MINUTES
Ornithological Atlassing in the Americas
A meeting of the North American Ornithological Atlas Committee (NORAC)
Held in conjunction with the 4th North American Ornithological Conference
Veracruz, Mexico
Monday, 2 October 2006, 8:30 – 17:00

Introduction:
The workshop consisted of a series of presentations on various aspects of atlassing, combined with open discussions of particular issues including data management and archiving, quantitative atlas sampling, and how to develop atlases in Latin America and the Caribbean. These minutes start with an overview of the major conclusions and next steps. They are followed by the agenda, a brief summary of each presentation, and detailed notes taken during the discussions – these notes are not comprehensive, but attempt to highlight major issues raised during discussion.

Meeting Objectives:
1. Exchange information and updates on recent developments in bird atlas projects in North America;
2. Consider the best ways to expand bird atlases throughout the Americas, including Latin America and the Caribbean
3. Set future objectives for NORAC and establish a new set of officers

Summary:
All of the presentations highlighted the value of ornithological atlases for bird conservation and management. For example, information on bird distributions contributes to land management planning; information on status of rare and sensitive species aids with recovery planning; data on changes in population numbers and distribution over time (from repeat atlases) can be used to estimate trends, to set priorities and to assess impacts of management activities. Atlasing also has a tremendous educational and training component. Many of these values are greatly enhanced if data from different regions are collected in comparable fashion, so they can be combined to provide a more comprehensive picture. There are still many gaps in coverage of atlases in the U.S. and Canada, and there is tremendous potential for development of atlases in Latin America and the Caribbean. There have also been many new developments in data management, data presentation (e.g., interactive web mapping applications), as well as field sampling methods (e.g., quantitative atlas sampling).

There thus remains a significant role for NORAC to become more active to help promote the development of new atlases, to help share information on methods and approaches available for atlasing, and to continue to promote standards for atlasing methods.

Major Recommendations:
1. Establish a subcommittee to review quantitative sampling methods, and provide recommendations on approaches for new atlases
2. Establish a subcommittee to help promote atlasing in Latin America and the Caribbean and to develop recommendations for methods and approaches for bird atlasing in these countries including consideration of year-round atlasing to survey migrants & residents
3. Establish a subcommittee to develop species table of acceptable breeding codes
4. Develop promotional materials to explain the uses and value of bird atlases for various audiences including both U.S./Canada as well as Latin America
5. Update NORAC webpages (http://www.bsc-eoc.org/norac/index.html) as a comprehensive resource of information on atlassing in the Americas, and set up a listserv for atlas organizers (BIRDATLAS-L@uark.edu)
6. Ensure that committee meets annually, in various locations to help promote objectives.

- 2007 (July) – Puerto Rico in combination with the Society for the Conservation and Study of Caribbean Birds biennial meeting
- 2008 (August) – Portland, Oregon in combination with joint meeting of American Ornithologists Union, Cooper Ornithological Society and Society of Canadian Ornithologists

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MEETING AGENDA

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Co-Chairs: Mike Cadman mcadman@uoguelph.ca,
Charles M Francis, charles.francis@ec.gc.ca,
José Salguero dricterus@yahoo.com

9:00 am – noon **Atlassing in North America**

9:00 – 9:10 am *Welcome and Introductions*
9:10 – 9:40 am *Session 1. Introduction to atlassing in North America.*
9:10 – 9:25 am Overview of atlas and other activities to map bird distributions in U.S./Canada, including a brief history of NORAC – **Mike Cadman**
9:25 – 9:40 am Applications of Atlas data in bird conservation. – **Chan Robbins**.

9:40 – 10:40 am *Session 2. Aspects of running a second atlas.*
9:40 – 9:55 am Dealing with different effort between first and second atlases – **Pete Blancher**
9:55 – 10:10 am Use of point counts to quantify abundance – **Charles Francis**
10:10 – 10:25 am Development of improved training materials for atlassers (e.g. bird song training guides). **Charles Francis**
10:25 – 10:40 am *Discussion*

10:40 – 11:00 am *Refreshment Break*

11:00 – noon *Session 3. Standardizing data collection and data management.*
11:00 – 11:15 Standardization of data collection and coding. **Mike Cadman**
11:15 – 11:30 Archiving data and comparisons between atlases. **Mark Wimer / Mike Cadman**
11:30 – 11:45 Atlasses and E-bird (Cornell Lab of Ornithology) **Jeff Gerbracht**
11:45 – noon Web-based data management, including scannable forms and web-based data entry (Bird Studies Canada) **Denis Lepage**

Noon – 1 pm **Lunch**

1:00 – 2:00 pm *Session 4: Discussion re data standardization and data management systems.*
- Include a discussion of whether NORAC wishes to make recommendations re standards for abundance data collection in North America

2 pm – 4:30 pm **The role of bird atlases for bird monitoring in Latin America and the Caribbean**

2:00 – 3:00 pm *Session 5: Bird distribution and abundance projects in Latin America and the Caribbean.*
2:00 – 2:20 pm Overview - **José Salguero**
2:20 – 2:40 pm The Puerto Rico Atlas - **José Salguero**
2:40 – 3:00 pm Atlassing in the Caribbean – **Rick West**

3:00 – 4:30 pm *Session 6: The potential for developing Breeding Bird Atlases in Latin America and the Caribbean – a discussion forum.*

a. Relative advantages of atlases versus other monitoring programs such as checklists or Breeding Bird Survey
b. Benefits and challenges of year-round atlassing
c. Infrastructure required to run an atlas
d. Sources of funds
e. Tools available to assist with data base management
f. Training materials required/available
g. Incorporating visiting birders from other countries
h. Next Steps: How best to advance bird atlassing and bird population distribution mapping in the Americas

4:30 pm – 5 pm **NORAC Business session.**
Election of officers
Discussion of the future of NORAC.

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SUMMARY OF PRESENTATIONS AND DISCUSSIONS

Session 1. Introduction to atlassing in North America.

Overview of atlas and other activities to map bird distributions in U.S./Canada, including a brief history of NORAC – Mike Cadman

- Mike presented a summary of the history of atlasing in the Americas, including maps of current atlas coverage.
- First atlas in U.K. 1969-1974.
- First atlases in North America in 1970s with county atlases in California, Maryland, and state atlases started in VT, CT, ME
- Many new atlases started in 1980s – NORAC was formed in 1980 (for history of NORAC activities, see NORAC web page - http://www.bsc-eoc.org/norac/norachistory.htm)
- *(WARNING: as the web pages get updated, some of these links may change. If they do not work, go to the NORAC home page and navigate from there).*
- by 1986, 30 states/provinces had atlases underway.
- In 1990 NORAC published handbook of recommended atlasing methods in English and Spanish (available on: http://www.bsc-eoc.org/norac/atlascont.htm)
- In 1999, NORAC met in conjunction with AOU at Cornell. Proceedings from that conference are on the NORAC website: http://www.bsc-eoc.org/norac/noracconference.htm
- 2000s – first repeat atlases started in New York, Ontario, Alberta and elsewhere.
- Quantitative sampling methods introduced with several atlases including Ontario
- Puerto Rico atlas started
- A series of maps were presented showing the state of coverage of North America by atlases – still a number of states and provinces do not have an atlas, and only some of the atlases that have been run have contributed data to efforts to provide continental coverage (BBA explorer – see http://www.pwrc.usgs.gov/bba/)
- The various types of data collected during atlases were reviewed, including breeding evidence, as well as new innovations such as web entry, rapid online mapping and quantitative sampling
- Highlighted three goals for NORAC:
    - Encourage more atlases
    - Improve effectiveness of atlases
    - Enhance compatability
        - Provide standards and guidelines
        - Enhance communication among atlases

Applications of Atlas data in bird conservation – Chan Robbins

- Reviewed advantages of an atlas over other surveys such as Breeding Bird Survey:
- Provides data to plan land use and conservation
- Involves multiple visits each year to all habitats, with traditional emphasis on confirmation of breeding
- Provides better coverage of offroad habitats, nocturnal species, wetland species, forest interior
- Can be targeting to provide information on specific areas of interest
- Can be linked to mapping data from other species (e.g., plants, insects, other animals) to get better understanding of biodiversity
- Valuable in roadless areas where annual surveys are not practical
- Provides baseline information for measuring change in particular areas, especially as associated with urban development, land exploitation (e.g., mining), intensive agriculture (including tree

plantations), land management practices, catastrophic events (e.g., hurricanes, drought, fire, invasive species, climate change)
- Atlas data provide a conservation tool for use by: Legislators, Land use planners, Developers, Environmentalists
- Atlas data stimulate public interest in conservation of critical habitats
- Atlas data document the conservation value of specific tracts of land
- Atlas data enable comparisons of the conservation potential of different tracts, so land use planners can steer urban development into areas with little conservation value and save (even improve) the conservation value of the more desirable sites.
- The BBS revolutionized the mapping of bird distribution.
- Atlas results have refined bird distribution mapping even further.
- Atlas results show not only the local ranges of threatened and endangered species.
- They also show additional species that are scarce locally and may be in need of conservation efforts.
- Atlas data document areas of unique and fragile habitat so that efforts can be made to protect them.
- Atlases can promote recording of Natural History Data: e.g., Nest records (Supporting vegetation, Height above ground, Date(s), Contents, Success or failure, Cause of failure)
- Because atlas data demonstrate gaps in knowledge, they initiate new studies to fill in these gaps.
    - A good example is the first Maryland/DC atlas, which showed gaps in the distribution of rails and other marsh birds. The State of Maryland initiated studies to fill in these gaps.
- Bird atlas studies have paved the way for atlases of other groups of animals: e.g., Butterflies, Dragonflies, Reptiles, Amphibians

Session 2. Aspects of running a second atlas

Dealing with different effort between first and second atlases – Peter Blancher

- one of the potential uses for atlases is to look at changes in bird distributions over time.
- However, for breeding evidence data, there is a problem that number of species detected in a square is dependent on effort
- In Ontario atlas, there were changes in amount of effort, type of effort and distribution of effort:
    - 19% more in second atlas,
    - major increase in North
    - most effort was not standardized
    - changes in type of effort: addition of point counts and an intensive survey project in boreal forest for second atlas
    - species richness estimates increase in a nearly linear fashion with log(effort)
- Methods were presented to adjust species richness for amount of effort, based on subsampling data
    - This was only possible because data were recorded in a cumulative fashion.
    - On the first atlas, data from different observers and different years were entered separately, together with the number of hours from each.
    - Subsampling was only possible by omitting later years/observers.
    - On the second atlas, species were recorded based on the first visit on which they were detected, together with effort (number of hours) for each visit. Thus, it was possible to subsample based on individual visits (e.g., only include species detected cumulatively up to the visit on which a particular number of hours was accumulated)
- There was very little correlation between the effort in a particular square on the first and second visits.
- However, by subsampling, it was possible to choose a set of squares for which effort was comparable on both atlases.

- It was then possible to develop predicted probabilities for detecting particular species in each time period after a certain number of hours of effort.
- These were then used to estimate change for different species – several examples were presented
- This method will be used for published book
- Details of method will be included in book (and posted on web)
- One major conclusion is that even with this approach, there are many uncertainties, especially related to compatibility of effort measures.
- One hour of effort from an observer can mean many different things, depending whether they are looking for nests, carrying out point counts, exploring one habitat or many, what time of day and what time of year, etc.
- This thus highlights the value of using alternative approaches, such as standardized sampling (including quantitative approaches) to estimate changes in distribution and abundance

Use of point counts to quantify abundance – Charles Francis

- Summarized several potential reasons to estimate relative abundance:
    - Estimate spatial variation in abundance
    - Improved estimates of change over time
    - Improved interpolation into unsampled areas
    - Precise location data for modelling (e.g., habitat associations)
    - Potential for more representative sampling
- Showed several example maps taken from Ontario Breeding Bird Atlas to show how information on relative abundance can provide a very different picture of distributions, especially for widespread species.
- Ontario atlas evaluated two methods for quantitative sampling in a pilot year:
    - Area Search: 1 x 1 km “cells”
        - 2 hour maximum area search
    - Point Counts
        - Roadside and off-road, former randomly selected
- Comparison of methods:
    - “Cells”: More flexible, but still strongly affected by song ID skills, especially if limited time
        - Enormous variation among cells in amount of cell and habitat covered
        - Lower precision per unit effort
        - Problems with accessibility in many areas
    - Point counts:
        - Substantially higher statistical precision
        - Easier to manage (can clearly define what needs to be surveyed, don’t need to track areas that were actually surveyed, etc.)
        - Can be integrated with other data sources
- As a result, Point Count Methods were selected:
    - 25 point counts per 10 x 10 km square
    - mostly on roadsides (randomly located)
    - 5 minute count of all birds (seen & heard)
    - Record separately <100m and > 100 m
    - ½ hour before sunrise to ~5 hours after sunrise
    - Peak breeding season (May 24-July 10 in Ontario)
    - Good weather only
- Selection of Point Count locations
    - Randomly generated 50 point count locations in each square
    - Atlassers asked to survey first 25 that are suitable (e.g. roads not too busy)
    - Supplemented with some off-road points to improve habitat representation
    - Maps were provided to atlassers showing point count locations, along with the GPS coordinates

- Who carries out point counts?
    - Implemented Point Counts with ordinary atlassers
    - Not everybody has to do Point Counts
    - Only people able to ID birds well by song
    - Many observers improved skills over atlas and often took on quantitative sampling later in atlas
    - A number of observers decided to specialize in point counts and carried them out for other atlassers as well.
    - Hired seasonal staff to atlas in areas with poor volunteer coverage – all of them were expected to do point counts
- Observer effects:
    - These are a potential problem with point counts, just like any other index survey
    - To minimize bias in maps, best to have many observers in each region doing point counts, so can help to "randomize" differences among observers
    - Best to have observers of different skill levels distributed among regions
    - (alternative is to have only a limited number of observers, all trained up to a comparable standard, as is being done for the Pennsylvania atlas – but that usually requires paid crews, and also limits potential sample size)
- Supplementing effort from atlassers – trying to cover the north
    - Relatively few resident birders, so needed to supplement with paid crews
    - To help with coverage initiated a research project on impacts of logging on forest birds in boreal forest, using protocols integrated with atlas protocols:
        - funding opportunity through sustainable forestry interests
        - results should be useful for forest management
        - enhanced atlas coverage
        - Slightly different sampling method (clusters of 6 points, with 2 roadside, 4 offroad)
    - Also incorporated point count data from other projects (e.g., Forest Bird Monitoring, Ministry of Natural Resources projects)
- How many point counts are needed?
    - Goal was to obtain 25 points in each square
    - Target was to cover every square in highly population areas, 1 in 4 in lower density areas, and smaller numbers in remote areas
- Coverage attained
    - 62,777 point counts (after verification) over 5 years – had to screen out a few
    - Determined that could use squares with at least 10 point counts for final analyses, though precision was increased if 25 target was reached.
    - With this criterion, majority of squares in southern Ontario had sufficient coverage for analysis
    - In North, analyses required much more interpolation to generate maps
- Point counts do not work for all species. Species not well sampled by point counts:
    - Waterbirds/ducks/gulls
    - Raptors
    - Owls/Nightjars
    - Rare/Localized Species
- Other sampling methods were developed for some of these (e.g., recording of rare/colonial species, specialized playback protocols (effectively modified point counts) for owls, etc.)

Development of bird song training guides for atlassers – Charles Francis

- A demonstration was given of the *Nuthatch* computer program that was developed for the Ontario Breeding Bird Atlas
- This is a Windows-based program that allows observers to view a picture of a species on the screen while listening to its song.
- Multiple different songs/calls were provided for each species, to help learn some of the variation

- Also, descriptions were provided for each song, highlighting some of the key identification characters for each species song.
- Perhaps the most important feature is a quiz function, which allows users to test themselves, based either on songs or pictures or both (depending on how skilled they are).
- The quiz can be restricted to particular groups of birds, based either on taxonomy, geography or song type, so that observers can focus on groups they are having trouble with.
- By including several different songs for each species, that are randomly picked, observers are more likely to focus on the important aspects of the species songs, rather than getting distracted by, for example, background noises.
- A comparable program, with an introductory list of species, has been developed for birds of Veracruz, and will be distributed free to participants at the conference.
- The program, called *Doricha* included songs of about 200 species, pictures of about 450. It could serve as a model for comparable programs to help start Latin American atlases.

Session 3. Standardizing data collection and data management.

Standardization of data collection and coding – Mike Cadman

- Presentation incorporated data put together by a team: M. Cadman, C. Elphick, C. M. Francis, S. Kelling, D. Lepage, B. Peterjohn, C. Robbins, M. Wimer
- Types of data
    - Breeding evidence
    - Rare/significant species
    - Abundance data
    - Habitat data
    - Effort
- Overview – breeding evidence field data categories
    - Location information
    - Observer info (ID#)
    - Species
    - Breeding code
    - Effort
    - Date & Time of visit
    - Other information (e.g., Nature of visit, Abundance, date of first confirmation)
- Location Information
    - Field Card
        - Block/square identifier
    - Database
        - Lat/long or UTM identifier for the block/square
        - southwest corner (for UTM based blocks) or southeast corner (Lat/long based)
        - also can provide center of the block (metadata to define polygon)
        - Need to identify partial blocks/squares (borders, etc.)
- Species
    - Field form
        - AOU Species name or standard 4 or 6 letter codes
    - Computer data base
        - Needs a standardized code with information on version of checklist (for changes in taxonomy)
    - Breeding Evidence (standard atlas codes)
        - Breeding category (Observed, Possible, Probable, Confirmed) if none standard
- Participant Information
    - Name
    - ID number (for use in data base)
    - Contact information:

        - Address (street, city, state/province, zip/postal code),
        - Phone number – Home and work
        - E-mail address
- Effort Information
    - Why collect effort data for breeding evidence (presence/absence) data?
        - Assess coverage to determine whether square is covered
        - Assess spatial and temporal comparability
        - Allows analyses of species accumulation vs effort, etc.
    - Effort data essential for abundance data collection
        - to ensure effort standards are followed
        - Record effort by year, in each block/square, for each atlasser (or group)
- Record for each visit:
    - Date
    - Begin time and end time (Time to the nearest 1/4 hr)
    - Party hours per visit
- Type of effort?
    - Useful for some applications, but adds complexity for participants:
    - Nocturnal/crepuscular survey
    - Specialized species/habitat survey (e.g. marsh birds)
    - Initial coverage of area
    - Return visit to sites previously atlassed
    - Breeding confirmation visit
    - Other (i.e., none of the above – specify)
- Additional information related to effort and observers
    - Could record number of new species recorded during each visit, but much better to record which new species recorded during each visit (as in Ontario – use one card per season, but record visit on which each species was first observed – allows understanding of relations between effort and detection)
    - Challenge if observer lives in square – record as casual observations, but may be worth specifically coding this.
- Rare/Significant/Colonial Species – record a lot more detailed information. Invaluable opportunity to learn more about these.
    - Species
    - Block/square
    - Observer(s) information
    - For each visit:
        - Date
        - Precise Location of observation (GPS or estimate from map)
        - Breeding evidence
        - Number of adults and young
        - Number of nests (colonial species)
        - Description of bird(s) and circumstances of the observation (to help verify information)
        - Habitat
        - How to access site/Sketch map of site
        - Land Ownership info
    - Data base should also track information on review process for these species
        - Who has reviewed record, as well as decision(s)
- Habitat data
    - Most atlases don't ask volunteers to record detailed habitat information
    - useful primarily for rare/significant species or for use with quantitative data
    - Questionable reliability
    - Might reduce involvement in atlassing – many observers are not skilled at this and may find it intimidating, not fun or additional effort
    - But – Nevada and Colorado atlases did collect habitat data (in broad categories)
- Quantitative data

  - Collected at same time as breeding evidence (e.g. Britain)
  - Same data categories used
  - Collected separate from Breeding evidence (e.g. Maryland, Ontario)
  - New data categories required
- Data required for quantitative sampling at a particular location (e.g. Point Counts)
  - Date
  - Start time
  - Location - Lat/long or UTM (specify North American Datum NAD)
  - source of coordinate (GPS or map)
  - Precision of each location (e.g. within 10m, 100m, 1 km, etc.)
  - Species
  - Number
  - Distance category?
  - Habitat?
  - Time Interval? (if using interval sampling, e.g. by 75second interval as in Pennsylvania)

Archiving data and comparisons between atlases – Mark Wimer / Mike Cadman

- Planning for long-term use can help create goals for data collection and storage policies.
- Archiving (annotating?) atlas data and running an atlas should happen at the same time;
- If all the information isn't there as far as data policies and full data capture, it won't magically appear later
- If possible, data rules should be transparent and complete prior to data collection
  - For example, if you tell people that they only need to record dates for confirmed records, and not to record a species prior to its safe dates, what happens when you later move those safe dates?
- Different purposes for an atlas means different archiving approaches
  - Creating a paper/pdf publication of baseline data
  - Creating a dataset/GIS for long-term data uses in the state or province
  - Contributing to a National or Continental atlas
- There are an increasing number of uses and users of the data, so more documentation is required to facilitate proper use of the information
- Contributing to a larger effort requires substantially more standardization across states and provinces
  - Lack of consistent standards has been a big challenge in creating a national repository of atlas data
- Other challenges: it is sometimes not clear which is the definitive version: the book or the archived dataset
  - Requires clear documentation of all changes.
  - Uneven recording of OB (observed with no further evidence of breeding) data in books and datasets, as well as variation among regions in the definition of OB
  - Missing data (book related to dataset, but no clear clock on the date of evolutionary split!)
- Uneven use of “safe dates” (dates within which it is safe to assume that a bird is breeding if present)
  - Some atlases do not use these, some apply the rules only after data collection.
- Taxonomic Challenges:
  - How to treat taxonomic changes. For example, for which states do we automatically convert Northern/Common Flicker to Yellow-shafted Flicker?
  - Treatment of hybrids, e.g. Lawrence's Warbler?
- Treatment of partial and border blocks not recorded, especially blocks that straddle state/provincial boundaries:
  - did atlasing stop at the border, and if so why does GIS layer show full block

- Some of the challenges to using/visualizing data across boundaries *(Challenges affecting repeat atlases in italics*)
    - Abundance data rarely attached to data set and even if they were, methods are not standardized
    - Differing age of data presents challenges – first atlases in some states are the same time frame as repeat atlases in others
    - *Effort not standardized* (affects richness map mostly; effect on species distribution maps harder to predict/determine)
    - Variation among atlases in block size: a larger block size cannot be covered as well (i.e. lower percentage of species likely to be detected for a given effort.
        - How should this be conveyed?
    - Smoothing a map across different sampling schemes – can we simply aggregate to the topo quad or equivalent level?
    - *If dates are not recorded or if safe dates/rules change, this is rarely encoded in data.*
    - Some codes are placed in different categories, e.g. nest-building may be defined as either Probable or Confirmed breeding, depending both on atlas and on species (not just the latter)
- Think about the next atlas(es) when designing the current one!

Atlasses and E-bird (Cornell Lab of Ornithology) – Jeff Gerbracht

- Highlighted potential high costs of administering and organizing an atlas in both time and money
    - Managing volunteers, tracking assignments of blocks, managing regional coordinators, etc.
- Benefits of web-based on-line applications to manage many of these tasks
- Examples were presented of web-based screens on Cornell application, for helping to manage block/square ownership (examples drawn from current Ohio and Pennsylvania atlases, both of which are using this application):
    - Participants can see what areas are available to be surveyed
    - Can request particular squares
    - Application will automatically update availability information when request is accepted
    - Coordinators can review which blocks have been allocated to each observer, how much coverage they have actually achieved, etc.
    - All requests are received electronically in an organized file by (regional) coordinator
- Online application can also help to determine when a block is adequately covered:
    - Can generate summary statistics such as number of species, percentage of species expected, number of hours effort, number of species of particular groups (e.g., owls, nightjars, etc.)
    - Can automatically determine whether certain coverage targets have been met
    - Can also map results to compare with those expected based on neighbouring squares
    - These can help to give the regional picture, for example to determine if some regions are under-covered compared to others
    - Can map based on number of species, number of hours, individual species, etc.
- Maps can also be useful to observers to guide their efforts, and not just coordinators
- Application is integrated with same data base and software as the E-bird applications at Cornell

Web-based data management and data quality control: A Case Study of the Ontario project (Bird Studies Canada) – Denis Lepage

- Focus on one aspect of data management – data quality control
- Particularly important for a volunteer based program to ensure credibility and confidence in data
- Scope of challenge in Ontario:

  - 10,000 squares (10 x 10 km)
  - 4,000 participants/assistants
  - 150,000 hours in the field
  - 570,000 breeding evidence records
  - 640,000 point count data
  - 21,700 significant species records
- Obviously not possible to expect zero errors, but need to minimize errors and set priorities
- First, and very critical step, is to ensure that observers have clear instructions and know what data to enter
  - Rely on regional coordinators to convey information, make sure instructions well understood
  - Regional coordinators also recruit volunteers, and determine which ones have adequate skill levels for different activities (e.g., point counts)
  - 47 regions, each with a coordinator in Ontario
- Next set of quality control tools is in data entry
  - With web-based data entry, can ensure that only potentially valid codes are entered. These can also be checked on entry from scanned records and other sources.
- Also set filters to determine unusual records – these are records that may be correct, but are worth double checking
  - High numbers (on a point count)
  - Outside of usual breeding range, or unusual in a region
  - Breeding Evidence codes that are inappropriate for a species (these were not flagged for Ontario Atlas but were introduced with the Maritimes Breeding Bird atlas).
  - Could potentially also flag dates
- Observers are notified of these, and asked to check them.
  - Invalid species codes (with online data entry) need to be changed before they can be saved
  - Other records can be saved, but may require extra documentation (e.g., rare species)
- Significant species form for unusual information has been invaluable in reviewing many of these unusual records
  - However, getting observers to complete these forms has been a significant challenge
  - Need to determine an appropriate compromise on criteria, so that forms are not required too often. Observers may be less likely to complete forms for species that they do not view as unusual – we have not yet analysed patterns in which forms were and were not completed.
  - Many repeat contacts required to observers
- Observers (and regional coordinators) were provided with tools to review records
  - Includes filters to view, for example, only their unusual records
  - Provides a summary of which ones have significant species forms, etc.
- Online reviewing tools provided for Regional Coordinators and others to review significant species records (note that if documentation was submitted on paper, it was scanned and made accessible through web data base)
  - System tracks who has reviewed record when, and what decisions have been made for it
  - Observers automatically informed by E-mail when a decision has been made for their record
  - First stage of review is Regional Coordinator
  - Second stage is a provincial rare species committee that helped to review records
  - Committee had to review 21,000 records! Fortunately, tools made it relatively easy, as many could be viewed at once on-line, could be sorted by species, observer, region, etc.
- Another data quality review tool is maps
  - Can look for distributional outliers on maps.
  - In many cases, these proved to be either early migrants that were recorded as breeders or, in some cases, mis-entered species codes
- Currently developing a matrix of breeding evidence codes that can be used for each species.
  - Provides additional information (a set of standard codes) for why particular codes may not be valid for particular species.

- Would be interested in sharing this developing table.
- Would also be interested in working together with others to develop such a table for North America.
- Presumably in most cases, this would not have to be specific to a particular region, as it is primarily dependent on the species biology, and could thus apply for a species across the continent.

Session 4: Discussion - data standardization and data management systems.

[the following notes were taken during the discussion, and attempt to capture some of the major issues raised, but are not comprehensive. No attempt was made to track who presented each idea, and ideas may have been synthesized from several people's comments]

- Data ownership
    - Principle of making data as public as possible
- Archiving data, Data security, Data standardization
    - AKN – Avian Knowledge Network. Members include Cornell Lab of Ornithology, Bird Studies Canada
    - Developing standards for interoperability of bird data
    - Data sharing standards started with need to share information among collections from museums
    - Original design kept relatively simple to make data easy to understand
    - Initially tried to use same systems for monitoring data, but does not capture all information (e.g., effort, non-detection, etc.)
    - So developing standards for interchange of data collected through monitoring programs such as point counts or other surveys
    - Will require additional consideration for data such as nest records or breeding evidence codes.
    - Many architectural issues related to this (archiving, data security, backups, long-term storage) that need to be sorted out
    - Opportunity for NORAC to interface with these committees through above partners (Cornell, BSC)
    - Can also use this infra-structure to help define our requirements
- Atlas Coordination/partnerships/management
    - Need a solid management structure that will continue through duration of project.
    - Working partnerships between NGOs (with birders as members) and government (state-provincial/federal) with additional resources – staff, funding, maps, support
    - Partnerships can include industry, especially resource industries (e.g., forestry) with interest in end results
    - Nevada – a lot of funding came from county with Las Vegas – they need to do a lot of land-use planning that is strongly influenced by Species at Risk, so benefited from atlas
        - Benefited from predictive models developed through the atlas
    - Land Trusts – may be interested. Involve land owners with an interest in their land bases
    - Can help many of these groups to develop monitoring on their lands
    - In Ontario, official partners developed a management board as well as quite a few committees dealing with various different aspects (volunteers, data analysis, rare species, publication).
    - Committees develop a formal structure that can greatly increase buy-in from partners and develop additional benefits
    - Multiple NGOs can also be helpful for approaching funding agencies
- Data Validation
    - Developing tables of valid breeding codes
    - Safe dates

    - Can spend as much time as one likes refining these but a basic level will improve atlas data quality control. Will benefit atlases all over the place
    - Subcommittee: Denis Lepage, Tony Leukering, Chris Elphick
- Breeding Evidence vs. Relative Abundance
    - Which is most important?
    - Suggestion that emphasis on confirmation of breeding is most important for edge of range, rare species, etc.
        - it is a waste of efforts to carry out an atlas without incorporating some abundance measures – very hard to meet many objectives.
        - Atlas data are primarily used to map distribution and changes in distribution
        - Much less used for breeding studies, so confirmation really is less important
        - rarely taken into account when mapping distributions. Also, highly effort dependent.
    - Furthermore, confirming breeding does not give information on breeding success, population viability, etc.
        - Potentially more important to be considering habitat data
        - Tie habitat and abundance data more together
    - However, there is also potential for an atlas to collect a lot of data that are not available on breeding biology of species in various regions.
        - Objectives of atlases can vary
        - Biology of birds may be changing as much as habitat
        - Information such as first nest dates can be valuable
        - Nevada did not use “safe dates” because felt did not have enough information to define them *a priori* – nesting seasons were not sufficiently well known
    - Quantitative data such as point counts:
        - Can be merged nicely among data bases
    - In less well known areas, e.g., Latin America, breeding evidence data can be very valuable
    - Need to consider motivation of atlassers
        - Many atlassers are interested in trying to find confirmed breeding evidence
        - Especially in combination with effort data, can provide useful information on phenology
    - Breeding Evidence data:
        - Many potential uses of these data require more information than is being recorded by most atlases (e.g., for nest should record full nest records data (precise location, date, nest contents, habitat, nest structure/location) for other observations need precise locations)
        - Should design atlases with a hierarchical structure of data collection
            - Certain minimum data, but atlasers encouraged to provide additional data when available, such as nest details
    - Habitat data
        - As much as possible, try to get point location data, including for nest data
    - Suggestion that bird atlases should learn from atlases of other taxa such as plants or butterflies.
        - E.g., plant atlases collect point locality information for all records
    - Abundance data:
        - Try to be comparable over time and over space
    - Cautionary note about using atlases to generate phenological data
        - in Colorado, most atlassing is in June/July (because that is when many atlassers are available)
        - Not suitable for e.g., climate change studies, because early nesting will be under-represented.
        - [however, that can potentially be accommodated if effort data are accurately recorded – need to track information on all visits]
    - Combine atlases with nest record schemes
        - In Ontario, contribution to nest record scheme declined when first atlas was started, because volunteers assumed that atlas data was more important

        - In second atlas, consciously promoted completion of nest record cards in combination with atlas (statistics should be examined on level of participation in submitting cards for cases where breeding evidence involved finding a nest)
    - For quantitative sampling, suggesting establishing particular points that are repeated from one atlas to the next
        - [if locations are accurately recorded, this will always be an option]
    - Suggestion was made that atlas approach needs to be quite different for first atlases, when pool of atlasers has not yet been developed
        - However, it was pointed out that most people carrying out quantitative methods now on their second atlas are wishing they had used the same methods on the first atlas
        - We should learn from experience and not repeat mistakes
        - When Ontario atlas was started, assumption was that point counts would be a hard sell to atlassers – however, we achieved 67,000 point counts, so that clearly was not the case!
- Recommended abundance methods:
    - Point counts vs. miniblocks
    - Ontario reviewed these methods in a pilot season and determined that point counts were easier to standardize, had better power. Miniblocks had many disadvantages.
    - **Action Item:** Publish document reviewing different methods that was developed in context of Ontario atlas, as a minimum on NORAC website.
    - **Action Item:** Develop a subcommittee to develop recommended methods for monitoring abundance.
- Habitat data
    - When should one try to collect this?
    - Advantages vs. disadvantages
    - Precise location data may not require habitat data
    - Note: remote sensing data are often for a time frame that does not match atlas. Sometimes quite out of date.
    - Big trade-off in habitat:
        - On-the-ground habitat collection provides more precise information, but is hard to standardize and not always popular with participants
    - Nevada found that habitat coverage was very different in randomly selected squares vs. non-random squares. Atlasers were selecting particular habitats/areas to atlas, if given a choice.
- Block completion/ targets
- Atlasing sparsely populated areas
- Extrapolating to un-surveyed areas
- Taxonomic forms

Session 5: Developing bird atlases in Latin America and the Caribbean

Bird distribution and abundance projects in Latin America and the Caribbean – José Salguero

- José provided a presentation that outlines the potential benefits of atlas projects to Latin American and Caribbean countries, with examples from the Puerto Rican atlas
- What is a Breeding Bird Atlas
    - Projects which focus on delimiting the geographic distribution of breeding bird species in a particular region
- What do Atlases Provide?
    - Lots of information in a limited time
    - Reliable and complete data on breeding distributions

    - Trends in breeding distribution in 10-20 yrs intervals
    - Excellent conservation tool
    - Versatility
- Products
    - Centralized data base on breeding birds for region/country
    - Breeding distribution maps for all species
    - Peer reviewed book and other publications.
- Mentioned examples of several Breeding Bird Atlases, especially in U.S., Canada and Europe
    - (note that there are also many good examples in Africa, Australia)
- Current Status of knowledge on breeding birds in Latin America:
    - Data on reproductive biology of breeding birds in LA is very limited
    - Relatively few species have been studied in any detail
        - Mainly species of Conservation Concern
        - Species with unusual breeding behaviors
    - Breeding biology knowledge is often incidental
    - Common species get neglected, but can be important environmental indicators
    - Most countries do not have centralized data sets
- Difficulties in establishing atlas projects
    - Size and complexity of LA countries
    - Extreme habitat diversity
    - Logistics
    - Limited number of Trained Volunteers
    - Limited knowledge on phenology of migratory species (safe dates for breeders)

The Puerto Rico Atlas - José Salguero

- [note: the notes on this atlas from the preceding atlasing presentation were combined with those from the presentation specifically on the atlas]
- Puerto Rico Breeding Bird Atlas was developed collaboratively with
    - Puerto Rican Gap Analysis Project, which is mapping many geographic features of Puerto Rico
    - Sociedad Ornitólogica Puertorriqueña (http://avesdepuertorico.org/)
- Puerto Rico is an Ornithological Melting Pot in the middle of the Caribbean
- The basic sampling frame is a Hexagon, each one approximately 24 km^2 (similar area to a 5 x 5 km^2).
    - 309 hexagons
    - Area was divided into 12 regions on the main island, with 2 outlying regions
- Collaborating with 3 other survey projects:
    - Breeding Bird Survey
    - Christmas Bird Counts
    - eBird
- Materials
    - Spanish
    - Informational booklet
    - Field cards
    - Volunteer CD of bird songs
    - Area maps
    - Habitat booklet
- Volunteer Package:
    - Handbook
    - Regional field cards
    - Topographic maps of hexagons - .pdf and hardcopies. Provided by PR GAP
- Work Plan
    - Pilot year 2004. Atlasing 2005-2009 (5 years)

    - 6 regional coordinators
    - Workforce:
        - Volunteers
            - including schools, boy and girl scouts, NGOs
        - State and Federal Agencies
        - Academia
- Methodology:
    - Breeding Bird Survey
    - Christmas Bird Counts
    - Point Counts within special areas
    - Specific Surveys
        - Nocturnal species
        - Colonial Waterbirds
        - Aquatic species
    - Incidental Sightings
- Safe Dates:
    - Several species do not have a specific breeding season
    - February to July is preliminary safe date period for most species
- Data
    - Accepting data from 1 January 2000 to present – effectively will include a 10-year period
    - Standard breeding evidence codes (observed, possible, probable, confirmed)
    - International Institute of Tropical Forestry (IITF) enters and manages data bank
- Goals:
    - Finish field work by 2009
    - 150 active volunteers
    - 45,000 observations
    - Preliminary publication by 2012
- Other Goals:
    - Gather data on migratory birds
    - Data on exotic species (e.g., introduced species of parrots)
    - Increase information on species of concern
- Atlas data already in use for conservation
    - Puerto Rico Critical Wildlife Areas
    - Puerto Rico Department of Natural and Environmental Resources (PRDNER)
    - Puerto Rico Gap Project -- an overview of this project is available on web:
        - http://muskox.com/powerpoint/NCSU2001/index.htm
    - Atlassers helping to increase BBS route coverage
    - Environmental groups
- Further information on Puerto Rican Atlas is available on this website:
    - http://www.avesdepuertorico.org/content/view/87/78/

Low Budget Atlassing – Rick West

- Necessity breeds invention
    - Delaware Atlas started as amateur project without professional backing
    - Worked on other Atlases in other states
    - Alabama did not have the resources
- Resources developed for Delaware
    - Maps (USGS) came from a donation
    - But gridded county maps worked almost as well
    - Institution provided photocopies for maps
    - Had access to a computer at my institution after hours (in the days before everybody had one!)
    - Had a son to help with computer program
    - Bird club provided manpower

    - Bulletin was part of monthly newsletter
    - State Department of Natural Resources (DNR) provided data and moral support
    - All conservation entities provided help
- In Alabama
    - Grant obtained to provide a set of maps
    - Department of Natural Resources provided sponsorship – but no money
    - Club provided Region Coordinators
    - Computer program for data management was borrowed from Georgia
    - Rick provided the leadership
    - Last year the state provided a grant
    - Plan is for electronic publication to save costs
- Some tricks to help with atlassing
    - Provide volunteers with a Letter of introduction to show land owners
    - Call it a "Wildlife Survey"
    - Try to obtain Free camping
    - Prepare electronic copies of everything in easily distributed format (PDF)
        - Greatly saves mailing and copying costs
        - Maps
        - Field cards
        - Thank you notes and QA
        - Results
- Bottom Line:
    - While there may be many advantages to large partnerships and big atlases, it is possible to run an atlas on a very low budget, with volunteer labour (especially if coordinator is retired and has time available!)
    - This may be very important for getting started in many Latin American countries

Session 6: Discussion: the potential for developing Bird Atlases in Latin America and the Caribbean

- Relative advantages of atlases as a conservation tool
- Alternatives:
    - Checklist surveys (e.g., e-bird)
    - Standardized monitoring surveys
    - Constant effort monitoring (e.g., mistnets)
    - Atlases
    - Christmas Bird Counts
- Can we objectively present these alternatives to help people make choices?
- Market research:
    - What do people want in the country?
    - Both to potential administrators and participants
    - Choice of surveys may be related to marketing
    - Something that will appeal to many local people/volunteers is clearly important
    - Also related to costs
    - Need to avoid imposing a model
        - Work collaboratively to develop ideas/programs
        - NORAC should be a resource to help people develop programs that suit their needs
- Important Bird Areas
    - Much information came from atlases and conversely, people engaged in IBA work are interested in promoting atlases
    - Atlassing may help with 5-year updates/reviews of IBAs
- Many challenges to an atlas in Latin American countries
- Advantages: Better information on breeding biology, distribution
- Develop scaled process

    - Basic level: checklist program
    - Next step: breeding information
    - Additional component: point counts
- Promotion of mapping:
    - Occurrence data is most basic form of monitoring
    - Whatever the sampling method, data involve information on where a bird was and was not found (latter requires information on effort)
    - Production of interim maps that show gaps in coverage or species distributions can help to motivate atlassers
- Encourage interests:
    - Priority to enhance existing projects (Puerto Rico)
    - Concentrate where people have expressed interest
    - Successful development of several Caribbean atlases will generate interest in additional areas
    - NORAC needs to help to promote atlases
    - Pooling resources for, e.g. data management
    - Consider ways to advertise/promote atlases
        - Need to think as business men
        - Need to show products
        - Perhaps start with particular regions or states
    - Good points:
        - 2 good public relations aspects:
            - map products – very valuable for promotion
            - especially valuable if people can relate to map (e.g., includes their home state)
            - relatively well-defined product that is relatively simple
            - gives a structure to the whole process
        - Atlases also do not require a long-term commitment – they have a fixed time period (e.g., 5 years) in which to achieve coverage
    - Challenges:
        - Most existing atlases have built on an existing base of birders/experts
        - Is it necessary to build up pool of birders first?
        - Or is the atlas itself a good tool to build this pool of expertise?
        - Experience in Puerto Rico and Nevada suggests that the latter is the case.
        - In Nevada built a pool of 400 birders through atlas.
    - Helps by having interest in common birds: means that many people can contribute data, even if not for all species
    - Many people want to contribute significantly to science
        - Conservation efforts for rare birds (e.g. in Puerto Rico) generate a lot of public commitment/engagement
        - An atlas may generate similar interest, if properly marketed
    - Collaboration of atlases with other ornithological projects and programs
    - Benefits and challenges of year-round atlassing
    - Setting up an atlas: Infrastructure required to run an atlas and sources of funds
    - Data base management tools and training materials required/available
    - Incorporating visiting birders from other countries
        - E-Bird Mexico is already in place
        - (Funded by CONABIO)
        - ~100 birders have contributed (many visitors)
        - as use of application starts, will hopefully “snowball”
            - results generated from existing data will stimulate interest and encourage greater participation
        - Hispaniola and Puerto Rica getting off ground through e-Bird

        - Most people in Latin America do not yet have Internet access to enter data
        - Need to consider scannable forms or other technologies to collect data
        - Even basic paper forms and hired staff or volunteers to carry out data entry may be effective
    - Perhaps could encourage birding tours to contribute more
        - Get people to visit new sites on birding tours to fill gaps in atlas (e.g., one day of atlassing in a new, unknown area on each trip instead of always visiting exactly the same areas on every tour
        - Many birding tours are very interested in conservation
    - Do we need to enhance flexibility of e-Bird to record additional information (e.g., breeding data)?
        - Advantages of "flexible" or "passive" atlassing – can become part of an ongoing monitoring program.
        - [Note that the second Australian atlas was based on a comparable, flexible process, with encouragement to fill gaps in maps]
    - E-Bird includes a set of people to vet data
        - Particular people have been selected to play this role in Mexico
        - State/provincial data checkers in most of US/Canada
        - Similar issue to that required for data quality control on an atlas (often achieved through regional coordinators)
    - Could feed existing E-bird data into a new atlas as a start
        - highlight areas with little or no coverage.
    - Could also use habitat models to predict distributions of species, and then gather data to test the models
- Funding suggestion:
    - Get particular agencies to sponsor particular geographic areas and use funding to get that area covered

Next Steps: How best to advance bird atlassing and bird population distribution mapping in the Americas
Ideas:

- participate in Caribbean Ornithological Society meeting next year
- send José to as many meetings as possible in region to promote atlases based on Puerto Rican experience
- Everybody here should encourage a birder to take an atlassing holiday in Puerto Rico to contribute to that atlas
- One challenge is to coordinate visiting birders
    - Could one get volunteer coordinators from outside a region to assist with that?
    - Web tools can greatly facilitate remote coordination

Discussion of other issues:

- Is it worth publishing a book from an atlas?
- Currently believed still to be fairly popular
- In terms of planning, more critical to ensure there is an electronic version of the data base (with maps, etc.) on the web
- Provided that a good, web-based data base is developed, interest in paper copy book can be judged afterwards near end of project
- Proposal in one region is a dynamic document on the web
    - Using a Wikipedia-type approach that allows for ongoing comment
- Very critical to make sure an organization with stability helps to maintain long-term preservation of data (make sure there are multiple copies in electronic format, etc.)
    - Posting something on the web does not guarantee it will always be there
    - (note, however, that emerging networks such as AKN may help with data archiving and preservation)
- paper copies can be relatively simple with just maps, pictures, minimal text

- They do have significant potential as a marketing tool

Addendum: After the workshop, Humberto Berlanga provided the following points:

- many Mexicans do not know a lot about what a bird atlas is (hence they did not think to participate in our workshops)
- they may be familiar with historical atlases based on museum records, published records, etc., but not with atlases as a monitoring tool, etc.
- he recommended developing a fact sheet that could be circulated within the Mexican ornithological community
- Also, suggested there were people with Pronatura and other organizations who may be very interested to run an ornithological atlas
- Yucatan and Veracruz are two states with significant birding interest that might be good locations for getting started

NORAC BUSINESS SECTION

Election of officers

- Need a small, formal core committee. Proposed members:
    - Charles Francis: new Chair
    - Committee Members:
        - José Salguero
        - Joan Walsh (coordinator of Massachusetts atlas)
        - Mark Wimer (to be asked)
- Thanks to Mike Cadman

Future directions and activities of NORAC in upcoming 3 years

1. Develop a list serve to enhance communication within NORAC
    - Kim Smith has volunteered to set it up and moderate
    - Agreement that moderation would be through approval of subscriptions
    - Only subscribers can post
    - Need a link to listserv from web pages
    - BIRDATLAS-L@uark.edu

2. Establish a subcommittee to review quantitative sampling methods, and provide recommendations on approaches for new atlases
    - make available analyses of different sampling methods prepared by Ontario atlas
    - review experiences and results from recent atlases that have incorporated quantitative sampling in North America including:
        - Ontario (5-minute random roadside & offroad point counts)
        - Maryland (mini-routes)
        - Pennsylvania (point counts dividing observations into 5 75-second intervals to allow use of removal sampling models to improve abundance estimates)
    - need to engage some folks with experience in West

3. Establish a subcommittee to help promote atlasing in Latin America and the Caribbean and to develop recommendations for methods and approaches for bird atlasing in these countries including consideration of year-round atlasing to survey long-distance migrants
    - focus on Caribbean as there is already one atlas (Puerto Rico) under way, and interest in developing more in other countries

- Also, within Mexico, there are people interested from Yucatan and Veracruz who should become engaged.
- Approach there should be to develop regional atlases first

4. Establish a subcommittee to develop species table of acceptable breeding codes. Membership: Denis Lepage (Chair), Tony Leukering, Chris Elphick

5. Develop promotional materials to explain the uses and value of bird atlases for various audiences including both U.S./Canada as well as Latin America
   - develop a compact Powerpoint (in English y español) describing what is a bird atlas that can be circulated via E-mail/Internet

6. Complete updates of NORAC webpage to ensure that it is a comprehensive resource of information on atlassing in the Americas
   - post information that has already been gathered
   - ensure that links are up to date for all atlases.

7. Increase frequency of meetings to meet annually, recognizing the rapid development of second atlases in many regions, as well as the potential to promote atlassing as a monitoring and conservation tool in Latin America and the Caribbean.
   Next meetings:
   2007 (July) – Puerto Rico in combination with the Society for the Conservation and Study of Caribbean Birds biennial meeting *[note: this was changed to a local meeting of the Puerto Rico atlas]*
   2008 (August) – Portland, Oregon in combination with joint meeting of American Ornithologists Union, Cooper Ornithological Society and Society of Canadian Ornithologists