Supplement to: Estimating uncertainty of North American landbird population sizes

The material in this supplement consists of 1) R code to generate avian population size estimates, 2) parameter files necessary to run the R code, and 3) summary output file of avian population size estimates with uncertainty ranges. Questions may be directed to the corresponding author.

R Scripts

The code to generate Population Size estimates from North American Breeding Bird Survey (BBS) data (Pardieck et al. 2017), as described in the accompanying manuscript, is provided in two separate R script files:

- 1_AssembleBBSdatabySpecies.R - Downloads (if option is selected) and formats the BBS datafiles for use as input in the next R script.
- 2_CalculatePIF_PSest_withCI.R - Calculates population size estimates with confidence intervals.

Non-BBS Parameter Files

Parameter files needed to run the scripts are provided with this supplement. The estimates contained in these files are as described in the accompanying manuscript or in the Partner's in Flight (PIF) manual of population size estimates (Blancher et al. 2007, 2013).

- Species_PSEst_Adjustments.csv - Species specific adjustment factors (Time of Day, Detection Distance, Pair)
- Species_Global_WH_Adjustments.csv - Species Global and WH range adjustment factors
- RangeAdjustment.csv - Species by Polygon (ProvBCR) range adjustment factors
- PS_othersources.csv - Species by Polygon (ProvBCR) Population Estimates from other sources (non-BBS)
- Species_byRange_Adjs_BorrowPoly.csv - Species by Polygons that borrow Population density estimate from other Polygon
- PolygonRangeAreas.csv - Land Area (in Km^2) of Polygons

Summary Output File

- PopEst_output.csv - Summarizes model output for the GLOBAL and U.S./CANADA population size estimates. Also includes PIF population size scores with uncertainty ranges.

Notes

1. In 2014 Bird Studies Canada and the North American Bird Conservation Initiative (NABCI; http://www.nabci.net/) published revised Bird Conservation Region (BCR) boundaries based on a formal review begun in 2009 by U.S. NABCI and NABCI Canada (Bird StudiesCanada and NABCI 2014). These latest boundaries are reflected in recent data releases from the North American Breeding Bird Survey (BBS) (version 2016.0 released on 04/25/2017; Pardieck et al.

2017). However, these updated boundaries are not yet reflected in the PIF population size estimates database. Range adjustment factors and land area of polygons here are based on the pre-2014 BCR boundaries.

2. Official Partners in Flight (PIF) population size estimates are reviewed, published, and maintained by PIF (https://www.partnersinflight.org). Estimates presented here in the summary output file have not been reviewed by PIF and are not official PIF population size estimates.

Instructions

- Place each of the Non-BBS Input files (listed above) together into an 'Input file' directory.
- The first time the scripts are run, remaining files needed will be downloaded from the BBS FTP site if that option is specified and an internet connection can be maintained for the file transfer.
- Run the 1_AssembleBBSdatabySpecies.R script first. This script will prompt the following user inputs in the command console:
  i. Path to Input file directory - BBS DATA and Adjustment parameter files
  ii. Path to where formatted BBS species level data should be written
  iii. Response of yes/no to the question of whether new BBS data should be fetched (All file paths should be entered as Unix paths without quotes)
- Once step 3 is complete, the Global Environment may be cleared and/or a new session of R begun.
- Run the 2_CalculatePIF_PSest_withCI.R script. This script will prompt the following user inputs in the command console:
  i. Number of iterations to run
  ii. Path to Input file directory - BBS DATA and Adjustment parameter files
  iii. Path to directory where species BBS data files generated in step 3 are stored
  iv. Path to where output files should be written

Disclaimer

This software has been approved for release by the U.S. Geological Survey (USGS). Although the software has been subjected to rigorous review, the USGS reserves the right to update the software as needed pursuant to further analysis and review. No warranty, expressed or implied, is made by the USGS or the U.S. Government as to the functionality of the software and related material nor shall the fact of release constitute any such warranty. Furthermore, the software is released on condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from its authorized or unauthorized use. This code is provided 'AS IS'.

Literature Cited

Bird Studies Canada and NABCI. 2014. Bird Conservation Regions. Bird Studies Canada on behalf of the North American Bird Conservation Initiative. Available from http://www.birdscanada.org/research/gislab/index.jsp?targetpg=bcr.

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