Office of the
Chief Statistician of the United States

Building on GDP: The Future of Economic Statistics

Technical Advances through Environmental-Economic Accounting to Expand Statistical Measures

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Office of Management and Budget

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Need for SEED

"Historically, we've lacked a standard approach to track the condition of nature or its economic role and value, which impairs our ability to fight the climate crisis, build a strong and sustainable economy, and advance economic equity"

cover of the *National Strategy to Develop Statistics for Environmental-Economic Decisions* (SEED), Prabhakar, Young, and Raimondo, p iv.

If you had a flock of geese that laid precious-metal eggs and someone was killing them, would you want to know how many geese were left, and what precious metal each goose laid? What kind of manager would you be if you didn't want to know?

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Definitions

- **Environmental-Economic Accounting (EEA)** extends national economic accounting (GDP-type) to include measures of stocks, processes, and products wherever humans and the environment connect.

- **Natural Capital Accounting** (**NCA**) measures natural resource stocks, processes, and interactions with the human economy more comprehensively than in the past.

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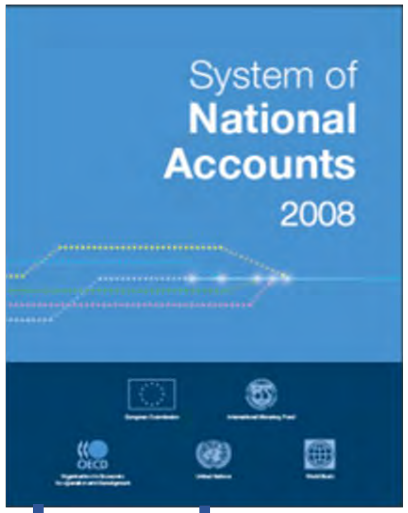
System of Environmental-Economic Accounting (SEEA)

System of National Accounts



BEA-DOI: Outdoor Recreation

BEA-NOAA: Marine Economy

(satellite accounts)

SEEA – Central Framework

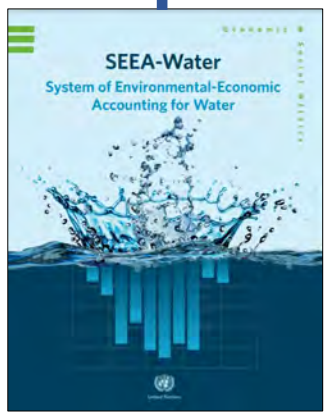
2014

SEEA - Ecosystem Accounting

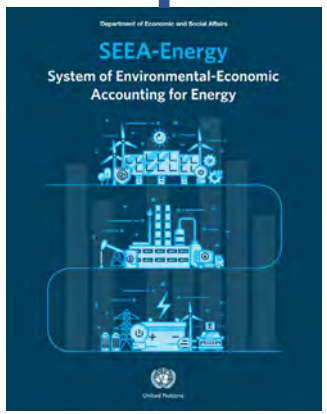
2021

Track natural resources:

- Over time
- At multiple spatial scales
- Compatible with economic accounts data



2007



2019

2020

UN: seea.un.org

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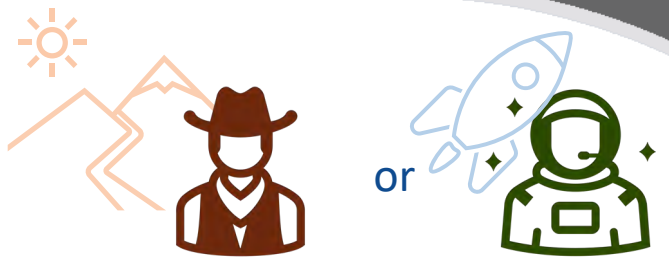
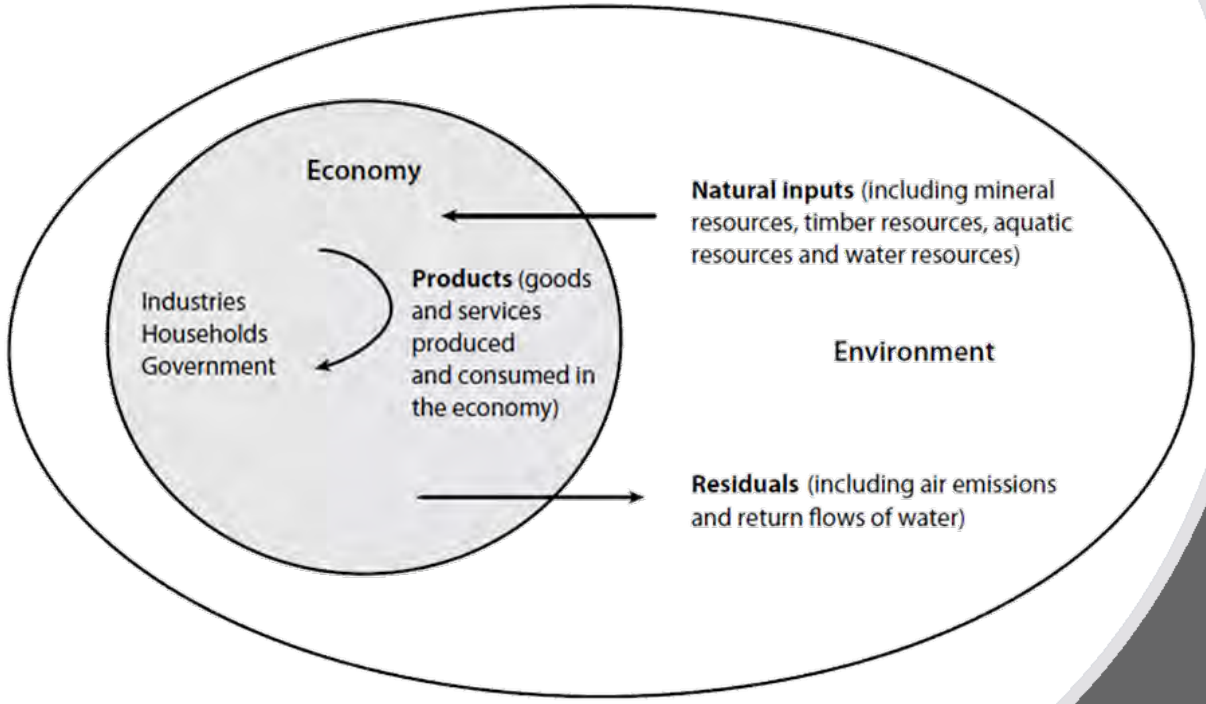
SEEA Central Framework (SEEA-CF)

- **Environmental flows** (energy, water, materials, air emissions, solid waste, etc.)
- **Stocks of environmental assets** (mineral and energy, land, soil, timber, aquatic/water resources, etc.)
- **Economic activity related to the environment** (environmental protection expenditures, environmental goods and services sector, tax and subsidy accounts)



or

Kenneth Boulding, 1966



seea.un.org/content/seea-central-framework

(Ecosystem Services are *not* in these accounts!)

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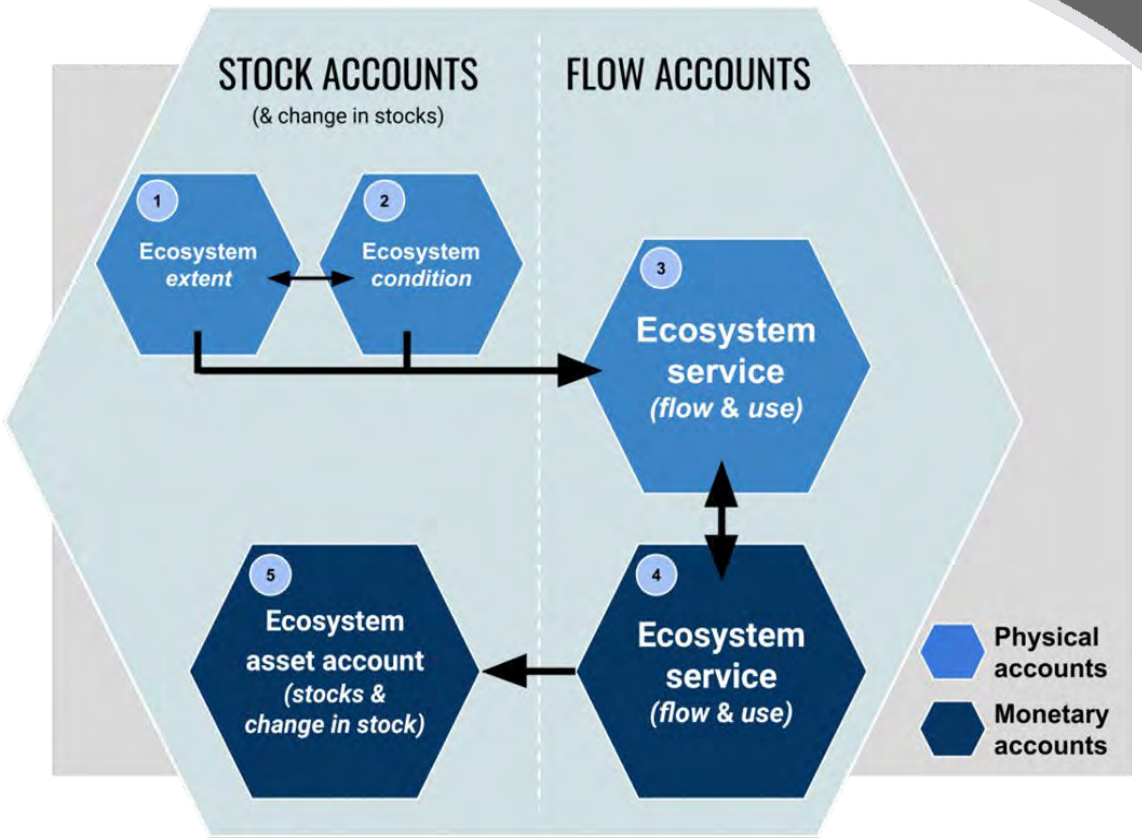
SEEA Ecosystem Accounting (SEEA-EA)

Coherent, comprehensive view of ecosystems:

- Ecosystem extent
- Ecosystem condition
- Ecosystem services supply/use
  - Physical
  - Monetary



https://seea.un.org/ecosystem-accounting

(Ecosystem Services *are* in these accounts!)

seea.un.org/content/frequently-asked-questions#Does%20monetary%20valuation%20amount%20to%20putting%20a%20price%20on%20nature

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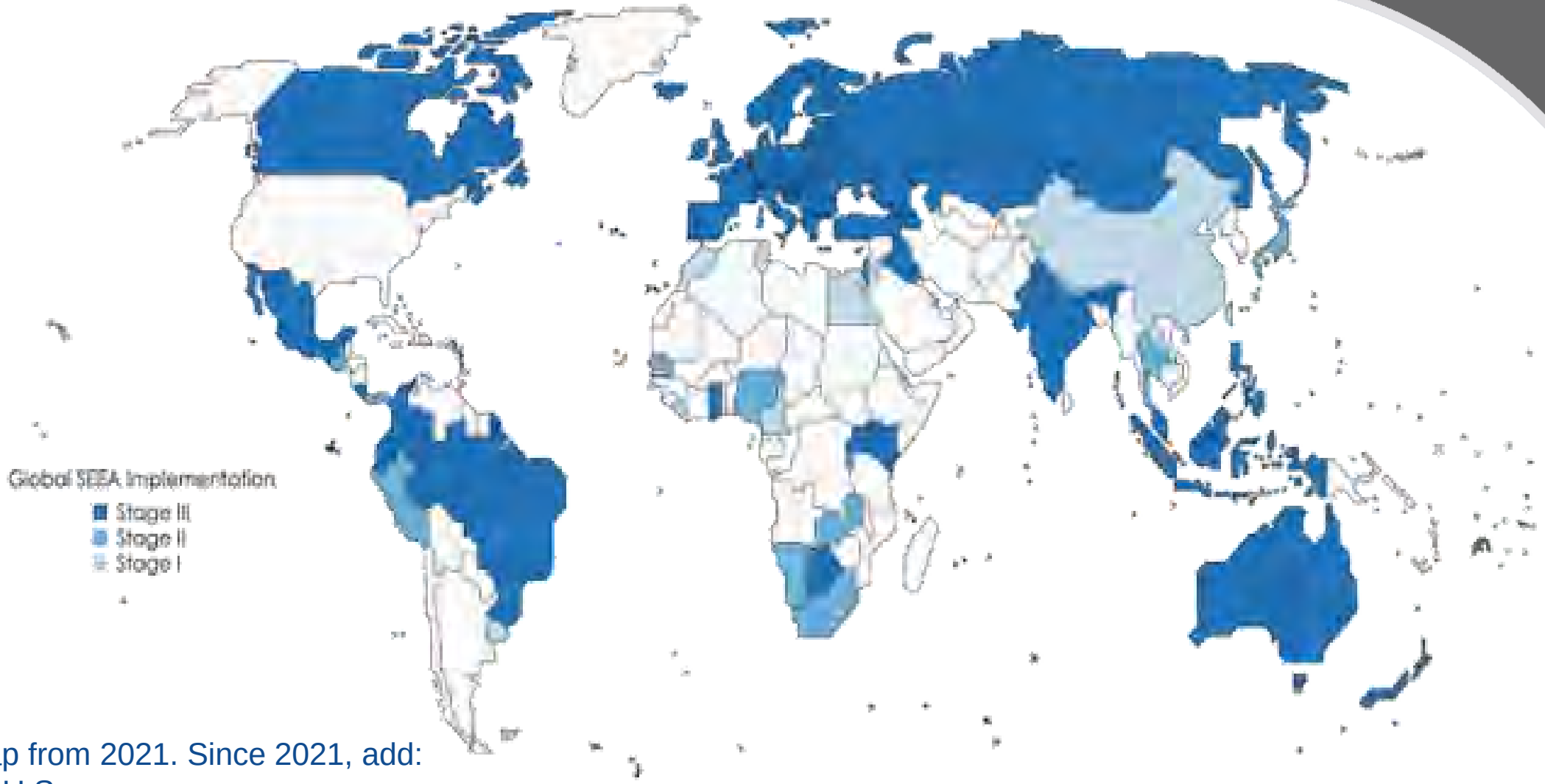
Global landscape: NCA now being implemented around the world



Map from 2021. Since 2021, add:

- U.S.
- Chile

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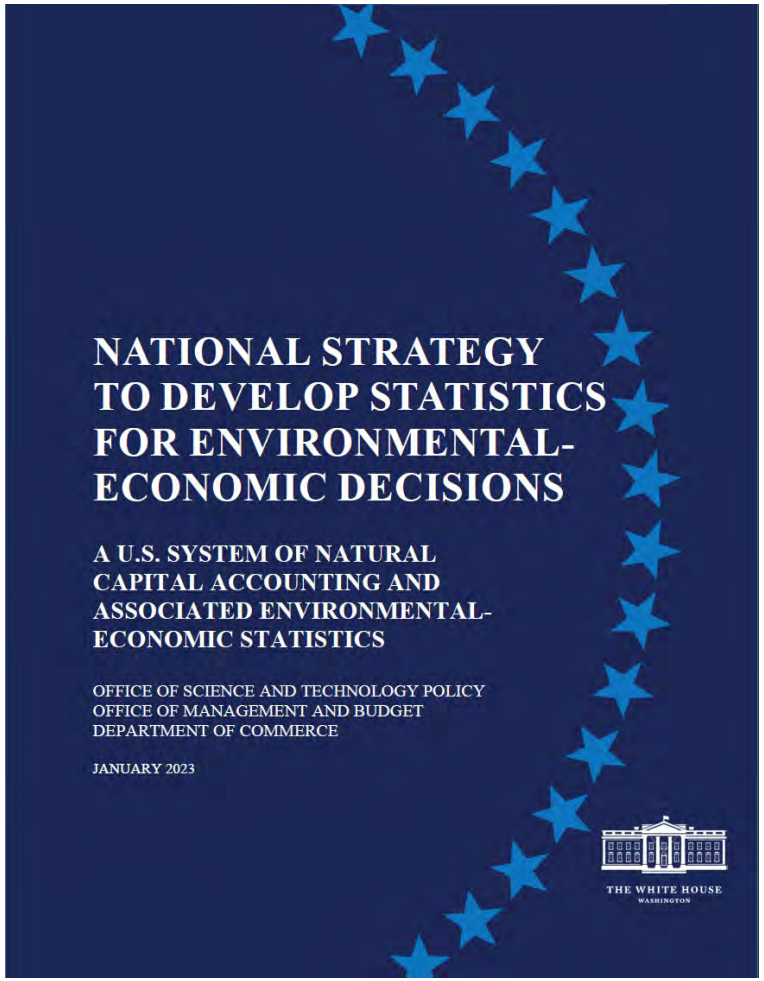
National Strategy

- Coordination across Federal Government and others
  - Data sharing
  - Interoperability
- 15-year phased approach
  - Research
  - Experimental stats/pilots
  - Core Statistical Products

Released: Davos, Switzerland, 19 Jan 2023



www.whitehouse.gov/wp-content/uploads/2023/01/Natural-Capital-Accounting-Strategy-final.pdf

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National Strategy – Five Principal Recommendations

NCA and environmental-economic statistics should:

1. Be **pragmatic and provide information** that supports a range of decision-making that affects human-environment relationships
2. Provide **domestic comparability through time and advance international comparisons** and harmonization
3. Be **embedded in the broader U.S. economic statistical system**, compliant with SEEA, accounting boundaries, and appropriate valuation methods
4. Via a **15-year phased approach**, transition from research grade environmental-economic statistics and natural capital accounts **to core statistical products**
5. Use **existing authorities** and **substantial expertise within Federal departments and agencies** to **coordinate** across agencies

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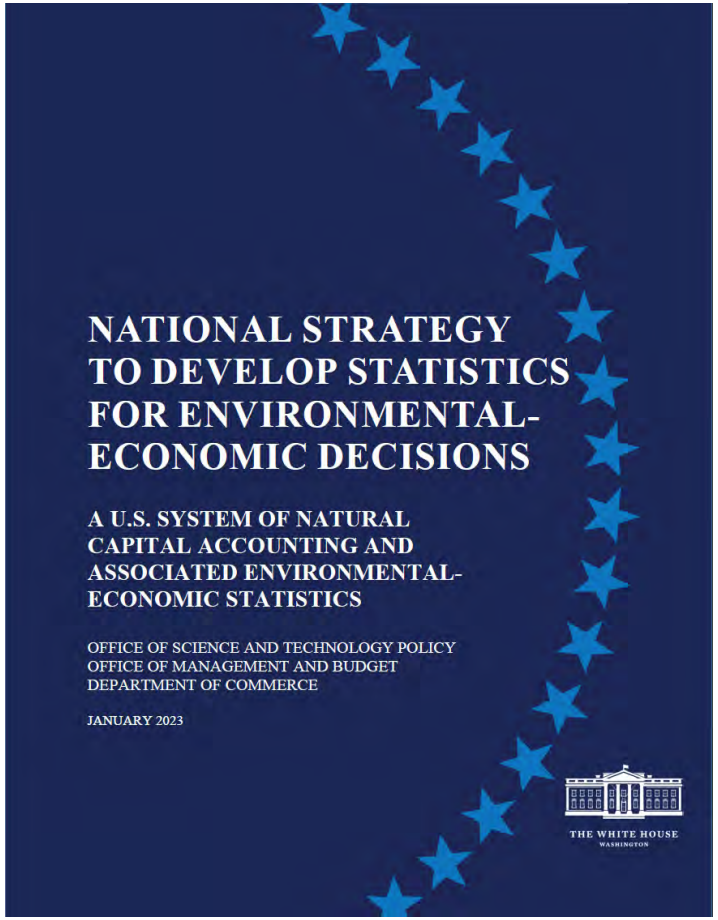
U.S. Domestic EEA Development

www.bea.gov/data/economic-accounts/national



www.whitehouse.gov/wp-content/uploads/2023/01/Natural-Capital-Accounting-Strategy-final.pdf

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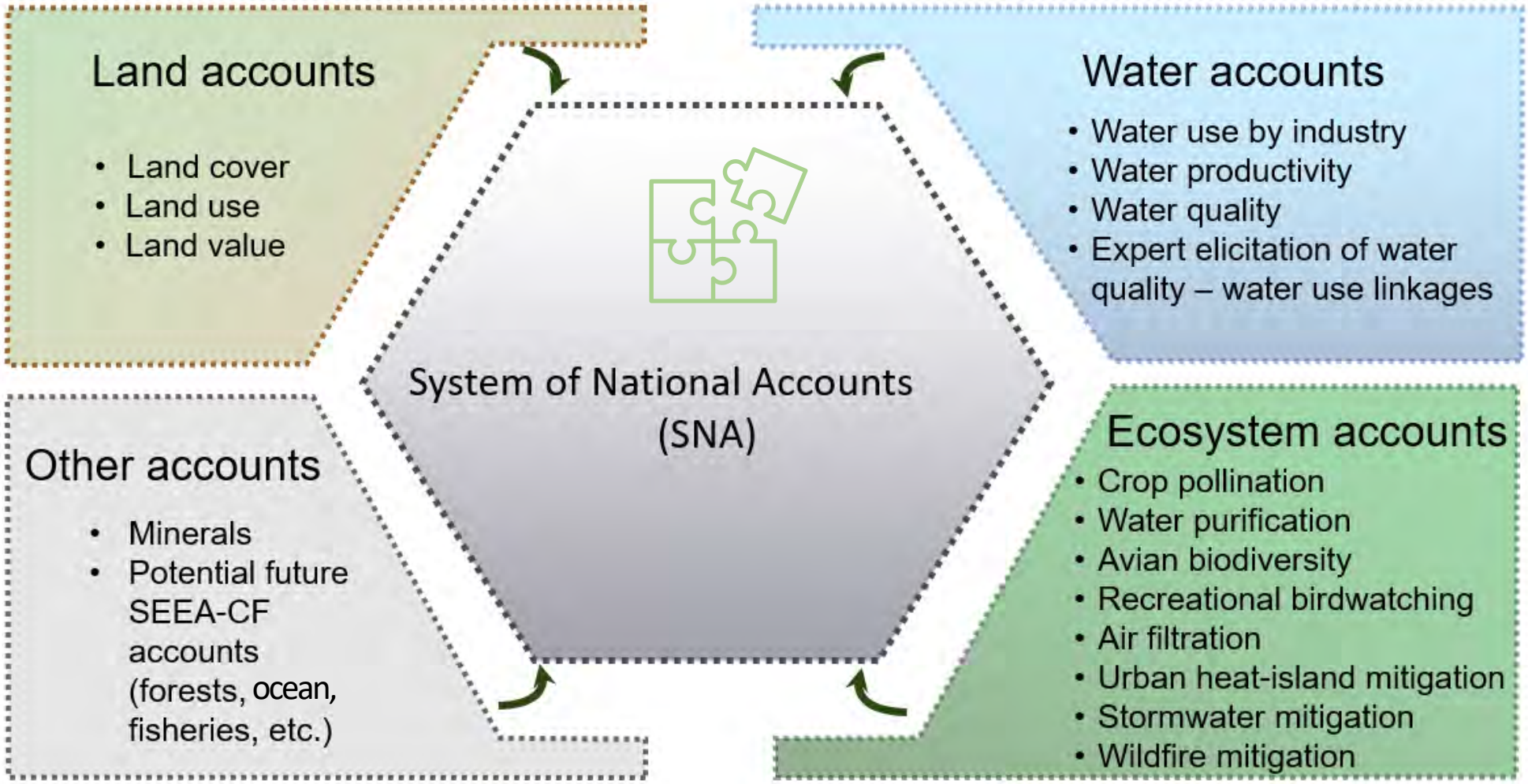
U.S. Domestic EEA Development

Wentland et al. 2020 (*Ecosystem Services*)

Bagstad et al. 2020 (*Ecosystem Services*)



National Strategy implementation plans for specific account types are in Phase I and II (of III)

Warnell et al. 2020,
Heris et al. 2021 (*Ecosystem Services*)

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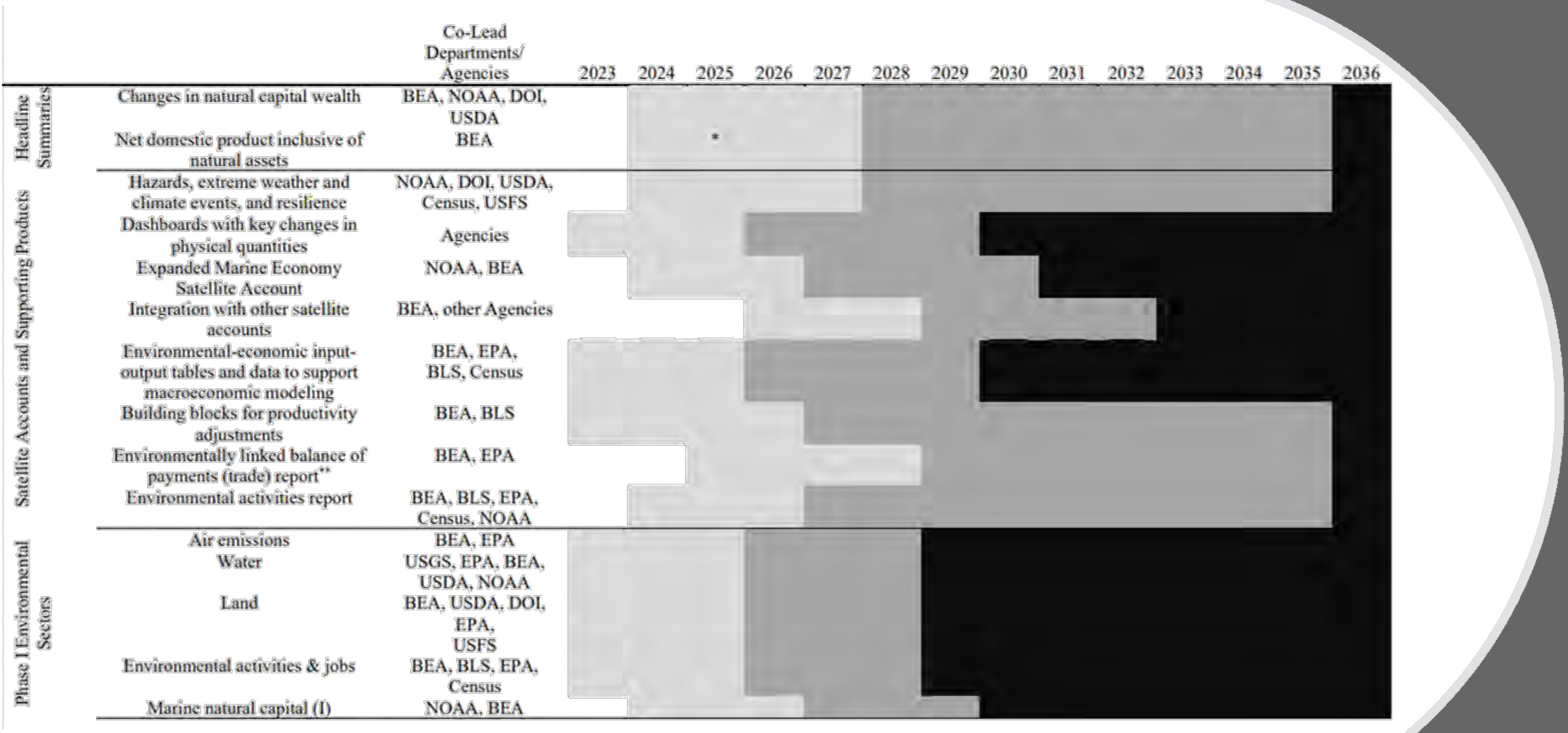
Timeline



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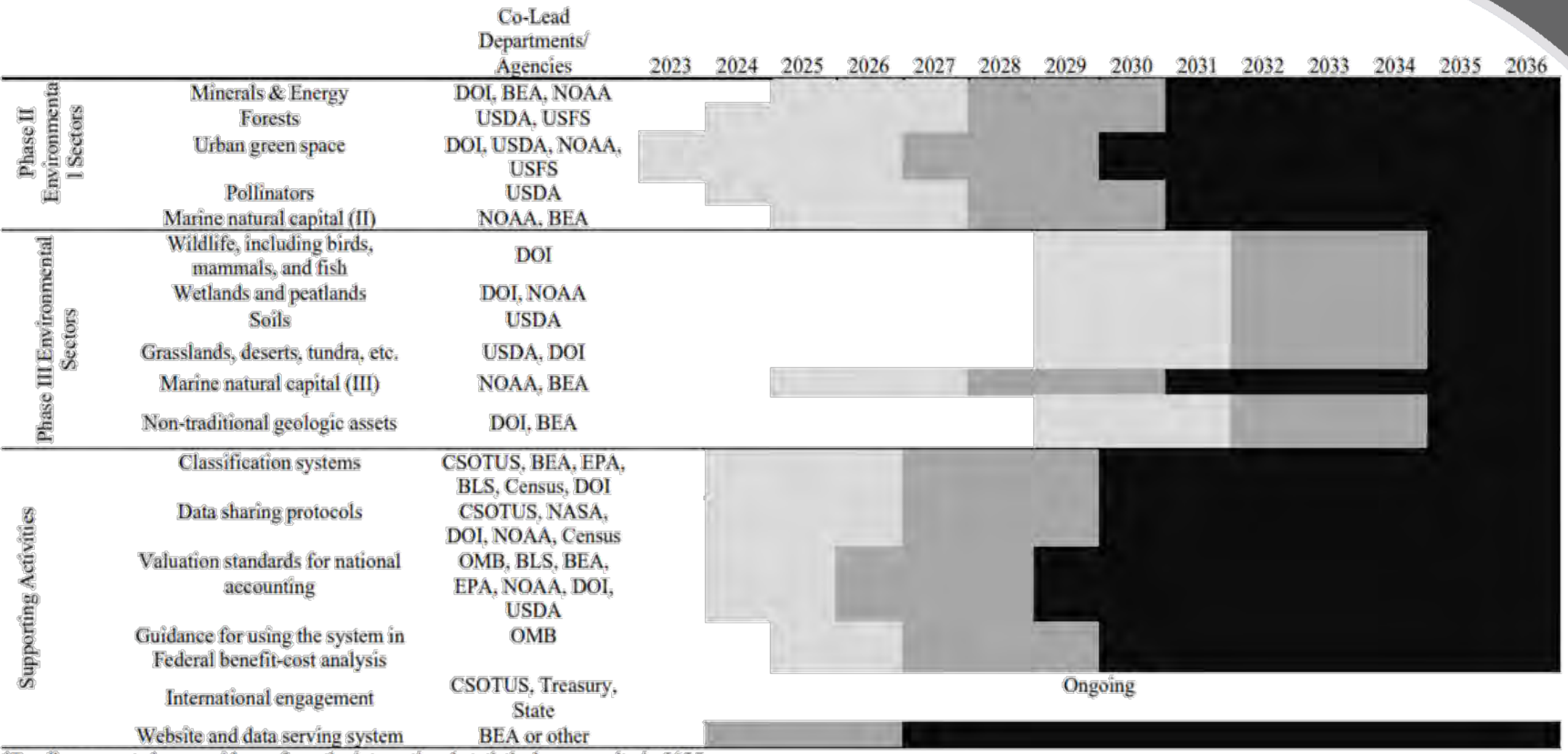
Timeline



*Pending expected new guidance from the international statistical community in 2025.
**May articulate to the G20 data gaps initiatives.

Chief Statistician of the United States and NCA

- CSOTUS role interplays statutes, regulations, and policies that govern issues of data-sharing, -access, -protection, -dissemination, and -quality
- EEA involves many core CSOTUS focus areas, so OCSOTUS is Technical Lead on many domestic and international EEA challenges
- Implementing the National Strategy, CSOTUS roles include:
  - Coordinating interagency work to set new EEA *Classifications*; *ITWG* to include BEA, DOI, EPA, NOAA, USDA, NASA, Census, BLS, other OMB (and others…)
  - Exploring *Data Sharing* issues and facilitating resolutions or workarounds where possible (forum TBD)
  - Exploring *Valuation* issues with a broader OIRA team, other EOP offices, and agencies (forum TBD)

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Bureau of Economic Analysis Examples

Environmental Goods & Services Sector (EGSS) Pilot

- BEA pilot, estimating size of “green economy”
- Drawing on data from: BEA, Census, EPA, USDA, BLS, and others

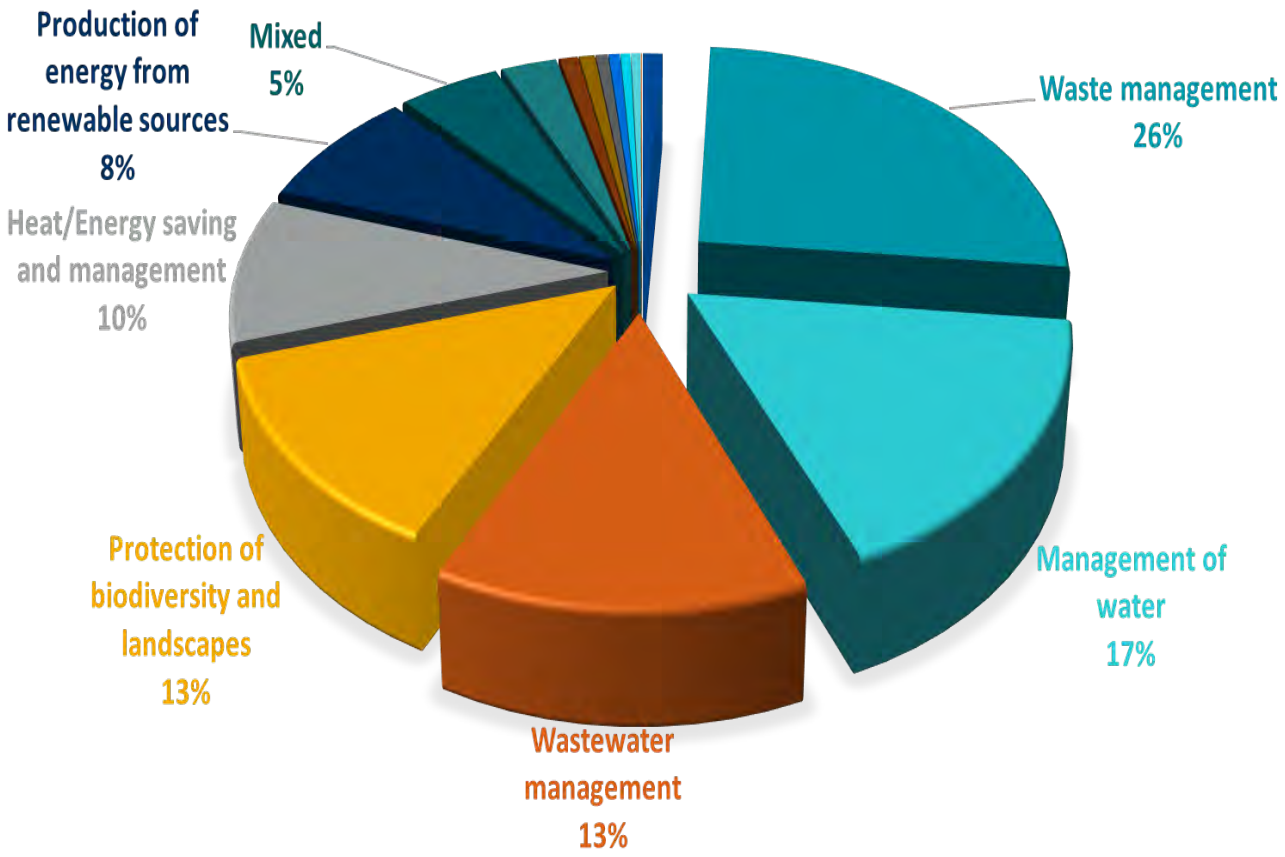

Table from: Fixler, Hass, Highfill, Wentland, and Wentland (2023), “Accounting for Environmental Activity: Measuring Public Environmental Expenditures and the Environmental Goods and Services Sector,” NBER, March 2023.

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Bureau of Economic Analysis Examples

Land Value (Pilot) Estimates for the Contiguous U.S.

- Combining multiple data sources
- Valuation
- Detailed transaction-level “Big Data”
  - 2020: hedonic regression; 2023: machine learning
- Quantifying land
- National Land Use Database
- Combines data from USGS, USDA, Census, NOAA, & others
  - 2010 only

Air Emissions Pilot Account – BEA Working Paper
Matthew Chambers

From: Wentland, Moulton, and Cornwall (2023), “For What It’s Worth: Measuring Land Value in the Era of Big Data and Machine Learning,” BEA Working Paper, May 2023.

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DOI USGS / EPA – Example

Water accounts – assets, use, quality, emissions

- USGS & EPA are *modeling* work to deliver *state-of-the-art information* into water accounts, planned from FY24–FY30
- *Capacity to integrate* these data into water accounts currently remains *limited*
- *SNA-compliant approaches* to valuing water quality & quantity *must be developed*
- Current *data limitations/needs*
  - More widespread & consistent water quality *monitoring*
  - *National-scale* databases
  - *National* survey

Water accounts Implementation Plan furthers and expands work described in:
Bagstad et al. 2020 (*Ecosystem Services*)

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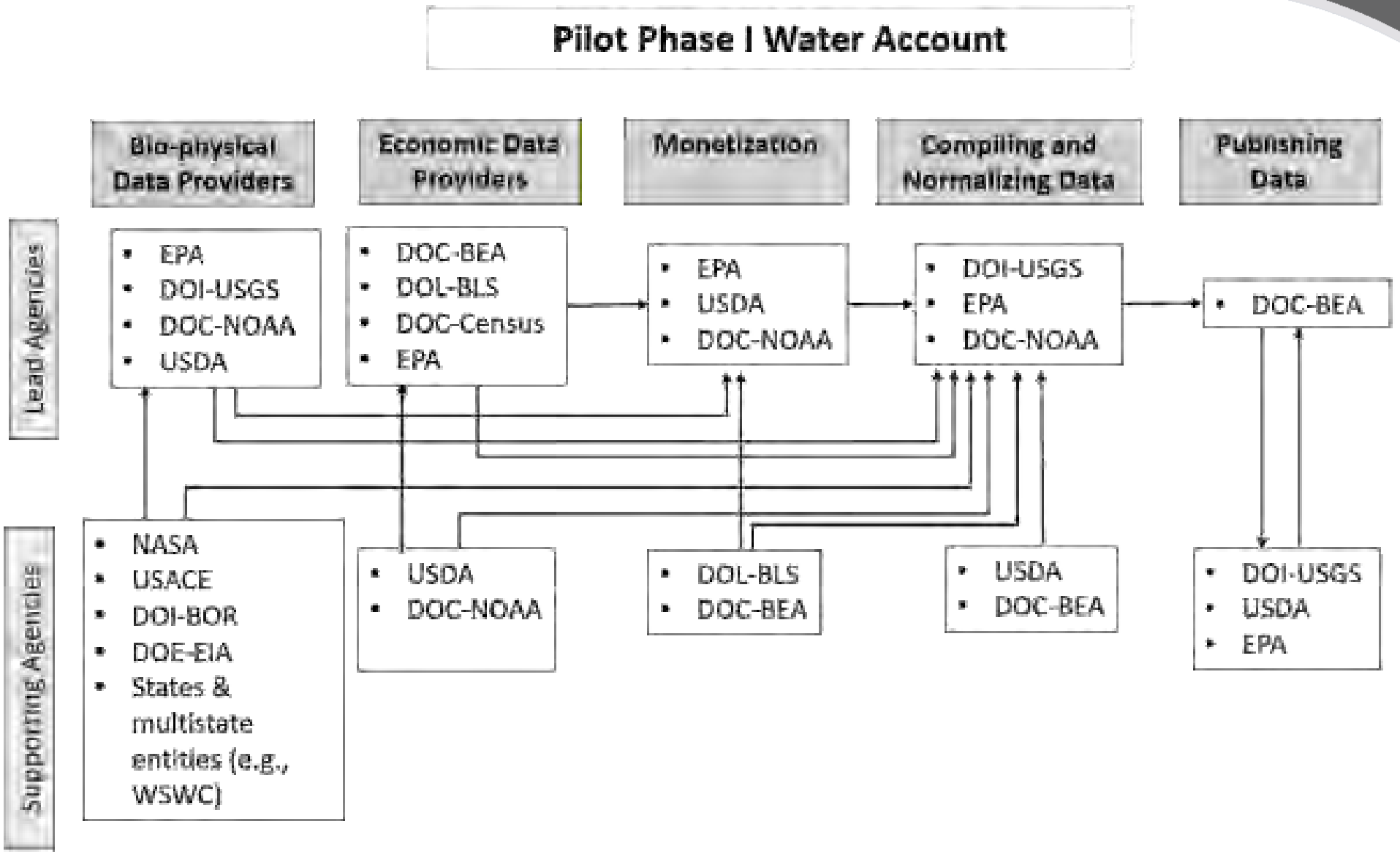
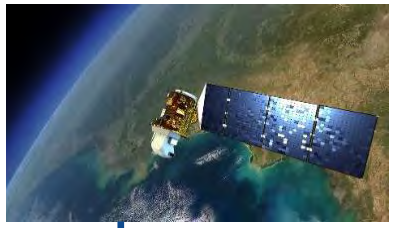
Water accounts – complexity

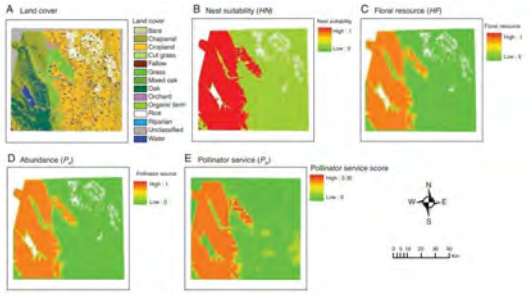


Pollinator accounts – complexity

Landsat (USGS/NASA)



NLCD (USGS)



USDA Cropland Data Layer

USDA-NASS crop yield & price data

Ecological data on pollinators (USDA, USGS, others)

https://code.usgs.gov/

USGS Supercomputing

USGS-Public data repository

ScienceBase

bea Bureau of Economic Analysis U.S. DEPARTMENT OF COMMERCE

Year	Ecosystem Types (Land cover)												
	Developed - Low	Developed - Medium	Developed - High	Barren	Deciduous Forest	Evergreen Forest	Mixed Forest	Scrub/Shrub	Grassland/Herbaceous	Agriculture	Woody Wetlands	Emergent Herbaceous Wetlands	TOTAL
2008	$140.4	$17.7	$1.2	$4.1	$243.7	$44.0	$50.7	$136.9	$552.1	$5,909.1	$101.2	$71.8	$7,273.0
2011	$160.7	$21.2	$1.5	$7.0	$286.8	$61.7	$61.2	$227.1	$531.3	$7,435.5	$119.8	$98.8	$9,012.7
2014	$223.9	$34.9	$2.7	$12.0	$399.7	$60.0	$74.5	$183.9	$791.9	$9,591.9	$145.6	$138.2	$11,659.1
2017	$210.5	$34.3	$2.7	$8.9	$431.9	$61.3	$77.8	$189.4	$506.1	$9,352.3	$149.1	$141.3	$11,165.6
2020	$171.9	$32.7	$2.7	$8.2	$432.2	$60.8	$90.6	$167.4	$381.5	$7,624.0	$121.6	$121.2	$9,215.0

Year	Economic Units													
	111110 Soybean farming	111120 Oilseed (except soybean) farming[1]	111219 Other vegetable (except potato) and melon farming[2]	111310 Orange groves	111320 Citrus (except orange)	111331 Apple orchards	111332 Grape vineyards	111333 Strawberry farming	111334 Berry (except strawberry) farming[3]	111335 Tree nut farming[4]	111339 Other noncitrus fruit farming[5]	111920 Cotton farming	111992 Peanut farming	TOTAL
2008	$4,311.2	$66.2	$66.7	$563.7	$57.5	$347.5	$506.5	$93.9	$45.1	$246.9	$264.7	$556.6	$146.3	$7,273.0
2011	$4,791.3	$64.2	$41.2	$576.5	$59.9	$342.7	$433.9	$107.9	$40.8	$364.7	$225.5	$1,798.4	$165.7	$9,012.7
2014	$7,415.7	$63.8	$47.4	$547.2	$86.3	$362.7	$868.0	$295.3	$81.2	$710.0	$220.4	$794.4	$166.9	$11,659.1
2017	$7,232.1	$65.6	$80.3	$368.4	$45.5	$328.5	$879.9	$137.8	$70.1	$528.5	$250.4	$998.6	$179.9	$11,165.6
2020	$5,848.8	$85.5	$43.3	$152.0	$94.3	$363.8	$654.2	$33.1	$94.1	$570.8	$351.8	$764.3	$159.1	$9,215.0

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Science needs: General challenges

- **Reduce latency** of key data products
  - e.g., National Land Cover Database; USDA Cropland Data Layer
- **Data gaps** remain
  - Identify & fill the most important ones
  - Understand where existing data are good enough
- Move from **agency to USG-wide** monitoring & modeling
- Need a **data/model management strategy** (interoperability)
  - Data & models are housed across agencies
  - Relying on individual scientists to regularly re-run their models is unsustainable
  - Public code repositories a desirable starting point (avoid platform lock-in)
  - High-level interoperability (e.g., ARIES for SEEA) potentially desirable, but will require commitment & small changes to the status quo
- The **challenge of AK, HI, territories** (especially AK)
- Agencies already produce much needed data, but **lack capacity for the "last mile" to turn it into accounts**

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SEED Products Tracker

	Implementation Plan	Pilot	Prototype	Valuation	Production
Air emissions					
Water					
Land					
Env. Activities & Jobs					
Marine (I)					

Phase 2

Minerals & Energy					
Forests					
Urban Green Space					
Pollinators					
Marine (II)					
Hazards					

Not Started
In Progress
Completed
Finalized

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Council of Account Leads

Co-chairs: Ken Bagstad (USGS), Scott Wentland (BEA)

- Communication, collaboration
- Avoid foreseeable obstacles, coordinate strategies
- Centralize communication between account teams & EOP

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U.S. International EEA Development – Special Agreements
High-Ambition Global Leadership Meeting: Australia – US

MAY 20, 2023

Australia-United States Joint Leaders' Statement – An Alliance for our Times

BRIEFING ROOM › STATEMENTS AND RELEASES

"Our countries are committed to halting and reversing environmental degradation, including via environmental economic accounting and reporting, nature-based solutions, preventing pollution, and protecting and restoring biodiversity on both land and in water."

www.whitehouse.gov/briefing-room/statements-releases/2023/05/20/australia-united-states-joint-leaders-statement-an-alliance-for-our-times/

New York City, September 19, 2023 – Senior Official Dialogue

Technical Track

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Thank You!

Questions?

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