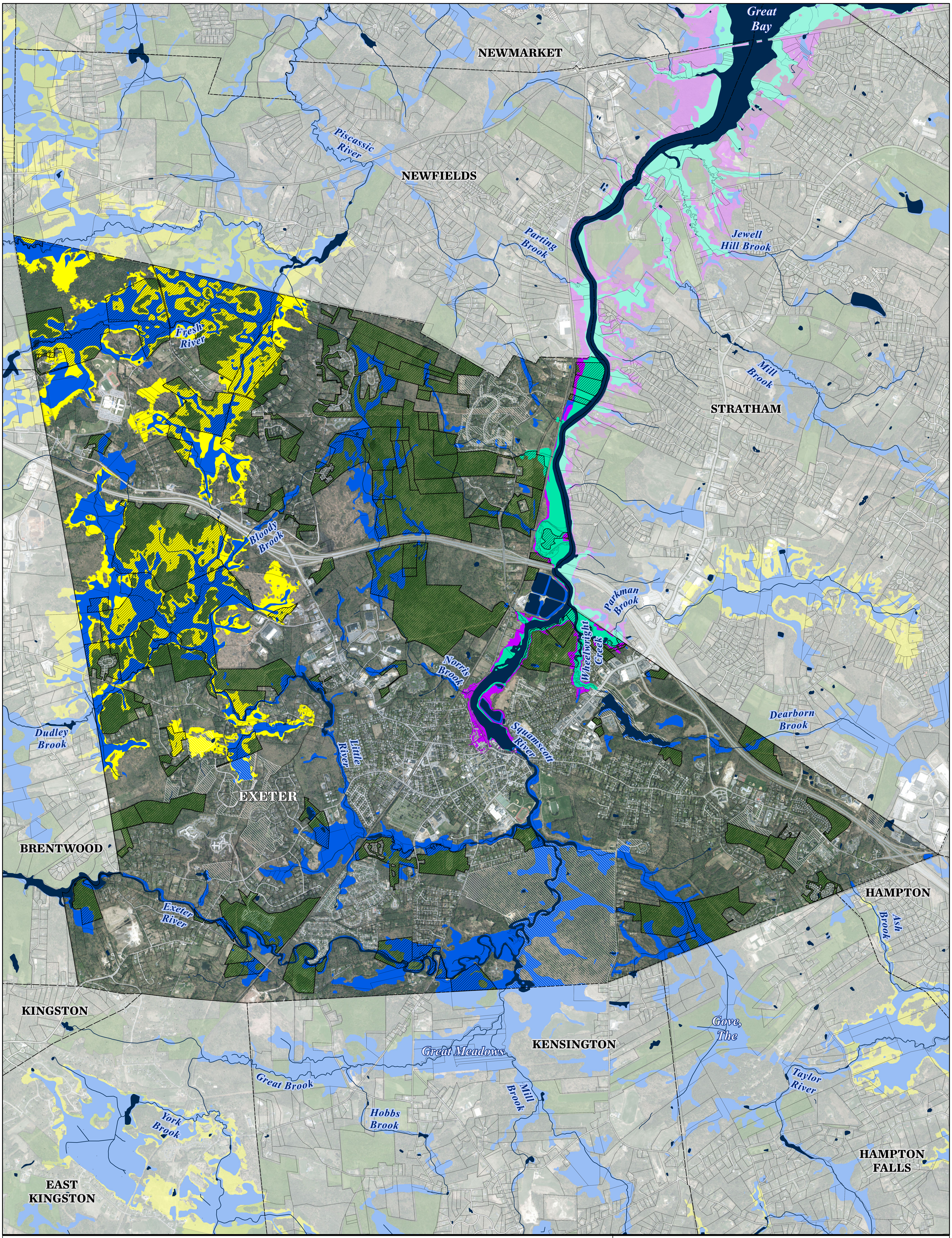


Land Conservation for Water Resource Protection

Flood Risk Reduction Opportunity Areas

Exeter, New Hampshire

Legend

- Flood Storage Opportunity Areas
- Salt Marsh Migration Opportunity Area
- Conservation Land
- Public/Other Land
- Municipal Boundary

Surface Water or Wetland

- Estuary
- Freshwater Wetland
- Open Water

N S W E

0 0.5 1

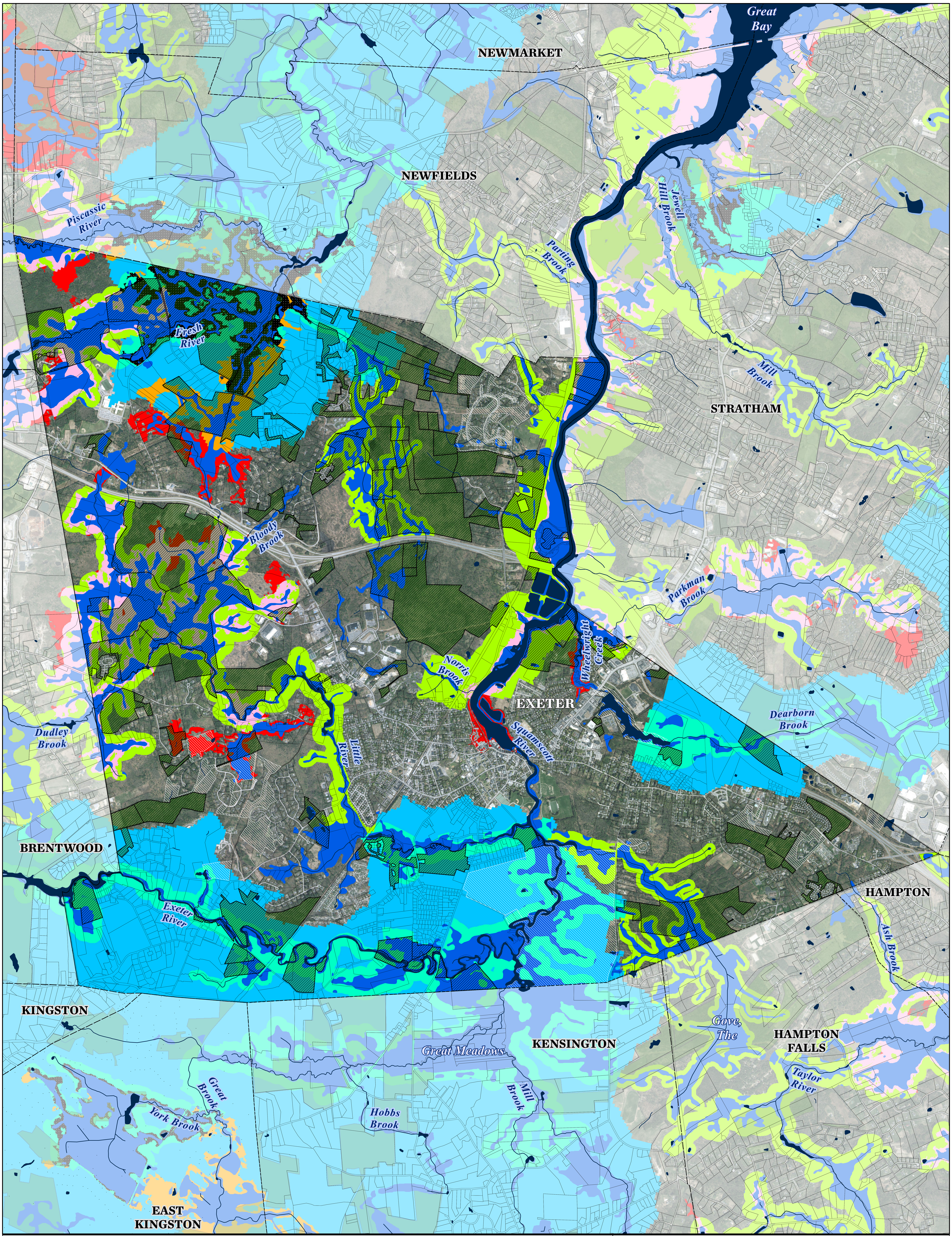
Miles

Map created 11/8/2018 by:

The Nature Conservancy

New Hampshire

Data displayed from NH GRANIT, NHDES, & The Nature Conservancy.



Legend

Areas Likely to Provide:

- Pollutant Attenuation
- Flood Risk Reduction
- Public Water Supply

Areas Likely to Provide Multiple Benefits

- Pollutant Attenuation and Flood Risk Reduction
- Pollutant Attenuation and Public Water Supply
- Flood Risk Reduction and Public Water Supply
- Pollutant Attenuation, Flood Risk Reduction and Public Water Supply

- Conservation Land
- Public/Other Land
- Municipal Boundary

Surface Water or Wetland

- Wetland
- Open Water

Land Conservation for Water Resource Protection

Single and Multiple Benefit Areas

Exeter,
New Hampshire

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New Hampshire
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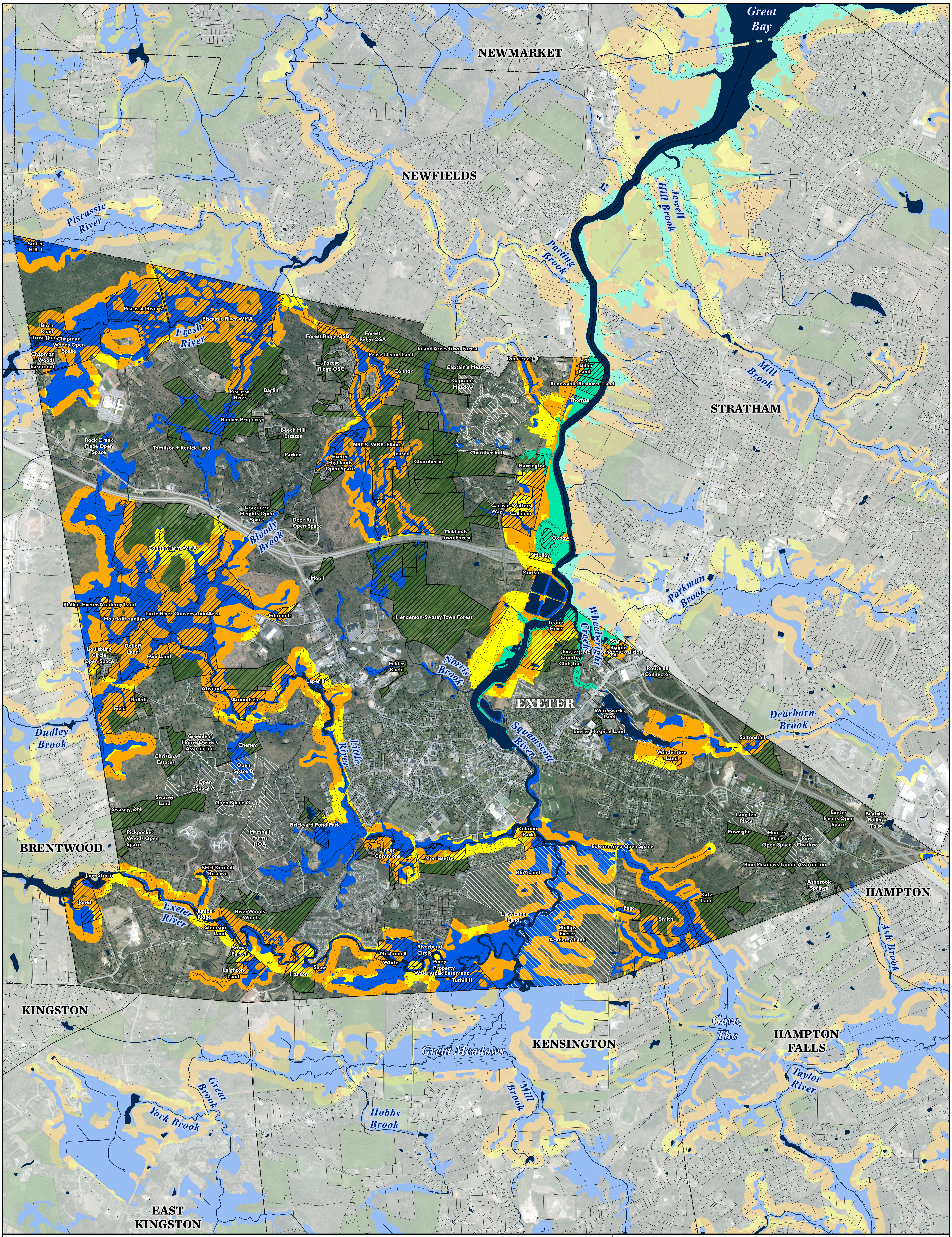

Legend

Riparian Buffer Areas

- Restoration Priority
- Protection Priority
- Conservation Land
- Public/Other Land
- Municipal Boundary

Surface Water or Wetland

- Estuary
- Freshwater Wetland
- Open Water

N S W E

0 0.5 1

Miles

Land Conservation for Water Resource Protection

Buffers for Water Quality Protection

Exeter, New Hampshire

Map created 11/8/2018 by:

The Nature Conservancy
New Hampshire

Data displayed from NH GRANIT, NHDES, & The Nature Conservancy.

Land Conservation Priorities for the Protection of Coastal Water Resources:

A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds

TECHNICAL REPORT

Prepared By

The Nature Conservancy
New Hampshire

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July 15, 2016

Land Conservation Priorities for the Protection of Coastal Water Resources:

A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds

TECHNICAL REPORT

July 15, 2016

Prepared for:

New Hampshire Department of Environmental Services Coastal Program

Key to Partner Acronyms

GBNERR	Great Bay National Estuarine Research Reserve	SELT	Southeast Land Trust
GBRPP	Great Bay Resource Protection Partnership	SPNHF	Society for the Protection of New Hampshire Forests
NHA	New Hampshire Audubon	TNC	The Nature Conservancy
NHCP	New Hampshire Coastal Program	TPL	Trust for Public Land
NHDES	New Hampshire Department of Environmental Services	UNH	University of New Hampshire
NHFG	New Hampshire Fish & Game	USEPA	United States Environmental Protection Agency
PREP	Piscataqua Region Estuaries Partnership	USFWS	United States Fish & Wildlife Service

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Executive Summary

The coastal watershed, which extends from the densely settled seacoast, west toward Manchester and north towards the Lakes Region, has experienced rapid development over the last few decades. As a result, water resources in New Hampshire's coastal watersheds are threatened by degradation and in some places they are already considered impaired based on standards set by the Clean Water Act. The link between development and declining water quality is provided by a range of pathways including:

1. The loss of lands under natural cover that provide important ecosystem services such as water purification, flood water retention, and groundwater recharge
2. An increase in pollutant loads to surface waters, stormwater runoff, and flood risk to downstream areas
3. An increase in valuable public and private infrastructure that is both reliant upon and often degrades key ecosystem services such as clean water.

When combined with the continuing effects of climate change, the effects of development on water quality are amplified. For example, more frequent high-intensity storms are likely to contribute to additional pollutant laden stormwater runoff, more flooding, and greater flood damages. Similarly, more frequent and intense droughts will put additional stress on public water supplies. Built and natural infrastructure will also become increasingly at risk as rising sea levels inundate low-lying coastal areas. As additional population growth and development across the coastal watershed continues, these threats and pressures on water resources will be exacerbated even further. Given the magnitude of these challenges, it is critical to capitalize upon existing natural infrastructure to maintain and improve current water quality and reduce risks to communities in the coastal watershed. Addressing land conversion by protecting critical lands is one important strategy to meet this need.

The purpose of this project was to identify land conservation opportunity areas that provide the greatest benefits to coastal water resources. Opportunity areas are targeted specifically to address threats associated with existing and future development, including:

- **Pollutant attenuation and removal:** riparian buffers that intercept stormwater runoff and at the same time maintain natural cover adjacent to surface waters, and riparian wetlands that are highly efficient at treating pollutants already in surface waters;
- **Flood storage and risk mitigation:** areas across the watershed with high flood storage capacities that reduce flood risks to downstream infrastructure, and natural areas that will accommodate sea level rise and salt marsh migration;
- **Public water supply:** lands that safeguard surface and groundwater resources for human consumption.

Once identified, these opportunity areas were combined to identify places that provide multiple benefits in addition to single benefits to the targets listed above. Geospatial data layers are available for on-line viewing and download using the NH GRANIT Coastal Viewer, available at: www.granit.unh.edu/nhcoastalviewer.

Introduction

New Hampshire's coastal habitats are among the state's most valued ecological treasures. The limited amount of coastline and coastal habitats in New Hampshire conveys a heightened responsibility to steward these resources for people and nature, both now and into the future. Unfortunately, pressures on these systems have increased as human populations have grown rapidly in the seacoast region. Coastal water resources have degraded as a result, with water quality impairments occurring in certain surface waters.

In 2013, the Great Bay Estuary (GBE) was in the midst of intense efforts to understand and address below-standard water quality conditions. The draft *Great Bay Nitrogen Non-Point Source Study* (Trowbridge et al. 2014) was released for public review, raising awareness about the stressors that were leading to ecological degradation in the estuary. At the same time, the Great Bay Resource Protection Partnership (GBRPP), a collaboration of conservation organizations in the coastal region, recognized its role in promoting land conservation as a vital long-term solution to maintaining and improving coastal water resources.

At the coastal watershed scale, the GBRPP and other conservation organizations have relied heavily on *The Land Conservation Plan for New Hampshire's Coastal Watersheds* (Zankel et al. 2006) to identify, promote, and complete land conservation projects. This plan, often referred to as the Coastal Plan, was developed to conserve terrestrial and aquatic resources that support native plants, animals, and natural communities. The Coastal Plan targets high quality, intact landscapes with a focus on protecting biodiversity.

This conservation plan, *Land Conservation Priorities for the Protection of Coastal Water Resources*, supplements the 2006 Coastal Plan. The GBRPP initiated this conservation planning effort with one primary objective: to protect coastal water resources. The plan's purpose is to identify spatially explicit land conservation opportunity areas that provide the greatest benefits to coastal water resources. Opportunity areas are targeted specifically to address threats associated with existing and future development, including:

- **Pollutant attenuation and removal:** riparian buffers that intercept stormwater runoff and at the same time maintain natural cover adjacent to surface waters, and riparian wetlands that are highly efficient at treating pollutants already in surface waters;
- **Flood storage and risk mitigation:** areas across the watershed with high flood storage capacities that reduce flood risks to downstream infrastructure, and natural areas that will accommodate sea level rise and salt marsh migration;
- **Public water supply:** lands that safeguard surface and groundwater resources for human consumption.

The justification for and details of these analyses are provided in their respective sections of the report. The results of these three analyses were further evaluated to understand where opportunity areas overlap to highlight multi-benefit areas, i.e. where land conservation serves more than one individual target. Finally, a brief synopsis of Great Bay's groundwater flow system, and implications for land conservation, is also provided.

Project results include geospatial data layers that are available for public consumption and distribution using NH GRANIT's online NH Coastal Viewer (available at: www.granit.unh.edu/nhcoastalviewer). The dataset is also available for download from the NH Coastal Viewer for use in a geographic information system (GIS).

While The Nature Conservancy led the literature review, GIS analysis, and reporting for the project, the project was completed with input and oversight by a large group of partners and stakeholders. A Coastal Conservation Plan Advisory Team was established from the GBRPP at the beginning of the project. Over the course of the project the advisory team grew to include research, technical, and resource manager experts. A list of partner and stakeholder outreach engagements that informed the project are included in **Appendix A**.

Pollutant Attenuation and Removal Analysis

Green infrastructure provides two key ecosystem services that help address aquatic pollutants. Riparian buffers are well documented for their role in intercepting pollutants from terrestrial sources before they enter surface waters. Once pollutants enter surface waters, wetlands adjacent to these riparian areas (hereafter "riparian wetlands") attenuate and remove some portion of these pollutants before they move downstream. Given these roles, protecting and potentially restoring these features provides a demonstrated method for reducing environmental degradation associated with aquatic pollutants. This section details the process developed to identify and prioritize these landscape features for land conservation to benefit coastal water quality. Detailed GIS procedures used in the analysis are provided in **Appendix B**.

Riparian Buffers and the Prioritization Analysis

There are opportunities to protect existing natural riparian buffers in the majority of drainages across the coastal watershed. In addition, there are opportunities to restore natural buffers in areas where vegetation has been cleared, but development has not occurred (for example, areas adjacent to agricultural lands or other open spaces). Our analysis considered two primary factors, buffer type and land cover within the buffer, to identify priorities for land conservation.

Buffer type refers to the riparian feature that the buffer is drawn from (based on stream order or whether the surface water is tidal, for example). Buffer distances were assigned to the different buffer types based on recommendations from a literature review. For example, the buffer type including first and second order streams was assigned a 50-meter buffer distance, while the buffer type including third order and higher streams was assigned a 100-meter buffer distance. Buffer types are further detailed in the *Determination of Riparian Buffer Types and Widths* section below.

Land cover within the riparian buffer was used to focus protection on those areas with natural or restorable land cover. Natural buffers (e.g. forest cover) provide existing ecosystem services for water quality; their conversion to development not only eliminates those services but also introduces a pollutant loading source. Restorable buffers (e.g. fields, lawns) are open spaces that were altered from their natural condition but that largely lack structures such as buildings, roads or parking areas. Restorable buffers present an opportunity to restore ecosystem services to areas where those services are lost or degraded, while eliminating the chance of the buffer's conversion to development. Restoring developed riparian buffers to natural cover is typically cost prohibitive. Protecting natural or restorable buffers provides the best opportunity for watershed-scale buffer protection. For these reasons the buffer analysis focuses on the identification and prioritization of natural and restorable buffers.

An overview of the latest guidance regarding buffer distances and effectiveness for water quality protection is provided in the following section, which informed our use of buffer types and widths. Once types and widths of buffers were selected, they were mapped for input into the prioritization analysis.

Determination of Riparian Buffer Types and Widths

Buffers contribute to the maintenance of water quality by reducing nitrogen, phosphorus, and sediment inputs to water bodies. The role of riparian buffers in reducing sediment inputs can be profound (Young et al. 1980; Dillaha et al. 1988; Dillaha et al. 1989; Magette et al. 1989). Buffers can help to reduce issues associated with sediments in three ways, by: (1) preventing the occurrence or mediating the severity of sediment-producing activities such as construction or agriculture; (2) trapping terrestrial sediments carried in run-off; and (3) supporting in-stream conditions that increase sediment deposition and/or reduce erosion, such as reducing the severity of high flow/velocity events from storm flows, stabilizing banks, and contributing woody debris which traps sediments in the water (Mayer et al. 2007; Zhang et al. 2010; Kirwan and Megonigal 2013). Since nutrients are often bound to sediment particles, the reduction of sediment transport may be dually beneficial as it also serves to reduce nutrient (i.e. nitrogen and phosphorus) export from riparian zones (Hickey and Doran 2004). Implementing riparian buffers has been shown to be an effective approach in reducing the transport of nitrate and phosphate from agriculture and human development through removal, detainment, and detoxification (Peterjohn and Correll 1984; Environmental Law Institute 2008).

There is an abundance of literature recommending minimum riparian buffer widths to achieve water quality protection. Much of the pollutant removal may occur within the first 5 to 10 meters (15 to 30 feet) of a buffer, but buffers ranging from 10 to 30 meters (30 to 100 feet) or more will remove pollutants more consistently (Environmental Law Institute 2008). For instance, a 30-meter wide buffer (approximately 100 feet) removes the majority (>80 percent) of nitrogen and phosphorus, and the majority (>75 percent) of sediment. The majority of literature sources recommend a minimum 30-meter buffer to protect water quality (Wenger 1999; Nieber et al. 2011; Environmental Law Institute 2008; Mayer et al. 2006). However, the scale of land protection more often occurs at the parcel scale than the narrow riparian buffer scale. To reflect this practice (and due to spatial data resolution constraints), we incorporated wider riparian buffer widths than the minimum recommendations to be more inclusive of buffer lands at the parcel scale.

Our analysis used an approach to determine buffer widths based on stream order and tidal status. First and second order streams and their associated wetlands were mapped with a 50-meter (164 foot) buffer, third order and higher streams and their associated wetlands were mapped with a 100-meter buffer (320 feet), and tidal shorelines and wetlands were mapped with a 2-meter (6.6 foot) vertical buffer and 200 meter (656 foot) horizontal buffer beyond the extent of the vertical buffer (i.e. first a 2-meter rise in sea level was simulated, then a 200-meter buffer was mapped from the “raised” sea level boundary).

First and second order systems (non-tidal)

The 50-meter (164 foot) buffer width used for first and second order streams exceeds the 23-meter (75 foot) and 30-meter (100 foot) recommendations from *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development* (Williams 2008) and *Buffers for Wetlands and Surface Waters: A Guidebook for New Hampshire Municipalities* (Chase et al. 1995), respectively. Geospatial analysis performed by Daley (2015) in the Great Bay watershed, and supported by Mayer et al. (2007), found that development within 50 meters of a surface water can increase nitrogen loading and reduce water quality. Finally, the National Land Cover Dataset spatial data layer used in the buffer prioritization process employs a 30-meter grid cell resolution, which justified the use of a minimum 50-meter riparian buffer to reasonably characterize buffer land cover for these smaller riparian systems.

Third order and higher systems (non-tidal)

The 100-meter (320 foot) buffer width for third order and higher streams was used in part to provide a higher weight to these systems in the prioritization process compared to first and second order buffers. These buffer distances are supported by recommendations for minimum widths up to approximately 90 meters (300 feet) to protect water quality for a water body (Bennett 2010; Sheldon et al. 2005). Higher order streams typically occur lower in the watershed where there is less opportunity to attenuate nutrient inputs such as nitrogen before they discharge into a receiving water body (Mineau et al. 2013). From a nitrogen standpoint, this suggests that buffer loss lower in the watershed will have a greater impact on estuary nitrogen loads compared with further upstream. Furthermore, wider buffers are needed where flow is more concentrated (Bentrup 2008), such as in higher order streams.

Tidal Systems

Tidal waters and wetlands were handled differently from freshwater systems to account for the potential effects of sea level rise (SLR). The first step in the process was to map a 2-meter vertical buffer from the boundaries of tidal wetlands to predict where the future tidal wetland boundaries might be in approximately 100 years. From that boundary we mapped an additional 200-meter horizontal buffer to identify areas for protection to restrict future development and pollutant load sources. The basis for these distances are detailed below.

Vertical Buffer:

While sea levels are rising in many areas of the world as a result of melting polar ice caused by global climate change, the northeastern United States is identified as a hotspot of accelerated SLR, with rates 3 to 4 times higher than global averages (Sallenger et al. 2012). SLR will lead to extensive coastal flooding (Kirshen et al. 2008), and may lead to the loss of important coastal habitat, such as dunes and salt marshes, depending on the rate and ability of habitats to redistribute in response to these changes (Craft et al. 2008). The high density of human settlement and associated infrastructure in lowland areas adjacent to the Great Bay Estuary also puts many communities at significant risk of coastal flooding as a result of SLR (Hamilton et al. 2010). Specifically, in the Great Bay Estuary region, sea levels have the potential to rise up to 2 meters (6.6 feet) by year 2100 (Kirshen et al. 2014). Land conservation has an opportunity to be proactive about protecting these low lying, at-risk areas that are identified by mapping a 2-meter vertical buffer from the upland edge of tidal wetlands and protecting the land area that is expected to become tidal wetland in 100 years' time.

Horizontal Buffer:

Areas close to waterways contribute a significant proportion of nutrient and sediment inputs. The *Oyster River Integrated Watershed Plan for Nitrogen Load Reductions* (Vanasse Hangen Brustlin, Inc. 2014), consistent with NHDES' *Great Bay Nitrogen Nonpoint Source Study*, estimated that the majority (60 percent) of nitrogen from septic systems is delivered from those within 200 meters of the estuary. Nitrogen from systems within 200 meters of the estuary have less opportunity for attenuation and thus deliver higher loads (Trowbridge et al. 2014; Vanasse Hangen Brustlin, Inc. 2014). Because tidal buffers are in such close proximity to the estuary, a wider buffer provides greater pollutant removal efficiency and at the same time distances future pollutant loading sources such as development from the estuary.

The 200-meter horizontal buffer was mapped from the extent of the 2-meter vertical buffer. By mapping a combination of the vertical and horizontal buffers, a conservative approach was taken to identify land protection focus areas that can limit pollutant loading to tidal waters both now and in years to come with rising sea levels.

Catchments as Units of Analysis for Buffer Prioritization

Once the mapping of buffers was complete, the watershed was subdivided by National Hydrography Dataset (NHD) Version 2 catchments for further evaluation and prioritization. Catchments are defined as local drainage areas that drain to a mapped NHD surface water feature. As such, the use of catchments to segment the buffers results in a direct relationship between a local drainage area and its associated stream reach. Pre-processing of the catchment layer was conducted to eliminate very small catchments (≤30 acres) from the analysis by merging them into adjacent catchments. In addition to addressing these very small catchments, all catchments between 30 and 50 acres were visually inspected and merged into adjacent catchments if appropriate. The criteria for this decision was based on the catchment's shape; some catchments were mapped as very narrow slivers extending high into a local watershed. These slivers are likely the result of the coarse 30-meter topographic data used to generate them. High resolution LiDAR data were used in the decision-making process to eliminate these slivers.

Following pre-processing, catchments were attributed by their distance along the stream network to tidal wetlands. These distances were then used to attribute catchments to one of three classes: upper, middle, and lower watershed based on distance quantiles. This was completed for two primary reasons: First, research has demonstrated that the longer the flow distance between a nitrogen loading source and the estuary, the more opportunity there is for nitrogen removal (Mineau et al. 2013). This suggests that buffer lands closest to the estuary might be more critical for protection from a nitrogen loading standpoint. Second, the coastal watershed is a large drainage with very different land use conditions occurring in different areas. Specifically, the upper watershed remains largely rural, the middle watershed represents a transition from rural to urban, and the lower watershed is more densely settled. These classes were used later in the buffer prioritization to compare and prioritize within classes rather than across the entire watershed to allow for more control in the distribution of buffer priorities.

Buffer Prioritization Process

A driver for mapping buffer protection focus areas was to identify catchments with large areas of natural or restorable buffers. From a watershed-scale conservation planning and implementation perspective, protecting clusters of larger buffer areas is much more feasible than small buffer fragments in a more developed (and potentially built-out) setting. Our approach largely considers buffer management and protection in an urban or urbanizing setting as a BMP for storm water management; these areas typically have drainage and sewer systems to address storm water.

The buffer prioritization process included a series of GIS steps followed by manual inspections and adjustments of each buffer focus area using recent aerial photographs. The basic steps in the buffer prioritization were to (1) complete a cluster analysis of natural and restorable land cover types within the buffer area; (2) intersect the top scoring 25 percent of the buffer clusters with the catchment layer to complete the buffer prioritization at the catchment scale; (3) for the catchments in each of the three watershed groups (lower, middle, and upper) use the mean cluster area or higher to identify buffer focus areas by catchment; and (4) assign tiered priorities based on the mean scores and manual inspections. Tiers indicate whether the priority is a result of the GIS analysis (Tier 1) or manual inspections (Tier 2).

Manual inspections of each catchment were completed to remove misclassified land cover classes (e.g. to remove development). The focus of the inspections was on removing developed areas with limited buffer protection opportunities, not every single developed site. If the buffer in a catchment was completely conserved and in natural cover (e.g. the Great Bay National Wildlife Refuge), it was also removed. Buffers selected through the GIS analysis steps (even if modified by inspections) were assigned a Tier 1 status.

Certain buffers with natural or restorable land cover were added back in as protection priorities if they make connections between disconnected Tier 1 buffers or reached into unfragmented headwaters from a Tier 1 buffer. These connecting buffers are assigned Tier 2. The purpose of the Tier 2 add-ins is to focus land protection on a network of connected riparian buffers rather than a patchwork of isolated buffers. Tier 2 buffers range in length from one catchment unit to many depending on the layout of the Tier 1 buffers and the landscape setting.

Advantages and Disadvantages of the Buffer Prioritization Methodology

As previously described, identifying buffer protection focus areas is challenging given the extent of buffers and their importance to water quality. Some of the strengths and shortcomings of the buffer prioritization analysis are detailed as follows:

- Advantages:
    - The structure of the analysis biases the results toward tidal and high order stream buffers based on the cluster analysis. The prioritization of these areas is supported by available scientific literature and understanding of a buffer's role in protecting estuarine systems.
    - The buffer prioritization was completely focused on land cover classes within the buffer and not weighted by areas outside of the buffer. This is an advantage in that the analysis works in a variety of landscape settings without being degraded by "outside the buffer" land covers.

- The results of the buffer analysis emphasize stream reaches without associated wetlands for protection. Wetlands function as buffers to streams; streams without wetland buffers are at a higher risk of pollutant loading from adjacent land uses because they lack the ecosystem services that wetlands provides.
- The manual inspections ground-truthed the results and corrected for the coarse resolution land cover data. Manual inspections offered the flexibility to build in the connected network of buffers using a tiered approach.

- Disadvantages:
  - At the start of the analysis, the goal was to tie upslope land cover and land uses to the selection of buffer focus areas. However, this goal was not achievable given the constraints of the project and the complexity of undertaking this task in a robust way. The project team hopes to create a "Catchment Analysis Tool" as a follow-on project to allow users to select catchment buffers that meet certain upslope, catchment, and buffer land cover criteria.
  - The 30-meter land cover data used in the analysis are coarse. Higher resolution land cover data would characterize land cover more accurately, leading to higher quality modeling results and less manual refinements.

Riparian Wetlands Prioritization Analysis

Riparian wetlands are well documented for their pollutant removal capabilities, especially for nitrogen. Based on a comprehensive literature review, the N-Sink planning tool (University of Connecticut 2016) was used to identify nutrient attenuation focus areas for pollutants already in the aquatic system; N-Sink was developed to assist in prioritizing watershed nitrogen source controls and management of sinks. The tool was adapted to identify the most productive denitrification areas across the landscape to prioritize land conservation, with nitrogen removal efficiencies used as a surrogate for removal of all aquatic pollutants.

Out of the three landscape features the N-Sink tool identifies as nitrogen sinks, riparian wetlands are estimated to have the highest removal efficiencies (the other two include lentic and lotic water bodies, ponds or lakes and stream reaches, respectively). Within riparian wetlands, those that are vegetated, have hydric soils, and have a riparian wetland width of greater than 30 meters (approximately 100 feet) are identified as having the highest percent nitrogen removal efficiency (80 percent). This set of criteria was used as our initial screen to identify highly effective nitrogen removal locations, resulting in over 2,500 wetlands selected across the watershed.

An initial prioritization was completed by calculating how much additional riparian wetland area is outside of the 30-meter width, assuming that more extensive riparian wetlands have greater potential for denitrification. We also incorporated a multiplier based on the area of the wettest National Wetland Inventory (NWI) classes (palustrine emergent or wetter) within the riparian wetland. These wettest wetlands typically have higher soil organic matter, higher water tables, and low dissolved oxygen – factors that favor conditions for microbial denitrification (Kellogg et al. 2011). Combining these factors, wetlands were scored for their denitrification potential based on their area outside of the 30-meter stream buffer multiplied by the area of wettest wetland types. Scores were then tiered; the top scoring 30 percent of riparian wetlands by area were attributed as Tier 1. For all HUC 12 watersheds that did not include a Tier 1 riparian wetland, the highest scoring riparian wetland was selected and attributed as Tier 2. Tier 1 areas represent wetlands with the greatest pollutant removal and attenuation across the entire watershed, whereas Tier 2 areas represent a distribution of higher functioning wetlands at a localized scale.

Visual inspections were performed on all Tier 1 and Tier 2 areas using 2014 aerial photography. Manual adjustments were made when the following conditions were met:

- Wetlands on one side of a large river were merged with wetlands on the opposite side of the river to incorporate the entire wetland system.
- Wetlands bisected by a railroad corridor were merged with adjacent hydrologically connected wetlands. Railroads tend to run in straight lines with large radius curves so are less discriminating about crossing wetlands at narrow points. Railroad corridors also do not typically have associated developed infrastructure (as opposed to roads with driveways, houses, and businesses). Wetlands bisected by roads were not merged because road crossings of wetlands often do cross at narrow points (or at least avoid wide wetland crossings) and are often more fragmenting with their adjacent ancillary land uses.

The result of this analysis identifies high functioning nitrogen removal wetlands for land protection. Since wetlands are a government regulated resource they have built in protections against dredging and filling. While protecting wetlands is critical, the adjacent uplands that support the functional values that a wetland provides are far more threatened by conversion and development. For this reason, the stream and wetland buffer distances were used (see: *Determination of Riparian Buffer Types and Widths* section) to apply the appropriate size buffer to each of the Tier 1 and Tier 2 wetland areas. For example, a Tier 1 wetland associated with a third order or higher stream would receive a 100-meter buffer whereas a Tier 1 wetland associated with a second order stream would receive a 50-meter buffer. Tier 2 wetlands were buffered in the same manner as Tier 1.

Integration of Priority Riparian and Wetland Buffers

The nutrient attenuation and removal analysis includes two separate analyses resulting in land protection focus areas to benefit coastal water resources. One analysis was conducted to identify land protection opportunities within riparian buffers to minimize pollutant loading into the aquatic system. The second analysis identifies high functioning wetlands and their buffers to attenuate and remove pollutants already in the aquatic system. Both analyses resulted in Tier 1 and Tier 2 focus areas as previously described.

The results of the two analyses were merged into one GIS data layer to depict overall nutrient attenuation and removal land protection focus areas. During the merge process, a Tier 1 area from either analysis overrode a Tier 2 area from the other analysis.

Flood Storage and Risk Mitigation Analysis

Extreme precipitation events in the northeast are increasing in frequency and intensity, with more than a 50 percent rise in precipitation from extreme storms from 1901 to 2012. The flooding that results from these events can be incredibly costly: For example, the region experienced back to back 100-year storm events in 2006 and 2007 during the “Mother’s Day” and “Patriot’s Day” storms (Kirshen et al. 2014), resulting in an estimated $10 million and $8 million in damages to public infrastructure respectively (National Weather Service 2016). Accounting for private damages would increase the estimated cost of recovery considerably. As the frequency and intensity of these events are expected to increase (Kirshen et al. 2014), so too will the damage from flooding and cost of recovery in the future. Given these trends, it is increasingly important that we maintain the capacity of natural environments to help reduce the risk and damage associated with catastrophic flooding. Of particular importance are areas where floodwaters are stored to prevent inundation to downstream communities. In addition to identifying and protecting these features for flood storage, it is also important that we avoid building homes and other infrastructure in these flood-prone locations.

Our analysis focused on identifying priority locations for land protection based on maximizing flood storage potential and thereby minimizing the risk to both built and natural systems under current and future climate scenarios. Models identifying flood storage potential typically focus exclusively on mapped wetland and riparian areas given the proven importance of these features in storing and slowly releasing stormwater. While these wetlands and riparian areas also form the core of our analyses, we wanted to address a couple of important limitations inherent in the use of these data: The first of these are errors in mapped wetlands, where the boundaries in available GIS layers do not conform to the actual boundaries on the ground. The second issue is that areas adjacent to wetlands often play a valuable role in flood storage, particularly where the wetland occurs in a low-profile depression. To address these issues, we adopted an analytical approach that identified and incorporated flood prone flat areas, or “low flats,” that might not be mapped as a NWI wetland or FEMA flood zone. High resolution topographic information was required for the analysis, thus we limited our analyses to the portion of the coastal watershed where LiDAR coverage was available (the majority of the watershed).

As previously mentioned, the Gulf of Maine is experiencing particularly high rates of sea level rise, leading to an additional risk of flooding to coastal communities. To account for sea level rise and tidal inundation, SLAMM conservation priorities (New Hampshire Fish and Game Department 2014) were also incorporated into the analysis. The incorporation of the SLAMM conservation priorities is limited to New Hampshire. Following is a summary of the flood storage and risk mitigation GIS analysis; details of the GIS analysis are provided in Appendix B.

Analysis Summary

The first step in the analysis was to map flood prone, low flat areas associated with riparian systems. A review of wetland boundaries using high resolution aerial photography and slopes generated from LiDAR (United States Geological Survey 2011) resulted in the identification of a four percent slope threshold to differentiate topographically consistent wetland boundaries from uplands. This slope threshold does not work in every situation, so additional corrective steps were taken. To train the modeling effort, a 1-meter vertical buffer was mapped from riparian associated wetlands to limit the extent that the low flats could extend beyond mapped NWI wetlands. Steps taken to clean and quality check the low flats throughout the process are detailed in Appendix B.

Once low flat areas were mapped, a GIS process was developed to estimate the flood storage capacity in each of the low flat areas. The process involved "flooding" the low flat areas, followed by calculating the volume between the flooded low flat surface and the LiDAR surface. A tiered prioritization was developed for the resulting flood storage areas. Tier 1 areas include the top 30 percent (by area) of flood storage capacity lands across the coastal watershed that are upstream of valuable infrastructure (e.g. densely developed areas, major transportation systems). Tier 1 areas also include SLAMM conservation priorities with salt marsh potential of up to 2 meters of sea level rise by year 2100. Tier 2 areas include the top scoring flood storage areas in each HUC12 watershed that didn't include a Tier 1 focus area, in addition to areas meeting the top 30 percent threshold used for Tier 1 but that are not upstream of valuable infrastructure.

Strengths and Challenges of the Flood Storage and Risk Mitigation Methodology

Following is summary of the strengths and challenges of the flood storage and risk mitigation prioritization:

- Strengths
    - The analysis looks beyond known regulated systems (i.e. mapped wetlands and flood zones) to identify at-risk transitional areas that are flood prone.
    - NWI boundaries are manually generated and topographically inconsistent. Using the low-flat methodology results in more topographically consistent low flat boundaries.
    - The analysis provides a means for comparing and prioritizing flood storage volumes, though flood volumes should not be taken literally since they are estimates.

- Challenges
    - The analysis provides a means for coarsely estimating flood volumes. Assumptions were made in the calculations, such as complete flooding to all low flat boundaries, that don't necessarily reflect flooding processes. Remaining topographic inconsistencies will need to be addressed before completing the analysis at the watershed scale.
    - The approach failed to recognize watershed breaks in some instances because of the vertical buffer component. Low flats could run across watershed breaks in areas where they shouldn't, capturing additional flood volumes in certain areas. Manual quality checking and corrections were necessary.
    - Riparian clusters of low flat areas connected by low slope stream channels had to be manually separated for the prioritization effort.

Public Water Supply Analysis

The goal of this analysis was to identify Conservation Focus Areas where targeted land protection would maximize benefits to public water supply. Spatial data layers for surface and groundwater resources were provided by the New Hampshire Department of Environmental Services (NHDES) Drinking Water and Groundwater Bureau. Areas of the coastal watershed were then grouped into tiered priorities based on the occurrence of these resources; Tier 1 areas have a higher likelihood of contributing to both surface and groundwater supplies while Tier 2 areas have a high likelihood of contributing to either surface or groundwater supply areas. Table 1 details the spatial data layers that were used to identify surface and groundwater supply resources with further detail provided in Appendix C.

Table 1: Spatial data layers from NHDES that were used to identify surface and groundwater supply resource areas.

Input for Surface Water Supply Areas	Inputs for Groundwater Supply Areas
• Hydrologic Areas of Concern (HAC)	• Groundwater classes GA1*, GA2 and GAA • Favorable gravel wells ≥75 gpm** and ≥150 gpm • Stratified Drift Aquifer ("TMIN" > 1000)*** • Wellhead Protection Areas, excluding private systems

*The GA1 area aligning with the town of Stratham was removed because of its alignment with an apparent political boundary rather than an identified groundwater resource.
** gpm = gallons per minute.
***for this analysis we used a minimum transmissivity threshold of 1,000 square feet per day.

Catchments as the unit of prioritization for the Public Water Supply analysis

Some of the data layers provided by the NHDES Drinking Water and Groundwater Bureau are sensitive from a security standpoint and are not available for public distribution to protect public water supplies. Fine scale catchments (NHDPLUSV2) from the National Hydrography Dataset (NHD) (last updated 1/07/2016) were used as the unit of analysis to mask the sensitive data used in the analysis. Pre-processing was required to consolidate very small catchments; all catchments smaller than 30 acres were merged into adjacent catchments and all catchments between 30 and 50 acres were reviewed and merged into adjacent catchments if deemed appropriate based on their configuration. Surface waters, and often groundwater, flow with surficial topography, and public water withdrawal sites generally occur lower in their respective watersheds. Therefore, a catchment based approach seemed appropriate for this type of analysis.

Background on prioritization and threshold selection

At the March 31, 2016 review meeting of the GBRPP Coastal Plan Advisory Team, a draft proposal was presented that identified any catchment with more than 50 percent coverage by all of the merged water supply resource layers (as identified in Table 1) as a conservation focus area. Committee feedback indicated that this approach resulted in public water supply conservation focus areas that were too expansive (292 catchments amounting to 156,000 acres). Given this feedback, we chose a tiered prioritization approach as a means of further prioritizing and reducing the coverage of the focus areas. Tier 1 areas include catchments with greater than 20 percent coverage of coinciding surface and groundwater resource areas, and where the catchment overlays greater than 80 percent of either surface or groundwater resource areas (this results in 50 catchments identified as Tier 1). Tier 2 areas include the remaining catchments that only meet the 80 percent coverage threshold for either surface or groundwater resource areas (this resulted in 164 catchments identified as Tier 2. Tier 1 and Tier 2 areas combined account for 214 catchments amounting to 111,000 acres – nearly a 30 percent decrease in area from the draft proposal). For both tiers we were satisfied that the 80 percent threshold included catchments that are very likely to contribute to the protection of public water supply.

Investigation of Groundwater Pathways of Nutrient Contributions to the Great Bay Estuary

In total, groundwater discharge has been likened to an additional unseen major tributary to the Great Bay Estuary (GBE). However, groundwater behaves very differently from the rivers and streams we typically think of in this context. For example, the amount of time it takes between water entering a ground-water pathway to ultimately discharging into the bay was measured at 23 years in one area of the GBE (Ballestero et al. 2004), far longer than it takes surface water to move a similar distance downstream. As a result of this potentially long residence time, the pollutant load we see in today's groundwater discharge is decades old, and any current changes to land use that may impact groundwater quality will not be detected for a similar duration of time into the future. In addition, groundwater discharges back into surface waters at varying distances from the point of entry, with variable options for addressing water quality issues along its flow path. In this review, we consider how these general characteristics and the specific hydrogeology of the region influence the role of groundwater in driving water quality in the GBE, and how land protection may offer an opportunity for addressing pollutant loading associated with this input.

Summary of Great Bay's Hydrogeology

Great Bay's groundwater flow system is one of relatively thin and discontinuous surficial aquifers underlain by fractured crystalline bedrock aquifer. Groundwater flows through both the surficial deposits ("overburden") and through fractures in the crystalline bedrock (Mack 2003). In general, there are three distinct hydrogeologic layers in the overburden as detailed from top to bottom: a sand and gravel unit, a marine clay layer, and a glacial till layer. The marine clay layer settled over much of the region when the land was a depressed ocean basin following glacial retreat. This layer of clay plays an important confining role in limiting and slowing groundwater flow into deeper bedrock. Because of this confining marine clay layer, the majority of groundwater flowing into the GBE (75 to 95 percent) is delivered through the overburden rather than through bedrock (Bacca-Cortes 2004).

The Great Bay Estuary is a shallow bedrock system, with an average depth to bedrock of approximately 6 meters (20 feet). Therefore, the topography of the underlying bedrock in the GBE is also important as it likely controls subsurface flow paths, and can direct flow into concentrated groundwater seepage areas (Ballestero et al. 2004). Because subsurface topography also tends to drive surface topography, we can use this surface topography to generally predict the flow of underlying groundwater. This assumption is supported by evidence from private well surveys (Roseen 2001).

In general, fresh groundwater upwells at the seaward edge of the marine clay layer in the tidal zone as it encounters denser salt water (referred to as a salt water wedge), with the majority of groundwater discharge occurring within the top 1 meter of mean lower low water (MLLW). These discharge areas are referred to as submarine groundwater discharge (SGD) zones, which is the area below the high tide line in contact with the salt water wedge. Using thermal imagery, 165 groundwater discharge zones were found in the intertidal mud flats around the perimeter of the GBE, and the size, intensity, and nutrient load from each was quantified. Although discharge zones were discovered around nearly the entire perimeter of Little and Great Bay, it appears that the high intensity discharge zones are mostly located in the southeastern corner of Great Bay (Ballestero et al. 2004). This likely corresponds to the steeper flow paths along the southern side of Great Bay, where the topographic relief is more pronounced than along the northeastern and northwestern sides (Roseen 2001). A similar study was completed in the Hampton-Seabrook Estuary; interestingly, results found an absence of groundwater discharge zones due to the large impermeable salt marshes in that system. Similarly, no discharge zones were found in Great Bay around the larger salt marshes along the Squamscott River, Lubberland Creek, Winnicut River, and Bellamy River (Ballestero 2004).

Pollutant Loading in Estuaries via Groundwater Discharge

Groundwater is the predominant pathway for N-inputs into the Chesapeake and other estuaries along the Atlantic Coast. These estuaries are within a landscape of sandy, porous, and permeable soils, and have more diffuse discharge zones around their estuarine shorelines than those at Great Bay. Conversely, development, impervious surfaces, and the poorly drained soils of the GBE direct most of the nitrogen applied to the land surface into surface waters directly through stormwater runoff (Trowbridge et al. 2014). Nitrogen that enters the groundwater is funneled toward discrete discharge zones around the estuary as described above. Delineation of groundwater capture zones in the GBE indicates that these are long linear features extending no further inland than 1.5 miles from the estuary shoreline (Bacca-Cortes 2004).

To better understand all the non-point sources of nitrogen, Trowbridge et al. (2014) modeled nitrogen loading to the Great Bay Estuary from groundwater and surface water sources. They found septic systems within a 200-meter buffer of the estuary to provide the largest source of nitrogen to groundwater in the GBE, with lawns and animal waste as the second and third largest sources, respectively. These findings are consistent with the results of a separate groundwater study that found higher nitrate concentrations in SGD from watersheds with more residential land use (Bacca-Cortes 2004). Waste water treatment facilities, storm water, and atmospheric deposition account for most of the nitrogen inputs into the estuary, but little of this nitrogen enters a groundwater pathway (Trowbridge et al. 2014). However, it is noteworthy that septic systems accounted for 29 percent of the annual total nitrogen load to the GBE, highlighting the need to better understandand preserve the integrity of the nitrogen uptake functions along the groundwater pathway from the Great Bay watershed to the estuarine shores. These findings support the role that land conservation adjacent to the bay can play in reducing inputs of pollutants into groundwater.

A Role for Land Protection in Mitigating Nutrient Contributions through Groundwater

The following summary describes how land protection could be prioritized to maximize benefits to groundwater quality in the Great Bay Estuary, although it is important to note that the slow transmissivity of soils in the GBE means that groundwater is not the major source of pollutants to the estuary:

- Protect naturally vegetated buffers within 200 meters of the estuary. Conserving natural land cover within these buffers doubly serves to reduce existing pollutant loads from upland areas and to eliminate the threat of new pollutant loads associated with development in these areas where the denitrification pathway is limited.
- Protect very permeable soils near the estuary, as porous sand and rocky till may facilitate more rapid groundwater contamination. This protection will help to prevent groundwater contamination from storm water flow and lawn fertilizers/chemicals. The threat of contamination via permeable soils may be particularly true for the southeastern side of the bay where the groundwater is closer to the surface, the topography is steeper, and more intense discharge zones are located along the tidal shoreline.
- Prioritize the protection of silty/marine clay soils near the GBE where groundwater seepage may occur and denitrification is active under saturated, slow flow conditions.

Creation of Single and Multi-Benefit Water Resource Focus Areas Layer

One additional analysis was completed to synthesize the results of the pollutant attenuation and removal, flood storage and risk mitigation, and public water supply analyses. This analysis was performed to identify land conservation focus areas that contribute to overlapping water resource protection targets. For example, the result of the analysis identifies where pollutant attenuation and removal co-occurs with flood storage and risk mitigation. Tier 1 and Tier 2 areas for each of the input datasets were treated equally in this process.

Results of the analysis identifies seven different combinations of single and overlapping areas in the following two categories:

1. **Areas Likely to Provide**
    - Pollutant Attenuation
    - Flood Storage
    - Public Water Supply

2. **Areas Likely to Provide Multiple Benefits**
    - Pollutant Attenuation and Removal **and** Flood Storage and Risk Mitigation
    - Pollutant Attenuation and Removal **and** Public Water Supply
    - Flood Storage and Risk Mitigation **and** Public Water Supply
    - Pollutant Attenuation and Removal **and** Flood Storage and Risk Mitigation **and** Public Water Supply

In actuality, maintaining natural cover through land conservation in any of these identified areas will likely provide multiple benefits.

Results

The primary results from this project are spatial data that identify land conservation focus areas for the protection of coastal water resources. Data are available for use in a GIS and in NH GRANIT's web mapping tool, the NH Coastal Viewer.

For use in a GIS, the resulting data layers are currently available in a file geodatabase through the NH Coastal Viewer. The file name and structure of the geodatabase is as follows:

File Geodatabase Name: Water_Resource_Priorities.gdb

Feature Class	Description
Flood_FAs	Flood storage and risk mitigation focus areas
Pollutant_Attenuation_FAs	Pollutant attenuation and removal focus areas
Public_Water_Supply_FAs	Public water supply focus areas
WaterResource_Overlays	Single and Multi-benefit focus areas

Full metadata records, as included in the file geodatabase, are included in Appendix D.

The NH Coastal Viewer is an online mapping tool with a geographic focus on New Hampshire's coastal watershed communities. Project results are accessible for viewing using the NH Coastal Viewer at: http://nhcoastalviewer.unh.edu/. Within the online mapping tool, browse through the following **Map Layers** (clicking "on" each check box as you drill down through the folders) to access the data layers resulting from this project:

Map Layer

- ☑ Environment and Conservation
  - ☑ Land Conservation Plan
    - ☑ Water Resources Conservation Focus Areas – 2016 Update
      - ☑ Flood Storage and Risk Mitigation
      - ☑ Pollutant Attenuation
      - ☑ Public Water Supply
      - ☑ Single and Multi-Benefit Areas
        - ☑ Areas Likely to Provide Single Benefits
        - ☑ Areas Likely to Provide Multiple Benefits

The "lite" version of metadata records for inclusion in the NH Coastal Viewer is included as Appendix E.

Potential Next Steps

A number of potential next steps were identified through the efforts of this project. These are summarized as follows:

- **Updates as Spatial Data Becomes Available**
    - The geographic extent of the flood analysis was limited by the extent of LiDAR coverage. As LiDAR coverage expands to include the entire coastal watershed, re-run the flood storage and risk mitigation analysis (at the very least for HUC12s missing LiDAR) to identify flood storage and risk mitigation focus areas in that portion of the watershed.
    - At the beginning of the project, the GBRPP Coastal Conservation Plan Advisory Team agreed that the focus of the project was on the NH portion of the coastal watershed. Watershed-wide analyses were run where full input data coverage for the entire watershed was available. Some analyses, such as for public water supply, were restricted to New Hampshire because of the availability of matching or comparable datasets.
        - Investigate the availability of SLAMM conservation priority areas in Maine, and update the flood storage and risk mitigation focus areas accordingly, if available.
        - Investigate the availability of public water supply input datasets in Maine, and update the public water supply focus areas accordingly, if available.

- **Additional Analysis**
    - The pollutant attenuation and removal analysis identified riparian buffer protection focus areas with natural or restorable land cover. Additional analysis should be completed to generate publishable data layers that explicitly identify riparian buffer restoration opportunities.
    - We completed an initial screen to identify hydrologically altered wetland systems in the lower portion of the watershed using aerial photos, NWI wetlands, and hydric soils. Additional refinement and prioritization of these areas are needed before publishing the data layer, which will be a valuable tool for land protection and restoration efforts.
        - The scope of this effort could be expanded to the entire coastal watershed.

- **Additional Research**
    - Acquire GIS data layers (unavailable to-date) that identify GBE groundwater discharge zones. Where studies are complete for the GBE, obtain delineated groundwater capture zones.
    - Consider conducting additional studies to delineate groundwater capture zones for the highest intensity groundwater discharge zones to help drive land conservation priorities.

- **Additional Tool Development**
    - The project team hopes to create a "Catchment Analysis Tool" as a follow-on project to allow users to select catchment buffers that meet certain upslope, catchment, and buffer land cover criteria. This tool will help users identify focal conservation areas at the catchment scale based on a set of user-defined criteria. Metrics would be calculated for the following:
        - Weighted Curve Number (stormwater runoff value)
        - Percent Impervious Cover (both 30-meter and 1-foot resolution)
        - NLCD 2011 Land cover
            - Percent Natural Land Cover
            - Percent Agricultural Land Cover (differentiate row crops from others)
            - Percent Developed Land Cover
            - Other NLCD groupings might be considered
        - Percent Conserved/Public land
            - Might consider incorporating GAP status, time and interest permitting
        - Percent Water Resource Focus Areas
        - Potentially other layers based on interest of the partners and available time
- **Tool Development** - Develop a GIS tool for users to easily load into ArcGIS and perform selection queries to identify catchments with conditions/resources of most interest based on their land protection and/or land management goals.

- **Outreach and Education**
    - Develop an outreach and education implementation plan, and associated products (e.g. community maps and brochures) to introduce project results to land trusts, regional planning commissions, municipal staff, boards, and commissions, and other stakeholders.

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Appendix A: Partner and Stakeholder Outreach Engagements

The following table details partner and stakeholder outreach engagements that occurred over the course of the project.

Date	Partners/Stakeholders Engaged	Purpose of Engagement
7/16/2013	EPA, GBNERR, SELT, SPNHF, TPL	Visioning session for coastal plan update effort
11/1/2013	EPA, GBNERR, NHA, NHFG, NRCS, SELT, SPNHF, TPL, USFWS	Second partner visioning session for coastal plan update effort
2/26/2014	Michelle Daley, Research Scientist, NH Water Resource Research Center	Review potential components of coastal plan update effort, review of research around land use and water quality monitoring
3/11/2014	GBRPP Coastal Conservation Plan Advisory Team	First meeting of the GBRPP Coastal Conservation Plan Advisory Team – develop priority list of analysis components and outcomes
5/23/2014	GBRPP Coastal Conservation Plan Advisory Team	Review draft scope of work for coastal plan update effort, solicit feedback/improvements
7/29/2014	Dartmouth, EPSCOR, Plymouth State, UNH	Review water resource analysis, solicit feedback/improvements, explore potential for tying in ecosystem service valuation efforts
10/10/2014	UNH	Review water resource analysis, solicit feedback/improvements, explore ways to tie analysis in to research efforts
1/26/2015	NHDES Drinking Water & Groundwater Bureau	Review Public Water Supply analysis, solicit feedback/improvements
12/3/2015	GBRPP	Project update, solicit feedback/improvements
1/21/2016	UNH	Review draft analysis results, solicit feedback/improvements
2/4/2016	GBRPP Coastal Conservation Plan Advisory Team	Review draft analysis results, solicit feedback/improvements
3/23/2016	NHDES Drinking Water & Groundwater Bureau	Review final draft analysis results for Public Water Supply, solicit feedback/improvements/agreement
3/31/2016	GBRPP Coastal Conservation Plan Advisory Team	Review final draft analysis results, solicit feedback/improvements/agreement

Appendix B: GIS Methods

Pollutant Attenuation and Removal Analysis GIS Methods

Input data layers:

- NHHD - NHDFlowline, perennial streams only: available from GRANIT (January, 2006)
- NHDPLUSV2 Catchments, available from USGS (January, 2016)
- NWI Piscataqua-Salmon Falls watershed (HUC 01060003) including 2014 updates http://www.fws.gov/wetlands/Data/Mapper.html
- LiDAR for the North East Project (MA/NH/ME),
- 2011 National Land Cover Database (NLCD)

1. Mapping Buffers
    a. 100-meter buffers:
        i. Dissolve freshwater wetlands.
        ii. Select dissolved freshwater wetlands within 10 meters of third order or higher streams (to capture riparian wetlands not touching NHDFlowline).
        iii. Buffer selected wetlands by 100 meters.
        iv. Buffer third order and higher flowlines by 100 meters.

    b. 50-meter buffers:
        i. Select dissolved freshwater wetlands within 10 meters of first and second order, non-intermittent streams.
        ii. Buffer dissolved freshwater wetlands within 10 meters of first and second order, non-intermittent streams by 50 meters.
        iii. Buffer first and second order, non-intermittent streams by 50 meters.

    c. 200-meter buffers:
        i. Create 2-meter vertical buffer to tidal wetlands:
            1. Create and extract mosaicked LiDAR to the coastal watershed.
            2. Convert to integer.
            3. Extract integer DEM to tidal wetlands.
            4. Run Euclidean allocation with the tidal wetlands DEM as the input, elevation attribute as the Source field.
            5. Generate a 2-meter vertical buffer with the Raster Calculator, using the following expression: "lidar_2011_int" <= ("tidal_wls_EucAllo"+2)

ii. Convert the 2-meter vertical buffer to polygon. Create attribute field “Buffer”. Attribute all outlier features as “No”, and all records to buffer horizontally as “Yes”. Buffer out “Yes” records by 200 meters.

d. Dissolve all buffer layers resulting from steps 1.a, 1.b, and 1.c.

2. Prioritizing Buffers
   a. Calculate path distance from buffer areas to tidal wetlands:
      i. Create cost surface of buffers where estuarine wetlands have a value of ‘0’ and all other records have a cost of 1 (cell size = 2 feet).
      ii. Calculate path distance from estuarine/marine wetlands (source) to all other buffer areas. The path distance is restricted to a riparian buffer area. Output cell size = 30 feet (2-foot cell size crashed repeatedly).
      iii. Reclassify path distance into three classes based on quantiles (1=low watershed, 2=middle watershed, 3= upper watershed).

   b. Pre-process NHD Catchments
      i. Clip NHD catchments to PREP boundary.
      ii. Convert to NH State Plane Ft coordinates.
      iii. Calculate acreage of each catchment polygon.
      iv. Delete all watershed edge (non-contributing catchment polygons).
      v. One by one, merge small catchments into larger adjoining catchments. All catchments 30 acres or smaller were merged into adjacent catchments (1 exception). Merged a number of catchments between 30 and 50 acres into adjacent catchments. Questions to consider when merging catchments: if merging a catchment into an adjacent polygon, which polygon will be affected most by that merge? Often downstream. But hydrologically if similar to upstream, then upstream. Headwater merges often merged upstream. Confluence/junction polygons often merged downstream. Used LiDAR hillshade to help in decision making, as well as hydrography network. Resulting layer of PREP_Catchments.
      vi. Attribute PREP_Catchments with path distance watershed class from 2.a.iii.

   c. Cluster analysis of natural and restorable buffers.
      i. Erase NWI wetlands used in the buffer creation process (step 1) from the dissolved buffer layer, resulting in a buffer only layer.
      ii. Extract NLCD classes not including low, medium, high intensity developed (22, 23, 24 – does include 21, open space)) to the buffer only layer.
      iii. Reclass all classes to a value of ‘1’.
      iv. Convert reclassified land cover raster to points.

v. Run kernel density, output cell size 30 meters, search radius 200 meters, area units acres, extract by buffer only.
vi. Classify resulting kernel density raster by quartile. Convert highest quartile (top scoring 25%) to polygon (>2.873616425).
vii. Intersect top scoring cluster polygons to PREP_Catchments.
    1. In the resulting layer, add acres field (double) and calculate acreages.
    2. Summarize acreage field by FEATUREID.
viii. In the PREP_Catchments layer:
    1. Add KD_Top25per_AC field (double)
    2. Join summarized acreage table from 2.c.vii.2 by FEATUREID.
    3. Calculate summarized acres from 2.c.vii.2 summary table into KD_Top25per_AC.
ix. Select Prioritization thresholds and attribute resulting catchments as 'tier 1':
    1. In lower watershed catchments (tier 1) use KD_Top25per_AC >=57.8 (mean, n=115).
    2. In middle watershed (tier 2) catchments (tier 2) use KD_Top25per_AC >=24.6 (mean, n=80),
    3. In upper watershed catchments (tier 3) use KD_Top25per_AC >=17.8 (mean, n=82).

d. Manually inspections of catchments:
    i. Check all high scoring catchments. Clip out dense sections that are converted to "hard" infrastructure. Did not remove every house lot. Also removed sections already conserved if they overlapped the entire buffer area within the catchment and they are in a natural land cover such as the GB NWR.
    ii. Added in connecting catchments buffers so as to have a focus on a network of riparian buffers, not just buffer protection fragment focus areas. Added in areas such as Salmon Falls as connector. High order stream connector buffers might best meet the definition of "if converted, will have the greatest impact on coastal water resources". Add-in connectors attributed as 'Tier 2'.

3. Identification and prioritization of highly efficient nitrogen removal wetlands:
    a. Create a riparian wetlands data layer from NWI.
        i. Buffer perennial NHDFlowlines by 10 meters on both sides, dissolving all.
        ii. Dissolve freshwater and emergent/SS/FO E2 (Class = 'E2E' OR Class = 'E2F' OR Class = 'E2S' OR Class = 'PAB' OR Class = 'PEM' OR Class = 'Pf' OR Class = 'PFO' OR Class = 'PSS' OR Class = 'PUB' OR Class = 'PUS') resulting in Riparian_Wetlands layer.
        iii. Add 'Riparian' attribute field (text) to Riparian_Wetlands.
            1. Select Riparian_Wetlands that intersect NHDFlowline buffered by 10 meters (a 10-meter buffer was used to capture riparian wetlands in close proximity to the NHDFlowline, but that do not edge match or

overlap). Add to this selection Riparian_Wetlands that intersect riverine wetlands (NWI with definition query WETLAND_TYPE = 'Riverine'). Add to this selection Riparian_Wetlands that intersect E2 emergent, forested, or scrub shrub (NWI with definition query Class = 'E2EM*' OR Class = 'E2FO*' OR Class = 'E2SS*'). Attribute the resulting selections in the 'Riparian' field as 'Yes'.

2. Attribute Riparian_Wetlands that are adjacent to lakes.
    a. Dissolve lacustrine wetland types from NWI (Class = 'L1AB*' OR Class = 'L1ABH' OR Class = 'L1UB*' OR Class = 'L1UBH' OR Class = 'L2AB*' OR Class = 'L2ABF' OR Class = 'L2ABH' OR Class = 'L2EM*' OR Class = 'L2EMC' OR Class = 'L2EMF' OR Class = 'L2UB*' OR Class = 'L2US*' OR Class = 'L2USC'), select all those that intersect NHDFlowline buffered by 10 meters, then select Riparian_Wetlands that the resulting selection intersects. Attribute the resulting records in Riparian_Wetlands as 'Riparian' = 'Lake'.
3. Attribute all other features as 'Riparian' = 'No'.

b. Calculate riparian wetland area beyond the 30-meter buffer width (for this analysis an additional 30-meter buffer was added on to the 10-meter stream buffer used to select riparian wetlands. Though this buffer might be excessive by 10 meters, it was considered as a more conservative approach given discrepancies in stream and wetland mapping/edge matching).
    i. Buffer the NHDFlowline with 10-meter buffer by an additional 30 meters, resulting in a 40-meter NHDFlowline buffer.
    ii. Erase 40-meter NHDFlowline buffer from Rparian_Wetlands with definition query: Riparian = 'Yes', resulting in Riparian_Wetlands_erase_40mbuf.
    iii. In Riparian_Wetlands table, add 'WET_ID' field (integer) and populate with a unique ID. Add 'Buf40m_AreaAC' field (double).
    iv. Calculate acreage of "Riparian_Wetlands_erase_40mbuf" and summarize by WET_ID to "Wet_ID_outside40mbuf_ac_summary" table.
    v. Join summarized table and populate in Buf40m_AreaAC field of Riparian_Wetlands layer.
c. Calculate wettest acreage for Riparian_Wetlands.
    i. Intersect wettest NWI (definition query: WETLAND_TYPE = 'Estuarine and Marine Wetland' OR WETLAND_TYPE = 'Freshwater Emergent Wetland' OR WETLAND_TYPE = 'Freshwater Pond') with Riparian_Wetlands.
    ii. Calculate area in acres in the resulting layer, summarize acres by 'WET_ID'.
    iii. Add 'Wettest_AC' field (double) to the Riparian_Wetlands layer.
    iv. Join summarized 'Wettest_AC' table to Riparian_Wetlands layer using 'WET_ID' field, and calculate 'Wettest_AC' field.

d. Rank riparian wetlands into Tier 1 and Tier 2 categories.
    i. Add ‘Weight_AC’ field (double) to Riparian_Wetlands layer
    ii. Weight (multiply) area of riparian wetland beyond 30-meter width by “Wettest_AC” to get “Weight_AC”.
    iii. Select top 30 percent of Riparian_Wetland acres with highest weighted score (‘Weight_AC) as Tier 1.
    iv. Select highest scoring “Weight_AC” for each HUC12 if a Tier 1 wetland does not already occur there as Tier 2.
    v. QC: Visual inspection of all Tier 1 and Tier 2 areas. Where made sense, merge in adjacent, hydrologically connected wetlands bisected by features such as railroad corridors. Did not merge in adjacent areas if bisected by a road. Used “roadless” areas as a driving principal for wetland focus areas, ie. those areas inside of roaded boundaries. Included adjacent areas if they are across a river channel to capture complete protection of the water resource.
    vi. Manually pull in buffers as mapped in step 1 and attribute accordingly for all Tier 1 and Tier 2 wetlands, respectively.

4. Combining buffer protection and wetland protection priorities.
    a. Add ‘RWL_Tier’ field to Riparian_Wetlands layer.
    b. To the buffer protection priority areas, add in nutrient attenuation riparian wetlands and their buffers, and attribute all catchments catchment buffers overlapping Tier 1 and 2 nutrient attenuation wetlands. Use RWL_Tier (Riparian Wetland Tier) attribute to capture tier information.
    c. QC to clean up fragments, multi-part features, etc.
        i. Tier 1 if catchment met KD threshold or is Tier 1 nutrient attenuation wetland
        ii. Tier 2 if catchment is an add-in (connector, tidal, headwater) or is Tier 2 nutrient attenuation wetlands
        iii. Merge small, disjunct areas of Tier 2 into adjacent Tier 1 to clean up. Left connectors through developed areas as Tier 2 even if small and disjunct.
    d. Using NWI with definition query: WETLAND_TYPE = 'Estuarine and Marine Deepwater' OR Class = 'E2AB*' OR Class = 'E2ABM' OR Class = 'E2ABN' OR Class = 'E2US*' OR Class = 'E2USM' OR Class = 'E2USN' OR Class = 'E2USP', dissolve layer (no multipart), and erase the six largest features in the resulting layer from the Tier 1 and 2 areas to clean up tidal shoreline areas so that boundaries fall along consistent features such as salt marsh/mud flat breaks.

Flood Storage and Risk Mitigation GIS Methods

Input data layers:

- NWI Piscataqua-Salmon Falls watershed (HUC 01060003) including 2014 updates http://www.fws.gov/wetlands/Data/Mapper.html
- LiDAR for the North East Project (MA/NH/ME)
- Sea Level Affecting Marsh Migration, from GBNERR (July, 2015)

1. Simulate topographically consistent wetlands and low flats.
    a. Convert LiDAR DEM to slope surface.
    b. Raster calculator to extract 4 percent slopes or less.
    c. Run Majority filter function, using eight and half parameters (lidar_NE_2011_PREP_perc_slope_4orless_MF1).
    d. Run Boundary Clean (no sort) WLs_lidar_bound_clean.
    e. Run Region Group, 4 neighbors, WITHIN grouping method, WLs_lidar_region_group.
    f. Convert “WLs_lidar_region_group” to polygon (WLs_lidar_poly). Select (WLs_lidar_poly) that intersect “Riparian_Wetlands” with DQ: Riparian <> 'No'. Export to “WLs_lidar _poly1”.
    g. Map NWI 1-meter vertical buffer to LIMIT the extent of 4% Slope
        i. Extract “lidar_NE_2011_PREP_10x_int” by “Riparian_Wetlands” with DQ: Riparian <> 'No' to “lidarx10int_extract_NWI_RipWLs”.
        ii. Run Euclidean Allocation of “lidarx10int_extract_NWI_RipWLs” to “lidarx10int_extract_NWI_RipWLs_EA” using input value raster of “lidar_NE_2011_PREP_10x_int”, extracting by “Coastal_Wshed_PREP” mask, cell size = 2.
        iii. Raster calculator "lidar_NE_2011_PREP_10x_int" <= ("lidarx10int_extract_NWI_RipWLs_EA"+10) resulting in “RasCalc_NWI_1m_vert_buf”.
        iv. Convert from raster to poly “RasCalc_NWI_1m_vert_buf” value = 1 to “poly_NWI_1m_vert_buf”.
    h. Clean gaps (holes) in wet flats surface.
        i. Extract “lidar_NE_2011_PREP_10x_int” by “WLs_lidar_poly1” to “lidarx10int_extract_poly1”. Run Euclidean Allocation of “lidarx10int_extract_poly1” to “lidarx10int_extract_poly1_EA” using input value raster of “lidar_NE_2011_PREP_10x_int”, extracting by “Coastal_Wshed_PREP” mask, cell size = 2.

- ii. Raster Calculator to identify 1m vertical buffer to “WLs_lidar_poly1”: "lidar_NE_2011_PREP_10x_int" <= ("lidarx10int_extract_poly1_EA" +10) resulting in “Try_RasCalc_poly1_1m_vert_buf”. Output was masked by “poly_NWI_1m_vert_buf”.
- iii. Convert “Try_RasCalc_poly1_1m_vert_buf” (value = 1) to “Try_poly1_1m_vert_buf”.
- iv. Select by location all those in “Try_poly1_1m_vert_buf” that intersect “Riparian_Wetlands” with DQ: Riparian <> 'No'. Export selection to “Try_poly1_1m_vert_buf_2”.
- v. Clip “Try_poly1_1m_vert_buf_2” to PREP_Wshed and then clip resulting layer to “LiDAR_extent_poly_inside_100m” to pull “flats” edges away from LiDAR edge, resulting in “Try_poly1_1m_vert_buf_3”.
- vi. Calculate Area_AC in “Try_poly1_1m_vert_buf_3”.

i. Attribute HUC10 & 12 CODES:

- i. Convert “Try_poly1_1m_vert_buf_3” to “Try_points1_1m_vert_buf_3” making sure point lands inside of polygon.
- ii. Intersect point “Try_points1_1m_vert_buf_3” with HUC 12. Attribute “Try_points1_1m_vert_buf_3” with HUC12 code.

j. Additional cleaning.

- i. Erase “Try_poly1_1m_vert_buf_3” From “LiDAR_extent_poly_inside_100m” resulting in “Try_poly1_1m_vert_buf_3_erase”
- ii. Select all fragments less than 0.1 acres and merge with ““Try_poly1_1m_vert_buf_3” resulting in ““Try_poly1_1m_vert_buf_3_merge”. Select all merged records less than 0.1 acres and Eliminate, resulting in “Try_poly1_1m_vert_buf_4”.
- iii. Select all >= 10 acres (670 out of 2648). Intersect “NHDPLUSV2_WBDHU12” with “Try_poly1_1m_vert_buf_3” resulting in “Try_poly1_1m_vert_buf_4”.

2. Use Wetland Volume Calculation tool to estimate flood storage capacity.
    a. Tool:
        i. Run batch process from excel table: G:\Z\CWLCP\2015_Water_Resources\Data\Flood_Analysis\Wetland_Volume_HUC12_Batch.xlsx.
        ii. Mosaic all flooded wetland rasters (had to go back and pick up a number of missed wetlands) to “Flooded_Wetland_Raster_ALL”
        iii. Raster calculator, “Flooded_Wetland_Raster_ALL” minus “lidar_NE_2011_PREP”, resulting in “RasterCalc_FloodVolume”.
        iv. Raster calculator "RasterCalc_FloodVolume" >= 0, resulting in “floodvolume_greater_zero”.
        v. Convert “floodvolume_greater_zero” value = 1 to polygon, “floodvolume_polys”, Select all “floodvolume_polys” that intersect “Riparian_Wetlands” (with DQ Riparian <> 'No' AND Area_AC >=1). Attribute selection as “Riparian_Wetland” = ‘yes’ in “floodvolume_polys”.
    1. First round of quality checking.
        a. Identify tool, input “RasterCalc_FloodVolume_pt”, Identify “floodvolume_polysDQ”, resulting in “RasterCalc_FloodVolume_pt_id_floodvolume_polys”. Summarize based on “Id” field for maximum, average, and sum grid_code.
        b. Join summarized table to “floodvolume_polysDQ”. Export to “floddvolume_polys_clean”.
        c. Sort descending “Maximum_grid_code”. Edit. Clean up all maximum_grid_code areas greater than 4 meters.
        d. Manually split flood storage areas strung together by larger stream systems.
        e. Erase wetlands_no_buffer with DQ WETLAND_TYPE = 'Estuarine and Marine Deepwater' OR WETLAND_TYPE = 'Lake' OR WETLAND_TYPE = 'Riverine' OR Class = 'E2AB*' OR Class = 'E2ABM' OR Class = 'E2ABN' OR Class = 'E2US*' OR Class = 'E2USM' OR Class = 'E2USN' OR Class = 'E2USP' (lakes, river, deepwater estuary and marine, and wettest intertidal) from floodvolume_polys_clean, resulting in “floodvolume_polys_clean1” to get a layer excluding open water habitats unless palustrine.
        f. Explode “floodvolume_polys_clean1” resulting in “floodvolume_polys_clean2”. Calculate unique Id field from OBJECTID. Calculate Area_AC.
    2. Second round of quality checking.
        a. Identify tool, input “RasterCalc_FloodVolume_pt”, Identify “floodvolume_polys_clean2”, resulting in “RasterCalc_FloodVolume_pt_id_floodvolume_polys_clean2”. Summarize based on “Id” field for maximum, average, and sum grid_code.

3. Calculate Sum_grid_code * 2m cell *2m cell to get cubic meters. Multiply by .000810714 to convert to acre-feet.

3. Rank flood storage areas into Tier 1 and Tier 2 categories.

i. Tier 1 areas were identified by the top 30 percent (by area) of flood storage capacity lands across the coastal watershed that are upstream of valuable infrastructure (e.g. densely developed areas, major transportation systems). The flood risk component of that analysis was completed manually.

ii. Tier 2 areas include the top scoring flood storage areas in each HUC12 watershed that didn't include a tier 1 focus area, in addition to areas meeting the top 30 percent threshold used for tier 1 but that are not upstream of valuable infrastructure.

iii. Manually inspect each Tier 1 and 2 wetlands to make sure boundaries and flood depths looks reasonable.

b. Incorporate Sea Level Affecting Marsh Migration (SLAMM)

i. Using SLAMM Conservation Priorities (draft 2015), dissolve all potential (DQ "SM_STATUS" <> 'Salt marsh persistent at 0.5m or 1.2m or 2m SLR') marsh migration areas to SLAMM_draft2015_potential_dis. Add SLAMM_Tier field and attribute as 1.

ii. Erase SLAMM_draft2015_potential_dis from floodvolume_polys_clean2 resulting in floodvolume_polys_clean2_SLAMM. Copy and paste SLAMM_draft2015_potential_dis into floodvolume_polys_clean2_SLAMM maintaining Flood_Tier attribute. Update Flood_Tier attribute with SLAMM_Tier attribute.

iii. SLAMM conservation priorities with salt marsh potential of up to 2 meters of sea level rise by year 2100 were attributed as Tier 1.

Public Water Supply GIS Methods

Following are the GIS steps taken to identify Tier 1 and Tier 2 public water supply areas.

1. Prepare "Catchments" layer to incorporate public water supply attributes.
    a. In "Catchments" layer, add fields Tier1_AC, Tier1_Perc, Tier2_AC, Tier2_Perc, DW_Tier.
2. Calculate attributes for the identification of Tier 1 catchments (catchments that contribute to both surface **AND** groundwater supply)
    a. Merge groundwater resource layers "groundwater_areas".
    b. Intersect surface water resource layer (HAC) with "groundwater_areas", then dissolve resulting layer to "surface_int_ground_areas_dis".
    c. Intersect "surface_int_ground_areas_dis" with "Catchments" layer, resulting in "surface_int_ground_areas_dis_int_catchments". Add Area_AC field to "surface_int_ground_areas_dis_int_catchments" and calculate area in acres.

    d. Summarize “surface_int_ground_areas_dis_int_catchments” layer by FEATUREID field, summing Area_AC field.
    e. Join summary table from step 2.d to “Catchments” layer using FEATUREID field. Calculate Tier1_AC field based on summarized Area_AC field. Calculate Tier1_Perc field (percent of catchment in Tier1_AC) using catchment area (acres) and Tier1_AC field.
3. Calculate attributes for the identification of Tier 2 catchments (catchments that contribute to surface **OR** groundwater supply)
    a. Merge “groundwater_areas” with HAC, then dissolve resulting in “PWS_layers_merge_dis”.
    b. Intersect “PWS_layers_merge_dis” with “Catchments”, resulting in “PWS_layers_merge_dis_int_Catchments”. Add Area_AC field to “PWS_layers_merge_dis_int_Catchments” and calculate area in acres.
    c. Summarize “PWS_layers_merge_dis_int_Catchments” layer by FEATUREID field, summing Area_AC field.
    d. Join summary table from step 3.c to “Catchments” layer using FEATUREID field. Calculate Tier2_AC field based on summarized Area_AC field. Calculate Tier2_Perc field (percent of catchment in Tier2_AC) using catchment area (acres) and Tier2_AC field.
4. Use thresholds to attribute Tier 1 and Tier 2 catchments.
    a. Tier 1 catchments were selected and attributed a value of 1 in the “Catchments” layer, DW_Tier field, using the selection query: Tier1_Perc >20 AND Tier2_Perc >80.
    b. Tier 2 catchments were selected and attributed a value of 2 in the “Catchments” layer, DW_Tier field, using the selection query: DW_Tier <> 1 AND Tier2_Perc >80.

Single and Multi-Benefit Water Resource GIS Methods

1. Add ‘type’ field to nutrient, flood, and drinking water layers. Populate fields accordingly with ‘Nutrient’, ‘Flood’, and ‘Public Water Supply’, respectively. Union each of these three layers, resulting in WaterResource_Overlays. Symbolize by unique values, many fields

Appendix C: Details for Public Water Supply Layers

Data layer details, except those for favorable gravel wells, are from the document titled, "Data Layers Available through NHDES OneStop GIS, December 2014", provided by NHDES.

DATA LAYER: **HACS** (Hydrologic Areas of Concern)
DESCRIPTION: Surface Water Supply Drinking Water Protection Areas, by default, include the entire watershed. In some Instances, these protection areas are being studied to determine a more immediate/direct watershed – called a Hydrologic Area of Concern.
STEWARD: Drinking Water and Groundwater Bureau (DWGB)
PROGRESS: This layer is up-to-date.
UPDATE FREQUENCY: Updates are made only when it newer and more accurate watershed information becomes available.
TIME PERIOD OF CONTENT: None provided.

DATA LAYER: **GAA, GA1, GA2** (Classes of Groundwater)
DESCRIPTION: Pursuant to the Groundwater Protection Act section 485-C:5, all groundwater shall be classified for the purpose of prescribing protections and management practices. This layer spatially represents the area(s) listed within RSA, including areas with greater state and local protections. Classifications do not necessarily reflect existing water quality.
STEWARD: Drinking Water and Groundwater Bureau (DWGB)
PROGRESS: This layer is up-to-date.
UPDATE FREQUENCY: This layer is updated annually and only when new GAA and GA1 reclassifications occur or protection areas are modified.
TIME PERIOD OF CONTENT: Corresponding to the statute, data in this layer originates from the early 1990s.

DATA LAYER: **SDA** (Stratified Drift Aquifer Data)
DESCRIPTION: These data were compiled through a series of 12 water resource investigations conducted by USGS and NHDES. GIS data for these projects were captured for the specific investigation locations and subsequently interpreted boundaries of these aquifers. Interpretive outputs included delineation of aquifers, transmissivity zones, water table contours and saturated thickness contours. Investigation data include wells, borings and seismic lines to catalog subsurface conditions.
STEWARD: NH Geological Survey
PROGRESS: Completed.
UPDATE FREQUENCY: None planned.
TIME PERIOD OF CONTENT: None provided.

DATA LAYER: **WHPA** (Wellhead Protection Areas)
DESCRIPTION: This polygon shapefile contains Wellhead Protection Areas (WHPAs) for community and non-community, non-transient drinking water supplies. WHPA and SWPA are subsets of

the Drinking Water Protection Areas (DWPA). Another subset, WAIVER, is used for the Phase II and V Sampling Waiver program.

STEWARD: Drinking Water and Groundwater Bureau (DWGB)

PROGRESS: This data is up-to-date, and is updated only when more accurate information is obtained.

UPDATE FREQUENCY: Quarterly.

TIME PERIOD OF CONTENT: 1990s to present.

DATA LAYER: **FGWA 300, FGWA 400** (Favorable Gravel Wells)

DESCRIPTION: The dataset was developed as part of an update of the DES Favorable Gravel Well Analysis model in 2010, under contract to NHDES. The FGWA model uses four buffer datasets to remove land areas on stratified-drift aquifers in NH that constrain the siting of new municipal water supplies. A final, dissolved dataset for each buffer regime is used to erase out aquifer area not suitable for municipal well development. The composite of all buffer erasures results in the remaining favorable gravel well land areas displayed in the final FGWA datasets.

STEWARD:

PROGRESS: This layer is up-to-date.

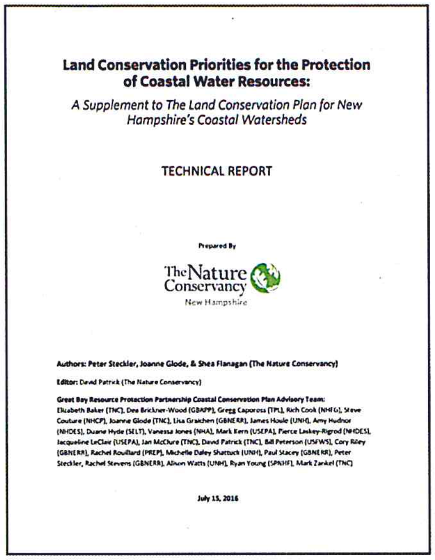
UPDATE FREQUENCY: Updated as needed.

TIME PERIOD OF CONTENT: Dataset was created in 2009 and data are current to July 2011.

Appendix D: Full GIS Metadata

Land Conservation Plan, Water Resource Conservation Focus Areas, 2016 Update

Water_Resource_Priorities file geodatabase



Land Conservation Priorities for the Protection of Coastal Water Resources:

A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds

TECHNICAL REPORT

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Tags

Land conservation plan, conservation, protection, focus area, land trust, coastal watershed, flood, flood risk, mitgiation, flood storage, flood capacity, nutrient, load, pollution, impairment, nitrogen, phophorus, sediment, buffer, riparian, surface water, wetland, drinking water, groundwater, source, water, public, supply, well, aquifer

Summary

This file contains the land conservation focus areas that provide the greatest benefits to coastal water resources. Focus areas are targeted specifically to address threats associated with existing and future development, including:
1. Pollutant attenuation and removal: riparian buffers that intercept stormwater runoff and at the same time maintain natural cover adjacent to surface waters, and riparian wetlands that are highly efficient at treating pollutants already in surface waters;
2. Flood storage and risk mitigation: areas across the watershed with high flood storage capacities that reduce flood risks to downstream infrastructure, and natural areas that will accommodate sea level rise and salt marsh migration;
3. Public water supply: lands that safeguard surface and groundwater resources for human consumption.

A feature class is included for each of the three target focus areas listed above. Additionaly, a fourth feature class is included that combines the three focus areas, differentiating between areas of single and mulitple target benefits.

Description

This file contains the results (feature classes) from the project "Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds", which had a goal of identifying land conservation focus areas for the purpose of protecting coastal water resources.

Feature classes included are:

1. Pollutant Attenuation Focus Areas

2. Flood Storage and Risk Mitigation Focus Areas

3. Public Water Supply Focus Areas

4. Single and Multi-Benefit Water Resource Focus

A comprehensive description of the project is available in the technical report.

Credits

This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

Use limitations

There are no access and use limitations for this item.

Extent

West	-71.305220	**East**	-70.631115
North	43.594466	**South**	42.837711

Scale Range

Maximum (zoomed in) 1:5,000
Minimum (zoomed out) 1:150,000,000

ArcGIS Metadata ►

Topics and Keywords ►

THEMES OR CATEGORIES OF THE RESOURCE environment, inlandWaters, oceans

CONTENT TYPE Downloadable Data
EXPORT TO FGDC CSDGM XML FORMAT AS RESOURCE DESCRIPTION No

PLACE KEYWORDS New Hampshire, Coastal, Seacoast

TEMPORAL KEYWORDS 2016

THEME KEYWORDS Land conservation plan, conservation, protection, focus area, land trust, coastal watershed, flood, flood risk, mitgiation, flood storage, flood capacity, nutrient, load, pollution, impairment, nitrogen, phophorus, sediment, buffer, riparian, surface water, wetland, drinking water, groundwater, source, water, public, supply, well, aquifer

Hide Topics and Keywords ▲

Citation ►

TITLE Land Conservation Plan, Water Resource Conservation Focus Areas, 2016 Update
ALTERNATE TITLES Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds
CREATION DATE 2016-05-31 00:00:00
PUBLICATION DATE 2016-07-15 00:00:00

PRESENTATION FORMATS digital map, digital document
FGDC GEOSPATIAL PRESENTATION FORMAT vector digital data, document

Hide Citation ▲

Citation Contacts ▶

RESPONSIBLE PARTY
INDIVIDUAL'S NAME The Nature Conservancy
CONTACT'S ROLE originator

CONTACT INFORMATION ▶
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VOICE (603)224-5853

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TYPE both
DELIVERY POINT 22 Bridge Street, Fourth Floor
CITY Concord
ADMINISTRATIVE AREA NH
POSTAL CODE 03301
COUNTRY US

Hide Contact information ▲

Hide Citation Contacts ▲

Resource Details ▶

DATASET LANGUAGES English
DATASET CHARACTER SET utf8 - 8 bit UCS Transfer Format

STATUS completed

SPATIAL RESOLUTION
DATASET'S SCALE
SCALE DENOMINATOR 5000

CREDITS
This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

ARCGIS ITEM PROPERTIES

Hide Resource Details ▲

Extents ▶

EXTENT
DESCRIPTION
New Hampshire's coastal watershed, including portions in Maine.

GEOGRAPHIC EXTENT
BOUNDING RECTANGLE
EXTENT TYPE Extent used for searching

WEST LONGITUDE -71.305220
EAST LONGITUDE -70.631115
NORTH LATITUDE 43.594466
SOUTH LATITUDE 42.837711
EXTENT CONTAINS THE RESOURCE Yes

TEMPORAL EXTENT
ENDING DATE 2016-05-31 00:00:00

Hide Extents ▲

Resource Points of Contact ▶

POINT OF CONTACT
INDIVIDUAL'S NAME Peter Steckler
ORGANIZATION'S NAME The Nature Conservancy, New Hampshire
CONTACT'S POSITION GIS & Conservation Project Manager
CONTACT'S ROLE point of contact

CONTACT INFORMATION ▶
PHONE
VOICE (603) 224-5853

ADDRESS
TYPE both
DELIVERY POINT 22 Bridge Street, Fourth Floor
CITY Concord
ADMINISTRATIVE AREA New Hampshire
POSTAL CODE 03301
COUNTRY US
E-MAIL ADDRESS psteckler@tnc.org

Hide Contact information ▲

Hide Resource Points of Contact ▲

Resource Maintenance ▶

RESOURCE MAINTENANCE
UPDATE FREQUENCY as needed

Hide Resource Maintenance ▲

Data Quality ▶

SCOPE OF QUALITY INFORMATION ▶
RESOURCE LEVEL dataset

Hide Scope of quality information ▲

Hide Data Quality ▲

Lineage ▶

LINEAGE STATEMENT

Full lineage details are proved in the technical report: Land Conservation Priorities for the Protection of Coastal Water Resources

SOURCE DATA ▶

DESCRIPTION

See accompanying technical report: Land Conservation Priorities for the Protection of Coastal Water Resources

SOURCE MEDIUM NAME online link

Hide Source data ▲

Hide Lineage ▲

Distribution ▶

DISTRIBUTION FORMAT

VERSION 20160715

NAME Water_Resource_Priorities file geodatabase

Hide Distribution ▲

References ▶

AGGREGATE INFORMATION

ASSOCIATION TYPE source

INITIATIVE TYPE project

AGGREGATE RESOURCE NAME ▶

TITLE Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watershed

CREATION DATE 2016-05-31 00:00:00

PUBLICATION DATE 2016-07-15 00:00:00

RESOURCE LOCATION ONLINE

LOCATION www.granit.unh.edu

Hide Aggregate resource name ▲

Hide References ▲

Metadata Details ▶

METADATA LANGUAGE English

METADATA CHARACTER SET utf8 - 8 bit UCS Transfer Format

METADATA IDENTIFIER 4C7E9AE7-A202-463C-9D9B-3AB032B4426C

SCOPE OF THE DATA DESCRIBED BY THE METADATA dataset

LAST UPDATE 2016-07-15

ARCGIS METADATA PROPERTIES

METADATA FORMAT ArcGIS 1.0

METADATA STYLE FGDC CSDGM Metadata
STANDARD OR PROFILE USED TO EDIT METADATA FGDC

CREATED IN ARCGIS FOR THE ITEM 2016-07-13 06:22:53
LAST MODIFIED IN ARCGIS FOR THE ITEM 2016-07-15 93:53:20

AUTOMATIC UPDATES
HAVE BEEN PERFORMED No

Hide Metadata Details ▲

Metadata Contacts ►

METADATA CONTACT
INDIVIDUAL'S NAME Peter Steckler
ORGANIZATION'S NAME The Nature Conservancy, New Hampshire
CONTACT'S POSITION GIS & Conservation Project Manager
CONTACT'S ROLE point of contact

CONTACT INFORMATION ►
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VOICE (603) 224-5853

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TYPE both
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POSTAL CODE 03301
COUNTRY US
E-MAIL ADDRESS psteckler@tnc.org

Hide Contact information ▲

Hide Metadata Contacts ▲

Metadata Maintenance ►

MAINTENANCE
UPDATE FREQUENCY as needed

Hide Metadata Maintenance ▲

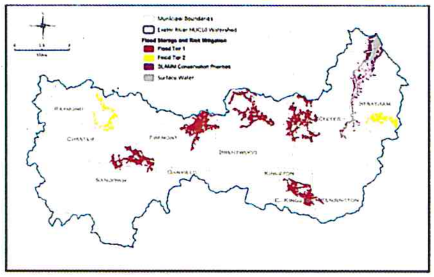
Thumbnail and Enclosures ►

THUMBNAIL
THUMBNAIL TYPE JPG

Hide Thumbnail and Enclosures ▲

Land Conservation Plan, Water Resource Conservation Focus Areas, 2016 Update - Flood Attenuation and Risk Mitigation

File Geodatabase Feature Class



Tags

LCP, coastal watershed, conservation plan, flood, flood storage, flood risk, attenuation, infrastructure, mitigation, conservation, focus areas, land protection, buffer, water resource, water quality, ecosystem service

Summary

Flood storage and risk mitigation conservation focus areas as delineated for the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds, which focused on protecting coastal water resources. These priority areas estimate low elevation, flat riparian land (i.e. low flats) with the greatest flood storage capacity from a whole-watershed perspective. They also include Sea Level Affecting Marsh Migration (SLAMM) conservation priorities.

Description

Flood storage and risk mitigation focus areas, in addition to focus areas for pollutant attenuation, public water supply, and a combination of the three, are the result of the project titled "Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds", which had a goal of identifying land conservation focus areas for the purpose of protecting coastal water resources.

A tiered prioritization was developed for flood storage and risk mitigation focus areas. Tier 1 areas include the top 30 percent (by area) of flood storage capacity lands across the coastal watershed that are upstream of valuable infrastructure (e.g. densely developed areas, major transportation systems). Tier 1 areas also include SLAMM conservation priorities with salt marsh potential of up to 2 meters of sea level rise by year 2100. Tier 2 includes the top scoring flood storage areas in each HUC12 watershed that does not already include a Tier 1 focus area, in addition to areas meeting the top 30 percent threshold used for Tier 1 but that are not upstream of valuable infrastructure.

The flood capacity analysis is limited to the extent of LiDAR coverage, so excludes the northwestern portion of the watershed. SLAMM results are limited to the New Hampshire portion of the watershed.

A comprehensive description of the flood storage and risk mitigation delineation process is available in the project's technical report.

Credits

This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal

Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

Use limitations
There are no access and use limitations for this item.

Extent

West	-71.302433	**East**	-70.631090
North	43.554791	**South**	42.835211

Scale Range
Maximum (zoomed in) 1:5,000
Minimum (zoomed out) 1:150,000,000

ArcGIS Metadata ▶

Topics and Keywords ▶

THEMES OR CATEGORIES OF THE RESOURCE environment, inlandWaters, oceans

* CONTENT TYPE Downloadable Data
EXPORT TO FGDC CSDGM XML FORMAT AS RESOURCE DESCRIPTION Yes

PLACE KEYWORDS New Hampshire, Coastal, Seacoast

TEMPORAL KEYWORDS 2016

THEME KEYWORDS LCP, coastal watershed, conservation plan, flood, flood storage, flood risk, attenuation, infrastructure, mitigation, conservation, focus areas, land protection, buffer, water resource, water quality, ecosystem service

Hide Topics and Keywords ▲

Citation ▶

TITLE Land Conservation Plan, Water Resource Conservation Focus Areas, 2016 Update - Flood Attenuation and Risk Mitigation
ALTERNATE TITLES Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds
CREATION DATE 2016-05-31 00:00:00
PUBLICATION DATE 2016-07-15 00:00:00

PRESENTATION FORMATS * digital map, digital document
FGDC GEOSPATIAL PRESENTATION FORMAT vector digital data, document

Hide Citation ▲

Citation Contacts ▶

RESPONSIBLE PARTY
INDIVIDUAL'S NAME The Nature Conservancy
CONTACT'S ROLE originator

CONTACT INFORMATION ▶

PHONE
VOICE (603)224-5853

ADDRESS
TYPE both
DELIVERY POINT 22 Bridge Street, Fourth Floor
CITY Concord
ADMINISTRATIVE AREA NH
POSTAL CODE 03301
COUNTRY US

Hide Contact information ▲

Hide Citation Contacts ▲

Resource Details ▶

DATASET LANGUAGES * English (UNITED STATES)
DATASET CHARACTER SET utf8 - 8 bit UCS Transfer Format

STATUS completed
SPATIAL REPRESENTATION TYPE * vector

SPATIAL RESOLUTION
DATASET'S SCALE
SCALE DENOMINATOR 5000

* PROCESSING ENVIRONMENT Microsoft Windows 7 Version 6.1 (Build 7601) Service Pack 1; Esri ArcGIS 10.2.0.3348

CREDITS
This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

ARCGIS ITEM PROPERTIES
* NAME Flood_FAs
* LOCATION file://\\Nh201-psteckle2
\gis\Z\CWLCP\2015_Water_Resources\Data\Final\Water_Resource_Priorities.gdb
* ACCESS PROTOCOL Local Area Network

Hide Resource Details ▲

Extents ▶

EXTENT
DESCRIPTION
New Hampshire's coastal watershed, restricted to LiDAR for the Northeast coverage (2011).

GEOGRAPHIC EXTENT
BOUNDING RECTANGLE
EXTENT TYPE Extent used for searching
* WEST LONGITUDE -71.302433
* EAST LONGITUDE -70.631090
* NORTH LATITUDE 43.554791

* SOUTH LATITUDE 42.835211
* EXTENT CONTAINS THE RESOURCE Yes

TEMPORAL EXTENT
BEGINNING DATE 2014-07-01 00:00:00
ENDING DATE 2016-07-15 00:00:00

EXTENT IN THE ITEM'S COORDINATE SYSTEM
* WEST LONGITUDE 1081941.196113
* EAST LONGITUDE 1258794.413089
* SOUTH LATITUDE 123832.706052
* NORTH LATITUDE 384652.463831
* EXTENT CONTAINS THE RESOURCE Yes

Hide Extents ▲

Resource Points of Contact ▶

POINT OF CONTACT
INDIVIDUAL'S NAME Peter Steckler
ORGANIZATION'S NAME The Nature Conservancy, New Hampshire
CONTACT'S POSITION GIS & Conservation Project Manager
CONTACT'S ROLE point of contact

CONTACT INFORMATION ▶
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ADMINISTRATIVE AREA New Hampshire
POSTAL CODE 03301
COUNTRY US
E-MAIL ADDRESS psteckler@tnc.org

Hide Contact information ▲

Hide Resource Points of Contact ▲

Resource Maintenance ▶

RESOURCE MAINTENANCE
UPDATE FREQUENCY as needed

Hide Resource Maintenance ▲

Spatial Reference ▶

ARCGIS COORDINATE SYSTEM
* TYPE Projected
* GEOGRAPHIC COORDINATE REFERENCE GCS_North_American_1983
* PROJECTION NAD_1983_StatePlane_New_Hampshire_FIPS_2800_Feet
* COORDINATE REFERENCE DETAILS
PROJECTED COORDINATE SYSTEM

WELL-KNOWN IDENTIFIER 102710
X ORIGIN -19308058.801988039
Y ORIGIN -50111124.519520968
XY SCALE 129905858.55079505
Z ORIGIN -100000
Z SCALE 1000
M ORIGIN -100000
M SCALE 10000
XY TOLERANCE 0.061120258240162546
Z TOLERANCE 0.002
M TOLERANCE 0.002
HIGH PRECISION true
LATEST WELL-KNOWN IDENTIFIER 3437
WELL-KNOWN TEXT PROJCS
["NAD_1983_StatePlane_New_Hampshire_FIPS_2800_Feet",GEOGCS
["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID
["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT
["Degree",0.0174532925199433]],PROJECTION["Transverse_Mercator"],PARAMETER
["False_Easting",984250.0],PARAMETER["False_Northing",0.0],PARAMETER
["Central_Meridian",-71.66666666666667],PARAMETER
["Scale_Factor",0.9999666666666667],PARAMETER["Latitude_Of_Origin",42.5],UNIT
["Foot_US",0.3048006096012192],AUTHORITY["EPSG",3437]]

REFERENCE SYSTEM IDENTIFIER
* VALUE 3437
* CODESPACE EPSG
* VERSION 8.1.1

Hide Spatial Reference ▲

Spatial Data Properties ▶

VECTOR ▶
* LEVEL OF TOPOLOGY FOR THIS DATASET geometry only

GEOMETRIC OBJECTS
FEATURE CLASS NAME Flood_FAs
* OBJECT TYPE composite
* OBJECT COUNT 8134

Hide Vector ▲

ARCGIS FEATURE CLASS PROPERTIES ▶
FEATURE CLASS NAME Flood_FAs
* FEATURE TYPE Simple
* GEOMETRY TYPE Polygon
* HAS TOPOLOGY FALSE
* FEATURE COUNT 8134
* SPATIAL INDEX TRUE
* LINEAR REFERENCING FALSE

Hide ArcGIS Feature Class Properties ▲

Hide Spatial Data Properties ▲

Data Quality ▶

SCOPE OF QUALITY INFORMATION ▶
RESOURCE LEVEL dataset

Hide Scope of quality information ▲

Hide Data Quality ▲

Lineage ▶

LINEAGE STATEMENT
Full lineage details are proved in the technical report: Land Conservation Priorities for the Protection of Coastal Water Resources

SOURCE DATA ▶
DESCRIPTION
See accompanying technical report: Land Conservation Priorities for the Protection of Coastal Water Resources

SOURCE MEDIUM NAME online link
Hide Source data ▲

Hide Lineage ▲

Geoprocessing history ▼

Distribution ▶

DISTRIBUTION FORMAT
* NAME File Geodatabase Feature Class
VERSION 20160715

Hide Distribution ▲

Fields ▶

DETAILS FOR OBJECT Flood_FAs ▶
* TYPE Feature Class
* ROW COUNT 8134
DEFINITION
Flood storage and risk mitigation conservtion focus areas

DEFINITION SOURCE
The Nature Conservancy

FIELD OBJECTID ▶
* ALIAS OBJECTID
* DATA TYPE OID
* WIDTH 4
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION

Internal feature number.

* DESCRIPTION SOURCE
  Esri

* DESCRIPTION OF VALUES
  Sequential unique whole numbers that are automatically generated.

Hide Field OBJECTID ▲

FIELD Shape ▶
* ALIAS Shape
* DATA TYPE Geometry
* WIDTH 0
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
  Feature geometry.

* DESCRIPTION SOURCE
  Esri

* DESCRIPTION OF VALUES
  Coordinates defining the features.

Hide Field Shape ▲

FIELD AcreFoot ▶
* ALIAS AcreFoot
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
  estimate of flood storage capacity in acre-feet.

DESCRIPTION SOURCE
  The Nature Conservancy, NH

Hide Field AcreFoot ▲

FIELD RiskMitigation ▶
* ALIAS RiskMitigation
* DATA TYPE String
* WIDTH 50
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
  Identifies if the feature provides flood risk mitigation benefits to downstream communities or infrastructure.

DESCRIPTION SOURCE

The Nature Conservancy, NH

Hide Field RiskMitigation ▲

FIELD Flood_Tier ▶
* ALIAS Flood_Tier
* DATA TYPE SmallInteger
* WIDTH 2
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION

Indicates the tier of the flood storage focus area for land protection. Tier 1 indicates the highest priority; tier 2 areas the next highest priority areas. See the technical report: Land Conservation Priorities for the Protection of Coastal Water Resources for additional details.

DESCRIPTION SOURCE

The Nature Conservancy, NH

Hide Field Flood_Tier ▲

FIELD Type ▶
* ALIAS Type
* DATA TYPE String
* WIDTH 30
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION

Indicates the focus of the analysis.

DESCRIPTION SOURCE

The Nature COnservancy, NH

Hide Field Type ▲

FIELD Shape_Length ▶
* ALIAS Shape_Length
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION

Length of feature in internal units.

* DESCRIPTION SOURCE

Esri

* DESCRIPTION OF VALUES

Positive real numbers that are automatically generated.

Hide Field Shape_Length ▲

FIELD Shape_Area ▶

* ALIAS Shape_Area
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
  Area of feature in internal units squared.

* DESCRIPTION SOURCE
  Esri

* DESCRIPTION OF VALUES
  Positive real numbers that are automatically generated.

Hide Field Shape_Area ▲

Hide Details for object Flood_FAs ▲

Hide Fields ▲

References ▶

AGGREGATE INFORMATION
ASSOCIATION TYPE source
INITIATIVE TYPE project

AGGREGATE RESOURCE NAME ▶
TITLE Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watershed
CREATION DATE 2016-05-31 00:00:00
PUBLICATION DATE 2016-07-15 00:00:00

RESOURCE LOCATION ONLINE
LOCATION www.granit.unh.edu

Hide Aggregate resource name ▲

Hide References ▲

Metadata Details ▶

* METADATA LANGUAGE English (UNITED STATES)
METADATA CHARACTER SET utf8 - 8 bit UCS Transfer Format

METADATA IDENTIFIER 8FC173D6-95DA-4349-8D82-73C278D987D2

SCOPE OF THE DATA DESCRIBED BY THE METADATA * dataset
SCOPE NAME * dataset

LAST UPDATE 2016-07-15

ARCGIS METADATA PROPERTIES
METADATA FORMAT ArcGIS 1.0

STANDARD OR PROFILE USED TO EDIT METADATA FGDC

CREATED IN ARCGIS FOR THE ITEM 2016-04-21 13:55:25
LAST MODIFIED IN ARCGIS FOR THE ITEM 2016-07-15 09:39:44

AUTOMATIC UPDATES
HAVE BEEN PERFORMED Yes
LAST UPDATE 2016-07-15 09:39:44

Hide Metadata Details ▲

Metadata Contacts ►

METADATA CONTACT
INDIVIDUAL'S NAME Peter Steckler
ORGANIZATION'S NAME The Nature Conservancy, New Hampshire
CONTACT'S POSITION GIS & Conservation Project Manager
CONTACT'S ROLE point of contact

CONTACT INFORMATION ►
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DELIVERY POINT 22 Bridge Street, Fourth Floor
CITY Concord
ADMINISTRATIVE AREA New Hampshire
POSTAL CODE 03301
COUNTRY US
E-MAIL ADDRESS psteckler@tnc.org

Hide Contact information ▲

Hide Metadata Contacts ▲

Metadata Maintenance ►

MAINTENANCE
UPDATE FREQUENCY as needed

Hide Metadata Maintenance ▲

Thumbnail and Enclosures ►

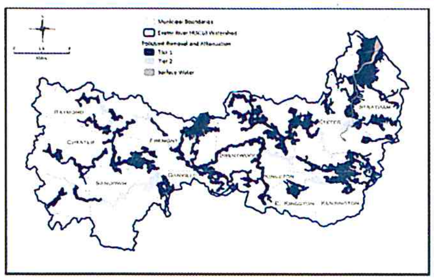
THUMBNAIL
THUMBNAIL TYPE JPG

Hide Thumbnail and Enclosures ▲

FGDC Metadata (read-only) ▼

Land Conservation Plan, Water Resource Conservation Focus Areas, 2016 Update - Pollutant Attenuation and Removal

File Geodatabase Feature Class



Tags

LCP, conservation, conservation plan, pollutant, attenuation, focus area, water quality, impairment, land conservation, land protection, coastal, ecosystem service, buffer, riparian, nitrogen

Summary

Pollutant attenuation conservation focus areas as delineated for the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds, which focused on protecting coastal water resources. Pollutant attenuation priority areas are highly functional riparian buffers and wetlands from a whole-watershed perspective that if protected, will benefit long-term coastal water quality. Specific riparian buffers are targeted for protection to intercept pollutants from entering aquatic systems; riparian wetlands (and their buffers) are targeted for protection to attenuate pollutants that have already entered the aquatic system.

Description

Pollutant attenuation and removal focus areas, in addition to focus areas for flood storage and risk mitigation, public water supply, and a combination of the three, are the result of the project titled "Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds", which had a goal of identifying land conservation focus areas for the purpose of protecting coastal water resources.

A tiered prioritization was developed for riparian buffers and wetlands independently and compiled into this single data layer. Tier 1 riparian buffers have a high density of natural or restorable land cover classes (based on NLCD 2011). Tier 2 riparian buffers include riparian buffer connectors between tier 1 areas. In total, tier 1 and 2 areas identify a network of connected riparian buffers to target for protection.

Riparian wetlands are prioritized based on width and hydrologic regime. Tier 1 areas include the top scoring 30 percent (by area) riparian wetlands; tier 2 includes the top scoring riparian wetland for each HUC12 watershed that does not already include a tier 1 riparian wetland. Riparian wetlands were buffered in a consistent approach to riparian buffers. First and second order streams and their associated wetlands were buffered 50 meters, third order and higher streams and their associated wetlands were buffered 100 meters, and tidal wetlands were buffered by a 2 meter vertical plus an additional 200 meter horizontal buffer. All buffer areas were examined using the most recent aerial photography to exclude dense areas of development.

A comprehensive description of the pollutant attenuation and removal delineation process is available in the project's technical report.

Credits

This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

Use limitations
There are no access and use limitations for this item.

Extent
West -71.305220 **East** -70.631115
North 43.594466 **South** 42.837711

Scale Range
Maximum (zoomed in) 1:5,000
Minimum (zoomed out) 1:150,000,000

ArcGIS Metadata ▶

Topics and Keywords ▶

THEMES OR CATEGORIES OF THE RESOURCE environment, inlandWaters, oceans

* CONTENT TYPE Downloadable Data
EXPORT TO FGDC CSDGM XML FORMAT AS RESOURCE DESCRIPTION No

PLACE KEYWORDS New Hampshire, Coastal, Seacoast

TEMPORAL KEYWORDS 2016

THEME KEYWORDS LCP, conservation, conservation plan, pollutant, attenuation, focus area, water quality, impairment, land conservation, land protection, coastal, ecosystem service, buffer, riparian, nitrogen

Hide Topics and Keywords ▲

Citation ▶

TITLE Land Conservation Plan, Water Resource Conservation Focus Areas, 2016 Update - Pollutant Attenuation and Removal
ALTERNATE TITLES Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds
CREATION DATE 2016-05-31 00:00:00
PUBLICATION DATE 2016-07-15 00:00:00

PRESENTATION FORMATS digital document
FGDC GEOSPATIAL PRESENTATION FORMAT vector digital data, document

Hide Citation ▲

Citation Contacts ▶

RESPONSIBLE PARTY
INDIVIDUAL'S NAME The Nature Conservancy

CONTACT'S ROLE originator

CONTACT INFORMATION ▶
PHONE
VOICE (603)224-5853

ADDRESS
TYPE both
DELIVERY POINT 22 Bridge Street, Fourth Floor
CITY Concord
ADMINISTRATIVE AREA NH
POSTAL CODE 03301
COUNTRY US

Hide Contact information ▲

Hide Citation Contacts ▲

Resource Details ▶

DATASET LANGUAGES * English (UNITED STATES)
DATASET CHARACTER SET utf8 - 8 bit UCS Transfer Format

STATUS completed
SPATIAL REPRESENTATION TYPE * vector

SPATIAL RESOLUTION
DATASET'S SCALE
SCALE DENOMINATOR 5000

* PROCESSING ENVIRONMENT Microsoft Windows 7 Version 6.1 (Build 7601) Service Pack 1; Esri ArcGIS 10.2.0.3348

CREDITS
This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

ARCGIS ITEM PROPERTIES
* NAME Pollutant_Attenuation_FAs
* LOCATION file://\\Nh201-psteckle2
\gis\Z\CWLCP\2015_Water_Resources\Data\Final\Water_Resource_Priorities.gdb
* ACCESS PROTOCOL Local Area Network

Hide Resource Details ▲

Extents ▶

EXTENT
DESCRIPTION
New Hampshire's coastal watershed, restricted to LiDAR for the Northeast coverage (2011).

TEMPORAL EXTENT
BEGINNING DATE 2014-07-01 00:00:00
ENDING DATE 2016-07-15 00:00:00

EXTENT
GEOGRAPHIC EXTENT
BOUNDING RECTANGLE
EXTENT TYPE Extent used for searching
* WEST LONGITUDE -71.305220
* EAST LONGITUDE -70.631115
* NORTH LATITUDE 43.594466
* SOUTH LATITUDE 42.837711
* EXTENT CONTAINS THE RESOURCE Yes

EXTENT IN THE ITEM'S COORDINATE SYSTEM
* WEST LONGITUDE 1081189.716370
* EAST LONGITUDE 1258607.861412
* SOUTH LATITUDE 124741.779552
* NORTH LATITUDE 399110.914290
* EXTENT CONTAINS THE RESOURCE Yes

Hide Extents ▲

Resource Points of Contact ▶

POINT OF CONTACT
INDIVIDUAL'S NAME Peter Steckler
ORGANIZATION'S NAME The Nature Conservancy, New Hampshire
CONTACT'S POSITION GIS & Conservation Project Manager
CONTACT'S ROLE point of contact

CONTACT INFORMATION ▶
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Hide Contact information ▲

Hide Resource Points of Contact ▲

Resource Maintenance ▶

RESOURCE MAINTENANCE
UPDATE FREQUENCY as needed

Hide Resource Maintenance ▲

Spatial Reference ▶

ARCGIS COORDINATE SYSTEM
* TYPE Projected

* GEOGRAPHIC COORDINATE REFERENCE GCS_North_American_1983
* PROJECTION NAD_1983_StatePlane_New_Hampshire_FIPS_2800_Feet
* COORDINATE REFERENCE DETAILS
  PROJECTED COORDINATE SYSTEM
    WELL-KNOWN IDENTIFIER 102710
    X ORIGIN -19308058.801988039
    Y ORIGIN -51537998.982830428
    XY SCALE 124770546.87651412
    Z ORIGIN -100000
    Z SCALE 10000
    M ORIGIN -100000
    M SCALE 10000
    XY TOLERANCE 0.0032808333333333331
    Z TOLERANCE 0.001
    M TOLERANCE 0.001
    HIGH PRECISION true
    LATEST WELL-KNOWN IDENTIFIER 3437
    WELL-KNOWN TEXT PROJCS ["NAD_1983_StatePlane_New_Hampshire_FIPS_2800_Feet",GEOGCS ["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID ["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT ["Degree",0.0174532925199433]],PROJECTION["Transverse_Mercator"],PARAMETER ["False_Easting",984250.0],PARAMETER["False_Northing",0.0],PARAMETER ["Central_Meridian",-71.66666666666667],PARAMETER ["Scale_Factor",0.9999666666666667],PARAMETER["Latitude_Of_Origin",42.5],UNIT ["Foot_US",0.3048006096012192],AUTHORITY["EPSG",3437]]

REFERENCE SYSTEM IDENTIFIER
* VALUE 3437
* CODESPACE EPSG
* VERSION 8.1.1

Hide Spatial Reference ▲

Spatial Data Properties ►

VECTOR ►
* LEVEL OF TOPOLOGY FOR THIS DATASET geometry only

GEOMETRIC OBJECTS
  FEATURE CLASS NAME Pollutant_Attenuation_FAs
  * OBJECT TYPE composite
  * OBJECT COUNT 803

Hide Vector ▲

ARCGIS FEATURE CLASS PROPERTIES ►
FEATURE CLASS NAME Pollutant_Attenuation_FAs
* FEATURE TYPE Simple
* GEOMETRY TYPE Polygon
* HAS TOPOLOGY FALSE
* FEATURE COUNT 803
* SPATIAL INDEX TRUE
* LINEAR REFERENCING FALSE

Hide ArcGIS Feature Class Properties ▲

Hide Spatial Data Properties ▲

Data Quality ►

SCOPE OF QUALITY INFORMATION ►
RESOURCE LEVEL dataset

Hide Scope of quality information ▲

Hide Data Quality ▲

Lineage ►

LINEAGE STATEMENT
Full lineage details are proved in the technical report: Land Conservation Priorities for the Protection of Coastal Water Resources

SOURCE DATA ►
DESCRIPTION
See accompanying technical report: Land Conservation Priorities for the Protection of Coastal Water Resources

SOURCE MEDIUM NAME online link
Hide Source data ▲

Hide Lineage ▲

Geoprocessing history ▼

Distribution ►

DISTRIBUTION FORMAT
VERSION 20160715
* NAME File Geodatabase Feature Class

Hide Distribution ▲

Fields ►

DETAILS FOR OBJECT Pollutant_Attenuation_FAs ►
* TYPE Feature Class
* ROW COUNT 803
DEFINITION
Flood storage and risk mitigation conservtion focus areas

DEFINITION SOURCE
The Nature Conservancy

FIELD OBJECTID ►

* ALIAS OBJECTID
* DATA TYPE OID
* WIDTH 4
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
  Internal feature number.

* DESCRIPTION SOURCE
  Esri

* DESCRIPTION OF VALUES
  Sequential unique whole numbers that are automatically generated.

Hide Field OBJECTID ▲

FIELD Shape ▶
* ALIAS Shape
* DATA TYPE Geometry
* WIDTH 0
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
  Feature geometry.

* DESCRIPTION SOURCE
  Esri

* DESCRIPTION OF VALUES
  Coordinates defining the features.

Hide Field Shape ▲

FIELD Wshed_Tier ▶
* ALIAS Wshed_Tier
* DATA TYPE SmallInteger
* WIDTH 2
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Indicates whether the buffer lies within the upper watershed (tier 3), middle watershed (tier 2) or lower watershed (tier 1).

DESCRIPTION SOURCE
The Nature Conservancy

RANGE OF VALUES
MINIMUM VALUE 1
MAXIMUM VALUE 3

Hide Field Wshed_Tier ▲

FIELD RiparianWL_Tier ▶
* ALIAS RiparianWL_Tier
* DATA TYPE SmallInteger
* WIDTH 2
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Indicates the tier assigned from the riparian wetland analysis.

DESCRIPTION SOURCE
The Nature Conservancy

RANGE OF VALUES
MINIMUM VALUE 1
MAXIMUM VALUE 2

Hide Field RiparianWL_Tier ▲

FIELD Polluntant_Tier ▶
* ALIAS Polluntant_Tier
* DATA TYPE SmallInteger
* WIDTH 2
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Indicates the tier assigned for the overall pollutant attenuation and removal analysis.

DESCRIPTION SOURCE
The Nature Conservancy

RANGE OF VALUES
MINIMUM VALUE 1
MAXIMUM VALUE 2

Hide Field Polluntant_Tier ▲

FIELD Pollutant_Tier_Explanation ▶
* ALIAS Pollutant_Tier_Explanation
* DATA TYPE String
* WIDTH 50
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Brief explanation about why the buffer ranked as a tier 1 or tier 2 area.

DESCRIPTION SOURCE
The Nature Conservancy

Hide Field Pollutant_Tier_Explanation ▲

FIELD Shape_Length ▶
* ALIAS Shape_Length
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

* FIELD DESCRIPTION
  Length of feature in internal units.

* DESCRIPTION SOURCE
  Esri

* DESCRIPTION OF VALUES
  Positive real numbers that are automatically generated.

Hide Field Shape_Length ▲

FIELD Shape_Area ▶
* ALIAS Shape_Area
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
  Area of feature in internal units squared.

* DESCRIPTION SOURCE
  Esri

* DESCRIPTION OF VALUES
  Positive real numbers that are automatically generated.

Hide Field Shape_Area ▲

Hide Details for object Pollutant_Attenuation_FAs ▲

Hide Fields ▲

References ▶

AGGREGATE INFORMATION
ASSOCIATION TYPE source
INITIATIVE TYPE project

AGGREGATE RESOURCE NAME ▶
TITLE Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watershed
CREATION DATE 2016-05-31 00:00:00
PUBLICATION DATE 2016-07-15 00:00:00

RESOURCE LOCATION ONLINE
LOCATION www.granit.unh.edu

Hide Aggregate resource name ▲

Hide References ▲

Metadata Details ►

* METADATA LANGUAGE English (UNITED STATES)
METADATA CHARACTER SET utf8 - 8 bit UCS Transfer Format

METADATA IDENTIFIER 18E2C499-79C4-4B4D-9D92-659B417A466B

SCOPE OF THE DATA DESCRIBED BY THE METADATA * dataset
SCOPE NAME * dataset

* LAST UPDATE 2016-07-15

ARCGIS METADATA PROPERTIES
METADATA FORMAT ArcGIS 1.0
METADATA STYLE North American Profile of ISO19115 2003
STANDARD OR PROFILE USED TO EDIT METADATA FGDC

CREATED IN ARCGIS FOR THE ITEM 2016-04-21 13:36:00
LAST MODIFIED IN ARCGIS FOR THE ITEM 2016-07-15 09:43:07

AUTOMATIC UPDATES
HAVE BEEN PERFORMED Yes
LAST UPDATE 2016-07-15 09:43:07

Hide Metadata Details ▲

Metadata Contacts ►

METADATA CONTACT
INDIVIDUAL'S NAME Peter Steckler
ORGANIZATION'S NAME The Nature Conservancy, New Hampshire
CONTACT'S POSITION GIS & Conservation Project Manager
CONTACT'S ROLE point of contact

CONTACT INFORMATION ►
PHONE
VOICE (603) 224-5853

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TYPE both
DELIVERY POINT 22 Bridge Street, Fourth Floor
CITY Concord
ADMINISTRATIVE AREA New Hampshire
POSTAL CODE 03301
COUNTRY US
E-MAIL ADDRESS psteckler@tnc.org

Hide Contact information ▲

Hide Metadata Contacts ▲

Metadata Maintenance ►

MAINTENANCE
UPDATE FREQUENCY as needed

Hide Metadata Maintenance ▲

Thumbnail and Enclosures ▶

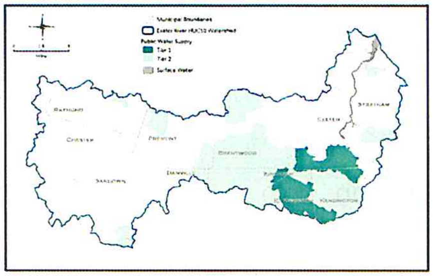
THUMBNAIL
THUMBNAIL TYPE JPG

Hide Thumbnail and Enclosures ▲

FGDC Metadata (read-only) ▼

Land Conservation Plan, Water Resource Conservation Focus Areas, 2016 Update - Public Water Supply

File Geodatabase Feature Class



Tags

LCP, conservation, coastal watershed, conservation plan, water, pollutant, focus area, impairment, land conservation, land protection, coastal, water quality, water supply, ecosystem service, groundwater, surface water, well, wellhead, drinking water, source water, aquifer, ga1, ga2, gaa

Summary

Public water supply conservation focus areas as delineated for the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds, which focused on protecting coastal water resources. These priority areas identify a subset of lands important to the provision of surface and groundwater resources for public water supply. The focus areas are based on existing data layers provided by the NH Department of Environmental Services Drinking Water and Groundwater Bureau (NHDES DWGB). The results of the analysis are masked by National Hydrography Dataset Plus Version 2 catchments (with some modification by The Nature Conservancy) to protect the sensitive nature of NHDES DWGB data sets.

Description

Public water supply focus areas, in addition to focus areas for flood storage and risk mitigation and pollutant attenuation and removal, and a combination of the three, are the result of the project titled "Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds", which had a goal of identifying land conservation focus areas for the purpose of protecting coastal water resources.

A tiered prioritization was developed for public water supply focus areas. Tier 1 areas prioritize co-occurring surface and groundwater public water supply resources. Tier 2 areas prioritize either surface or groundwater public water supply resource areas. Data layer users are encouraged to coordinate with the NHDES DWGB when further prioritizing or protecting land specifically for the protection of public water supply.

Currently this analysis is limited to the extent of data available through the NHDES DWGB. Maine areas are not included except where NHDES DWGB data extends beyond New Hampshire.

A comprehensive description of the public water supply delineation process is available in the project's technical report.

Credits

This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

Use limitations
There are no access and use limitations for this item.

Extent

West -71.364681 **East** -70.629920
North 43.621951 **South** 42.834294

Scale Range

Maximum (zoomed in) 1:5,000
Minimum (zoomed out) 1:150,000,000

ArcGIS Metadata ▶

Topics and Keywords ▶

THEMES OR CATEGORIES OF THE RESOURCE environment, inlandWaters, oceans

* CONTENT TYPE Downloadable Data
EXPORT TO FGDC CSDGM XML FORMAT AS RESOURCE DESCRIPTION No

PLACE KEYWORDS New Hampshire, Coastal, Seacoast

TEMPORAL KEYWORDS 2016

THEME KEYWORDS LCP, conservation, coastal watershed, conservation plan, water, pollutant, focus area, impairment, land conservation, land protection, coastal, water quality, water supply, ecosystem service, groundwater, surface water, well, wellhead, drinking water, source water, aquifer, ga1, ga2, gaa

Hide Topics and Keywords ▲

Citation ▶

TITLE Land Conservation Plan, Water Resource Conservation Focus Areas, 2016 Update - Public Water Supply
ALTERNATE TITLES Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds
CREATION DATE 2016-05-31 00:00:00
PUBLICATION DATE 2016-07-15 00:00:00

PRESENTATION FORMATS digital document
FGDC GEOSPATIAL PRESENTATION FORMAT vector digital data, document

Hide Citation ▲

Citation Contacts ▶

RESPONSIBLE PARTY
INDIVIDUAL'S NAME The Nature Conservancy
CONTACT'S ROLE originator

CONTACT INFORMATION ▶
PHONE
VOICE (603)224-5853

ADDRESS
TYPE both
DELIVERY POINT 22 Bridge Street, Fourth Floor
CITY Concord
ADMINISTRATIVE AREA NH
POSTAL CODE 03301
COUNTRY US

Hide Contact information ▲

Hide Citation Contacts ▲

Resource Details ▶

DATASET LANGUAGES * English (UNITED STATES)
DATASET CHARACTER SET utf8 - 8 bit UCS Transfer Format

STATUS completed
SPATIAL REPRESENTATION TYPE * vector

SPATIAL RESOLUTION
DATASET'S SCALE
SCALE DENOMINATOR 5000

* PROCESSING ENVIRONMENT Microsoft Windows 7 Version 6.1 (Build 7601) Service Pack 1; Esri ArcGIS 10.2.0.3348

CREDITS
This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

ARCGIS ITEM PROPERTIES
* NAME Public_Water_Supply_FAs
* LOCATION file://\\Nh201-psteckle2\gis\Z\CWLCP\2015_Water_Resources\Data\Final\Water_Resource_Priorities.gdb
* ACCESS PROTOCOL Local Area Network

Hide Resource Details ▲

Extents ▶

EXTENT
DESCRIPTION
New Hampshire's coastal watershed, restricted to LiDAR for the Northeast coverage (2011).

TEMPORAL EXTENT
BEGINNING DATE 2014-07-01 00:00:00
ENDING DATE 2016-07-15 00:00:00

EXTENT
GEOGRAPHIC EXTENT
BOUNDING RECTANGLE
EXTENT TYPE Extent used for searching

* WEST LONGITUDE -71.364681
* EAST LONGITUDE -70.629920
* NORTH LATITUDE 43.621951
* SOUTH LATITUDE 42.834294
* EXTENT CONTAINS THE RESOURCE Yes

EXTENT IN THE ITEM'S COORDINATE SYSTEM
* WEST LONGITUDE 1065246.532571
* EAST LONGITUDE 1258800.189594
* SOUTH LATITUDE 123498.681554
* NORTH LATITUDE 409065.053027
* EXTENT CONTAINS THE RESOURCE Yes

Hide Extents ▲

Resource Points of Contact ▶

POINT OF CONTACT
INDIVIDUAL'S NAME Peter Steckler
ORGANIZATION'S NAME The Nature Conservancy, New Hampshire
CONTACT'S POSITION GIS & Conservation Project Manager
CONTACT'S ROLE point of contact

CONTACT INFORMATION ▶
PHONE
VOICE (603) 224-5853

ADDRESS
TYPE both
DELIVERY POINT 22 Bridge Street, Fourth Floor
CITY Concord
ADMINISTRATIVE AREA New Hampshire
POSTAL CODE 03301
COUNTRY US
E-MAIL ADDRESS psteckler@tnc.org

Hide Contact information ▲

Hide Resource Points of Contact ▲

Resource Maintenance ▶

RESOURCE MAINTENANCE
UPDATE FREQUENCY as needed

Hide Resource Maintenance ▲

Spatial Reference ▶

ARCGIS COORDINATE SYSTEM
* TYPE Projected
* GEOGRAPHIC COORDINATE REFERENCE GCS_North_American_1983
* PROJECTION NAD_1983_StatePlane_New_Hampshire_FIPS_2800_Feet
* COORDINATE REFERENCE DETAILS
PROJECTED COORDINATE SYSTEM
WELL-KNOWN IDENTIFIER 102710

X ORIGIN -19308058.801988039
Y ORIGIN -51537998.982830428
XY SCALE 124770546.87651412
Z ORIGIN -100000
Z SCALE 10000
M ORIGIN -100000
M SCALE 10000
XY TOLERANCE 0.0032808333333333331
Z TOLERANCE 0.001
M TOLERANCE 0.001
HIGH PRECISION true
LATEST WELL-KNOWN IDENTIFIER 3437
WELL-KNOWN TEXT PROJCS ["NAD_1983_StatePlane_New_Hampshire_FIPS_2800_Feet",GEOGCS ["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID ["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT ["Degree",0.0174532925199433]],PROJECTION["Transverse_Mercator"],PARAMETER ["False_Easting",984250.0],PARAMETER["False_Northing",0.0],PARAMETER ["Central_Meridian",-71.66666666666667],PARAMETER ["Scale_Factor",0.9999666666666667],PARAMETER["Latitude_Of_Origin",42.5],UNIT ["Foot_US",0.3048006096012192],AUTHORITY["EPSG",3437]]

REFERENCE SYSTEM IDENTIFIER
* VALUE 3437
* CODESPACE EPSG
* VERSION 8.1.1

Hide Spatial Reference ▲

Spatial Data Properties ►

VECTOR ►
* LEVEL OF TOPOLOGY FOR THIS DATASET geometry only

GEOMETRIC OBJECTS
FEATURE CLASS NAME Public_Water_Supply_FAs
* OBJECT TYPE composite
* OBJECT COUNT 1325

Hide Vector ▲

ARCGIS FEATURE CLASS PROPERTIES ►
FEATURE CLASS NAME Public_Water_Supply_FAs
* FEATURE TYPE Simple
* GEOMETRY TYPE Polygon
* HAS TOPOLOGY FALSE
* FEATURE COUNT 1325
* SPATIAL INDEX TRUE
* LINEAR REFERENCING FALSE

Hide ArcGIS Feature Class Properties ▲

Hide Spatial Data Properties ▲

Data Quality ►

SCOPE OF QUALITY INFORMATION ▶
RESOURCE LEVEL dataset

Hide Scope of quality information ▲

Hide Data Quality ▲

Lineage ▶

LINEAGE STATEMENT
Full lineage details are proved in the technical report: Land Conservation Priorities for the Protection of Coastal Water Resources

SOURCE DATA ▶
DESCRIPTION
See accompanying technical report: Land Conservation Priorities for the Protection of Coastal Water Resources

SOURCE MEDIUM NAME online link
Hide Source data ▲

Hide Lineage ▲

Geoprocessing history ▼

Distribution ▶

DISTRIBUTION FORMAT
VERSION 20160715
* NAME File Geodatabase Feature Class

Hide Distribution ▲

Fields ▶

DETAILS FOR OBJECT Public_Water_Supply_FAs ▶
* TYPE Feature Class
* ROW COUNT 1325
DEFINITION
Flood storage and risk mitigation conservtion focus areas

DEFINITION SOURCE
The Nature Conservancy

FIELD OBJECTID ▶
* ALIAS OBJECTID
* DATA TYPE OID
* WIDTH 4
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION

Internal feature number.

* DESCRIPTION SOURCE
  Esri

* DESCRIPTION OF VALUES
  Sequential unique whole numbers that are automatically generated.

Hide Field OBJECTID ▲

FIELD Shape ▶
* ALIAS Shape
* DATA TYPE Geometry
* WIDTH 0
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
  Feature geometry.

* DESCRIPTION SOURCE
  Esri

* DESCRIPTION OF VALUES
  Coordinates defining the features.

Hide Field Shape ▲

FIELD FEATUREID ▶
* ALIAS FEATUREID
* DATA TYPE Integer
* WIDTH 4
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
NHDV2 Catchment Feature ID

DESCRIPTION SOURCE
USGS/NHD

Hide Field FEATUREID ▲

FIELD Area_AC ▶
* ALIAS Area_AC
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Area of the NHDPLUSV2 catchment

DESCRIPTION SOURCE
The Nature Conservancy

Hide Field Area_AC ▲

FIELD Tier1_AC ▶
* ALIAS Tier1_AC
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Area (in acres) where surface and groundwater input data layers intersect the catchment.

DESCRIPTION SOURCE
The Nature Conservancy

Hide Field Tier1_AC ▲

FIELD Tier1_Perc ▶
* ALIAS Tier1_Perc
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Percent of catchment that intersect surface and groundwater input data layers overlap.

DESCRIPTION SOURCE
The Nature Conservancy

RANGE OF VALUES
MINIMUM VALUE 0
MAXIMUM VALUE 100

Hide Field Tier1_Perc ▲

FIELD Tier2_AC ▶
* ALIAS Tier2_AC
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Area (in acres) where surface or groundwater input data layers intersect the catchment.

DESCRIPTION SOURCE
The Nature Conservancy

Hide Field Tier2_AC ▲

FIELD Tier2_Perc ▶
* ALIAS Tier2_Perc
* DATA TYPE Double
* WIDTH 8

* PRECISION 0
* SCALE 0

FIELD DESCRIPTION

Percent of catchment that intersect surface or groundwater input data layers.

DESCRIPTION SOURCE

The Nature Conservancy

RANGE OF VALUES

MINIMUM VALUE 0

MAXIMUM VALUE 100

Hide Field Tier2_Perc ▲

FIELD Type ▶

* ALIAS Type
* DATA TYPE String
* WIDTH 30
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION

Defines the type of conservation focus area.

DESCRIPTION SOURCE

The Nature Conservancy

Hide Field Type ▲

FIELD PWS_Tier ▶

* ALIAS PWS_Tier
* DATA TYPE SmallInteger
* WIDTH 2
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION

Designates the tier for the public water supply conservation focus area.

DESCRIPTION SOURCE

The Nature Conservancy

RANGE OF VALUES

MINIMUM VALUE 1

MAXIMUM VALUE 2

Hide Field PWS_Tier ▲

FIELD Shape_Length ▶

* ALIAS Shape_Length
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION

Length of feature in internal units.

* DESCRIPTION SOURCE

Esri

* DESCRIPTION OF VALUES
Positive real numbers that are automatically generated.

Hide Field Shape_Length ▲

FIELD Shape_Area ▶
* ALIAS Shape_Area
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
Area of feature in internal units squared.

* DESCRIPTION SOURCE
Esri

* DESCRIPTION OF VALUES
Positive real numbers that are automatically generated.

Hide Field Shape_Area ▲

Hide Details for object Public_Water_Supply_FAs ▲

Hide Fields ▲

References ▶

AGGREGATE INFORMATION
ASSOCIATION TYPE source
INITIATIVE TYPE project

AGGREGATE RESOURCE NAME ▶
TITLE Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watershed
CREATION DATE 2016-05-31 00:00:00
PUBLICATION DATE 2016-07-15 00:00:00

RESOURCE LOCATION ONLINE
LOCATION www.granit.unh.edu

Hide Aggregate resource name ▲

Hide References ▲

Metadata Details ▶

* METADATA LANGUAGE English (UNITED STATES)

METADATA CHARACTER SET utf8 - 8 bit UCS Transfer Format

METADATA IDENTIFIER 7A1306B2-6AF0-406C-968E-CDCF8CF2E5E0

SCOPE OF THE DATA DESCRIBED BY THE METADATA * dataset
SCOPE NAME * dataset

* LAST UPDATE 2016-07-15

ARCGIS METADATA PROPERTIES
METADATA FORMAT ArcGIS 1.0
METADATA STYLE North American Profile of ISO19115 2003
STANDARD OR PROFILE USED TO EDIT METADATA FGDC

CREATED IN ARCGIS FOR THE ITEM 2016-04-21 14:12:17
LAST MODIFIED IN ARCGIS FOR THE ITEM 2016-07-15 09:44:31

AUTOMATIC UPDATES
HAVE BEEN PERFORMED Yes
LAST UPDATE 2016-07-15 09:44:31

Hide Metadata Details ▲

Metadata Contacts ▶

METADATA CONTACT
INDIVIDUAL'S NAME Peter Steckler
ORGANIZATION'S NAME The Nature Conservancy, New Hampshire
CONTACT'S POSITION GIS & Conservation Project Manager
CONTACT'S ROLE point of contact

CONTACT INFORMATION ▶
PHONE
VOICE (603) 224-5853

ADDRESS
TYPE both
DELIVERY POINT 22 Bridge Street, Fourth Floor
CITY Concord
ADMINISTRATIVE AREA New Hampshire
POSTAL CODE 03301
COUNTRY US
E-MAIL ADDRESS psteckler@tnc.org

Hide Contact information ▲

Hide Metadata Contacts ▲

Metadata Maintenance ▶

MAINTENANCE
UPDATE FREQUENCY as needed

Hide Metadata Maintenance ▲

Thumbnail and Enclosures ►

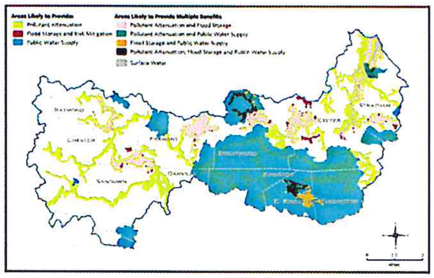
THUMBNAIL
THUMBNAIL TYPE JPG

Hide Thumbnail and Enclosures ▲

FGDC Metadata (read-only) ▼

Land Conservation Plan, Water Resource Conservation Focus Areas, 2016 Update - Flood Storage and Risk Mitgation, Pollutant Attenuation and Removal, Public Water Supply, Single and Multi-Benefits

File Geodatabase Feature Class



Tags

LCP, conservation focus area, conservation, conservation plan, pollutant, focus area, land conservation, land protection, coastal, water quality, impairment, water quality, ecosystem service, groundwater, surface water, well, wellhead, drinking water, source water, aquifer, ga1, ga2, gaa, flood, flood storage, flood risk, mitigation, buffer, water resource, attenuation, riparian, nitrogen, benefit, single, multiple

Summary

Single and multi-benefit conservation focus areas as delineated for the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds, which focused on protecting coastal water resources.

Description

Single and multi-benefit focus areas, based on focus areas identified for flood storage and risk mitigation, pollutant attenuation and removal, and public warer suppy, are the result of the project titled "Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds", which had a goal of identifying land conservation focus areas for the purpose of protecting coastal water resources.

These priority areas identify single and multi-benefit areas based on an overlay analysis of pollutant attenuation, flood storage and risk mitigation, and public water supply conservation focus areas. Refer to the metadata of each respective input data layer for more information. The overlay analysis treated tiers from each of the input data layers equally, that is, there is no differentiation between input layer tiers in the symbology as shown.

A comprehensive description of the single and multi-benefit delineation process is available in the project's technical report.

Credits

This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

Use limitations

There are no access and use limitations for this item.

Extent

West -71.305235 **East** -70.630297
North 43.601070 **South** 42.835211

Scale Range

Maximum (zoomed in) 1:5,000
Minimum (zoomed out) 1:150,000,000

ArcGIS Metadata ►

Topics and Keywords ►

THEMES OR CATEGORIES OF THE RESOURCE environment, inlandWaters, oceans

* CONTENT TYPE Downloadable Data
EXPORT TO FGDC CSDGM XML FORMAT AS RESOURCE DESCRIPTION No

PLACE KEYWORDS New Hampshire, Coastal, Seacoast

TEMPORAL KEYWORDS 2016

THEME KEYWORDS LCP, conservation focus area, conservation, conservation plan, pollutant, focus area, land conservation, land protection, coastal, water quality, impairment, water quality, ecosystem service, groundwater, surface water, well, wellhead, drinking water, source water, aquifer, ga1, ga2, gaa, flood, flood storage, flood risk, mitigation, buffer, water resource, attenuation, riparian, nitrogen, benefit, single, multiple

Hide Topics and Keywords ▲

Citation ►

TITLE Land Conservation Plan, Water Resource Conservation Focus Areas, 2016 Update - Flood Storage and Risk Mitgation, Pollutant Attenuation and Removal, Public Water Supply, Single and Multi-Benefits
ALTERNATE TITLES Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watersheds
CREATION DATE 2016-05-31 00:00:00
PUBLICATION DATE 2016-07-15 00:00:00

PRESENTATION FORMATS digital document
FGDC GEOSPATIAL PRESENTATION FORMAT vector digital data, document

Hide Citation ▲

Citation Contacts ►

RESPONSIBLE PARTY
INDIVIDUAL'S NAME The Nature Conservancy
CONTACT'S ROLE originator

CONTACT INFORMATION ►
PHONE
VOICE (603)224-5853

ADDRESS
TYPE both
DELIVERY POINT 22 Bridge Street, Fourth Floor
CITY Concord
ADMINISTRATIVE AREA NH
POSTAL CODE 03301
COUNTRY US

Hide Contact information ▲

Hide Citation Contacts ▲

Resource Details ▶

DATASET LANGUAGES * English (UNITED STATES)
DATASET CHARACTER SET utf8 - 8 bit UCS Transfer Format

STATUS completed
SPATIAL REPRESENTATION TYPE * vector

SPATIAL RESOLUTION
DATASET'S SCALE
SCALE DENOMINATOR 5000

* PROCESSING ENVIRONMENT Microsoft Windows 7 Version 6.1 (Build 7601) Service Pack 1; Esri ArcGIS 10.2.0.3348

CREDITS
This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

ARCGIS ITEM PROPERTIES
* NAME WaterResource_Overlays
* LOCATION file://\\Nh201-psteckle2 \gis\Z\CWLCP\2015_Water_Resources\Data\Final\Water_Resource_Priorities.gdb
* ACCESS PROTOCOL Local Area Network

Hide Resource Details ▲

Extents ▶

EXTENT
DESCRIPTION
New Hampshire's coastal watershed, restricted to LiDAR for the Northeast coverage (2011).

TEMPORAL EXTENT
BEGINNING DATE 2014-07-01 00:00:00
ENDING DATE 2016-07-15 00:00:00

EXTENT
GEOGRAPHIC EXTENT
BOUNDING RECTANGLE
EXTENT TYPE Extent used for searching
* WEST LONGITUDE -71.305235

* EAST LONGITUDE -70.630297
* NORTH LATITUDE 43.601070
* SOUTH LATITUDE 42.835211
* EXTENT CONTAINS THE RESOURCE Yes

EXTENT IN THE ITEM'S COORDINATE SYSTEM
* WEST LONGITUDE 1081189.716370
* EAST LONGITUDE 1258794.413089
* SOUTH LATITUDE 123832.706052
* NORTH LATITUDE 401518.221815
* EXTENT CONTAINS THE RESOURCE Yes

Hide Extents ▲

Resource Points of Contact ►

POINT OF CONTACT
INDIVIDUAL'S NAME Peter Steckler
ORGANIZATION'S NAME The Nature Conservancy, New Hampshire
CONTACT'S POSITION GIS & Conservation Project Manager
CONTACT'S ROLE point of contact

CONTACT INFORMATION ►
PHONE
VOICE (603) 224-5853

ADDRESS
TYPE both
DELIVERY POINT 22 Bridge Street, Fourth Floor
CITY Concord
ADMINISTRATIVE AREA New Hampshire
POSTAL CODE 03301
COUNTRY US
E-MAIL ADDRESS psteckler@tnc.org

Hide Contact information ▲

Hide Resource Points of Contact ▲

Resource Maintenance ►

RESOURCE MAINTENANCE
UPDATE FREQUENCY as needed

Hide Resource Maintenance ▲

Spatial Reference ►

ARCGIS COORDINATE SYSTEM
* TYPE Projected
* GEOGRAPHIC COORDINATE REFERENCE GCS_North_American_1983
* PROJECTION NAD_1983_StatePlane_New_Hampshire_FIPS_2800_Feet
* COORDINATE REFERENCE DETAILS
PROJECTED COORDINATE SYSTEM
WELL-KNOWN IDENTIFIER 102710
X ORIGIN -19308058.801988039

Y ORIGIN -51537998.982830428
XY SCALE 124770546.87651412
Z ORIGIN -100000
Z SCALE 10000
M ORIGIN -100000
M SCALE 10000
XY TOLERANCE 0.0032808333333333331
Z TOLERANCE 0.001
M TOLERANCE 0.001
HIGH PRECISION true
LATEST WELL-KNOWN IDENTIFIER 3437
WELL-KNOWN TEXT PROJCS ["NAD_1983_StatePlane_New_Hampshire_FIPS_2800_Feet",GEOGCS ["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID ["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT ["Degree",0.0174532925199433]],PROJECTION["Transverse_Mercator"],PARAMETER ["False_Easting",984250.0],PARAMETER["False_Northing",0.0],PARAMETER ["Central_Meridian",-71.66666666666667],PARAMETER ["Scale_Factor",0.9999666666666667],PARAMETER["Latitude_Of_Origin",42.5],UNIT ["Foot_US",0.3048006096012192],AUTHORITY["EPSG",3437]]

REFERENCE SYSTEM IDENTIFIER
* VALUE 3437
* CODESPACE EPSG
* VERSION 8.1.1

Hide Spatial Reference ▲

Spatial Data Properties ▶

VECTOR ▶
* LEVEL OF TOPOLOGY FOR THIS DATASET geometry only

GEOMETRIC OBJECTS
FEATURE CLASS NAME WaterResource_Overlays
* OBJECT TYPE composite
* OBJECT COUNT 10415

Hide Vector ▲

ARCGIS FEATURE CLASS PROPERTIES ▶
FEATURE CLASS NAME WaterResource_Overlays
* FEATURE TYPE Simple
* GEOMETRY TYPE Polygon
* HAS TOPOLOGY FALSE
* FEATURE COUNT 10415
* SPATIAL INDEX TRUE
* LINEAR REFERENCING FALSE

Hide ArcGIS Feature Class Properties ▲

Hide Spatial Data Properties ▲

Data Quality ▶

SCOPE OF QUALITY INFORMATION ▶
RESOURCE LEVEL dataset

Hide Scope of quality information ▲

Hide Data Quality ▲

Lineage ▶

LINEAGE STATEMENT
Full lineage details are proved in the technical report: Land Conservation Priorities for the Protection of Coastal Water Resources

SOURCE DATA ▶
DESCRIPTION
See accompanying technical report: Land Conservation Priorities for the Protection of Coastal Water Resources

SOURCE MEDIUM NAME online link
Hide Source data ▲

Hide Lineage ▲

Geoprocessing history ▼

Distribution ▶

DISTRIBUTION FORMAT
VERSION 20160715
* NAME File Geodatabase Feature Class

Hide Distribution ▲

Fields ▶

DETAILS FOR OBJECT WaterResource_Overlays ▶
* TYPE Feature Class
* ROW COUNT 10415
DEFINITION
Flood storage and risk mitigation conservtion focus areas

DEFINITION SOURCE
The Nature Conservancy

FIELD OBJECTID ▶
* ALIAS OBJECTID
* DATA TYPE OID
* WIDTH 4
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION

Internal feature number.

* DESCRIPTION SOURCE
Esri

* DESCRIPTION OF VALUES
Sequential unique whole numbers that are automatically generated.

Hide Field OBJECTID ▲

FIELD Shape ▶
* ALIAS Shape
* DATA TYPE Geometry
* WIDTH 0
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
Feature geometry.

* DESCRIPTION SOURCE
Esri

* DESCRIPTION OF VALUES
Coordinates defining the features.

Hide Field Shape ▲

FIELD Type ▶
* ALIAS Type
* DATA TYPE String
* WIDTH 30
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Defines if the feature is a pollutant attenuation and removal focus area

DESCRIPTION SOURCE
The Nature Conservancy

Hide Field Type ▲

FIELD Type_1 ▶
* ALIAS Type
* DATA TYPE String
* WIDTH 30
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Defines if the feature is a flood storage and risk mitigation focus area

DESCRIPTION SOURCE
The Nature Conservancy

Hide Field Type_1 ▲

FIELD Type_12 ▶
* ALIAS Type
* DATA TYPE String
* WIDTH 30
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Defines if the feature is a public water supply focus area

DESCRIPTION SOURCE
The Nature Conservancy

Hide Field Type_12 ▲

FIELD Shape_Length ▶
* ALIAS Shape_Length
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
Length of feature in internal units.

* DESCRIPTION SOURCE
Esri

* DESCRIPTION OF VALUES
Positive real numbers that are automatically generated.

Hide Field Shape_Length ▲

FIELD Shape_Area ▶
* ALIAS Shape_Area
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
Area of feature in internal units squared.

* DESCRIPTION SOURCE
Esri

* DESCRIPTION OF VALUES
Positive real numbers that are automatically generated.

Hide Field Shape_Area ▲

Hide Details for object WaterResource_Overlays ▲

Hide Fields ▲

References ▶

AGGREGATE INFORMATION
ASSOCIATION TYPE source
INITIATIVE TYPE project

AGGREGATE RESOURCE NAME ▶
TITLE Land Conservation Priorities for the Protection of Coastal Water Resources: A Supplement to The Land Conservation Plan for New Hampshire's Coastal Watershed
CREATION DATE 2016-05-31 00:00:00
PUBLICATION DATE 2016-07-15 00:00:00

RESOURCE LOCATION ONLINE
LOCATION www.granit.unh.edu

Hide Aggregate resource name ▲

Hide References ▲

Metadata Details ▶

* METADATA LANGUAGE English (UNITED STATES)
METADATA CHARACTER SET utf8 - 8 bit UCS Transfer Format

METADATA IDENTIFIER 28B03DA3-C010-4A91-AEF4-87182960C84F

SCOPE OF THE DATA DESCRIBED BY THE METADATA * dataset
SCOPE NAME * dataset

* LAST UPDATE 2016-07-15

ARCGIS METADATA PROPERTIES
METADATA FORMAT ArcGIS 1.0
METADATA STYLE North American Profile of ISO19115 2003
STANDARD OR PROFILE USED TO EDIT METADATA FGDC

CREATED IN ARCGIS FOR THE ITEM 2016-01-12 10:43:52
LAST MODIFIED IN ARCGIS FOR THE ITEM 2016-07-15 09:45:44

AUTOMATIC UPDATES
HAVE BEEN PERFORMED Yes
LAST UPDATE 2016-07-15 09:45:44

Hide Metadata Details ▲

Metadata Contacts ▶

METADATA CONTACT
INDIVIDUAL'S NAME Peter Steckler
ORGANIZATION'S NAME The Nature Conservancy, New Hampshire

CONTACT'S POSITION GIS & Conservation Project Manager
CONTACT'S ROLE point of contact

CONTACT INFORMATION ▶
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COUNTRY US
E-MAIL ADDRESS psteckler@tnc.org

Hide Contact information ▲

Hide Metadata Contacts ▲

Metadata Maintenance ▶

MAINTENANCE
UPDATE FREQUENCY as needed

Hide Metadata Maintenance ▲

Thumbnail and Enclosures ▶

THUMBNAIL
THUMBNAIL TYPE JPG

Hide Thumbnail and Enclosures ▲

FGDC Metadata (read-only) ▼

Appendix E: "Lite" GIS Metadata for NH Coastal Viewer

TITLE: Pollutant Attenuation Focus Areas from the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds	
TIME PERIOD OF CONTENT: 5/31/2016	**PUBLICATION DATE:** 7/15/2016
ORIGINATOR: The Nature Conservancy	
ABSTRACT: Pollutant attenuation conservation focus areas as delineated for the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds, which focused on protecting coastal water resources. Pollutant attenuation priority areas are highly functional riparian buffers and wetlands from a whole-watershed perspective that if protected, will benefit long-term coastal water quality. Specific riparian buffers are targeted for protection to intercept pollutants from entering aquatic systems; riparian wetlands (and their buffers) are targeted for protection to attenuate pollutants that have already entered the aquatic system. A tiered prioritization was developed for riparian buffers and wetlands independently and compiled into this single data layer. Tier 1 riparian buffers have a high density of natural or restorable land cover classes (based on NLCD 2011). Tier 2 riparian buffers include riparian buffer connectors between Tier 1 areas. In total, Tier 1 and 2 areas identify a network of connected riparian buffers to target for protection. Riparian wetlands are prioritized based on width and hydrologic regime. Tier 1 areas include the top scoring 30 percent (by area) riparian wetlands; Tier 2 includes the top scoring riparian wetland for each HUC12 watershed that does not already include a Tier 1 riparian wetland. Riparian wetlands were buffered in a consistent approach to riparian buffers. First and second order streams and their associated wetlands were buffered 50 meters, third order and higher streams and their associated wetlands were buffered 100 meters, and tidal wetlands were buffered by a 2 meter vertical plus an additional 200 meter horizontal buffer. All buffer areas were examined using the most recent aerial photography to exclude dense areas of development. A comprehensive description of the pollutant attenuation delineation process is available in the project's technical report.	
THEME KEYWORDS: LCP, conservation, conservation plan, pollutant, attenuation, focus area, water quality, impairment, land conservation, land protection, coastal, ecosystem service, buffer, riparian, nitrogen	
Full Metadata and Data Download	

TITLE: Flood Storage and Risk Mitigation Focus Areas from the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds	
TIME PERIOD OF CONTENT: 5/31/2016	**PUBLICATION DATE:** 7/15/2016
ORIGINATOR: The Nature Conservancy	

ABSTRACT:

Flood storage and risk mitigation conservation focus areas as delineated for the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds, which focused on protecting coastal water resources. These priority areas estimate low elevation, flat riparian land (i.e. low flats) with the greatest flood storage capacity from a whole-watershed perspective. They also include Sea Level Affecting Marsh Migration (SLAMM) conservation priorities.

A tiered prioritization was developed for flood storage and risk mitigation focus areas. Tier 1 areas include the top 30 percent (by area) of flood storage capacity lands across the coastal watershed that are upstream of valuable infrastructure (e.g. densely developed areas, major transportation systems). Tier 1 areas also include SLAMM conservation priorities with salt marsh potential of up to 2 meters of sea level rise by year 2100. Tier 2 includes the top scoring flood storage areas in each HUC12 watershed that does not already include a Tier 1 focus area, in addition to areas meeting the top 30 percent threshold used for Tier 1 but that are not upstream of valuable infrastructure.

The flood capacity analysis is limited to the extent of LiDAR coverage, so excludes the northwestern portion of the watershed. SLAMM results are limited to the New Hampshire portion of the watershed.

A comprehensive description of the flood storage and risk mitigation delineation process is available in the project's technical report.

THEME KEYWORDS: LCP, coastal watershed, conservation plan, flood, flood storage, flood risk, attenuation, infrastructure, mitigation, conservation, focus areas, land protection, buffer, water resource, water quality, ecosystem service

Full Metadata and Data Download

TITLE: Public Water Supply Focus Areas from the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds	
TIME PERIOD OF CONTENT: 5/31/2016	**PUBLICATION DATE:** 7/15/2016
ORIGINATOR: The Nature Conservancy	

ABSTRACT:
Public water supply conservation focus areas as delineated for the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds, which focused on protecting coastal water resources. These priority areas identify a subset of lands important to the provision of surface and groundwater resources for public water supply. The focus areas are based on existing data layers provided by the NH Department of Environmental Services Drinking Water and Groundwater Bureau (NHDES DWGB). The results of the analysis are masked by National Hydrography Dataset Plus Version 2 catchments (with some modification by The Nature Conservancy) to protect the sensitive nature of NHDES DWGB data sets.

A tiered prioritization was developed for public water supply focus areas. Tier 1 areas prioritize co-occurring surface and groundwater public water supply resources. Tier 2 areas prioritize either surface or groundwater public water supply resource areas. Data layer users are encouraged to coordinate with the NHDES DWGB when further prioritizing or protecting land specifically for the protection of public water supply.

Currently this analysis is limited to the extent of data available through the NHDES DWGB. Maine areas are not included except where NHDES DWGB data extends beyond New Hampshire.

A comprehensive description of the public water supply delineation process is available in the project's technical report.

THEME KEYWORDS: LCP, conservation, coastal watershed, conservation plan, water, pollutant, focus area, impairment, land conservation, land protection, coastal, water quality, water supply, ecosystem service, groundwater, surface water, well, wellhead, drinking water, source water, aquifer, ga1, ga2, gaa

Full Metadata and Data Download

TITLE: Single and Multi-Benefit Water Resource Focus Areas from the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds	
TIME PERIOD OF CONTENT: 5/31/2016	**PUBLICATION DATE:** 7/15/2016
ORIGINATOR: The Nature Conservancy	
ABSTRACT: Single and multi-benefit conservation focus areas as delineated for the 2016 update to the Land Conservation Plan for New Hampshire's Coastal Watersheds, which focused on protecting coastal water resources. These priority areas identify single and multi-benefit areas based on an overlay analysis of pollutant attenuation, flood storage and risk mitigation, and public water supply conservation focus areas. Refer to the metadata of each respective input data layer for more information. The overlay analysis treated tiers from each of the input data layers equally, that is, there is no differentiation between input layer tiers in the symbology as shown. A description of the single and multi-benefit delineation process is available in the project's technical report.	
THEME KEYWORDS: LCP, conservation focus area, conservation, conservation plan, pollutant, focus area, land conservation, land protection, coastal, water quality, impairment, water quality, ecosystem service, groundwater, surface water, well, wellhead, drinking water, source water, aquifer, ga1, ga2, gaa, flood, flood storage, flood risk, mitigation, buffer, water resource, attenuation, riparian, nitrogen, benefit, single, multiple	
Full Metadata and Data Download	