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GIS rasters to identify best sites for creating habitat for American Woodcock in Rhode Island

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Summary

The University of Rhode Island has conducted many studies of the habitat use of American Woodcock (*Scolopax minor*) in Rhode Island, USA. In 2020 we developed a new geographic information system (GIS) tool based on our previous research to identify sites in Rhode Island where forest clearcutting to create young forest habitat would have the most positive effect for American woodcock. We believe that our new tool is effective, and that it helps landowners identify the best locations on their properties to improve woodcock habitat. This report provides public access to the GIS rasters of the tool and to an article providing more details about how the tool was created.

Methods

We created the new tool based on the 2018 species distribution model (SDM) raster for American Woodcock in Rhode Island. A typical SDM predicts the probability of presence of a species at any location based on an analysis of known occurrences and environmental variables, but it cannot predict how much the probability of presence would change after a new patch of young forest is created in any location. Creating the tool involved creating five new ArcGIS raster datasets, which are now publicly available. We used Maxent 3.4.1 to create our new SDM tool, and ArcGIS Desktop 10.6 to store the output raster datasets in a geodatabase that can only be opened with geographic information system (GIS) software. The geodatabase contains five raster datasets that cover the entire state of Rhode Island, and was uploaded to DRYAD, an open data publishing platform. A brief description of the five rasters is provided below.

Five Rasters

The five ArcGIS raster datasets described below can only be viewed by using geographic information system (GIS) software such as ArcGIS Desktop or ArcGIS Pro (Environmental Systems Research Institute, Redlands, CA).

Woodcock POP 2018: This raster (10m pixels) shows the 2018 probability of presence for woodcock in RI. It is based on Maxent modelling of three years of woodcock location data, obtained by catching 68 woodcock in RI in the spring, attaching transmitters, and tracking their movements until August. The Maxent model was projected onto 2018 spatial data.

Woodcock Upland POP 2018: This probability of presence raster (50m pixels) is a modified version of Woodcock POP 2018. It has 50m pixels and only includes upland forest areas which are suitable for clearcuts to create young forest habitat, rather than wetlands which are not suitable for clearcuts.

Woodcock POP After Forest Mgt 2018: This raster (50m pixels) was the first product of our new SDM tool. It shows the predicted probability of presence for woodcock in RI if young forest habitat is created at any upland forest location in RI.

Increase in Woodcock POP After Forest Mgt 2018: This raster (50m pixels) shows the predicted increase in probability of presence for woodcock in RI if young forest habitat is created at any site. It was produced by using a raster calculator to subtract the POP values of Woodcock Upland POP 2018 from Woodcock POP After Forest Mgt 2018.

Top Priority Sites for Forest Mgt 2018: This raster (50m pixels) is the most valuable output of our new SDM tool. It shows the top priority (top 20% and top 40%) sites for creating young forest habitat for woodcock in Rhode Island. The top 20% sites include areas where both the predicted POP increase after forest management and the predicted POP after forest management are in the top 20% class. The top 40% sites include areas where both the predicted POP increase after forest management and the predicted POP after forest management are in the top 40% range (See Figure 1 below).

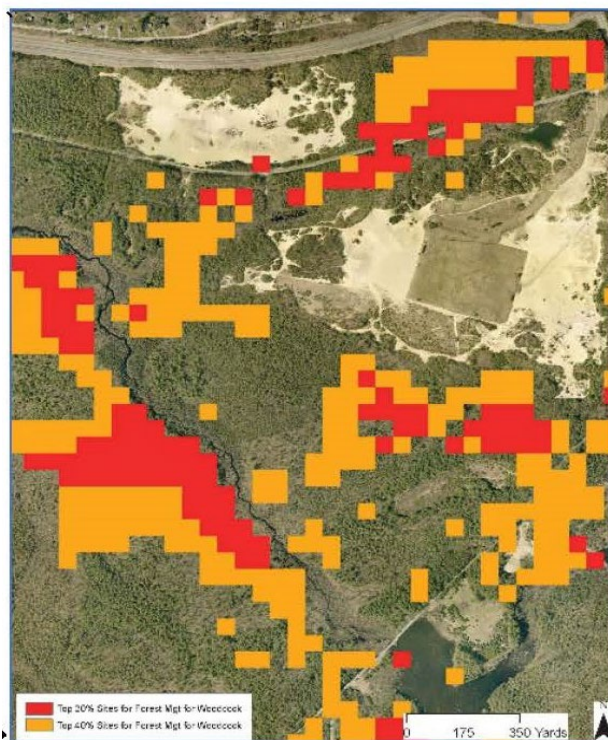


Figure 1. Top priority sites for forest management. The GIS raster covers the entire state of RI, but this figure zooms into a 385 ha portion of the state-owned Big River Management Area.

The five rasters described above are publicly available in DRYAD:

<https://doi.org/10.5061/dryad.pg4f4qrp6>. The geodatabase which was uploaded to DRYAD, contains a total of 619 files, but when it is opened with GIS software, the five raster datasets are visible and easily opened.

If you would like to read a detailed description of how we created our new SDM tool, and how the tool can be used, this information is available in the following journal article: Novel Use of Species Distribution Modelling to Identify High Priority Sites for American Woodcock Habitat Management, B Buffum, R Masse and S McWilliams, 2021. The article is publicly available at: https://digitalcommons.uri.edu/nrs_facpubs/208

Keep in mind that the GIS layers were based on 2018 data. The tool is still be accurate for most forested areas in Rhode Island. However, in some suburban portions of the state, a number of previously forested areas have been clearcut since 2018 for the construction of new houses. So you may be surprised to see that some areas identified by the tool as high priority for creating young forest habitat for woodcock are no longer forested.