Great Lakes Data Management

Meeting present and future needs for coastal resiliency

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USACE Great Lakes Coastal Resiliency Study (FY19-21)

A comprehensive assessment of Great Lakes coastal resilience includes identifying the **physical, ecological, economic, and societal** vulnerabilities along our coasts and evaluating the ability of the coasts and coastal communities to withstand and recover from stressors, change, and hazardous events

A **holistic approach** to maintaining coastal resilience is necessary since the vulnerabilities (and management measures) are inherently linked through coastal processes

Assessment of Great Lakes coastal resiliency will be **data-driven**, but is also expected to be **data-limited**

Must integrate physical, ecological, socioeconomic, climatological, geologic, engineering, infrastructure, environmental, hazards, and land use data to:

- analyze existing coastal vulnerabilities in the Great Lakes
- forecast future conditions that will be used in assessing risk and vulnerability within built and natural coastal environments

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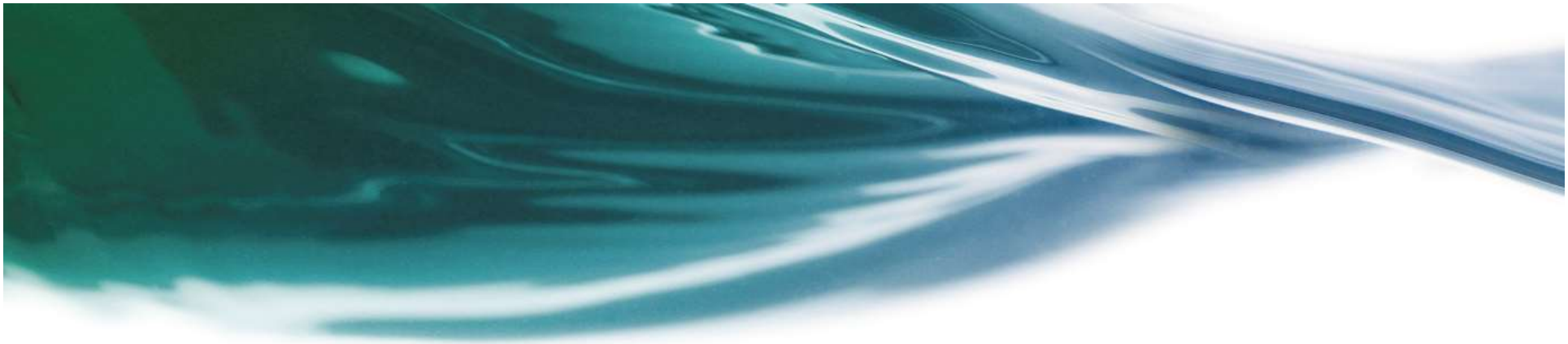

Data Discovery

A major issue and an opportunity for improvement

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Example: The Chicago Crescent

- 160 miles of densely populated coast (Milwaukee to Michigan City)
- 12.4 million people within 50 miles of the coast
- 61 tributaries
- 300 lakefront parks and beaches
- 339 known spawning sites for 43 species of fish
- 4.4 billion gallons of waterwater discharged daily (249 registered outfalls)
- 3 Areas of Concern (AOCs)
- 16 powerplants within about 1 mile of coast
- High (80-100%) stress index from 34 stressors (GLEAM)

Figure 2. Night view of southern Lake Michigan and the partial domain of the "Chicago Crescent" extending offshore 3 km into Lake Michigan from Milwaukee, Wisconsin to Michigan City, Indiana. Photograph by NASA.

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Coastal Resiliency of the Chicago Crescent:
Data needs and *some* (but not all) sources

- **Physical data** (NOAA, USGS, USACE, NPS, GLOS, ISGS, WSCO,…)
- **Biological/Ecological data** (USGS, USFWS, NPS, NOAA, USACE, DNRs, GLAHF, GLFC, GLRC, SeaGrants,…)
- **Socioeconomic and political data** (USGS, CSO, WSCO, ISGS, IGIO, Chicago, Milwaukee, CPD,…)
- **Climatological/Met data** (NOAA, USGS, GLOS, CPD,…)
- **Land use data** (USGS, USDA, WSCO, Chicago, Milwaukee,…)
- **Geologic and sediment data** (USGS, USACE, ISGS, WSCO, IGS,…)
- **Infrastructure and Engineering data** (USACE, DOTs, DNRs, CSO,…)
- **Environmental data** (EPA—US & states, IDEM, SeaGrants, MMSD, CPD, MWRDGC,…)
- **Shoreline mapping, Coastal imaging, Remote sensing** (NOAA, NASA, USFWS, WCMP, MTU,…)
- **Hazards data** (USCG, NOAA, FEMA, SeaGrants, WEM, IEMA, IDHS,…)
- **Tributary/stormwater runoff data** (USGS, EPA—US & states, IDEM, MWRDGC, MMSD,…)

+ county, municipal, academic, NPOs, crowd-sourced…

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Efficient Data Management is Critical

A one-stop shop for Great Lakes data is not feasible, but…

- We must find a way to efficiently share and serve data
- Metadata is the key (as are the standards used)
- Federal, state, local, and academic data portals must “talk” via metadata
- Top-level data portals must allow advanced spatial data queries
- Data quality cannot impede data discovery, but must be specified
- Must be incentive to share data (especially academics) such as DOI for data sets
- Top-level data portals must include data discovery/sharing capabilities for individuals (basic metadata form, contact info, and link)

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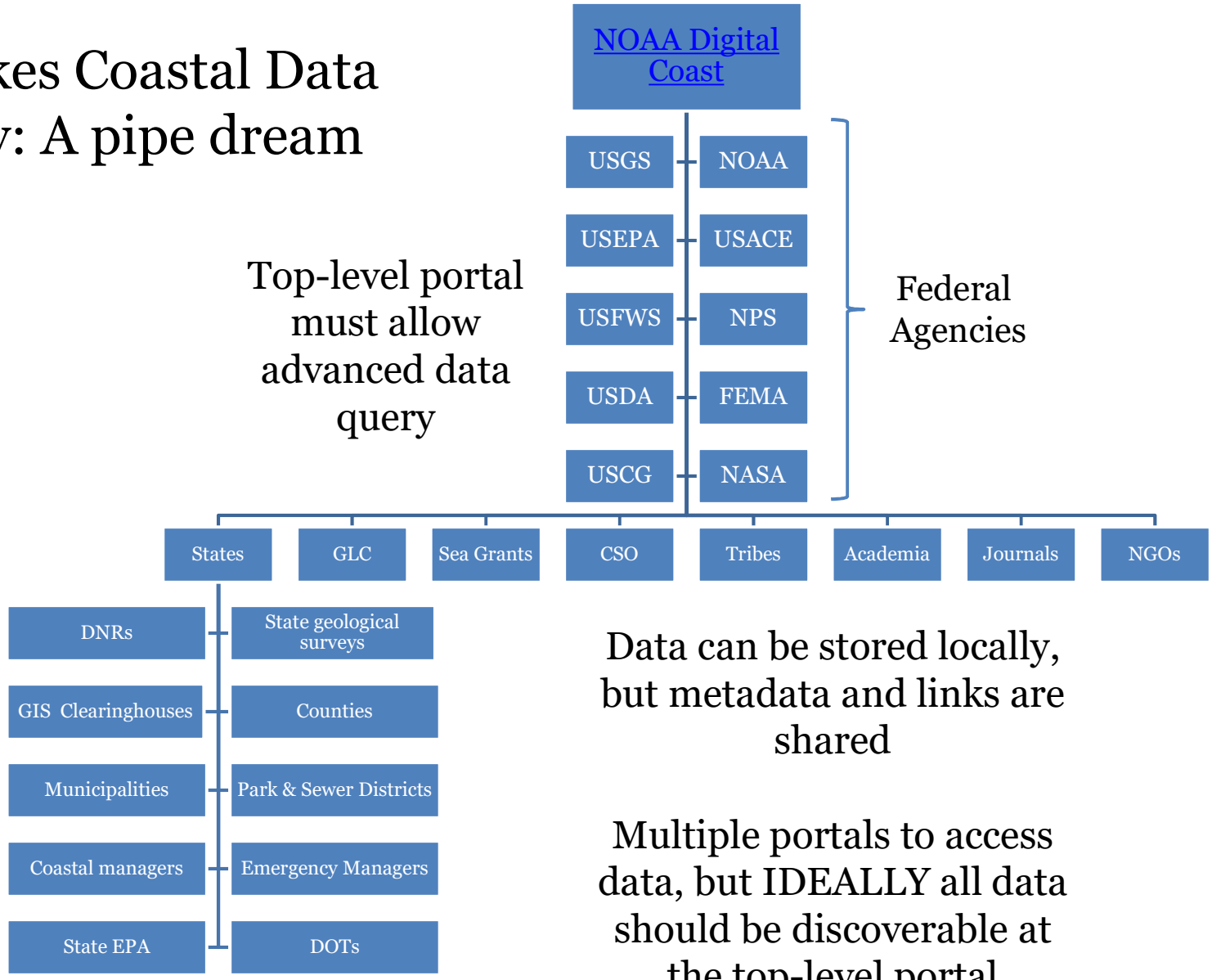
Great Lakes Coastal Data Discovery: A pipe dream



Top-level portal must allow advanced data query

Data can be stored locally, but metadata and links are shared

Multiple portals to access data, but IDEALLY all data should be discoverable at the top-level portal

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Existing Data and Literature

Major problem, key resource

- What about existing data and studies in the literature that lack proper metadata?
- Must find a way to efficiently mine the literature to extract relevant studies and data (…but how?)

Example: USGS Great Lakes Coastal Science data call

- Requested recent, relevant USGS coastal science for Great Lakes (studies, data, etc.) with a 1-week deadline
- Received 223 studies and datasets from 10 USGS offices
- The vast majority of these studies are not discoverable through major data portals like Data.gov and Digital Coast

…Houston, we have a problem.

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U.S. Federal Mapping Coordination: A good example

- The Integrated Working Group on Ocean and Coastal Mapping (IWG-OCM) and the 3D Elevation Program (3DEP)
- Demonstrating how to coordinate mapping requirements and plans of Federal and state agencies around the country
- The kinds of activities that are included in this coordination site are:
  - **Mapping data needs/requirements** and priority areas for mapping
  - Preliminary **plans to acquire** mapping data

I envision a data discovery portal that operates in a similar fashion

KEY COMPONENTS: Data Needs + Data Collection Plans + Existing Data

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The Federal Open Data Policy & Data.gov

The USGS perspective

- Scientific data that are used to support the conclusions in scholarly publications will be made available free-of-charge for public access simultaneously with or prior to the release of an associated scholarly publication*
- Final project scientific data approved for release are made available free-of-charge at the end of the project*
- Scientific data follow the requirements of the data management plan (DMP) which includes information such as:
  - acquisition method, quality assurance, security, disposition, and if applicable, circumstance restricting public access
- Metadata must accompany the scientific data (using USGS endorsed metadata standards)
- Approved scientific data are assigned a USGS digital object identifier (DOI)
- Scientific data are approved for release in accordance with USGS Fundamental Science Practices requirements (data are peer reviewed)
- Scientific data are preserved as the authoritative version on or through an approved USGS server, application, or repository (ScienceBase, Data.gov, etc.)

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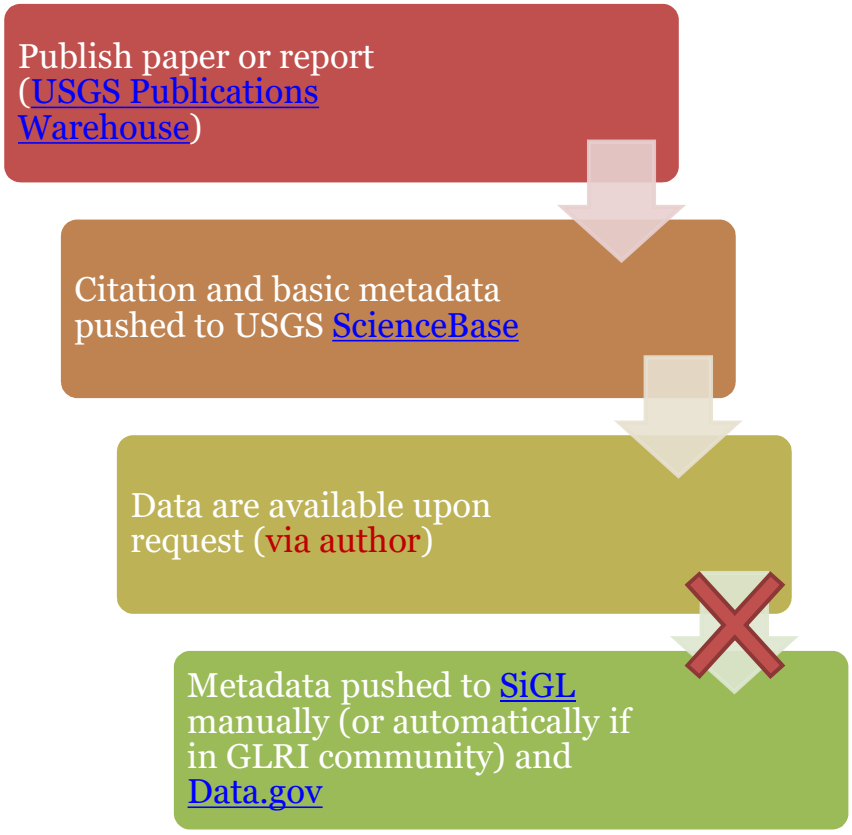
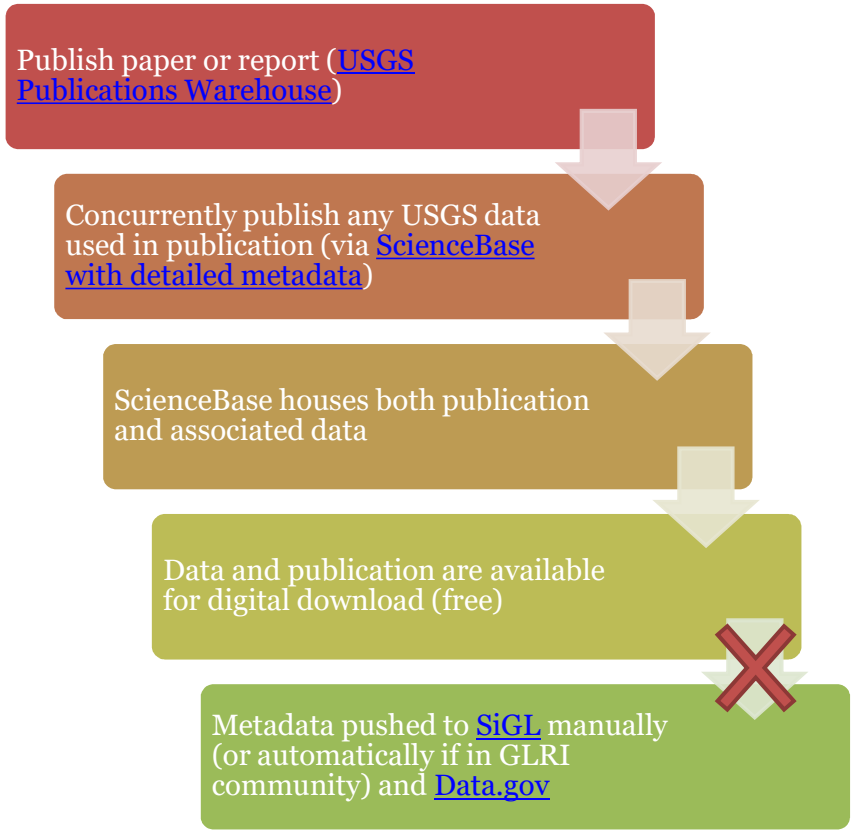
*Some exclusions apply

USGS Great Lakes Data Flow (Studies)

Prior to 2016



Starting Oct. 1, 2016



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Future Work

- USGS is currently reviewing linkages between ScienceBase and SiGL and enforcing metadata standards on products (will also be looking at linkages to Data.gov)
- The USGS, NOAA, and USACE have begun discussions on where improvements can be made to improve data discovery in Digital Coast
- We hope to secure funding for FY18 to initiate data compilation for the USACE Coastal Resiliency study
- The Great Lakes Commission has engaged the USGS and USACE regarding collaboration on coastal resiliency

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Thank you.

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