

## ORIGINS OF THE NORTH CAROLINA BIODIVERSITY WEBSITE

The North Carolina Biodiversity Project traces its origins to the 1990's, when Harry LeGrand and Tom Howard developed a **Butterflies of North Carolina** database, compiling all known records for butterflies in the state. Building on NC county distribution maps begun by Paul Opler and Jeff Nekola, LeGrand began compiling new records based on Natural Heritage Program surveys as well as information collected by the Carolinaleps Listserve, a group that had formed a year or two earlier, where observers in North and South Carolina exchanged their observations via e-mail messages. The original database used by LeGrand was an Excel file using the following six fields: Common Name, County, Date, Observer, Number, and Comments (generally a location). At the end of each year, this file was sent to Howard, who added butterfly records submitted by State Parks staff through NRID, the Natural Resources Inventory Database created to compile natural history observations made in state park units.

Around 1994, Howard created an internet website, hosted by N.C. State Parks, which provided online access to the butterfly data, as well as PDF versions that could be downloaded from the site. A number of new fields were added by LeGrand to summarize the following information for each butterfly species: Distribution, Abundance, Flight Period, Habitat, Food and Nectar Plants, and Comments. Each PDF species account page additionally included flight chart phenograms, and both the PDF and the website displayed county distribution maps.

New versions of the website and PDFs have since been produced annually, with LeGrand submitting a new Excel file each winter, and Howard then generating new flight charts and range maps, with LeGrand editing the text accordingly. The purpose of the website was certainly two-fold: 1) providing a means for the butterflyers in the state and in the Southeast to see the "fruits of their labors" – flight charts, abundance data, and other valuable information on habitats and other life history information; and 2) providing a way for the general public to learn about the butterfly species in North Carolina. Over time, photographs of each species were added to the website, which is now (2017) in its 24<sup>th</sup> year of operation.

A few years after the Butterfly website began, LeGrand decided that up-to-date information on birds in the state was needed. Though there were several statewide books published on the distribution of birds in North Carolina, the last book on this subject was published in 1980, and the Carolinabirds Listserve that had existed for a number of years prior to the website provided only a limited distribution of new information.

Again, Howard provided a website framework, with LeGrand compiling the information. Although similar in format to the Butterfly website, the primary focus for the **Birds of North Carolina** site was on distribution and abundance of birds within each of the three major physiographic provinces: Mountains, Piedmont, and Coastal Plain. The accounts written by LeGrand represent summaries of abundance and seasonal occurrence for each species in a province based mainly on his 35 years of personal experience. A database of bird sightings – the Avendex database -- published in The Chat (Carolina Bird Club journal),

was extremely helpful in providing LeGrand with data on rare sightings, high counts, and general timing of observations through the year.

Originally, the bird website was hosted by State Parks but now been taken over (appropriately) by the Carolina Bird Club, and is now updated four times a year, using selected rare records published in each issue of The Chat. As with the butterfly site, the purposes of the bird website are to allow birders and the general public in the state and region to see the geographic distribution of each bird species found in the state, as well as to determine their rarity. Because there is a county map for each species on a given account page, birders can now identify the first county sightings for a given species, and upload the records accordingly.

State Parks also hosts the **Dragonflies and Damselflies** (i.e., Odonates) **of North Carolina** website, which was created by LeGrand and Howard around 2010. Unlike with the other two (i.e., butterflies and birds) websites, most of the original data for the site came from the specimen records of the late Duncan Cuyler, who began his surveys of the state's fauna back in the 1940s. As there is no state listserve for Odonate reporting, Howard set up a data input function whereby observers can enter their own records and photos, as opposed to LeGrand doing all of the data entry. As with the butterfly site, LeGrand summarized the data for each Odonate species using the following six fields: Distribution, Abundance, Flight Period, Habitat, Behavior, and Comments. As in the other websites, the Odonate Website also contains county range maps and flight charts for all species, and photographs for most species. At the end of each year, Howard generates a PDF of all species accounts, and LeGrand updates the text accordingly. Currently (2017), the website is now in its 8<sup>th</sup> approximation, with a new approximation prepared each winter.

A similar website for **Mammals of North Carolina** was started by LeGrand and Howard around 2012, and also hosted by State Parks. As with the Odonate website, observers can upload records, though it is preferred that only new county records be submitted, as the purpose of the site is not to accumulate all of the known records for species, but to better delineate the geographic range of a species in the state. The site also contains text fields, written by LeGrand, on Distribution, Abundance, Seasonal Occurrence, Habitat, Behavior, and Comments. Unlike the Butterfly and Odonate sites, PDF approximations have not been done on an annual basis for the Mammals; the 2<sup>nd</sup> Approximation PDF was generated in the spring of 2017.

In 2014, Steve Hall, Bo Sullivan, Parker Backstrom, and Merrill Lynch began working with Howard to develop a **Moths of North Carolina** website. As in the previous websites, the intention was to cover each species that has been recorded in the state, providing the same sort of information on Distribution, Frequency, Habitat Associations, Life Histories, and Conservation Status. However, in the case of moths, close to 3,000 species have been listed as occurring in North Carolina, compared to just the few hundreds of species of Butterflies, Birds, Odonates, and Mammals. Consequently, progress on populating the website has been comparatively slow and will take many more years to complete. Although now available to the public online, this is definitely still a work in progress.

Two more websites that are currently under development cover the state's "**Hoppers**". The first, developed by Kyle Kittleberger, was begun in 2015 and provides information on the Tree Hoppers, Leaf Hoppers, Plant Hoppers, and Frog Hoppers – collectively termed the **Hemipteran Hoppers**. The second, just established in 2017 by Steve Hall and Ed Corey, deals with the **Orthopteran Hoppers**, i.e., the **Grasshoppers, Crickets, and Katydid**s. Although only partially populated as of July 2017, both of these sites will eventually provide the same sort of information as found in the already established websites.

Also in the works is a very large website of the state's **Vascular Plants** – close to 4,000 species in the state – will be available soon on the NCBP website. Initially, the plant site will be mainly a listing of species, with their abundance ranks and protection statuses. Over time, species accounts will be written, and an input function for uploading photos, and potentially new county records, will be provided. County range maps will be available for each species at the opening of the website, though initially the maps will be somewhat outdated. As with the moth website, the vascular plant website will take several years to be fully "completed" with written species accounts and up-to-date maps, as well as photos. But, each of these two taxa groups have a number of potential authors and editors available to assist LeGrand and Hall in making these sites among the best of their kind in the country.

All of the websites that had been created as of 2015 were developed informally, based on the cooperative working relationship initiated between LeGrand and Howard and subsequently followed as the additional authors joined in. By 2015, however, there were enough authors assembled to make a group approach more reasonable, and the North Carolina Biodiversity Project was created to represent the interests of the authors, none of whom are employed by State Parks and many not employees of the state at all. Following several foundational meetings, a set of Articles of Association were prepared and ratified by this group (see Articles of Association under About the NCBP). That was followed by discussion between the NCBP and the Division of Parks and Recreation, resulting in the signing of an MOA describing the collaboration between the two in creating and managing the websites (see MOA between NCBP and DPR under About the NCBP). Both of these steps, along with the formation of another partnership with the Southern Conservation Partners, sets out the pattern of relationships we wish to follow, with each group recognized as a separate, independent entities, but working cooperatively towards a common set of goals – recognition of the importance of maintaining the viability of the natural world, building an interest and appreciation in our native species and ecosystems, and raising public awareness of the need to increase our conservation efforts.

We recognize that we are not alone in these efforts and that we are not unique in our use of websites to achieve our goals. There are, in fact, several existing websites with which the NCBP does not want to compete, such as the Amphibians and Reptiles of North Carolina website, hosted by Davidson College, or the Flora of the Southern and Mid-Atlantic States, hosted by the UNC Herbarium. In view of our common interests with these websites we provide links to them on our home page, hoping to spread the awareness of their existence to the general public.

Even where outside websites exist for a given taxonomic group, however, we feel that there is some value in presenting species lists on our site that provide both up-to-date taxonomy as well as a unified approach to assessing conservation needs. In the latter regard, we make use of the ranking conventions

developed by NatureServe and the Natural Heritage Program Network. Again, we do not wish to supersede the evaluations made by those organizations themselves. Instead, we adopt those ranks wherever possible, but also extend their application to species that have otherwise not been considered with regard to their need for conservation.

Currently, we have a list available for the state's Amphibians and Reptiles, with several others in development: Freshwater Fishes, Coastal/Marine Fishes, Freshwater Mussels, Terrestrial and Aquatic Snails, and Crayfishes. These lists have the advantage in that they can be updated as needed, with PDF's regenerated automatically following any edits made by the NCBP authors. Other lists are planned for future development, as are additional websites, once a core of experts has been assembled for a particular taxonomic group. Ultimately, we would like to see all of the state's flora and fauna covered either through our efforts or by other groups with similar aims to protect and enhance our understanding of the natural world.