WHATS ALL THE BUZZ? LEARNING THE LANGUAGE OF ASSESSING POLLINATORS

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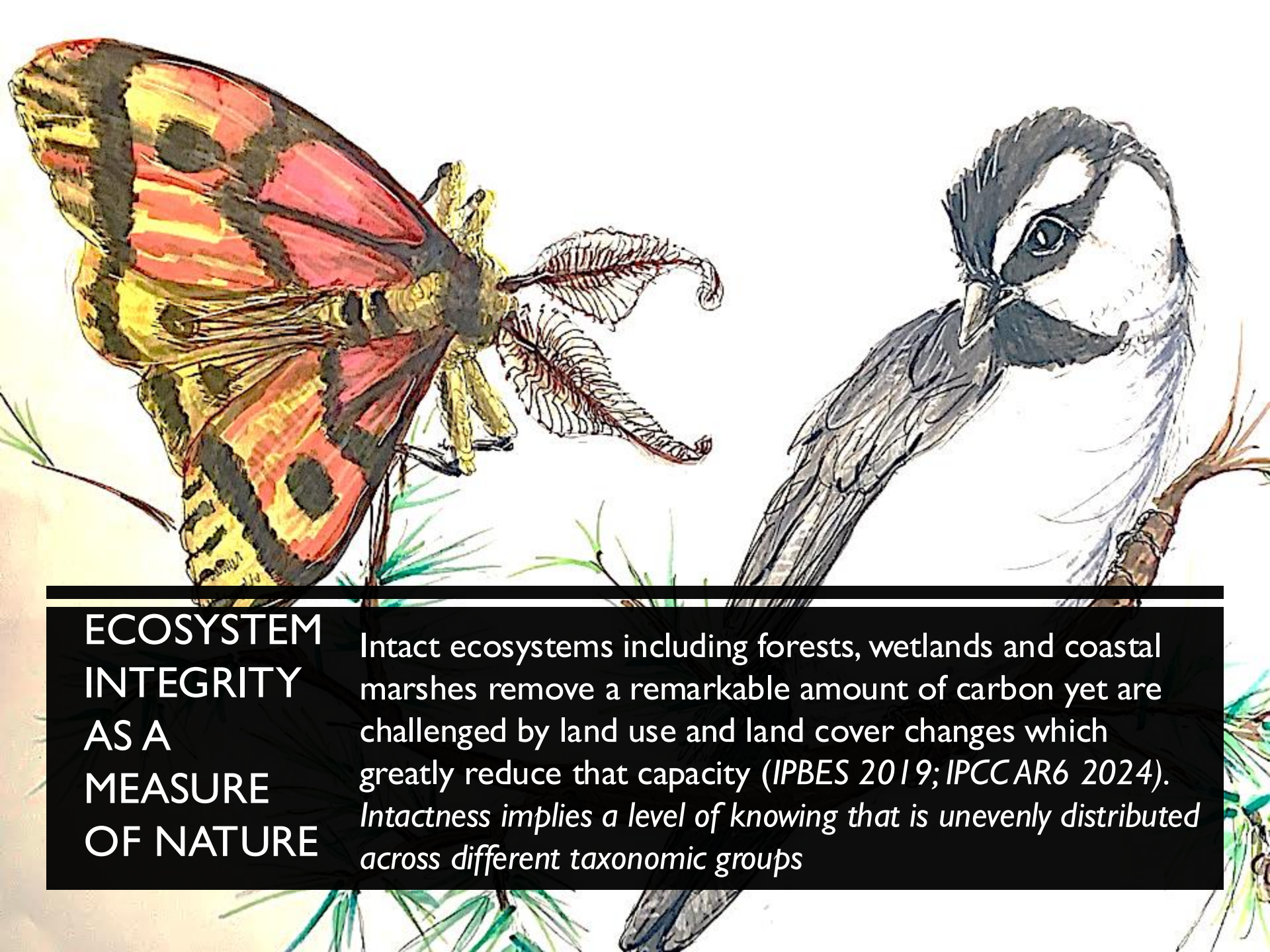
What is the buzz about pollinators in nature assessments?

> Pollination services are an 'agricultural input' that ensure the production of crops. All farmers, especially family farmers and smallholders around the world, benefit from these services. Improving pollinator density and diversity has a direct positive impact on crop yields, consequently promoting food and nutrition security. Hence, enhancing pollinator services is important for achieving the Sustainable Development Goals, as well as for helping family farmers' adaptation to climate change.

José Graziano da Silva
Director-General,
Food and Agriculture Organization of the United Nations (FAO)

IPBES Summary for Policymakers 2019



ECOSYSTEM INTEGRITY AS A MEASURE OF NATURE

Intact ecosystems including forests, wetlands and coastal marshes remove a remarkable amount of carbon yet are challenged by land use and land cover changes which greatly reduce that capacity (*IPBES 2019; IPCC AR6 2024*). *Intactness implies a level of knowing that is unevenly distributed across different taxonomic groups*

Why is the language for assessing the biodiversity of small things so tricky?

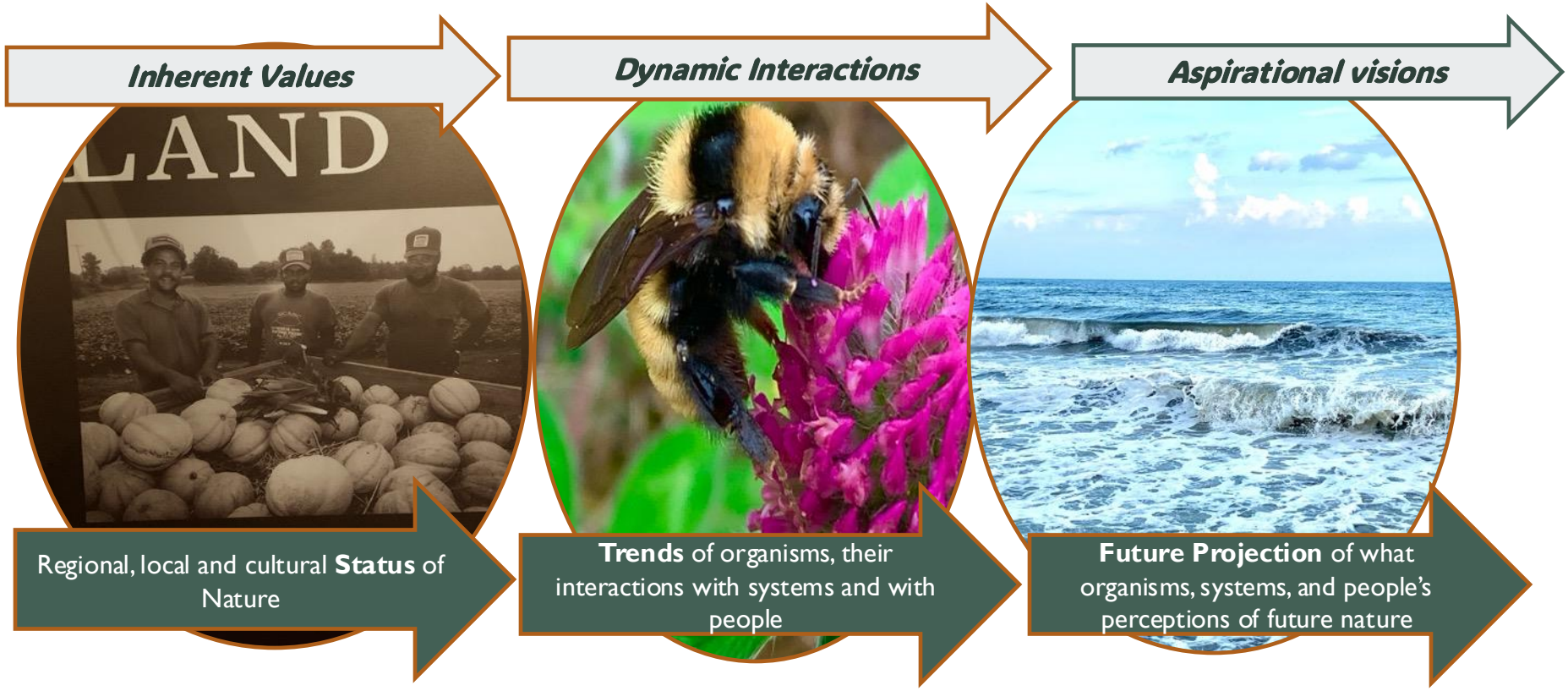
Scientific assessments are based on scientific literature but also on grey literature and increasingly on different knowledge systems including local community (nonexpert) data such as iNaturalist, Indigenous knowledge, and museum data.

Assessments provide policy relevant data for policy makers and stakeholders to make informed decisions.

But what about the data itself that is influenced by perceptions and biases of what species we see

Cartoon from COP27 communication science exhibit, Glasgow Scotland

THE STATUS, TRENDS AND FUTURE PROJECTIONS OF NATURE

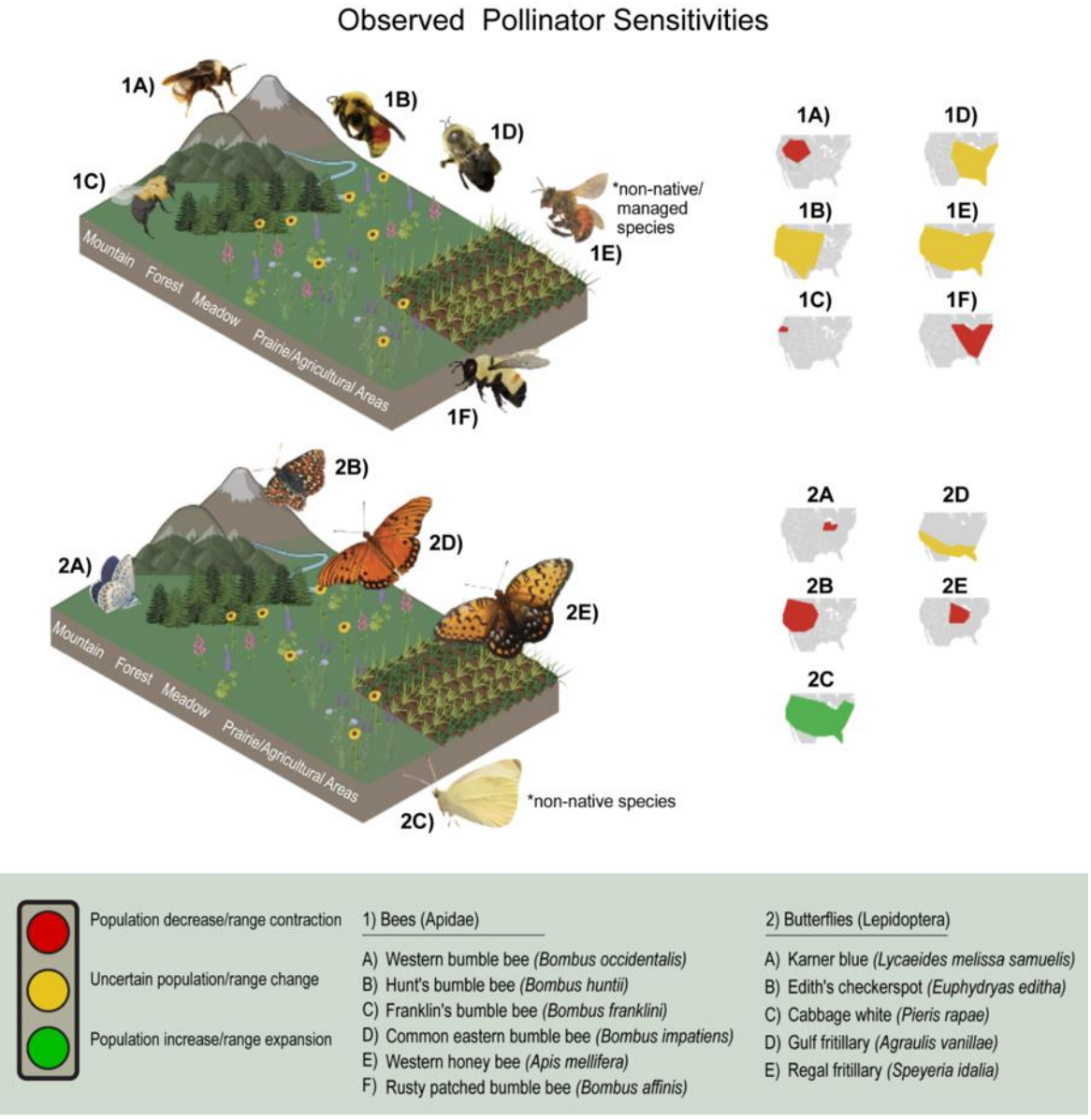


What do we see and what do we fail to see in assessments of nature?

NNA chapter team draft figure 2024

DATA GAPS AND TRAPS NCA5 CHAPTER 8

- Biodiversity loss or biodiversity shifts. Latitudinal or altitude movement can influence observations of species richness at the local scale.
- Smaller species are harder to detect and the absence of data can lead to conclusions of extinction risk or severe decline.



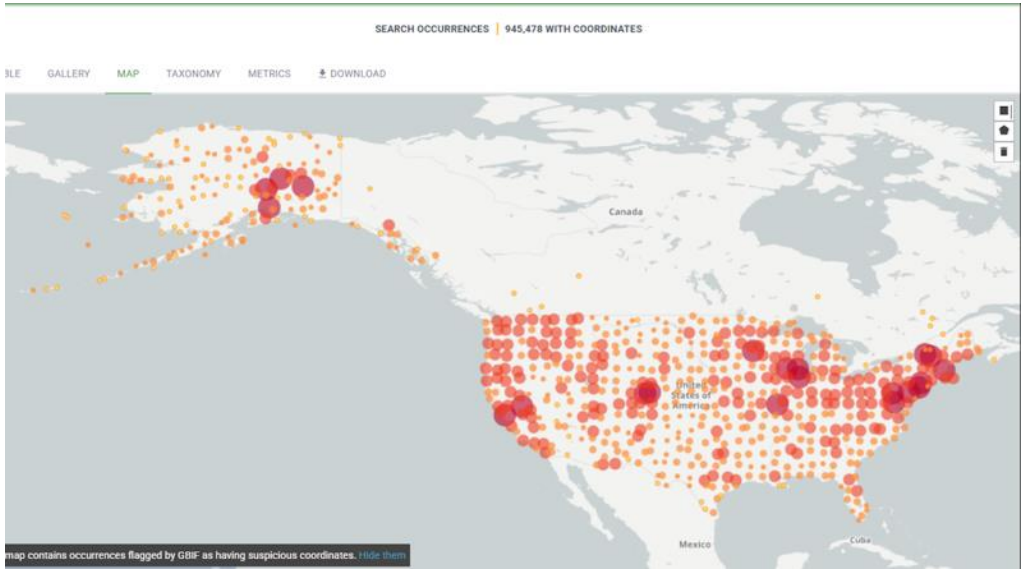
(Fifth US National Climate Assessment McElwee et al 2023)

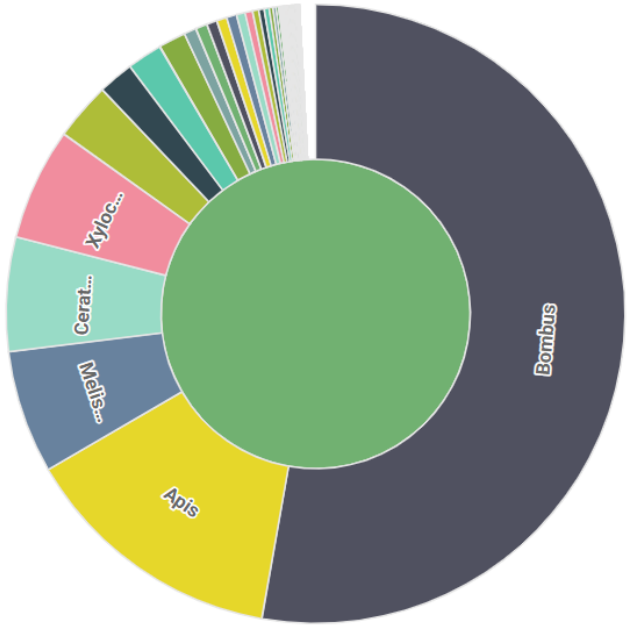
Rare species can be easily missed (or mis identified) in pockets of preferred habitats off the beaten path. The case of *Bombus occidentalis* in Yellowstone National Park

Bombus is the most common bee in iNaturalist data in North America and the most observed species in 6 states!

Abundance of data can lead to patterns of species occurrences that are not reflective of distribution but of observations recorded by people

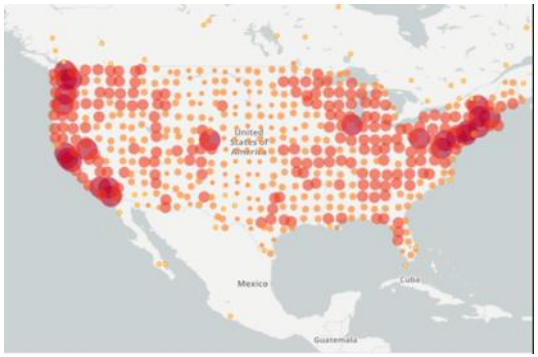
Bombus observations in GBIF

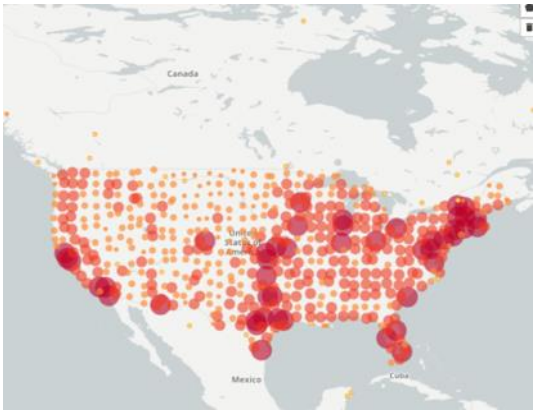




Graphics generated by S. Henriques for NNA, 2025

Species observations in large scale datasets like GBIF can create appearances of patterns that match the distributions of urban centers or concentrations of researchers





Maps show examples of Nymphalidae, Hesipirdae, Vaccium , and Bombus observations in GBIF generated by S. Henriques 2025)

Perceptions generate species occurrence data that can also be a data trap for assessments of nature.

Do we just record the pretty species and fail to record common or less visible ones? The case of the blue butterflies

US National Climate Assessment (NCA5). McElwee et al 2024

Pollinator declines, species occurrence data, and insect data gaps in assessments of nature

Recent articles on butterfly decline highlight issues of data gaps with almost 200 of the 600 species of butterflies in north America as data poor (for modeling purposes).

Inoyue 202; Science 10.1126/science.adw1633

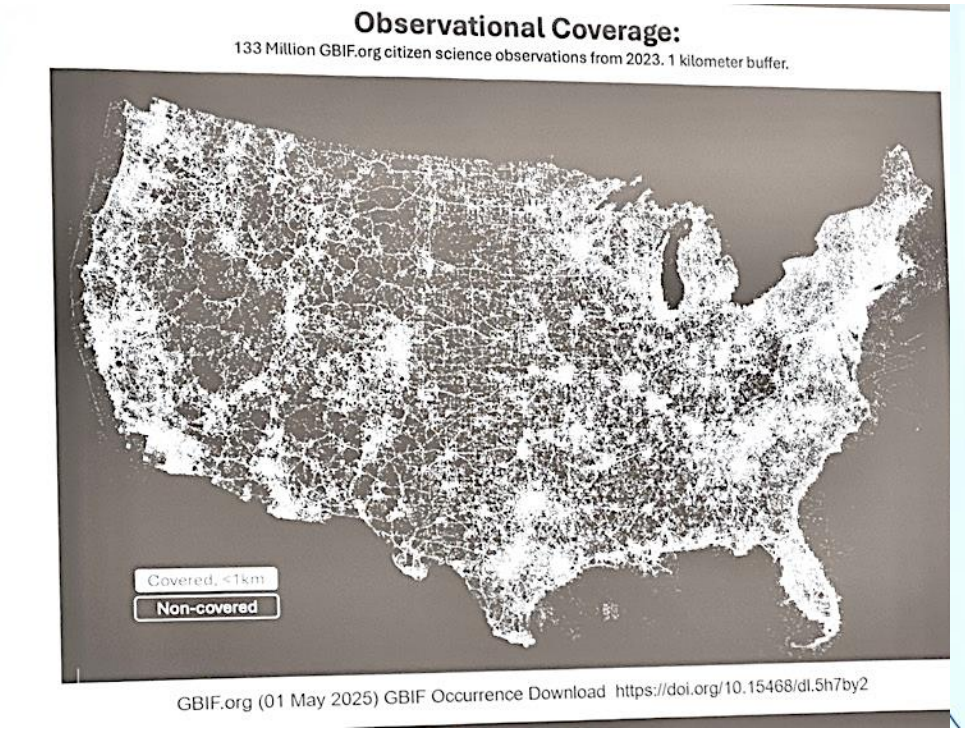
Edwards et al 2025 385 1060 Science

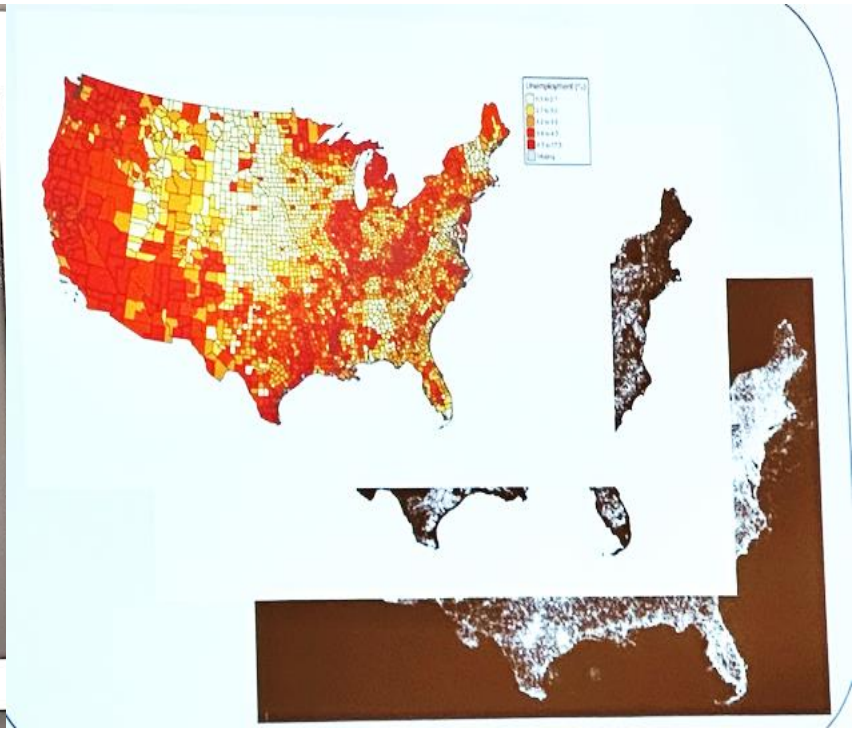
Harvey et al. 2022 Ecological Monographs. 2023;93:e1553. https://doi.org/10.1002/ecm.1553

Perceptions and data abundance

Invertebrate pollinators are easy to sample in the field or a backyard with simple tools such as mobile phones that can record time and place. Documenting biodiversity status and trends is a critical function of assessments yet the influence of the public's perceptions as to what gets measured is embedded in some of the largest datasets on the least known species

The expanding uses of GBIF and non-expert taxonomic data highlights the need to understand perceptions or how data appears and why data gaps persist. People measure what they perceive as important or what they see in a local environment





Screen captures from Ecological Society of America presentation, Baltimore 2025

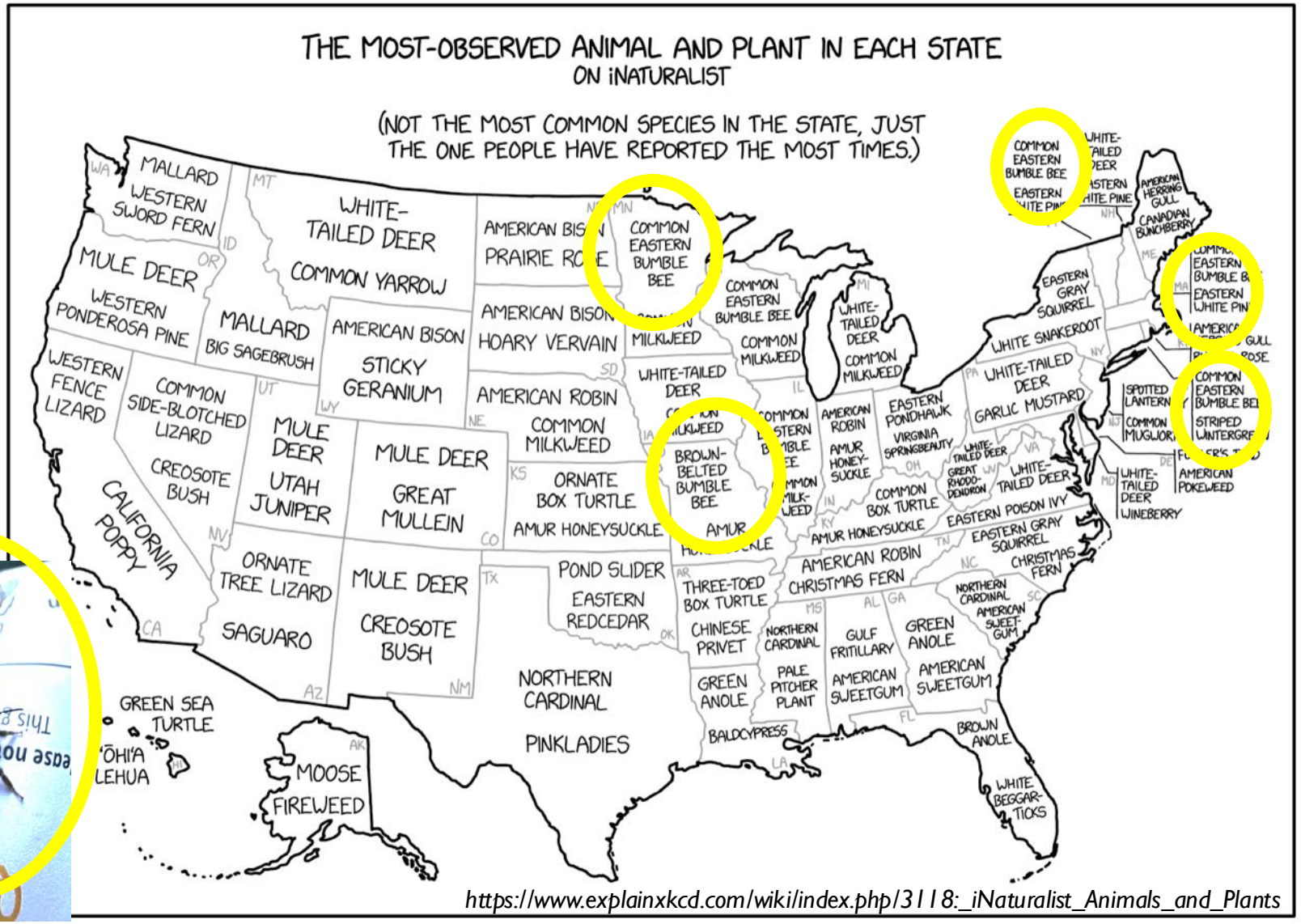
What's the buzz?

Nature assessment data are full of gaps and traps where small things can be absent and pretty things overrepresented.

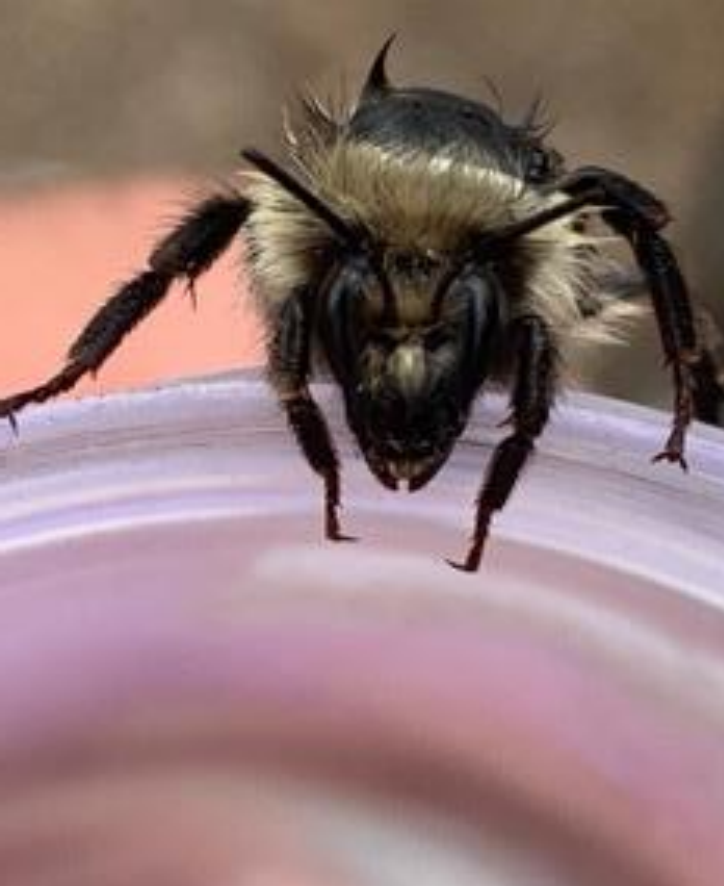
The benefits of a lot of data on little known things

The public purpose of a national nature assessment is to provide policy makers and stakeholders information based on best available scientific literature or similar published reports. The sheer volume of raw data coming in from cellular platforms and other sources highlights the need to explore public perception and potential data traps when we assess the status and trends of "nature" using multiple knowledge systems.

THE MOST OBSERVED PLANT OR ANIMAL ON INATURALIST



Technology and documentation of species driven by what the public sees is arguably the most critical data needed within a nature assessment as inclusive of stakeholder knowledge. Yet, such systems full of data traps that can contribute to erroneous management decisions



People protect what they understand—Technology and AI has influenced taxonomic accuracy such that the non-expert data plays a growing role in building status and trends information needed for informed environmental governance.