

# Existing Models and Inspiring New Networks-of-Networks: *Dispatches from a network-of- networks*

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# About Me

- Background
  - I study the impacts of global change on biodiversity with a focus on butterflies
- Why am I here?
  - Lead a network of butterfly monitoring networks
  - Work in several collaborative networks focused on building infrastructure for the community (web outreach, teaching, research tools)
  - Part of many collaborative research networks
    - Workshops in synthesis centers
    - Research collaborations

# My current networks

**MonarchNet**  
The North American network of monarch butterfly monitoring programs

**WELCOME TO MONARCHNET!**  
Monarch butterflies (*Danaus plexippus*) are one of the world's most well-known and beloved insects. In North America their spectacular migratory behavior makes them a flagship species, not just for insects but for all migratory species. A network of North American monitoring programs, some focused solely on the monarch butterfly and some focused on all butterflies, gather data on all stages of their migratory cycle.

**NEWS**  
**MonarchNet News, February 2019**  
In this issue you'll find information on the migration of Pacific Northwest monarchs, updates on the value of citizen science in learning, a featured scientist, and a program update... [more](#)  
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**MonarchNet News, February 2018**  
The February 2018 issue of MonarchNet News reports the first year results of Nature's Notebook Nectar Connectors, shares insight from a citizen scientist, features Milkweed Matters... [more](#)  
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**CURRENT FEATURED SCIENTIST**  
**Giovanni**  
Giovanni is a 7th grade student and butterfly activist at Arthur Ashe Charter School in New Orleans. He spoke with him to learn more about his interest in butterflies.

**ButterflyNET**

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ABOUT THE PROJECT MEET THE SCIENTISTS WATCH OUR YOUTUBE

PHYLOGENY GEOGRAPHY TRAITS

**The North American Butterfly Monitoring Network**  
*working together to advance knowledge on butterflies*

Home About Us Gain Monitoring Programs Activities

**BNN: The Butterfly Network News**  
Sign up here for the Butterfly Network News, the quarterly e-newsletter of The Butterfly Network.  
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**Welcome to the Butterfly Network**  
Every year, thousands of volunteers go into the field to collect data on butterflies. These networks of naturalists, activists and educators are part of a growing movement called "citizen-science" that is changing the way we do science today. Of course, "citizen-science" isn't really new since amateur naturalists have always contributed heavily to our knowledge of biodiversity through collections and natural history observations.  
Now, organized programs to collect butterfly data are expanding rapidly. This network includes monitoring programs, informatics experts, and downstream data users. Our goal is to expand the scale at which we are collecting data, allow for greater participation, and greater data access so we can track not just distributions, but timing, yearly changes, unusual events, and dynamics at local, regional, and continental scales.

**Featured Scientist**  
**Taron, Doug**  
Doug is the lead of the Illinois Butterfly Monitoring Network  
[Read more](#)

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**The Power of Math + Biology + Community**  
QUBES is a community of math and biology educators who share resources and methods for preparing students to tackle real, complex, biological problems.

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**News**  
Fall 2019 Faculty Mentoring Networks - Registrations are open!  
Please join us for an EDSIN WebChat with the broader NSF INCLUDES.  
QUBES Newsletter - August 2019

**Latest Tweet**  
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**Resources**  
Created by our members and partners  
Individual faculty and partnering projects contribute teaching resources for others to adopt, adapt, and implement in their own courses. QUBES

# International collaborations

**CESAB**  
CENTER FOR SYNTHESIS AND ANALYSIS OF BIODIVERSITY

FRB  
FONDATION POUR LA RECHERCHE SUR LA BIODIVERSITE

A centre created and developed by the FRB

**LOLA-BMS**

How Local-scale processes build up the Large-scale response of Butterflies to global changes: Integrative analysis across Monitoring Schemes

Principal Investigator: Romain Julliard, Muséum national d'Histoire naturelle (MNHN) (julliard@mnhn.fr); Co-PI: Guy Pe'er, UFZ, Germany

Post-Doctor: Reto Schumucki

11 participants: Leslie Ries, University of Maryland, USA, Chris van Swaay, De Vlinderstichting, The Netherlands, Arco van Strien, Netherlands Statistics, The Netherlands, David Roy, CEH, United Kingdom, Jeremy Thomas, University of Oxford, United Kingdom, Josef Settele, UFZ, Germany, Elisabeth Kühn, UFZ, Germany, Janne Heliölä, Finnish Envir. Inst., Finland, Mikko Kuussaari, Finnish Envir. Inst., Finland, Constanti Stefanescu, Museu Granollers-Ciències Naturals, Spain, Racheli Schwartz-Tzachor, Ramat Hanadiv Nature Park, Israel, Oliver T.H., NERC Centre for Ecology & Hydrology, Wallingford, Oxfordshire, UK

**Abstract:**  
The monitoring of biodiversity in response to environmental changes still much depends on human observers, and greatly relies on the activity of volunteers. Large data bases have been developed over time, following more or less standardized protocols. Butterflies are the group of animals most studied after birds, to evaluate the consequences of global changes on biodiversity. Standard Butterfly

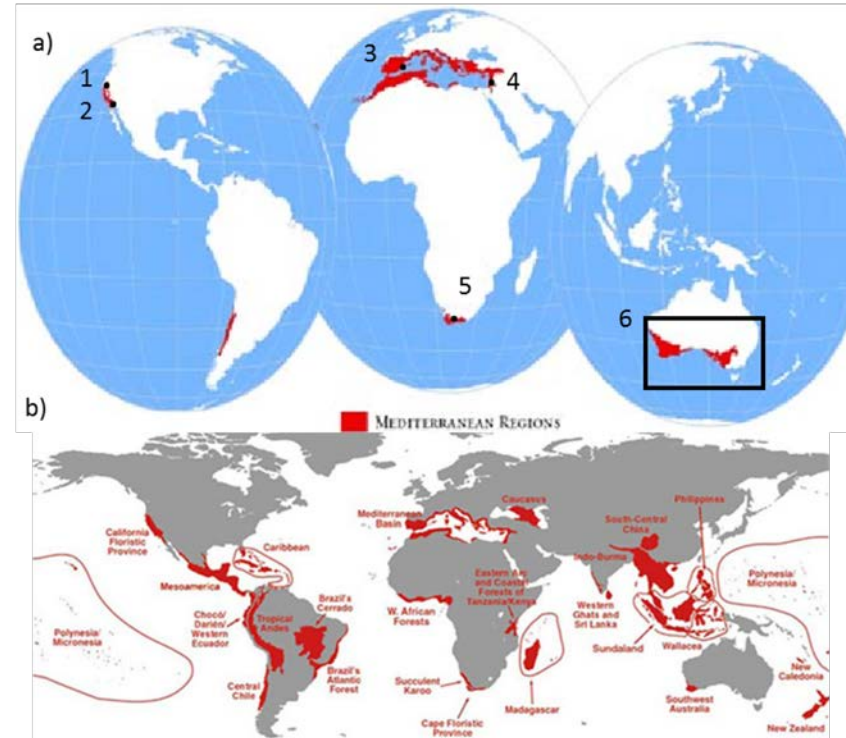


Figure 1. A map of Mediterranean biomes (a). This map also shows the location of several programs to monitor butterflies. These include the Shapiro Butterfly Monitoring Program(BMP) (1: launched 1972), the Orange County BMP (2: 2011), the Catalan BMP (3: 1996), the Israeli BMP (4: 2009), the South African (5: current atlas program, planning BMP), and Australia (6: current atlas program). All Mediterranean biomes are included in Conservation International Global Hotspots for Biodiversity (b)

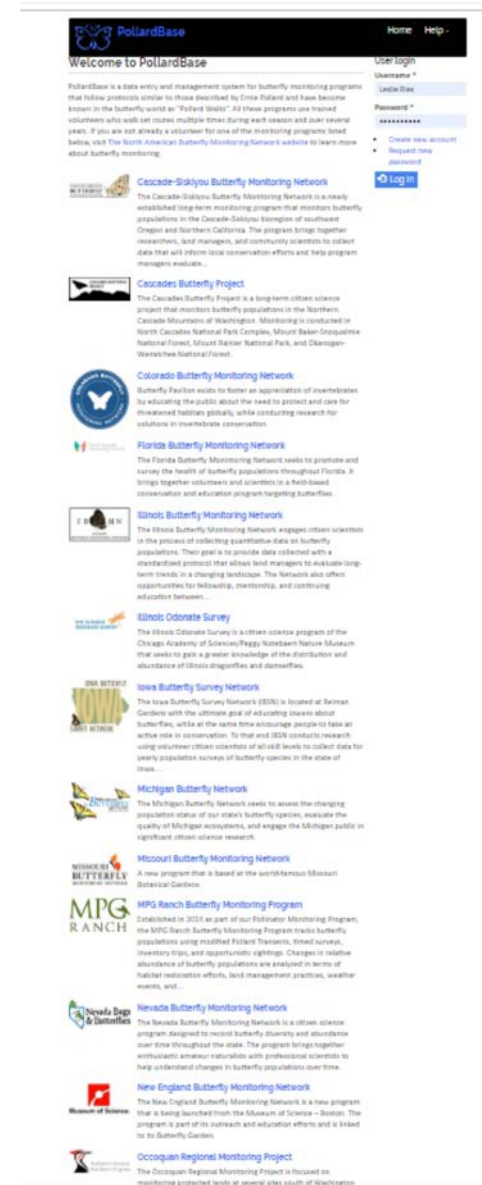
# Network of Network Characteristics

- International engagement integral to success of activities
- Aligned mission and goals among the participating networks
- Leveraged resources across networks for mutual benefit
- Professional skills and global research perspectives developed
- Protocols, activities, products developed that reduce barriers to international collaboration

# Lessons learned: *Engagement is integral to success of activities*

## The North American Butterfly Monitoring Network

- One of my key goals was to support data management activities for citizen science butterfly monitoring networks (because I wanted to be able to use their data!)
  - Could only support one system
  - Needed a lot of buy in to make a single system work
  - Expanded our goals to cover a broader suite of activities



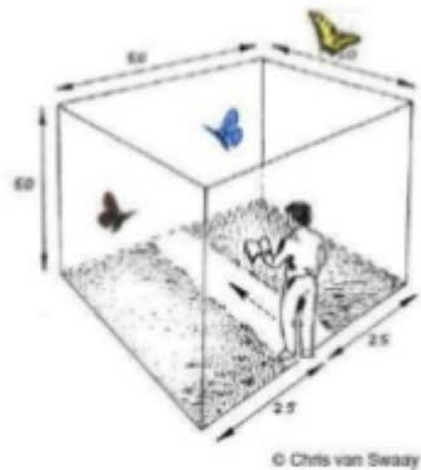
The screenshot shows the PollardBase website interface. At the top, there is a navigation bar with 'Home' and 'Help' links. Below the navigation bar, there is a 'Welcome to PollardBase' message and a 'User login' section with fields for 'Username' and 'Password', and buttons for 'Log in', 'Create new account', and 'Request new account'. The main content area features a list of butterfly monitoring networks, each with a logo and a brief description:

- Cascade-Siskiyou Butterfly Monitoring Network**: The Cascade-Siskiyou Butterfly Monitoring Network is a newly established long-term monitoring program that monitors butterfly populations in the Cascade-Siskiyou bioregion of southwest Oregon and Northern California. The program brings together researchers, land managers, and community members to collect data that will inform local conservation efforts and help program managers evaluate...
- Cascades Butterfly Project**: The Cascades Butterfly Project is a long-term citizen science project that monitors butterfly populations in the Northern Cascade Mountains of Washington. Monitoring is conducted in North Cascades National Park Complex, Mount Baker-Snoqualmie National Forest, Mount Rainier National Park, and Olympic-Nemah National Forest.
- Colorado Butterfly Monitoring Network**: Butterfly Pavilion wants to foster an appreciation of invertebrates and educate the public about the need to protect and use our threatened habitats globally, while conducting research for solutions in invertebrate conservation.
- Florida Butterfly Monitoring Network**: The Florida Butterfly Monitoring Network seeks to promote and survey the health of butterfly populations throughout Florida. It brings together volunteers and scientists in a field-based conservation and education program targeting butterflies.
- Illinois Butterfly Monitoring Network**: The Illinois Butterfly Monitoring Network engages citizen scientists in the process of collecting quantitative data on butterfly populations. Their goal is to provide data collected with a standardized protocol that allows land managers to evaluate long-term trends in a changing landscape. The network also offers opportunities for fellowship, mentorship, and continuing education between...
- Illinois Odonate Survey**: The Illinois Odonate Survey is a citizen science program of the Chicago Academy of Science/Pepper Institute Nature Museum that seeks to give a greater knowledge of the distribution and abundance of Illinois dragonflies and damselflies.
- Iowa Butterfly Survey Network**: The Iowa Butterfly Survey Network (IBSN) is located at Roman Catholic with the ultimate goal of educating Iowans about butterflies, while at the same time encourage people to take an active role in conservation. To that end, IBSN conducts research using volunteer citizen scientists of all skill levels to collect data for year's population surveys of butterfly species in the state of Iowa.
- Michigan Butterfly Network**: The Michigan Butterfly Network seeks to assess the changing population status of our state's butterfly species, evaluate the quality of Michigan ecosystems, and engage the Michigan public in significant citizen science research.
- Missouri Butterfly Monitoring Network**: A new program that is based at the world-famous Missouri Botanical Garden.
- MPG Ranch Butterfly Monitoring Program**: Established in 2010 as part of our PollardBase Monitoring Program, the MPG Ranch Butterfly Monitoring Program monitors butterfly populations using modified Pollard Transects, timed surveys, inventory trips, and opportunistic sightings. Changes in relative abundance of butterfly populations are analyzed in terms of habitat restoration efforts, land management practices, weather events, and...
- Nevada Bug & Butterfly**: The Nevada Butterfly Monitoring Network is a citizen science program designed to record butterfly diversity and abundance over time throughout the state. The program brings together enthusiastic amateur naturalists with professional scientists to help understand changes in butterfly populations over time.
- New England Butterfly Monitoring Network**: The New England Butterfly Monitoring Network is a new program that is being launched from the Museum of Science - Boston. The program is part of an outreach and education effort and is linked to its Butterfly Garden.
- Oregonian Regional Monitoring Project**: The Oregonian Regional Monitoring Project is focused on monitoring protected lands at several sites south of Washington.

# Lessons learned:

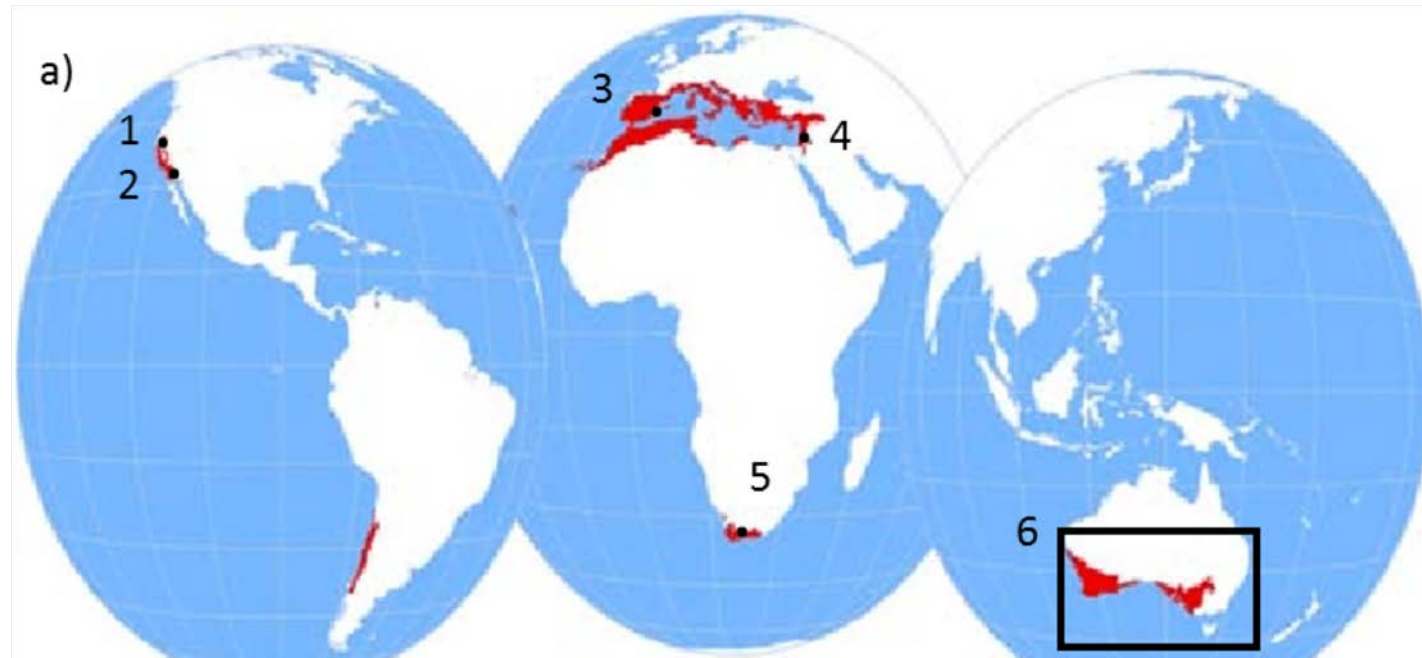
## ***Engagement is integral to success of activities***

- Cross-boundary synthesis of network data requires buy in from all data producers
- Cultural barriers (including from institutions and different disciplines) can be formidable



Lessons learned:  
***Engagement is integral to success of activities***

Personal research goal: models of how species respond to global change that are generalizable (across systems)





# Lessons learned: *Aligned missions and goals among networks*



The screenshot shows the website for The North American Butterfly Monitoring Network. The header features a blue butterfly logo and the text "The North American Butterfly Monitoring Network" with the tagline "working together to advance knowledge on butterflies". A green navigation bar contains links for Home, About Us, Goals, Monitoring Programs, and Activities. The main content area is titled "Goals" and contains a paragraph explaining the network's purpose and a list of six major goals. A sidebar on the right, titled "Goals", lists these six goals in detail. The bottom of the page features a dark blue footer with the Georgetown University logo and name.

## The North American Butterfly Monitoring Network

working together to advance knowledge on butterflies

Home About Us Goals Monitoring Programs Activities

### Goals

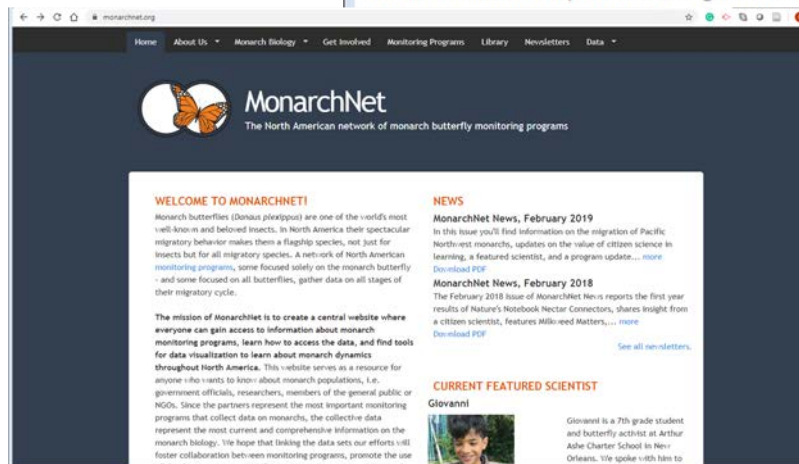
Every year in North America, thousands of citizen scientists record information on the continent's butterfly species through a large variety of programs. Butterfly monitoring began in the 1970s and has expanded rapidly, especially since 2000. Yet currently these programs are little known and under-utilized by both the general public and the scientific community. Further, the tens of thousands of observations that are recorded each year receive different kinds and levels of data management and most data are not easily available to the public. At our inaugural workshop in May 2012, we formed a network of volunteer-based monitoring programs and supporting institutions with the goal of developing shared approaches to data management, visualization, and analytical tools designed to handle this increasingly large data stream. We have six major goals.

#### Goals

- GOAL 1: Track all North American butterfly monitoring
- GOAL 2: Standardize protocols as much as possible
- GOAL 3: Develop or enhance data management systems
- GOAL 4: Share data
- GOAL 5: Expand program participation
- GOAL 6: Develop analytical tools

ation  
EGIN

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The screenshot shows the MonarchNet website. The header includes the MonarchNet logo and the text "The North American network of monarch butterfly monitoring programs". The main content area is titled "WELCOME TO MONARCHNET" and contains a paragraph explaining the network's purpose. Below this, there are sections for "NEWS" and "CURRENT FEATURED SCIENTIST". The "NEWS" section includes two articles: "MonarchNet News, February 2019" and "MonarchNet News, February 2018". The "CURRENT FEATURED SCIENTIST" section features a photo of Giovanni and a short bio.

Home About Us Monarch Biology Get Involved Monitoring Programs Library Newsletters Data

## MonarchNet

The North American network of monarch butterfly monitoring programs

### WELCOME TO MONARCHNET

Monarch butterflies (*Danaus plexippus*) are one of the world's most well-known and beloved insects. In North America their spectacular migratory behavior makes them a flagship species, not just for insects but for all migratory species. A network of North American monitoring programs, some focused solely on the monarch butterfly - and some focused on all butterflies, gather data on all stages of their migratory cycle.

The mission of MonarchNet is to create a central website where everyone can gain access to information about monarch monitoring programs, learn how to access the data, and find tools for data visualization to learn about monarch dynamics throughout North America. This website serves as a resource for anyone who wants to know about monarch populations, i.e. government officials, researchers, members of the general public or NGOs. Since the partners represent the most important monitoring programs that collect data on monarchs, the collective data represent the most current and comprehensive information on the monarch biology. We hope that linking the data sets our efforts will foster collaboration between monitoring programs, promote the use of our data, and increase our monitoring programs' monitoring capabilities.

### NEWS

#### MonarchNet News, February 2019

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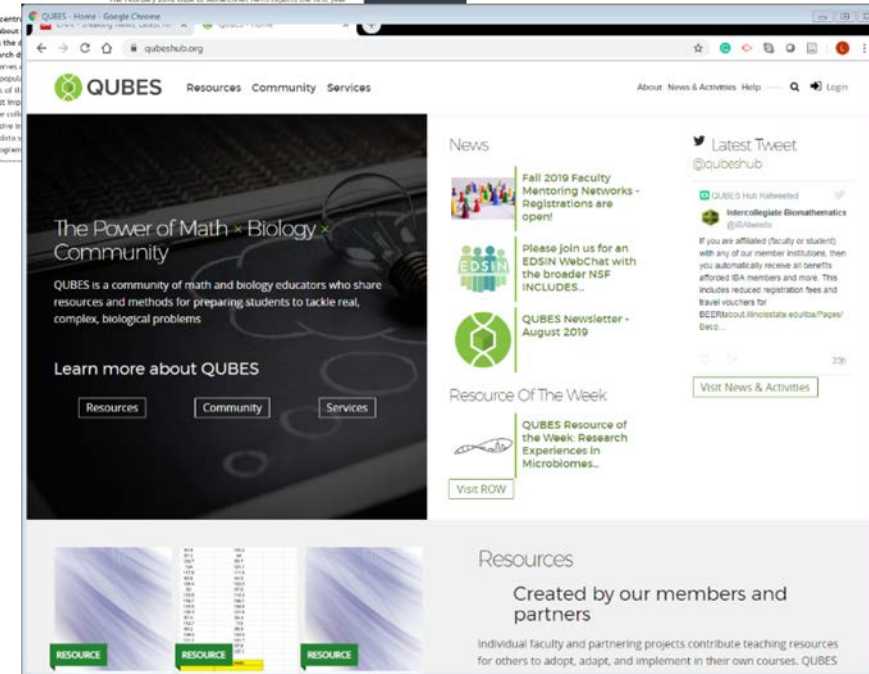
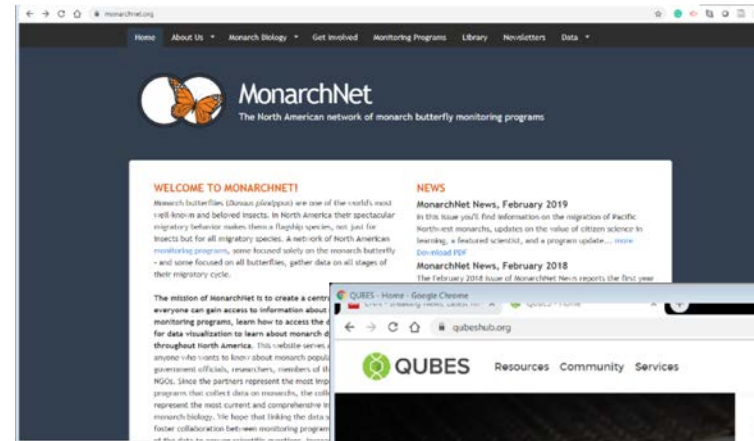
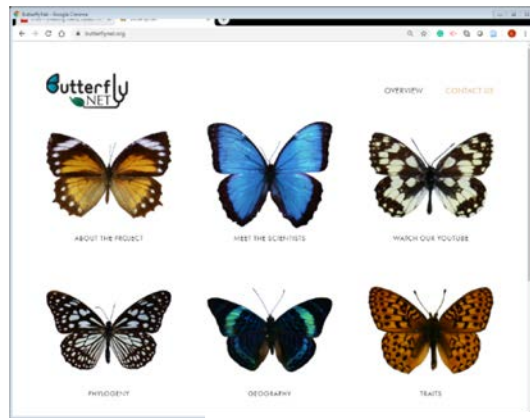
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### CURRENT FEATURED SCIENTIST

#### Giovanni

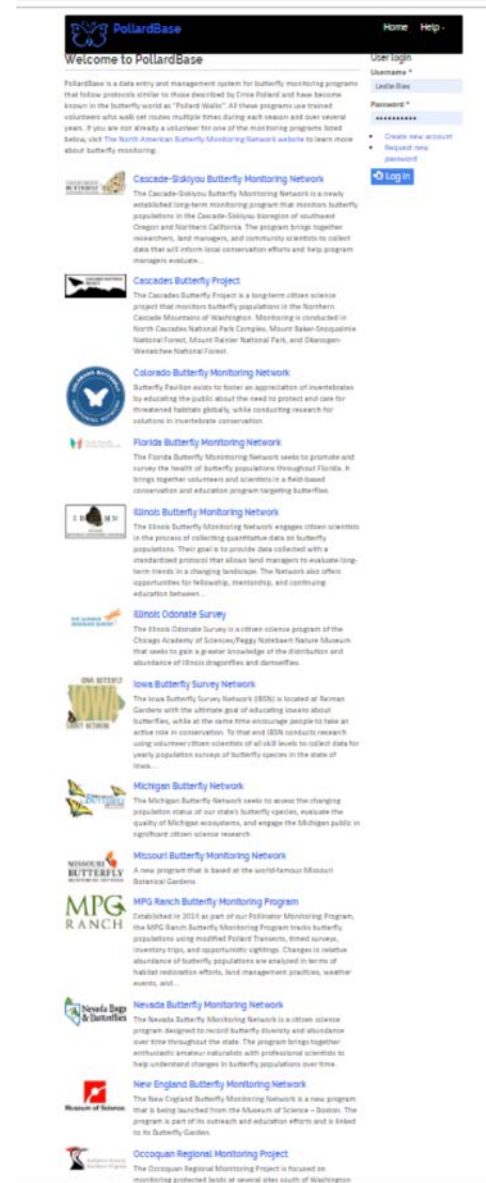
Giovanni is a 7th grade student and butterfly activist at Arthur Ashe Charter School in New Orleans. We spoke with him to

# Lessons learned: *Aligned missions and goals among networks*



# Lessons learned: *Leverage resources across networks for mutual benefit*

- The main benefit for all groups is a data entry and management system that allowed them to shift their focus from data management to:
  - Recruitment
  - Training
- Biennial meetings allow for continued interactions and to articulate shared interests
- Support for new members through mentorship and lessons learned
  - Goals to expand those services are still on hold but are always in our sites

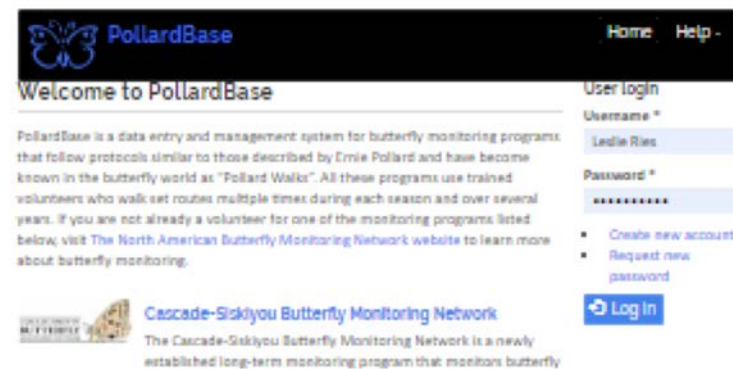


# Lessons learned: *Sustained engagement requires some kind of value-add for network members (unless you are meeting a critical need)*

Q: What constitutes added v

A: Lots of things, including:

- Prestige
- Research updates
- Research opportunities
- Networking/friendship



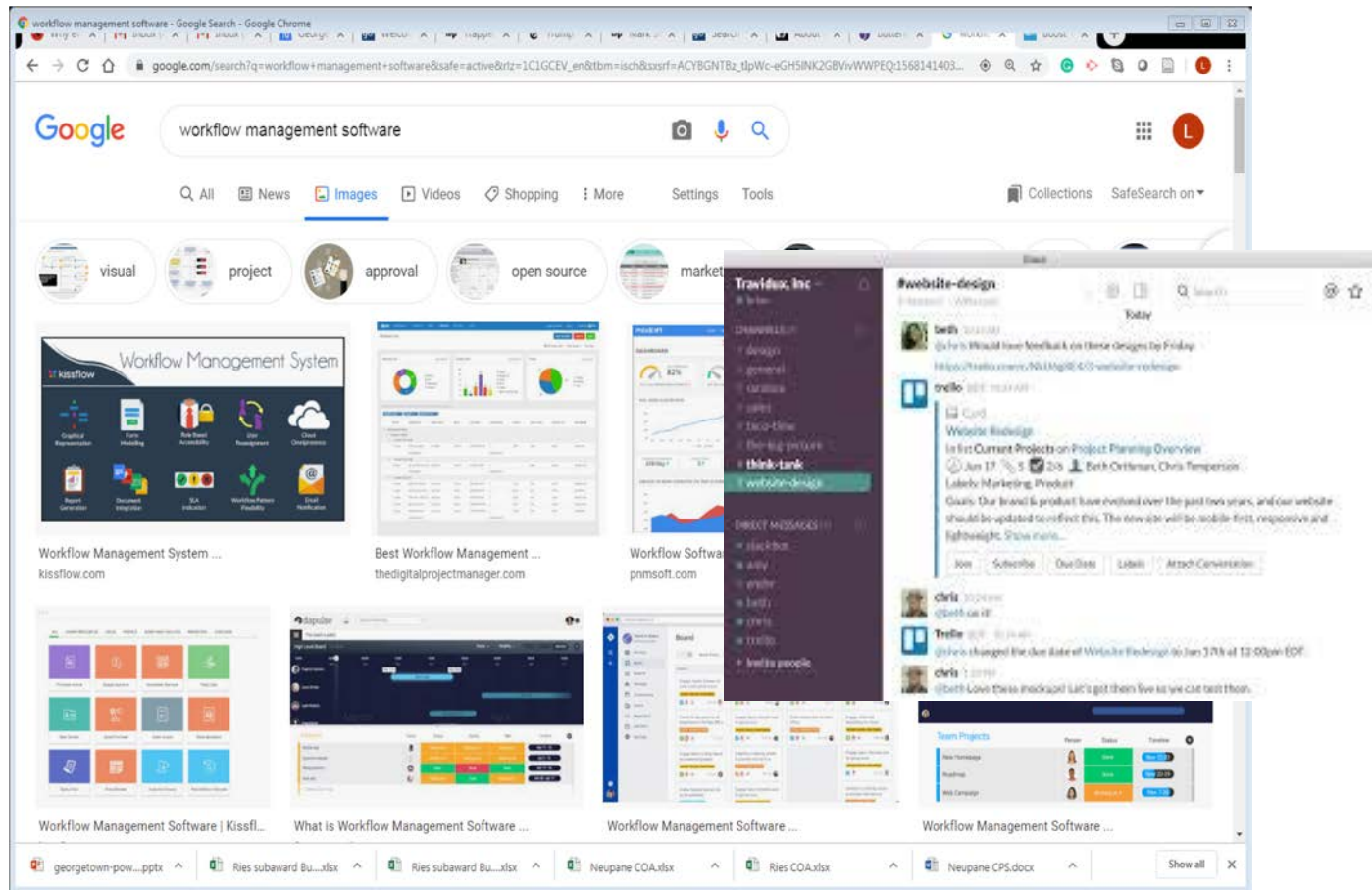
# Lessons learned: *Face-to-face interactions among network members is best way to build a cohesive group.*



Participants in

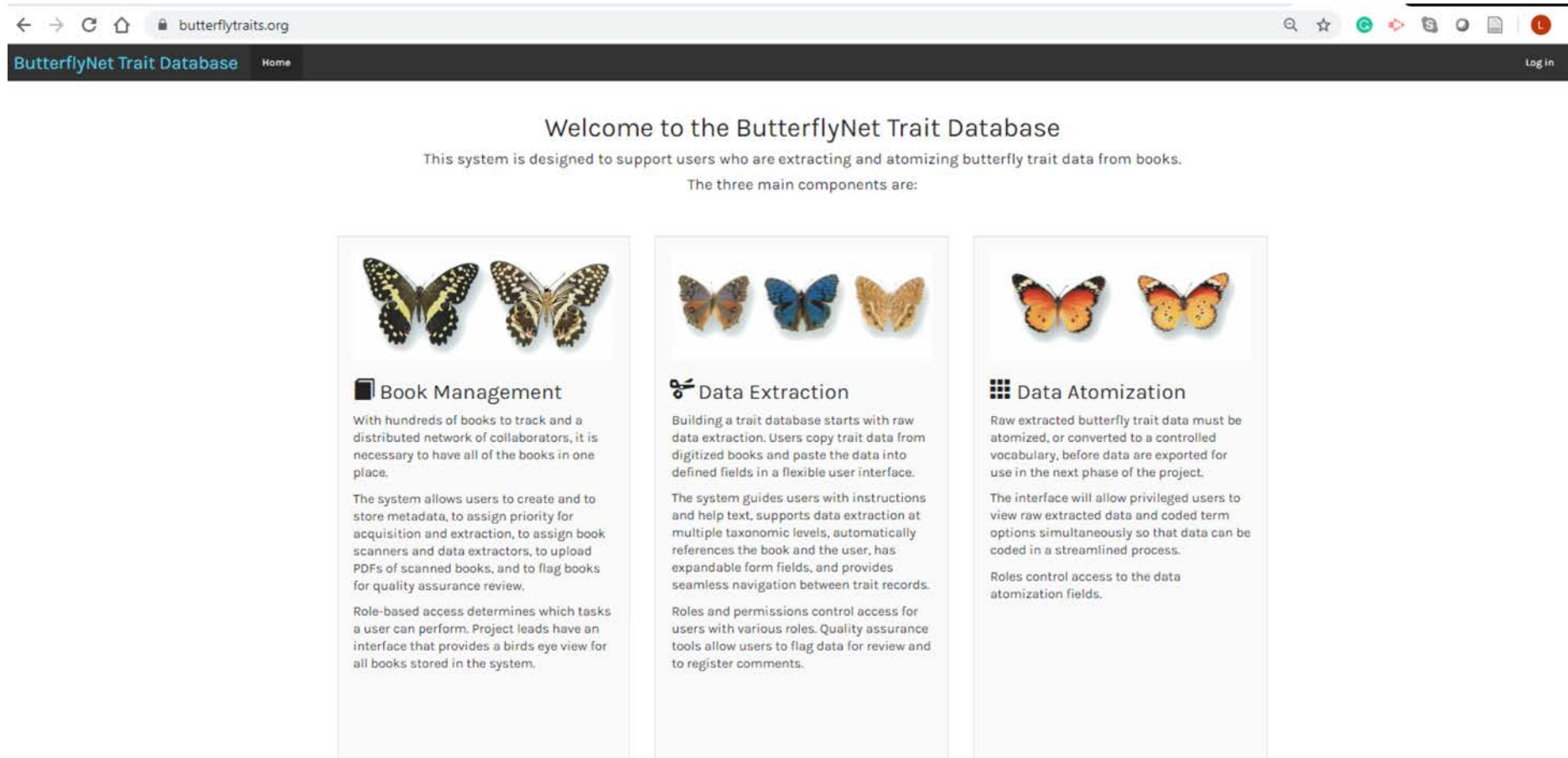


# Lessons learned: *Protocols, activities and products that reduce barriers to participation*



- There are great systems out there, but people involved in multiple collaborations can suffer from “platform” overload
- Without widespread buy-in, may be best to stick to email and google docs.

# Although, in some cases, a shared platform is essential to success. And you get what you pay for!!!




← → ↻ 🏠 butterflytraits.org 🔍 ☆ 🌐 📄 📁 📧

ButterflyNet Trait Database Home Log in

## Welcome to the ButterflyNet Trait Database

This system is designed to support users who are extracting and atomizing butterfly trait data from books.

The three main components are:




### 📖 Book Management

With hundreds of books to track and a distributed network of collaborators, it is necessary to have all of the books in one place.

The system allows users to create and to store metadata, to assign priority for acquisition and extraction, to assign book scanners and data extractors, to upload PDFs of scanned books, and to flag books for quality assurance review.

Role-based access determines which tasks a user can perform. Project leads have an interface that provides a birds eye view for all books stored in the system.




### 🔍 Data Extraction

Building a trait database starts with raw data extraction. Users copy trait data from digitized books and paste the data into defined fields in a flexible user interface.

The system guides users with instructions and help text, supports data extraction at multiple taxonomic levels, automatically references the book and the user, has expandable form fields, and provides seamless navigation between trait records.

Roles and permissions control access for users with various roles. Quality assurance tools allow users to flag data for review and to register comments.



### 🔢 Data Atomization

Raw extracted butterfly trait data must be atomized, or converted to a controlled vocabulary, before data are exported for use in the next phase of the project.

The interface will allow privileged users to view raw extracted data and coded term options simultaneously so that data can be coded in a streamlined process.

Roles control access to the data atomization fields.

## Lessons learned:

### ***Professional skills and global perspectives***

- True collaborations are needed when no one person or team has the skills or expertise to meet the goals of the project
- You must be prepared to hear other's perspectives, even if they conflict with your own
  - that is actually the point!!!
- Creating and maintaining networks of collaborators is a skill in and of itself
  - and that may be the skill you are bringing to the group!!



# ***Lessons learned: Without a dedicated (and competent) manager/admin, everything becomes much harder***

- Many academic researchers seem reluctant to build admin costs into their budgets (at least in my field)
- There is a lack of respect for effective leadership in this field
- A lot of the work running a network requires time and activities that are not rewarded for tenure track professors (so at least give yourself summer salary OR hire someone to manage your network, ideally someone with experience, or at least skills towards management!)