Biodiversity Information
Serving Our Nation

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Branch Chief for Eco-Science Synthesis
Core Science Systems Mission Area
United States Geological Survey
Core Science Analytics, Synthesis & Libraries

Everyone’s data online helping to save our environment

More than a million professional and citizen scientists have gathered the data that is in BISON
An open source framework to add spatial extent and geospatial visibility to Big Data
DOI: 10.1109/BigData.2014.7004495
Core Science Analytics, Synthesis & Libraries

(BISON.USGS.GOV)

- National Clearinghouse for occurrence data
- US Node of GBIF
- Biodiversity Hub of EcoINFORMA
- 261+ million records & growing
- Nearly all species
- Taxonomic standardization
- Every state and county
- 55 environmental layers
- Who, what, when, where for every record (at a minimum)
- 1568 data sets from 380 global providers across Federal, State, and local Gov’ts, NGOs and Academia

“I have been spending a lot of weekends using BISON and the data have been extremely helpful in my analyses. I am very grateful to have this resource - thank you for all you’ve done to make this what it is.”
September 14, 2016. Laura T. Bortolin, Harvard Medical School, Dept. of Genetics, Boston, MA

“...I am very impressed with BISON and am happy the USGS is making biodiversity data available as it is desperately needed. Keep up the good work!”

“...thanks a million for this application. It is really adding to the number of records I have been able to acquire for numerous amphibian and reptile species.”
April 29, 2013. Bill Sutton, Ph.D., Postdoctoral Research Associate, Clemson University, School of Agricultural, Forest and Environmental Sciences.

“...we’re really excited at its performance in producing and mapping extremely large search-result sets (I generated one with 1.8 million hits in a matter of seconds).”
April 22, 2013. Scott L. Cross, Ph.D., NOAA National Oceanographic Data Center/National Coastal Data Development Center, Charleston, SC.
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Custom Maps & Checklists

For Any Area Including User Polygons

[Image of a custom map interface with a table showing search results for scientific names and their counts.]

USGS
Documentation with a Click & Download
Connections

100’s Global Providers

- Natureserve
- Smithsonian
- eBird
- VertNet
- iNaturalist
- US Federal Data
- Non-Gov Data in BISON analyses (e.g. VegBank)
- USDA PLANTS

GBIF

USDA PLANTS

BISON

Connections
Datasets from other Federal agencies:
BLM - Landscape Monitoring Framework - Plants - 2011-2013 (44,626)
BLM - National Invasive Species Information Management System - Plants - 2010-2014 (62,317)
EPA - National Lakes Assessment - Zooplankton - 2007 (17,539)
NPS - Inventory and Monitoring Program - NPSpecies Park Species Lists (256,073)
USDA - PLANTS Database (2,390,439)
USFS - Forest Inventory and Analysis - Tree Species (18,170,706)
USFS - New York City Tree Census - 1995 (516989)
USFWS - Big Rivers Network Native Bee Survey Project (FWS No. F11AC00869) - 2013 (6,071)
USFWS - Mourning Dove Call-Count Survey - 2001-2013 (9,270)
USFWS - Ruby Lake NWR - Vegetation Mapping Survey - 2012-2013 (577)

Numerous sets from USGS Science Centers: Alaska, FORT, Leetown, NWHC, PIERC, PWRC, SESC & WERC.
Highlighting PWRC...
USGS PWRC - Bird Banding Lab - (61,605,303)
USGS PWRC - Bird Phenology Program (585,541)
USGS PWRC - Colonial Waterbirds - US (109,596)
USGS PWRC - Native Bee Inventory and Monitoring Lab - US-CA-MX - Bees (260,950)
USGS PWRC - North American Breeding Bird Atlas Explorer (2,726,852)

Other USGS Programs including:
USGS GAP - Alaska - Vertebrates - 1867-2009 (1,193,488)
USGS NAWQA - BioData - USA (1,154,963)

Non-Federal datasets of importance to the BISON mission:
International Biological Information System - US - Nonnative Species (299,222)
Multistate Aquatic Resources Information System - MARIS - Fish (961,352)
VegBank - Carolina Vegetation Survey (438,861)
VegBank - Vegetation Plot Database (1,029,948)
## Individual Statistics

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Data Hubs</th>
<th>Records Count</th>
<th>Counts</th>
<th>Data Hubs</th>
<th>Records Count</th>
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This application will look at all scientific names in the data set of a specific provider and compare them to the ITIS accepted names for those organisms in BISON. Conflicts will be listed. You will need to enter the three digit BISON Provider ID number which is listed in brackets after the provider name HERE.

Enter a BISON Provider ID: 362  Submit Query

24 Conflicts Found

Provider 362 = Bosmina coregoni vs ITIS = Eubosmina coregoni
Provider 362 = Chinemys reevesii vs ITIS = Mauremys reevesii
Provider 362 = Cichlasoma nigrofasciatum vs ITIS = Archocentrus nigrofasciatus
Provider 362 = Cichlasoma spilurum vs ITIS = Archocentrus spilurus
Provider 362 = Cichlasoma urophthalmus vs ITIS = Cichlasoma urophthalma
Provider 362 = Gambusia holbrooki vs ITIS = Gambusia affinis
Provider 362 = Gasterosteus aculeatus williamsoni vs ITIS = Gasterosteus aculeatus
Provider 362 = Gila bicolor vs ITIS = Siphasieles bicolor
Provider 362 = Gila bicolor mohavensis vs ITIS = Siphasieles bicolor mohavensis
Provider 362 = Gila bicolor obesa vs ITIS = Siphasieles bicolor obesus
Provider 362 = Gila bicolor snyderi vs ITIS = Siphasieles bicolor snyderi
Provider 362 = Hypsopsetta guttulata vs ITIS = Pleuronichthys guttulatus
Provider 362 = Lampetra appendix vs ITIS = Lethenteron appendix
Provider 362 = Myleus rubripinnis vs ITIS = Myloplus rubripinnis
Provider 362 = Notropis dorsalis vs ITIS = Hybopsis dorsalis
Provider 362 = Oncorhynchus gilae apache vs ITIS = Oncorhynchus apache
Provider 362 = Oncorhynchus mykiss aguabonita vs ITIS = Oncorhynchus aguabonita
Provider 362 = Phoxinus neogaeus vs ITIS = Chrosomus neogaeus
Provider 362 = Phoxinus oreas vs ITIS = Chrosomus oreas
Rhus flagellaris Wild.
Taxonomic Serial No.: 24621

98% of records in BISON are covered by ITIS
RESEARCH ARTICLE

The Importance of Species Name Synonyms in Literature Searches

Gerald F. Guala

All citations found with current name
Citations missing with current name

Animalia
- 61.7%
- 38.3%

Archaea
- 2%
- 98%

Bacteria
- 12.3%
- 87.7%

Chromista
- 58.5%
- 41.5%

Fungi
- 58.7%
- 41.3%

Plantae
- 59.4%
- 40.6%

Protozoa
- 52%
- 48%
http://www.itis.gov/solr_examples.html
EcoINFORMA

Ecoinformatics-based Open Resources and Machine Accessibility (EcoINFORMA)
GeoPlatform Web Map Viewer

View maps and overlays of spatial data from the EcoINFORMA resource hubs (BISON, EnviroAtlas, and MRLC) and other national environmental data assets related to ecosystems, their living (biotic) and non-living (abiotic) components, and factors that impact ecosystems and biodiversity.

The GeoPlatform Web Map Viewer allows users to discover a wide range of spatial layers, create map overlays using remote map services and the user’s own content, and share maps openly for use by other applications and websites. Visit the GeoPlatform to access additional geospatial data, services and applications.
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Data Hubs

EcoINFORMA’s Resource Hubs are data hubs that serve as primary entry points for access and visualization of data around common ecosystem-related themes and their corresponding communities of practice. Established resource hubs of EcoINFORMA can be accessed below.

Biodiversity Resource Hub

Biodiversity Information Serving Our Nation (BISON) is a web-based information system allowing users to find, explore, and download biological occurrence data for species (e.g., plants, animals, fungi) that occur at a particular location and time in the United States (U.S.) and Territories. BISON, a product of the U.S. Geological Survey (USGS), offers over 168 million species occurrence records from a large collection of datasets provided by participating institutions.

Learn More

Ecotourism Services Resource Hub

EnviroAtlas

EnviroAtlas is a web-based decision-support tool consisting of maps, graphs, analysis tools, and interpretive information about ecosystem services and their role in maintaining sustainable and healthy communities of the contiguous United States (lower 48 states). EnviroAtlas is a collaborative project developed by the U.S. Environmental Protection Agency (EPA) in cooperation with the U.S. Geological Survey (USGS), the Natural Resources Conservation Service (NRCS), the U.S. Forest Service, and LandScope America.

Learn More

Land Cover Dynamics Resource Hub

Multi-Resolution Land Characteristics Consortium (MRLC)

The Multi-Resolution Land Characteristics Consortium (MRLC) provides land cover and land cover dynamics information at the national scale for a wide variety of environmental, land management, and modeling applications. MRLC is composed of a group of federal agencies that coordinate and generate nationally complete, current and consistent land cover information products.

Learn More
Many ways to use BISON’s extensive services

Output Formats
(Direct Solr & API)
JSON, JSONP, XML, SHP, CSV
+ WMS services
Core Science Analytics, Synthesis & Libraries

More ways to use BISON’s extensive services
Patuxent Wildlife Research Center Bird Banding Lab Data Viewer. Major cost savings, and speed: powered by BISON
Walk through the woods with cyber-enabled vision and see exactly where species are in a heads up display – as well as on a map on your handset...
GIS Plugin for advanced species and guild modeling
Improving Project Review with Species Distribution Models

Previously, a project anywhere in these four counties would have triggered FWS consultation.

Now both agencies are beginning to use the same screening tools to trigger consultation. Inductive Species Distribution Models (SDM) are developed based on GIS and statistical analysis of the unique relationships between species locations and various habitat characteristics. Map outputs are used in USFWS and VA Natural Heritage online environmental review tools: IPaC (Information Planning and Conservation System) and NHDE (Natural Heritage Data Explorer).

These objective methods and clear model outputs (for R. michauxii, in pink) enable better-informed survey requests, and expedited consultation for government and for clients. Virginia Natural Heritage is currently building a library of SDMs for all T&E species in Virginia.
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Climate Sensitive Geoservices and Checklists in BISON

Pilot: 34,500 species modelled for their current and future distribution under climate change
Subtropical Invasive Mustards Expanding into the Southeast
Potential effects of climate change on a species at the click of a button...

*Taenionema atlanticum (Winter Stonefly)* as its habitat suitability shifts using the A2 scenario for three future timesteps. The A2 storyline and scenario family: a very heterogeneous world with continuously increasing global population and regionally oriented economic growth that is more fragmented and slower than in other storylines. Layers are CURRENT & A2 scenario, 2039, 2069, and 2099.
Distribution of Barn Swallow (*Hirundo rustica*)

Probability by ordinal day of the year for the 1920’s
Probability of seeing a Barn Swallow (*Hirundo rustica*) on April 30th for every year from 1917-1949
TIME
for
QUESTIONS
( Thank you )