The Tutorial of The Bird Atlas Generator Introduced By SaveBirds.app

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1 Introduction

In this tutorial, efforts have been made to present instructions on extracting data from Savebirds and generating atlases in the most straightforward manner possible. This tutorial enables users to download the desired data from the Bird Atlas Generator on SaveBirds.app and initiate the Atlas Generator on their local system in a matter of minutes. Subsequent steps are automated, obviating the need for users to oversee the atlas generation process actively. The time required to produce the desired atlas varies, ranging from a few minutes to several hours, depending on the size of the area selected.

2 Prerequisites

Before beginning to utilize the Bird Atlas Generator (BAG), it is essential to ensure the system is equipped with the appropriate software. The primary requirement is the installation of ArcGIS Pro, version 2.5 or higher. Users can download ArcGIS Pro from the official website. Installing the latest version is recommended to exploit the software's capabilities fully.

3 Download BBS Data and the BAG

Users can access the BAG feature on SaveBirds using this Link (Figure 1). This feature allows users to select a specific year interval and geographical area of interest. Additionally, the option, *Custom Shapefile*, permits the upload of a user's desired Shapefile. Upon selecting the desired settings and

clicking the designated button, *Click*, the platform displays the map to verify the entered information. A *Download zip* button becomes available after verification, enabling users to download a zip file. In the example depicted in Figure 1, the filename for the downloaded zip file, designated as *Bird_Atlas_BCR_BBS_data_2017_2022_1707841344418343.zip*. The filename is structured into four distinct segments: ***Bird_Atlas_[Geographic Area]_[Year Interval]_[Unix timestamp]***. We designed this format to convey essential information about the atlas's content concisely. To explain further:

1. **Bird_Atlas**: Remains constant.
2. **Geographic area**: Extracted from the shapefile name that users choose on the SaveBirds or Upload through *Custom Shapefile* option.
3. **Year interval**: Based on users' BBS data extracted from SaveBirds.
4. **Unix timestamp**: The zip file's generation date and time, in Unix time format, is a 16-digit numerical code. Curious users can use online Unix timestamp converter to determine the date and time the file was generated.

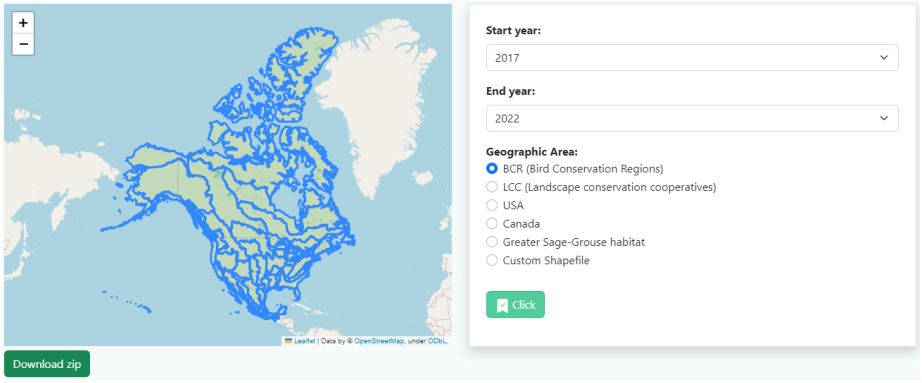

Figure 1: The Bird Atlas Generator on SaveBirds.app enables users to select particular years and geographic regions of interest. Furthermore, it allows users to upload their geographic datasets (shapefiles), facilitating the creation of customized maps. Upon finalizing their selections and initiating the process through the *Click* button, users are presented with a visual representation of their choices on a map. Subsequently, the requisite data and the atlas generator will be downloaded in a compressed format (zip file) followed by pressing the *Download zip* button.

In the *Geographic Area* section, for the *Custom Shapefile* option, users must ensure that:

1. The ZIP archive contains the necessary shapefile components: at least the .shp, .shx, and .dbf files.

2. The files must be at the root level of the ZIP archive.

3. The shapefile's Geographic Coordinate System is to be ***WGS 1984***.

4 Zip file contents

Upon downloading the Zip file to their preferred directory, users should proceed to unpack its contents. Inside is a nested zip file named *Atlas_Generator.zip* (Figure 2).

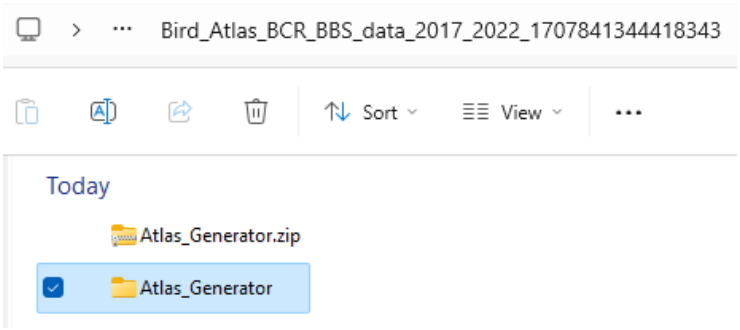

Figure 2: Contents of the downloaded zip file from the SaveBirds.app: The user must copy the extracted *Atlas Generator* folder and paste it into an ArcGIS Pro project Later.

Curious users can open the *Atlas Generator* folder to explore the contents. Users will find four *gdb* folders, each corresponding to generating a specific atlas (Figure 3). The folder named *CSV files* serves as the designated repository for CSV files.

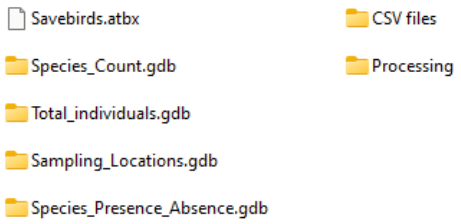

Figure 3: Contents of the *Atlas_Generator* Folder: Structured for Atlas Creation in ArcGIS Pro

Upon opening the *CSV files* folder, users will encounter an array of CSV files (Figure 4), 687 to be precise, for Bird Conservation Regions (BCR) spanning 2017-2022. Among these, the file named *AOU__All_Species_.csv* consists of the data from all the other CSV files. This comprehensive file facilitates the generation of rasters depicting *Species Presence-Absence*, *Sampling Locations*,

Species Count, and *Total Individuals* for all observed species. The remaining CSV files, each dedicated to a single species, generate similar rasters (except *Species Count*) for individual species. The acronym *AOU* in the file names denotes the *American Ornithological Union* committed to avian research in North America. The numerical code in the file names corresponds to a designated species code, such as *10*, which identifies the *Western Grebe*.

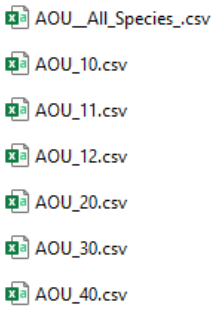

Figure 4: Snapshot of the extracted The folder named *CSV files*, showcasing a collection of 687 CSV files for Bird Conservation Regions (BCR) from 2017 to 2022. The *AOU__All_Species_.csv* file aggregates data across all species. The individual CSV files prefixed with AOU and a number are tailored to each species. AOU signifies the American Ornithological Union, which is synonymous with avian research in North America, and the numbers represent unique species codes, such as *10* for the *Western Grebe*.

5 Custom Data

We have designed the BAG to accommodate a wide range of datasets beyond avian data to enhance the flexibility and applicability of the Bird Atlas Generator (BAG). This adaptability allows users to generate atlases for various subjects such as urban development, vegetation cover, or other animal species. The critical requirement for integrating custom datasets into the BAG is that the data must be in CSV format and structured similarly to the datasets provided by SaveBirds.app.

Similar structure means that as long as user-desired CSV files maintain the column structure analogous to those found in the SaveBirds.app exports—such as geographical coordinates, timestamps, and relevant categorical or numerical data indicators—user can seamlessly feed this information into the BAG. This functionality significantly broadens the scope of the atlas generator, making it a versatile tool for various research and analytical purposes, not just limited to bird conservation.

6 To Initialize an Atlas Project in ArcGIS Pro

To commence the atlas development, the user must launch the ArcGIS Pro software and proceed to the *New Project* section, then select the *Map* option (Figure 5). The project title should be carefully selected to reflect its contents and scope. We advise users to utilize the name of the zip file downloaded from the SaveBirds.app as the project name for consistency and ease of identification. Taking *Bird-Atlas_BCR_BBS-data_2017-2022* as an exemplar, the title is systematically composed to provide a comprehensive overview: *Bird-Atlas* signifies the thematic concentration on ornithological distribution; *BCR* indicates the Bird Conservation Region under study; *BBS-data* refers to the incorporation of Breeding Bird Survey datasets; and *2017-2022* defines the temporal frame of the data collected. This titling methodology aligns with best practices for file naming, ensuring optimal organization and future retrievability of data within our archival systems.

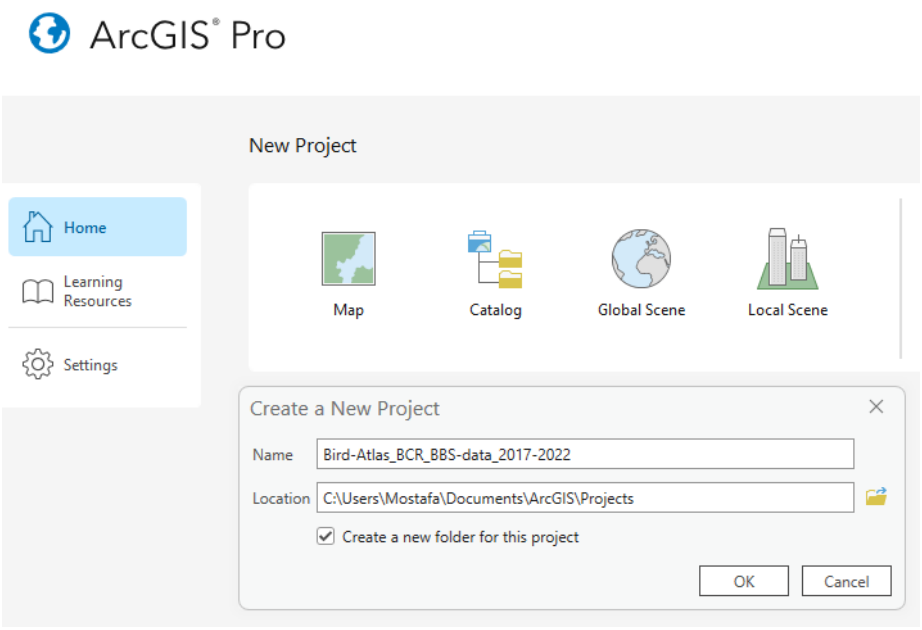

Figure 5: Initializing an Atlas Project in ArcGIS Pro: The ArcGIS Pro interface is shown with the *New Project* dialog open and the *Map* option selected. The user has named the project *Bird-Atlas_BCR_BBS-data_2017-2022*, reflecting the thematic focus on bird distributions, *Bird-Atlas*, the specific region of interest, *BCR*, the data source, *BBS-data*, and the period covered by the dataset, *2017-2022*.

7 To feed the new ArcGIS project

The user must access the corresponding project folder after establishing a new project titled *Bird-Atlas_BCR_BBS-data_2017-2022*. Figure 6 exemplifies this folder's structure and contents.

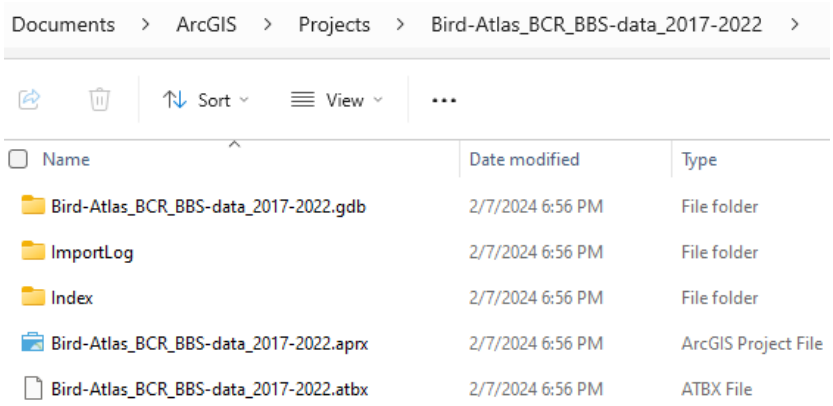

Figure 6: Project Folder Structure for *Bird-Atlas_BCR_BBS-data_2017-2022*: This image illustrates the internal arrangement of the project directory after creating a new project in ArcGIS. The folders and files are essential for the project's organization and subsequent processes.

To feed the project with appropriate data and atlas generator, the *Atlas_Generator* folder, already downloaded and extracted (highlighted in Figure 2), must be copied and pasted into the project directory. Comparing Figure 6 and Figure 7 demonstrates the completion of this essential step.

8 To Initiate Atlas Generation Process

To initiate the Bird Atlas Generation process within ArcGIS Pro, the user should First access the *Catalog Pane* by selecting it under the *View* tab. Once within the *Catalog Pane* (Figure 8), navigate to and expand the *Folders* directory. Subsequently, locate and open the project folder labeled *Bird-Atlas_BCR_BBS-data_2017-2022* (in this example). The *Atlas_Generator* folder will be present in this project. Upon entering the *Atlas_Generator* folder, the *SaveBirds.atbx* tool should be visible. To proceed, the user must open the *SaveBirds.atbx*, **right-click on the *Atlas Generator* and press Open** to activate the tool. This step may take up to two minutes, depending on the size of the area.

Upon initiating the *Atlas Generator*, the BAG interface will be displayed (Figure 9). This step may take up to five minutes, depending on the size of the area. At this point, atlas generation can be commenced by pressing the *Run* button. The duration of this operation is contingent on the extent of the

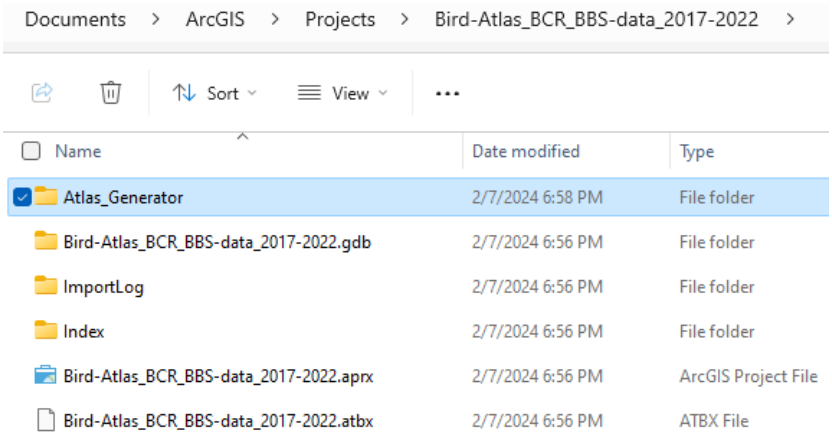

Figure 7: Updated Project Directory with *Atlas_Generator* Folder: The *Atlas_Generator* folder (highlighted in Figure 2), has been successfully copied and integrated into the project directory.

delineated region and the corresponding diversity of avian species encompassed therein, ranging from several minutes to 12 hours. Users with advanced expertise or those with a penchant for detailed customization may modify the interface parameters to tailor the atlas to more specific requirements. An instance of such customization could involve adjusting the dimensions of the fishnet cells to alter the granularity of the atlas's spatial analysis.

9 To Utilize the Generated Atlases

Upon completing the Atlas Generator's execution, the generated raster files can be located in the databases identified by the *gdb* extension, as shown in Figure 8. Users can visualize these rasters in their preferred format or employ them as input for further statistical analysis using any suitable analytical tool.

10 To Showcase your works

Contributors are invited to open their project's directory, compress the specified folders with the *gdb* extension and the *CSV files* folder into a single zip file, and then share this package. It is considered best practice to name the zip file identically to the project name for consistency and ease of identification. Then, they can send the zip file to one of the BAG's developers (tutorial's authors) or request to be added as a contributor on the SaveBirds.app GitHub organization. Regardless of the method chosen, their atlases will be credited to them upon publication.

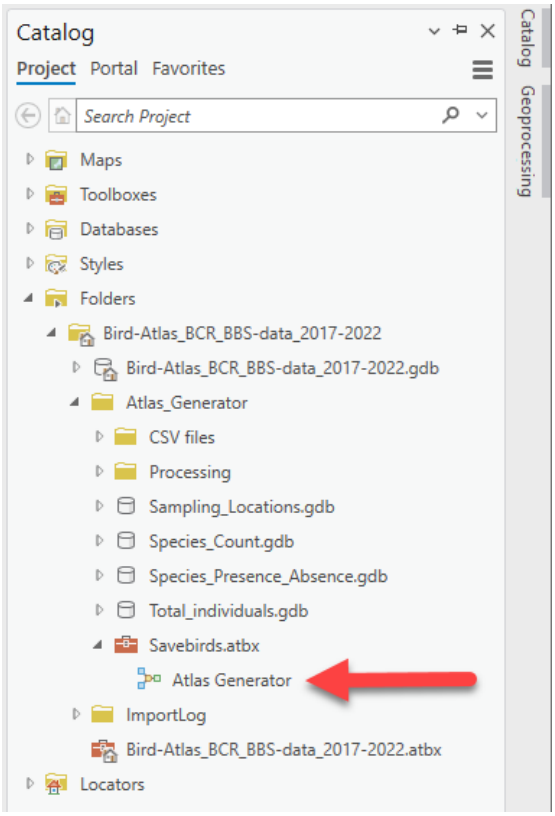

Figure 8: The figure demonstrates the user project within the *Catalog Pane* after selecting it from the *View* tab. It shows the expanded *Folders* directory with the project folder *Bird-Atlas_BCR_BBS-data_2017-2022* open, revealing the *Atlas_Generator* folder. The user must open the *SaveBirds.atbx*, **right-click on the *Atlas Generator* and press Open** to activate the tool.

Moreover, contributors can include citations of pertinent articles alongside their atlases. By making these citations readily available, they can guide researchers utilizing their atlases to reference these specific works, thereby promoting a culture of recognition and facilitating the assimilation of their contributions into broader scholarly dialogues.

11 The Importance of Sharing Atlases

The SaveBirds.app GitHub organization invites all researchers to enhance the collective progress of research by sharing the atlases they have developed with the broader academic and professional community. The public dissemination of such work is paramount within academic and applied research spheres. Making

generated atlases available signifies a dedication to the ethos of scientific collaboration and provides substantial assistance to peers by saving them time and computational resources.

Disseminating atlases via the SaveBirds.app GitHub organization achieves two primary objectives. First, it amplifies the visibility of the researchers' work, attracting the attention of an international network of scholars and practitioners. Such visibility promotes a culture of collaboration, innovation, and inspiration, enabling the cross-pollination of ideas and techniques among varied research areas. Second, contributors play an essential role in a broader ecosystem of knowledge exchange, crucial for expediting the processes of scientific discovery and its practical applications.

Furthermore, the sharing of atlases cultivates a norm of citation and recognition within the scholarly community. When researchers incorporate these atlases into their studies, citing the original work becomes a norm, thus magnifying the impact of the contributions. This augments the contributors' professional reputation and significantly boosts the metrics of their research impact through increased citations.

Engagement in this communal repository signifies data sharing and active participation in a movement toward open science. This movement emphasizes the necessity of accessibility and collaboration in addressing intricate environmental challenges. By collectively contributing to this repository, the research community can make a substantial impact, creating an environment where research is openly available, and collaboration forms the foundation of innovation.

In anticipation of such valuable contributions, sincere appreciation is extended to those considering the opportunity to share their work through the SaveBirds.app GitHub organization. By joining forces, it can significantly influence conservation efforts globally, paving the path toward a future where shared knowledge and cooperative research catalyze significant breakthroughs.

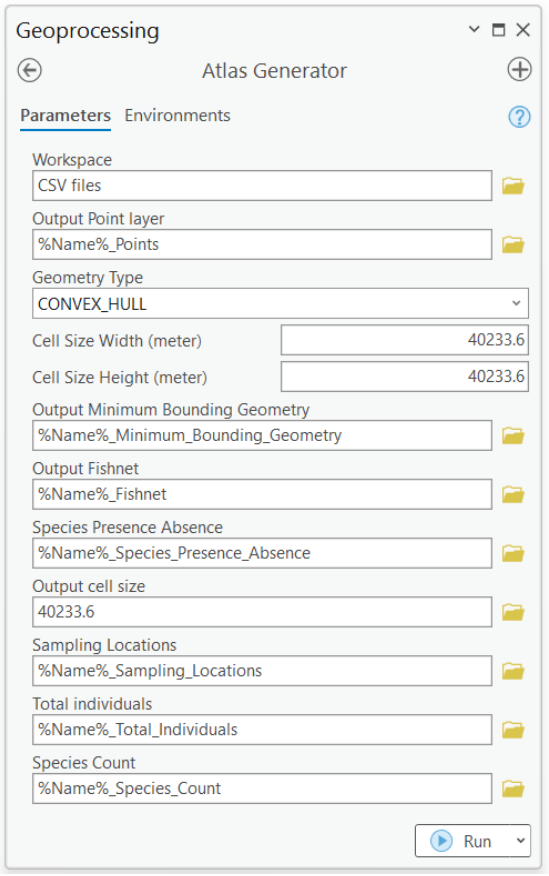

Figure 9: The BAG Interface in ArcGIS Pro: Displayed is the interface for atlas generation, where users initiate the process by clicking the *Run* button. The completion time will vary, ranging from several minutes to 12 hours, based on the project's complexity and species diversity in the selected area.

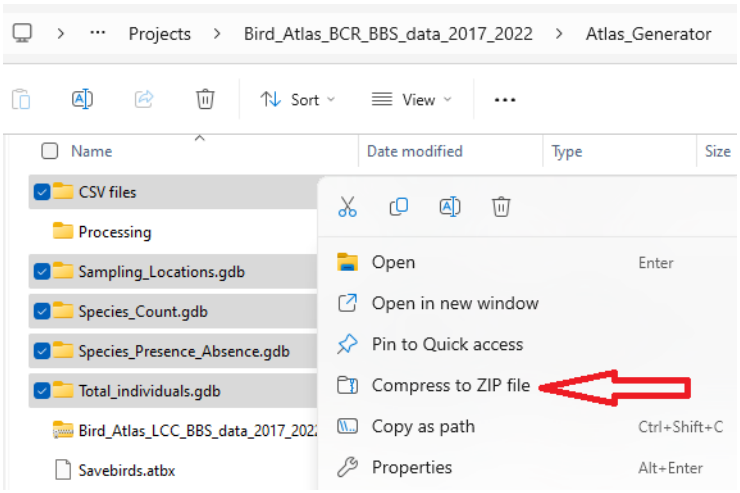

Figure 10: Contributors compress *gdb* folders and *CSV files* into a zip file named after the project for submission. They can then share this with the BAG's developers (tutorial's authors) or join the SaveBirds.app GitHub organization for publication credit. Including relevant citations with their atlases encourages proper acknowledgment and integrates their work into broader academic discussions.