

# New Hampshire Coastal Spatial Data Management Plan and Inventory

*Coordinating information to improve coastal and estuarine management*  
**July 2014**

---

A **Product** of the New Hampshire Estuary Spatial Planning Project

**Prepared by** Kirsten Howard, NHDES, Watershed Management Bureau, Coastal Program

**Contributors**

Steve Couture, NHDES, Watershed Management Bureau, Coastal Program

Ray Konisky, The Nature Conservancy

Fay Rubin, University of New Hampshire, Earth Systems Research Center

Phil Trowbridge, Piscataqua Region Estuaries Partnership

Chris Williams, NHDES, Watershed Management Bureau, Coastal Program

**NHDES Commissioner**, Tom Burack

**NHDES Assistant Commissioner**, Vicki Quiram

**NHDES Watershed Management Bureau Administrator**, Ted Diers

**Address:**

New Hampshire Department of Environmental Services

Watershed Management Bureau, Coastal Program

222 International Drive, Suite 175

Portsmouth, NH 03801

**Phone:** 603-559-0020

**Website:** [www.des.nh.gov](http://www.des.nh.gov)



## **Acknowledgements**

This document was developed as part of the New Hampshire Estuary Spatial Planning Project ([NHESP](#))—a partnership between the New Hampshire Department of Environmental Services (NHDES) Coastal Program, the Piscataqua Region Estuaries Partnership, The Nature Conservancy, and the Earth Systems Research Center. The project partners thank the members of the NHESP Project Advisory Committee for their input and review.

# Introduction

The New Hampshire Coastal Zone<sup>1</sup> is a critical state and regional asset that supports beach and boating tourism, commercial fishing, an emerging aquaculture industry, recreational fishing, critical wildlife habitat, naval shipyard activities, commercial transportation and much more. However, the coast and estuaries face ongoing stresses including but not limited to pollution, population growth and development, shoreline erosion, marine transportation, increasing recreational and commercial boating activity, pathogens, invasive species, and impacts from climate change such as flooding from sea-level rise and more intense storms. Currently, decision-making mechanisms pertaining to these stresses are sector-specific and inadequately integrated even though they affect the same areas. Fortunately, many partner organizations work within the coastal watershed<sup>2</sup> to protect the vital ecosystems that communities depend on and enjoy.

Geographic Information Systems (GIS) information (or spatial data) is increasingly a key component to more integrated, coordinated coastal management in New Hampshire. Consequently, partner organizations are increasingly developing and/or using spatial datasets related to the New Hampshire coasts and estuaries that include information on water quality, bathymetry, subtidal and terrestrial habitats, fish and wildlife, human uses, and potential impacts from climate change, to name a few. However, these datasets exist in disparate locations on various, often difficult-to-access servers, making them difficult to use in an effective way.

This Spatial Data Management Plan (Plan) presents an initial step toward better coordinating spatial data relevant to decision-making in New Hampshire's coastal watershed. The Plan and the attached Coastal Spatial Data Inventory (Inventory) explain the state of existing spatial data relevant to New Hampshire coastal and estuarine management and make recommendations to improve data coordination and access to enhance information-sharing and decision-making. The intended audience for the Plan and Inventory is organizations involved in developing, managing, and providing public access to spatial data in coastal New Hampshire. The Plan and Inventory are intended to be *living documents* that will inform and help coordinate this community of coastal spatial data developers and managers and improve spatial data accessibility and utility for user groups. The Plan is organized in the following sections:

## 1. Coastal Spatial Data Inventory and Data Viewer (p. 4)

- 1.1 The process used to document existing spatial data in the Coastal Spatial Data Inventory
- 1.2 Description of the new Coastal Data Viewer, a decision-support tool that will give users access and tools to view and query existing spatial datasets, and the criteria used to prioritize a subset of datasets for the NH [GRANIT](#)<sup>3</sup> Coastal Data Viewer

## 2. Coastal Spatial Data Stewardship Landscape (p. 6)

- 2.1 Data stewards<sup>4</sup> and their relationships with NH GRANIT
- 2.2 Existing ocean and coastal data portals managed by other agencies and organizations

## 3. Data Coordination Recommendations and Data Gaps (p. 9)

- 3.1 Recommendations to data stewards to improve spatial data coordination and access
- 3.2 Spatial data gaps in need of additional research, data processing, and funding

---

<sup>1</sup> The **Coastal Zone** of New Hampshire includes the total area of the 17 municipalities subject to tidal influence and extends 3 nautical miles off the coast, including a 3-mile buffer around the New Hampshire Isles of Shoals.

<sup>2</sup> The **coastal watershed** of New Hampshire consists of both the Great Bay Watershed and the Hampton-Seabrook Watershed, encompassing 525,000 acres that drain into NH's Coastal Zone waters.

<sup>3</sup> **GRANIT** is New Hampshire's statewide Geographic Information Systems (GIS) clearinghouse. See Section 1.2 for more information. [www.granit.unh.edu](http://www.granit.unh.edu)

<sup>4</sup> **Coastal spatial data steward** refers to an organization or individual that creates and manages spatial data related to coastal and/or estuarine issues and management in New Hampshire.

# 1. Coastal Spatial Data Inventory and Data Viewer

## 1.1. Inventory

### Purpose

The Inventory has three primary purposes:

- a. To be a reference and coordination tool for those interested in developing and/or using spatial data, including but not limited to coastal managers, researchers, state and local officials, non-profit organizations and user and industry groups.
- b. To inform the development of a web-based Coastal Data Viewer by NH GRANIT (see Section 1.2).
- c. To inform the NHESP Project assessment of ecosystem services in the Great Bay Estuary as well as additional future ecosystem services analyses in coastal New Hampshire.

The Inventory identifies important existing and ‘in development’ spatial datasets that are relevant to New Hampshire coastal and estuarine management. It endeavors to help answer questions like:

- What spatial data exists?
- Who develops and manages existing spatial data?
- Where is a specific spatial dataset housed?
- How often is a specific spatial dataset updated?
- How can a specific spatial dataset be accessed?
- Does a specific spatial dataset contain structured metadata?

While the Inventory attempts to capture key spatial datasets relevant to New Hampshire coastal and estuarine management, it is not a complete list. The Inventory should be regularly updated and subsequent Inventory updates will be noted by the version number of the Inventory title (currently 1.0). Management of the Inventory will be conducted by the NHDES Coastal Program (NHCP) through August 2015, at which time the management role will be reevaluated. If you have datasets to add to the Inventory, please contact Kirsten Howard by email at [kirsten.howard@des.nh.gov](mailto:kirsten.howard@des.nh.gov) or by phone at (603) 559-0020.

### Methods

Information about existing New Hampshire coastal spatial datasets was obtained through several methods.

**NHESP Project Workshop:** In October 2013, multiple organizations that develop, manage and use spatial datasets shared relevant datasets.

**Existing public data portals:** GRANIT and other portals and online sources including the Northeast Ocean Data Portal, the US Census Bureau and NOAA’s Digital Coast (see Section 2.2).

**Interviews with data stewards:** NHDES, the Great Bay National Estuarine Research Reserve (GBNERR), The Nature Conservancy (TNC), the University of New Hampshire (UNH), the Piscataqua Region Estuaries Partnership (PREP), the New Hampshire Department of Fish and Game and New Hampshire Sea Grant.

**Additional research:** State of New Hampshire Geographic Information Systems Strategic Plan (2007) as well as meeting notes from the New Hampshire GIS Advisory Committee.

### Using the Inventory: An assessment of Great Bay ecosystem services

In one example of how the Coastal Spatial Data Inventory will be used, the NHESP project team is currently using spatial data to map the ecosystem services—or the benefits people get from the environment—for the Great Bay Estuary.

The project team will use the Inventory to identify and gain access to the best spatial datasets for Great Bay habitats, including saltmarsh, eelgrass and oyster beds, as well as human uses such as recreational boating, oyster aquaculture sites and moorings, among others. The datasets will be used together in an integrated modeling process that identifies habitat risk as well as in models that estimate the value of ecosystem services like fish production and recreation.

The assessment will help coastal managers answer pertinent management questions such as: What configuration of uses and activities maximize the benefits people get from the Great Bay Estuary?

## **1.2. Coastal Data Viewer**

### **Development**

The New Hampshire Geographically Referenced Analysis and Information Transfer System ([GRANIT](#)) is a cooperative project to create, maintain and make available a statewide geographic database serving the information needs of state, regional and local decision-makers. A collaborative effort between UNH and the New Hampshire Office of Energy and Planning, the core GRANIT System is housed at the UNH Institute for the Study of Earth, Oceans, and Space and managed through the Earth Systems Research Center in Durham, New Hampshire.

The GRANIT approach to a statewide GIS depends upon the cooperative efforts of a host of agencies to collaborate on various elements of database design and construction as well as application development. The collaboration occurs formally through the New Hampshire GIS Advisory Committee and informally through daily interactions between the growing body of GIS users in the state and the region.

GRANIT is developing a Coastal Data Viewer that will make relevant coastal spatial datasets publicly available to view and query. The Coastal Data Viewer will be created in collaboration with GRANIT's partners on the NOAA-funded Resilient New Hampshire Coasts Project<sup>5</sup>, and will rely on municipal officials and other important end-users for input prioritizing the datasets it serves.

### **Criteria**

A set of criteria was applied to the datasets identified in the Inventory as an initial filter to prioritize candidate datasets for the Coastal Data Viewer. These priority datasets are highlighted in the attached Inventory. The list of prioritized datasets is subject to change, and prioritized datasets are not guaranteed to be in the Coastal Data Viewer. In no particular order, the criteria stipulate that the dataset:

1. Is spatial.
2. Is relevant to coastal and/or estuarine decision-making.
3. Occurs within the New Hampshire Coastal Zone or the Coastal Watershed.
4. Has been completed.
5. Can be made publicly available.
6. Has structured metadata or someone willing to create and maintain it.
7. Has a Steward who will commit to update the data and provide it regularly to GRANIT.
8. Is preferably not partial, but if partial, is relevant to more than one New Hampshire community.
9. Depicts substantial unique data not captured by other prioritized datasets.

In cases where two or more datasets capture seemingly similar information on the ground, the most current, accurate and regularly-updated dataset is preferred. The Inventory identifies several datasets that capture seemingly similar information using different methods. To avoid confusion for end-users of the Coastal Data Viewer, we generally selected one dataset that provided similar or overlapping information. The justification for why specific datasets are not prioritized due to Criteria #9 can be found in Column P of the Inventory. If a similar dataset meets the GRANIT requirements but is not prioritized for the Viewer, it can still be made available for download.

---

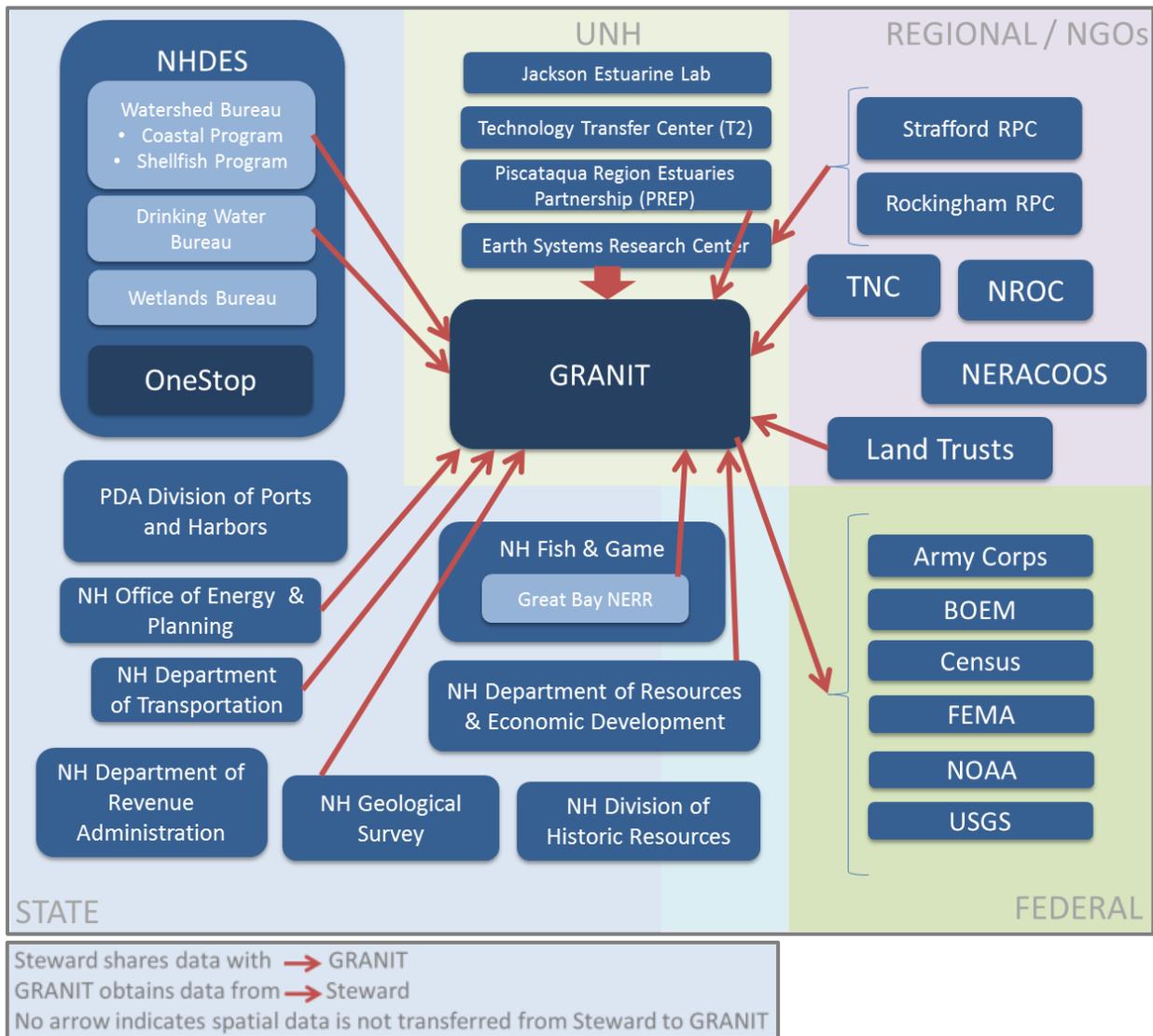
<sup>5</sup> Resilient New Hampshire Coasts project partners include the NHDES Coastal Program, the Natural Resource Outreach Coalition, UNH Jackson Estuarine Laboratory, Great Bay Stewards, the New Hampshire Geological Survey, GBNERR, the Rockingham Planning Commission and the New Hampshire Coastal Adaptation Workgroup.

## 2. Coastal Spatial Data Stewardship Landscape

### 2.1. Data Stewards

Many agencies and organizations create and manage coastal and estuarine spatial data pertinent to New Hampshire. GRANIT obtains data through formal and informal relationships with organizations, therefore some of the responsibility falls to data stewards to regularly provide GRANIT with datasets and ensure they meet minimum GRANIT criteria, including [FGDC](#)<sup>6</sup> metadata<sup>7</sup> standards.

The following simplified organizational web depicts coastal and estuarine spatial data stewards and their relationship to GRANIT. As indicated by this diagram, there are inconsistencies in the ways spatial data for the New Hampshire Coastal Zone are shared and made available to the public. One goal of the GRANIT Coastal Data Viewer is to harmonize these processes as much as possible.



<sup>6</sup> The **Federal Geographic Data Committee (FGDC)** is an interagency committee that promotes the coordinated development, use, sharing, and dissemination of geospatial data on a national basis through the development of standards for data organizations and structure, including metadata.

<sup>7</sup> **Metadata** is data about data that describes how, when and by whom a set of data was collected, how the data is formatted, the quality of the data, and limitations on data use, among other information.

## 2.2. Existing Ocean and Coastal Data Portals

Data portals are increasingly popular decision support tools used to coordinate existing datasets from multiple sources and make data accessible. A number of different data portals have been launched in recent years. This is not a comprehensive list, but rather a list of some data portals that provide access to useful spatial data relevant to coastal management in New Hampshire, the Northeast, and the Gulf of Maine. The regional and national data portals provide valuable data, but some of the data is collected at relatively low resolutions over large regions compared to local datasets. The GRANIT Coastal Viewer will fill a need for high resolution local spatial data focused on the New Hampshire Coastal Zone and coastal watershed to help municipal and state officials, NGOs, and research institutions design and implement new management strategies. A few coastal municipalities in New Hampshire also maintain their own GIS data resource pages on city and town websites—these were not included in this compilation but are useful ways to access local data such as tax parcel maps.

Data Portal	Geographic Scope	Organization	Description	URL
<b>EPSCoR Data Discovery Center</b>	New Hampshire	UNH EpSCoR	The main interface for the New Hampshire EPSCoR “Ecosystems and Society” Project. The role of the Data Discovery Center is to provide data access, increase capacity of projects, strengthen management and policy decision capacity, and expand the science education workforce.	<a href="http://epscor-ddc.sr.unh.edu/">http://epscor-ddc.sr.unh.edu/</a>
<b>GRANIT and GRANITView (Coastal Data Viewer in development)</b>	New Hampshire	NH GRANIT	As New Hampshire's statewide geographic information system (GIS) Clearinghouse, NH GRANIT offers geospatial services, including data development/distribution, spatial analysis, online mapping, image processing, application development, training, cartography, and technical services.	<a href="http://www.granit.unh.edu">www.granit.unh.edu</a> <a href="http://granitviewii.unh.edu/">http://granitviewii.unh.edu/</a>
<b>New Hampshire Department of Environmental Services OneStop and Web GIS</b>	New Hampshire	NHDES	OneStop is an online, searchable database comprised of environmental information and data compiled by NHDES programs. OneStop does not provide access to all existing NHDES data, however, available information includes: sources of environmental interest; GIS data; environmental monitoring data; ordering sampling equipment for environmental testing; permit statuses; and information on local businesses that provide various environmental services, ranging from hazardous waste transportation to water well contractors.	<a href="http://des.nh.gov/onestop/">http://des.nh.gov/onestop/</a> <a href="http://www2.des.state.nh.us/gis/onestop/">http://www2.des.state.nh.us/gis/onestop/</a>
<b>Emergency Response Management Application (ERMA®)</b>	New England	UNH	ERMA® is an online mapping tool that integrates both static and real-time data, such as Environmental Sensitivity Index (ESI) maps, ship locations, weather, and ocean currents, in a centralized, easy-to-use format for environmental responders and decision-makers. The tool focuses on oil spill response.	<a href="http://www.erma.unh.edu/newengland">www.erma.unh.edu/newengland</a>
<b>NERACOOS Real Time Data Portal</b>	Northeast	NERACOOS	This Portal displays real-time observations from buoys and monitoring stations in the Northeast region.	<a href="http://www.neracoos.org/realtime_map">www.neracoos.org/realtime_map</a>
<b>Northeast Ocean Data Portal</b>	Northeast	Northeast Regional Ocean Council	The Northeast Ocean Data website provides access to data, interactive maps, tools, and other information needed for decision making. The primary audiences include regional managers, ocean stakeholders, and technical staff. The website builds on existing efforts and provides additional capacity for state and regional ocean planning.	<a href="http://www.northeastoceandata.org">www.northeastoceandata.org</a>

Data Portal	Geographic Scope	Organization	Description	URL
<b>Meta-database for Integrated Sentinel Monitoring for Climate Change in Northeast Coastal Ecosystems</b>	Northeast	Northeast Regional Ocean Council and NERACOOS	This meta-database of monitoring efforts throughout the region is intended to be accessible to partners, researchers, managers and the public. The database is intended to coordinate monitoring data taken at sentinel sites to better understand climate change impacts in Northeastern coastal ecosystems.	<a href="http://www.neracoos.org/sentinelmonitoring/database">www.neracoos.org/sentinelmonitoring/database</a>
<b>Gulf of Maine Council Ecosystem Indicator Partnership</b>	Gulf of Maine	Gulf of Maine Council on the Marine Environment	The EcoSystem Indicator Partnership (ESIP) was formed by the Gulf of Maine Council to develop indicators for the Gulf of Maine. Activities of ESIP initially center on convening regional practitioners in six indicator areas: coastal development, contaminants and pathogens, eutrophication, aquatic habitat, fisheries and aquaculture, and climate change. The current Indicator Reporting Tool is the initial step towards delivering indicators for the Gulf of Maine.	<a href="http://www2.gulfofmaine.org/esip/reporting/gmap2.php?new=true">http://www2.gulfofmaine.org/esip/reporting/gmap2.php?new=true</a>
<b>Marine Cadastre</b>	National	Bureau of Ocean Energy Management and NOAA	This is the national data viewer for ocean and coastal data. The integrated marine information system provides authoritative and regularly updated ocean information, including offshore boundaries, infrastructure, human use, energy potential, and other datasets.	<a href="http://www.marinecadastre.gov">www.marinecadastre.gov</a>
<b>Digital Coast &amp; Sea-level rise Viewer</b>	National	NOAA	The need for good data forms the foundation of Digital Coast, which provides existing datasets to users, however the basic premise behind the effort is the understanding that data alone are not enough. The Digital Coast offers assistance with data, tools, training, stories from the field, and more. The Sea-level rise Viewer allows coastal communities to visualize potential impacts from sea-level rise. A slider bar is used to show how various levels of sea-level rise will impact coastal communities.	<a href="http://csc.noaa.gov/digitalcoast/">http://csc.noaa.gov/digitalcoast/</a>  <a href="http://csc.noaa.gov/slr/viewer/">http://csc.noaa.gov/slr/viewer/</a>
<b>NERR System Wide Monitoring Program</b>	National	NOAA National Estuarine Research Reserve	The GIS application gives users access to real-time and archived water quality data for stations in the Great Bay National Estuarine Research Reserve and reserves around the country.	<a href="http://cdmo.baruch.sc.edu/">http://cdmo.baruch.sc.edu/</a>
<b>Essential Fish Habitat Mapper</b>	National	NOAA National Marine Fisheries Service	The EFH Mapper is a one-stop tool for viewing the spatial representations of fish species, their life-stages, and important habitats. NMFS provides links to supporting materials, including fishery management plans, and the ability to download GIS data.	<a href="http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html">http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html</a>

### 3. Data Coordination Recommendations and Data Gaps

#### 3.1. Recommendations

Given the rich quality of coastal and estuarine spatial data that already exists and is in development for New Hampshire, data stewards should focus on improving access and use of existing data now. GRANIT currently represents the best option for spatial data-sharing and coordination in New Hampshire. The Coastal Data Viewer will be a valuable ‘one-stop-shop’ for spatial data users to view and query information about New Hampshire coasts and estuaries. This section lays out short-term (1-12 months) and long-term (1-3 years) recommendations directed at different data stewards to improve data coordination, and access.

##### 1. Data stewardship organizations should:

SHORT TERM

- a. Establish formalized processes to share data products with other organizations and the public.
- b. Participate in a data stewardship workshop, hosted by GRANIT and the NHDES Coastal Program, to advance compliance and plan for achievement of these recommendations.
- c. Give one or more employees the specific responsibility to coordinate spatial data internally and maintain a relationship with GRANIT staff.

LONG TERM

- d. Create FGDC-compliant metadata for all existing spatial datasets and require FGDC-compliant metadata for all future spatial datasets.
- e. Include resources for metadata development and data-sharing in future research funding proposals.
- f. Provide a dedicated, consistent funding source for GRANIT to coordinate with the data stewardship community, provide technical support, data preparation services, and purchase hardware and software.

##### 2. The New Hampshire Department of Environmental Services\* should:

SHORT TERM

- a. Co-host a data stewardship workshop with GRANIT to advance compliance and plan for achievement of these recommendations.
- b. Hire a dedicated data coordination specialist responsible for coordinating data (including spatial data) within and among the bureaus at NHDES and regularly providing datasets and updates to GRANIT.
- c. Designate a New Hampshire Coastal Program staff person responsible for regularly updating the Coastal Spatial Data Inventory and helping implement the Data Management Plan recommendations.

LONG TERM

- d. Restructure OneStop into a more user-friendly database of NHDES datasets.

\*NOTE: A NHDES GIS Team formed in 2014 to improve data organization, management, and accessibility. The group is beginning to address some of the recommendations listed.

**3. State agencies and the New Hampshire GIS Advisory Committee should:**

SHORT TERM

- a. Include GRANIT in discussions about statewide spatial data coordination.
- b. Establish data consistency standards for spatial datasets and data management.

LONG TERM

- c. Better coordinate data development in order to avoid duplication and enhance efficiency.
- d. Provide long-term funding for GRANIT.

**4. NH GRANIT should:**

SHORT TERM

- a. Co-host a data stewardship workshop with the NHDES Coastal Program to advance compliance and plan for achievement of these recommendations.
- b. Secure funding for maintenance of the Coastal Data Viewer beyond its first year of development.
- c. Provide clear guidance to all potential partner organizations about GRANIT data requirements and the data upload process.

LONG TERM

- d. Where possible, establish partnership agreements with data stewards to formalize frequency of data updates and format.
- e. Secure long-term funding for staff to coordinate with the data stewardship community, provide technical support, data preparation services, and purchase hardware and software.

### **3.2. Spatial Data Gaps**

While data stewards work to improve coordination and access to existing data, efforts should continue to fill coastal and estuarine spatial data gaps. The following spatial data gaps were identified in Inventory interviews with data stewards and through a web-based survey administered to a selection of data stewards and data users throughout coastal New Hampshire.

#### **Habitats & ecosystems**

- Integrated, comprehensive topographic bathymetric model.
- Integrated benthic habitat mapping.
- Updated invasive species data.\*
- Fish habitat and population data.
- Consistently-updated priority areas for conservation and restoration.\*
- Benthic habitat characteristics from backscatter data from side-scan sonar mapping in the Great Bay Estuary.
- Head of tide delineation.\*
- Comprehensive stream order completed for the New Hampshire Hydrography Dataset.\*

#### **Coastal hazards and climate change**

- Inventory of coastal barriers/hardened shorelines.
- Inventory of resources vulnerable to floods from sea-level rise and storms.
- Enhanced culvert assessment that accounts for predicted precipitation changes.
- Dynamic sea-level rise projections, including wave action and freshwater flooding.
- Historical high water marks.

#### **Social indicators, regulations, and projections**

- Commercial fishing activity.\*
- Recreational activity and resource visitation numbers.\*
- Distribution of coastal economic activity.\*
- Distribution of chemical fertilizer use and frequency of septic tank pumping over time
- Spatial depiction of federal, state, and municipal regulations like setbacks and buffer requirements.
- Accessible tax parcel data.\*
- Build out and population projections.\*

---

\*Indicates a dataset that already exists in some form, but should be updated, enhanced or made accessible