



Bugs and BISON:
130+ Million Mapped Species Records Now
Includes ITIS-Enabled Search
*BISON: A national unified resource for discovery,
linkage and reuse of species occurrence data.*

<http://bison.usgs.ornl.gov>

Annie Simpson

**U.S. Geological Survey; Core Science Analytics, Synthesis, & Libraries (CSASL) Program
Core Science Systems (CSS) Mission Area**

16-June-2014

The BISON system *(a review)*

- **Developed by the U.S. Geological Survey**
 - **Core Science Analytics, Synthesis, & Libraries (CSASL) Program**
- **A species occurrence data aggregator providing 137+M species occurrence records for the U.S. and Territories including:**
 - Almost every US species (animals, plants, fungi)
 - Various data types: observation-based, natural history collections (specimen-based), and literature-based
 - Federal and non-federal data

BISON Goals

**Increase Data Access, Exposure,
Discoverability, and Quality**

**Data Mobilization through integration
and application of standards, open data
technologies, machine readable access**

Data Layers

USGS
science for a changing world

USGS Home
Contact USGS
Search USGS

Biodiversity Information Serving Our Nation (BISON)

Home Search About Data Providers Help

species name (common / scientific) Search Reset

by scientific name by common name

Found 220 matches for *Acer spicatum* of type specimen
143 georeferenced

Refine Your Search Map List

Climate and Weather

- Annual Mean Daily Average Temperature
- Annual Mean Daily Average Temperature - Hawaii
- January Annual Mean Daily Average Temperature
- July Annual Mean Daily Average Temperature

Legend:

- A < 40.1
- B 40.1 - 45.0
- C 45.1 - 50.0
- D 50.1 - 55.0
- E 55.1 - 60.0
- F 60.1 - 65.0
- G 65.1 - 70.0
- H 70.1 - 75.0
- I > 75.0

Search time: 3.53 seconds

Accessibility FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey
URL: <http://bison.usgs.ornl.gov/>
Page Contact Information: [Ask USGS](#)
Page Last Modified: Wednesday, July 3, 2013

USA.gov TAKE PRIDE IN AMERICA

LAYERS

- Basemap Layers
- BISON Layers
- Climate and Weather
- Agriculture & Soils
- Ecosystems and Regions
- National Atlas & Demographic HUCs, Catchments, Land cover
- Protected Areas
- Other

Combine specimen and observation data with other data layers to detect relationships and patterns.

What's new in BISON?

- Search is now more than “exact match” of a name, so taxon groups can be searched, including synonyms
- Uses powerful name resolution ability of the Integrated Taxonomic Information System

Search example – *Halyomorpha halys*

Only 13 matches currently

Record Details generated with ITIS taxonomy.

Resource: KNWR Entomology Collection
Basis of Record: specimen
Scientific Name: *Halyomorpha halys*
Common Names: brown marmorated stink bug
State: Alaska
County: Kenai Peninsula Borough
Provider: Arctos
Collector: unknown
Latitude: 60.31663
Longitude: -151.26102
Precision: N/A
Year: 2012
Occurrence Date: 2012-11-25

For more information, or to make comments on this occurrence, please contact the provider.



Data Fields

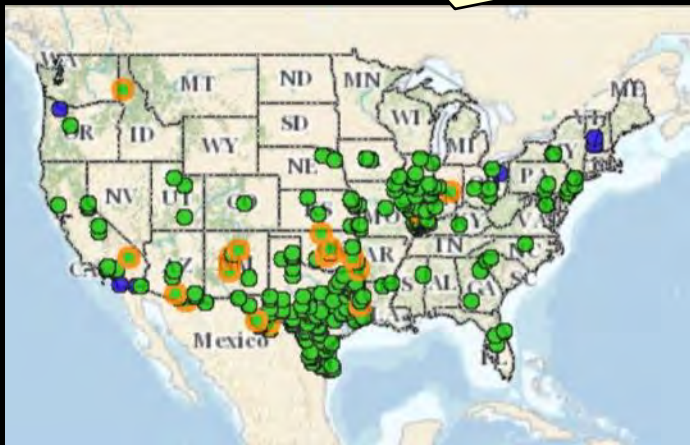
- Darwin Core standard fields desirable
- Minimum fields necessary for new datasets to be successfully added into BISON

	Field
Who -	provider - resource
What -	scientific_name
Where -	decimal_latitude / decimal_longitude (or a place name e.g. state, county...)
When -	occurrence_date

Additional data fields are welcome/encouraged

Search example – Halyinae, Pentatominae

Halyini = 701 records



Pentatominae = 12,342 records



ITIS search for BMSB hosts in BISON



Prunus persica
common cherry (2,524)



Prunus spp.
stone fruit (34,642)



Ailanthus altissima
tree of heaven (2,443)



Ailanthus spp.
(2,847)

What else is new in BISON?

- 40+ data fields now supported, including several verbatim from provider
- Support for voucher images, video, audio files (later this summer)

BISON fields (43)

BISON FIELD NAME	BISON FIELD NAME
valid_accepted_scientific_name	calculated_county_name
valid_accepted_tsn	calculated_fips
itis_common_name	calculated_state_name
basis_of_record	centroid
occurrence_date	provided_county_name
year	provided_fips
provider	provided_state_name
provider_url	thumb_url
resource	associated_media
resource_url	associated_references
occurrence_url	general_comments
catalog_number	id
collector	provider_id
collector_number	resource_id
clean_provided_scientific_name	provided_common_name
itis_tsn	provided_kingdom
provided_scientific_name	calculated_tsn
provided_tsn	geodetic_datum
latitude	coordinate_precision
longitude	coordinate_uncertainty
verbatim_elevation	verbatim_locality
verbatim_depth	iso_country_code

Darwin Core Fields (148)

occurrenceID	associatedSequences	locationAccordingTo	identificationID
type	associatedTaxa	locationRemarks	identifiedBy
modified	eventID	verbatimCoordinates	dateIdentified
language	samplingProtocol	verbatimLatitude	identificationReferences
rights	samplingEffort	verbatimLongitude	identificationRemarks
rightsHolder	eventDate	verbatimCoordinateSystem	identificationQualifier
accessRights	eventTime	verbatimSRS	typeStatus
bibliographicCitation	startDayOfYear	decimalLatitude	taxonID
institutionID	endDayOfYear	decimalLongitude	scientificNameID
collectionID	year	geodeticDatum	acceptedNameUsageID
datasetID	month	coordinateUncertaintyInMeters	parentNameUsageID
institutionCode	day	coordinatePrecision	originalNameUsageID
collectionCode	verbatimEventDate	pointRadiusSpatialFit	nameAccordingToID
datasetName	habitat	footprintWKT	namePublishedInID
ownerInstitutionCode	fieldNumber	footprintSRS	taxonConceptID
basisOfRecord	fieldNotes	footprintSpatialFit	scientificName
informationWithheld	eventRemarks	georeferencedBy	acceptedNameUsage
dataGeneralizations	locationID	georeferenceProtocol	parentNameUsage
dynamicProperties	higherGeographyID	georeferenceSources	originalNameUsage
catalogNumber	higherGeography	georeferenceVerificationStatus	nameAccordingTo
occurrenceDetails	continent	georeferenceRemarks	namePublishedIn
occurrenceRemarks	waterBody	geologicalContextID	higherClassification
recordNumber	islandGroup	earliestEonOrLowestEonothem	kingdom
recordedBy	island	latestEonOrHighestEonothem	phylum
individualID	country	earliestEraOrLowestErathem	class
individualCount	countryCode	latestEraOrHighestErathem	order
sex	stateProvince	earliestPeriodOrLowestSystem	family
lifeStage	county	latestPeriodOrHighestSystem	genus
reproductiveCondition	municipality	earliestEpochOrLowestSeries	subgenus
behavior	locality	latestEpochOrHighestSeries	specificEpithet
establishmentMeans	verbatimLocality	earliestAgeOrLowestStage	infraspecificEpithet
occurrenceStatus	verbatimElevation	latestAgeOrHighestStage	taxonRank
preparations	minimumElevationInMeters	lowestBiostratigraphicZone	verbatimTaxonRank
disposition	maximumElevationInMeters	highestBiostratigraphicZone	scientificNameAuthorship
otherCatalogNumbers	verbatimDepth	lithostratigraphicTerms	vernacularName
previousIdentifications	minimumDepthInMeters	group	nomenclaturalCode
associatedMedia	maximumDepthInMeters	formation	taxonomicStatus
associatedReferences	minimumDistanceAboveSurfaceInMeters	member	nomenclaturalStatus
associatedOccurrences	maximumDistanceAboveSurfaceInMeters	bed	taxonRemarks

BISON Associated Media

Resource: NYSM Mammals (ZM)
Basis of Record: specimen
Scientific Name: *Canis latrans*
Common Names: Coyote, Coyote, coyote
State: Ohio
County: Putnam County
Provider: New York State Museum (NYSM)
Collector: Ohio Department of Natural Resources
Latitude: 41.08067
Longitude: -83.8854
Precision: N/A
Year: 2005
Occurrence Date: Occurrence Date Unknown

Associated Media:



Filename.jpg



Filename.mp3



Filename.mov

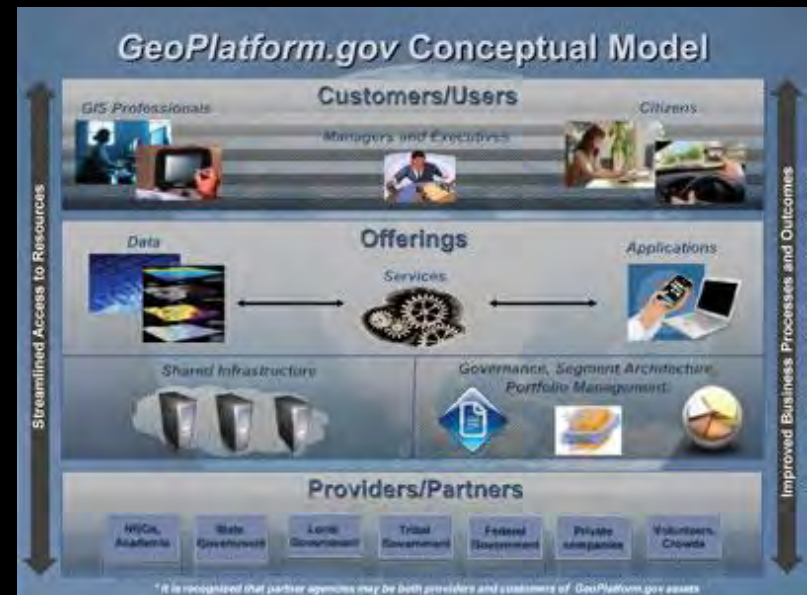
Associated References:

- http://en.wikipedia.org/wiki/Canis_latrans
- http://wamu.org/news/11/03/03/coyotes_are_here_to_stay_in_dc_region.php

USGS GeoPlatform

- A National and Federal focal point where governmental, non-governmental, private, and public data and applications can be visualized together to inform and address national and regional issues

GeoPlatform.gov
Conceptual Model



BISON Data Workflow Products

- **Final Package** – original dataset + BISON (enhanced) dataset + metadata record (linked and archived) + ReadMe file (record of BISON data modifications)
- **Standardized data** – Darwin Core format, Scientific Name mapping to ITIS, FIPS Code location references
- **Data updates** – ongoing for *living* datasets
- **Data Quality** – improvement reports/recommendations sent to Data Provider
- **Web and Web Services access** – inc. mapping and visualization, and integration with other data layers
- **Multi-format data download** – .csv, .kml, .zip
- **Machine access** – via API

BISON & BMSB-NEIPM

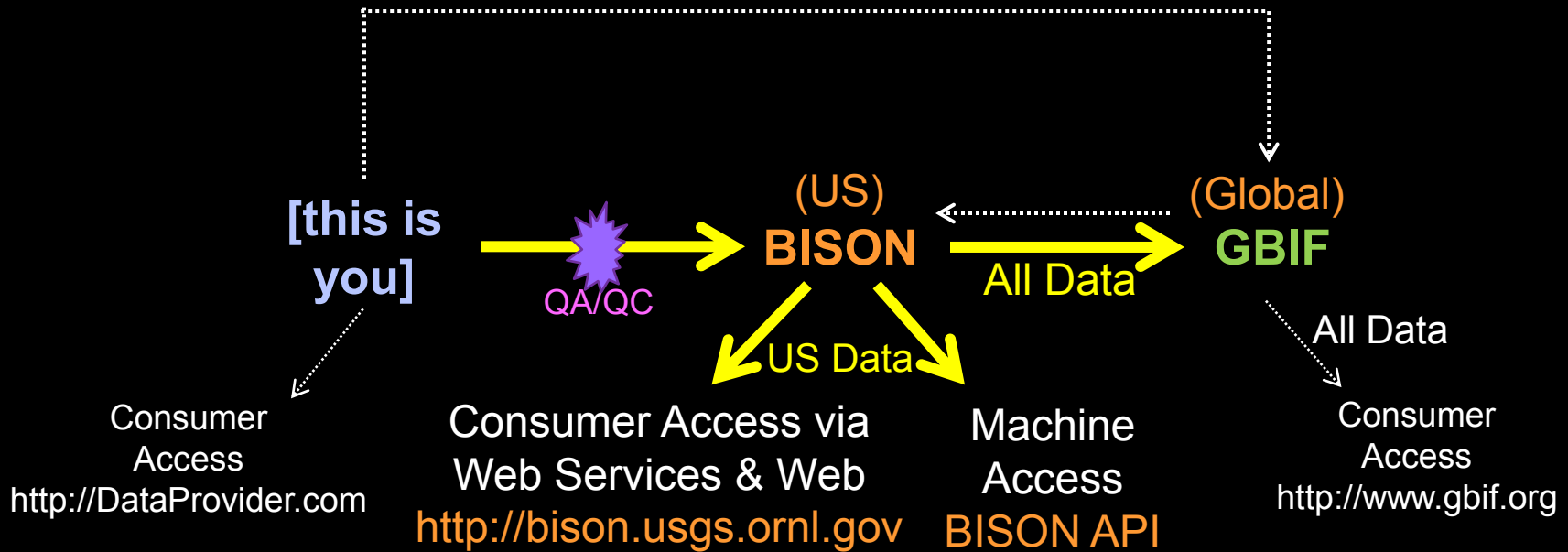
How can BISON help members of the BMSB-NEIPM working group?

1. “Submit-a-dataset”
2. Smarter search including synonyms and children; search for host species and species groups
3. Post BISON API search results on your Web pages as canned search results

<http://bisonapi.usgs.ornl.gov/index.html>

4. Use BISON data or visualizations in your publications

1. Submit a dataset to BISON



Future Attractions

- **Link to images of specimens and other media**
- **User interface redesign**
(first phase coming this summer)
- **Addition of non-native status tags to species**
- **Automated species lists by protected area**
(e.g. refuge or park)

Data Retrieval and Download



USGS Home
Contact USGS
Search USGS

Biodiversity Information Serving Our Nation (BISON)

Home Search About Data Providers Help

species name (common / scientific) Search Reset

by scientific name by common name

Found **781** matches for *Bison bison*
366 georeferenced

Refine Your Search Map List

Occurrence Layer

- Observation
- Fossil
- Specimen
- Literature
- Unknown
- Living

Geo Precision:

- Known Center

500 mi

Search time: 3.519 seconds

Accessibility FOIA

U.S. Department of the Interior
URL: <http://bison.usgs.gov>
Page Contact Information
Page Last Modified: Wed Aug 15 2007 15:54:00 GMT-0500 (CDT)

Record Details

Resource: iNaturalist research-grade observations
Basis of Record: observation
Scientific Name: *Bison bison*
American bison, Amerika bizonu, Amerika bizonu, Amerikaanse bizon, Amerikako bizonte, Amerikanesche Bison, Amerikanische Bison, Amerikanischer Bison, Amerikansk bison, Amerikas bizonas, Awya Yala Bisuntî, Bilisoni, Bison Amerika, Bison d'Amérique du Nord, Bisonoxe, Bisont american, Bisonte american, Bisonte americano, Bisonur, Bisôo americano, Bizon, Bizon Amerika, Bizonas, Hotoa'e, Valzcwx metjcouh, bison

Common Names:

State: Oklahoma
County: Comanche
Country_code: US
Provider: iNaturalist.org
Provider URL: <http://www.inaturalist.org>
Collector: Greg Lasley
Latitude: 34.7365
Longitude: -98.704
Precision: N/A
Year: 2007
Occurrence Date: 2007-04-09

For more information, or to make comments on this occurrence, please contact the provider.

Location Records: 10
[Download All](#)

- Bison bison***
Basis Type: Observation
Occurrence Date: 2007-04-09
Provider: iNaturalist.org
Resource: iNaturalist research-grade observations
[Show Details](#) | [Download](#)
- Bison bison***
Basis Type: Observation

Downloading Options
781 *Bison bison* occurrences

File Type:

- Comma Separated Values (.CSV file)
- Google Earth KML file (.KML file)
- Zipped Shapefile bundle (.ZIP file)

OK Cancel

Biodiversity Information Serving Our Nation (BISON):

<http://bison.usgs.ornl.gov>

For questions, additional information:

bison@usgs.gov

BISON Team (...@usgs.gov)

- Gerald (Stinger) Guala
[Director] - gguala
- Elizabeth Martin – elizabeth_martin
- Derek Masaki - dmasaki
- Elizabeth Sellers – esellers
- Annie Simpson - asimpson