2015

Rhode Island Wildlife Action Plan

Chapter 2

Rhode Island's Fish and Wildlife Habitat

The Nature Conservancy
Protecting nature. Preserving life.
State of Rhode Island Department of Environmental Management
The University of Rhode Island

Chapter 2: Table of Contents

Chapter 2: List of Figures

Chapter 2: List of Tables

Introduction

7KHGLVWULEXWLRQDQGDEXQGDQFHRI5KRGH,VODQG¶VZLOGOLIHLVRYHUQHGEWKHDYDLODELOLWDQTXOLW habitat. Habitat is defined as the place where an animal normally lives, often characterized by a dominant plant form or physical characteristic (e.g. VWUHDP KDELWDW DQG IRUHVW KDELWDW soil types, topography, and hydrology support a range of plant communities that provide a complex HFRORJLFDO IUDPHZRUN RI KDELWDWV IRU 5KRGH ,VODQG¶V ILVK D This document uses the WHUP ³KDELWDW´ WR LQFOXGH HFRORJLFDO FRPPXQLWLHV YHJHWD discrete entities that can be mapped that support fish or wildlife species of greatest conservation need (SGCN). This chapter identifies Rh RGH ,VODQG¶V .H\ +DELWDWV DGGUHVVLQJ (OH relative condition and extent in the state.

Rhode Island is part of the northeastern U.S. region that extends from Maine to Virginia. A brief overview of this region provides a context for un GHUVWDQGLQJ 5KRGH ,VODQG¶V FRQWUL biodiversity. The Northeast is more than 60% forested, with an average forest age of 60 years. It contains more than 200,000 miles of rivers and streams, 34,000 water bodies, and more than 6 million acres of wetlands. Eleven globally unique habitats, from sandy barrens to limestone glade, support 2,700 restricted rare species. Habitat fragmentation is one of the greatest challenges to regional biodiversity, as the region is crisscrossed by more than 732,000 miles of roads. The region also has the highest density of dams and other obstacles to fish passage in the country, with an average of 7 dams and 106 road-stream crossings per 100 miles of river (Martin and Apse 2011). Conversion to human use has also impacted much of the northeast landscape, with one-third of forested land and one-quarter of wetlands already converted from its natural state to other uses through human activity. Total wetland area has expanded slightly in the Northeast over the past 20 years, although 67% of wetlands are close to roads and thus have likely experienced some form of disruption, alteration, or species loss (Anderson et al. 2013a).

A conservation status assessment of regionally significant fish and wildlife species and habitats was completed by The Nature Conservancy (TNC) in 2011 with support from NEAFWA (Anderson and Olivero Sheldon 2011). TNC applied key indicators and measures for tracking wildlife status developed by the NEAFWA Monitoring and Performance Reporting Framework and detailed in the report ³*Monitoring the Conservation of Fish and Wildlife in the Northeast: A Report on the Monitoring and 3HUIRUPDQFH 5HSRUWLQJ)UDPHZRUN IRU WKH 1RUWKHDVW $VVRFLD* (NEAFWA 2008) (refer to Chapter 5). The conservation status assessment reports the condition of key habitats and species groups (e.g., bird population trends) in the region, and this information is summarized below. *http://www.rcngrants.org/sites/default/files/final_reports/Conservation-Status-of-Fish-Wildlife-and-Natural-Habitats.pdf*.

The recent geospatial condition analysis project (Anderson et al. 2013b) assesses several important metrics of the condition of 116 terrestrial and aquatic habitats across the Northeast using the standardized region-wide habitat mapping data of streams and terrestrial ecosystems developed through the RCN Grant Program (Gawler 2008). The geospatial condition report is a companion to the Northeast Habitat Guides. It presents additional information on the condition and levels of human impact on the habitats in the region *http://nature.ly/habitatguides*.

One-sixth (16%) of the region is conserved and five percent of that land is secured explicitly for nature (GAP 1 or 2). The secured land is held by more than 6,000 fee owners and 2,000 easement holders. State government is the largest public conservation land owner, with 12 million acres, followed by federal government, which holds 6 million acres. Private lands held in easements account for 3 million acres and land owned by private non-profit land trusts accounts for another 1.4 million acres. Land conversion, however, outweighs land conserved by roughly 2:1 (28%:16%) (Anderson et al. 2013a).

Approximately 23% of the terrestrial habitats and 63% of mountain habitats are conserved in the Northeast. A few low-elevation coastal habitats including the Central Atlantic Coastal Plain Maritime Forest (89%) and Great Lakes Dune and Swale (69%) were also well conserved. Piedmont habitats were the least conserved habitats in the region, especially the Southern Piedmont Mesic Forest (3%), Southern Piedmont Dry Oak-Pine Forest (3%), Piedmont Hardpan Woodland and Forest (2%) and Southern Piedmont Glade and Barrens (0%). Among wetlands, the Atlantic Coastal Plain Peatland Pocosin and Canebrake (99%) and Atlantic Coastal Plain Northern Bog (72%) were habitats with a high percentage of conserved acreage (Anderson et al. 2013a).

The geospatial analysis also provides metrics which follow the Northeast Monitoring and Performance Reporting Framework (NEAFWA 2008). These are calculated relative to each habitat type using the region-wide maps, which allow each habitat in the region to be evaluated across its entire range. Please see: *https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Pages/geospatial.aspx*.

Rhode Island's Landscape

From the maritime beaches of South County and Block Island, to the extensive wetland systems of the Wood-Pawcatuck River watershed, to the rolling forests of western Rhode Island, and the farmland in 1HZSRUW &RXQW\ WKH VWDWH¶V WRWDO ODQG DUHD RI VTXDU fish and wildlife. Western Rhode Island is largely rural, while the region surrounding Narragansett Bay is increasingly urban. In fact, Rhode Island is the second-most densely populated state in the country and pressure from human use can be significantly greater during the summer, especially in coastal areas. Development pressures on the remaining natural landscape continue to rise, threatening the health of PDQ\ RI WKH VWDWH¶V HFRV\VWHPV. The state has developed numerous conservation and management plans to protect its natural resources, and this SWAP serves as a catalyst to coordinate these existing plans.

Physiography

Rhode Island is divided into three main topographical regions. A narrow coastal plain with elevations of less than 100 feet lies along the south shore and around Narragansett Bay. A second region characterized by gently rolling uplands with elevations up to 200 feet lies to the north and east of the Bay. The western two-thirds of the state consist of predominantly hilly uplands, of mostly 200 to 600 feet in elevation; with the highest point located at Jerimoth Hill in Foster (elevation 812 feet) (refer to Figure 2-1).

Narragansett Bay and its tributaries dominate the eastern part of Rhode Island and a low-lying strip along WKH %D\¶V ZHVWHUQ VKRUH. 7KH $WODQWLF 2FHDQ DQG %Oock Island Sound define the southern border of the state. There are more than 30 islands within Narragansett Bay which has 420 miles of shoreline. Block

Island is a well-known landmark 12 miles south of the Rhode Island coast and 14 miles from Montauk Point, Long Island. RI DEM has produced an interactive, on-line Environmental Resources Map that L O O X V W U D W H V W K H http://www.dem.ri.gov/maps/index.htm#GV. D W

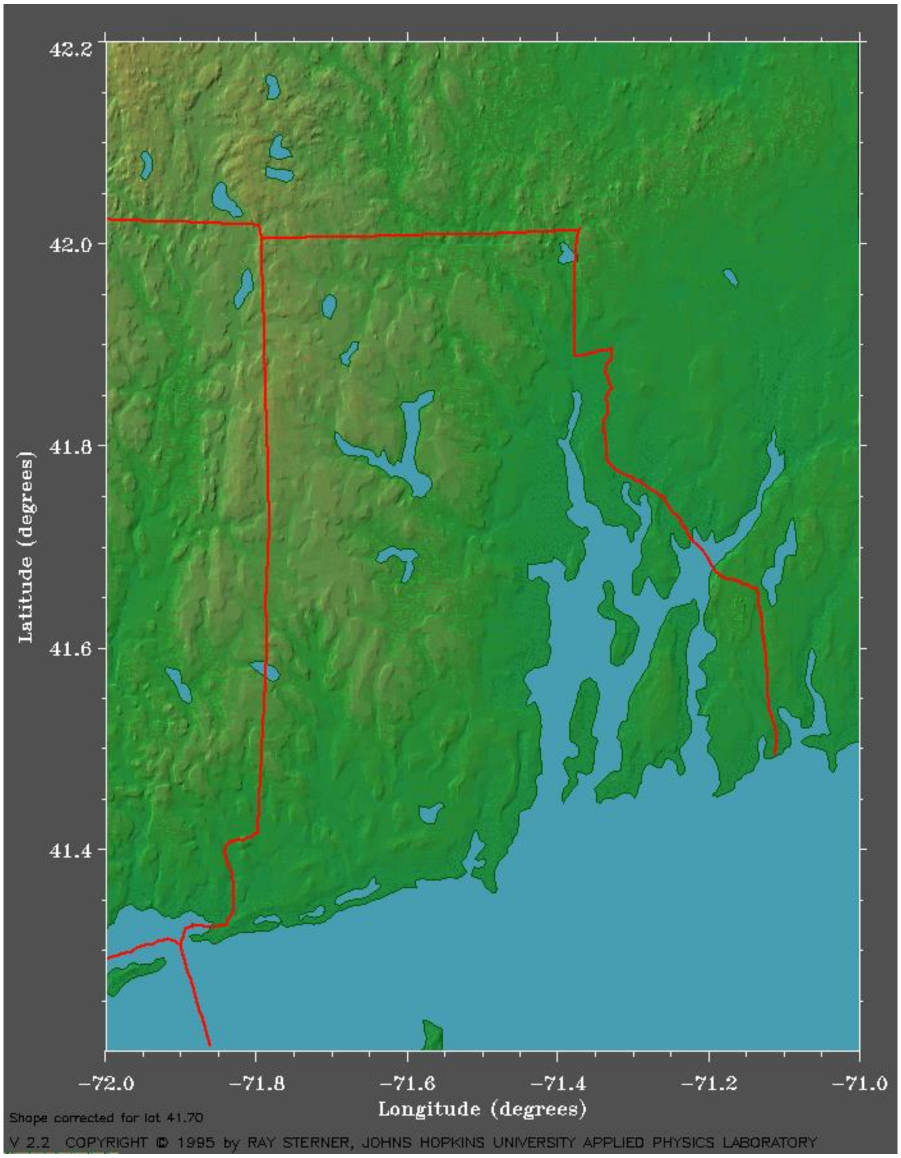

Figure 2-1. Physiography of Rhode Island. Source: Ray Sterner, John Hopkins University, Applied Physics Laboratory 2014

Geology

The geologic history of Rhode Island includes two periods of mountain-building followed by extensive periods of erosion that produced the st D W H ¶ V F X U U H Q W O R Z topography (Gibbs et al. 1995; Quinn 1997). 7 K H I D X O W O L Q H V S U R G X F H G -building phases are still present in the Narragansett Bay area and occasionally rock the state with minor earthquakes. The highest magnitude earthquake centered within Rhode Island occurred on June 10, 1951, with an epicenter near Slocum and a magnitude of 4.6 (Wheeler et al. 2000). More recently, a magnitude 3.5 earthquake was felt near Newport on March 11, 1976 (Stover and Coffman 1993). Some areas of the state occasionally experience stronger earthquakes that are centered elsewhere in the Northeast and eastern Canada (see Figure 2-2).

Most of the state is underlain by igneous and metamorphic rocks that are between 136 and 570 million years old (Figure 2.2; Quinn 1997). This bedrock is typically seen in natural formations along the coast where glaciers and waves have exposed the underlying rocks along the southern coast (e.g., south of Narragansett, Mt. Hope, and Purgatory Chasm). 2WKHUZLVH WKH VWDWH¶V ODQGVFDSH RI VDQG DQG JUDYHO WKDW UHIOHFWV WKH VWDWH¶V PRUH UHFHQW The bedrock is dominated by granites, with sedimentary rocks and coal beds found within and surrounding Narragansett Bay (Gibbs et al. 1995; Quinn 1997). The only known occurrence in the world of the mineral cumberlandite is found in Cumberland at Iron Mine Hill where it was mined during the 18th century. Fine-grained granite found in Westerly is also well-known and is one of the global standards for the granite rock type (Quinn 1997).

State of Rhode Island Archives

Erratic boulder from glaciation; Rolling Rock Wickford, RI circa 1907; Boulder destroyed as deemed hazardous

5KRGH ,VODQG¶V PRUH UHFHQW J history begins with the last period of glaciation roughly 14,000 years ago. The glaciers and the material they left behind (or took away) created Long Island, Long Island Sound, and Narragansett Bay. Conanicut and Aquidneck Islands are high points isolated from the mainland by rising post-glacial sea levels. The entire land form of Block Island is a pile of glacial till that is a remnant of the terminal moraine which once stretched continuously from Long Island (NY) to Cape Cod (MA). Erratics, large boulderV OHIW EHKLQG E\ PHOWLQJ JODFLHUV DUH VFDWWHUHG WK numerous stone walls crisscrossing the state are a legacy of the glaciers. Overall, the retreating glaciers left behind a covering of sand and gravel throughout Rhode Island (Gibbs et al. 1995; Quinn 1997). RI DEM has produced an interactive, on-line Environmental Resource Map that shows the distribution of bedrock formations and glacial deposits throughout the state at *http://www.dem.ri.gov/maps/index.htm#GV*.

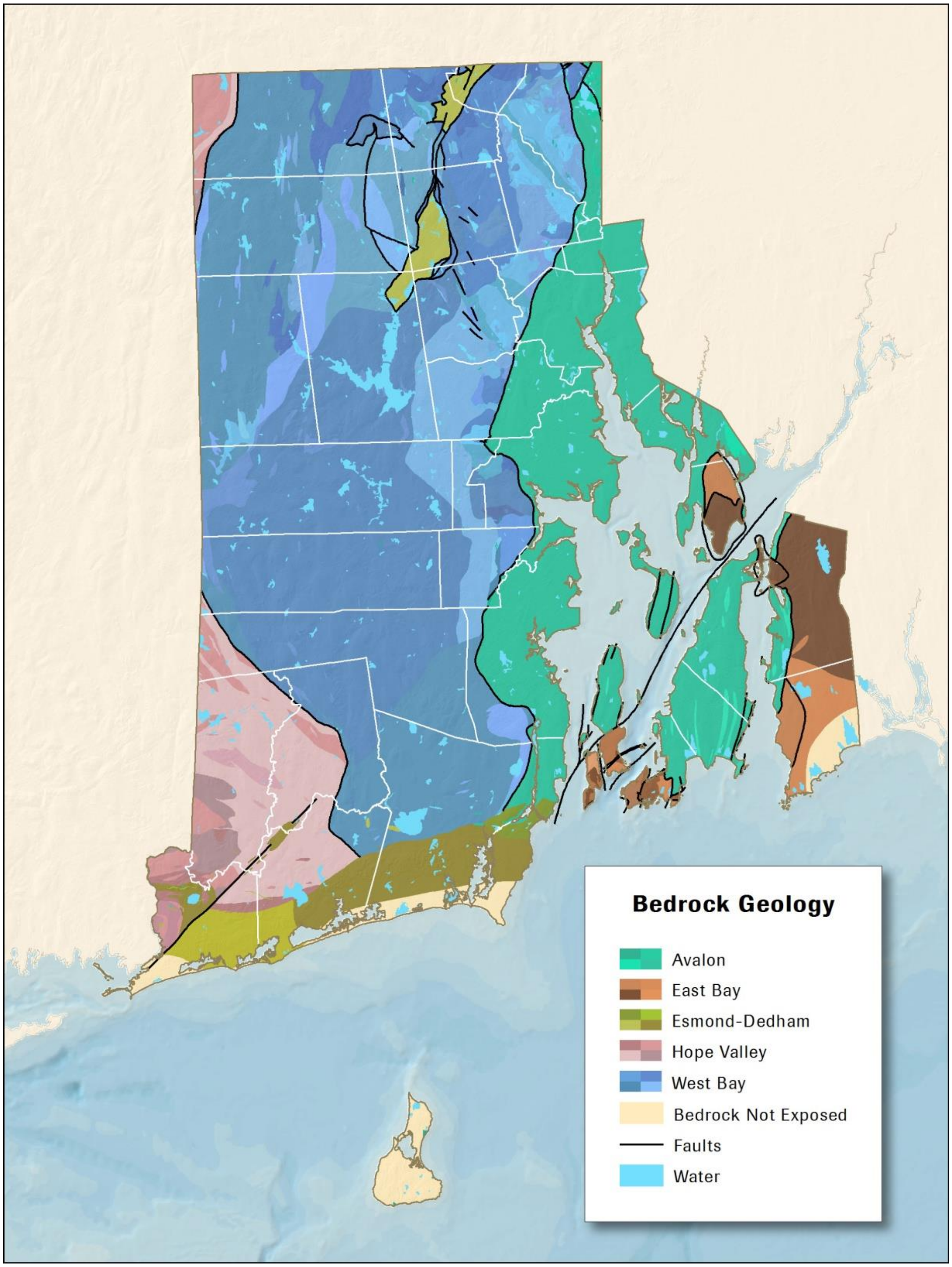

Figure 2-2. Bedrock Geology Map of Rhode Island. Source: RI TNC 2014

7KHJODFLDOKLVWRU\RI5KRGH,VODQGLVWKHSUHGRPLQDQWIDFWRUUHVSRQVLEOHIRUWKHVWDWH¶VS and landforms (Gibbs et al. 1995). The Charlestown Moraine, a ridge of sand and gravel, extends inland along the coast from Westerly to Narragansett and corresponds to similar landforms on Long Island (Gibbs et al. 1995; Quinn 1997). Worden Pond and Great Swamp in South Kingstown are remnants of a larger water body created behind the dam formed by the Charlestown Moraine. Other glacial features found in Rhode Island include drumlins; streamlined hills oriented in the direction the glacier moved across the landscape; and eskers which are sinuous ridges of sand and gravel that formed underneath a melting glacier. Kettle holes are depressions created when chunks of glacial ice melted to form lakes, ponds and wetlands (Gibbs et al. 1995; Quinn 1997).

At the end of the last glacial period the climate warmed and melting ice eventually caused the sea level to rise several hundred feet. Long Island and Block Island Sounds were originally freshwater lakes that became sounds when flooded by marine waters. Narragansett Bay was once a series of inland river valleys that were drowned with saltwater, forming a network of estuaries and islands (Gibbs et al. 1995; Quinn 1997).

Soils

HDYLOL\QIOXHQFHGE\WKHVWDWH¶VJODFLDOKLVWRU\WKHPDMRULW\RI5KRGH,VODQG¶VVRLOW\SHVDUHG from glacial till and glaciofluvial deposits. Sandy loam is the dominant soil type, covering more than half of the state on hills, drumlins, terraces, and outwash plains (Figure 2-3). These soils are moderately well-drained to well-drained and contain varying amo XQWV RI URFN DQG VWRQH WKDW FUHDW VWRQ\´ ³JUDYHOO\´ RU ³H[WUHPHO\ VWRQ\´ FKDUDFWHUL]DWLRQV Silt loams are the second most abundant soil W\SH DQG DORQJ ZLWK WKH VDQG\ ORDPV IRUP WKH EDVLV IRU PDQ Important Farmlands. Mucks, which are very poorly drained soils associated with wetlands, cover about 4% of the state and are derived from organic material. Other soil types are less abundant and more localized in their distribution, including beach soils, dune soils, peats, and bedrock outcrops. Mucky sandy and/or silt ORDPV DUH FKDUDFWHULVWLF RI 5KRGH ,VODQG¶V IORRGSODLQ VRL from alluvium and sandy glaciofluvial materials (NRCS 1981). RI DEM has produced an interactive, on-OLQH (QYLURQPHQWDO 5HVRXUFH 0DS WKDW PDSV WKH H[WHQW RI *http://www.dem.ri.gov/maps/index.htm#GV*.

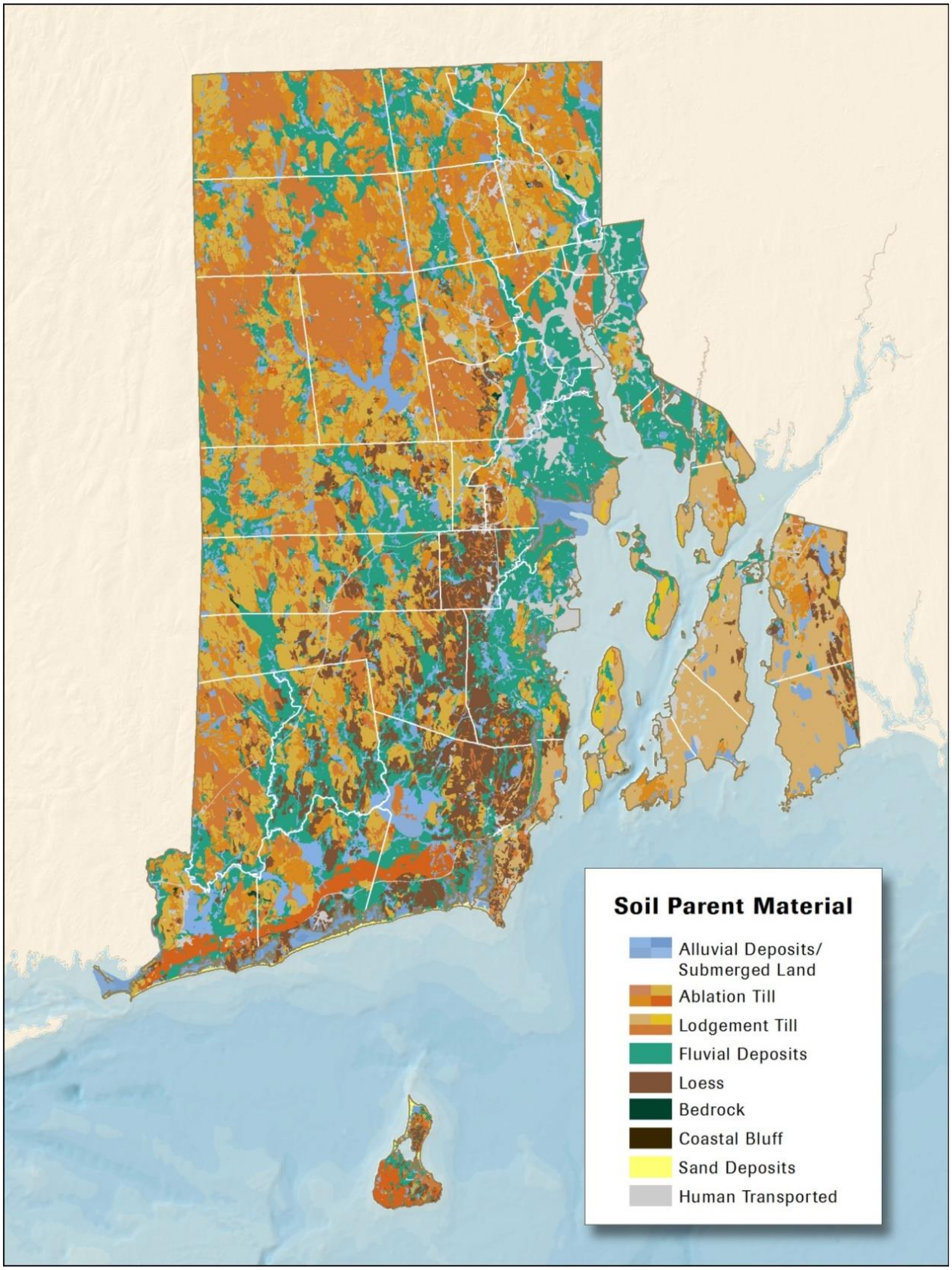

Figure 2-3. Soils Map of Rhode Island. Source: The Nature Conservancy, Rhode Island Chapter

Climate

5KRGH,VODQG¶VFOLPDWHLVODUJHORYHUHQGELWVSUR[LPLWDQHFRVXHWRWKH$WODQWLF2FHDQZLWK coastal areas tending to have slightly moderated temperatures (Gibbs et al. 1995). Average precipitation in Rhode Island is approximately 43.09 inches annually, and the mean annual temperature is 49.4 °F. January is the coldest month of the year (mean temperature of 29.1°F), and July the warmest month (mean temperature of 70.4 °F; NOAA 2014). This annual variation creates distinct seasons that affect or LQIOXHQFH XVH RI WKH VWDWH¶V ODQG DQG ZDWHU UHVRXUFHV E\ D YD . Precipitation is more uniform than temperature through the four seasons, with summer (June through August) slightly drier than the other three seasons (NOAA 2014). 2YHUDOO WKH VWDWH¶V ZHDWKHU LV N dramatic changes, with temperatures that can shift up to 50 degrees in one week (Gibbs et al. 1995). Blizzards and hurricanes occasionally affect the state, as do tornadoes, ice storms, and flash floods. The most significant recent storm to impact Rhode Island was hurricane Sandy on October 29, 2012. Damage from the storm resulted in more than $35 million paid to flood insurance policy holders (FEMA 2013).

Many aspects of the global climate are changing rapidly, and the primary drivers of that change are human in origin. Evidence supporting climate change abounds, from the top of the atmosphere to the depths of the oceans (Kennedy et al. 2010). This evidence has been painstakingly compiled by scientists and engineers from around the world using satellites, weather balloons, thermometers at surface stations, DQG PDQ\ RWKHU WRROV IRU PRQLWRULQJ WKH (DUWK¶V FOLPDWH V an unambiguous convincing story that the planet is warming. Temperatures at the surface, in the troposphere (the active weather layer extending up to about 8 to 12 miles above the ground), and in the oceans have all increased in recent decades. Snow and ice coverage has decreased in most areas. Water vapor has been increasing in the lower atmosphere, due to increased evaporation from the warmer surface. Sea levels are rising. Changes in other indicators such as length of growing season have been observed in many areas. Worldwide, changes in average climate conditions have been accompanied by upward trends in extremes of heat, cold, drought, and heavy precipitation events (Alexander et al. 2006). Recent studies have already detected changes in the phenology (flowering time) of plants caused by global warming, including those of Miller-Rushing and Primack (2008) and Primack et al. (2004).

Rhode Island has been growing warmer and wetter since 1895, with annual precipitation increasing at a rate of approximately 1 inch per decade and the mean annual temperature rising at 0.2 °F per decade (NOAA 2014). Climate change is given special consideration in the RI WAP because its scope reaches EH\RQG WKH VWDWH¶V ERUGHUV DQG EHFDXVH LW DIIHFWV HDFK HUEDWHV PI wildlife and effects each species differently. Thus, incorporating climate change considerations into the WAP is vital for the development and implementation of effective conservation actions.

The Manomet Center for Conservation Sciences and the National Wildlife Federation (MCCS and NWF 2012), and NatureServe (2014) have assessed the vulnerability of northeastern fish and wildlife and their habitats to climate change and published a series of reports to help effectively plan conservation efforts at state and regional scales under a changing climate regime. Their work identifies species and habitats that may be especially vulnerable to climate change and predicts how these species and habitats will adapt under different climate scenarios. The results of these studies relevant to Rhode Island habitats are detailed in Chapter 3. In addition, the reports outline potential adaptation options that can be used to safeguard vulnerable habitats and species, and this information is detailed in Chapter 4.

Ecological Regions of Rhode Island's Landscape

Several ecological classifications of the Northeast have been developed that place Rhode Island and its wildlife resources within a national setting, allowing Rhode Island to participate in and benefit from regional and national conservation efforts with a variety of partner agencies and organizations.

In a broad context, the U.S. Forest Service (USFS) classification system places Rhode Island in a single Ecoregional Province (McNab and Avers 1994; Bailey 1995; Rudis 1999), specifically within the Lower