An Interactive Natural History Database to Support a GK-12 Program

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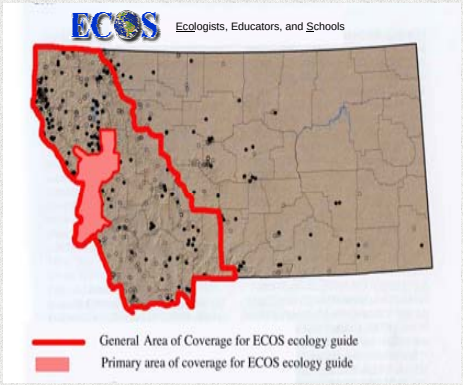


Abstract

Natural history, systematics, and other field-based studies are often limited by the difficulty of using field guides or manuals to identify species of plants and animals. We designed illustrated interactive keys that avoid the frustrations and challenges of dichotomous keys, so that people with a wide range of abilities and interests can better document biodiversity patterns in their schoolyards. Using a dynamic framework of linked databases the guide illustrates many connections that exist between species and their habitats in our area. Our guide includes detailed descriptions, ecology, history, and uses of over 200 vascular plant species, and information on all 84 mammal species and 100 bird species that frequent our area. Our online natural history guide, developed as a part of our NSF-funded GK-12 program (ECOS) links fellows, teachers, students, and college faculty in a common project that integrates our data across physical and biological fields of study. Models and structures we have developed can easily be adapted to other geographic areas. Local guides make natural history information more readily available to the public, and help promote interest in ecosystems and their conservation.

Goals and Purpose of the Nature Guide

Teachers often request better materials for the identification of plants and animals when developing schoolyard investigations. This need led to the initial development of this project. The nature guide was developed to meet the following goals:

- Describe common species of plants, animals and their habitats in the Northern Rockies region.
- Provide interactive keys and more intuitive means to identify species accurately in the region, by using any combination of characters
- Improve scientific accuracy of field experiments and overall educational value of field-oriented studies by making natural history information on ecosystems around our region more accessible to both teachers and students.
- Provide ecological information about each species or species group to help identify topics for student field investigations and to stimulate greater interest in the natural history and ecology of this region.

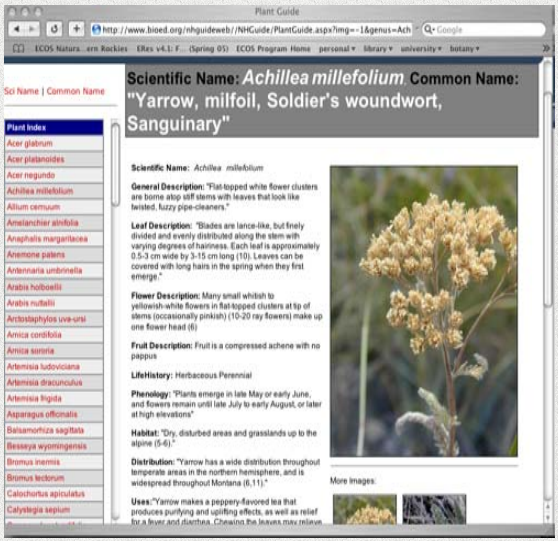
Creating an Interactive Guide

Species lists were assembled from local studies, national and regional databases, and published literature. Templates were developed for the fields required for both descriptions and identification as well as information on medicinal uses, other human uses, and ecology. SQL code was used to integrate the database with a web-friendly interface and to provide unique applications for local schools as needed. Static pages are now being replaced with dynamic data-driven species descriptions. Digital photos were made for the 600 most common plant species representing phenological changes throughout the year; Database also accomodates multiple common and scientific names. GK-12 graduate and undergraduate fellows, along with other students and faculty, assembled species descriptions from current studies, the literature, and other web-based databases. These descriptions were reviewed and edited by specialists. Interactive keys were created for the more complex species groups.

Glossary illustrates nomenclature and structure, and can be used for species searches. Watercolor illustrations by ECOS Fellow Brooke McBride

For more information or to use the guide, please see http://www.bioed.org/nhguide

Sample Page of Plant Description Browser



Plant Search Function. Users can select the characteristics they can see from their plant. Program will then list all the species which share those characteristics.

Current Features of the Guide

Habitats and Geology —information on geography, geology, and habitats that dominate our study area including maps linked to descriptions and environmental data. We are working on developing interactive maps which will allow displaying geographic distribution of environmental features as well as key species groups in the area.

Plants — 230 species of plants in schoolyards and nearby forests and parks have been described. By the end of this grant cycle the guide should include the most common plant species in this region (approximately 300-500 species). We have already photographed 600 species of plants in our area including seedlings, flowers, fruits, leaves, bark, and general habit for the most common species. Quick field identification sheets (photos and short descriptions) are availblae for individual schools by request.

Animal Groups — Sections are being developed to include representative species, generally 30-60 each of amphibians, reptiles, fishes, invertebrate (families), birds and mammals. All amphibians and reptile species have been described and will be added to guide as soon as photos and other graphics are available. Mammal and bird sections will be added this Fall.

Science Inquiries for GK-12 Students -- Taxonomy and dichotomous key inquiries have been developed that use this guide in K-12 schools, and as well as in classes and labs at the University. A traveling teaching herbarium complements the guide and brings specimens to the classroom. We will be developing and testing new sections of the guide for use by younger children.

Benefits of Web-Based Nature Guides

❖ Web-based natural history guides have great potential for enhancing ecology education at all educational levels. While investment is high in developing such a web-based system, the ability to integrate graphical and text information allows for a much wider range of users than is possible with traditional field guides or manuals.

❖Our guide has served as a useful bridge between the university and the surrounding community by engaging ecological researchers, K-12 teachers and their students, and natural resource professionals.

❖Moreover, development of the guide has fostered cross-disciplinary collaborations, engaging modelers, artists, physical and biological scientists and educators.

❖Importantly, the guide allows teachers to easily determine the names and natural history of organisms in and around their schoolyard and gives them greater confidence in leading their students in outdoor ecological investigations.

A large library of digital photos allows documentation of life stages and local variation in species

Fritillaria pudica, Yellow bells

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