1. **Type of Event**: Symposia, Tools in Ornithology
2. **Title of Event**: *Advances in estimating patterns of bird abundance and distributions at relevant spatial and temporal scales*
3. **Organizers**:
    a. Viviana Ruiz-Gutierrez, Conservation Science and Bird Population Studies, Cornell Lab of Ornithology, and Monitoring Subcommittee, North American Bird Conservation Initiative.
    b. John Sauer, U.S. Geological Survey Patuxent Wildlife Research Center, and Monitoring Subcommittee, North American Bird Conservation Initiative.
    c. Steve Kelling, Information Science, Cornell Lab of Ornithology.
4. **Speakers and titles**:
    a. *Monitoring patterns and changes in abundance and distribution across space and time: advances in approaches and methodologies for monitoring bird populations*. Viviana Ruiz-Gutierrez, Conservation Science and Bird Population Studies, Cornell Lab of Ornithology, NY.
    b. *Finding the middle ground between structured and unstructured monitoring in citizen science.* Steve Kelling, Information Science, Cornell Lab of Ornithology, NY.
    c. *North American Breeding Bird Survey: Model inferences from a complex survey*. John Sauer, USGS Patuxent Wildlife Research Center, MD.
    d. *An Integrated Population Model for Multi-scale Inferences about Population Dynamics of North American Landbirds.* Jim Saracco, Institute for Bird Population Studies, CA.
    e. *Composite models for range-wide estimation of waterfowl abundance*. Guthrie Zimmerman, US Fish and Wildlife Service, MD.
    f. *Avian abundance estimation with eBird: full annual cycle information from continental to regional scales.* Daniel Fink, Information Science, Cornell Lab of Ornithology, NY.
    g. *Estimates of observer expertise improve inferences on species distributions from citizen science data*. Ali Johnston, Population and Ecology modeling, British Trust for Ornithology, UK.
    h. *Using eBird data to estimate year-round distributions and habitat associations of Tricolored Blackbird (Agelaius tricolor).* Orin Robinson, Conservation Science, Cornell Lab of Ornithology, NY.
5. **Preferred duration**: Half-day, afternoon

6. **Symposium Description**:

Bird conservation in the anthropocene will require innovative approaches in both science and technology aimed at improving our current understanding of bird populations. The North American Bird Conservation Initiative (NABCI) Monitoring Subcommittee is charged with providing guidance for improving methods for monitoring bird populations to best inform the conservation and management decisions made by NABCI members and their partners. The development and application of analytical tools, methodologies and frameworks for monitoring are a major focus of the Subcommittee. In this symposium, we discuss work supported by the Subcommittee to address one of the major challenges ornithologists are tasked with in the 21st century: understanding patterns of bird abundance and distributions at spatial and temporal scales that are relevant to the ecology and management of species. To meet this challenge, we require cost-effective approaches for acquiring large volumes of year-round information at continental scales, and statistical methods that can accommodate multiple sources of information. Traditional surveys, such as the North America Breeding Bird Survey, have provided critical information on annual trends, habitat associations and species distributions during the breeding season. Advances in the way we collect data with the help of citizen scientists, such as eBird, have encouraged the development of statistical models that have begun to provide unique insights into year-round patterns of species abundance, distribution, and habitat associations. Analytical approaches are also being developed that leverage recent improvements in statistical modeling to integrate information from these bird surveys with large-scale, long-term demographic monitoring efforts, such as the Monitoring Avian Productivity and Survivorship in the U.S. In essence, these integrated population models link information on changes in abundance over time to underlying demographic processes, and are the best way to increase our understanding of the actual drivers of changes in populations. Here, we provide an initial overview of advances and challenges surrounding how to best monitor bird populations, and describe frameworks for collecting and integrating multiple sources of information at broad spatial and temporal scales. The overview is followed by talks that describe projects underway that address current challenges and specifically support the goals of the NABCI Monitoring Subcommittee. These talks will provide guidelines and examples of how to apply and improve upon current approaches for monitoring bird populations, with the objective of fostering more effective partnerships for bird monitoring between citizen scientists, state and government agencies, and individual researchers.

The main organizer is part of the AOS Diversity Committee, and effort was made to include early, mid and late career professionals, as well as representatives from Academia, government and NGO sectors. In addition, we made a strong effort to include women who are quantitative ecologists. Unfortunately, the field of quantitative ecology in general is largely male-biased, with very little representation of women and minorities, but we were able to include two women quantitative ecologists to serve as role models for other women interested in this field in ornithology.

7. **Rationale**:
Information on abundance and distribution is at the foundation of much research in ornithology and conservation biology. For example, knowing the "*when, where and how many"* for bird populations is fundamental for questions such as the evolutionary drivers of diversity and speciation, but also critical for understanding the potential impacts of changes in climatic conditions on bird populations. It is our expectation that a symposium on advances in how we estimate changes in abundance and distribution of bird populations across their full annual cycle will be of interest to broad audiences of ornithologists, ranging from academics, to staff at state and government agencies in charge of defining species management plans. There has also been an exponential increase in the implementation of citizen science bird monitoring programs, with a similar interest in ways to address the challenges inherent to these data. This symposium presents best practices for both the collection and analysis of information from citizen scientists, and will likely draw additional interest from conference participants.