NASA Biodiversity and Ecological Conservation Team Meeting
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Earth System Science Is Biodiversity Science

An Answer to the “Why Biodiversity?” and “Why Diversity?” Questions

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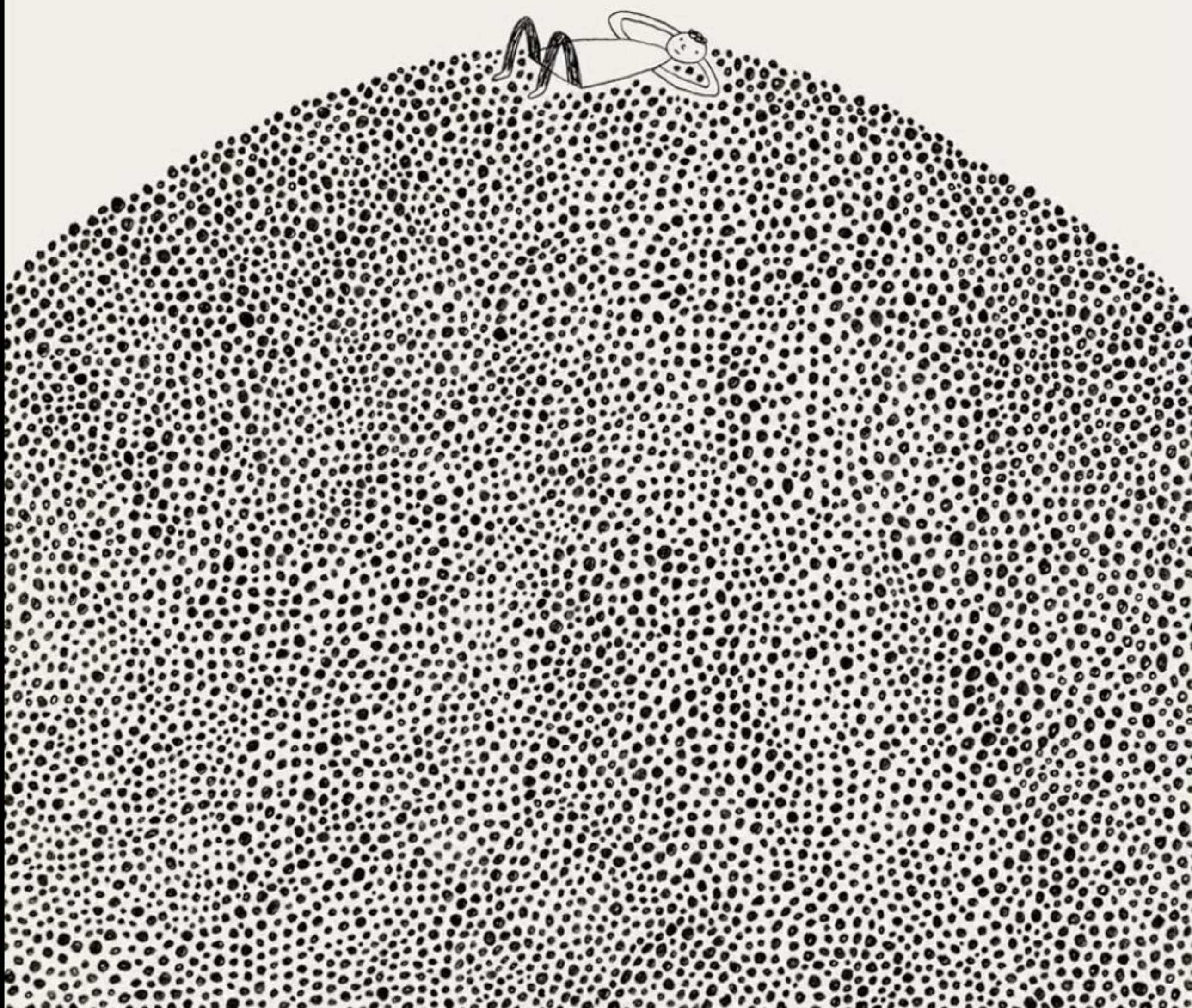
First Principles: Programmatic Commitments

- Understanding Life on Earth
  - Biological Diversity Program

- Saving Life on Earth
  - Ecological Conservation Program

The Mysterious, Deep-Dwelling Microbes That Sculpt Our Planet

Earth's crust teems with subterranean life that we are only now beginning to understand.



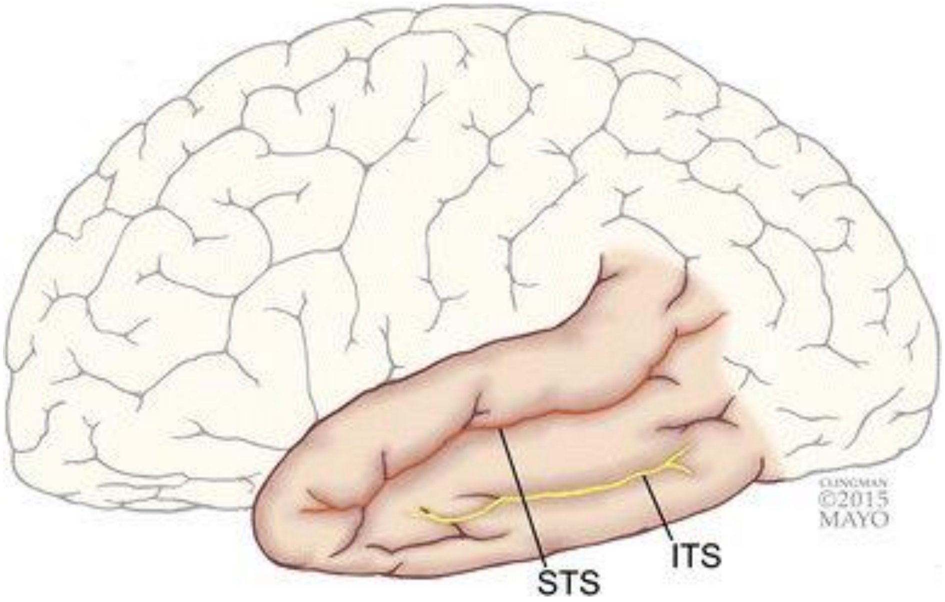
Ferris Jabr in *New York Times Magazine*, 24 June 2024

Earth = Life, Life = Diversity, so Earth = Diversity

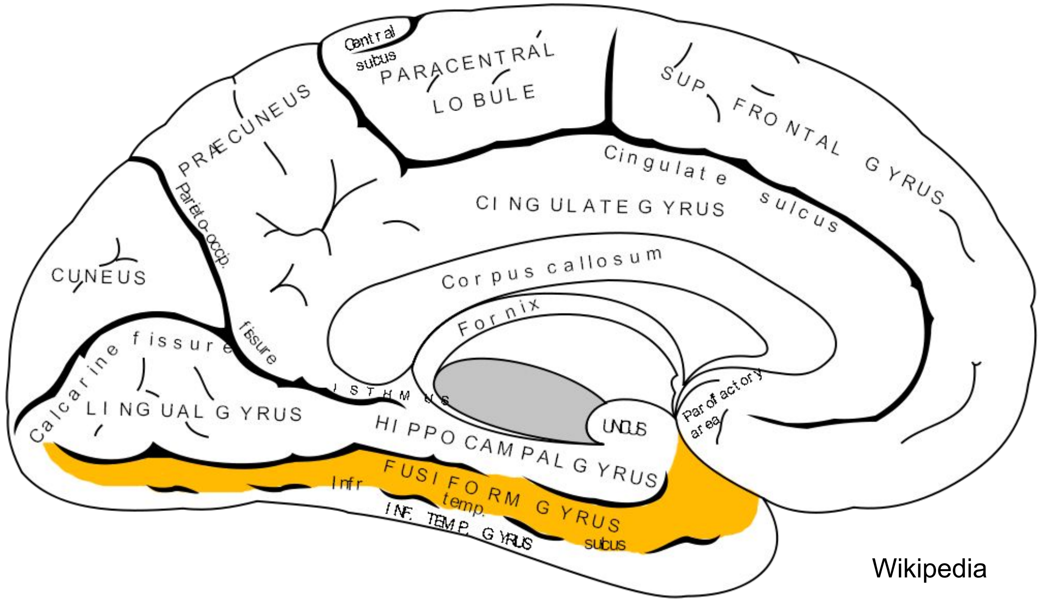
Principal Components Analysis by Discipline

Physics	~12 fundamental particles
Chemistry	~120 elements
Geology	~6000 minerals
Biology	~2,300,000 to 10,000,000 species
Economics	~8,200,000,000 people

Wired for Biodiversity Classification



Superior Temporal Sulcus



Wikipedia

Lateral Fusiform
Gyrus

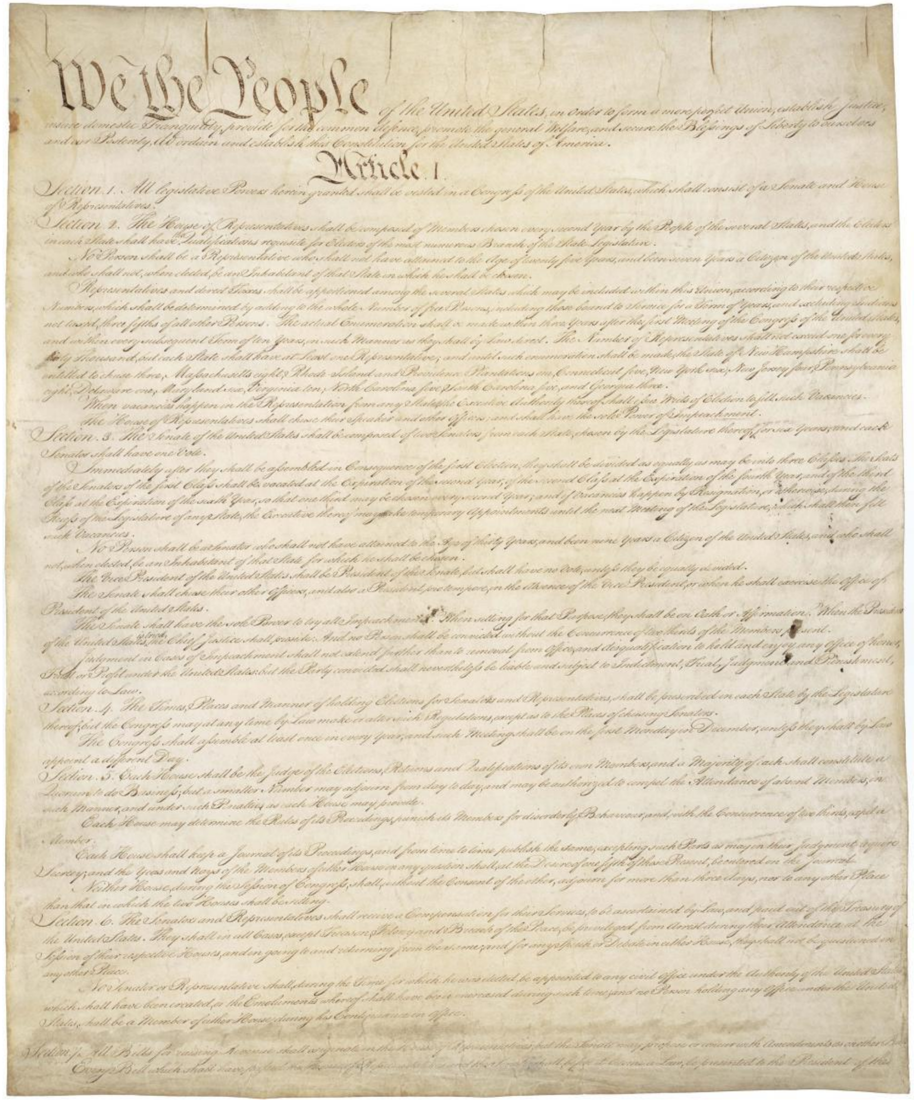
Why does Life on Earth trend toward Diversity?

- As often the case, the answer may be sex
- Or, why not just clones?
- Sex is riskier than asexuality—but apparently worth it at some level
- Theory: sexual versus asexual reproduction provides for changes in offspring as life’s means of addressing changes in an Earth system characterized by dynamic physics, chemistry, and geology—ultimately requiring a dynamic biology
- Diversity is life on Earth’s superpower!

Human Diversity

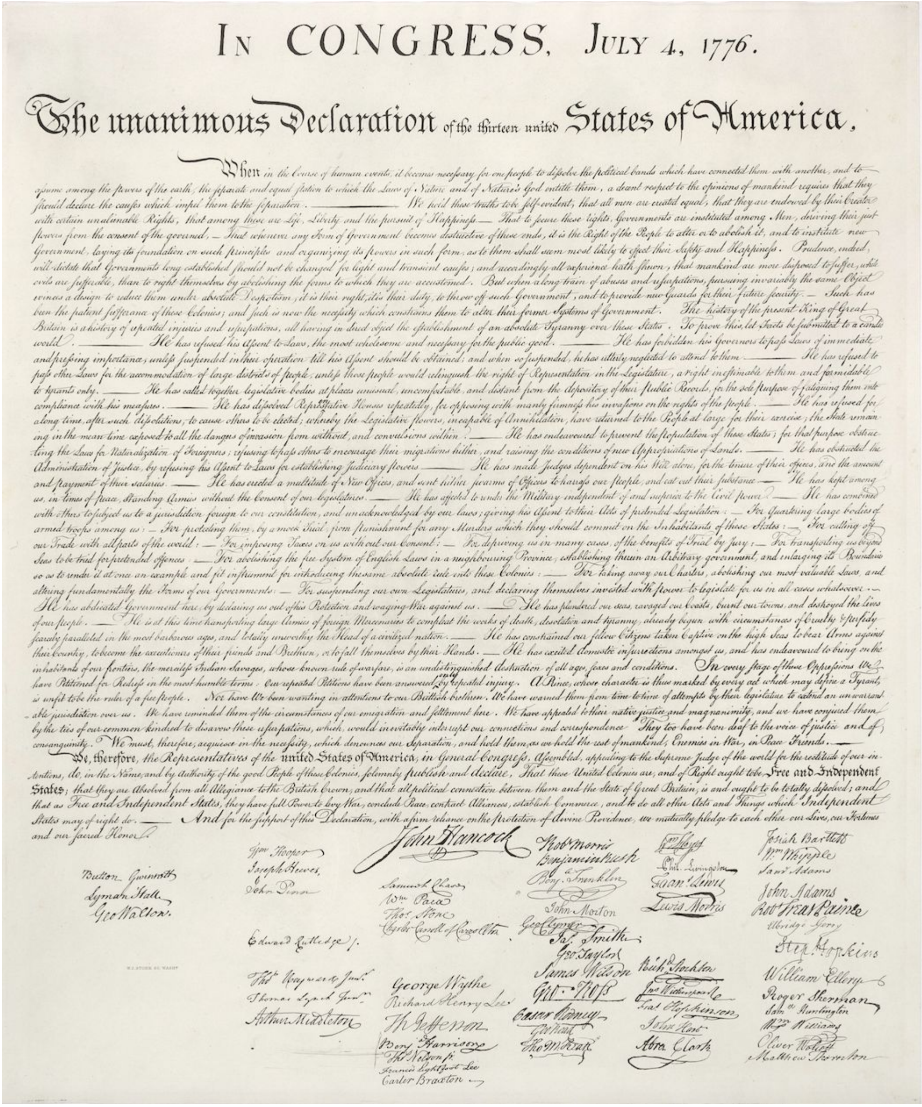
Title: Map of the Indian tribes of North America, about 1600 A.D. along the Atlantic, & about 1800 A.D. westwardly (Source: Library of Congress; Control Number: 2002622260; Albert Gallatin of the American Antiquarian Society,

First Principles: For a Nation too


We the People

Article 1

(National Archives)


IN CONGRESS, JULY 4, 1776.

The unanimous Declaration of the thirteen united States of America.

(National Archives)


Thank You!

An Earth Science Existential Challenge

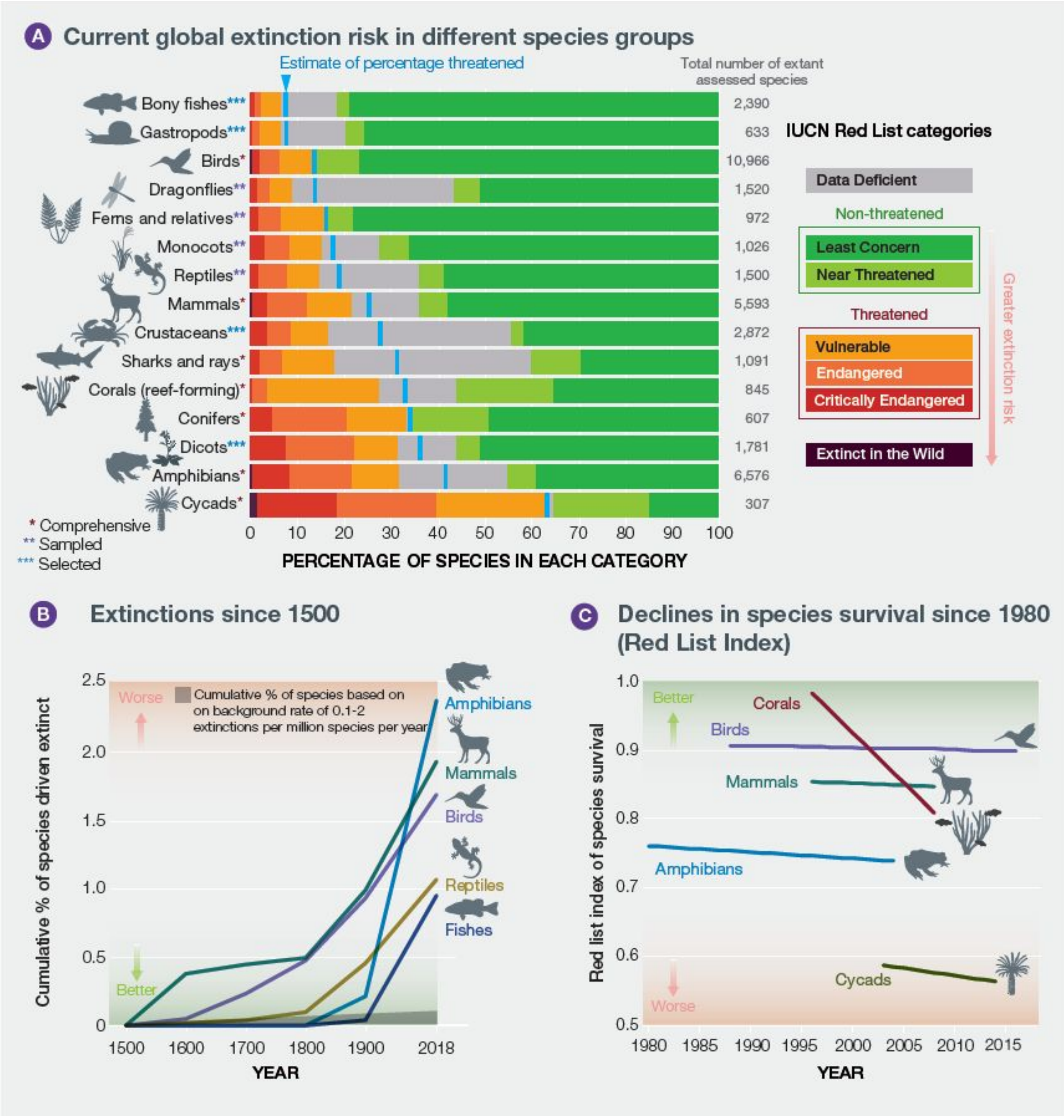
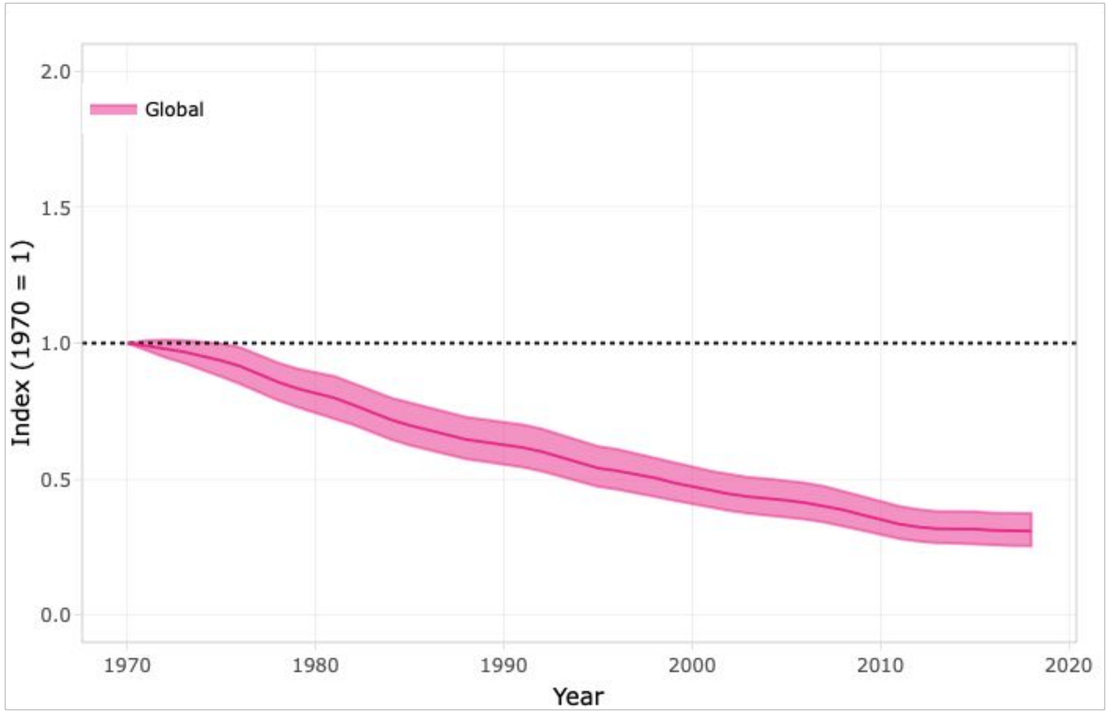


Figure SPM 3 A substantial proportion of assessed species are threatened with extinction and overall trends are deteriorating, with extinction rates increasing sharply in the past century.

SPM Figure 3 Global Assessment of Biodiversity and Ecosystem Services (2019)



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