

Bridging the Gap Between Science and Decision Making Through Data Integration & Software Development

Jessica L. Burnett

Research Ecologist, Mendenhall Postdoctoral Fellow

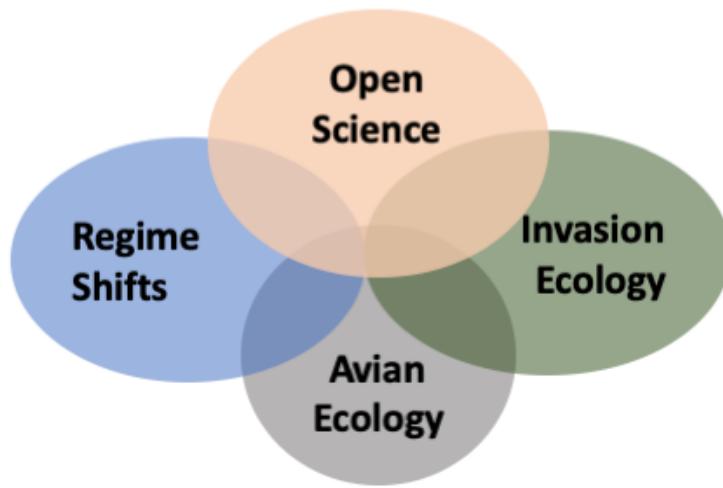
Science Analytics and Synthesis | Core Science Systems
U.S. Geological Survey, Lakewood CO

October 14, 2019

Indigenous People's Day



Brief Overview of Past and Ongoing Research





**Avian
Ecology**



Florida Field Naturalist 44(4):157-168, 2016.

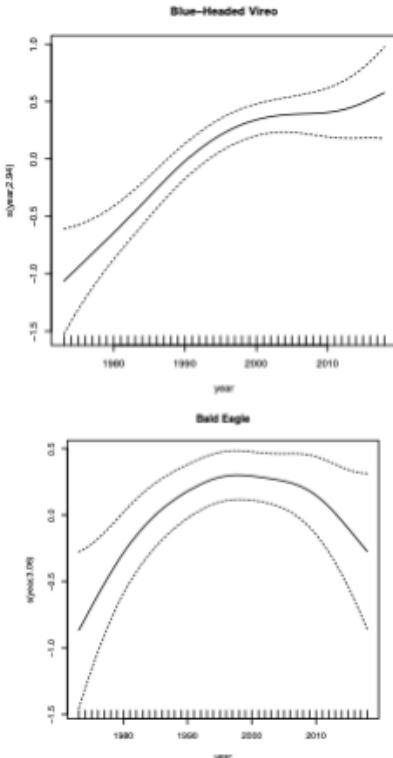
SONGBIRD DISTRESS CALLS AS AN IMPROVED METHOD FOR DETECTING RED- SHOULDERED HAWKS (*Buteo lineatus*)

JESSICA L. BURNETT¹ AND KATHRYN E. SIEVING

*Department of Wildlife Ecology and Conservation, University of
Florida, Gainesville, Florida 32611*



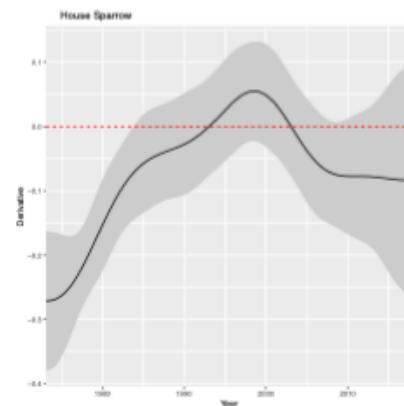
Avian
Ecology



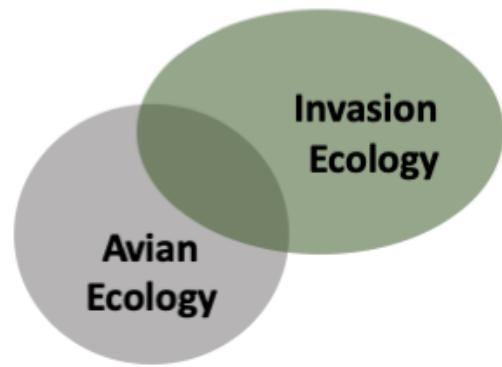
USING A CHRISTMAS BIRD COUNT TO UNDERSTAND LOCAL AND REGIONAL CHANGES IN BIRD POPULATIONS IN NORTHCENTRAL FLORIDA

Jessica Burnett¹, Andrew Kratter², Scott Robinson²

¹ Science Analytics and Synthesis, Core Science Systems, US Geological Survey; ² Florida Museum of Natural History, University of Florida



(in prep) intended for submission to *Florida Field Naturalist*



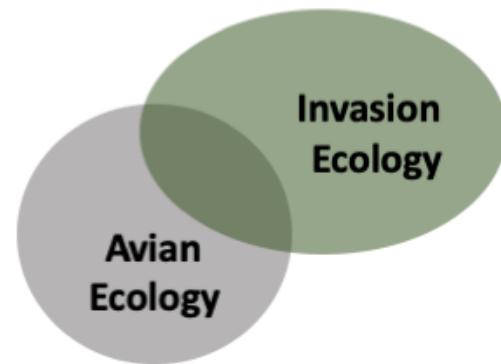
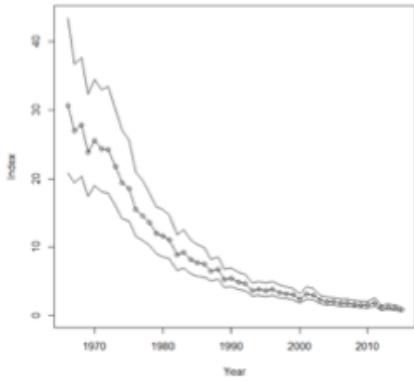


Florida Field Naturalist 43(4):167–172, 2015.

RECENT TRENDS IN HOUSE SPARROW (*Passer domesticus*) DISTRIBUTION AND ABUNDANCE IN GAINESVILLE, ALACHUA COUNTY, FLORIDA

JESSICA L. BURNETT¹ AND MICHAEL P. MOULTON

*Department of Wildlife Ecology and Conservation,
University of Florida, P.O. Box 110430, Gainesville, Florida 32611-0430*





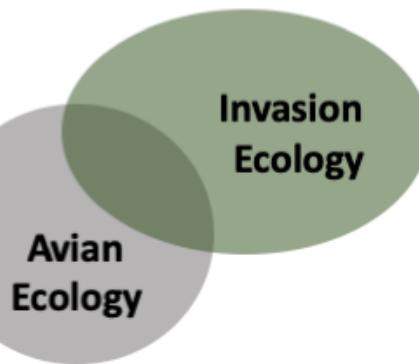
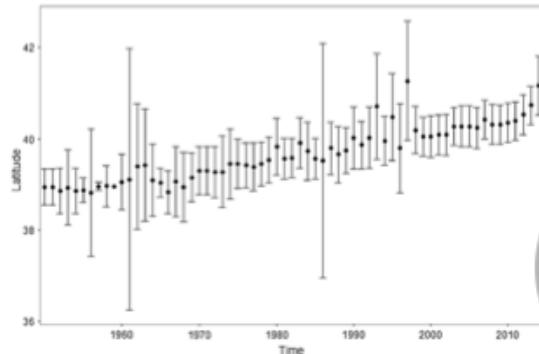
Biol Invasions (2017) 19:5–9
DOI 10.1007/s10530-016-1273-4



INVASION NOTE

Range expansion by *Passer montanus* in North America

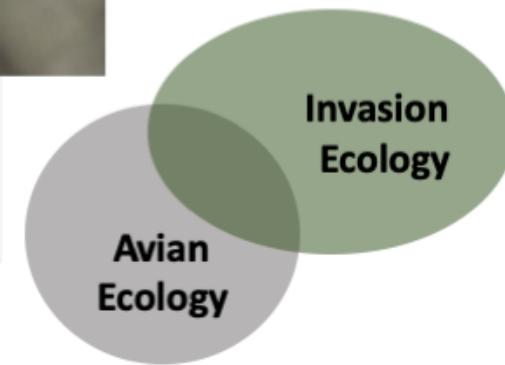
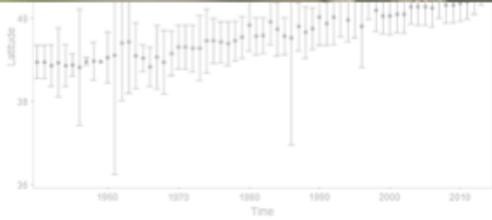
J. L. Burnett · C. P. Roberts · C. R. Allen · M. B. Brown · M. P. Moulton



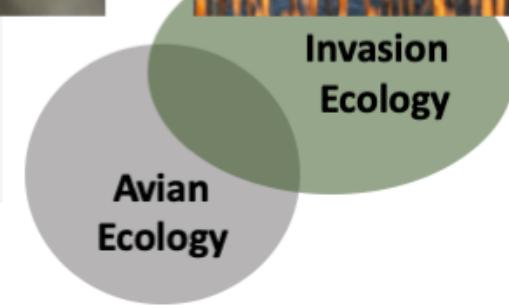
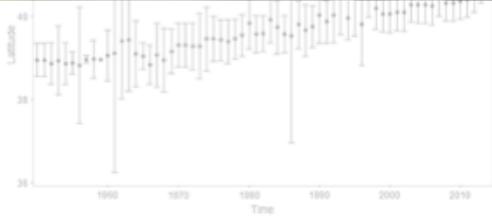


Introductions by *Passer montanus* in North America

J. N. Gilbert • N. Anich • J. Burnett • C. R. Allen • M. B. Brown • M. P. Moulton

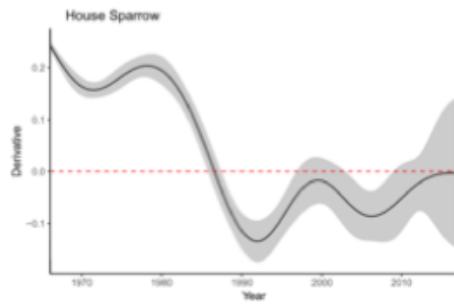
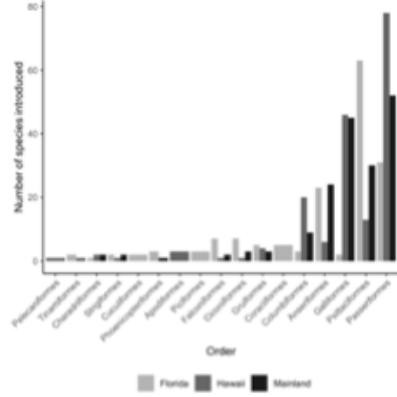


[1] Burnett, J, N Gilbert, N Anich (*in prep*) Great Tit introductions to and distribution in North America.



[1] Burnett, J, N Gilbert, N Anich (*in prep*) Great Tit introductions to and distribution in North America.

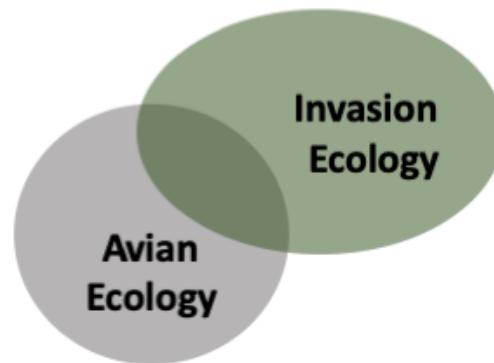
[2] Burnett, J, L Wszola, N Mirochnitchenko, E Stuber, M Bomberger Brown, J Carroll (*in prep*). Gray Partridge distribution in North America: Changing landscapes for an introduced species.



CHAPTER 38 Continental analysis of invasive birds: North America

Jessica L. Burnett* and Craig R. Allen

Citation: Burnett, J.L. and Allen, C.R. (2019). Continental analysis of invasive birds: North America. In Downs, C.T. and Hart, L.A. (eds), Global trends and impacts of alien invasive birds. CABI, Wallingford, UK, pp. x-xx.





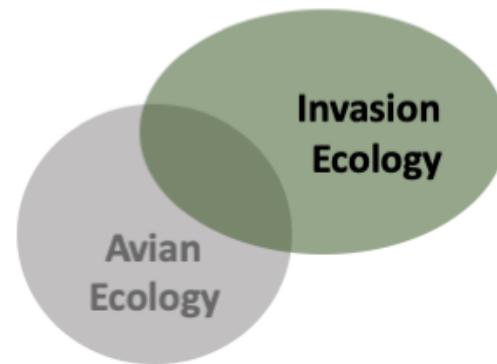
Thermal Tolerance Limits of the Chinese Mystery Snail (*Bellamya chinensis*): Implications for Management

Authors: Jessica L. Burnett, Kevin, L. Pope, Alec Wong, Craig R. Allen, Danielle M. Haak, et. al.

Source: American Malacological Bulletin, 36(1) : 140-144

Upper limit: ~ 45°C

Lower limit: < 0 °C

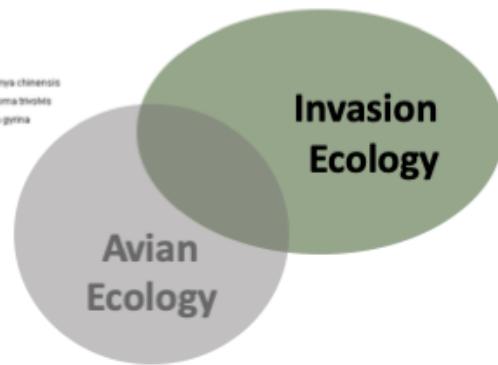
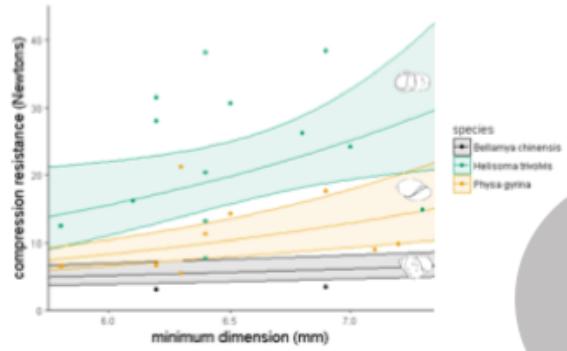




**Shell strength does not limit predation of an invasive snail species (*Bellamya chinensis*) by
native fish**

Shell strength and predation of *Bellamya chinensis*

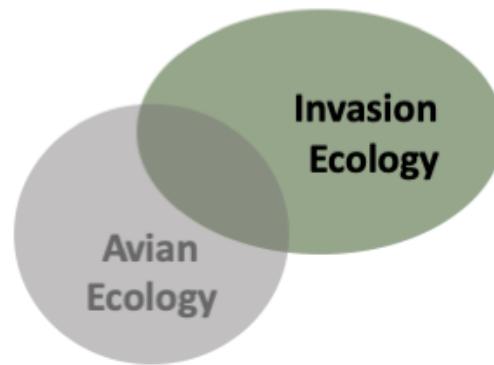
Jessica L. Burnett¹, Rebecca C. Wilcox², Bruce J. Stephen¹, Daniel R. Uden^{1,*}, Craig R. Allen³,
Patricia W. Freeman⁴, and Kevin L. Pope³

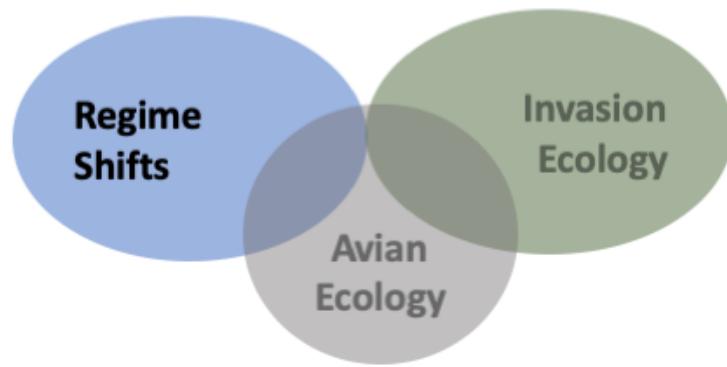


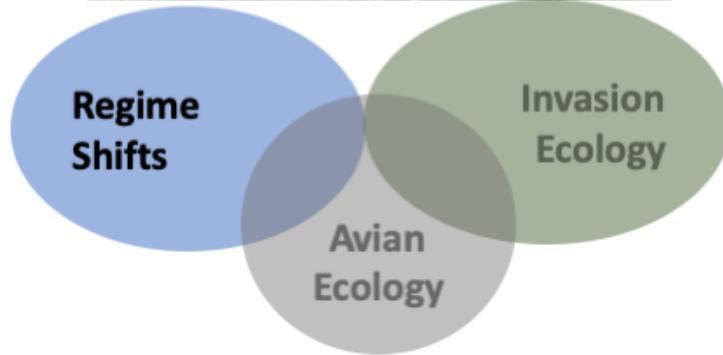
[1] Burnett et al. (under revision) American Malacological Bulletin.

Social-ecological landscape patterns predict woody encroachment from native tree plantings in a temperate grassland

Victoria M. Donovan¹ | Jessica L. Burnett² | Christine H. Bielski¹ |
Hannah E. Birge² | Rebecca Bevans² | Dirac Twidwell¹ | Craig R. Allen³



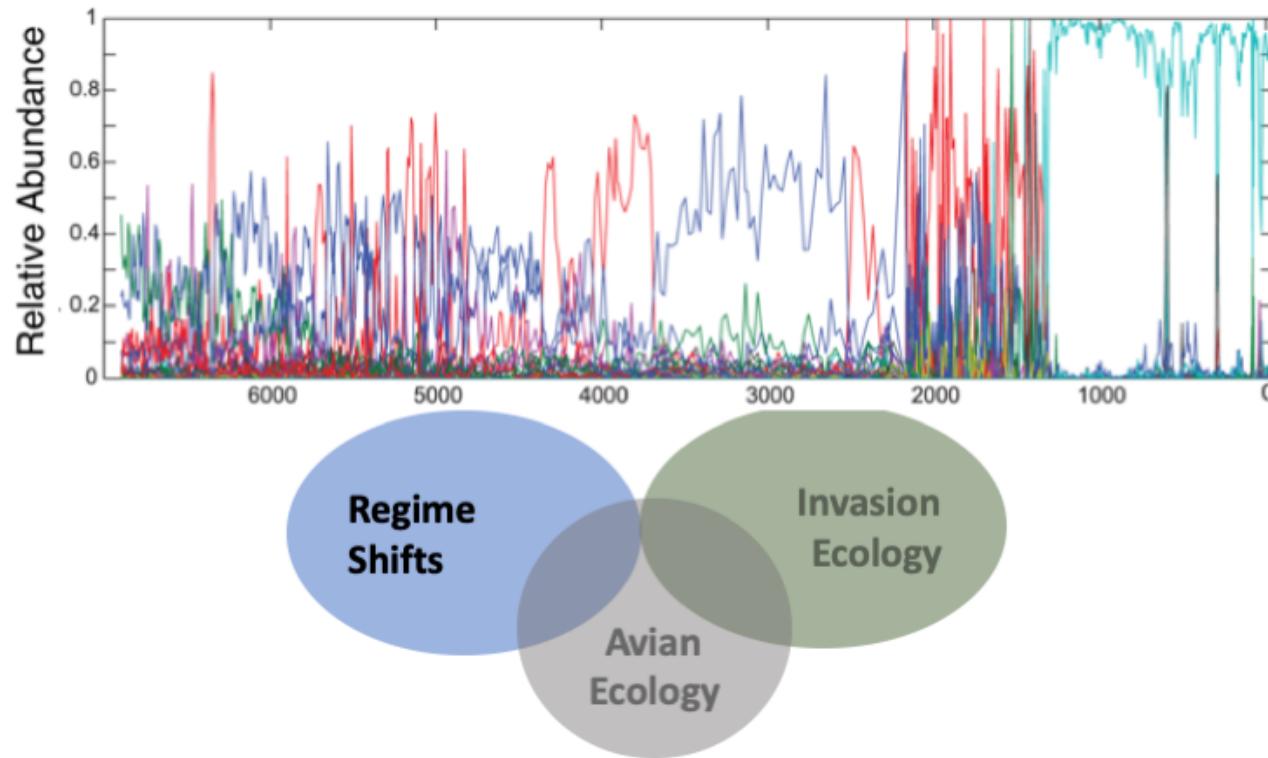


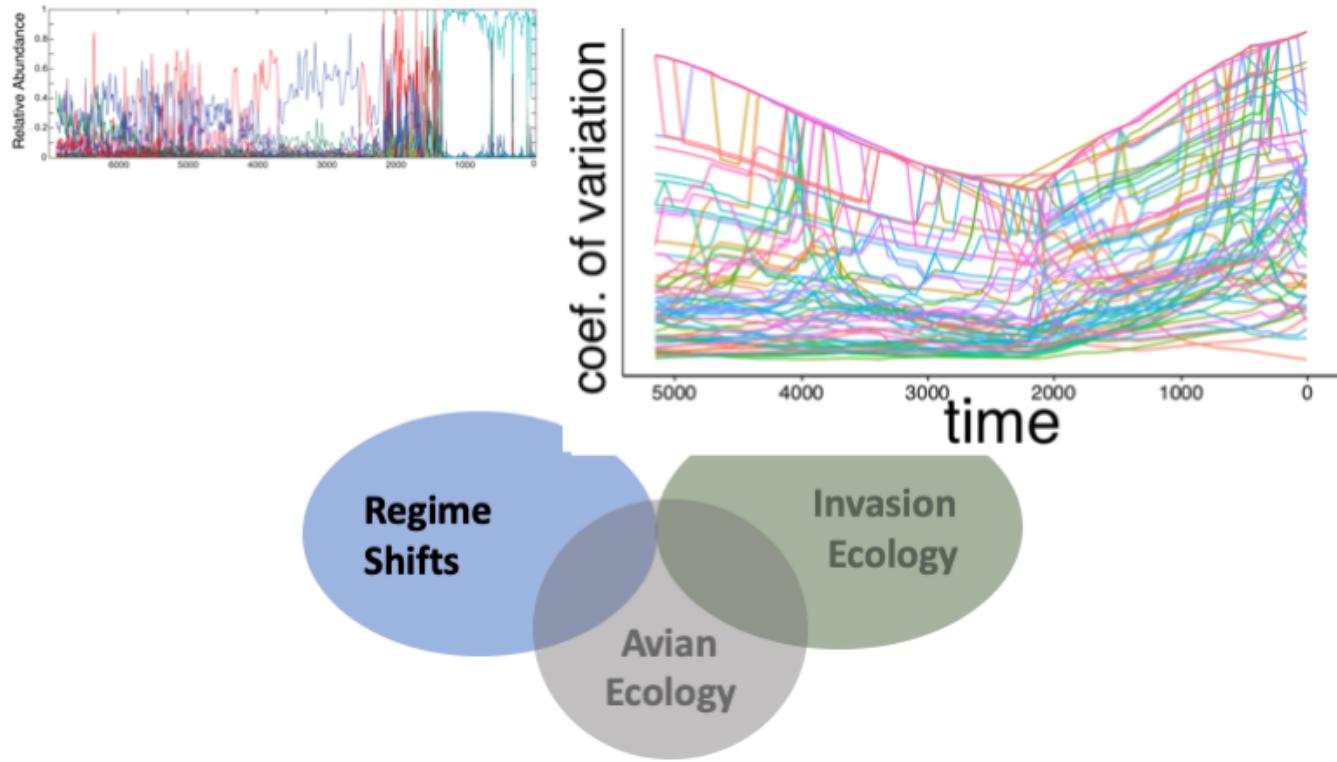


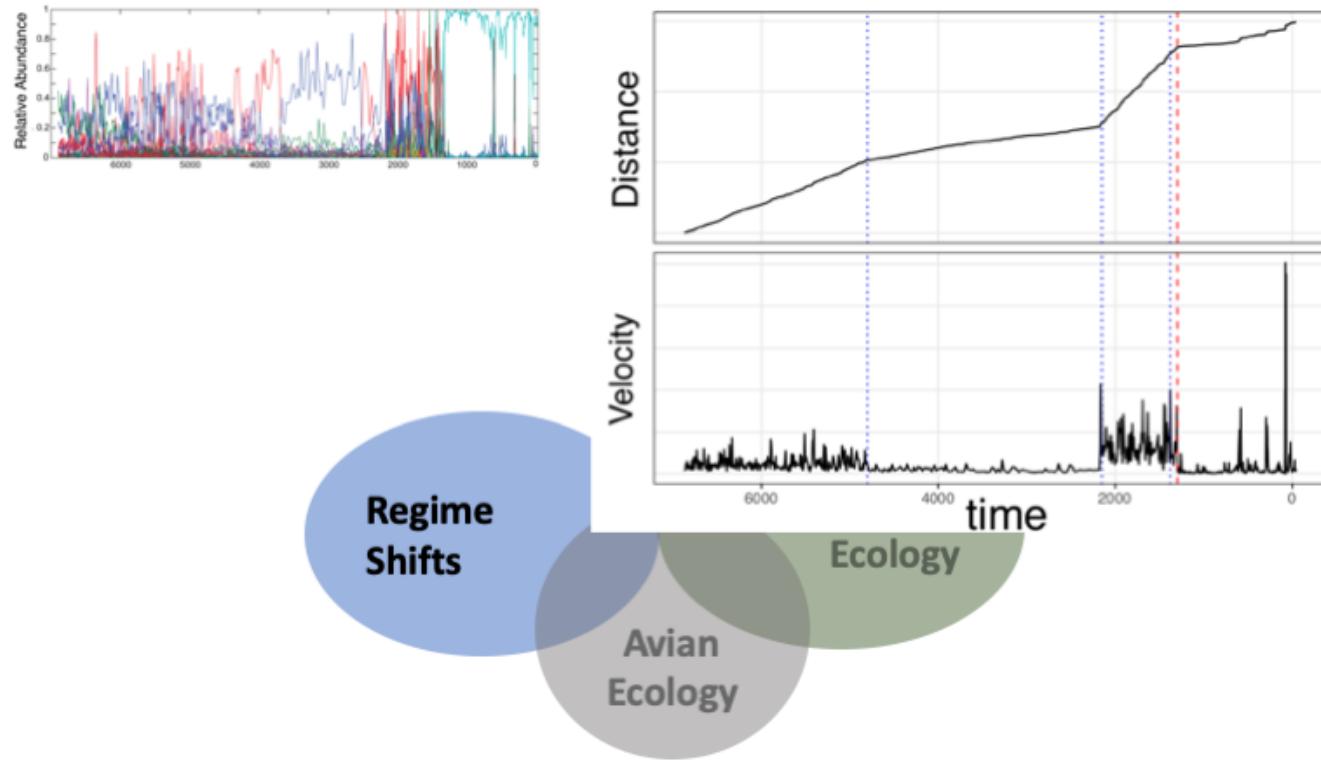
Theme 1: Synthesize and review regime shift methods and literature

Theme 2: Test the utility and efficacy of methods

Theme 3: Improve method accessibility

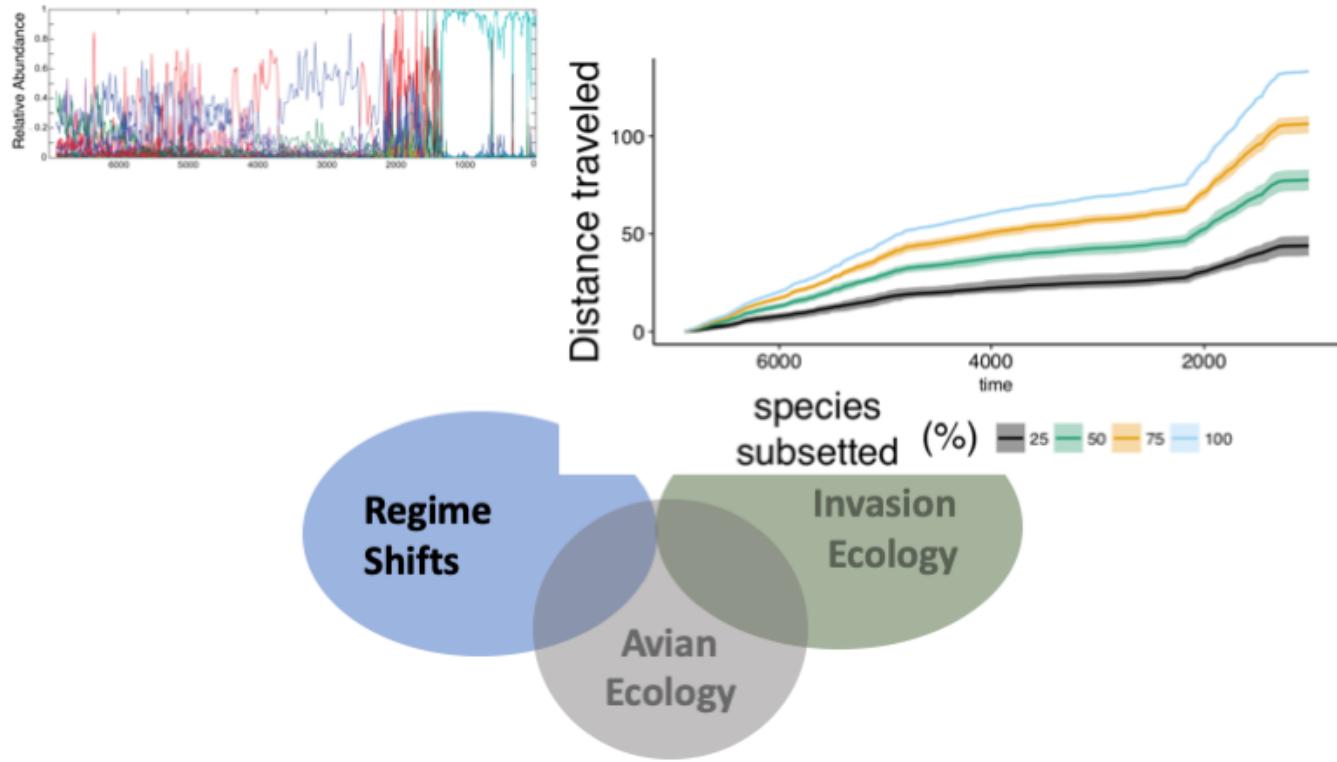


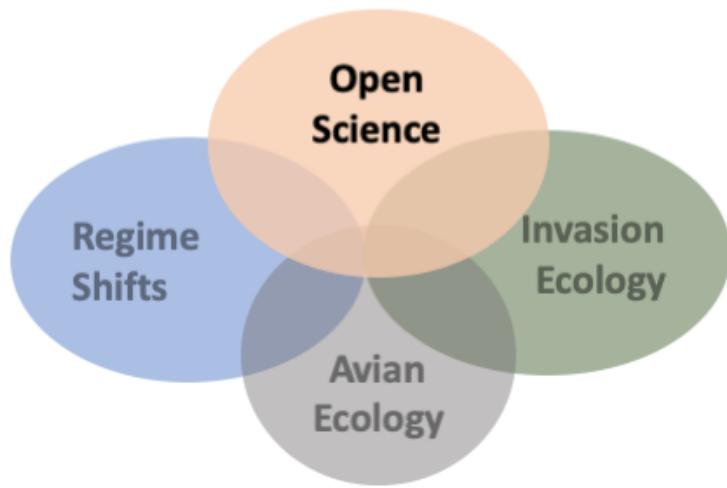




[1] Burnett, J, N Price, and A Tyre. (*in prep*). Distance travelled and velocity of distance travelled as a measure of abrupt change in multivariable ecological data.

[2] Burnett, J and N Price (2018). `regimeDetectionMeasures`: An R package for calculating univariate and multivariate regime detection measures.

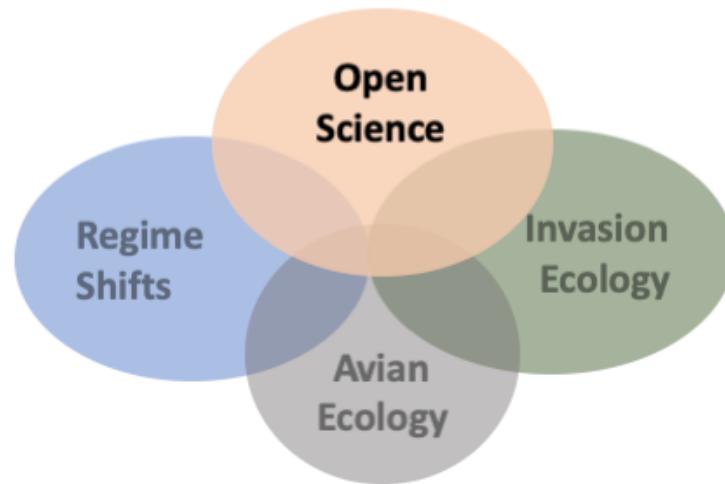






regimeDetectionMeasures: An R Package for Calculating Multiple Regime Detection Measures

Jessica L. Burnett Last updated: 2019-10-13



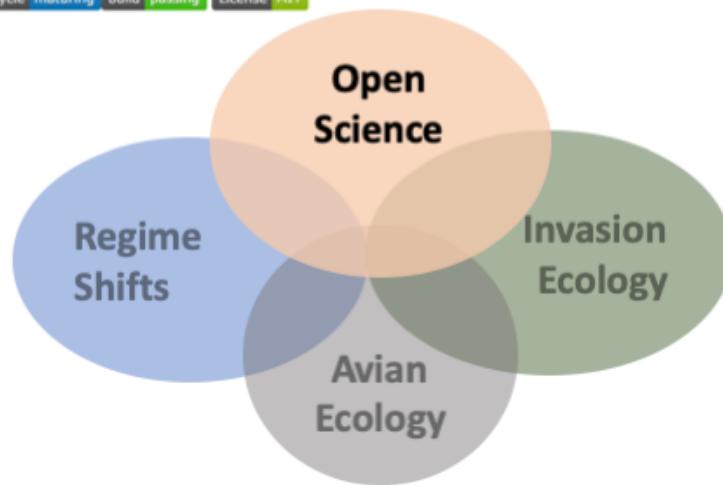
github.com/trashbirdecology/regimedetectionmeasures



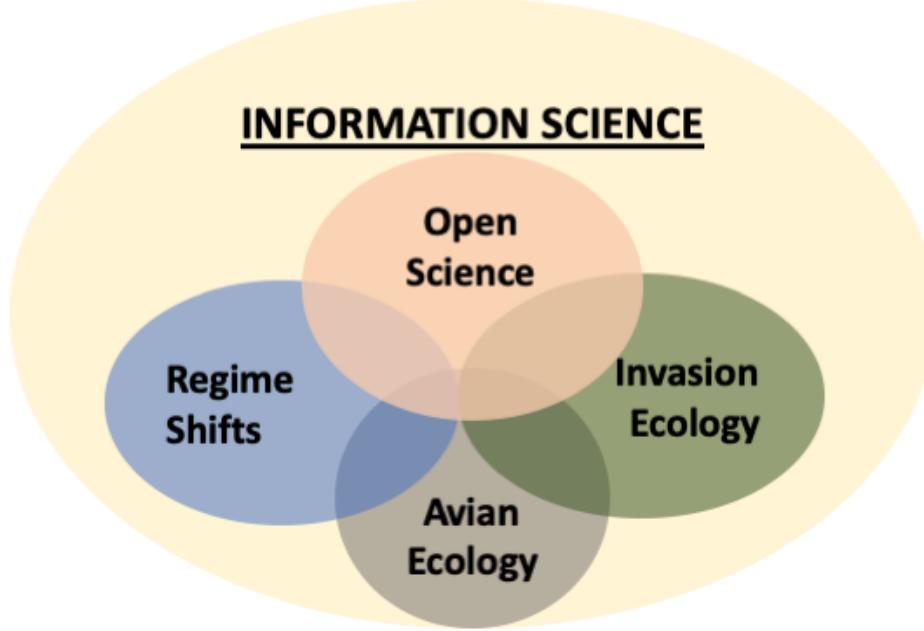
- ☞ **bbsAssistant: An R package for downloading and handling data and information from the North American Breeding Bird Survey.**

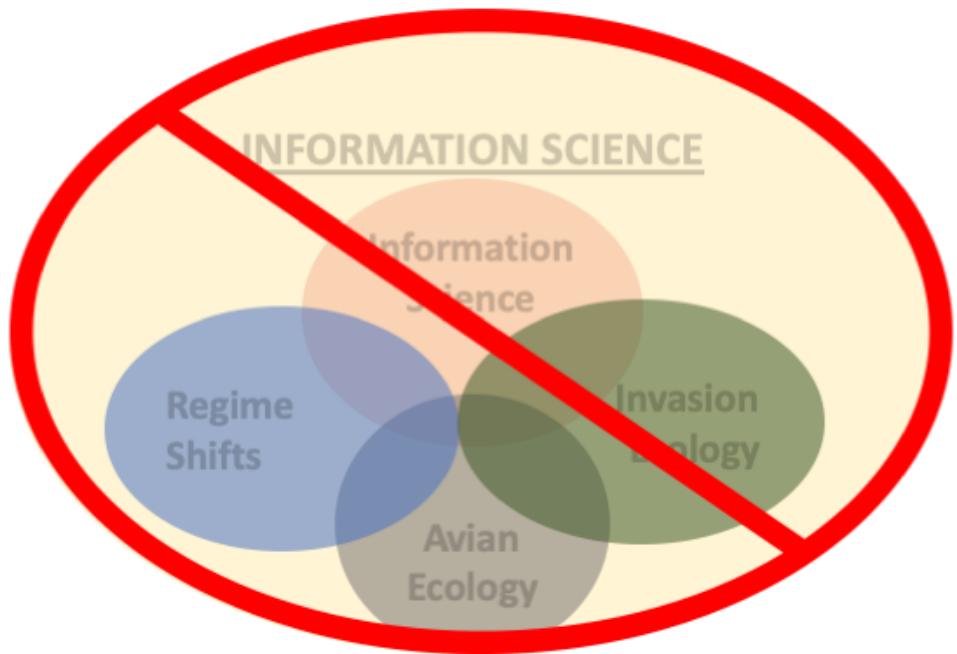
Last updated: 2019-08-16

[lifecycle](#) [maturing](#) [build](#) [passing](#) [License](#) [MIT](#)



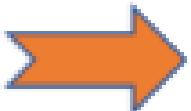
github.com/trashbirdecology/bbsAssistant





- 
- End-users
 - Practitioners
 - Decision Makers

Data Curation
&
Management



Research &
Modelling

Flow of Science Products and Knowledge

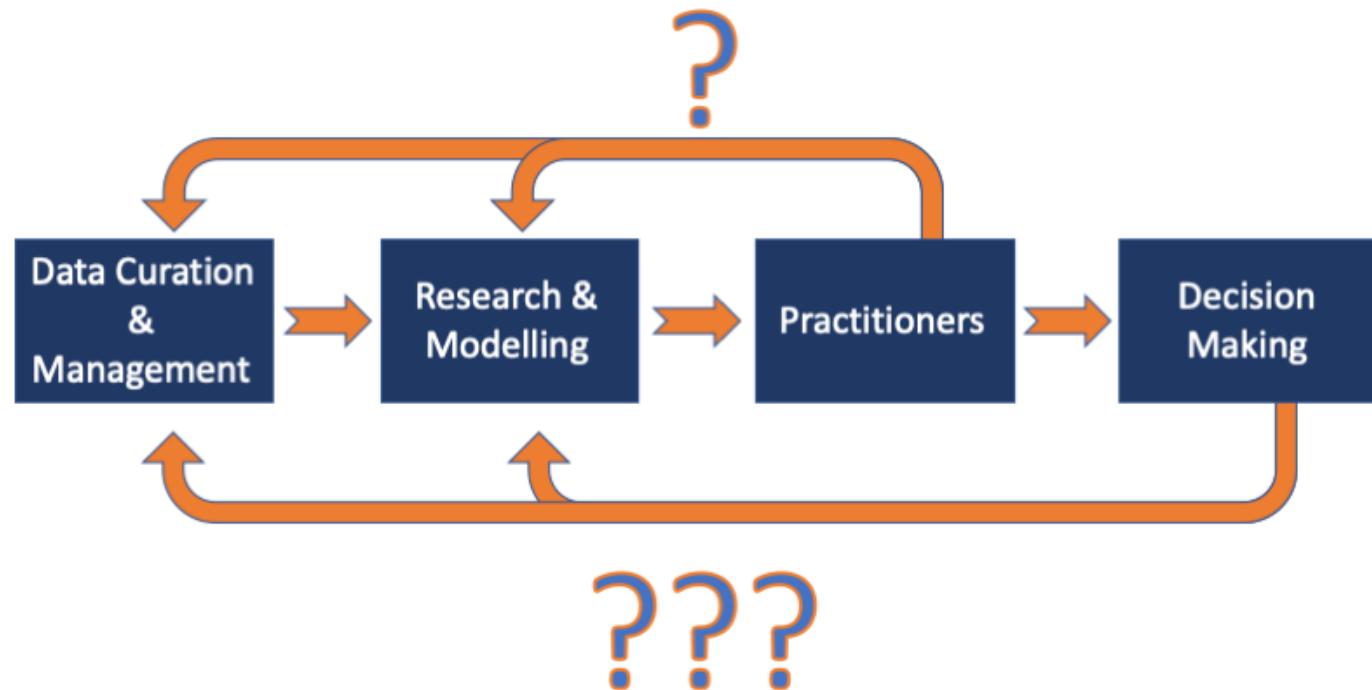
Data and Science Products Often Flow Linearly



Data and Science Products Often Flow Linearly



Data and Science Products Often Flow Linearly



'Most models in ecology are intended for other ecologists, cooked up by scientists for consumption by other scientists' *Roughgarden (1979)*

- **data**
- **results**
- **papers**
- **presentations**

[1] Theory of population genetics and evolutionary ecology: an introduction.

Avoiding the Linear Trajectory of Data and Science Products

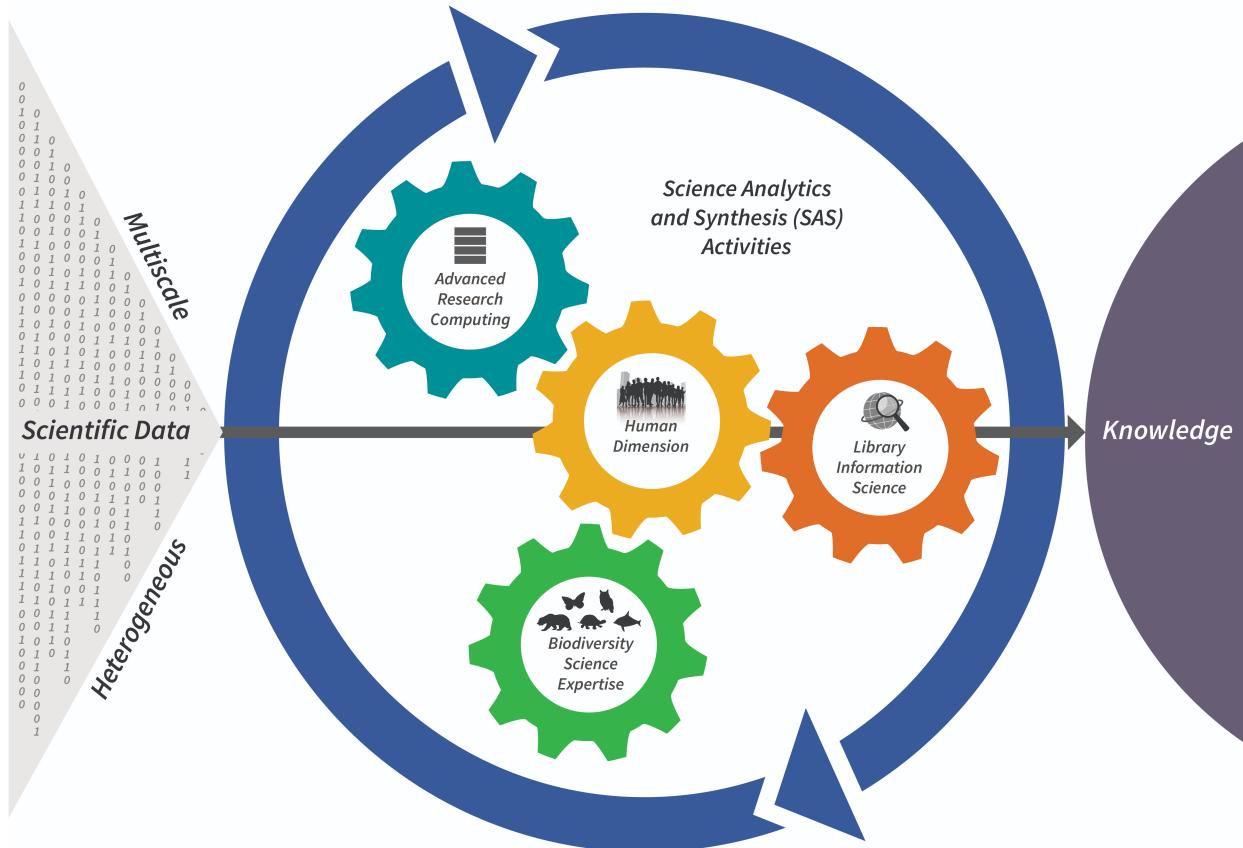
USGS Science Analytics & Synthesis

Vision: Synthesize and deliver Earth system data and information.

Mission: Accelerate research and decisionmaking through data science, information delivery, advanced computing, and biodiversity analytics.

Data Science

Converting Data into Actionable Knowledge



Data and Science Products at the USGS:

F.indable

A.ccessible

I.nteroperable

R.eusable

USGS Science Analytics & Synthesis: Integrated Science Products



Gap Analysis Project

Home

How well are we protecting common plants and animals? Gap Analysis is the science of answering this question. Developing the data and tools to support that science is the mission of the Gap Analysis Project (GAP). Check out our [SCIENCE](#) section on the left to begin exploring GAP products: [Species](#), [Land Cover](#), and [Protected Areas Database of the United States](#).

Species Data



GAP has delineated species range and predicted distribution maps for more than 2,000 species that occur within the continental U.S. as well as Alaska, Hawaii, and Puerto Rico.

Download Date

Land Cover Data



The GAP/LANDFIRE National Terrestrial Ecosystems data set includes detailed vegetation and land cover patterns for the continental United States. The data set incorporates the Ecological System classification system developed by NatureServe.

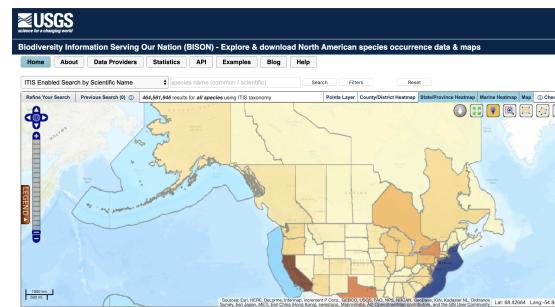
Download Date

Protected Areas Data

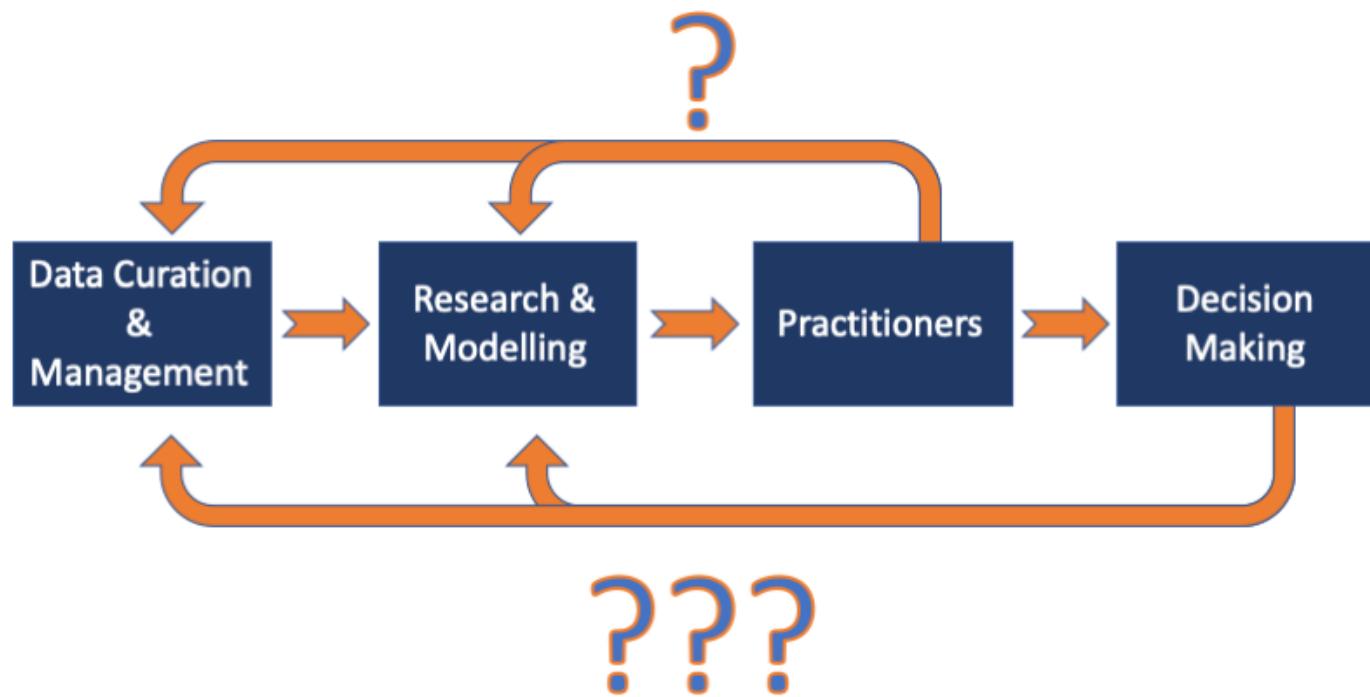


PAD-US is America's official national inventory of U.S. terrestrial and marine protected areas ([List of National Geospatial Data Assets](#)).

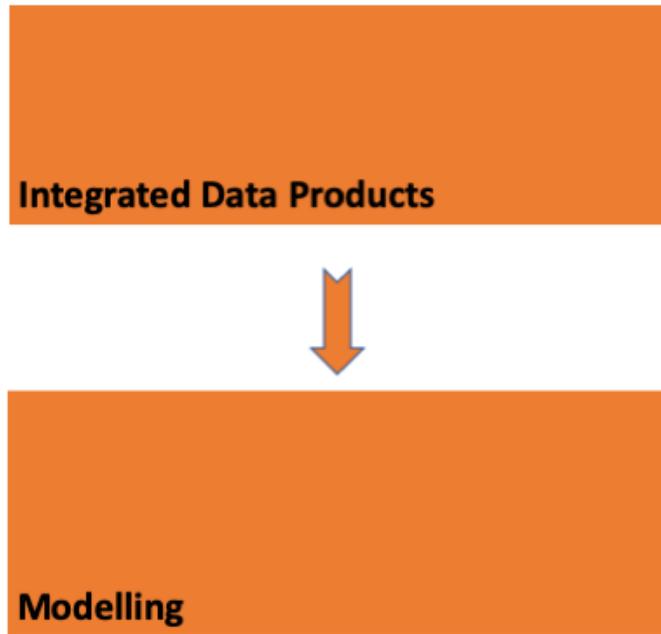
[Download Data](#)



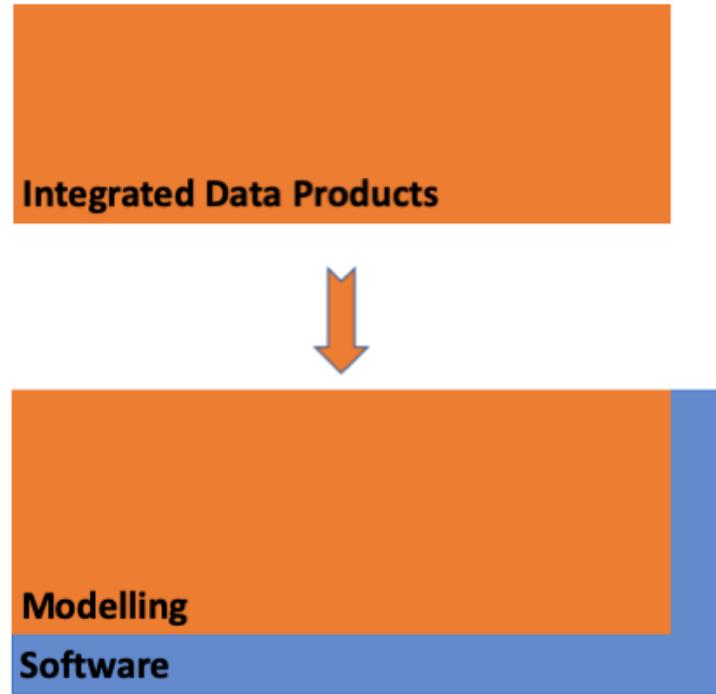
Project Overview



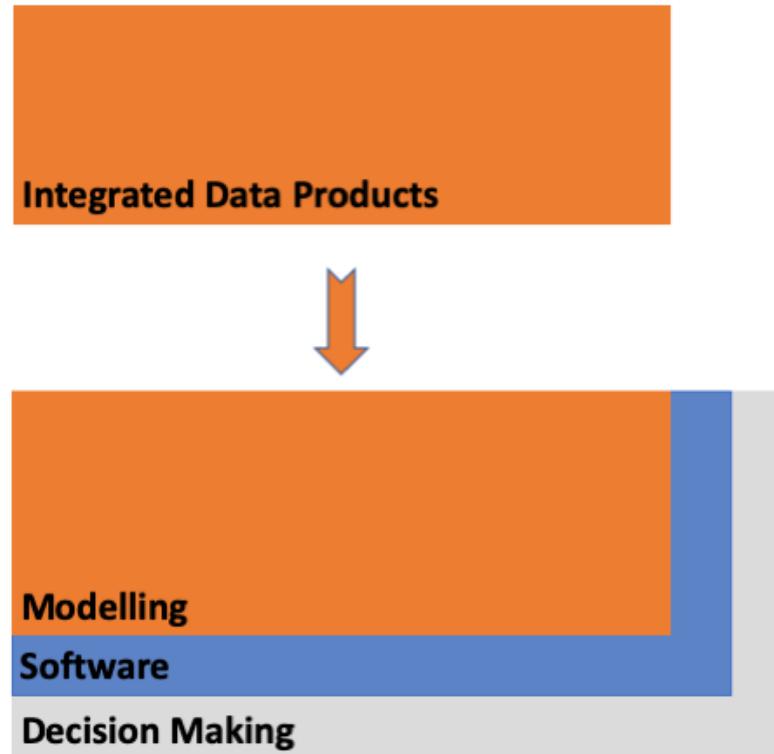
Project Overview



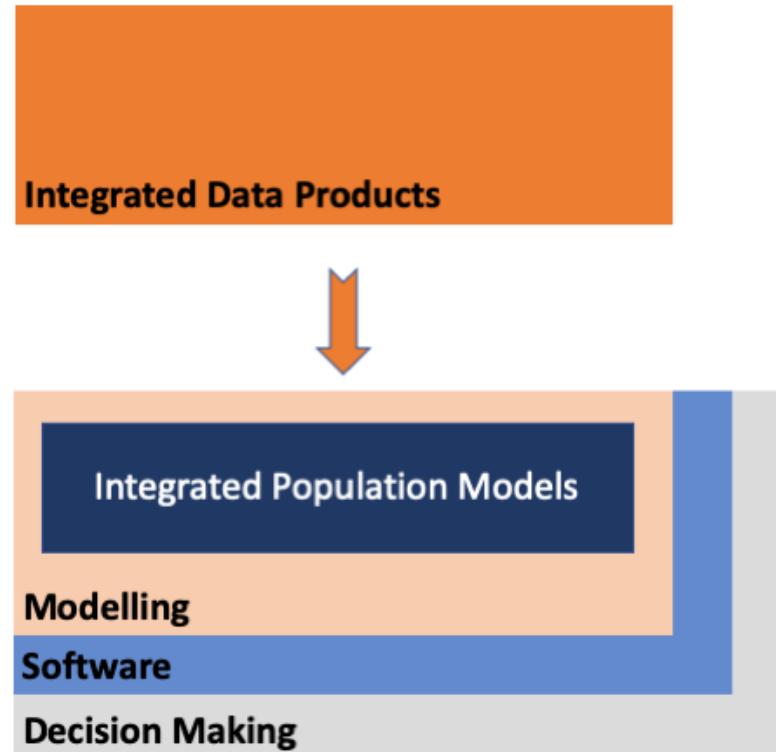
Project Overview



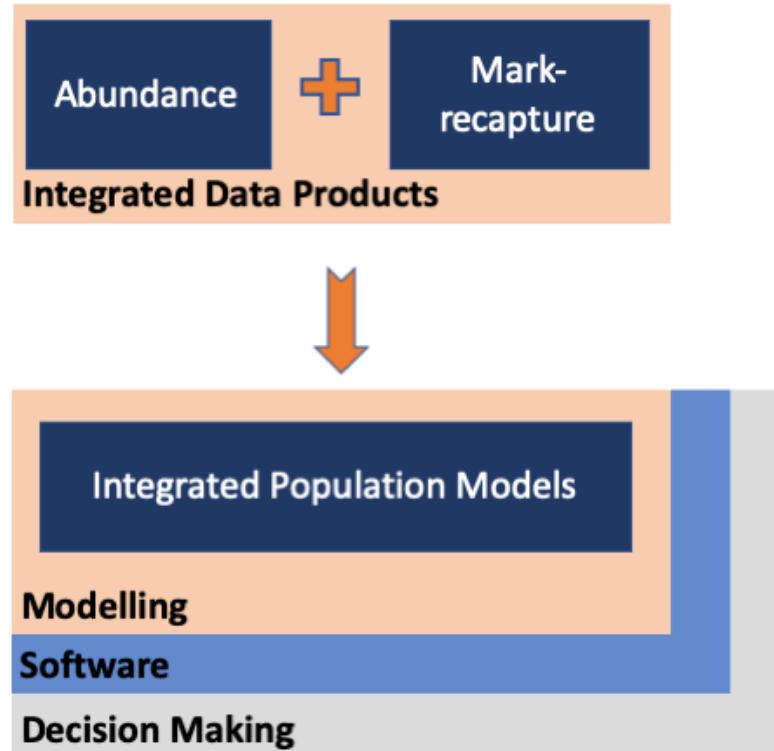
Project Overview



Project Overview



Project Overview



1. Data Integration

2. Integrated Population Models

3. Software

4. End-user Needs

1. Data Integration

2. Integrated Population Models

3. Software

4. End-user Needs

Abundance Data: USGS Breeding Bird Survey



Distribution

Status

Trends

Encounter Data: USGS Bird Banding Lab



Demographic
parameters

Distribution

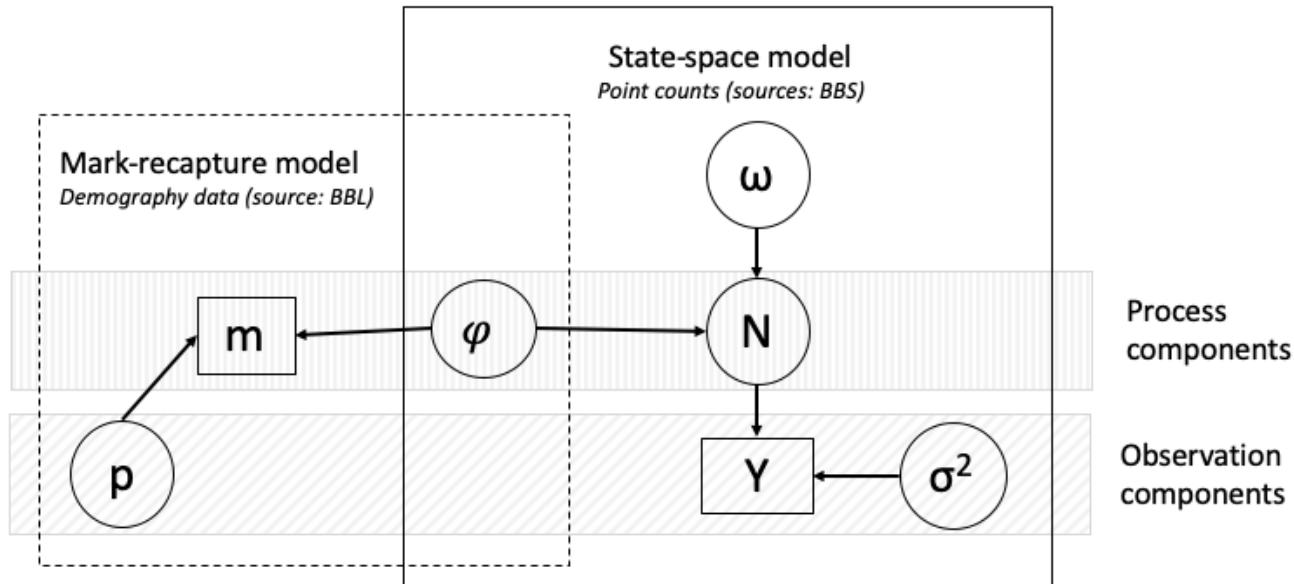
1. Data Integration

2. Integrated Population Models

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Integrated Population Models



1. Data Integration

2. Integrated Population Models

3. Software

4. End-user Needs

Software Goals

Short-term

1. Munge, integrate BBS and BBL data
2. Integrate at multiple spatial scales
3. Place-based, limited extents
4. Off-line

Long-term

5. Incorporate land use/land cover
6. Run integrated population models
7. Broad-scale (U.S., Canada)
8. On-line

1. Data Integration

2. Integrated Population Models

3. Software

4. End-user Needs

Identify and Incorporate End-user Needs

Challenges

1. Who are the end-users? 2. Who the data and science feasibly serve? 3 Iterative feedback to identify end-user
 - **needs**
 - **actual use**
2. Producing adaptable products

Identify and Incorporate End-user Needs

Approach

1. Working groups
 - data curators/managers
 - modellers/analysts
 - back-end developers
 - practitioners
 - decision makers
2. Iterative feedback

Anticipated Products

1. Software

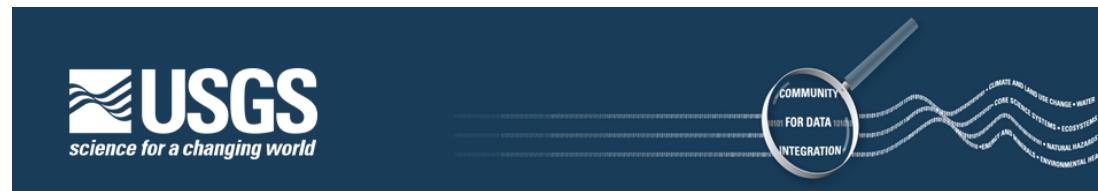
- Data integration
- Integrated population models2. **Roadmap**
- Integration for population models
- Identify and incorporate end-users

Collaborators

- Tristan Wellman
- Karen Jenni
- Sky Bristol
- Steve Aulenbach
- Ken Bagstad
- Andy Royle
- Kevin Pope
- Drew Tyre
- Lyndsie Wszola
- Gabby Palomo
- Nat Price
- Brian Fath
- Christie Bahlai
- Eric Pedersen
- Easton White
- Xavier Benito

Some Relevant Plugs

<https://www.usgs.gov/centers/cdi>



- ▼ Collaboration Areas
 - Artificial Intelligence/Machine Learning
 - CDI Collaboration Areas 101
 - Citizen-Centered Innovation Community
 - Communication Working Group (CWG)
 - Connected Devices Working Group (CDWG)
 - Data Management Working Group
 - Data Science at the USGS
 - Earth-Science Themes Working Group
 - General Project Workspaces
 - Interagency Collaborative for Environmental Modeling and Monitoring
 - Semantic Web Working Group
 - Software Development Cluster
 - Technology Stack Working Group (TSWG)
 - USGS DevOps Working Group

Funding/Opportunities: Grad Students

Summer Program in Austria: Systems Analysis



International Institute for
Applied Systems Analysis
IIASA www.iiasa.ac.at

Application Information

Registrations for the 2020 program are open from 7 Oct 2019 - 11 Jan 2020.



Who should apply?

The program is designed for PhD students (ideally about 2 years prior to receiving their PhD) working on a topic compatible with ongoing research at IIASA and a wish to explore the policy implications of their work.

Participants will be working under the direct supervision



CONTACT DETAILS

Tanja Huber

YSSP Coordinator & Team Leader
Young Scientists Summer Program
T +43(0) 2236 807 344
huber@iiasa.ac.at

Funding/Opportunities: All Students!

USGS Pathways

- For undergraduate & graduate students
- Leads to permanent employment

Pathways Internship Program

DOI - USGS Pathways Internship Program

Effective 07/10/2012

The USGS Internship Program is designed to provide students enrolled in a wide variety of educational institutions, from high school to graduate level, with opportunities to work in agencies and explore Federal careers while still in school and getting paid for the work performed.

Contacts

[USGS Pathways Program](#)

[USGS Pathways Program](#)

Email: pathways@usgs.gov

Funding/Opportunities: Grad Students

Summer Program in Austria: Systems Analysis



International Institute for
Applied Systems Analysis
IIASA www.iiasa.ac.at

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huber@iiasa.ac.at

Funding/Opportunities: Postdocs

usgs.gov/centers/mendenhall/

- For senior graduate students and post-docs



Mendenhall Research Fellowship Program

Theoretical, Quantitative Ecology Ph.D. Assistantship

Tenhumberg Lab, University of Nebraska-Lincoln

PhD Candidate Theoretical or Quantitative Ecology – Nebraska

Agency	University of Nebraska-Lincoln
Location	Lincoln NE
Job Category	Graduate Assistantships
Salary	see https://biosci.unl.edu/financial-aid-incoming-graduate-students
Start Date	08/01/2020
Last Date to Apply	12/01/2019