

Biodiversity at the heart of the ocean ecosystem: The frontier for the coming decade

Emmett Duffy
Smithsonian



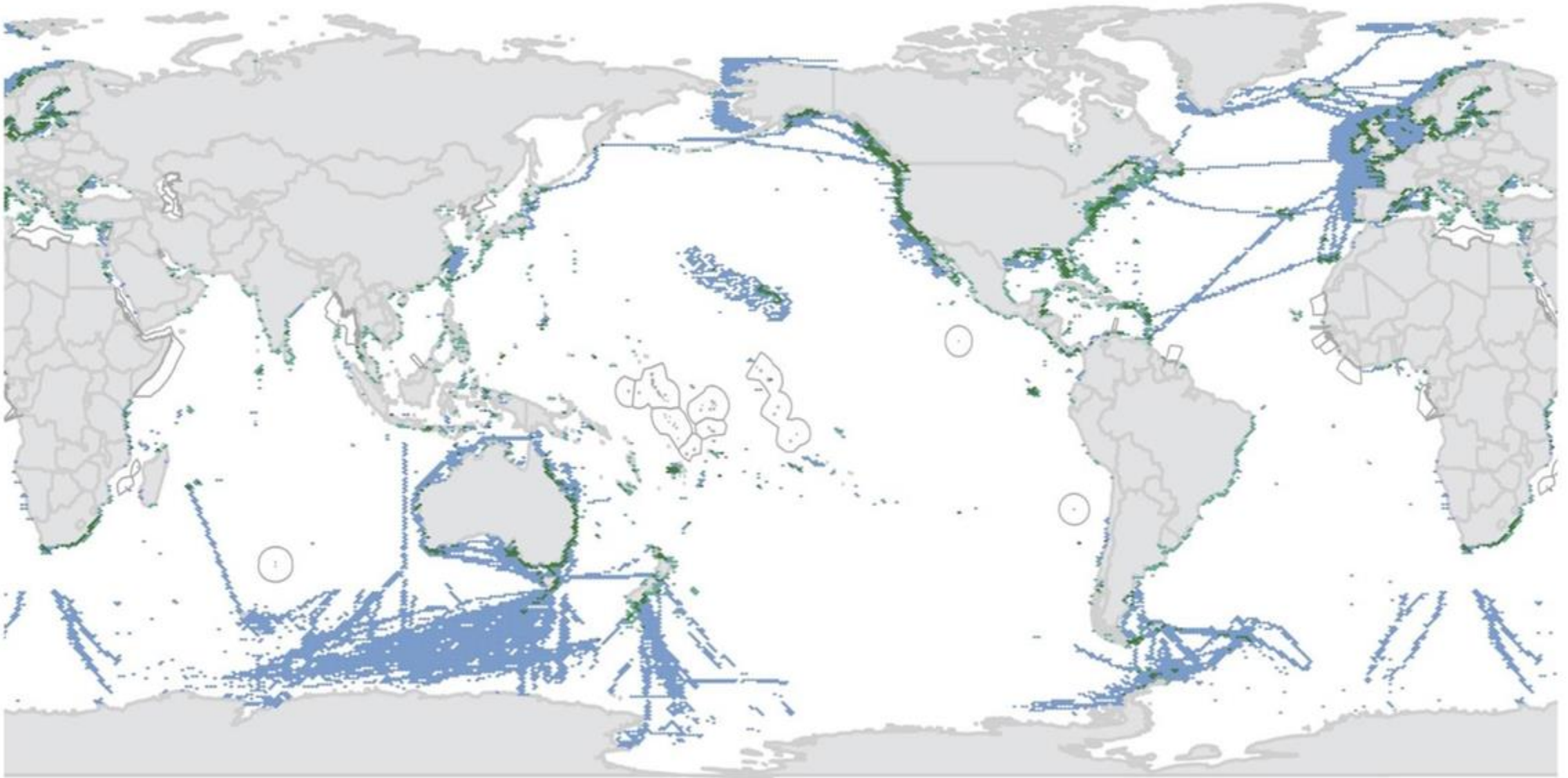
Gabrielle Canonico
NOAA, US IOOS



2025-2035 must be the decade of ocean biodiversity



First, we need a dynamic map of ocean biodiversity

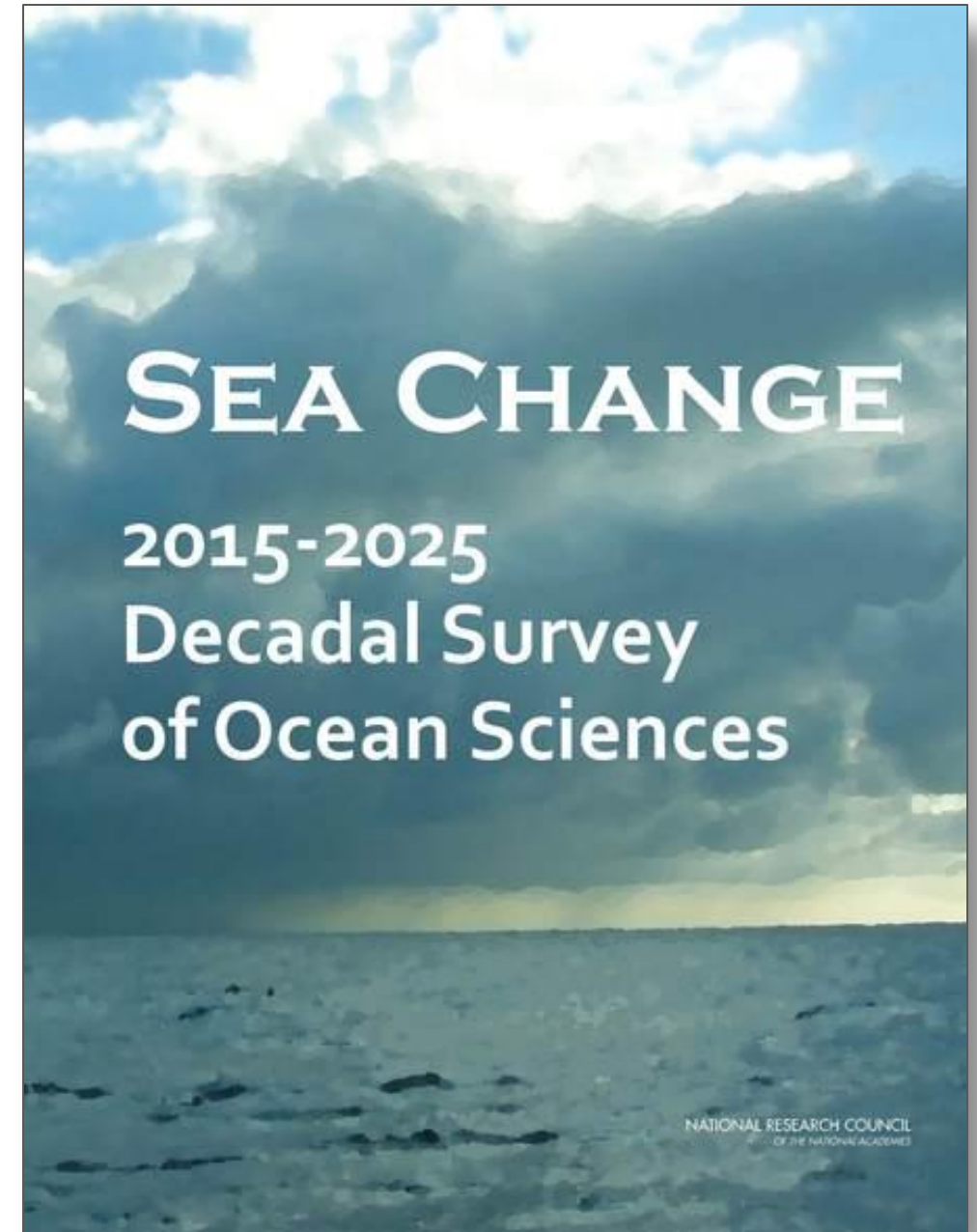


The biodiversity frontier is not new



A long-standing question

“What is the role of biodiversity in the resilience of marine ecosystems, and how will it be affected by natural and anthropogenic changes?”

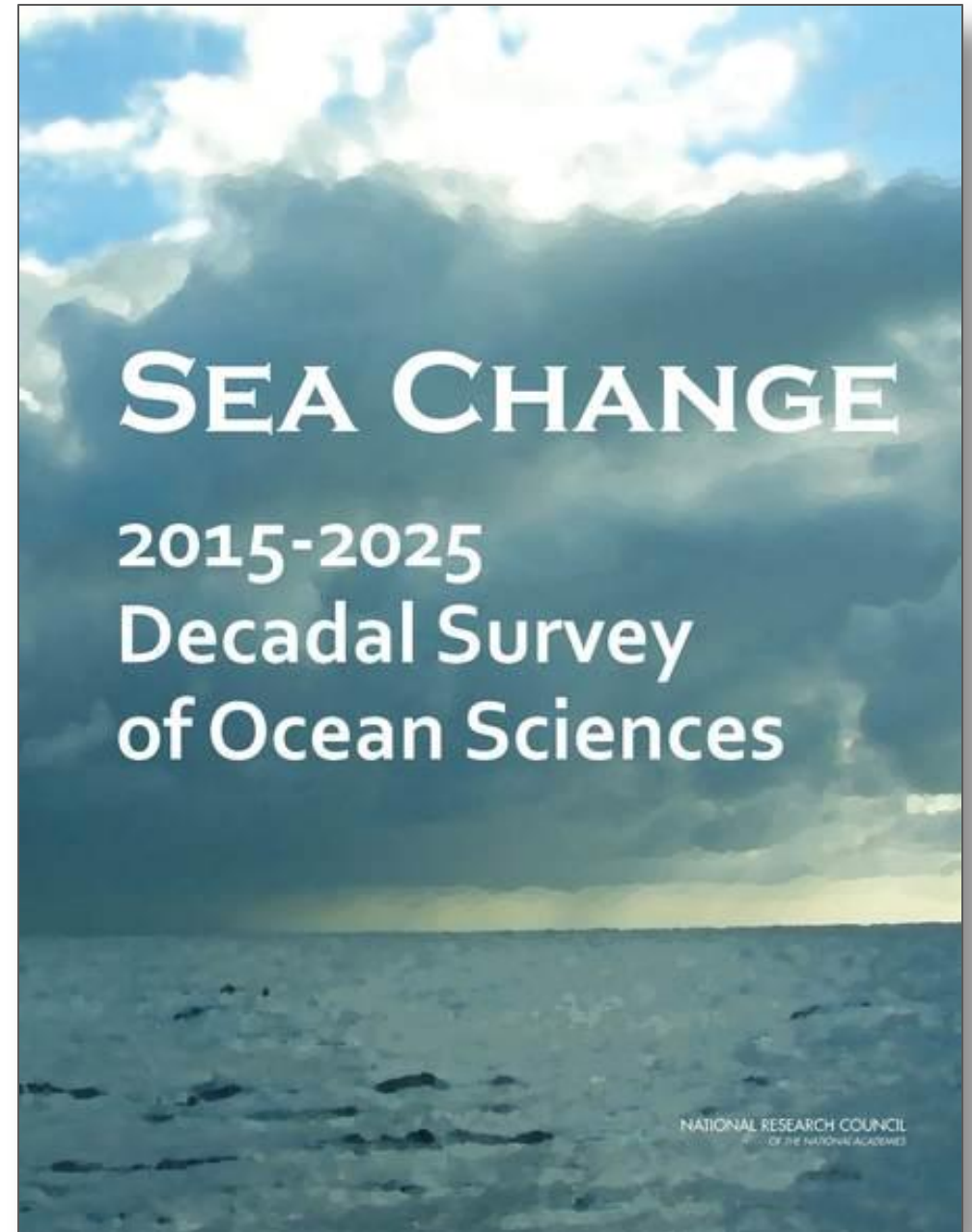


A long-standing question

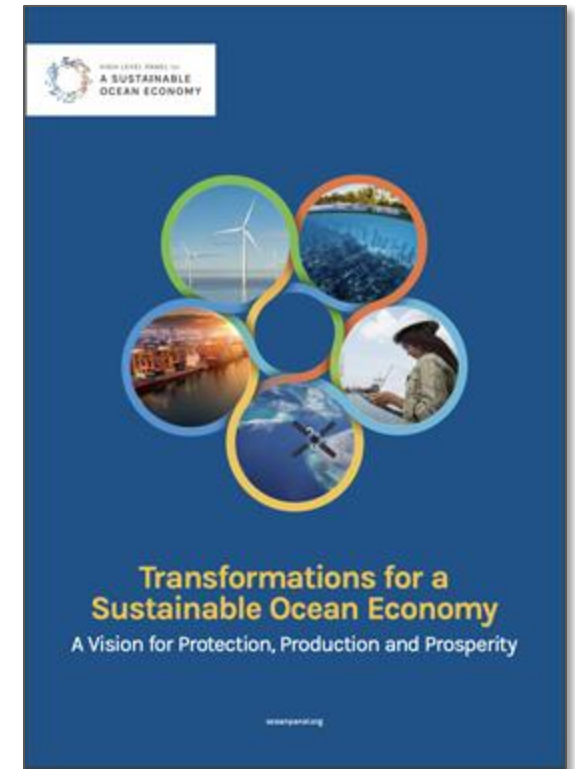
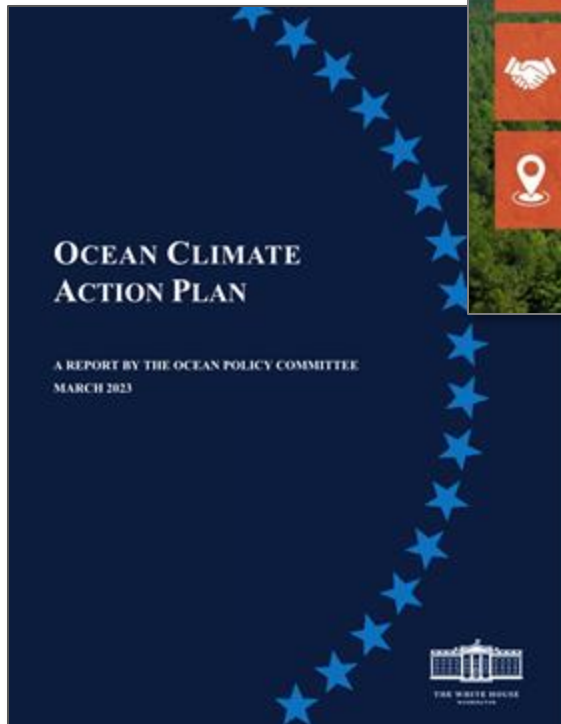
“What is the role of biodiversity in the resilience of marine ecosystems, and how will it be affected by natural and anthropogenic changes?”

What's new is that

***we can answer it in this decade
... and we are being asked to do so***



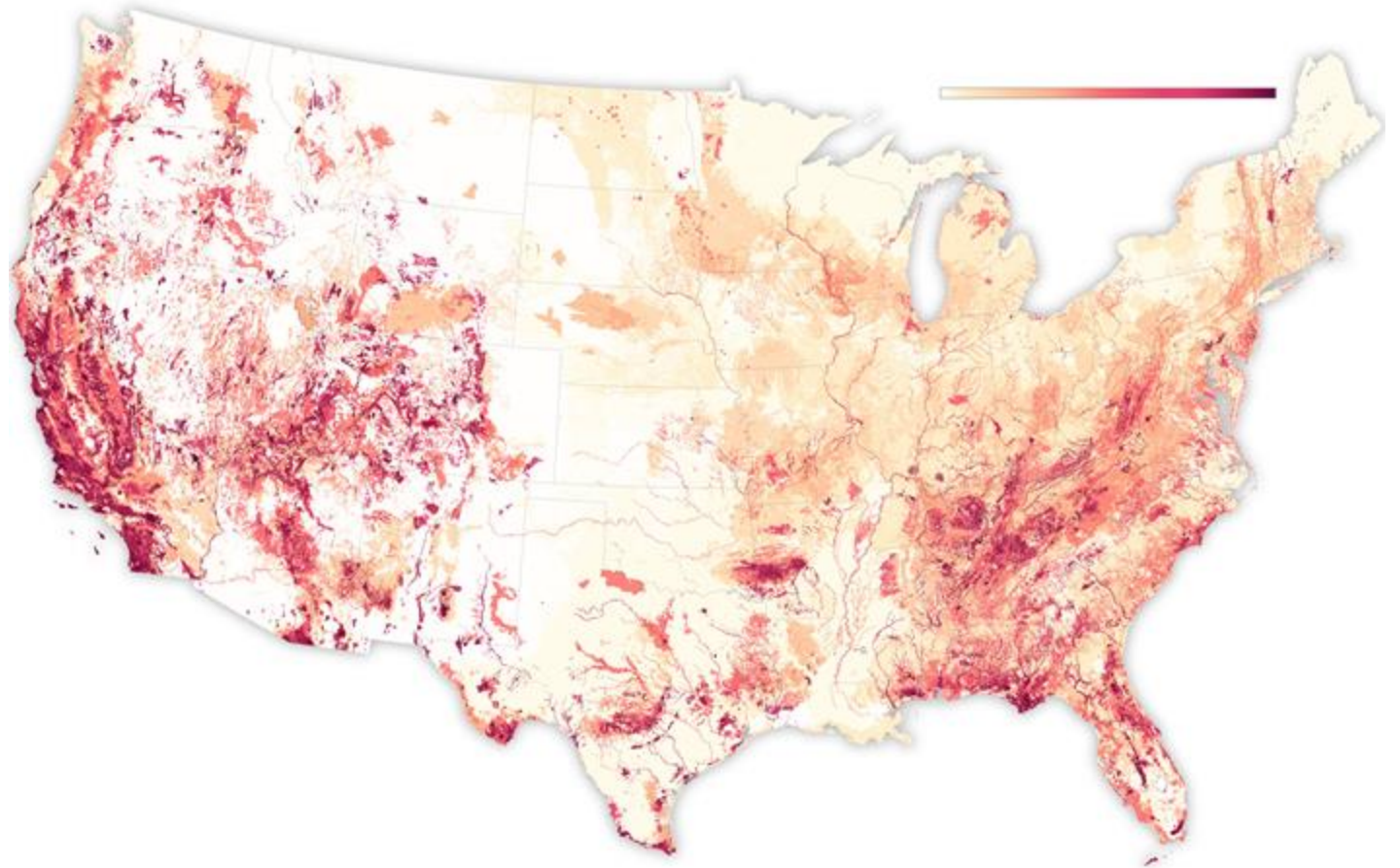
We now have pressing national demands for biodiversity data



We need a dynamic map of ocean biodiversity

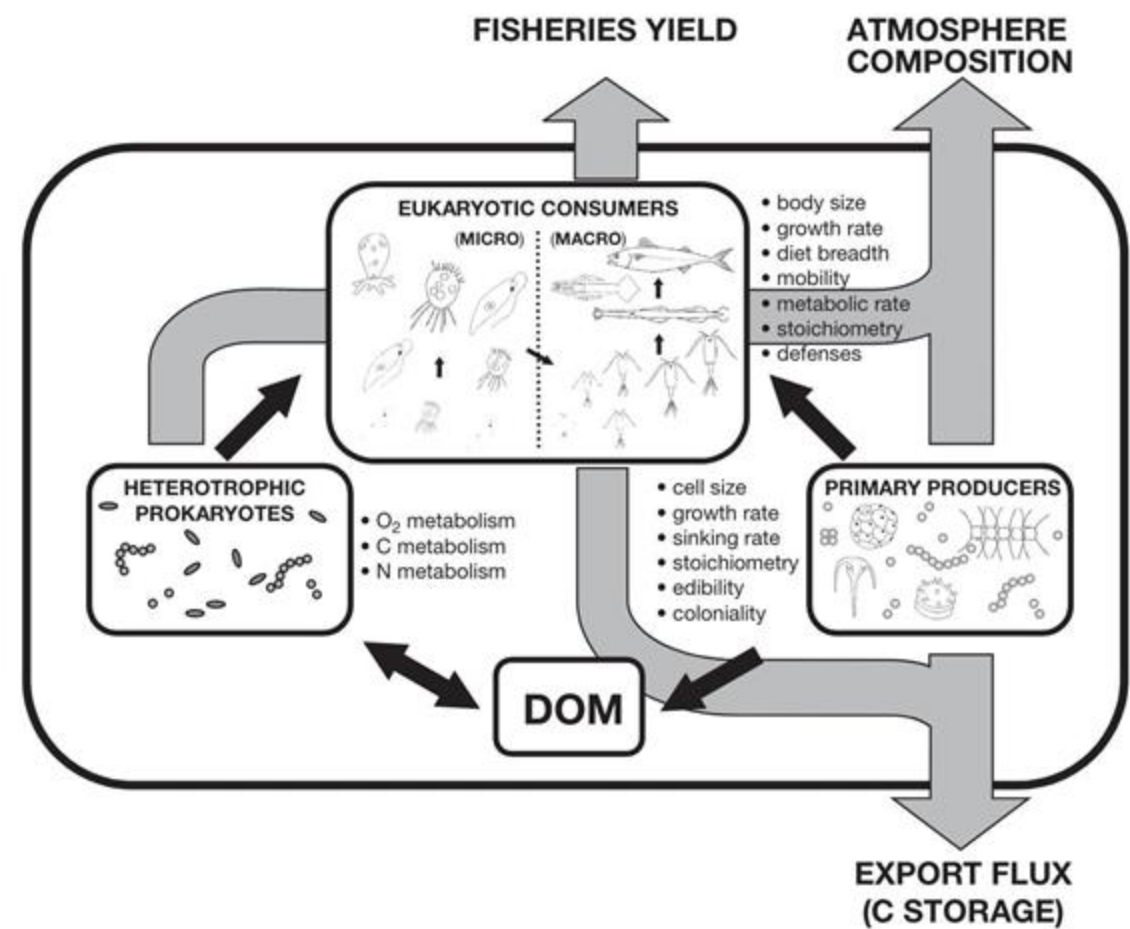
“This Map Shows Where Biodiversity Is Most at Risk in America”

— New York Times, 2022



<https://www.nytimes.com/interactive/2022/03/03/climate/biodiversity-map.html>

And we need a periodic table of ocean species functions



Element	Atomic weight	Species	Trait combination
Li 6.94 1 Valence		Sp ¹ 20/2 Fun1 Ecological function	Specific leaf area/Height

I	II	I	II
Li 6.94 1	Be 9.01 2	Sp ¹ 20/2 Fun1	Sp ⁵ 80/6 Fun2
Na 22.99 1	Mg 24.31 2	Sp ² 25/3 Fun1	Sp ⁶ 85/7 Fun2
K 39.10 1	Ca 40.08 2	Sp ³ 30/4 Fun1	Sp ⁷ 90/8 Fun2
Rb 85.47 1	Sr 87.62 2	Sp ⁴ 35/5 Fun1	Sp ⁸ 95/9 Fun2

The periodic table of elements

The periodic table of niches based on traits

[illegible]

We now have the strong foundation of networks and partnerships



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Review

An Overview of Marine Biodiversity in United States Waters

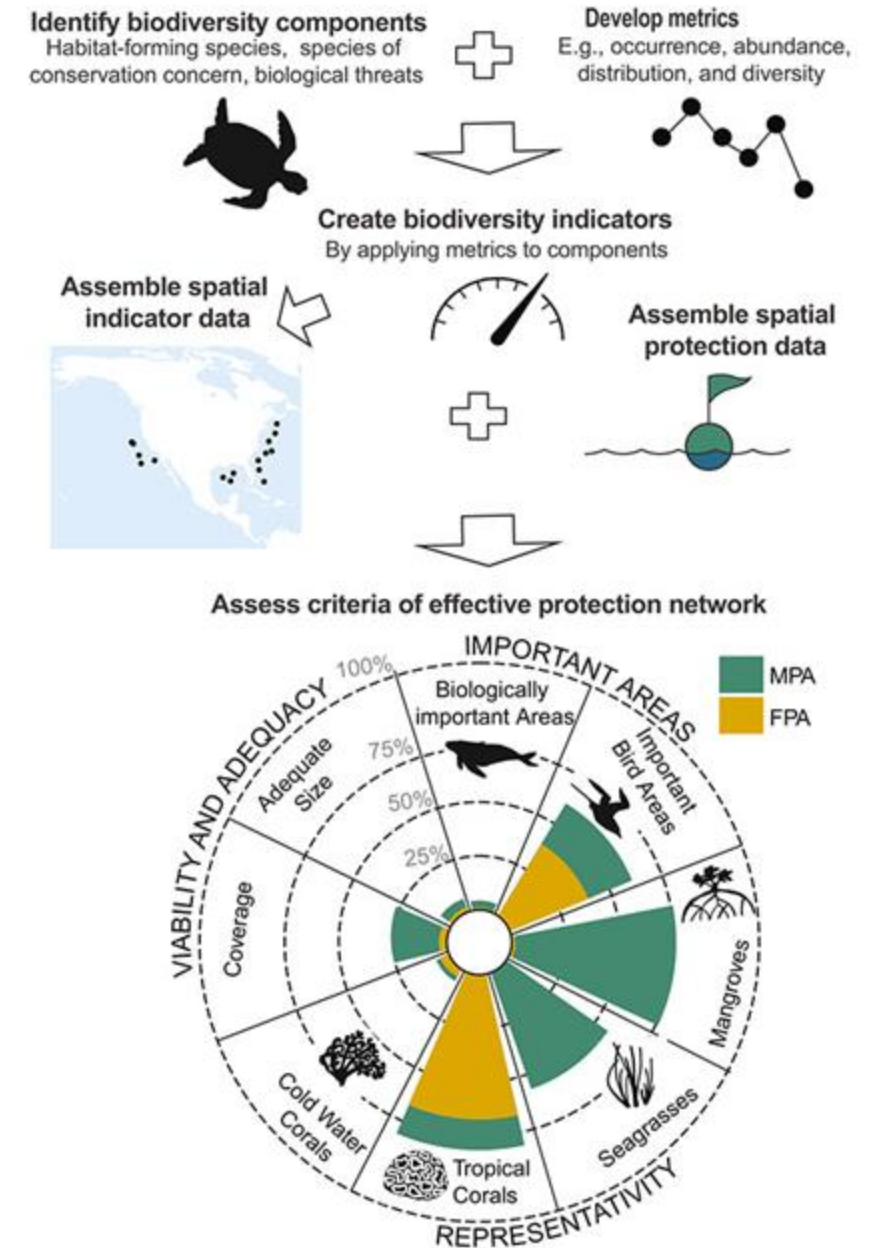
Daphne Fautin^{1*}, Penelope Dalton², Lewis S. Incze³, Jo-Ann C. Leong⁴, Clarence Pautzke⁵, Andrew Rosenberg⁶, Paul Sandifer⁷, George Sedberry⁸, John W. Tunnell Jr.⁹, Isabella Abbott¹⁰, Russell E. Brainard¹¹, Melissa Brodeur¹², Lucius G. Eldredge¹³, Michael Feldman¹², Fabio Moretzsohn⁹, Peter S. Vroom¹⁴, Michelle Wainstein², Nicholas Wolff³



NEMESIS



We now have a framework to do it



The U.S. is developing a ***National Strategy for Ocean Biodiversity***

