

Consolidation of Delaware’s Tier 1 Insects of Greatest Conservation Need and Associations with Non-Tidal Freshwater Wetlands

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Cole Palmer: Fisheries Management
Christopher M. Heckscher, Ph.D.
Delaware State University, Dover DE
University of Delaware Water Resources Center, Newark DE

Abstract

Using the Delaware Wildlife Action Plan as the primary guide, a dataset of Delaware’s non-tidal wetlands and their associated Tier 1 insect species was developed. The dataset was used to create an online searchable database for easy viewing of species-habitat associations, as well as sources for each species confirming those associations. Non-tidal wetland ranges and species associations were mapped using the Northeastern Terrestrial Wildlife Habitat Classification System, but was not fully completed due to limited data.

Methods

Database Development

- Non-tidal wetlands and associated Tier 1 (T1) insect species were sourced from the DWAP (DNREC 2015) for review
- Documentation for each species associating them with their habitats was sourced for citation
- Peer reviewed sources were taken primarily from publicly available resources (Google Scholar, ResearchGate, etc.) to minimize the usage of private or obscure articles
- DWAP Tier, Group, Subgroup, Scientific Name, Common Name, Primary Wetland and Supplemental Wetland Associations, and Associated Literature was collected in a spreadsheet
- Database was developed using the datatable package in RStudio and was published online using RPubs

Introduction

While state lists of rare Arthropods and associated habitats have been previously developed, there has been no previous effort to consolidate non-tidal wetlands and their species associations. While the majority of this information is contained in the Delaware Wildlife Action Plan (DWAP), it is outdated and scattered within the several hundred-page document. The goal of the project was to develop a publicly available dataset, searchable database, and mapping of non-tidal wetlands with species specific layers.

ArcGIS Mapping

- Using ArcGIS, habitats were mapped using the Northeastern Terrestrial Wildlife Habitat Classification System (NETWHCS) (Fig. 1) Raster Dataset (Gawler 2008) as a framework
- Habitat codes for non-tidal wetlands were sourced from the DWAP which were used to isolate individual wetland types
- The isolated non-tidal wetland layers were then recombined to create individual layers for previously identified T1 species

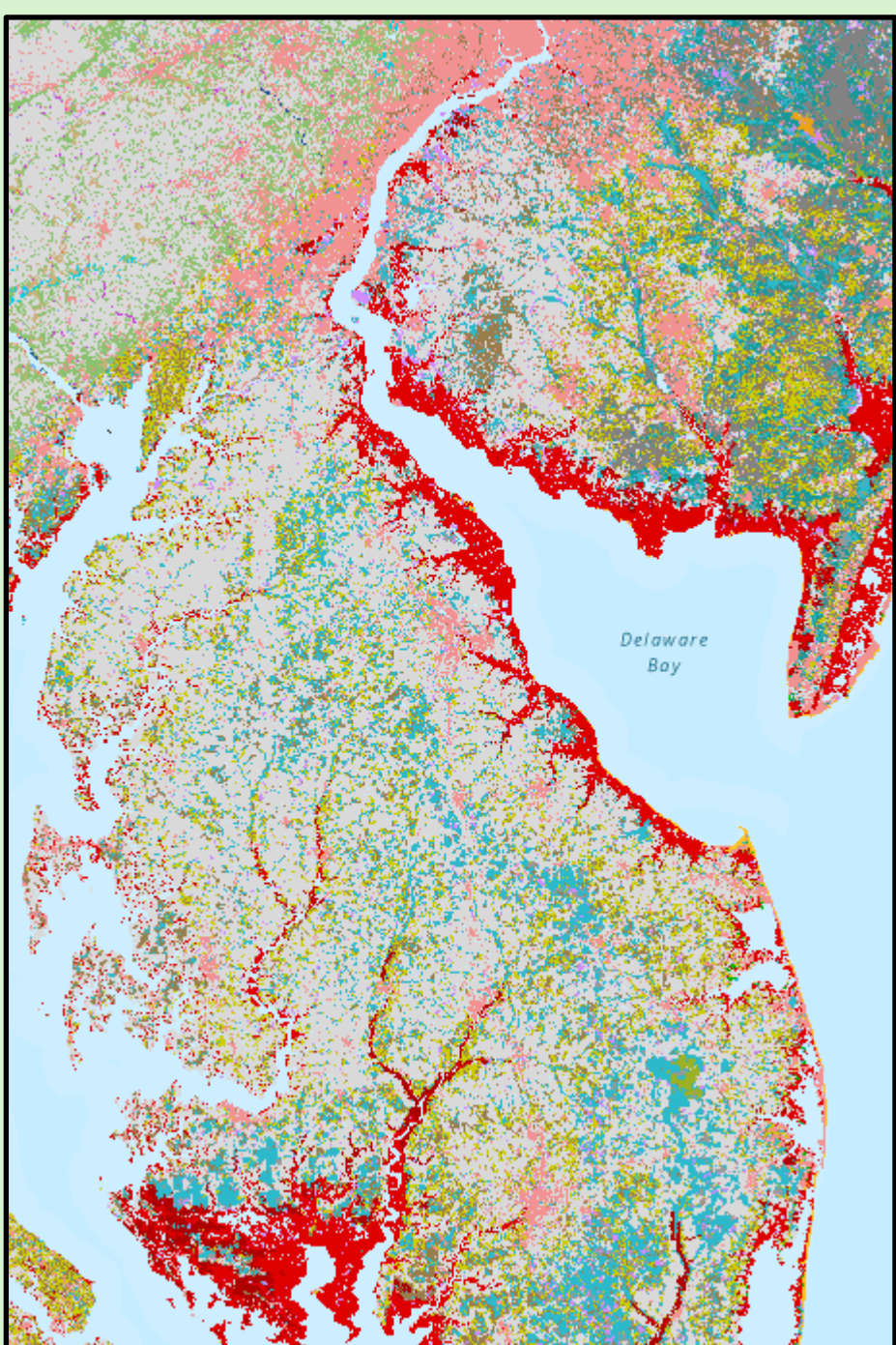


Figure 1. Image of habitats in Delaware and the surrounding area as determined by the NETWHCS

Results

- Searchable database was published on RPubs (Fig. 2) using the following link <https://rpubs.com/polvozinho/t1dwap>
- 15 Non-Tidal Wetlands with a collective 32 associated T1 insect species were identified (Fig. 3)
- Links to the completed project files were included in the description and comments of the RPubs page or at https://github.com/polvozinho/T1DWAP_ProjectFiles



Figure 2. QR Code linking to the developed RPubs database

Scientific Name	Cypress	CPFlt	CPPnd	CPFen	CPSwp	CPFlt	CPCdr	EFM	FSS	IW	VP	SLF	PDMdw	PDSwp	PDFld
<i>H. planatus</i>			P								S				
<i>H. spangleri</i>			S								P				
<i>P. mysticalampas</i>					S	S	P								
<i>P. bethaniensis</i>										P					
<i>B. fontana</i>				S	S		S						S	S	
<i>E. phaeton</i>													P		S
<i>E. conspicua</i>													P		S
<i>E. dian</i>		S				S		S				S			
<i>P. m. chermocki</i>				P	P	P									
<i>P. m. massasoit</i>													P	P	S
<i>A. halesus</i>				S	S		P		P						
<i>C. hesseli</i>							P								
<i>S. kingi</i>	P														
<i>E. fax</i>				P	S		S								
<i>P. appassionata</i>				P	P										
<i>P. speciosissima</i>					S	S		S	S	P					
<i>P. nelita</i>														S	
<i>C. marmorata</i>		S	P												
<i>I. pergracilis</i>	P														
<i>O. detrita</i>	S				S	S		S							
<i>A. tuberculifera</i>			S		S		S						P	P	S
<i>A. bipunctulata</i>				P			S								
<i>C. bilineata</i>						S									
<i>C. erronea</i>													P	P	
<i>E. dubium</i>		P						P					P	P	
<i>E. pallidum</i>						S		S							
<i>E. spinosa</i>	P	S	S												
<i>G. antilope</i>	S	S					S								
<i>L. eurinus</i>			S												
<i>N. bella</i>				S									P		
<i>R. mutata</i>															
<i>S. provocans</i>		S				S									

Figure 3. Chart of Primary and Supplemental species-wetland associations

- 7/15 habitats were successfully mapped without complication using the NETWHCS
- 2/15 habitats were partially mapped due to discrepancies between the NETWHCS and the DWAP (Fig. 4)
- 2/15 habitats were not able to mapped due to lack of data in the NETWHCS
- 4/15 habitats were not able to be mapped with public data due to obscurity and rarity
- Species layers were constructed when substantial data was available

Conclusions

- All non-tidal wetland associated Tier 1 insects according to the DWAP were catalogued with sources confirming habitat association
- Mapping species-wetland associations in ArcGIS was partially successful within the timeframe
- Both the database and project files will be updated in the future, starting with complete habitat mapping, then Tier 2 and 3 associated insects

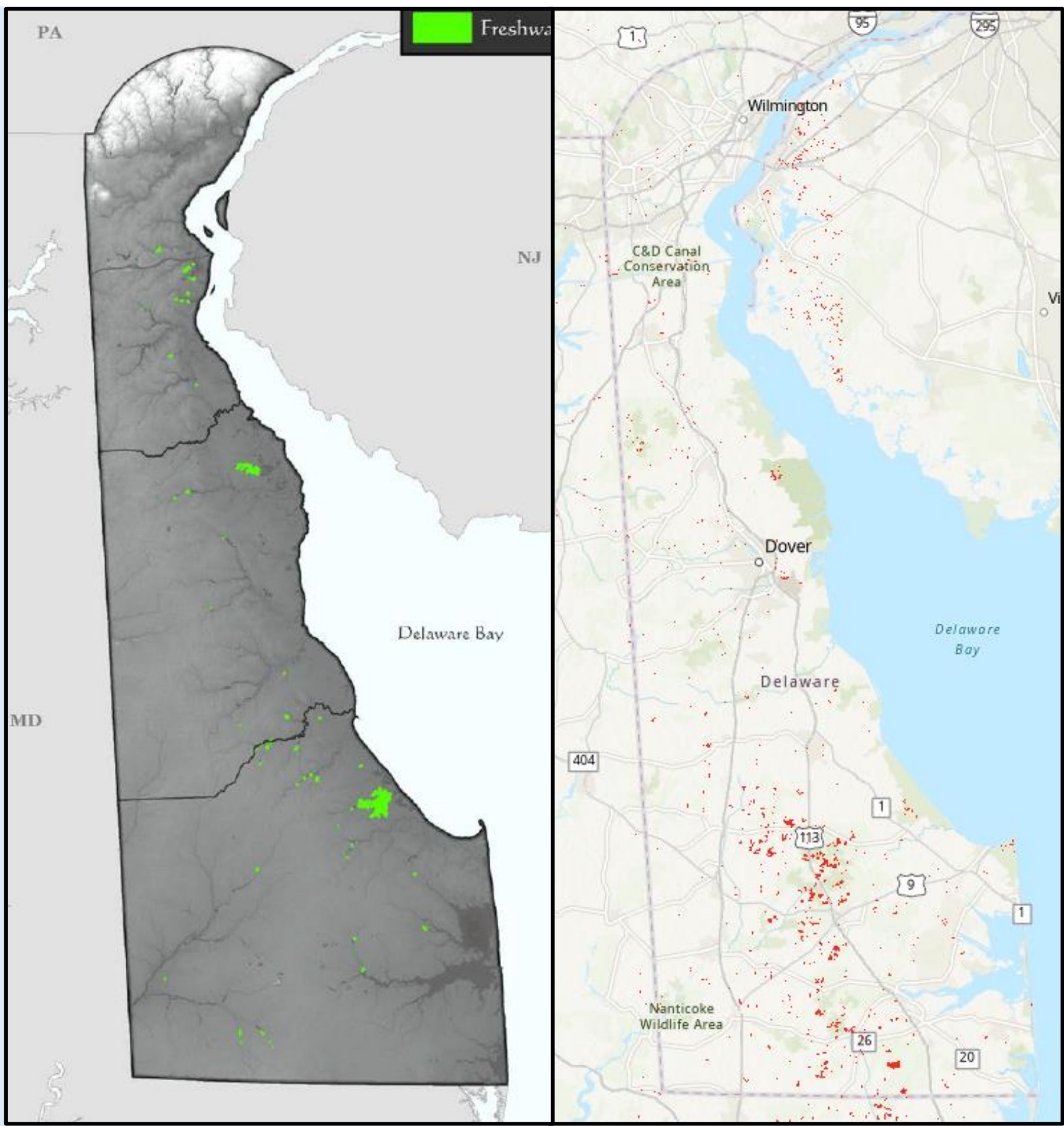


Figure 4. The differences in Freshwater Shrub Swamp habitat range between the DWAP (left) and the NETWHCS (right)

Citations

Delaware Department of Natural Resources and Environmental Control. 2015. 2015-2025 Delaware Wildlife Action Plan. Dover, Delaware, USA.

Gawler, S. C. 2008. Northeastern Terrestrial Wildlife Habitat Classification. Report to the Virginia Department of Game and Inland Fisheries on behalf of the Northeast Association of Fish and Wildlife Agencies and the National Fish and Wildlife Foundation. NatureServe, Boston, Massachusetts. 102 pp.