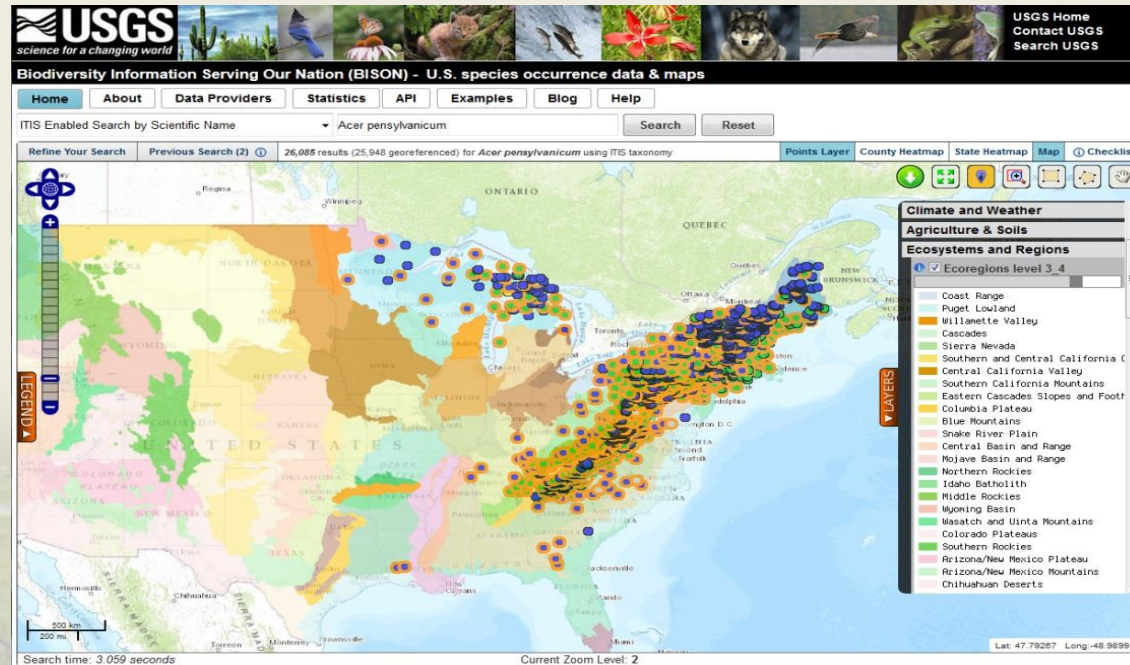


# BISON (Biodiversity Information Serving Our Nation)



## Tracking the invaders

Gerald “Stinger” Guala, Ph.D.  
Branch Chief: Eco-Science Synthesis  
USGS

- US National Clearinghouse for biological occurrence data
- 381+ million records & growing
  - 15M are non-natives
  - 100M available nowhere else
- US Node Application of GBIF
- Nearly all species in US
  - Including 10K non-natives
- Taxonomic standardization
- Every state and county
- Who, what, when, where for every record (at a minimum)
- Saves repeated re-investment in data integration.

***“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!”***

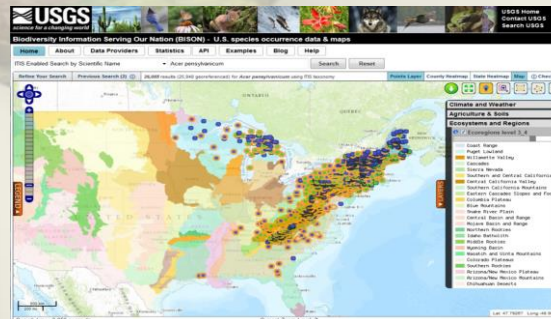
December 14, 2015. Robert Irwin, Resource Conservationist, Sacramento River Forum, Red Bluff, CA.

***“...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.

***“...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.”***

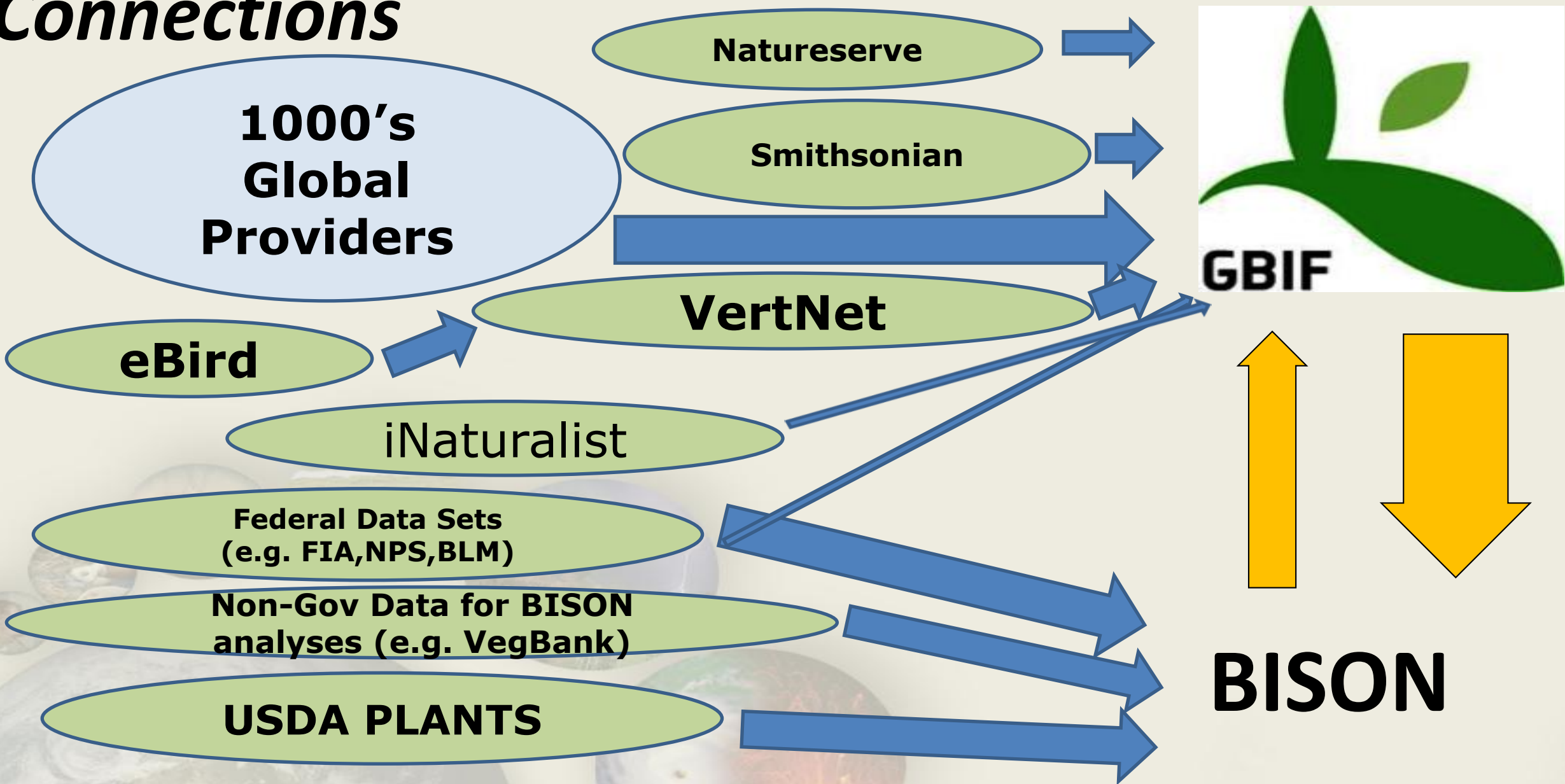
April 29, 2013. Bill Sutton, Ph.D., Postdoctoral Research Associate, Clemson University, School of Agricultural, Forest and Environmental Sciences.



# What BISON Does

- **Provides a fully integrated and comprehensive clearinghouse for US species occurrence data** with extensive web services to power other websites, scientific analyses and applications.
- **Delivers Federal data sets, increasing usage, visibility and consistency,** including millions of records not suitable for GBIF.
- **Identifies and mobilizes targeted data sets (Federal and Non-Federal) to produce comprehensive coverages.** Emphasis groups: Invasives, Birds & Pollinators
- **Provides US relevant taxonomic and geospatial binning (e.g. ITIS, Counties, States).** Automatic customized checklists for any State, County or custom polygon.
- **Offers community engagement, training and support.** Integrates internationally with GBIF and trains others in proper delivery and use of biological occurrence data.

# Connections

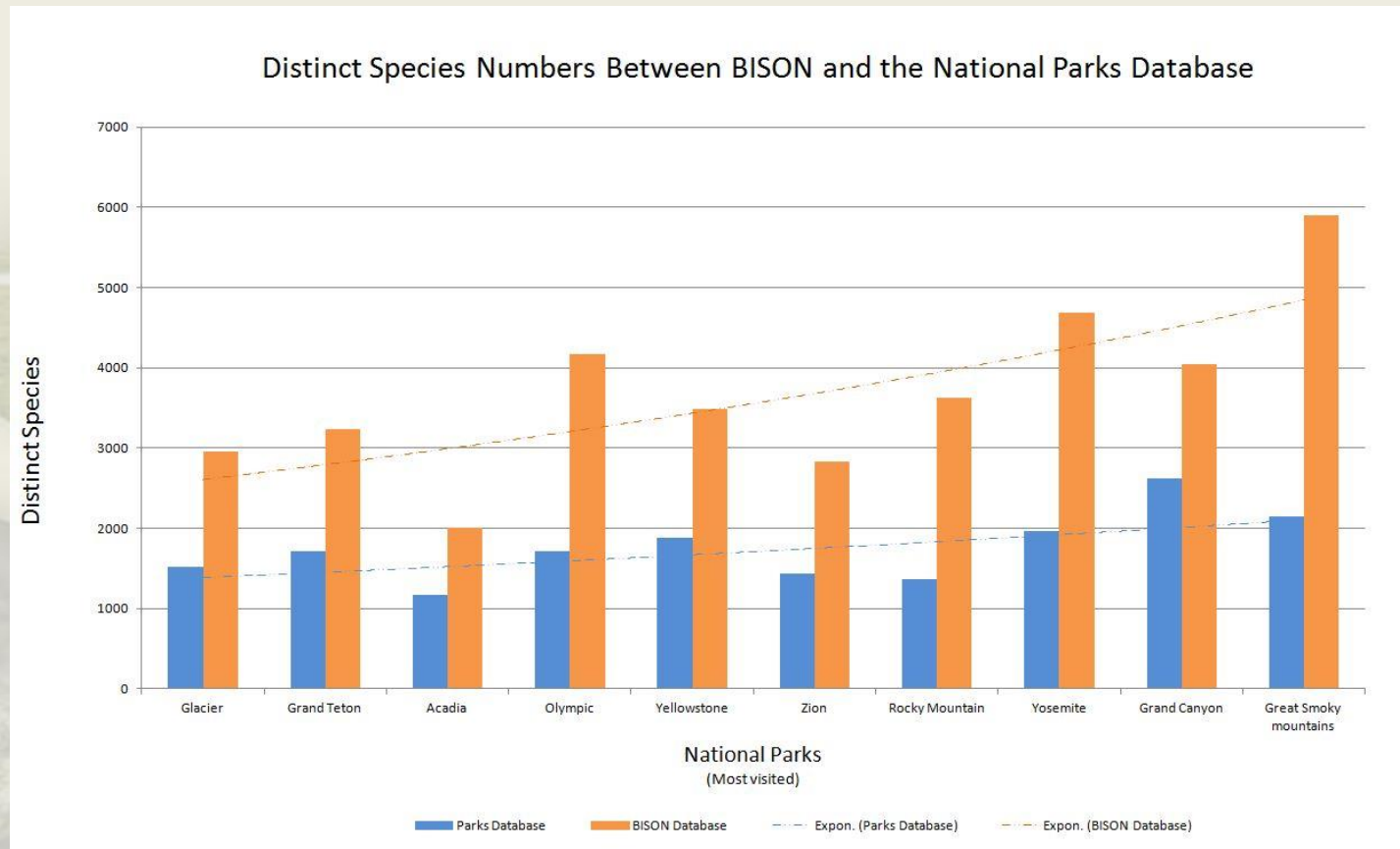


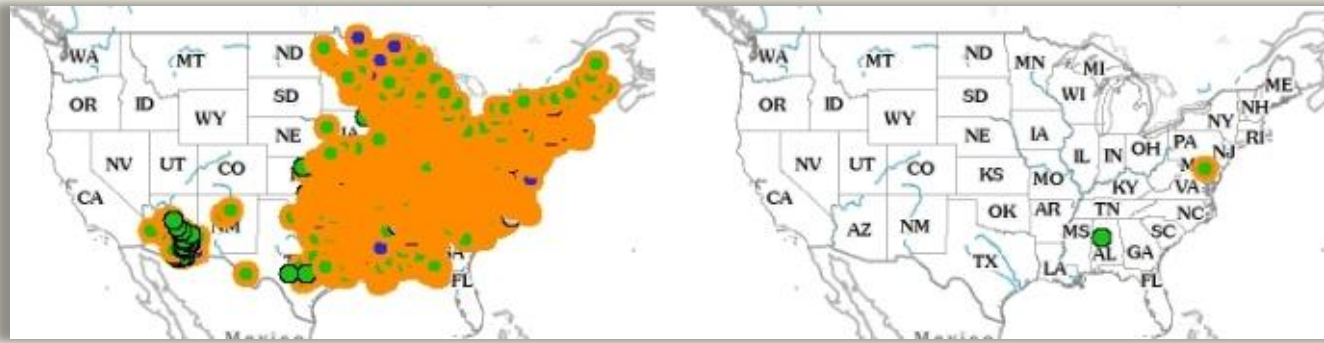
*More than a million different people have collected the data points now in BISON*

# Power in Data from Multiple Sources

## Species coverage in checklists of National Parks NPSpecies vs. BISON

Theo Burton,  
USGS Patuxent  
Wildlife  
Research Center  
Student project





[Go to Print Version](#)

***Rubus flagellaris* Willd.**  
Taxonomic Serial No.: 24921

[Download data](#) ([Download Help](#)) *Rubus flagellaris* TSN 24921

### Taxonomy and Nomenclature

Kingdom:	Plantae
Taxonomic Rank:	Species
Synonym(s):	<a href="#">Rubus scambens</a> L.H. Bailey <a href="#">Rubus aboriginum</a> Rydb. <a href="#">Rubus apogaeus</a> L.H. Bailey <a href="#">Rubus aptatus</a> L.H. Bailey <a href="#">Rubus arenicolus</a> Blanch. <a href="#">Rubus arizonensis</a> Focke <a href="#">Rubus arundelanus</a> Blanch. <a href="#">Rubus ashei</a> L.H. Bailey <a href="#">Rubus baileyanus</a> Britton <a href="#">Rubus cacaponensis</a> H.A. Davis & T. Davis <a href="#">Rubus celer</a> L.H. Bailey <a href="#">Rubus centralis</a> L.H. Bailey <a href="#">Rubus clarus</a> L.H. Bailey <a href="#">Rubus curtipes</a> L.H. Bailey <a href="#">Rubus deamii</a> L.H. Bailey <a href="#">Rubus decor</a> L.H. Bailey <a href="#">Rubus depavitus</a> L.H. Bailey <a href="#">Rubus enslenii</a> Tratt. <a href="#">Rubus exsularis</a> L.H. Bailey <a href="#">Rubus fecundus</a> L.H. Bailey <a href="#">Rubus felix</a> L.H. Bailey <a href="#">Rubus grimesii</a> L.H. Bailey <a href="#">Rubus hancinianus</a> L.H. Bailey <a href="#">Rubus ininunctus</a> L.H. Bailey <a href="#">Rubus invisus</a> (L.H. Bailey) Britton <a href="#">Rubus ithacanus</a> L.H. Bailey <a href="#">Rubus kentuckiensis</a> L.H. Bailey <a href="#">Rubus leviculus</a> L.H. Bailey <a href="#">Rubus meracus</a> L.H. Bailey <a href="#">Rubus michiganensis</a> (Card ex L.H. Bailey) L.H. B. <a href="#">Rubus multiflorus</a> L.H. Bailey <a href="#">Rubus mundus</a> L.H. Bailey

[Rubus mundus](#) L.H. Bailey  
[Rubus nefrens](#) L.H. Bailey  
[Rubus obsessus](#) L.H. Bailey  
[Rubus particeps](#) L.H. Bailey  
[Rubus plicatifolius](#) Blanch.  
[Rubus profusiflorus](#) L.H. Bailey  
[Rubus pronus](#) L.H. Bailey  
[Rubus roribaccus](#) (L.H. Bailey) Rydb.  
[Rubus russeus](#) L.H. Bailey  
[Rubus sailorii](#) L.H. Bailey  
[Rubus schoolcraftianus](#) L.H. Bailey  
[Rubus steelei](#) L.H. Bailey  
[Rubus temerarius](#) L.H. Bailey  
[Rubus uvidus](#) L.H. Bailey  
[Rubus vixalacer](#) L.H. Bailey  
[Rubus whartoniae](#) L.H. Bailey  
[Rubus arenicola](#) Blanch.  
[Rubus iniens](#) L.H. Bailey  
[Rubus obvius](#) L.H. Bailey  
[Rubus pernagaesus](#) Fernald  
[Rubus plexus](#) Fernald  
[Rubus seawardianus](#) Fernald  
[Rubus alacer](#) L.H. Bailey  
[Rubus alius](#) L.H. Bailey  
[Rubus almus](#) (L.H. Bailey) L.H. Bailey  
[Rubus armatus](#) (Fernald) L.H. Bailey  
[Rubus austrinus](#) L.H. Bailey  
[Rubus bollianus](#) L.H. Bailey  
[Rubus bonus](#) L.H. Bailey  
[Rubus botruosus](#) L.H. Bailey  
[Rubus bretonis](#) L.H. Bailey  
[Rubus camurus](#) L.H. Bailey  
[Rubus canaanensis](#) H.A. Davis & T. Davis  
[Rubus cathartium](#) Fernald  
[Rubus census](#) L.H. Bailey  
[Rubus clandestinus](#) L.H. Bailey  
[Rubus coloniatus](#) L.H. Bailey  
[Rubus complex](#) L.H. Bailey  
[Rubus conabii](#) L.H. Bailey  
[Rubus connixus](#) L.H. Bailey  
[Rubus cordialis](#) L.H. Bailey  
[Rubus cordifrons](#) (L.H. Bailey) L.H. Bailey  
[Rubus currulis](#) L.H. Bailey  
[Rubus dives](#) L.H. Bailey  
[Rubus etlagellaris](#) L.H. Bailey

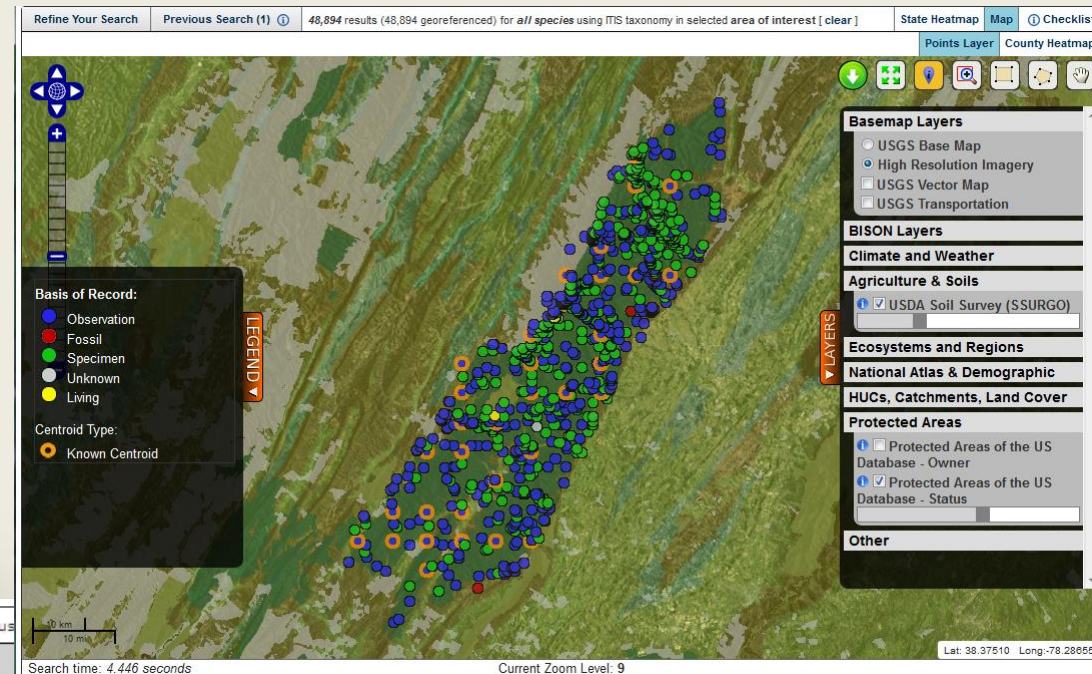
[Rubus etlagellaris](#) L.H. Bailey  
[Rubus exemptus](#) L.H. Bailey  
[Rubus exutus](#) L.H. Bailey  
[Rubus fandus](#) L.H. Bailey  
[Rubus florenceae](#) L.H. Bailey  
[Rubus foliaceus](#) L.H. Bailey  
[Rubus folioflorus](#) L.H. Bailey  
[Rubus frustratus](#) L.H. Bailey  
[Rubus fuscus](#) Weihe & Nees ex Bluff & Finge  
[Rubus geophilus](#) Blanch.  
[Rubus gordonii](#) L.H. Bailey ex Core  
[Rubus housei](#) L.H. Bailey  
[Rubus ignarus](#) L.H. Bailey  
[Rubus imperiorum](#) Fernald  
[Rubus indianensis](#) L.H. Bailey  
[Rubus inobvius](#) L.H. Bailey  
[Rubus jactus](#) L.H. Bailey  
[Rubus jaysmithii](#) L.H. Bailey  
[Rubus lassus](#) L.H. Bailey  
[Rubus longipes](#) Fernald  
[Rubus lundelliorum](#) L.H. Bailey  
[Rubus macdanielsii](#) L.H. Bailey  
[Rubus mainensis](#) L.H. Bailey  
[Rubus maltei](#) L.H. Bailey  
[Rubus masseyi](#) L.H. Bailey  
[Rubus minnesotanus](#) L.H. Bailey  
[Rubus neonefrens](#) L.H. Bailey  
[Rubus occidentalis](#) (L.H. Bailey) L.H. Bailey  
[Rubus occultus](#) L.H. Bailey  
[Rubus pauper](#) L.H. Bailey  
[Rubus peracer](#) L.H. Bailey  
[Rubus pityophilus](#) S.J. Sm.  
[Rubus pohlii](#) L.H. Bailey  
[Rubus polulus](#) L.H. Bailey  
[Rubus polybotrys](#) L.H. Bailey  
[Rubus prior](#) L.H. Bailey  
[Rubus problematicus](#) L.H. Bailey  
[Rubus redundans](#) L.H. Bailey  
[Rubus rhodinsulanus](#) L.H. Bailey  
[Rubus ricei](#) L.H. Bailey  
[Rubus rosagnetis](#) L.H. Bailey  
[Rubus sanfordii](#) L.H. Bailey  
[Rubus satis](#) L.H. Bailey  
[Rubus semierectus](#) Blanch.

[Rubus serenus](#) L.H. Bailey  
[Rubus subinnoxius](#) Fernald  
[Rubus subuniflorus](#) Rydb.  
[Rubus tantulus](#) L.H. Bailey  
[Rubus tenuicaulis](#) L.H. Bailey  
[Rubus terraltanus](#) L.H. Bailey  
[Rubus tetricus](#) L.H. Bailey  
[Rubus tracyi](#) L.H. Bailey  
[Rubus uncius](#) L.H. Bailey  
[Rubus uniflorifer](#) L.H. Bailey  
[Rubus urbanianus](#) L.H. Bailey  
[Rubus usus](#) L.H. Bailey  
[Rubus arundelanus var. jockylanus](#) (Blanch.)  
[Rubus flagellaris var. almus](#) L.H. Bailey  
[Rubus flagellaris var. humifusus](#) (Torr. & A. G.  
[Rubus flagellaris var. occidentalis](#) L.H. Bailey  
[Rubus jaysmithii var. angustior](#) L.H. Bailey  
[Rubus obsessus var. unilaris](#) L.H. Bailey  
[Rubus recurvicaulis var. armatus](#) Fernald  
[Rubus villosus](#) Aiton  
[Rubus procumbens](#) Muhl.  
[Rubus brevipedalis](#) L.H. Bailey  
[Rubus clairbrownii](#) L.H. Bailey

**98% of  
records in  
BISON  
are  
covered  
by ITIS**

# Custom Maps & Checklists

For Any  
Area  
Including  
User  
Polygons



Found 9,070,998 matches for all species us  
9,070,998 georeferenced

Search time: 4.446 seconds Current Zoom Level: 9

Kingdom	Count
Animalia	7974656
Chromista	10808
Fungi	2651
Plantae	454729
ITIS Scientific Name	Count
Abies balsamea	12807
Abies balsamea balsamea	28
Abies homolepis	2
Abies magnifica	1
Abies procera	1
Abietinella abietina	5
Abutilon theophrasti	39
Acacia baileyana	1
Acacia cultriformis	1
Acacia ligulata	1

# Documentation with a Click & Download

**USGS** science for a changing world

**Biodiversity Information Serving Our Nation (BISON) - Explore & download U.S. species occurrence data & maps**

Home About Data Providers Statistics API Examples Blog Help

ITIS Enabled Search by Scientific Name  Search Reset

Found 9,883 matches for *Ailanthus altissima* using ITIS taxonomy from the specified provider(s)

9,883 ge...

Record Details generated with ITIS taxonomy.

**Summary Details**

Processed Scientific Name: *Ailanthus altissima*

ITIS Common Name: copal tree; tree of heaven; tree-of-heaven

ITIS TSN: 28827

Basis of Record: specimen

Occurrence Date: 7-16-2011

Provider: BISON

Resource: [Towson University - MidAtlantic - Ailanthus altissima - 2011](#)

**Taxonomic/Occurrence Details**

Collector: Matthew S. Hansen and Roland P. Roberts

Collector Number: MSH405

Valid/Accepted Scientific Name: *Ailanthus altissima*

Valid/Accepted ITIS TSN: 28827

As Provided Scientific Name: *Ailanthus altissima* (Mill.) Swingle


**Spatial Details**

Latitude/Longitude: 37.12985/-78.51189

Calculated County or Equivalent/State: Prince Edward County/Virginia

Calculated FIPS: 51147

**Associated Media:**



twsnalth\_hansen\_and\_roberts\_2011\_417.jpg

**General Comments:** GPS Unit: GPSmap76CSx; Individuals sampled: 688; Photo vouchers taken: 683; collector\_number = Unique DNA sample identifier

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

**Downloading Options**

1 *Ailanthus altissima* occurrences

File Type:

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

OK Cancel

**Location Records: 17**

**Download All**

1. *Ailanthus altissima*

Processed Scientific Name: *Ailanthus altissima*

ITIS Common Name: copal tree; tree of heaven; tree-of-heaven

ITIS TSN: 28827

Basis of Record: Specimen

Occurrence Date: 7-16-2011

Provider: BISON

Resource: Towson Ailanthus

Show Details | Download

Basemap Layers

BISON Layers

- State Heatmap
- County Heatmap
- Points Layer

Climate and Weather

Agriculture & Soils

Ecosystems and Regions

National Atlas & Demographic

CS, Catchments, Land Cover

Protected Areas

- Protected Areas of the US database - Owner
- Protected Areas of the US database - Status

Search time: 3.338 seconds

Current Zoom Level: 6

Lat: 38.54078 Long: -74.59815



# Advanced Search and Environmental Layers

The screenshot displays the USGS Biodiversity Information System (BISON) interface. At the top, the USGS logo and navigation menu are visible. The main search area shows a search for "Ailanthus altissima" with 47,244 results. The search results are displayed in a table with columns for Basis of Record, Provider, State/Province, and Marine EEZ. The Basis of Record column includes options like literature (11), observation (14981), specimen (2320), and unknown (20). The Provider column lists various institutions such as Arizona State University, Bermani Pauahi Bishop Museum, BISON, and Botanic Garden and Botanical Museum Berlin-Dahlem. The State/Province column shows counts for various states, including Alabama (152), Arizona (65), Arkansas (97), British Columbia Canada (7), California (444), and Colorado (111). The Marine EEZ column shows US Atlantic EEZ (13).

Below the search results, there are filters for Higher Taxa (Plants (Plantae) 17344, Vascular Plants (Tracheophyta) 17344) and Centroid (All Data, Centroid Only Data, Non-Centroid Data). The map shows the distribution of Ailanthus altissima in the United States, with a color-coded legend for environmental layers. The legend includes Basemap Layers (Base Map, High Resolution Imagery, Vector Map, USGS Transportation), BISON Layers (State/Province Heatmap, County/District Heatmap, Marine Heatmap, Points Layer), and Climate and Weather layers (Annual Mean Daily Average Temperature, Annual Mean Daily Average Temperature - Hawaii, January Annual Mean Daily Average Temperature, July Annual Mean Daily Average Temperature, January Annual Mean Daily Average Temperature - Alaska, July Annual Mean Daily Average Temperature - Alaska, January Annual Mean Daily Average Temperature - Hawaii, July Annual Mean Daily Average Temperature - Hawaii, US Average Annual Precipitation on 1961 to 1999, Annual Mean Daily Precipitation Totals for the Contiguous US, Annual Mean Daily Precipitation Totals for Alaska, Annual Mean Daily Precipitation Totals for Hawaii, January Mean Daily Precipitation Totals for the Contiguous US, January Mean Daily Precipitation Totals for Alaska, January Mean Daily Precipitation Totals for Hawaii).

The map shows a high density of points in the eastern and central United States, indicating a high concentration of Ailanthus altissima records. The environmental layers are color-coded, with warmer temperatures and higher precipitation generally corresponding to higher densities of records.

**Establishment Means**  
(Designation of Non-Natives)

11,166 Taxa  
10,467 Species

Alaska: 529  
Hawaii: 5481  
L48: 6742

Search/Filter  
capability  
to be included in  
the BISON GUI and  
web services in FY18

*First comprehensive list of all non-native  
species in the United States*

*Segregated by major regions*

Simpson, Annie<sup>1</sup> and Meghan C. Eyer<sup>2</sup>

Abstract

In the United States, harm caused by invasive species has been estimated by scientists to cost more than \$120B annually, or almost four times the average annual cost of all severe weather events such as hurricanes, floods, tornados, and freezes. Invasive species are non-native organisms "whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health." Scientists and naturalists have been compiling non-native and invasive species lists ever since these species have been causing harm, yet national non-native species lists are not universal, nor even common. The reasons for generating non-native species lists are diverse, such as: watch lists for preventing invasions; monitoring lists for species research; regulatory lists for invasive species control; and non-regulatory lists for raising awareness. This diversity of purpose and also the lists' variance in geographic scope makes compiling and creating authoritative non-native species lists a difficult task. However difficult the task, it is important to know what species are non-native (or alien) in an area to be able to mount an effective response to non-native species incursions. Over a period of years, we reviewed hundreds of resources in the scientific literature, including annotated taxonomic species lists and databases, to compile non-native species lists and watch lists for three large areas of the United States: Alaska (AK) with 529 taxa, Hawaii (HI) with 5,481, and the lower 48 contiguous states (L48) with 6,742. The consolidated list of non-native species for these areas contains 11,166 names, 10,467 of which are binomial species names. The list will be updated in an ongoing manner as non-native species continue to arrive and spread in the United States. It will also be used to annotate species occurrence records in the Biodiversity Information Serving Our Nation (BISON) species mapping application and be made available online as a web service.

Keywords

<sup>1</sup> United States Geological Survey, 12201 Sunrise Valley Drive, Mailstop 302, Reston, Virginia 20192  
USA [asimpson@usgs.gov](mailto:asimpson@usgs.gov), 703-648-4281

<sup>2</sup> United States Geological Survey, 11510 American Holly Drive, Laurel, Maryland 20708 USA  
[mmannas@usgs.gov](mailto:mmannas@usgs.gov), 301-497-5882

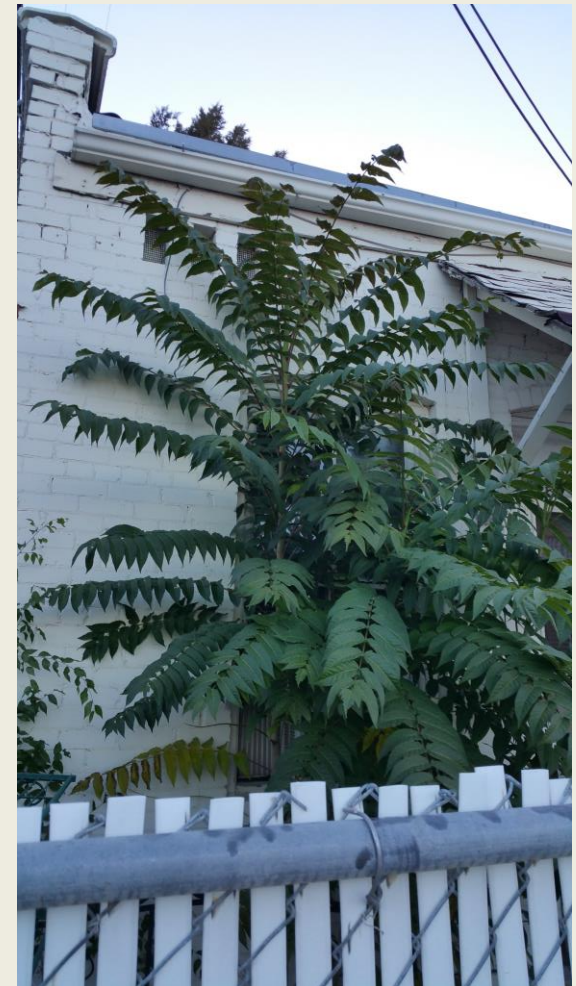


# BISON

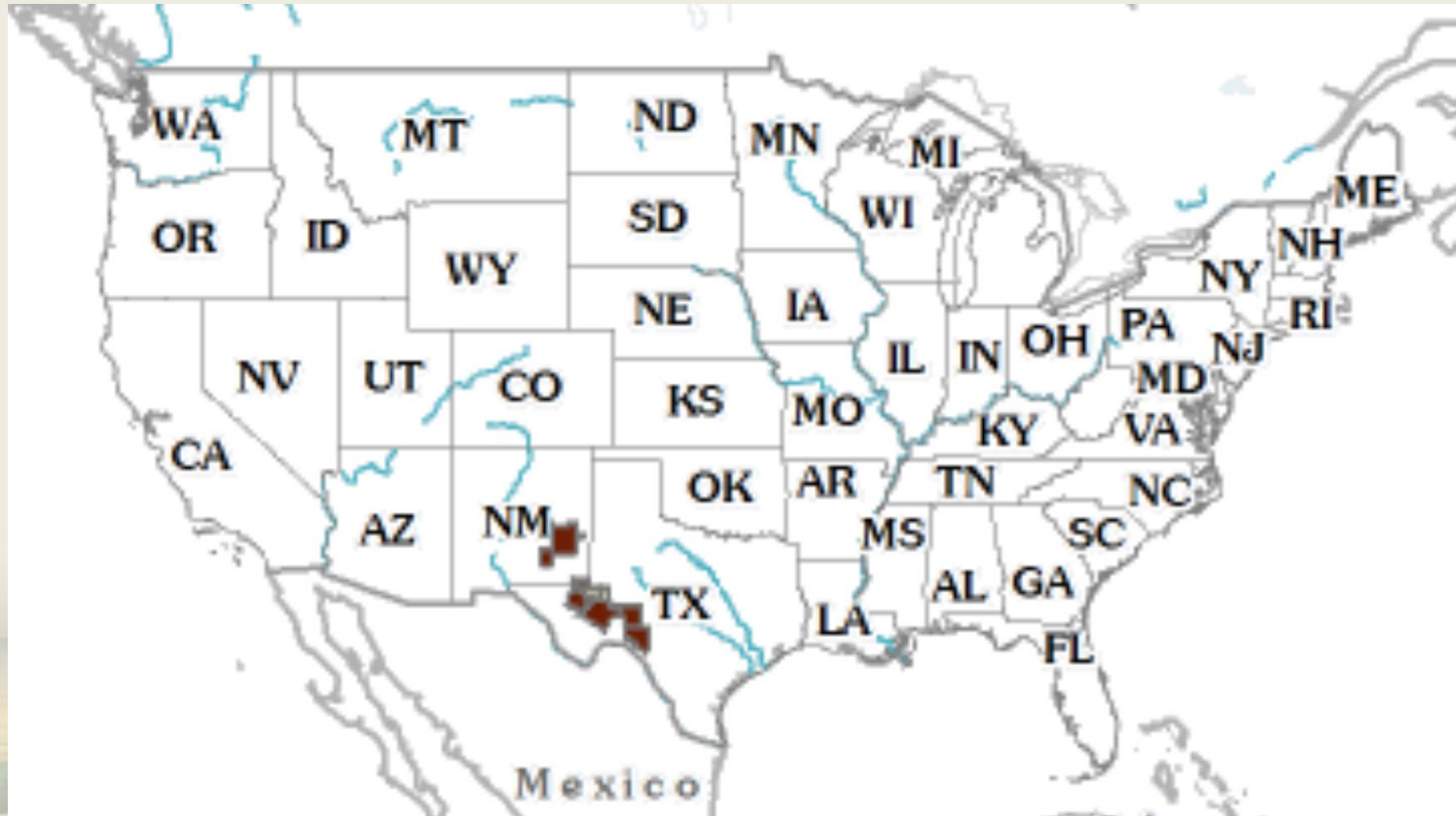
## Animated Maps of Spread Over Time

Note that the data only reflects what is in the databases and may not reflect actual routes of dispersal or original introductions

- [Kudzu](#)
- [Tree of Heaven](#)



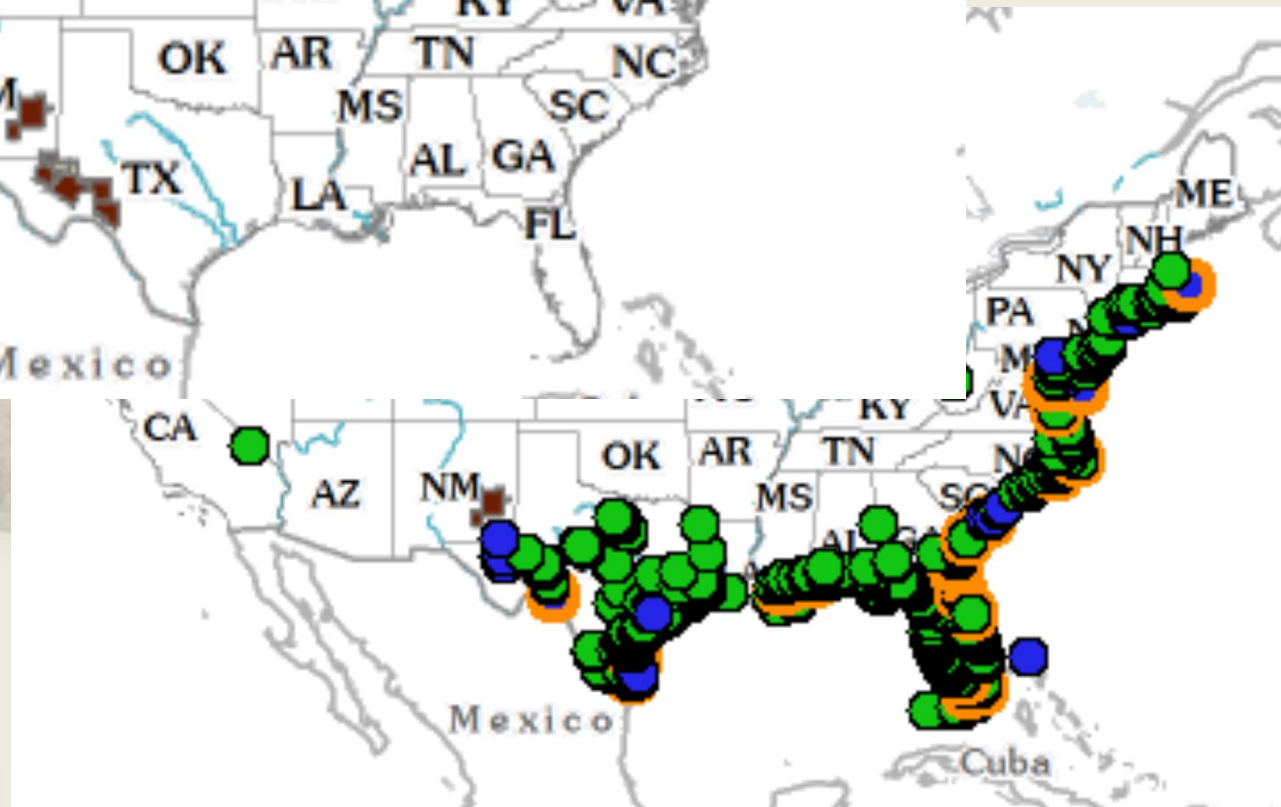
# Invasion of Rare Native Pecos Pupfish by Invasive Sheepshead Minnow



*Where they come into contact, they hybridize, eradicating the pupfish.*

*An example of the power of having integrated T&E and Invasives data.*

*At least forty percent of T&E species are pressured by invasives.*



Pick a State:

Virginia

Submit

There are 772 species of non-natives documented in states bordering this state that are not documented in the state itself in BISON. Click on a name to open a tab with the species full distribution in BISON.

- [Abelmoschus esculentus](#)
- [Abies alba](#)
- [Acantholyda erythrocephala](#)
- [Acer campestre](#)
- [Acer tataricum](#)
- [Achillea filipendulina](#)
- [Achillea ptarmica](#)
- [Achyranthes japonica](#)
- [Achyranthes japonica hachijoensis](#)
- [Acmella decumbens](#)
- [Actinidia polygama](#)
- [Acyrtosiphon pisum](#)
- [Adonis annua](#)
- [Adonis vernalis](#)
- [Aegilops crassa](#)
- [Aethusa cynapium](#)
- [Aglaonema commutatum](#)
- [Agrilus subrobustus](#)
- [Agrimonia eupatoria](#)
- [Agropyron cristatum](#)
- [Ahasverus advena](#)
- [Ajuga genevensis](#)
- [Allium atroviolaceum](#)
- [Allium oleraceum](#)
- [Allium sativum](#)
- [Allium schoenoprasum](#)
- [Allium tuberosum](#)
- [Alloglossidium corti](#)
- [Alnus cordata](#)



### [A simple list of what is in your “bad” neighbor’s yard](#)

Note that all data and methods here are provisional until published according to USGS Fundamental Science Practices (FSP)

Click on a state and get a list of all non-native species (and subspecies) that are documented in the states bordering that state but not documented in the state itself.

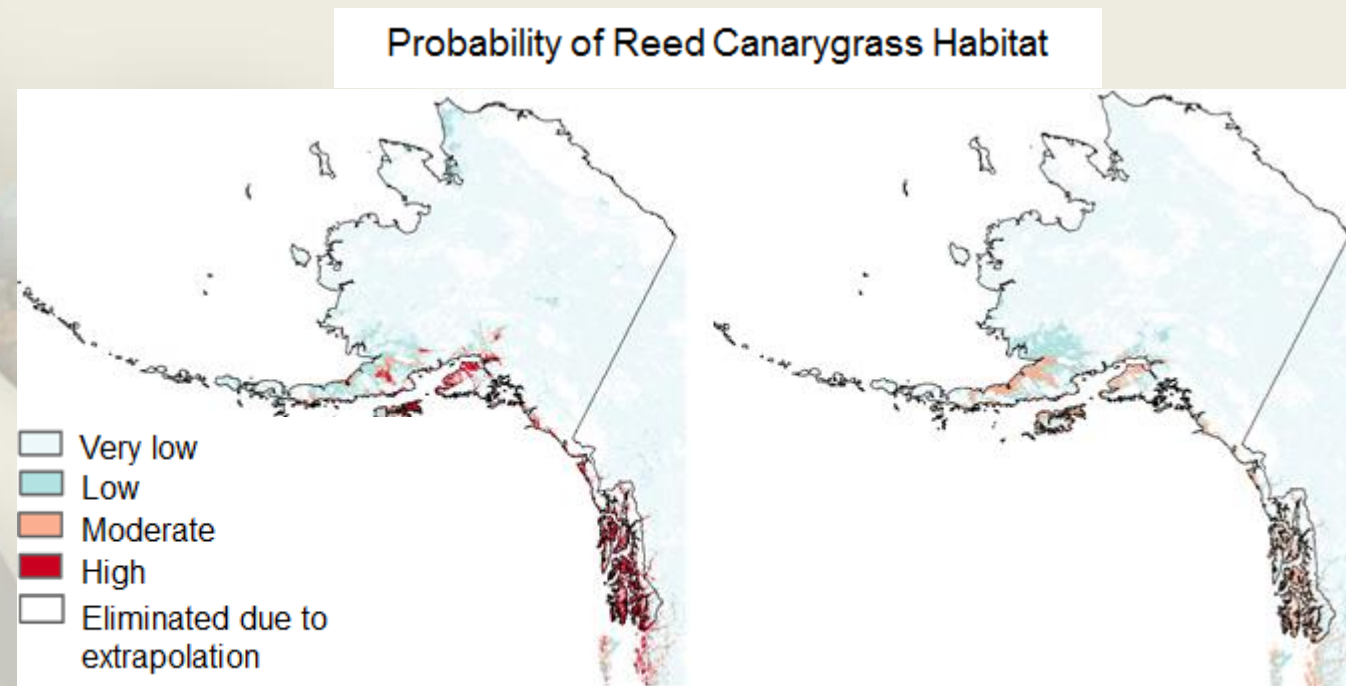
A NISC Product – Powered by **BISON**

# Modeling Species Distributions

*Invasive species – Collaboration with USGS FORT – Catherine Jarnevich*

## What is the risk of spread of invasives into Alaska?

- Summer NASA DEVELOP project partnering with Alaska USFWS
- BISON provided North America presence locations



# Modeling Species Distributions

*Invasive species – Collaboration with USGS FORT – Catherine Jarnevich*

## Watch lists for EDRR

- Park species lists
- Lists of invasive species of concern system wide

What subset should be focused on for detection in Parks?

Eric Coombs,  
Oregon Department  
of Agriculture,  
[Bugwood.org](http://Bugwood.org)

