is a proactive management that is doing something positive.

FIA is very coarse scale, but with other data incorporated, simulation models may help. We can make predictions and assessment based on models. These models need to be played with in order to get a grasp on what will happen with the forest and amount of habitat.

Productive sites at this point, even though we don't know why they are productive, need to be protected foremost. Reproductive success data may need to be done, but protection of these areas should be foremost.

Expansion of the atlas project needs to be completed so that we can have a better grasp of the population estimates, especially in areas of the Appalachians.

Ridgetops seem to be important in some areas of ridge and valley. Censusing needs to be done to see what CERWs are using in the different areas. How does knowing where more birds are going to help us, when we haven't been able to do anything with the thousands of points that we already have. Much censusing has been opportunistic, and maybe a more systematic process needs to be applied.

Diseases and spraying may have an effect forest condition which could be effecting CERWs. Acidification is one of the most widespread and impacting, and that may be affecting CERWs indirectly. Why are CERW more susceptible?

Privatization of land (North Carolina) may offset any maturation of forest and addition of "suitable habitat"

Setting the scale for preserving intact areas of birds is going to be important.

.

Recorder: Tiffany Beachy

Facilitator: Brian Smith

Intro/General:

- Limited to habitat quantity and quality
- Range of values in terms of fecundity; in general it's pretty good
- Nest success around 50%
- Fecundity decreases adjacent to cc, densities lower
- Large blocks of intact habitat = good – the larger, the lower edge effect
- Landscape scale focus is important – edge effects are landscape dependent (eg. Largely forested landscape vs not)
- More hardwood forest in App BCR than historically
- Affect quality by increasing heterogeneity of structure
- The actions taken to increase quantity are diff than for quality
- Ripping to mitigate reclaimed mines – avg \$150/ac
 - mine sites often double mined
 - status of veg – to replant to high qual hardwoods is expensive
 - landowner interests
- have to compete with other species (elk, HESP, NOBO)
- We don't know which is most critical
- Need both survival and reproductive success
- Need returns from SA to be successful here
-

What is the most significant contribution your region can make toward the global population objective?

- Qualitative and quantitative approach
- how to define – strip mine restoration affects both
- We don't know what changing the forest structure will do
- Hard to prove exactly what will happen
- Filling in huge gaps vs. conducting silvicultural changes
- Choosing one action only may hurt our credibility
- Opportunity to work with state agencies to reforest – pre and post SMCRA

NOTES

What types of metrics are appropriate for defining a population and/or habitat objective for your region?

- Need to ID high density and high qual sites
- Need to know low qual/marginal sites that support fewer birds – could double density there
- ID and protect/enhance hotspots
- Mineral rights in highest qual areas owned by others
- Can prioritize where we put our money
- Reforestation as the land use – very difficult
- Avg landowner doesn't care what post-mining land use is – but we could do outreach/education
- Develop outreach program for landowners, industry, consultants
- Surface owners can prohibit mining on their property – SMCRA
- USFWS reviews all mining permits – can submit recommendations
- Action plan - Could come up with a CERW reclamation plan
- Can get acreage from TN, KY, WV models – can estimate how much of total is a hotspot
- Can get rough estimate and build from there
- Well-placed restoration efforts
- ID high priority spots to reduce edge and area effects
- Should encourage mgt activities that enhance structural diversity
- Efforts more local/intermediate scale
- Take existing CERW habitat: protect hotspots and enhance/grow more individuals in marginal areas
- Make measurable goals and evaluate over time (5-10 yrs)
- Cater goals to the people you're communicating with
- Develop conservation measures for 100% of hotspots – create defn of hotspot, then protect them all; eg. 20% highest density sites
- Have to double or triple current densities on high qual sites to meet obj – Have 80% of the pop; if continental pop goal is doubling, we MUST double it

NOTES

Patrick Angel's Action Plans:

1. Create a CERW Reclamation Plan with a 'boiler plate' permit language for surface mine operators to use as a specific post-mining land use
2. ID hotspots and watch for mining permitting applications that will have a potential on CERW populations and provide outreach to encourage CERW reclamation plans
3. Outreach to active mine operations, in particular land owners and make a case why reforestation is a good choice relative to the CERW
4. Investigate ways to establish incentive programs that promote the reforestation of previously mined lands
5. All CERW groups, organizations, or entities should consider formally partnering with like-minded reforestation groups like ARRI and provide encouragement and support

Describing regional population and/or habitat objectives

NOTES

-Adaptive management framework

-ID target areas

- oppor. to increase forest cover/connectivity – monitor density, fecundity, etc there

-There are certain areas where you need to address quantity and others quality

-Ex. Go by results of efforts to see what's happening

-Need to work for restoration for the future

-improves qual and quantity in short term and long term

Recorder: Patrick McElhone

Facilitator: Paul Hamel

What is the most significant contribution your region can make toward the global population objective?

- ❖ Maintain and increase the amount of contiguous forest in already established CERW use areas
- ❖ There is enough available habitat right now that doubling the CERW population is possible
- ❖ Use southern Michigan sites (Fort Custer, Allegan state game area, Berry state game area) as targets for acquisition of buffers to consolidate forest
- ❖ Increasing the patch size and thereby increasing the distance from the edge to the core of the forest would reduce cowbird parasitism

*Assume the South American group will create appropriate situations for birds to return

What types of metrics are appropriate for defining a population and/or habitat objective for your region?

- ❖ Mostly nonfederal land in Midwest and lower Miss
- ❖ The incentive is unknown for CRP with the production of ethanol in upper Midwest
- ❖ Pessimistic – whatever yardstick that we choose will not be strong enough to avoid being broken by external forces (human pop. Growth, CERW populations in core range)
- ❖ Optimetrics – amount of core forest area greater than 300m?, 2km?, 5km? from hard agricultural edge analogous to the LMVJV
- ❖ Wildlife Habitat Council to broker consolidation of forest ownership in negotiation with energy companies
- ❖ Attempt to create source populations in certain areas

Describing regional population and/or habitat objectives

- ❖ Maintain silver maple stands in Midwest in relation to altered hydrologic regimes
- ❖ Quality of habitat in the upper Midwest might be lower due to Dutch elm disease altering habitat back in the 50's

Recorder: Sara Barker

Facilitator: Ken Rosenberg

What is the most significant contribution your region can make toward the global population objective?

- ❖ Contribute to doubling with two regional strategies – one in core and one on edge.
 - ❖ Maintain habitat and current distribution and enhance suitability, productivity, and quality of available habitat. Place for source birds to disperse to from core of range.
 - ❖ Enhance habitat quality to increase productivity.
 - ❖ Work to double the amount of forest habitat on ground in the more peripheral areas, focus more on specific areas and sites (identified core mini-sources).
-

-Not a very high proportion of global population, but does represent significant chunk of bird's distribution. Most heavily forested portion of range, but forest cover increase may have turned the corner and stopped. Possibly shifting range with climate change. Possibly in an area where CERW may move to in the future.

-CERW is a bird of special concern in Canada and each state in this region. Gives the states a mandate to protect this species (justification).

-Are there areas of suitable habitat that does not have CERW? Need to revisit this tomorrow.

-Easier to double a smaller number of birds.

-Continuation of core of range and then remnant habitats like Montezuma in NYS – two distinct areas?

-Can the NE think about doubling its population in line with the global population?

What types of metrics are appropriate for defining a population and/or habitat objective for your region?

- ❖ Attempt to increase number of suitable areas extending out from satellite populations.
- ❖ Modeling approach to determine potential of current landscapes.
- ❖ Continue to count birds as BBS is marginal in this area.
- ❖ Occupancy relative to habitat potential – maintain a certain number of sites and enhance the distribution at these known and potential sites.
- ❖ Increase fecundity at edge of range by continuing to collect baseline demographic data.
- ❖ Measure response and number of acres targeted for and effected by management.
- ❖ Increase juvenile survivorship

-John stated that we don't yet know how many birds our habitat can support. We could determine that we don't need more trees, but must get the birds to the trees and establish connectivity, look at fragmentation, etc.

Describing regional population and/or habitat objectives

See above...

Is this region still expanding?

-If expanding might not need to add habitat, but general trend seems to be a reversal and subsequent decline – not all agree but those not present.

-New Jersey – few pockets that are expanding.

-Pennsylvania – Pittsburg area and SW corner of state is decreasing according to atlas.

Jeff says there are areas with shelterwood cuts that appear to have plenty of birds, not sure if these are new areas. Scott believes atlasers will be under estimating birds.

-Canada – declined 27% (blocks) in Ontario from last atlas to present. SW section of province has largest decline, 44%, agriculture area. Queens U area there's a 6% decline in blocks. 4,000-5,000 pair estimate in province, although those that work on the species believe this is too high. Consensus is Ontario has 500-750 pairs. Not sure if range or population decline, birds are possibly just more clustered.

-Maximum couple thousand birds once you get out of PA.

Appendix 6. Results from breakout grounds during session on identifying limiting factors within geographic regions

Definitions	
<u>Score</u>	<u>Magnitude of the Effect - on the future CERW population trend in your region.</u>
3	Strong Effect: If the proposed effect were the primary effect impacting Cerulean Warblers in your region, it would result in a CERW population trend in your region that is more severe (i.e., steeper) than the historic 40-yr trend.
2	Moderate Effect: If the proposed effect were the primary effect impacting Cerulean Warblers in your region, it would result in a CERW population trend in your region similar to the historic 40-yr trend.
1	Weak Effect: If the proposed effect were the primary effect impacting Cerulean Warblers in your region, it would result in a CERW population trend in your region that is less severe than the historic 40-yr trend (i.e., a less negative, stable, or increasing trend).
<u>Score</u>	<u>Level of Certainty - that proposed cause and effect proposition will happen.</u>
3	High Certainty: the group feels there is a high likelihood (e.g., >75% chance) that the causal factor will occur in the future and it will have the proposed effect.
2	Moderate Certainty: the group feels there is a modest likelihood (50-75% chance) that the causal factor will occur in the future and it will have the proposed effect.
1	Low Certainty: the group feels there is a low (<50% chance) or unknown likelihood that the causal factor will occur in the future and it will have the proposed effect.
<u>Score</u>	<u>Range-Wide Applicability</u>
3	(note: this score is primarily for use when we begin looking at the results across breakout session; it might or might not have much value for your regional discussions.)
2	Range-wide: the causal factor is one that is likely to occur across the seasonal range (e.g., breeding range, non-breeding range, migratory range)
1	Single Region: the causal factor is one that would only occur within your region

Geographic Area: Northeast
Facilitator: Scott Stoleson
Recorder: Sara Barker

Key Words	Limiting Factor Proposition	Magnitude of Effect	Level of Certainty	Range-wide Applicability
Habitat Quality	Excessive deer browse, limits diversity of forest structure. Understory structure needed for post fledging. Lack of regeneration.	2	3	
Habitat Quality	Forestry practices such as high grading and diameter limit cuts that remove the largest trees and thus the primary canopy structure.	3	3	
Habitat Quality	Trend towards lack of management in some forests, high stocking, small stem density.	2.5	2.5	
Habitat Quality	Short rotation times in managed forests don't allow for mature forest conditions.	2	3	
Habitat Quality	Increased public road density; creating edge effects that allow greater access to predators, parasitism, noise, etc.	1.5	2	
Habitat Quality (landscape level)	Continued urban sprawl and fragmentation.	3		
Habitat Quantity	Ex-urban development is causing continued removal of forest patches.	3		
Habitat Quality	Lack of oak regeneration and conversion to maple dominated forests.	2		

Habitat Quality	Acid rain causing changes in calcium and a drop in Ph levels of soil -- could change tree composition and structure.	1		
Atmospheric and Direct Mortality	Decreased calcium and increased mercury levels, could potentially become an issue for reproduction and food supply.	2		
Direct Mortality	Proliferation of towers and possibly wind farms in preferred CERW habitat such as ridge tops, could disproportionately effect CERW habitat.	2		
Atmospheric and Global Climate	Increased frequency of storms (especially ice storms) that could have direct effects of removing CERW habitat or structure.	2		
Habitat Quality	Changes in seasonal weather regimes, such as drought or cold, wet springs that might lower reproductive success due to decreased prey abundance.	2		
Demographic	Patchy distribution of CERW so hotspots are more vulnerable, larger chance of losing higher percentage of CERW population in region.	2		

Geographic Area: Cumberland Plateau / Ohio Hills

Facilitator: Randy Dettmers

Recorder: Tiffany Beachy

Key Words	Limiting Factor Proposition	Magnitude of Effect	Level of Certainty	Range-wide Applicability
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Habitat Quality	Reduction of overall forest cover to below ~70% caused by cumulative effects	3	3	3
Habitat Quality	Lack of silvicultural disturbance that improves canopy heterogeneity in mature hardwood forests	3	3	3
Habitat Quantity	Conversion of mature forest habitat to human development/urbanization will remove and fragment breeding habitat resulting in lower overall reproductive output for the region due to reduced amounts of habitat, contributing to a declining population trend in the region.	3	3	3
Habitat Quantity	Conversion of mature forest habitat to surface mining will remove and fragment breeding habitat resulting in lower overall reproductive output for the region due to reduced amounts of habitat, contributing to a declining population trend in the region.	3	3	1
Habitat Quality	Edge effects associated with surface mine sites reduces CERW density, abundance, and nest success in adjacent forests	3	2	1
Habitat Quality	Continuation of conventional reclamation that retards the development of diverse, mature healthy hardwood forests and natural succession and prevents reducing the net loss	3	1	1
Habitat Quality	Edge effects associated with even-age forest management (clearcut) reduces CERW density, abundance, and nest success in adjacent forests	2	3	1
Habitat Quality	Forest fragmentation associated with the development of coal bed methane well sites and road systems	2	3	1
Habitat Quality	Forest fragmentation associated with the development of communications, wind power, powerline rights of way, energy	2	3	2
Direct Mortality	Caused by wind power development	1	2	2
Habitat Quality	Stagnated natural succession on previously mined land reclaimed without the benefit of adequate reforestation			

Geographic Area: Appalachians/Central Hardwoods

Facilitator: Jane Fitzgerald

Recorder: Deanna Dawson

Key Words	Limiting Factor Proposition	Magnitude of Effect	Level of Certainty	Range-wide Applicability
Climate change	Climate change could cause northward shift of birds out of the Appalachians/Central Hardwoods region, or southern portion of it. Lack of certainty in understanding of bird response (habitat or other factors?)	?	1	3
Climate change	Changes in precipitation & temperature patterns could effect habitat structure & food availability, and consequently CERW abundance & demographics.			
Climate change	Increase in catastrophic weather events could reduce nesting success, increase mortality in migration, and reduce/degrade stopover habitat.			
Habitat Quantity	Conversion of mature forest habitat to human development/urbanization could reduce available breeding habitat for CERW, contributing to a declining population trend in the region.			
Habitat Quantity	Present & additional loss of suitable habitat within region could reduce CERW habitat & abundance.			
Habitat Quality	Some silvicultural techniques could render some existing habitat as unsuitable for CERW, reducing their abundance.			
Habitat Quality	Fragmentation through exurban development could increase abundance of potential nest predators, reducing CERW nesting			

success.

Habitat Quantity	Competing/conflicting management objectives for different species (e.g., management for RUGR) could reduce habitat quality/quantity.		
Habitat Quantity	Lack of large-scale planning capability (e.g., coordination among state, federal, & private landowners) makes it difficult to manage at a landscape scale.		
Habitat Quantity	High proportion of existing forestland lacks appropriate structural diversity for CERW. Lack of ability to improve it.		
Habitat Quantity	Conversion of suitable habitat for bio-fuel production.		
Habitat Quantity	For Central Hardwoods, which is predominated by oak, gypsy moth & spraying for gypsy moths could affect CERW abundance & nesting success.		
Habitat Quantity	Insect pests, tree disease could impact both breeding & stopover habitat.		
Direct Mortality	Avian disease could result in increased mortality, contributing to a declining population trend.		
Direct Mortality	High predator and/or parasite populations will result in high nest depredation and failure rates, contributing to a declining population trend		

Geographic Area: Midwest and Lower Mississippi Valley

Facilitator: Dean Demarest

Recorder: Patrick McElhone

Key Words	Limiting Factor Proposition	Magnitude of Effect	Level of Certainty	Range-wide Applicability
Habitat Quantity	Small and isolated forest habitat patches contribute to reduced productivity	2	3	2
Habitat Quantity	Small and isolated forest habitat patches contribute to reduced survival	2	3	2
Habitat Quantity	Overall forest habitat availability is anticipated to decrease as a result of changing land use patterns (development, agriculture conversion) which will result in reduced productivity and survival	3	3	3
Habitat Quantity	Forest habitat availability is anticipated to decrease as a result of altered hydrologic regimes preventing alluvial forest regeneration and succession (cottonwood, silver maple) which will result in reduced productivity and survival	2	3	2
Habitat Quality	Condition and structure of forest habitats are expected to degrade as a result of altered hydrologic regimes which will result in reduced productivity	2	3	2

	Assumed condition and structure of forest habitat produced by land retirement programs may not deliver anticipated suitable habitat for CERW's resulting in lowered expected productivity	1	2	1
Direct Mortality	Overabundant cowbird populations are jeopardizing the sustainability of populations in core forest habitats resulting in reduced productivity	3	3	2
Direct Mortality	Improper placement of wind development projects leads to potential for increased mortality	1	1	3

Geographic Area: South America

Facilitator: Jason Jones

Recorder: Molly McDermott

Key Words	Limiting Factor Proposition	Magnitude of Effect	Level of Certainty	Range-wide Applicability
Habitat quantity/quality	Continued loss and degradation of suitable secondary habitat (e.g. shade-coffee and other shade plantations) at altitudes where the CERW is found. Habitat limitation affects survivorship and condition during the overwintering period.	3	3	
Habitat quantity	Loss of primary forest habitat may indirectly affect the Cerulean Warbler by affecting the surrounding secondary habitats (landscape	3	3	

	context, water balance, movement of residents, competition).			
Habitat quantity	Loss of primary forest habitat may directly affect the Cerulean Warbler by limiting habitat availability, which will negatively influence both survival and condition.	2	2	
Food resources	Lack of connectivity and lack of patch diversity at the landscape scale may prevent the CERW from obtaining sufficient resources in rural landscapes.	2	2	
Food resources	Floristics and other vegetative characteristics influence food availability, thereby influencing individual condition.	2	2	
Sociality	The interaction of sociality (i.e., participation in mixed-species flocks) and habitat carrying capacity has the potential to influence (positively or negatively) survival and condition.	1	1	

Appendix 7. Results from breakout grounds during session on identifying critical information needs

Topic Area:Site specific demographic factors

Facilitator: Dean Demarest

Recorder:Patrick McElhone

Gap Number	Information Gap	Score
6	Improving estimates of adult and juvenile survival on breeding grounds, especially females	5
10	Better delineating the distribution and abundance on wintering grounds and temporal patterns	4
11	Better defining specific habitat parameters on wintering grounds	4
12	Site specific knowledge of "important areas" on the wintering grounds	4
14	Survival rates by habitat specific parameters on the wintering grounds	4
3	Refine our ability to measure fecundity (e.g. estimating clutch size)	3
8	Better understanding the assumptions that support our demographic models (e.g. immigration, emigration rates)	2
16	Behavior and foraging strategies on wintering grounds	2
1	Demographic studies of CERW's productivity next to mine sites	1
2	Lack of information on clutch size and tools to accurately measure size	1
5	Understanding the relative contribution of threats that affect productivity	1
7	Role of dispersal for adult and juveniles to other habitats	1
9	Improving knowledge of postfledging and premigration habitat requirements	1
13	Relative contribution of primary forest habitat in wintering grounds	1
15	Better understanding of fitness in habitat-specific areas on wintering grounds	1
4	More information on species-specific predators and rates of parasitism	
17	Determining if non-habitat limiting factors are affecting the species (e.g. pesticide use in coffee plantations)	
18	Identifying timing and patterns of migrations and any bottlenecks	
19	Identifying characteristics of stopover habitats	

Topic Area: "Movement" demographic factors

Facilitator: Greg Butcher

Recorder: Molly McDermott

Gap Number	Information Gap	Score
8	What habitats are used post-fledging/pre-migration? Adults and young birds	7
18	At what time period are birds most vulnerable to mortality?	7
3	Spring migration - extent of staging area in Central America?	5
13	What is non-breeding site-fidelity between and within seasons?	5
24	Are there any age- or sex-specific differences in movements?	5
5	Spring migration - what % of the population is staging in C. America or flying directly to N. America?	3
7	What is breeding site fidelity for adults and first breeders (SY birds)?	3
12	Fall migration - do migration routes differ from spring migration routes?	3
22	Will climate change affect the phenology of food resources available to migrant birds?	3
4	Spring migration - what are habitat preferences in Central America stopover sites?	2
15	Are there any changes in wind patterns during the periods of spring and fall migration?	2
16	Can we connect breeding and wintering populations?	2
2	Spring migration - what is the migration route in S. America?	1
14	What proportion of birds are territorial vs. flocking in non-breeding habitat?	1
19	Where are resources lacking before and during movement or upon arrival?	1
21	How much of a threat are storms/hurricanes to migrating birds?	1

23	Are they using specific topographic features during migration?	1
1	Spring migration - staging in South America prior to departure?	0
6	Spring migration - are there vital stopover sites in N. America not used for breeding?	0
10	Are there pre-fall migration staging areas?	0
11	Fall migration - do stopover sites differ from spring stopover sites?	0
17	What is the time frame for migration on the population and individual levels?	0
20	How important are collisions with or distractions from human-built structures?	0
25	Are there any regional differences?	0
26	Is there a social system during migration?	0

Topic Area: Survey and Monitoring

Facilitator: Ken Rosenberg

Recorder: Sara Barker

Gap Number	Information Gap	Score
14	Link monitoring to address habitat conditions and the drivers of population change.	9
12	More standardized surveys, including training and better materials, plus explorations of new areas in C/S America.	9
13	Development of longer term trend monitoring in South America.	7
15	Explore and use modeling approaches to better integrate monitoring and trend information.	7
19	Monitoring of migration pathways and potential hotspots.	7
5	Improve sampling methodology to increase confidence that we're finding existing populations and identify hotspots.	6
2	Monitor hotspots to see if populations are stable or disappearing, site based approach.	4
8	Use monitoring to evaluate forestry techniques that help or hinder birds (possibly combine with 14)	3

9	Lack of communication and coordination of monitoring in C/S America.	2
10	To encourage local groups to survey migrants in C/S America	2
3	To know if BBS is actually reflecting off road abundance and habitat changes	2
4	Need to refine population estimates by BCR	1
7	Refine nest finding techniques and demographaic monitoring	1
6	Surveys to determine effects of cowbird parasitism	1
17	Monitoring of mortality from collisions with man-made structures.	0
16	Use of ancillary data sets, such as FIA, to inform models	0

Topic Area: Behavioral Charactersitics

Facilitator: Carol Croy

Recorder: Matthew Shumar

Gap Number	Information Gap	Score
4	Habitat preference for females / juveniles / males on wintering grounds.	6
14	Individual responses to area sensitivity across geographic areas	5
3	Sensitivity to fragmentation, effects on success.	4
1	Is there a sex / age difference in habitat selection, use? If so, what are the mechanisms?	4
17	Strength of site fidelity, especially in response to lost habitat (breeding)	5
7	Optimal staging, habitat	4
15	Cues to individuals to settle and create territories across breeding range	4
11	Does conspecific attraction play a role?	3
18	Strength of site fidelity, especially in response to lost habitat (wintering)	3
2	Arthropod; foraging in different regions/habitats	2
5	Are birds reaching migratory potential in shade plantations, or is this creating a sink?	2
6	Optimal wintering habitat for all.	2
16	What mechanisms and benefits are there to CERWs associating with mixed species flocks (wintering)	2
9	Optimal fallout habitat.	1
10	How are they choosing landing spots along coast, habitat selection immediately post migration. What is the mechanism?	1

8	Is there sex partitioning in wintering/migratory habitat	0
12	Double brooding? Is this a function of density dependence, etc	0
13	Influence of mating systems on density dependence	0
19	Territoriality at beginning of wintering and changes throughout winter	0

Topic Area: Non-bird information needs

Facilitator: Dave Mehlman

Recorder: Deanna Dawson

Gap Number	Information Gap	Score
3	Better information on land-use patterns in Andes & at stopover areas	12
1	Economic or cultural factors influencing management of cafetales	11
9	Understanding wood products market forecast projections	10
6	Factors driving conversion of forestland to non-forest use	9
10	Understanding coffee market forecast projections	9
11	Understanding energy (coal, oil & gas, wind) market forecast projections	9
5	Tools needed to address critical threats, especially urban sprawl & exurban development, through planning & other processes	7
15	Extent of primary forest & processes affecting it in winter range	7
20	Most important things to do & where should they be done i.e., large-scale planning picture	7
4	Better information on probabilities of land conversion in N America	6
19	Good understanding of ongoing conservation efforts so that CERW conservation can be integrated	6
2	Best stakeholder groups to engage with to influence land use rangewide	5
7	Ways for conservation community to engage with planners, etc.	4
8	Current land ownership & turnover potential of areas of interest within breeding range	4
16	Spatial distribution of land with reforestation potential on mined lands, both previously reclaimed land and newly mined, and elsewhere	4
18	Historical information on habitat conversion in northern Andes	4
13	Educating private landowners about land protection/enhancement opportunities	3
17	FWS needs to engage in mining permit review process	2

Appendix 8. Results from breakout groups during session on identifying and describing conservation actions, and summary presentations/discussions provided to the entire group on Thursday morning.

Appendix 8a. Results from breakout groups during session on identifying and describing conservation actions.

DEFINITIONS

Score URGENCY with which the management action needs to be implemented.

- 3 Extremely Urgent. Needs to happen first, before any other management or conservation action, in order for limiting factor to be ameliorated.
- 2 Urgent. If the management action does not occur within a few years, the critical limiting factor will continue to cause declines.
- 1 Important Action, but could occur at any time or at a later point in the process of addressing the threat.

Score MAGNITUDE of effect of the management action.

- 3 If the management action is implemented, it will completely address the threat at local and rangewide scales and CERW populations will rebound as a result.
- 2 If the management action is implemented, it will contribute in large part toward reversing CERW declines.
- 1 If the management action is implemented, it will definitely make a contribution toward addressing the limiting factor, especially locally or regionally, but may not in itself reverse declines.

Score CONFIDENCE that the management action will work, or certainty that the management action, if implemented, will have the desired effect.

- 3 Full Confidence; the management action has been shown through published research and or documented studies to be effective in reducing or eliminating the critical threat or limiting factor in question.
- 2 Pretty sure it will work; others have used the management action with some success, or it employs components that have been used successfully.
- 1 No track record for this action, but it seems an ingenious idea and will likely be successful, or it is so promising that it is worth a try.

Breakout Group Topic: Loss of Habitat Quantity

Facilitator: Greg Butcher

Recorder: Tiffany Beachy

Critical Limiting Factor: Quantity of habitat on wintering grounds

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Incentives for existing shade coffee not to convert to pasture/sun coffee	3	2	3
Give financial and technical support to conservation NGO's in wintering ground countries	3	2	3
Identify areas of high concentrations of CERW	3	1	3
Ensure enforcement of protection of protected areas	3	1	2
Develop economic incentives to convert from sun to shade coffee	2	2	2
Diversify landscape/tree/crop species - don't put all eggs in one basket	2	2	2
Use incentives such as carbon credits to encourage agro-forestry and silvi-pastures in CERW areas	2	2	2
Develop funding mechanisms to protect CERW habitat	2	2	2
ID target sites for conversion of sun to shade	2	1	3
Use connections among state wildlife agencies and international SWG grants to protect CERW habitat	2	1	1
Promote ecotourism/fund-raising in CERW areas (eg coffee tours)	1	1	1

Critical Limiting Factor: Habitat quantity on breeding grounds

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Have clearly defined focal areas; have a conservation plan/vision	3	2	2
Use models to predict source/sink, etc (eg Central Hardwoods) - (could be part of #12)	3	2	2
Target valuable forest patches around urban areas - (could be part of #12)	3	1	2
Influence what happens to vast landholdings that encompass CERW habitat that are sold by industries (eg	3	1	2

Mead Westvaco)			
Promote conservation easements near CERW hotspots	2	2	2
Education/outreach to professional regional planners	2	2	1
Make more transparent the economic consequences of ex-urban development to local communities	2	1	1
Use NOBO conservation model to get landowners on board	1	1	1
Conservation Activity	Key Partners	Contributing Partners	Regions for Implementation
South America			
Identify areas of high concentrations of CERW			All Andean countries
Refine habitat models	Paul B. Hamel et al.		All Andean countries
Expand field surveys effort and geographic scope	In country partners	US partners	All Andean countries
Add data to priority migrant ebird	Cornell, FWS, Proaves	In country partners, birdwatchers	All Andean countries
Field studies of habitat use and survival	In country partners	US partners	All Andean countries
Standardize and coordinate field methods	Grupo Ceruleo, Monitoring Group of CWTG		All Andean countries
US			
Have clearly defined focal areas; have a conservation plan/vision	Jane Fitzgerald	Wayne Thogmartin	Entire breeding range
Model distribution and abundance of CERW in key BCR based on BBS data			Entire breeding range
Identify protected areas and regions of CERW abundance			Entire breeding range

Identify source forest landscapes based on forest coverage			Entire breeding range
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Breakout Group Topic: Degradation of Habitat Quality

Facilitator: Paul Hamel

Recorder: Deanna Dawson

Critical Limiting Factor: Degradation of habitat quality, breeding grounds

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Identify & protect (surface & subsurface rights) important CERW breeding sites	3	3	2
Develop better characterization of 'quality' habitat in relation to demographics	3	3	2
Adopt Charleston guidelines for forestry & mining	3	3	2
Foster reforestation of surface mines	3	2	2
Increase amount of buffer between forest and development/edge	3	2	2
Maintain or restore connectivity among patches outside core breeding range	3	2	2
Develop economic forecasting tools to predict impact of forestry & energy development on CERW habitat	3	2	2
Improve stand stocking to approximate good habitat	2	3	2
Control or reduce populations of predators & brood parasites	2	2	2
Enable appropriate silviculture in potential habitats on National Forest Land	2	1	2
Implement activities to reduce or mitigate fragmentation (e.g., locate infrastructure to minimize fragmentation)	2	1	2
Apply forest restoration techniques to restore forested buffers	2	1	2

Encourage cluster development to minimize human impacts on forest	2	1	2
Educate the public on relationships among birds, habitats, and economic activities	2	1	2
Minimize incompatible activities on public lands that degrade habitat (e.g., ORV, cattle grazing)	1	1	2
Apply easements to inholdings on public lands	1	1	2
Apply easements to mineral rights on public lands	1	1	2

Critical Limiting Factor: Degradation of habitat quality, non-breeding grounds

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Research to determine characteristics of 'quality' habitat	3	3	2
Promote conversion of pasture to forested habitats	3	3	2
Maintain existing natural vegetation, restore other areas	3	3	2
Identify & protect important CERW sites	3	3	2
Promote & purchase shade-grown coffee	3	3	2
Increase education of land managers & stewards	3	2	2
Increase amount of agro-forestry	3	2	2
Encourage watershed-scale management planning to enhance spatial connectivity	3	2	2
Provide information to certification bodies so they could include criteria beneficial to CERW in certification process	3	2	2
Encourage tax incentives to promote forest protection	3	2	2
Maintain or increase structural diversity in shade plantations	2	2	2
Maintain patch connectivity, increase forest patch size	2	2	2

Use plants determined useful to CERW in forest restoration activities	2	2	2
Educate landowners on economic activities that are compatible with or enhance biodiversity	2	2	2
Apply easements to inholdings on public or private reserve lands	2	2	2
Apply easements to increase connectivity to primary forest	2	2	2
Encourage economic diversification through appropriate agro-forestry techniques	2	2	2
Enhance ability to monitor habitat conditions in northern Andes	3	1	2
Conduct research to refine conservation or management actions	2	2	2
Monitor CERW to determine effectiveness of conservation actions	3	1	2
Implement economic development programs for farmers that result in appropriate habitat for CERW	2	2	2
Develop economic forecasting tools to predict impact of coffee & other crops on CERW habitat	2	2	2
Educate the public on relationships among birds, habitats, and economic activities	2	2	2
Educate the public to appreciate & understand role of migratory birds & other wildlife	2	1	2
Conservation Activity	Key Partners	Contributing Partners	Regions for Implementation
Non-breeding season			
Research to determine characteristics of 'quality' habitat	universities & research institutions, in & out of government; NGOs; local	governmental institutions for financial support, implementation; land owners	agro-forestry in Colombia & Venezuela, primary forest throughout northern Andes;

	ornithological societies in South, Central, & North America		stopover habitats in Mexico & Central America, and Gulf Coast
Promote conversion of pasture to forested habitats (or 'shade pastures')	land owner organizations at watershed scale; cattle-raising associations	local governments; natural resource agencies; restoration-oriented NGOs & research institutions	pastures throughout CERW non-breeding range; e.g., inter-Andean valleys in Colombia
Maintain existing natural vegetation, restore other areas	national park systems, owners of private reserves, private landowners	restoration-oriented NGOs & research institutions, local governments,	throughout non-breeding range, emphasizing areas near important CERW sites
Identify & protect important CERW sites	universities & research institutions, NGOs, local ornithological societies in South, Central, & North America; landowners	NGOs, private donors, international development banks	throughout non-breeding range, emphasizing areas with CERW & other species of concern
Promote & purchase shade-grown coffee	coffee federations or	coffee-drinkers; advertising &	coffee-consuming

	other entities to provide technical & financial support (yellow shirts); coffee certification programs; coffee buyers ("big" coffee); coffee growers	media outlets; Juan Valdez, Starbucks; Smithsonian Migratory Bird Center; organized consumer groups (e.g., Speciality Coffee Association of America)	regions
Breeding season			
Identify & protect (surface & subsurface rights) important CERW breeding sites	universities & research institutions, NGOs, local ornithological societies; land owners and holders of mineral & other rights	NGOs, private donors, mining & forestry associations, TIMOs, government programs, influential politicians	throughout breeding range, especially areas in core range with CERW & other species of concern
Develop better characterization of 'quality' habitat in relation to demographics	universities & research institutions, in & out of government; NGOs; local ornithological societies	forestry associations; governmental institutions for financial support, implementation; land owners	throughout breeding range
Adopt Charleston guidelines for forestry & mining	partners in forestry &	NGOs, private donors, mining	forestry guidelines

	mining interests; land owner associations; ARRI; CWTG; incorporate item 2 in draft guidelines for both mining & forestry	& forestry associations, TIMOs, government programs, influential politicians	throughout breeding range; mining guidelines in coal-mining regions
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Breakout Group Topic: Loss of breeding habitat due to large-scale habitat alterations

Facilitator: Rick Buckley

Recorder: Matthew Shumar

Critical Limiting Factor: Reclamation practices that inhibit restoration of suitable CERW habitat

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Create & implement CERW Reclamation Plans with "boiler plate" permit language for surface mine operators to use as a specific post-mining land use	3	2	2
Determining the extent to which CERW use reforested pre-SMCRA lands	2	2	2
Employing reclamation practices that facilitate reforestation on pre- and post-SMCRA surface mined lands that were reclaimed without adequate reforestation	3	2	2
Investigate ways to reduce remining of reclaimed habitat by creating incentives to remove all coal at once.	1	1	1

Critical Limiting Factor: Loss of mature forest habitat due to surface mining

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
ID "hotspots" & monitor for overlapping mining permitting applications to prevent mining or mitigate	3	3	2

Continue to develop the draft recommendations from the March meeting in Charleston	3	1	2
Develop outreach methods that continue to educate the public & industry, and develop partnerships	2	1	2

Critical Limiting Factor: Decrease reproductive success due to increase in frequency of severe weather events

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
maintain a distribution of viable populations throughout range	2	2	2
maintain core forest patch size (large areas)	2	1	2
contact government officials urging to curb global warming effects	3	1	1
Conservation Activity	Key Partners	Contributing Partners	Regions for Implementation
Create & implement CERW Reclamation Plans with "boiler plate" permit language for surface mine operators to use as a specific post-mining land use			
All CERW groups, organizations, or entities should consider formally partnering with like-minded reforestation groups like ARRI and provide encouragement and support			
Develop a technical working group to develop a CERW reclamation plan			
identify metrics used to create CERW reclamation plan			
Implement outreach for involvement of permit reviewers & issuers			
monitoring of the success of sites reforested using the CERW reclamation plan			

Breakout Group Topic: Degradation of breeding habitat quality due to

inappropriate management of forests, natural disturbance, and wildlife

Facilitator: Carol Croy

Recorder: Christine Vance

Critical Limiting Factor: Loss of breeding habitat quality due to CERW-incompatible forest management

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Develop region specific forest mgmt guidelines (engaging forest industry/mgrs in the process to assist with this)	3	1	
Target areas that have greatest potential to improve population within each region	3	1	
Engaging /educating forest managers and land managers/certification programs in using SFM techniques applicable to CERW	3	2	
Develop and support existing incentive programs for SFM/managing habitat for CERW	3	1	

Critical Limiting Factor: Loss of breeding habitat quality due to excessive herbivory

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Better management /control of deer/wild hog populations - Create/promote partnerships with deer/hunting organizations - encourage people to take allowable limits	2	2	
Target areas that have greatest potential to improve population within each region	2	2	

Critical Limiting Factor: Loss of breeding habitat quality due to lack of natural disturbance

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Where applicable, use prescribed burns as a disturbance mechanism	2	2	
Develop silvicultural surrogates of natural disturbance regimes	2	2	
Target areas that have greatest potential to improve population within each region	2	2	
Conservation Activity	Key Partners	Contributing Partners	Regions for Implementation
Develop region specific forest mgmt guidelines (engaging forest industry/mgrs in the process to assist with this)			
Encourage the adoption of Consensus CERW Conservation Guidelines for Forestry	CERW TG, Representatives of the Forest Industry	Private Landowners, NGOs, State gov't, fed gov't, academia	TN, OH, NC, KY, WV, VA
Hold workshops to regionalize the CERW Conservation Guidelines for Forestry, considering the applicability/impacts to other species	Private industry, state industry, federal, provincial	Private Landowners, NGOs, State gov't, fed gov't, academia	Remaining part of the CERW breeding range
Incorporate adaptive management feedback into guidelines (evaluate to determine effectiveness over time)	Private industry, state industry, federal, provincial	Private Landowners, NGOs, State gov't, fed gov't, academia	

<p>Target areas that have greatest potential to improve population within each region</p>			
<p>Establish criteria for identifying target areas in each region</p>	<p>Academia, researchers, Ornithological societies, Fed, state, prov. Agencies, landowners</p>	<p>Landowners</p>	
<p>Develop approaches/techniques for determining where criteria are met</p>	<p>GIS/landscape analyst specialists, land managers, foresters</p>		
<p>Engaging /educating forest managers and land managers/certification programs in using SFM techniques applicable to CERW</p>			
<p>Identify opportunities to educate public</p>			
<p>Develop an end product that helps educate people & get them enthusiastic about managing for CERW habitat - identify target audience & develop appropriate materials for that audience</p>			
<p>Engage state/provincial forestry associations and their committees that work with forestry community</p>	<p>State/provincial forestry associations</p>	<p>Organizations that are responsible for forest stewardship</p>	

Where applicable, use prescribed burns as a disturbance mechanism			
Utilize existing tools (e.g. landfire) to determine suitability of prescribed fire in a region	Nature Conservancy		
Develop a research program to employ adaptive mgmt framework for assessing this conservation tool - evaluate treatments, best economic choice	State division of forestry,		
Improve legislation so that it enables/allows prescribed burning as a conservation tool			
Establish ecological basis/justification for fire as a mechanism for restoration/ habitat maintenance	State division of forestry,		
Build consensus among partners that its realistic to consider fire as a mechanism			
Develop mgmt prescriptions	State division of forestry,		
Better management /control of deer/wild hog populations			
Create/promote partnerships with deer/hunting organizations			
Educate public/hunting community & encourage them to take allowable limits			
Encourage 'Hunters for the Hungry' program in areas where it doesn't exist			
Work with Government agencies (State and provincial) for improving the regulations re; Deer and wild boar mgmt (e.g. increasing season limitations)			
Educate public re; misconception that hunting is inhumane - should be an interagency approach so the same message is being delivered to public			

Breakout Group Topic: Limiting Factors Associated with Migration

Facilitator: Jason Jones

Recorder: Molly McDermott

Mortality at human-made structures (communications

Critical Limiting Factor: towers, lighted bldgs, off-shore oil platforms, lighthouses, wind turbines...)

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Conversion of communication tower lighting to bird-friendly lights	3	2	3
Reduce guy-wiring at communications towers	3	2	3
Increase monitoring network of human-made structures	3	2	2
Encourage large urban areas to participate in "lights out" programs	2	2	3
Encourage responsible siting of future human-made structures	2	2	2

Critical Limiting Factor: Availability of appropriate post-fledging/pre-migration habitat

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Pre-fall:			
Identify appropriate post-fledging/pre-migration habitat	3	3	3
Promote availability of appropriate post-fledging/pre-migration habitat	3	3	2
Band fledglings and submit banding records immediately	2	1	2
Encourage banders/banding stations to sample secondary habitats near breeding grounds (starting in July)	2	1	2
Encourage technological development of suitably sized and powered transmitters	2	1	1
Pre-spring:			
Identification and monitoring of likely pre-migration staging areas in S. America (March and April)	3	3	3

Promote availability of appropriate pre-migration staging habitat	3	3	2

Critical Limiting Factor: Availability of stopover/staging sites

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Identify stopover/staging sites	3	3	3
Explore use of radar data to search for stopover/staging sites	3	3	2
Assess ownership/conservation status of stopover/staging sites	2	2	2
Arrange for protection/management of stopover/staging sites	2	2	2
Support reforestation actions at identified stopover/staging sites	2	2	2

Critical Limiting Factor: Suitability (quality) of stopover/staging sites

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Assess physical condition of birds using stopover/staging sites	3	2	3
Augment food resources (via habitat manipulations) at documented stopover/staging sites	2	2	3
Assess arthropod biomass at known stopover/staging sites	2	2	3

Critical Limiting Factor: Segregation (spatial or temporal) during migration (by age, gender, or population)

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Monitor migration at stopover/staging sites for duration of migration period (earlier in spring and earlier in the fall)	3	2	3
Extend network of migration monitoring stations using observational monitoring	3	2	3
Add observational monitoring to current migration banding	3	2	3

operations			
Refine estimates of migratory connectivity using stable isotope analysis.	3	2	1
Conservation Activity	Key Partners	Contributing Partners	Regions for Implementation
Urgency = 3			
Pre-fall migration: Identify appropriate post-fledging/pre-migration habitat	all parties investigating demographics		Eastern N.A.
Pre-fall migration: Promote availability of appropriate post-fledging/pre-migration habitat	state/fed/private land managers		Eastern N.A.
Pre-spring migration: Identification and monitoring of likely pre-migration staging areas in S. America (March and April)	University of Colombia, ProAves Colombia, ULA-Venezuela		S. America
Pre-spring migration: Promote availability of appropriate pre-migration habitat	University of Colombia, ProAves Colombia, ULA-Venezuela	Bird Life Int., TNC	S. America
Identify stopover/staging sites	GCBO (Melinda Welton et al.)	TNC, ABC, USFWS	Rangewide
Explore use of radar data to search for stopover/staging sites	Sid Gauthreaux et al.		Southern U.S.
Assess physical condition of birds using stopover/staging sites	biologists monitoring stopover sites		Rangewide
Refine estimates of migratory connectivity using stable isotope analysis	all parties catching Ceruleans	Ken Keyser at Queens University, Ryan Norris at University	Rangewide

		of Guelph	
Monitor migration at stopover sites for duration of migration period: spring (S.A. - early March, C.A. - late March, U.S. - late March); fall (U.S. - late July, C.A. - late Aug, S.A. - late Aug)	all Eastern migration monitoring stations, GCBO (Melinda Welton et al.)		Eastern U.S. and C. America
Extend network of migration monitoring stations using observational monitoring	NGOs		Eastern U.S. and C. America
Add observational monitoring to current migration banding operations	all Eastern migration monitoring stations		Eastern U.S. and C. America
Conversion of tower lighting to bird-friendly lights	TV stations, cell phone companies, FCC, and ABC		Rangewide
Reduce guy-wiring at communications towers	TV stations, cell phone companies, FCC, and ABC		Rangewide
Urgency = 2			
Encourage technological development of suitably sized and powered transmitters	Telemetry companies and US military		independent of geography
Pre-fall migration: Band fledglings and submit banding records immediately	all biologists studying demography		Breeding range
Pre-fall migration: Encourage banders/banding stations to sample secondary habitats near breeding grounds (starting in July)	all Eastern migration monitoring stations		Eastern U.S.
Assess ownership/conservation status of stopover/staging sites	TNC, local gov'ts, state agencies, NGOs in US, C.		Rangewide

	and S. America		
Arrange for protection/management of stopover/staging sites	TNC, local governments & state agencies, NGOs in US, C. and S. America, National Audubon Society		Rangewide
Support reforestation actions at identified stopover/staging sites	USFS, state agencies, C. and S. American NGOs		Rangewide
Assess arthropod biomass at known stopover/staging sites	biologists monitoring stopover sites		Rangewide
Augment food resources (via habitat manipulations) at documented stopover/staging sites	biologists monitoring stopover sites, USFS, state agencies, C. and S. American NGOs		Rangewide
Increase monitoring network of human-made structures	US NGOs		Rangewide
Encourage large urban areas to participate in "lights out" programs	Urban governments, FLAP, local NGOs		Rangewide
Encourage responsible siting of future human-made structures	local NGOs, ABC, USFWS, FCC, FAA, industry reps, local governments & state agencies		Rangewide

Appendix 8b. PowerPoint presentation by Group 2 – Degradation of Habitat Quality

Appendix 8c. Notes captured during the Thursday morning presentations of results and following discussions about conservation actions for critical limiting factors

Group 5: Migration – presented by Jason Jones

Post Fledging pre-migration habitat: determine what and where habitat is. Only a few clues about it now. Leslie has some data. Try to enhance it.

Band fledglings: Sample secondary habitat near breeding areas

Need to know where birds are migrating, especially from southern most part of the non-breeding range (Ecuador)

Stopover/staging: find out where the sights are (work underway). Try Radar data. Get out early. Protect areas that are identified as having heavy use. Reforest, especially in southern US. And at arrival locations in SA.

Assess bird condition at stopover/staging sites, changes while there. Determine local prey availability

Monitor during migration to determine if the males and females are migrating at different times and along different routes

Add sites for monitoring.

Use stable isotopes to determine connectivity.

Mortality caused by human-made structures: convert to bird friendly lights. Decrease guy wires. Monitor around structures. Lights out program. Get involved with siting locations.

New Item: Priority migrant eBird for keeping track

Note: Migration group interpreted “Urgency” and “magnitude” to affect the limiting

factor, not necessarily to reverse the whole decline.

Group 4: Degradation of breeding habitat quality due to inappropriate management of forests, natural disturbance, and wildlife – presented by Carol Croy

Limiting factor: loss of breeding habitat due to incompatible forest management practices

Conservation actions:

Develop region specific forest management guidelines in cooperation with private landowners, state agencies, federal agencies in workshop type settings. Important to determine what practices are important to CERW but also to determine what land managers think is reasonable to contribute.

Use workshop in Charleston, WV between CWTG and forest industry as a model for next workshops

Develop programs to educate public and private forest land owners to encourage practitioners to use guidelines that are developed.

Develop and support incentive programs to incorporate CERW strategies into their practices

Regional guidelines are important because of the variability in the CERWs habitat associations across the range

Limiting Factor: excessive herbivory, primarily deer, but also elk, and in some areas have wild hogs

Conservation Actions: Work with agencies that have responsibilities to develop better management and control.

Actively seek out partnerships with hunting associations.

Focus deer management in areas where the CERW populations are highest or areas of highest probability

Limiting Factor: Lack of natural disturbance.

Conservation actions:

We have no control over some disturbances, but we can use prescribed fire and silvicultural practices

Timber management to create small patch openings

Restore open woodlands using prescribed fire. It is the only tool for use in low-site productivity. These open sites might create forage and draw deer from oak regeneration. Cause indirect and direct benefits.

Start with the areas that have the greatest potential to enhance CERW populations.

Wayne Thogmartin asked how can we increase deer hunting beyond current levels? Audubon has fostered relationships with hunting associations to foster the attitude that they are not just hunting deer but that they are creating CERW habitat. The states set regulations as a balance between hunting and anti-hunting perspectives. Something may be gained by letting bag limit managers know that we encourage hunting to levels that keep deer populations down. Increasing bag limits may not make the difference. Perhaps just open season on does, or other population control measures. Bottom line: we need to change the culture of hunters by educating them about the health of the deer population and the forest within which it resides.

Randy Dettmers asked: how much modification of the set of guidelines from the Charleston, WV meeting is need? Bottomland hardwoods and along streams, for example (1) New England and northern parts (2) Miss Delta (3) upper Midwest. Paul Hamel: Bottomland hardwood workshop have developed "desired forest conditions" and they are working on economically viable prescription

Group 3: Large landscape scale disturbances – presented by Rick Buckley

Limiting Factor: decrease of reproductive success due to increasing frequency of severe weather events.

Conservation Actions: maintain a distribution of viable populations throughout the range to buffer losses from isolated events. Maintain a large core area to withstand small losses. Contact government officials urging to curb greenhouse gas emissions.

Limiting Factor: loss of breeding habitat quantity due to landscape scale alterations. The group didn't deal with agriculture because they didn't have the expertise. They focused on mining.

Limiting Factor: reclamation practices that prohibit restoration of CERW habitat.

Conservation Actions:

Create and implement CERW prescription with boilerplate permitting language.

Create and implement CERW reclamation plan to make available to coal companies. Make it easy for coal companies to know what to do. And, make it easy for permittees to approve. The prescription needs to be developed in cooperation with coal.

Pre and post surface mine lands reclaimed without reforestation. 700,000 acres available for reforestation at this time.

Limiting Factor: loss of mature forest habitat from surface

Conservation Actions:

Identify CERW hotspots and identify overlap with mining. Try to mitigate impacts in the hotspots or protect them from mining. "lands unsuitable certificate" is hard to get and improbable. Best luck might come from working with coal companies and seeking mitigation and reclamation plan. Implement Charleston agreements. Develop outreach methods to educate public, industry, and govt.

Wayne: clearinghouse with digital data layer with authorized extent of permitted mining. That way we can overlay it with CERW data. Mining data is not available digitally, in all areas. **Need to ask for a central repository for this lease area data, so it is easier to access, and not just one permit at a time.** Not all permitted area is mined, but they do give you potential area. The amount of regulatory authority varies from state to state and therefore ability to mitigate varies.

Continue with the mining group to flesh out long-term options later. Pat and Rick will continue

Group 2 – Habitat Quality – presented by Paul Hamel (see PowerPoint from Appendix 8b)

Three different countries represented in this group

Considered degraded habitat quality on both breeding and non-breeding grounds. They listed conservation actions and identified urgency and magnitude

Maximum urgency/max impact – refer to powerpoint

Recognition that landowners are key partners in every respect

Footprint of CERW habitat and footprint of coffee is similar to footprint of CERW and footprint of coal. We need to have a meeting with coffee growers just like we did with coal.

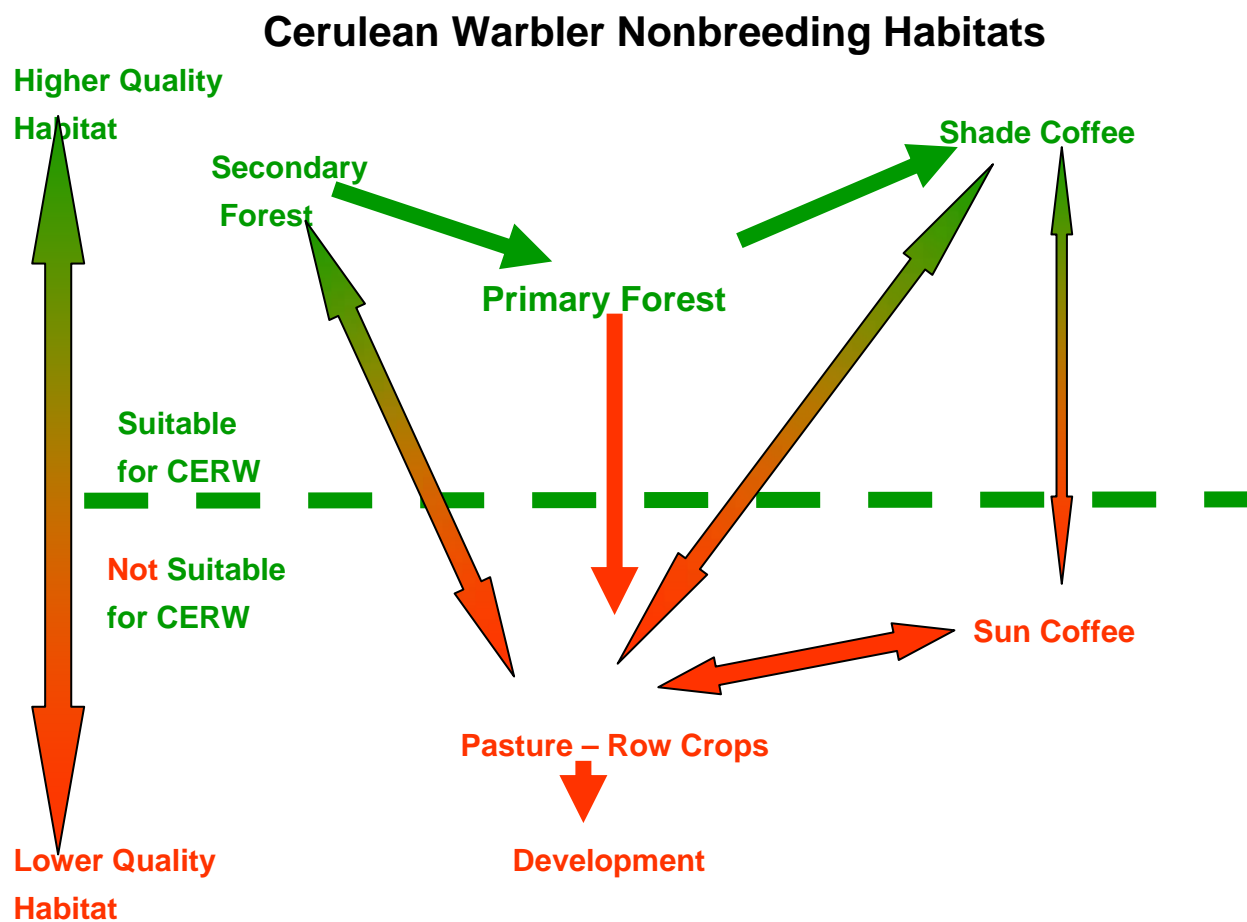
Guidelines in Charleston call for cooperation. We need to replicate that with other groups.

This process-there is a bias against education of public and education of young people. We need to make sure that we need to get the importance of outreach and education into the focal species plan

Can we add social scientists to this working group?

Group 1 – Habitat Quantity – presented by Greg Butcher

The following diagram (created by David Pashley) was presented on a flip chart – it is a schematic illustration of some of the relationships between various land uses/land covers and quality of CERW habitat



Stop conversion of primary forest, but not practical

Coffee: don't convert shade to sun. Financial incentives for sun to shade may not be feasible.

Keep shade coffee as shade coffee.

CERW coffee and other shade-based agriculture – may be responsive to financial incentives to keep shade as shade

NGOs in US more well off than Latin America NGOs, so we need to keep helping and getting North American NGOs to help Latin NGOs. A small amount of money can make a big difference.

Ensure enforcement of protection of protected areas. Success varies among countries: Ecuador, Peru, Bolivia hard. Colombia and Venezuela easier.

All kinds of products come from the forests; can we foster useful connections?

Silva-pastures – grow trees in areas where cattle are grazed

Recommendations:

Non-breeding grounds:

Refine habitat models with more field surveys with in-country partners

Bolivia not finding many birds

Add data to priority eBird

More studies of habitat use and survival – is primary forest CERW habitat or not?

Standardize field protocol

Breeding grounds:

CERW in NE use small habitat patches, but in heart of range they still need big patches.

Scale of conservation is daunting.

Clearly define focal areas with vision. BCR regional planning. Forest models that embody all interior forest species.

Use models to predict sources and sinks. Target valuable forest patches around urban areas. High priority because they will go the fastest.

Target buying big parcels from timber companies.

Promote conservation easements near hotspots. This is another daunting task because of its scale.

More people to add to this working group: Professional regional planners

Exurban development – work with local rural landowners to keep rural rural

Northern bobwhite model – conservation easements—can we use this model for CERW

David Pashley's diagram (see figure above) of habitat in Andes. Sun to shade is not simple because we cannot get the complexity of shade, especially in cloud cover. Some of these areas might be valuable to other migrants. We might be able to target steep slopes, and other lands less desirable for sun coffee. Can we do some things around edges, perhaps not throughout the whole plantations? Socio-economic factors play a big role.

Tom Will – call on everyone to take personal action at a local scale.

Increasing demand for shade may cause more growers to move into primary forest, not convert sun to shade.

How do we move forward?:

“Cerulean Cartel”: Is partnership already there? Does it need to be catalyzed? How do we help make it happen?

Dave Pashley – momentum built about 7 or 8 years ago. Russ Greenburg from Smithsonian. It seems like the steam has gone out of that movement. Do we need to reinvigorate or start anew?

Jorge Botero – Colombia federations now seeing possibilities in selling certified coffees. That is a share of the coffee market that seems to be working. Rainforest alliance is certifying coffee, and it seems to be working. Momentum in Colombia is increasing. Areas are now being enriched to comply with those certification criteria. **Rainforest**

Alliance will soon start a research project to evaluate certification criteria—maybe we can partner with Rainforest Alliance. Perhaps they can use it to promote their coffee too. They certify and help with marketing of coffee. Smithsonian did not help market.

Chris Eberly – also need to address issue of certification; there is no standardization of what constitutes shade certified. Each coffee distributor defines its own criteria. Perhaps we can bring the distributors together to certify to include CERW habitat needs.

Tom Will – these great ideas to seem to fade. Tom’s statement of optimism. This idea is perpetuating itself. We do need to reinvigorate with our critical density. Bird friendly agriculture.

Gabriel Colorado – cost of certification is expensive for the farmer. Small growers (1 or 2 hectare) don’t have that kind of capital. Therefore, it is difficult for them. They need some financial assistance.

Ken Rosenberg – second what Tom is saying. The first big push was a diffuse idea-the conservation impact wasn’t clear. We can now add focus to the conservation impact on this highest priority migrant bird. We have more of a flagship! **The other exciting thing is the potential for mining reclamation. We have an industrial partner on both ends. Industry to industry connection, mining mitigation to help coffee partners in Latin America**

?? – Venezuela and Peru issues are not well represented in these countries, and we need to make sure not to overlook these countries. The field is ripe in Venezuela for partnerships. Peru is a bit more difficult. Don’t forget the other issues in other countries.

Paul Hamel – Proportion of forest in Peru is much more than Venezuela or Colombia. Modeling results. Habitat connectivity NA to SA. Lower Miss birds may have the best outlook in SA if the connectivity is true.

The opportunity in Peru requires a larger effort to find partners. El Grupo is working on looking to find others, with advise from the CWTG. Very fine work is taking place in Venezuela by Amanda and Marja. We need to continue. We still have more opportunities to reach out in Peru and Venezuela. Peru doesn’t have a central NGO or

natural country-wide leader. Bird Life partner in Peru?

Significant penetration in Peru is with (*sounds like - Carolina Tobar*) in geography-not ornithology.

Is El Grupo willing to take lead on these issues. Paul Hamel says "YES!"

Appendix 9. Synthesis presentation on management recommendations and other conservation actions as identified through the breakout sessions



Range-wide Objectives

- Double the range-wide population by 2050

Range-wide Limiting Factors

Limiting Factor	Respondents	
	%	#
Loss of non-breeding habitat (i.e., native forest and shade plantations) QUANTITY due to land use changes in the Andes	73%	37
Loss of QUALITY of non-breeding habitat due to land use changes in the Andes	45%	23

Regional Objectives

- **Maintain primary forest**
- **Maintain, improve, increase other available habitat, including shade plantations**
 - Improve species diversity
 - Improve canopy complexity
 - Bromeliads
- **Provide connectivity between habitat patches**

Regional Limiting Factors

- Loss of primary forest causes indirect landscape-scale effects and ecological effects (*habitat quality*)
- Loss of primary forest limits habitat availability (*habitat quantity*)
- Loss and degradation of shade plantations limits habitat availability (*habitat quality & quantity*)
- Lack of landscape-scale forest connectivity and patch-level diversity (flora) reduces resource availability (*food resources*)
- Habitat degradation could limit participation in mixed-species flocks, resulting in poor survival or condition (*sociality*)

Conservation Actions

Activity	Key Partners	Contributing Partners	Regions for Implementation
South America			
Identify areas of high concentrations of CERW			All Andean countries
Refine habitat models	Paul B. Hensel et al.		All Andean countries
Expand field surveys effort and geographic scope	In country partners	US partners	All Andean countries
Add data to priority migrant ebird	Cornell, FWS, Proves	In country partners, birdwatchers	All Andean countries
Field studies of habitat use and survival	In country partners	US partners	All Andean countries
Standardize and coordinate field methods	Grupo Ceruleo, Monitoring Group of CWTG		All Andean countries

Conservation Actions

CONSERVATION ACTION	URGENCY	MAGNITUDE	CONFIDENCE
Incentives for existing shade coffee not to convert to pasture/sun coffee	3	2	3
Give financial and technical support to conservation NGO's in wintering ground countries	3	2	3
Identify areas of high concentrations of CERW	3	1	3
Ensure enforcement of protection of protected areas	3	1	2
Develop economic incentives to convert from sun to shade coffee	2	2	2

Conservation Actions (cont.)

Activity	Key Partners	Contributing Partners	Regions for Implementation
Non-breeding season			
Research to determine characteristics of 'quality' habitat	research institutions, NGOs, ornithological societies in South, Central, & North America	governmental institutions for financial support, implementers, land owners	agro-forestry in Colombia & Venezuela, primary forest throughout northern Andes, stepover habitats in Mexico & Central America, and Gulf Coast
Promote conversion of pasture to forested habitats (or 'shade pastures')	land owner organizations at watershed scale, cattle-raising associations	local governments, natural resource agencies, restoration-oriented NGOs & research institutions	pastures throughout CERW non-breeding range; e.g., intra-Andean valleys in Colombia
Maintain existing natural vegetation, restore other areas	national park systems, owners of private reserves, private landowners	restoration-oriented NGOs & research institutions, local governments	throughout non-breeding range, expanding areas near important CERW sites
Identify & protect important CERW sites	conservation & research institutions, NGOs, local ornithological societies in South, Central, & North America, landowners	NGOs, private donors, international development banks	throughout non-breeding range, expanding areas with CERW & other species of concern
Promote & purchase shade-grown coffee	coffee federations or other entities to provide technical & financial support (yellow shirt), coffee certification programs, coffee buyers ('big' coffee), coffee growers	coffee distributors, advertising & media outlets, Inca Valley, Starbucks, Smithsonian Migratory Bird Center, organized consumer groups (e.g., Specialty Coffee Association of	coffee-consuming regions

Shade Coffee

Activity	Key Partners	Contributing Partners	Regions for Implementation
Promote & purchase shade-grown coffee	coffee federations or other entities to provide technical & financial support (yellow shirts); coffee certification programs; coffee buyers ("big" coffee); coffee growers	coffee-drinkers; advertising & media outlets; Juan Valdez, Starbucks; Smithsonian Migratory Bird Center; organized consumer groups (e.g., Speciality Coffee Association of America)	coffee-consuming regions

Cerulean Cartel



Adopt Charleston Guidelines



Protect Stopover/Staging Areas

