

RCN 2009-11: Development of an Online Database to Enhance the Conservation of SGCN Invertebrates in the Northeastern Region

James W. Fetzner Jr. & John E. Rawlins
Section of Invertebrate Zoology, Carnegie Museum of Natural History,
 4400 Forbes Avenue, Pittsburgh, PA 15213-4080
 Fetznerj@CarnegieMNH.Org or Rawlinsj@CarnegieMNH.Org

Project Description: This project is developing a suite of online-accessible tools that will allow operation of a database of occurrence records (spatial and temporal) to enhance conservation management of invertebrate species of greatest conservation need (SGCN) in the Northeast Region. The data to be exploited are derived from authoritatively determined specimens in institutional collections, and a wide range of other information not documented directly by specimens (literature, notes, reports, etc.). The tools will allow the scientific community to add, edit and download species-specific data records in a secure manner for the purpose of generating distribution maps, seasonality plots, etc., and directly improving efforts for invertebrate conservation.

Introduction

Effective conservation action on SGCN invertebrates is often complicated by the inconsistent availability of accurate data, ranging from historical information associated with preserved specimens (especially spatial and temporal data), to critical factors not documented by specimens, such as recent field observations, information in the literature, unpublished notes gathered by experts, life history data, and various ecological associations. This lack of information is a leading reason why so few invertebrate taxa ever receive conservation attention. **However, much of the historical information and data that is needed to address at least some of these data shortfalls is already contained in natural history museum collections!** Because of this, the Northeast Association of Fish & Wildlife Associations (NEAFWA) called for the development of a database that would gather and disseminate information on invertebrate taxa as part of its 2009 RCN grant program. This program outlined some of the special needs and shortfalls that needed to be addressed (see below), and we suggested some possible solutions to these needs.

RCN Needs:

- Lack of a basic understanding of rarity, range and distribution, and habitat associations for many SGCN taxa.
- Digitize museum and university invertebrate collections.
- Link existing on-line databases to increase data availability and improve understanding of species rarity and distribution.
- Creation of a species database providing information that will facilitate the inventory and conservation of SGCN invertebrates in the Northeast.

Our Solutions:

- Build a database and associated website that will display museum specimen records.
- Build a system that will allow multiple institutions to contribute data to the effort.
- Output distribution maps, adult seasonality and other data based on specimen records contained in the database.
- Include annotated specimen photos to aid identification and show within-species variation.
- Provide links to other taxon-based web resources.

Impediments to the Successful Conservation of SGCN Invertebrates

There are several factors that can hinder conservation efforts. These include **1)** a lack of available data documenting historical ranges, **2)** the inability to define current distributions and abundances, **3)** *taxonomic impediments* (i.e., a lack of input from appropriate experts, delimitation and validity of species concepts, accurate and authoritative determination, and correct nomenclature), and **4)** insufficient mechanisms for gathering and rapidly sharing sensitive taxon-specific data. In many ways, museum collections can play an important role in the conservation of invertebrate taxa by supplying exactly these types of data and expertise.

Project Products

This project will deliver a website and associated database of specimen occurrence data that can be used by the conservation community for invertebrate conservation efforts. However, such an undertaking requires a large amount of time and effort in order to provide authoritatively identified specimens and verification of historical specimen data (often involving retrospective label data capture and geo-referencing). Often, museum collections are under-staffed and lack sufficient funding to support these efforts by themselves. **It is imperative that conservation organizations support these efforts through various funding initiatives.** That being said, this project is a major step forward because it provides a means of disseminating needed data to the conservation community for invertebrate taxa.

The main product of the website is the "Species Account" pages (among others). These pages will gather together all known data about a species in one place (see the figure to the right for an explanation of the various items contained on these pages). Each SGCN taxon in the Northeastern Region will have a page like this. During the Beta-testing phase of the website, we hope to receive constructive feedback from the community and welcome any suggestions for improving the layout and functionality of the site. To become a registered user of the site, you must be a member of a museum, state or federal agency, or an NGO conservation organization. If you would like to be a beta tester, please contact us at the e-mail addresses above.

The main products of the project are listed below.

- An interactive website (SGCN Invertebrates), **A BETA site should be available to the conservation community by October 2011 for testing at the following URL: <http://iz.carnegiemnh.org/SGCNinverts/>**
- Initial test database of SGCN invertebrate occurrence records (>17,000) from the Carnegie Museum collection.
- Distribution maps and seasonality charts (generated from records contained in the database).
- Photographs of representative specimens to show variation, aid in the identification of taxa, and in some cases, annotated to show diagnostic identification features.
- Species life history information (where available).
- List of associated references.
- Notes and comments that allow for easy addition of data to individual species pages by website users (museum, state or federal agencies, & NGOs).

The Species Account Page

Taxonomy: A list of higher-level taxonomic categories. Mouse over names to view the taxonomic category. Click a link to view a list of taxa for that group.

Names: Scientific name and authority, and associated common name.

Conservation Status: State (Northeastern Region only), Federal and Global status.

Life History & Ecological Notes: Information on the natural history and lifeway of species.

Adult Seasonality & Collections by Year: A graphical display of the specimen records contained in the SGCN Invertebrates database for the selected species.

Distribution & Map: Textual description of the entire distribution, and a map showing current location and locality info for specimens contained in the SGCN Invertebrates database. To view individual record location data, just click a dot on the map. **The map will not be displayed to Guest Users.**

References: A list of literature citations with importance to taxonomy, systematics, ecology, life history, and conservation.

Comments: A comment system that allows logged-in users to add additional comments, field observations, or notes about the species.

The screenshot shows the SGCN Invertebrates website interface. At the top, there's a navigation bar with 'Home', 'About', 'Contact Us', and 'Help'. The main content area is for the species *Calosoma (Calodrepa) wilcoxii* LeConte, 1848. It features a large image of the beetle, a list of other images, and a detailed text-based account. The account includes taxonomy (Arthropoda > Insecta > Coleoptera > Adephaga > Carabidae > Carabini > Calosoma > Calodrepa), conservation status (Connecticut (SC), Rhode Island (NR), NatureServe (GNR)), life history (Size of Adults: Length 17-22 mm; Distinguishing Features: Easily distinguished by color pattern, except similar C. scrutator; larva is much larger, has tibia of middle leg strongly arcuate and with a hairbrush near apex; Variation: See photos (this page); Food: Adults found eating caterpillars and grasshoppers; larvae eating caterpillars (Larochele and Larivière 2003); Immature Stages: Burgess and Collins (1917) record some rearing experiments. They found adult activity mainly in May and early June; larval activity in June and July, development taking about a month; pupation a couple of weeks, followed by adult hibernation. Apparently no new activity until the next spring; Life History Notes: As with many carabids, this species has potent pygidial defense glands which emit a pungent and caustic chemical to dissuade predators; Ecology: Habitat: Larochele and Larivière (2003): lowlands and mountains. Primarily deciduous forests (e.g., oak, maple) in trees and on shaded ground, forest edges, adjacent gardens and fields. Adults actively climbing trees in search of caterpillars; larvae are on the forest floor; Associations: Important economically in control of forest caterpillars (e.g., massive looper outbreaks). Known predators include woodpeckers and crows. Known parasites include tachinids; Limiting Factors: N/A; Ecological Notes: Winged, diurnal as well as nocturnal, and attracted to lights at night. Larochele and Larivière (2003): January to December, but adults found overwintering in soil 2.5-15 cm deep; can hibernate through two winters; life span is 2-3 years. Copulating pairs and gravid females found in June.), adult seasonality (a bar chart showing collection frequency by month), a distribution map (showing collection locations in the Northeastern US and Canada), and a list of specimen records (with columns for UniqueNo, Repository, Genus, Subgenus, Species, Sublevel, Subname, Authority, DetBy, DetYear, Country, State, County, Locality string, latitude, longitude).

User Accounts: Accounts will provide password-protected access to the website and will only be provided to approved museum staff that contribute data to the site, as well as other state, federal and NGO conservation organizations. Access to the these pages by the general public (=Guest account) will be possible, but the pages will not disclose sensitive locality data and maps.

Photos: A large image of a representative specimen of the species. Click on the image to view it at full screen size.

Image Gallery: Can include an unlimited number of photos. Click one to view full screen images as a slideshow.

Add Images: Ability for registered users to contribute to a page by uploading additional photos.

Links: Links to additional web resources for the selected species.

View Specimen Records: The ability to view complete records of individual specimens from the SGCN Invertebrates database (*not all fields are visible below*). Output can be sorted and filtered. **This function will not be visible to Guest Users.**

ID	UniqueNo	Repository	Genus	Subgenus	Species	Sublevel	Subname	Authority	DetBy	DetYear	Country	State	County	Locality string	latitude	longitude
1	529593	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Delaware	[Sussex]	Gumboro, Great Swamp	38.477500	-75.365560
2	538790	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	District of Columbia		District of Columbia	38.898270	-77.015103
3	519486	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	District of Columbia		District of Columbia	38.898270	-77.015103
4	499322	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	District of Columbia		District of Columbia	38.898270	-77.015103
5	526653	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	District of Columbia		District of Columbia	38.898270	-77.015103
6	519004	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	District of Columbia		District of Columbia	38.898270	-77.015103
7	517908	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	District of Columbia		District of Columbia	38.898270	-77.015103
8	499638	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	District of Columbia		District of Columbia	38.898270	-77.015103
9	493556	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	District of Columbia		District of Columbia	38.898270	-77.015103
10	499734	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Kentucky	Edmonson	Mammoth Cave National Park	37.183330	-86.150000
11	540405	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Kentucky	Edmonson	Mammoth Cave National Park	37.183330	-86.150000
12	499181	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Kentucky	Edmonson	Mammoth Cave National Park	37.183330	-86.150000
13	499652	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Kentucky	Edmonson	Mammoth Cave National Park	37.183330	-86.150000
14	497255	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Anne Arundel	Harwood	38.865830	-76.620280
15	529899	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Anne Arundel	Annapolis	38.978330	-76.492500
16	533383	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Anne Arundel	Sandy Point State Park	39.016390	-76.401940
17	512116	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Baltimore	Baldwin	39.494720	-76.470560
18	494683	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Caroline	Henderson	39.074170	-75.766390
19	538836	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Caroline	Preston	38.712500	-75.910280
20	499212	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Caroline	Preston	38.712500	-75.910280
21	541388	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Caroline	Reliance	38.658824	-75.728153
22	531880	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Caroline	Preston	38.712500	-75.910280
23	527006	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Caroline	Henderson	39.074170	-75.766390
24	493217	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Caroline	Henderson	39.074170	-75.766390
25	523759	CMNH	Calosoma	Calodrepa	wilcoxii			LeConte, 1848	R. Davidson		United States	Maryland	Carroll	Eldersburg	39.403610	-76.950560