

drying, and support communities dominated by animals adapted to living in temporary, fishless pools. In New Hampshire they provide essential breeding habitat for one or more wildlife species including Ambystomatid salamanders (*Ambystoma* spp., called “mole salamanders” because they live in burrows), wood frogs (*Lithobates sylvaticus*), and fairy shrimp (*Eubrachhipus* spp.).

Vernal pools can either be stand-alone (referred to as “classic” vernal pools) or part of larger wetland complexes (e.g., an area of pooled water in a large, forested wetland). The pools and their adjacent terrestrial habitat contribute significantly to the overall biodiversity of Northeastern landscapes. They produce large quantities of frogs that serve as the base of the food chain. Even though vernal pools typically cover a small area, they provide numerous important functions including flood water detention, aquifer recharge, nutrient cycling, and denitrification. However, due to their small size and seasonality, vernal pools are often overlooked or discounted and are therefore disproportionately impacted by development, notably suburban sprawl (Klemens, Davison, & Oko, 2012).

Vernal pools undoubtedly exist and have been identified in Rye. As of the writing of this report, however, there have been no formal public efforts to survey and map vernal pools throughout the town except when development is proposed, and wetlands are mapped by the applicant’s wetland scientist.

#### 2.2.4 PRIME WETLANDS

New Hampshire law provides a unique process for towns to enact special protection for “Prime Wetlands” in their jurisdiction. The New Hampshire Department of Environmental Service’s Prime Wetlands in New Hampshire Communities webpage (Bennett, 2012) provides the following description:

Under New Hampshire law (RSA 482-A:15 and administrative rules Env-Wt 700), individual municipalities may elect to designate wetlands as “prime wetlands” if, after thorough analysis, it is determined that high-quality wetlands are present. Typically, a wetland receives this designation because of its large size, unspoiled character, and ability to sustain populations of rare or threatened plant and animal species. Field and “desktop” data are used for the evaluation process.

After high-value wetlands are identified, the municipality holds a public hearing before the residents of the community to vote on the designation. Once the municipality approves the wetlands for designation as prime, the municipality provides to the Department of Environmental Services (DES) Wetlands Program a copy of the study and tax maps with the designated prime wetlands identified. DES reviews the submission from the municipality to ensure that it is complete and in accordance with Env-Wt 702.03.

Once the town's prime wetland submission is considered complete and approved, DES will apply the law and rules that are applicable to any future projects that are within the prime wetland or the 100-foot prime wetland buffer.

There are currently 33 towns in New Hampshire that have designated prime wetlands. This designation provides a means by which these towns can provide additional protection to wetlands that are particularly unique or sensitive to disturbance by restricting construction or earthwork in

or within 100 feet of these resources. Currently, Rye does not have any wetlands with this designation, though the Wetland Conservation District (§ 190-3.1 of the Rye Code) does provide rules and regulations for the protection of wetlands beyond state regulations.

### 2.2.1 THE ATLANTIC OCEAN

The coastline of Rye covers approximately eight miles and represents 52% of the New Hampshire mainland coastline. Waters along Rye’s coastline are derived from the Labrador Current or the “Cold Wall” current which brings cool, oxygen rich water south from the Davis Strait, through the Labrador Sea, and along the northeast coast of the United States. These currents and the nearshore rocky geologic features create the habitats necessary to sustain the fisheries and recreational opportunities that have played key roles in Rye’s history (see Section 2.6 Aquatic & Marine Habitats). Four of the Isles of Shoals are within the jurisdiction of Rye: Star Island, White Island, Lunging Island, and Seavey Island. These rocky islands in the Atlantic Ocean are a haven for coastal wildlife, are an integral part of the scenic resources in Rye, and a key element of the history of settlement in Rye. For more about the Isles of Shoals, see Section 5.1.4.

## 2.3 BEDROCK, SURFICIAL GEOLOGY AND SAND AND GRAVEL RESOURCES

### 2.3.1 BEDROCK GEOLOGY

Bedrock geology describes the solid rocks underlying the looser and softer soils, sediments, and deposits at the Earth’s surface. A region’s bedrock sets the template for the formation of the soils, surficial geology, rivers, lakes, and other features of the landscape. Over eons, bedrock, along with the shallow deposits of materials left by the retreating glaciers mixed with oceanic elements, is weathered and transformed into soil. For this reason, geologists term the underlying rocks the “parent material” of soils.

The bedrock underlying Rye is of metamorphic origin, meaning rocks formed by transformation of older rocks under tremendous heat and pressure deep below the surface. From two converging rock formations, a migmatite was created when a quartz-feldspar granitic gneiss and pegmatite intruded the Rye Complex. Metamorphic rocks are created from existing rock formations that are subject to high heat, pressure, and/or hot mineral-rich fluids (USGS, n.d.). The vast majority of the bedrock in Rye is the Rye Complex with the most western section made of the Rye Complex/Breakfast Hill Granite of Novotny. The Rye Complex is a metamorphic result of schist, gneiss, and quartzite. Many local landforms including Breakfast Hill (west of the intersection of Route 1 and Washington Road), shorelines, and the Isles of Shoals are shaped by bedrock landforms.

Rye rocky coastline

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