

2025 ANNUAL REPORT



**ENSURING BIODIVERSITY DATA
ARE READY TO SUPPORT ACTION**

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A MESSAGE FROM OUR PRESIDENT



As the first full year of Elimia comes to an end and I review our achievements, I feel a great sense of gratitude. Owing to the support of our wonderful partners and collaborators, we were able to carry out crucial work in biodiversity conservation spanning the boundaries between the public and private sectors.

In 2025, Elimia's activities touched on all aspects of biodiversity analytics to support the management and conservation of species of concern: measuring population trends, developing metrics of recovery, mapping distributions, and assessing extinction risk. The outputs and tools we develop are actively transforming data on the status of species and communities into insights that identify monitoring, management, and conservation needs. This is the space where we want to operate and we could not be more thrilled that we are beginning to make an impact.

Our organization's nimble structure, coupled with our breadth of expertise and knowledge in this sector, allows us to reposition ourselves quickly and strategically where we are needed most. We firmly believe organizations like ours have a pivotal role to play in our efforts to halt the biodiversity crisis, with 5 years left to achieve the ambitious targets of Kunming-Montreal Global Biodiversity Framework and local 30 x 30 initiatives around the world. We are excited to build on a strong year and work towards more biodiversity data science solutions for the benefit of our partners, the broader community, and the planet's biodiversity.

Giovanni Rapacciuolo, Ph.D.
President and Chief Scientist

ABOUT US



WHAT DRIVES US

The discovery, translation, and application of biodiversity insights in support of management and conservation action.

WHAT WE DO

Integration. We integrate, synthesize, and mobilize big biodiversity data.

Navigating the multitude of data sources on biodiversity and natural systems can be exceptionally challenging. Not all data sources are equally fit for purpose or easily accessible. What's more, each dataset comes with specific attributes and biases that need to be taken into account for robust inferences. With over 15 years of experience working in biodiversity data science, we are experts in identifying, accessing, querying, processing, and integrating the biodiversity data most relevant to the application at hand.

Analysis. We quantify biodiversity metrics and trends over space and time.

Identifying which species and ecosystems are found in a location and how they are changing over time is the basic information we need to unlock positive biodiversity outcomes. We leverage our expertise in cutting-edge ecological and evolutionary modeling techniques, AI, geospatial mapping, and time series analysis to derive metrics of biodiversity across scales of space and time.

Visualization. We convey biodiversity insights via visualizations and web tools.

At Elimia, we understand that biodiversity insights are only useful if they are communicated in a compelling way. Failure to appropriately package and convey the outcomes of biodiversity analyses means that insights will not reach their intended audience and will not be put into practice. Our ultimate objective is to open up the biodiversity big data black box and communicate complex concepts and data in concise, transparent, and compelling ways. We focus on repeatability so that the entire pipeline from data integration, to metrics, to visualization can be fully reproduced as inputs are updated.

ABOUT US



OUR SERVICES

- Mobilize open access biodiversity data repositories in real-time via Application Programming Interfaces and other methods.
- Clean up and process large tabular and spatial biodiversity datasets.
- Reconcile taxonomy across multiple datasets.
- Generate estimates of the distribution of species using machine learning and other standard approaches.
- Assess species' extinction risk.
- Identify historical and recent trends in the abundance of species and ecosystems.
- Forecast potential changes in species' distributions and population trends in response to environmental changes.
- Identify conservation priority areas based on the uniqueness and irreplaceability of local species and ecosystems.
- Communicate insights using infographics and publication-quality figures.
- Build interactive web-based applications.
- Generate standardized automated reports.
- Create state-of-the-art static and interactive maps.

OUR PARTNERS INCLUDE





ACTIVITY HIGHLIGHTS

MEASURING TRENDS

Quantifying Local Biodiversity Trends from Integrated Data Sources

Project: A Biodiversity Trends Engine for California

Main Partner(s): California Academy of Sciences, Center for Biodiversity and Community

Importance

In October 2020, California became the first US state to join the international 30x30 movement, setting out to conserve 30% and restore 30% of their lands and coastal waters by 2030. As a result, there has never been a greater need for reliable estimates of biodiversity changes, which enable identifying early warning signals of biodiversity declines, monitoring recovery following management actions, and understanding opportunities for continued regeneration of natural areas across the State. Without reliable local-scale estimates of biodiversity changes, we risk compromising the long-term success of the 30x30 initiative beyond the year 2030.

Objectives

Mobilizing hundreds of millions of species-level observations collected over the past century in California by professional scientists, amateur naturalists, and local community members and gathered via digitized museum collections and community science projects represents our best chance to quantify trends in biodiversity across large temporal, spatial, and taxonomic scales. Novel statistical approaches that can account for underlying biases in these messy but incredibly information-rich data sources have now unlocked their potential to provide reliable estimates of biodiversity trends.

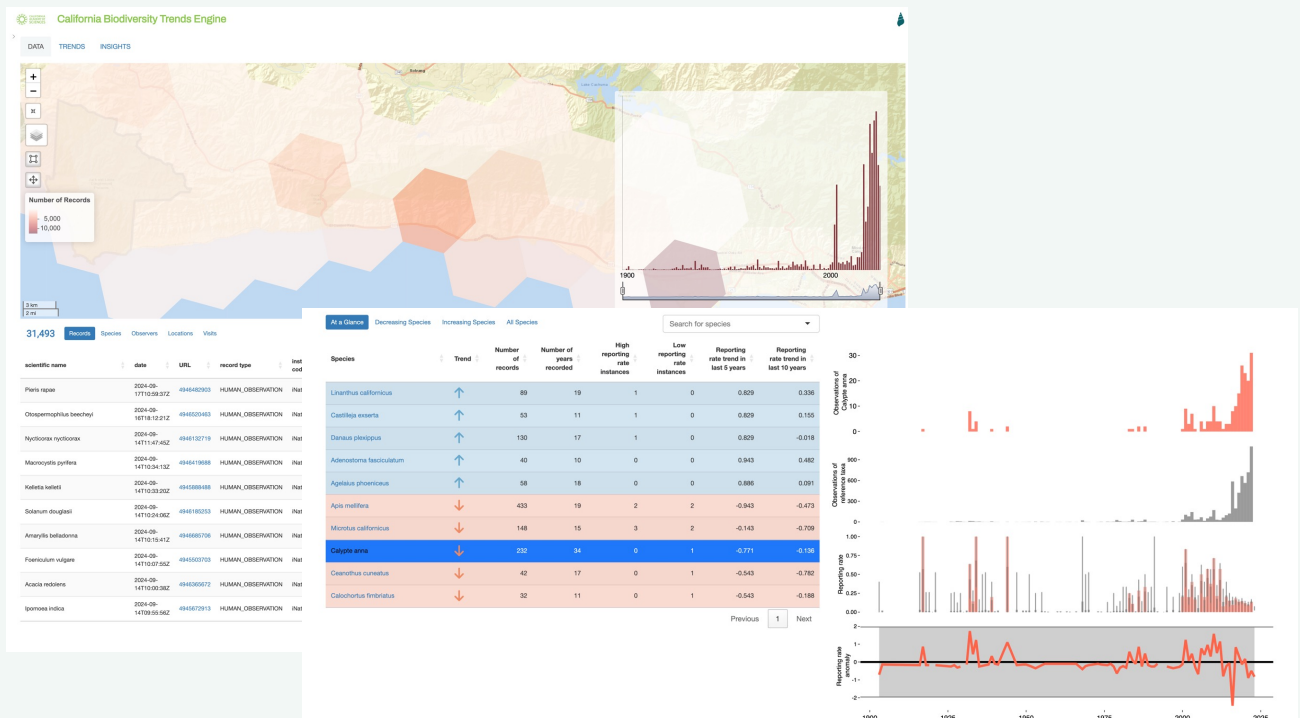
In collaboration with the California Academy of Sciences, Elimia is building an engine to quantify temporal trends in biodiversity from a combined database of digitized museum collection records and community-contributed observations for a multitude of species and ecosystems across areas of conservation interest in California. Trends are estimated for a variety of species-level and ecological community-level metrics via comparisons with historical and regional baselines, all the while accounting for biases in the frequency and intensity of observation. A focus on the detection of biodiversity changes indicative of regeneration opportunities, successful management actions, and early warning signals across core management units will enable the engine to provide locally relevant and actionable biodiversity insights.

ACTIVITY HIGHLIGHTS

MEASURING TRENDS

2025 Outcomes

- Made significant innovations in the efficient live-streaming, synthesis, and visualization of all GBIF data for a geographical place of interest.
- Developed an analytical framework and methodology to power the Biodiversity Trends Engine. Built a set of tools and functions, organized as an openly accessible R package and served via GitHub.
- Implemented analytical framework to detect recent biodiversity trends for tens of places of conservation interest in California.
- Built a first prototype of a biodiversity trends engine web application, available here: <https://calacademy-community-science.shinyapps.io/california-biodiversity-trends>.
- Begun collaborations with land managers to translate biodiversity trends detected via this tool into actionable management insights.



The [California Biodiversity Trends Engine web application](https://calacademy-community-science.shinyapps.io/california-biodiversity-trends) enables users to explore spatial and temporal patterns and changes in the rate of recording across all species found in a place of interest.

ACTIVITY HIGHLIGHTS

DEVELOPING METRICS

Developing Metrics to Quantify Biodiversity Net Gains

Project: Ecosystem Services Market Consortium Biodiversity Metric

Main Partner(s): Ecosystem Services Market Consortium, Tetra Tech

Importance

Market-based solutions are becoming increasingly key to environmental sustainability and positive outcomes for nature. Among those are programs that incentivize agricultural producers to adopt conservation practices that enhance biodiversity on their properties. These programs rely on reliable estimates of biodiversity change prior to and following implementation of given conservation practices to assess biodiversity recovery and compensate producers fairly.

Objectives

Ecosystem Services Market Consortium (ESMC) is a leader in advancing market-based solutions that drive environmental sustainability, especially through the development of carbon and greenhouse gas emissions (C/GHG) and water credits. The credits incentivize agricultural producers to adopt conservation practices that enhance carbon sequestration and water quality. ESMC is looking to add biodiversity impact programming they can weave into existing C/GHG and water programs to promote overall ecosystem health.

To support the goal of adding biodiversity impacts to existing credit programs, Elimia is supporting ESMC and collaborating with Tetra Tech on the development of a Biodiversity Metric designed to quantify the potential net biodiversity gains of different best management practices implemented by agricultural producers. In this project, Elimia's role has been to synthesize and mobilize the biodiversity knowledge and data necessary to understand and quantify the impacts of different practices on biodiversity in agroecological systems.

ACTIVITY HIGHLIGHTS

DEVELOPING METRICS

2025 Outcomes

- Synthesized published evidence towards potential biodiversity benefits of different best management practices in agroecological systems, such as cover cropping, tillage reduction, nutrient management, edge-of-field flowering strips, and riparian buffers.
- Provided expertise and support with identifying, accessing, and mobilizing open access spatial biodiversity data sources of relevance.
- Reviewed existing analysis protocols and metrics to quantify impacts of agricultural best management practices on biodiversity.
- Implemented additional analysis steps and supplemented existing framework with open access spatial biodiversity data sources.
- Supported reporting and documentation on newly developed Biodiversity Metric.
- Supported trial implementation of newly developed Biodiversity Metric.

ACTIVITY HIGHLIGHTS

MAPPING DISTRIBUTIONS

Mapping the Distributions of Rare and Threatened Species

Project: The Range and Distribution Mapping and Analysis Project

Main Partner(s): California Department of Fish and Wildlife, Conservation Analysis Unit

Importance

To conserve threatened species, we first must understand where they are. In October 2020, California became the first US state to commit to the international 30x30 movement, setting out to “protect biodiversity, advance equitable access to nature and combat climate change” by conserving 30% and restoring 30% of their lands and coastal waters by 2030. As a result, there has never been a greater need for models and maps of the distributions of rare and threatened species in California.

Objectives

The Conservation Analysis Unit of the California Department of Fish and Wildlife is undertaking the Range and Distribution Mapping and Analysis Project (RADMAP), with the objective to develop and maintain a library of species habitat models (SHM) and range maps, with a focus on imperiled plants and animals. Species habitat models (SHMs) are machine learning models that identify locations across the landscape where habitat conditions are most likely to support a given species. These models fit relationships between the relatively few known presence localities of a species and features of the local environment, such as climate, topography, geology, land cover, and land use. SHMs then predict the relative probability that habitat conditions that support the species are present across the broader landscape.

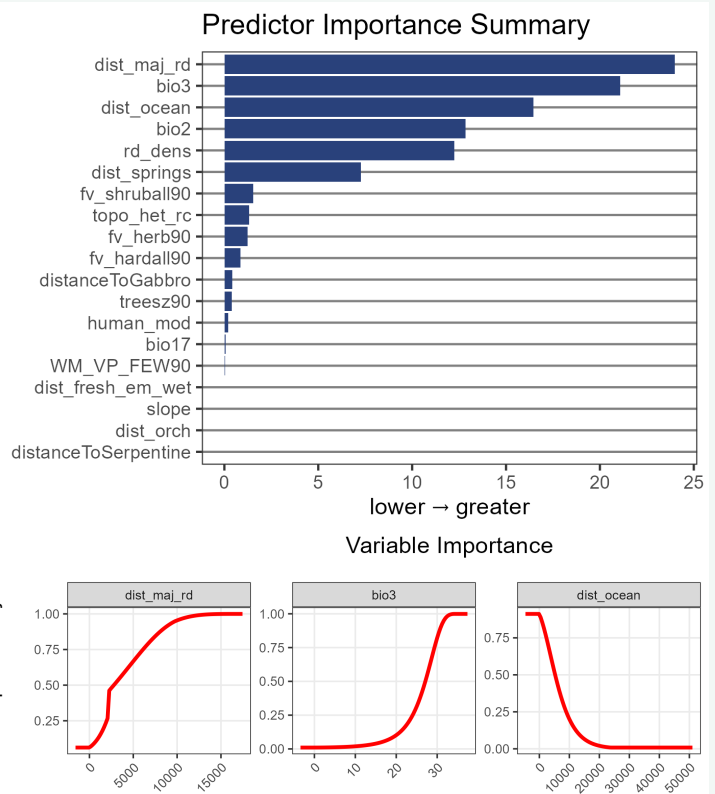
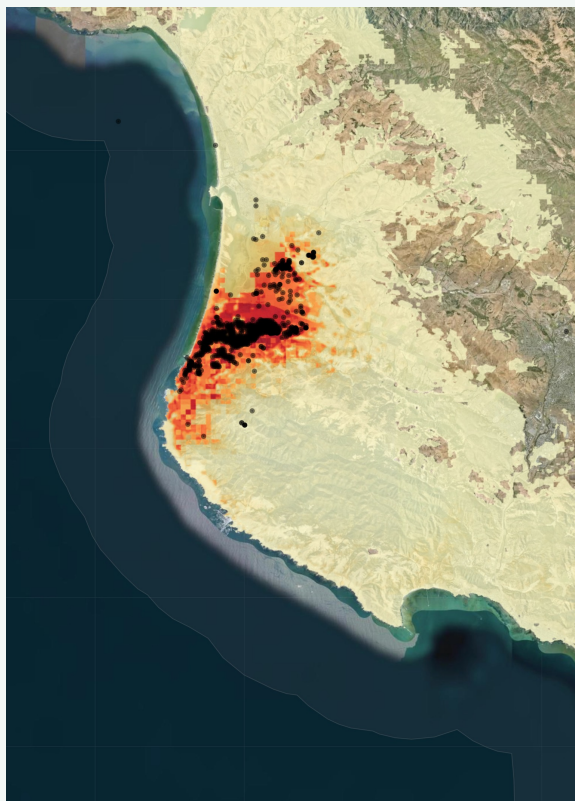
Elimia’s Chief Scientist has been partnering with the California Department of Fish and Wildlife to develop the methodological framework to generate reliable species habitat models from their data and produce models of the distributions of thousands of rare and threatened species of plants in California.

ACTIVITY HIGHLIGHTS

MAPPING DISTRIBUTIONS

2025 Outcomes

- Co-led the development of the methodological framework to produce species habitat models from rare species data at the California Department of Fish and Wildlife.
- Implemented the methodological framework to generate reliable estimates and maps of the distributions of hundreds of rare and threatened species of plants in California.
- Facilitated the review of machine learning model outputs and maps by rare species experts.



As part of the Range and Distribution Mapping and Analysis Project, ElimiA is generating predictive machine learning models and distribution maps for hundreds of California's most rare and imperiled plant species.

ACTIVITY HIGHLIGHTS

ASSESSING RARITY

Assessing Species Rarity and Extinction Risk

Project: Rapid Analysis of Rarity and Endangerment Conservation Assessment Tool (RARECAT)

Main Partner(s): NatureServe

Importance

Determining which plants, animals, and ecosystems are thriving and which are rare or declining is crucial for targeting conservation of the species and ecosystems in greatest need. Conservation status ranks are widely used throughout the conservation community and are regarded as highly credible by scientists, government agencies, and private-sector organizations. These assessments are also a valuable resource for government agencies responsible for administration of Federal, state, and provincial species conservation laws.

Objectives

NatureServe produce Conservation Assessment Status Ranks at global, national, or subnational scales for nearly all taxa in North America based on Rarity, Threat, and Trend Factors. Assessing the conservation status of a plant, animal, or ecosystem requires detailed knowledge of its distribution, population size and trends, and critical threats (e.g., habitat loss or fragmentation).

Elimia has been collaborating with NatureServe to develop a tool to support and significantly speed up NatureServe Conservation Status Assessments. NatureServe's RARECAT (Rapid Analysis of Rarity and Endangerment Conservation Assessment Tool) facilitates extraction, vetting, and filtering of distribution data, visualization of data quality and quantity over space and time, and calculation of three fundamental factors of Rarity – Range Extent, Area of Occupancy, and Number of Occurrences. Doing so, RARECAT supports higher quality, efficiency, and standardization in Conservation Assessment Status ranking practice for both common and rare taxa.

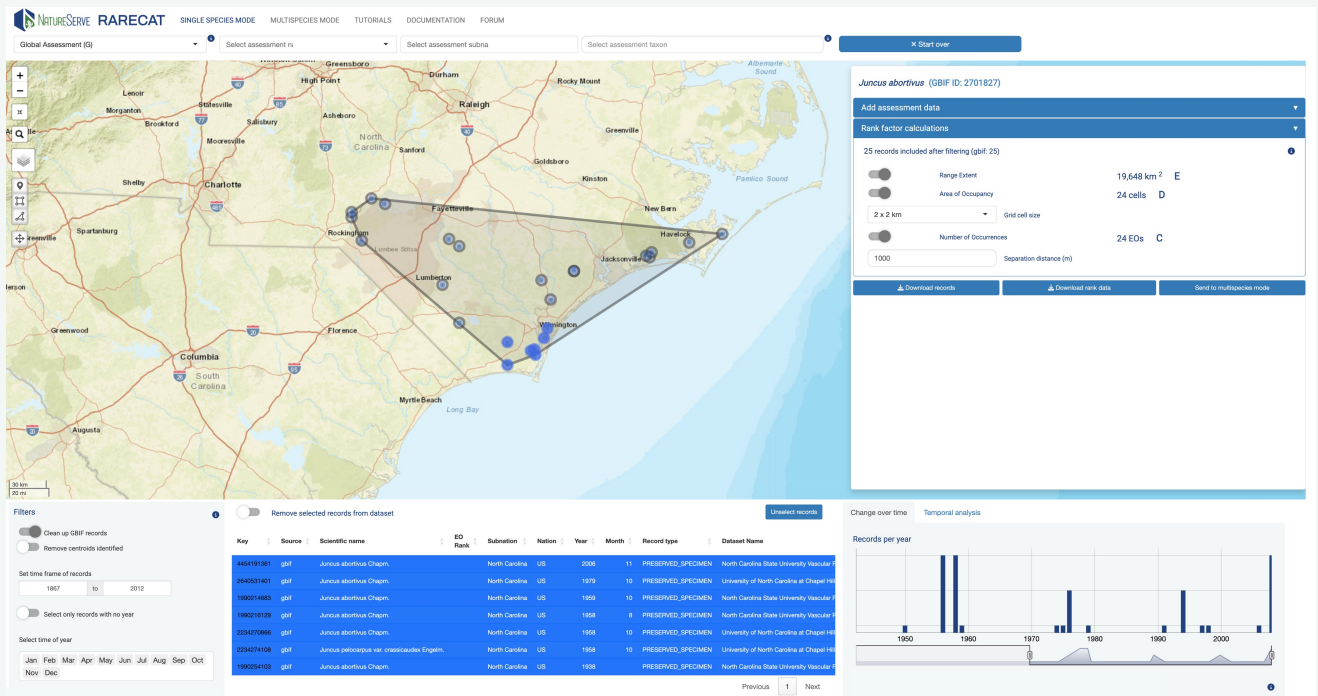
Documentation to find out more about RARECAT can be found [here](#); tutorials are also available via the NatureServe Youtube channel ([here](#) and [here](#)).

ACTIVITY HIGHLIGHTS

ASSESSING RARITY

2025 Outcomes

- Added RARECAT's Multispecies Mode to calculate rarity factors concurrently for a list of hundreds of species.
- Built a "Change over time" tool to estimate temporal change in rarity factors across set time periods.
- Built a "Temporal Analysis" tool to derive an estimate of year-on-year change in the recording rate of the assessment taxon relative to a broader reference taxon of relevance.
- Improved User Interface.
- Added the ability to carry out National and Subnational assessments.
- Added the ability to limit analyses to specific GBIF datasets.



Elimia has been collaborating with NatureServe to develop RARECAT, a tool to support higher quality, efficiency, and standardization in Conservation Status ranking practice for both common and rare taxa.

ACTIVITY HIGHLIGHTS

MEASURING RESILIENCE

Assessing Ecosystem Resilience Under Environmental Change

Project: Metrics of Wildlife Community Resilience for Sierra Nevada Forests

Main Partner(s): California Academy of Sciences, United States Forest Service

Importance

Forests have evolved to persist, rebound, and regenerate after severe disturbances like fire, disease, pests, and drought. However, climate change together with more than a century of fire suppression in the Sierra Nevada has amplified the intensity and duration of these disturbances, such that they may overwhelm the ability of forests to bounce back. In the face of these mega disturbances, federal and state governments, industry, forest communities, private groups, and NGOs are all working together to increase the pace and scale of the restoration of forest resilience. Ensuring forests are resilient is necessary because healthy forests provide clean water, clean air, places to recreate, fire protection, and economic opportunities.

Objectives

In December of 2020, the California Wildlife Conservation Board funded a collaboration between the California Academy of Sciences and the United States Forest Service with the objective to develop metrics of the current and future resilience of forest wildlife communities to stressors associated with climate change. These metrics will help inform land managers on how different management actions may influence wildlife community resilience into the future, using Sierra Nevada wildlife communities as a case study.

Elimia has been supporting the California Academy of Sciences on this project by providing assistance analyzing, visualizing, and communicating how resilience metrics are calculated and what trends in resilience metrics may imply for wildlife communities in Sierra Nevada Forests.

ACTIVITY HIGHLIGHTS

MEASURING RESILIENCE

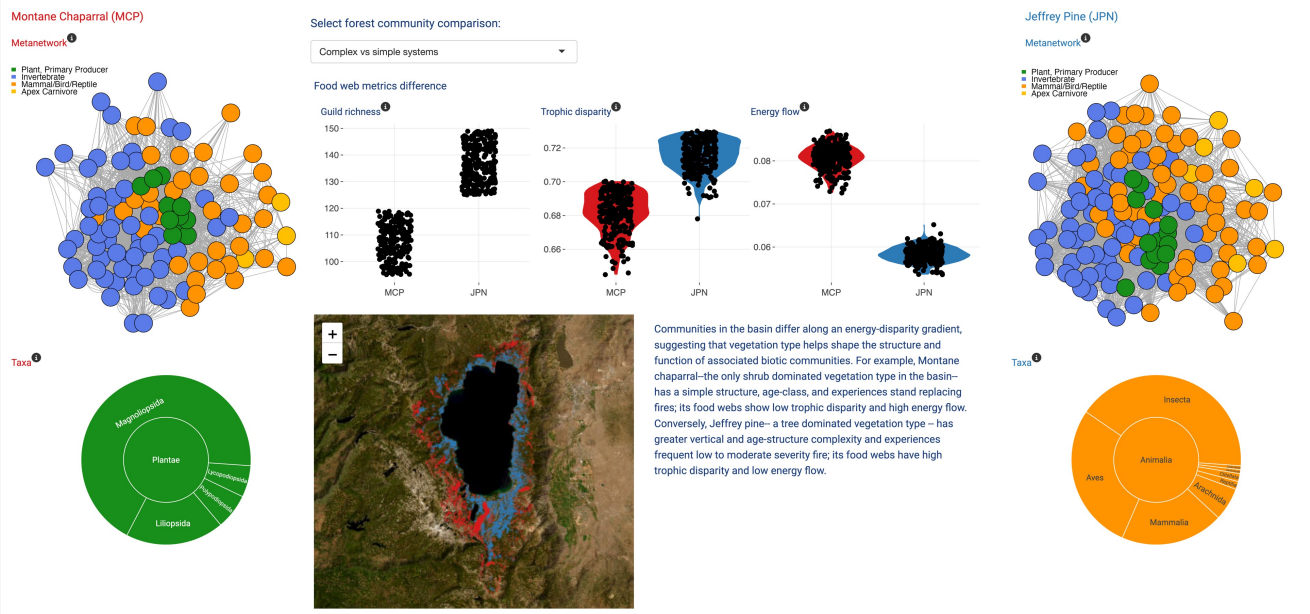
2025 Outcomes

- Advise on current outputs and outcomes of project phase 1 and potential next steps
- Create interactive web application to communicate project results

Temperate Forest Food Web App

Food Webs Forest Communities Landscape Changes

We built food webs for each of the eight different forest communities (habitats/vegetation types) in the Lake Tahoe Basin. Comparing food web metrics lets us see similarities and differences in structure, diversity, on with implications for stability and resilience. Use the drop down menu to explore similarities and differences among forest communities in the Lake Tahoe Basin.



Elimia has been supporting the California Academy of Sciences by providing assistance analyzing, visualizing, trends in ecological resilience metrics and what those may imply for wildlife communities in Sierra Nevada Forests.

ACTIVITY HIGHLIGHTS

SUPPORTING MANAGEMENT

Detecting Large-scale Biodiversity Patterns to Inform Local Management

Project: Understanding the biogeographic context of the Jack and Laura Dangermond Preserve

Main Partner(s): The Nature Conservancy, Point Conception Institute

Importance

A frequent concern about large-scale biodiversity data and metrics is that they are not relevant for local conservation on the ground. Yet, in a world where species are moving through the landscape to keep pace with rapid environmental change, some management concerns can only be addressed by taking a large-scale perspective on a given place of interest. Ensuring biodiversity findings at regional, continental, or even global scales are translated into relevant insights useful to managing species and ecosystems at local scales is key to conservation success in a changing world.

Objectives

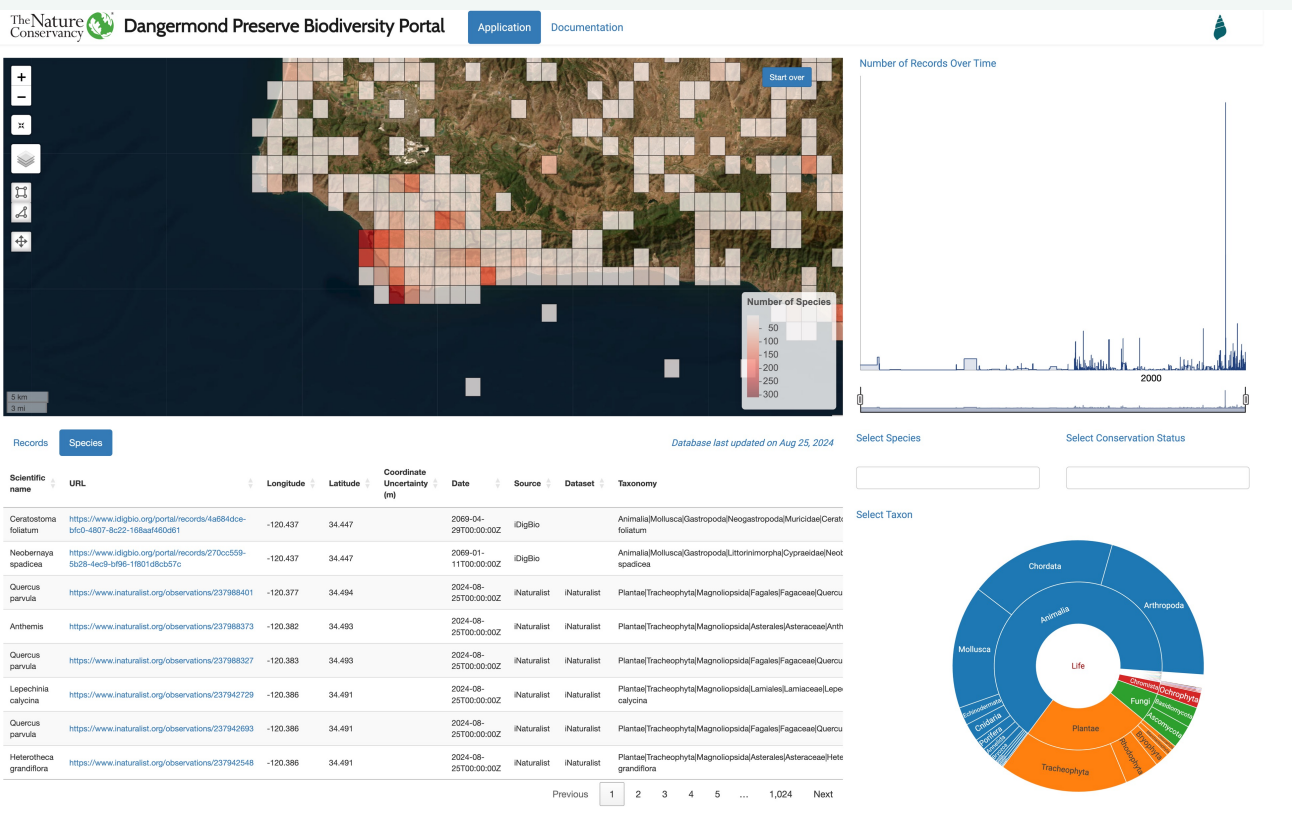
In 2017, The Nature Conservancy established the Jack and Laura Dangermond Preserve at Point Conception (Santa Barbara County, California): a place that has long been recognized as harboring a high biodiversity, including numerous imperiled animals, plants, and ecosystems that occur almost exclusively there. The high biodiversity at Point Conception has traditionally been attributed to the fact that the area represents an ecological transition zone, where northern and southern California habitat conditions and associated ecological communities converge. Appropriate management of this landscape will likely be key to a statewide biodiversity conservation strategy, with many of the species that reach their range limits in this area relying on sufficient landscape connectivity to successfully track their suitable habitat conditions north or south.

In collaboration with The Nature Conservancy's Point Conception Institute, Elimia is helping to generate the knowledge base necessary to understand what underlies the high biodiversity value at Point Conception, whether it represents an ecological transition zone in California, and what the implications may be under climate change. We are reviewing published evidence and analyzing large-scale biodiversity data at the species and ecosystem levels throughout California to provide a better assessment of this question. Outputs will enable furthering the Dangermond Preserve's biodiversity management plan and help understand how to manage this key region for the best biodiversity outcomes.

ACTIVITY HIGHLIGHTS SUPPORTING MANAGEMENT

2025 Outcomes

- Synthesized past and recent evidence on Point Conception as a biogeographic transition zone, including data, graphics, and relevant references.
- Developed code to automatically download and refresh open access data on species occurrences for the Dangermond Preserve across multiple sources.
- Analyzed California-wide data on plant ranges to understand whether Point Conception represents a hotspot of plant range limits in California.
- Built an interactive web-based application to explore species data for the Dangermond Preserve and surrounding area.



Elimia has been supporting the The Nature Conservancy's Point Conception Institute by integrating species-level biodiversity data for the Jack and Laura Dangermond Preserve across a number of data sources, and packaging those within an interactive web-based tool for the benefit of managers and researchers on the Preserve.

2025 MEDIA AND PUBLIC ENGAGEMENT HIGHLIGHTS

- Elimia was included in the [NatureTechCollective Biodiversity Sector Map](#).
- Elimia's Giovanni Rapacciuolo contributed to [the largest global assessment of freshwater animals on the IUCN Red List of Threatened Species™ to date](#).
- Elimia's Giovanni Rapacciuolo was invited to present at The Nature Conservancy's Point Conception Institute and La Kretz Research Institute [2025 Joint Science Symposium](#).
- Elimia's Giovanni Rapacciuolo was quoted in [an article by the Los Angeles Times](#) on the collection and use of community-contributed biodiversity observations.

CONTACT US



BIODIVERSITY DATA SCIENCE SOLUTIONS

Elimia is an S Corporation registered in California.

We are thankful to our partners and collaborators for their ongoing support.

To learn more about the work we do and how we may be able to help you:

- Visit elimia.io
- Email us at gjo@elimia.io
- Find us on LinkedIn at <https://www.linkedin.com/company/elimia>

