Oklahoma Biological Information System

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Oklahoma Biological Survey

Overview

The Oklahoma Biological Survey (OBS) is both a state agency and a research unit of the College of Arts and Sciences at the University of Oklahoma. OBS is tasked with gathering, analyzing, and disseminating information regarding animal and plant forms and ecological communities within the state and associated geographical areas. Additionally, OBS provides information pertaining to Oklahoma's biota to citizens, organizations, businesses, and other agencies and assists in the protection and preservation of the natural heritage of Oklahoma. To these ends, OBS maintains a number of disparate databases pertaining to Oklahoma's biota and ecological communities. These databases offer different degrees of accessibility and functionally. OBS staff, in conjunction with staff from the University of Oklahoma Information Technology Department, is now working to integrate these disparate databases into a single, integrated data management system, tentatively called the Oklahoma Biological Information System (OBIS).

Current Status

The Oklahoma Biological Survey (OBS) and its associated programs maintain several databases pertaining to Oklahoma's biodiversity. These include, but are not limited to:

- Distribution of Oklahoma Amphibian and Reptiles by Recorded Sightings (DOKARRS), a database of recorded state sightings of amphibians and reptiles from the 1970s through the 1998.
- Oklahoma Vascular Plants Database (OVPD), a database of all Oklahoma plant specimens housed in state herbaria; provides the most current knowledge of Oklahoma plant distributions.
- Oklahoma Natural Heritage Inventory Database, observational records of Oklahoma's species of concern, including federal and stated listed and candidate species and state species of greatest conservation need.
- Oklahoma Bird Specimen Records (OBSR), observational records of Oklahoma's bird specimens housed at various museums in the state and around the world.
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- Biological Literature, several bibliographic databases related to Oklahoma aquatic, avifauna, herpetological, mammal, and plant literature.
- Upland Forests, 1953 field data of Elroy Rice and William Penfound's upland forest investigation.

Conservation Need

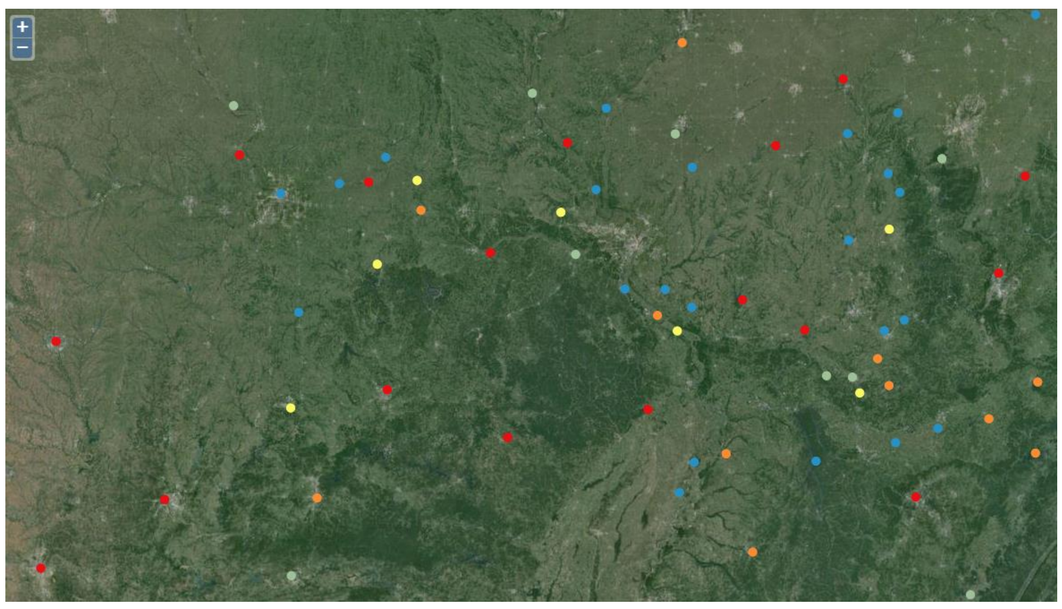
Detailed, spatially explicit information regarding plant and animal species and ecological communities is a vital component for the conservation of biodiversity and land management activities. Since the creation of these various databases, the need for a single, integrated application to access Oklahoma biodiversity information has grown. For instance, in November 2012, the U.S. Fish and Wildlife Service proposed to list the lesser prairie chicken (*Tympanuchus pallidicinctus*) threatened under the Endangered Species Act (USFWC 2012). Also in 2012, a population of haperella (*Harperlla nodosum*), a federally listed endangered species previously unknown from Oklahoma, was discovered in southeastern Oklahoma (Buthod and Hoagland 2013). Management of these and other species of concern, such as *Orconectes saxatilis* (Kiamichi crayfish), an endemic to the Kiamichi River and its tributaries; *Notropis girardi* (Arkansas River shiner), a federally listed threatened species; *Phrynosoma cornutum* (Texas horned lizard), a state species of special concern, and *Calopogon oklahomensis* (Oklahoma grasspink), will be greatly improved with a single, integrated, readily accessible data management system.

Photo credit: (A) Noppadol Paothong; (B) Amy Buthod; (C) Chris Likhaup; (D) Daniel Fenner, USFWS; (E). Unknown, courtesy of Oklahoma Natural Areas Registry; and (F) Amy Buthod..

Application Development

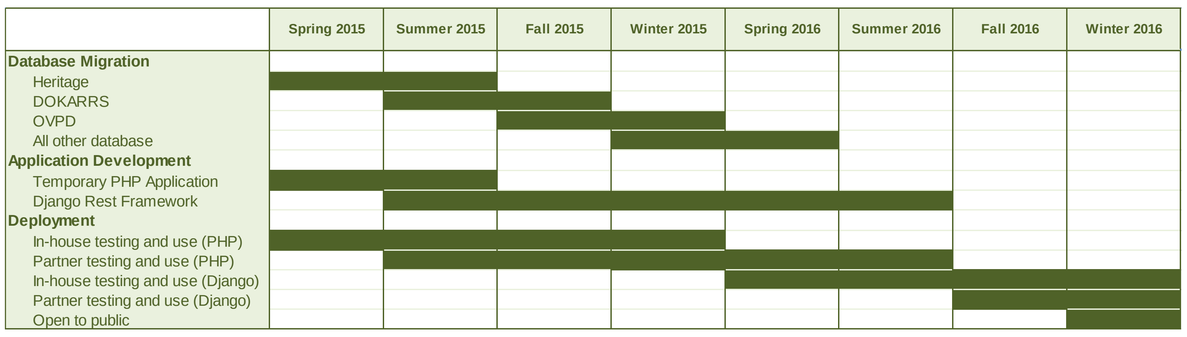
The disparate databases have historically resided in a variety of database management systems, such as Oracle, MySQL, and SQL Server. Currently, several of the databases are web accessible, though others are not. The goal is to eventually make all accessible through a single web interface. In order to accomplish this, OBS will migrate all databases to PostgreSQL, which OBS staff selected due to spatial database extender available through the PostGIS extension. OBS will utilize the Python-based Django Rest Framework toolkit to develop the web API for the databases. Additionally, OBS will utilize GeoServer and OpenLayers to manage, serve, and view the spatial data stored in the PostgreSQL databases. All toolkits used for the development of the web based application are free and open source.

GIS Component



Biological data is collected at a variety of scales often with different purposes in mind. Further confounding the issue is the spatial precision of the data, especially historical records collected before the advent of modern spatial technologies, such as GPS and remote sensing. As a result, locational information of observation data varies widely, from referenced counties and even broader geographic entities to high precision and accurate point (x,y) observations. The challenge for OBS is to represent these data with different locational precision in a meaningful and useful manner. Currently, steps are being taken to geocode historical observational data based on textual location information. Absence of such descriptors, OBS will use the finest available information to delineate the observational data. Ultimately, though, OBS' goal is to provide the best available information on the distributions of Oklahoma's biodiversity.

Project Timeline



OBS hopes to have the Oklahoma Biological Information System fully functional and available for use within two years. OBS staff have already begun the migration of Heritage database from Oracle to PostgreSQL and have developed a temporary PHP application for Survey staff and other stakeholders to access the information. Complete database migration should be complete within a year. Additionally, OBS and OU IT have begun preliminary development of the web API using the Django Restful Framework. Development should be complete by Summer 2016, which will be followed by a period of beta testing by Survey staff and other stakeholders. The full application should be publicly available by the end of next year.

References and Acknowledgements

Buthod, A.K. and B.W. Hoagland. 2013. Oklahoma Noteworthy Collections: *Harperella nodosum*. *Castanea.* 78: 213-215.

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