Chapter 8
Water Resources

Introduction

The focus of this chapter is freshwater resources, including lakes and ponds, rivers and streams, wetlands, and groundwater. A discussion of marine or saltwater resources, including beaches, harbors, and tidal streams is included in Chapter 9 Marine Resources.

Rivers and surface water bodies play a key ecological role carrying water and nutrients and providing habitat and food for many species. Freshwater resources also provide numerous ecosystems services, or benefits to people and communities. These include:

- Supporting services, such as maintaining floodplain fertility and primary production.
- Provisioning services, such as water for drinking, domestic use, agriculture, and industrial use, non-consumptive uses like transportation and generating power, and food and medicines.
- Regulating services, such as maintaining water quality through natural filtration and water treatment, erosion and flood control.
- Cultural services, including recreation (kayaking, hiking, fishing), tourism, and existence values, such as the appreciation of free-flowing rivers.[1]

Resource Inventory

Rivers & Streams

Kennebunkport has two major watercourses: the Kennebunk River and the Batson River. The Kennebunk River flows 15 miles from Kennebunk Pond in Lyman to the Atlantic Ocean, where it forms the boundary between Kennebunk and Kennebunkport. The entire length of the river within Kennebunkport — approximately 5.2 miles from its mouth — is tidal. The river provides a scenic backdrop to Dock Square. The Kennebunk River watershed is approximately 38 square miles, five of which are in Kennebunkport. The remainder of the watershed drains roughly equal areas of the Towns of Lyman, Arundel, and Kennebunk.

As of October 2020, the York County Soil and Water Conservation District is in the midst of a two-year effort to prepare a watershed-based plan for the Kennebunk River. The plan will compile information about natural resources, nonpoint source and bacteria problems, and identify locally supported watershed goals, objectives, and action strategies for protecting the River and its tributaries.[2]

The 2012 Comprehensive Plan references past studies of freshwater resources, such as *A Guide to the Kennebunk River and Its Tributaries for Arundel, Kennebunk, and Kennebunkport.* This 1986 joint study of water resources in the Towns of Kennebunkport, Kennebunk, and Arundel documented changes in growth; commercial uses on the Kennebunk River; the relationship between wildlife diversity and development on the River; and background information on wetlands. The study also suggested that the Towns coordinate adoption of protective ordinances, including the following land use ordinances: Shoreland Zoning amendments, Wetlands Ordinance, Groundwater Protection Ordinance.

The Batson River watershed comprises a majority of the area of the Town. The river enters Goosefare Bay between Marshall Point and the western end of Goose Rocks Beach. The river is tidal for approximately three-quarters of a mile from its mouth to the dam just downstream of Route 9 (Mills Road). There are over 15 miles of perennial streams within the Batson River watershed.

Other streams include the Little River and Beaver Pond Brook, which lie outside of the Kennebunk River and Batson River watersheds. The Little River originates from the wetlands by Proctor Road and lies mostly within Biddeford, entering Kennebunkport at Route 9 near the Biddeford line and forming a portion of the town boundary. Beaver Pond Brook also empties into the ocean near this location (Figure 8-1).

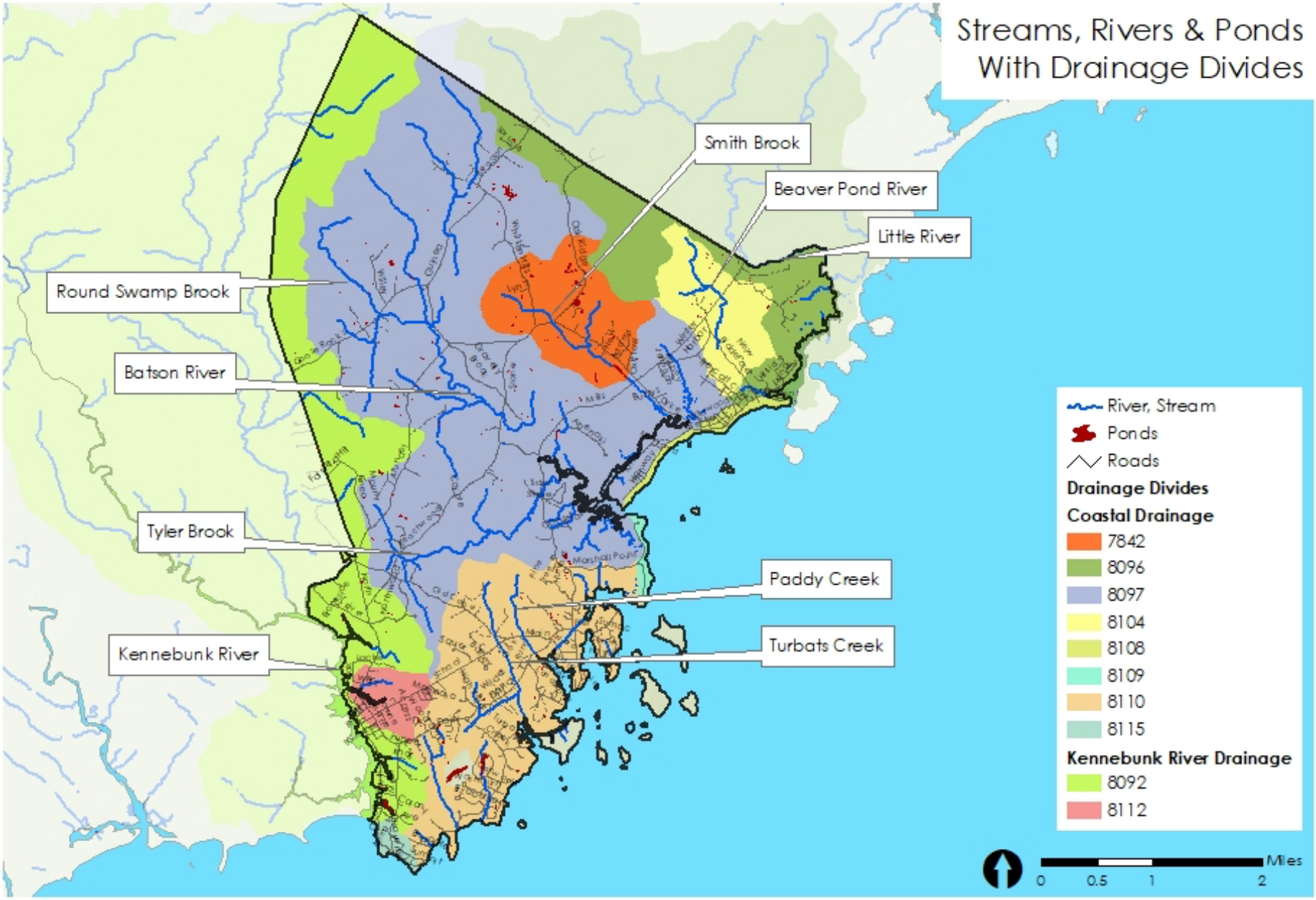

Figure 8-1 Streams, rivers, and ponds with drainage divides (Source: ME GIS)

Lakes and Ponds

While the state does not recognize a definitive difference between lakes and ponds, ponds generally have a small surface area and shallower depth. Sunlight is able to penetrate to the bottom of a pond whereas deep areas of lakes receive no sunlight.[3]

As shown in Figure 8-1, Kennebunkport has several small, scattered ponds. These ponds are not large or deep enough for recreational use other than fishing. There are no Great Ponds in Kennebunkport.

> "Great pond" means any inland body of water which in a natural state has a surface area in excess of 10 acres and any inland body of water artificially formed or increased which has a surface area in excess of 30 acres except for the purposes of this article, where the artificially formed or increased inland body of water is completely surrounded by land held by a single owner. (Source: Maine DEP)

Although it is not classified as a Great Pond, Lake of the Woods is protected by the Resource Protection Zone of the Town's Land Use Ordinance (LUO). Lake of the Woods is located off Ocean Avenue near Walkers Point and was donated to the Kennebunkport Conservation Trust in 1981.[4]

Wetlands

Wetlands provide flood storage, groundwater recharge and discharge, erosion control, and critical habitat for fish and wildlife. Wetlands are important to the tourism, recreation, forestry, fishing, and hunting industries.[5] Freshwater wetlands include freshwater swamps, marshes, bogs and similar areas that are inundated or saturated by surface or groundwater at a frequency and for a duration sufficient to support wetland vegetation. Great ponds, coastal wetlands, rivers, streams, or brooks are not considered freshwater wetlands by the State of Maine (38 MSRA 480-b(4)).

According to National Wetlands Inventory (NWI) data, wetlands account for approximately 3,300 acres (25%) of Kennebunkport.[1] Palustrine wetlands comprise just over half of wetlands (Table 8-1). Palustrine wetlands are nontidal, have a salinity due to ocean-derived salts of less than 0.5%, and are dominated by trees, shrubs, persistent emergents, and emergent mosses or lichens.[6] Wetlands identified as open water comprise approximately 54 acres. Combined with palustrine wetlands, these freshwater resources account for a total of 2,015 acres.

Table 8-1 Wetland acreage by type (National Wetlands Inventory (NWI))

System	Acres	Percent of Wetland Area
Palustrine	1,960.9	51.5%
Marine	991.7	26.0%
Estuarine	802.3	21.1%
Open Water	53.8	1.4%
Total	3,308.7	100%

Palustrine wetlands and significant aquatic habitat identified by the Maine Department of Inland Fisheries and Wildlife, are shown in Figure 8-2.

[1] Note that the in the Land Use Chapter, acres of generalized land use date obtained from the NOAA C-CAP national dataset indicates that wetlands comprise approximately 2,888 acres of land in Kennebunkport.

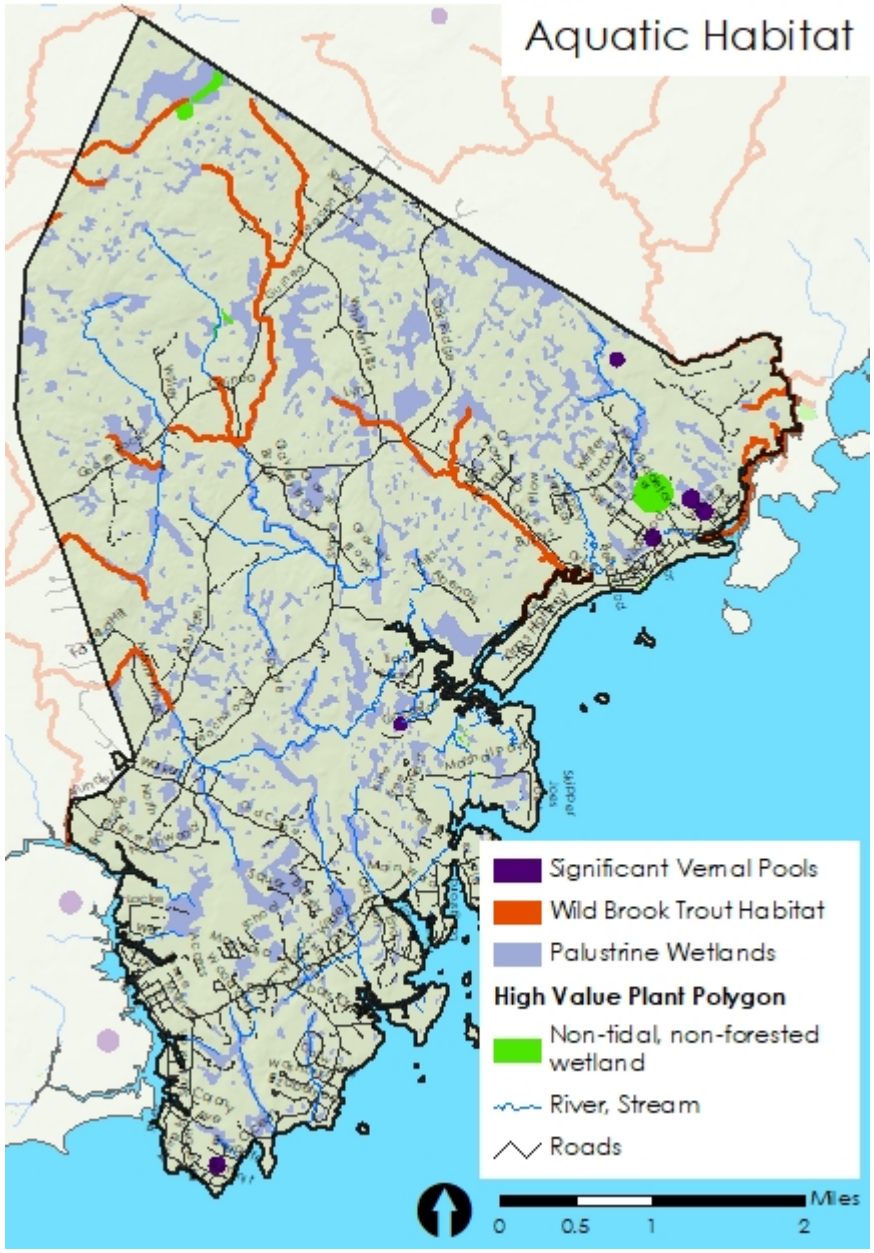

Figure 8-2 Aquatic Habitat (Source: MDIFW, MDMRS)

The State of Maine has developed wetlands characterization data vis based off the NWI. Wetland areas are characterized based on six wetland functions and values: flood flow alteration, sediment retention, finfish habitat shellfish habitat, plant and animal habitat, and cultural value. Figure 8-3 displays the percent of freshwater wetland acres in Kennebunkport that meet the criteria for these functions. As shown in this figure, 73% of freshwater wetlands meet the criteria for providing plant and animal habitat, while only 4% meet the criteria for providing cultural value. A map of freshwater wetlands and the number of functions is displayed in Figure 8-4. The acres of freshwater wetland area that meets zero, one, or more than one of the functions is reported in the chart in Figure 8-5.

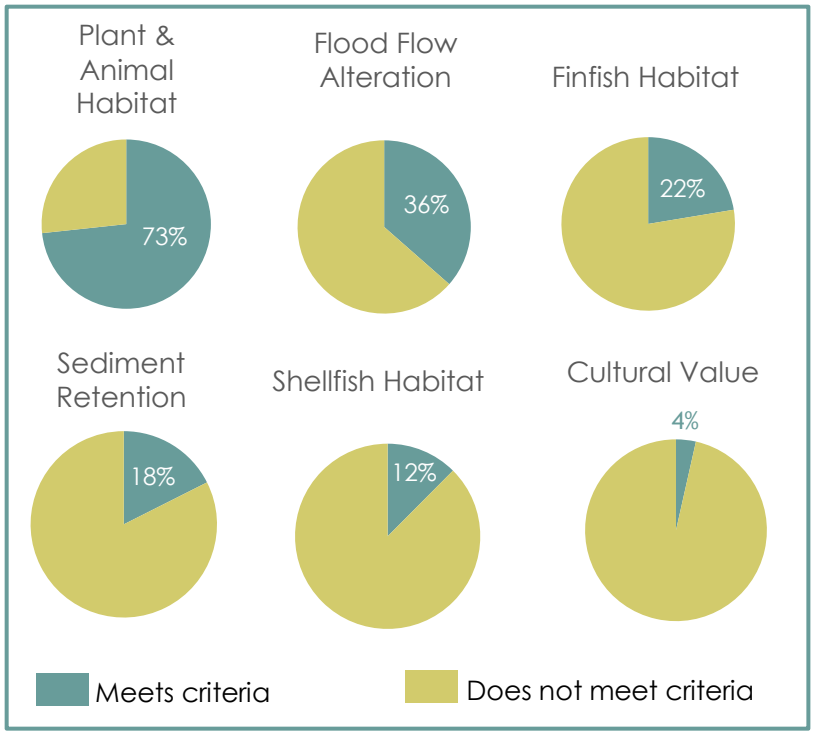

Figure 8-3. Area of freshwater wetlands (palustrine and open water) that meet the criteria for each wetland function (Source: ME GIS)

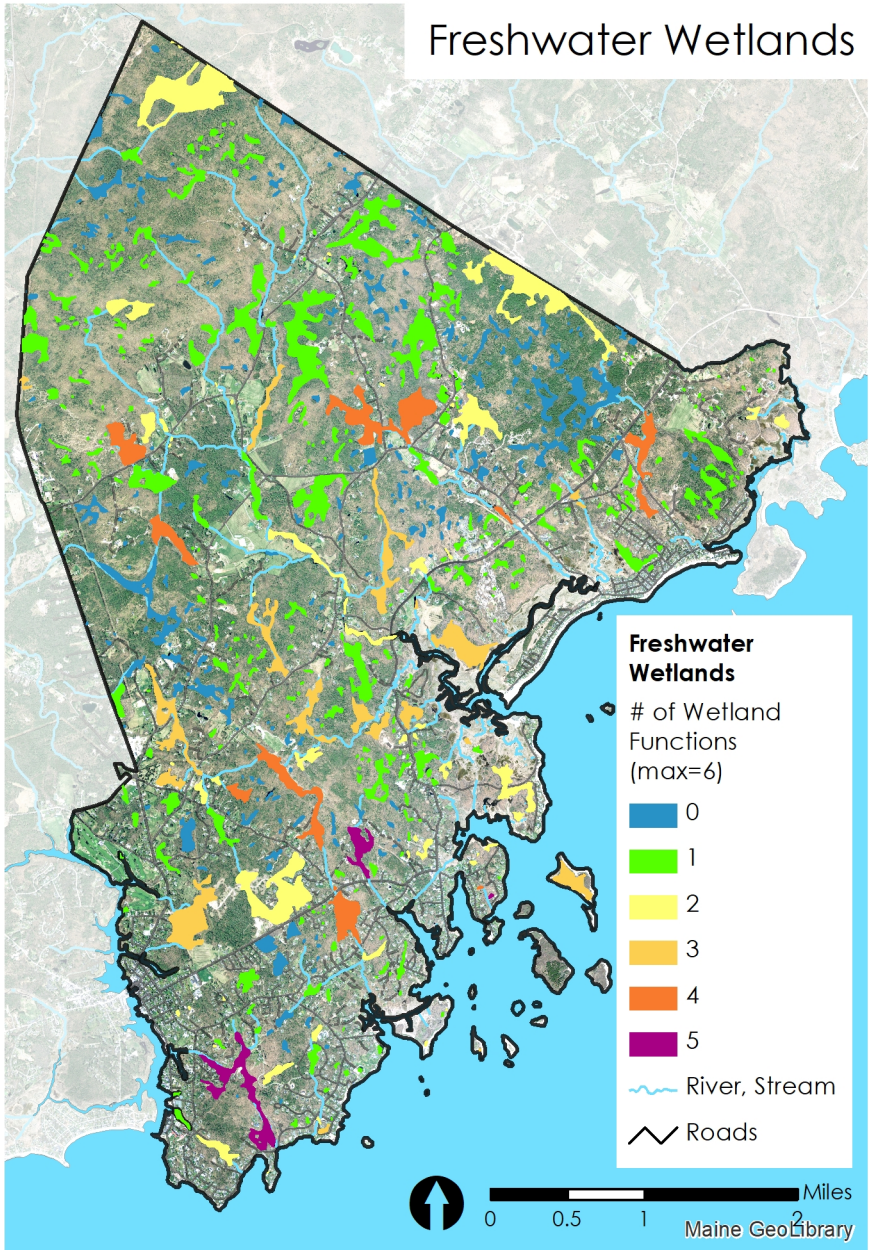

Figure 8-4 Freshwater wetlands and functions for which criteria are met (Source: ME GIS)

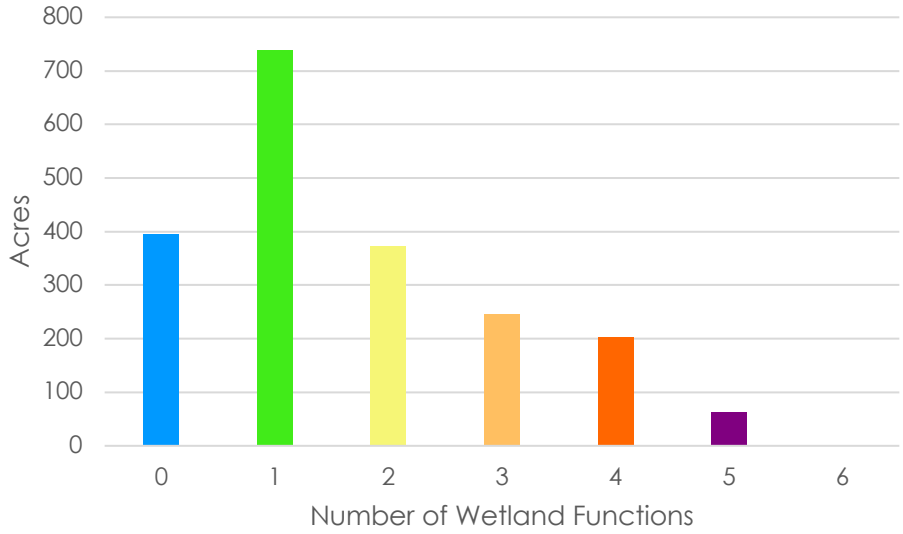

Figure 8-5 Acres of freshwater wetlands (palustrine and open water) that meet the criteria of 0 to 5 of the State's wetland function criteria (total acres =2,015) (Source: ME GIS)

Drinking Water Supply

Groundwater provides 60% of drinking water in the state.[7] The drinking water supply for Kennebunkport consists of private wells, public wells, and surface and groundwater supplied by the Kennebunk, Kennebunkport, and Wells Water District (KKWWD).

[Note: Awaiting clarification of wells and well data from DEP, this section will be revised] There are five public wells in Kennebunkport (Figure 8-6). The Hidden Pond II and Ocean Woods Resort public water supplies are non-community water supplies that serve at least 25 persons, but not necessarily the same persons, for at least 60 days per year. The Hidden Pond well is a bedrock well with a depth of 520 feet and is considered to be at low risk for contamination based on well type and site geography, low risk of acute contamination, and low risk for future acute contamination. The Ocean Woods Resort is a bedrock well with a dept of 480 feet. This well is rated as at low risk for contamination based on the well type and site geology as well as for acute contamination, but high risk for future acute contamination due to the fact that the well owner owns less than 50 feet of the land within the 700 foot Well Head Protection Radius associated with the well. A bedrock well at the Inn at Goose Rocks was rated as moderate risk for existing contamination based on well type and site geology, acute contamination, and future risk of acute contamination.[8]

Table 8-2 displays public waters supply wells. Approximately 1,410 parcels (40% of all parcels in town) are served by the KKWWD. Lots that are not served by public wells or KKWWD are served by private wells.

Drinking water wells in Kennebunkport may be vulnerable to groundwater rise associated with sea level rise.

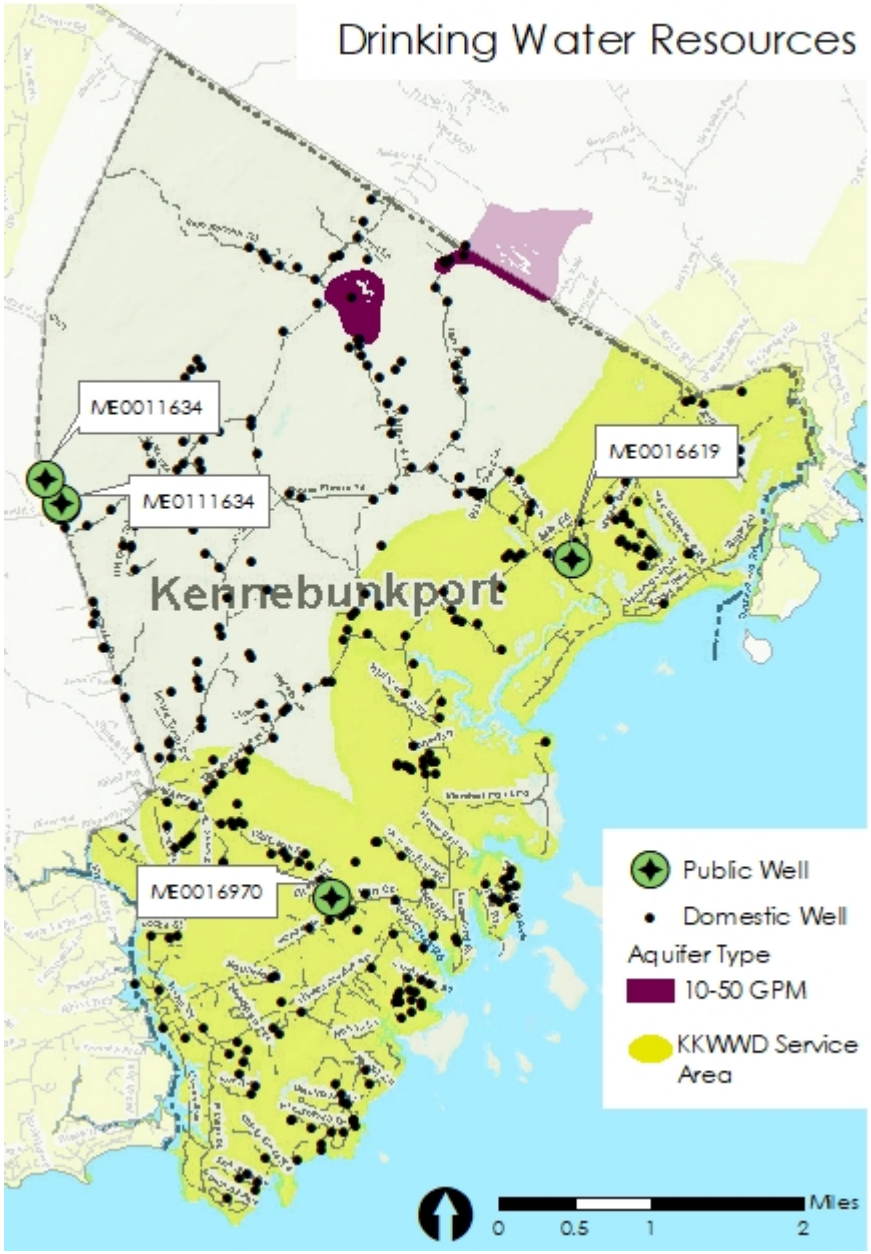

Figure 8-6 Drinking water resources (Source: ME GIS, KKWWD, MGS)

Table 8-2 Public Water Supply Well in Kennebunkport (NOTE: awaiting data clarification from DEP)

System Name	Hidden Pond II	Ocean Woods Resort	Ocean Woods Resort	Seashore Trolley Museum #2
Facility ID	94947101	16619102	16619101	111634101
Federal ID	ME0094947	ME0016619	ME0016619	ME0111634
System Type	Non Community (NC)	NC	NC	NC
Radius	300 ft	300 ft	300 ft	300 ft
Population	308	250	250	116
Number of Wells	1	2	2	1
GPM	6	10	10	0
Depth	520 ft	480 ft	999 ft	200 ft
System Status	A	A	A	A
Facility Status	A	A	A	A

Aquifers

There are 118 acres of high yield sand and gravel aquifers in Kennebunkport[9] Figure 8-6 shows the areas where ground water yields in excess of 10 gallons per minute can be expected. These areas include a region near the intersection of Guinea Road and Whitten Hill Road known as Beacon Corner and an area off Oak Ridge Road that extends into Biddeford. The portion of this aquifer that underlies Biddeford is protected by the City's Aquifer Protection Overlay District (Biddeford Land Use Ordinance Article V, Section 10). Kennebunkport does not have an aquifer protection overlay district.

As reported in the Town's 2019 Annual Report, groundwater sources produced 406.1 million gallons, accounting for 38.4% of all Town water production for 2019.[10]

Photo Credit: Tom Morgan

Kennebunk, Kennebunkport, and Wells Water District (KKWWDD)

The KKWWD is a quasi-municipal water utility established in 1921 that supplies water to seven communities and a population of 28,000 to over 75,000, depending on the season.[11] All of the water that is provided by the KKWWD is derived from locations outside of Kennebunkport. One of the primary sources of water is the Branch Brook. The 12.5 square mile Branch Brook watershed provides a consistent, reliable source of drinking water to KKWWD.

The Branch Brook originates in Sanford and joins the Merriland River within the Rachel Carson Wildlife Refuge in Wells. The underlying geology of the watershed is comprised predominantly of sand and gravel deposits, which have a high capacity to store groundwater.[12]

The Branch Brook was the only source of supply to the water district until 1980 when peak daily water demand increased to 4 million gallons per day (MGD). KKWWD began purchasing up to one million gallons per day (MGD) of finished water from the Biddeford & Saco Water Company.[13] When peak demand increased to 7 MDG in early 2000, KKWWD entered into a mutual aid agreement with the York Water District to allow for the bulk purchase of 1 MGD. KKWWD has pursued additional supplies of unfinished water from wells and finished water from utilities. Since 2015, KKWWD has produced approximately 3 MGD. Figure 8-7 displays the KKWWD annual water production along with water supplied to Kennebunkport.

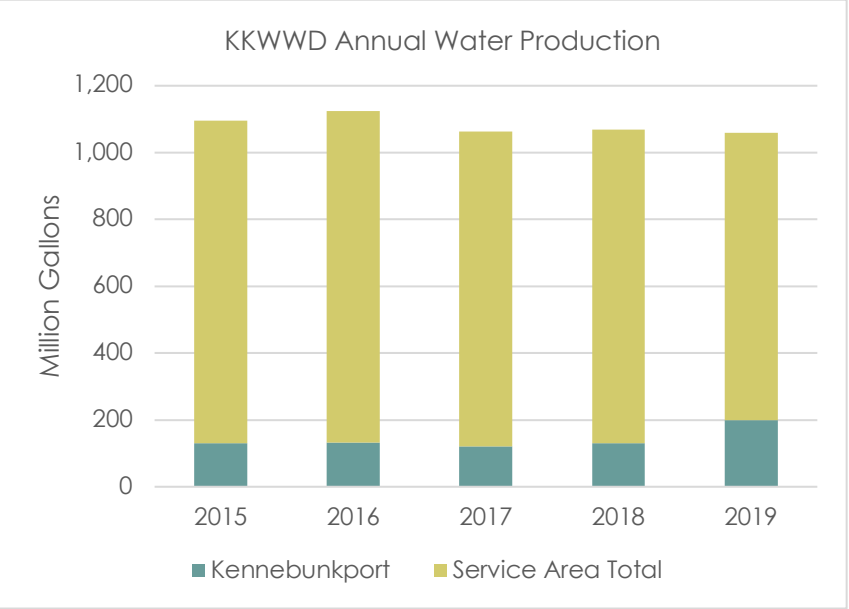

Figure 8-7 KKWWD Water Production and water supplied to Kennebunkport (Source: KKWD)

A USGS stream gauge[2] monitors the flow rate on Branch Brook. Summary statistics for water year 2019 and for the last decade are displayed in Table 8-3. Figure 8-8 shows the monthly average, minimum, and maximum flow rate for the last decade. The highest flow on Branch Brook occurs in March, while the lowest occurs in September.[14]

[2] The gauge is available at: https://waterdata.usgs.gov/me/nwis/uv/?site_no=01069700&PARAmeter_cd=00065,00060

Table 8-3 Summary statistics for Branch Brook near Kennebunk, USGS Station 01069700 (Source: USGS)

	Water Year 2019		Water Years 2009-2019	
	Discharge, Cubic Feet per Second (Daily Mean Values)	Date	Discharge, Cubic Feet per Second (Daily Mean Values)	Date
Annual total	9,077	-	-	-
Annual mean	24.9	-	21.8	-
Highest annual mean	-	-	32.2	2010
Lowest annual mean	-	-	15.9	2016
Highest daily mean	174	27-Nov	480	15-Mar-10
Lowest daily mean	6.19	30-Sep	4.76	5-Sep-16
Annual 7-day minimum	6.57	24-Sep	4.91	30-Aug-16
Maximum peak flow	-	-	536[a]	26-Feb-10
Maximum peak stage	-	-	11.35[b,c]	15-Mar-10
Annual runoff (cfsm)	2.32	-	2.09	-
Annual runoff (inches)	31.5	-	28.4	-
10 percent exceeds	41.2	-	38.6	-
50 percent exceeds	22.3	-	17.8	-
90 percent exceeds	8.53	-	9.04	-

Notes: [a] Discharge is an estimate, [b] Gage height affected by backwater, [c] Max gage height not associated with peak discharge.

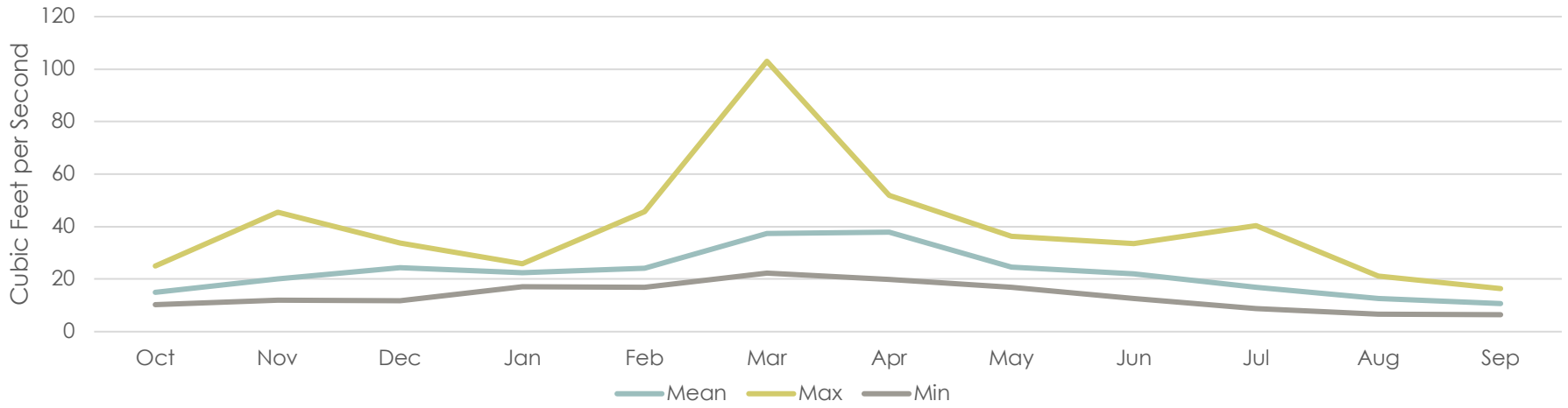

Figure 8-8 Branch Brook USGS Station 01069700 mean, maximum, and minimum flow by month between 2009 and 2019 (Source: USGS)

Floodplains

Floodplains are the areas adjacent to streams, rivers, and coastlines that experience occasional flooding. Floodplains are dynamic systems that can change over time. These landscape features provide habitat and floodwater storage. Floodplains are often associated with wetlands, fertile soils, rare and endangered plants and animals, and/or sites of archaeological and historical significance.[15] Undeveloped floodplains provide economic, social, and environmental value.[16] For these reasons, it is important to regulate land in these areas.

Kennebunkport regulates areas that are vulnerable to flooding through its Floodplain Management Ordinance. The Town joined the Federal Emergency Management Agency (FEMA)'s National Flood Insurance Program (NFIP) in May 27, 1975. This program enables property owners to obtain flood insurance. Kennebunkport requires the recognition and evaluation of flood hazards in all official actions related to land use in the floodplain areas that comprise the Special Flood Hazard Area (SFHA). The SFHA is the extent area with a 1% annual chance of flooding, commonly referred to as the 100-year flood or the base flood.

Figure 8-9 displays a representation of the approximate extent of the SFHA associated with the current, effective Flood Insurance Rate Maps (FIRMS) from 1988, along with the preliminary flood maps from the 2017 update of the FIRMs. Areas that are included in both the current and preliminary maps are shown in green. FIRMs are used for flood insurance, planning, and regulating development or improvements to buildings in flood hazard areas. The extent of the current floodplain is based on a digital representation of certain features of the older, FIRMs Q3 flood

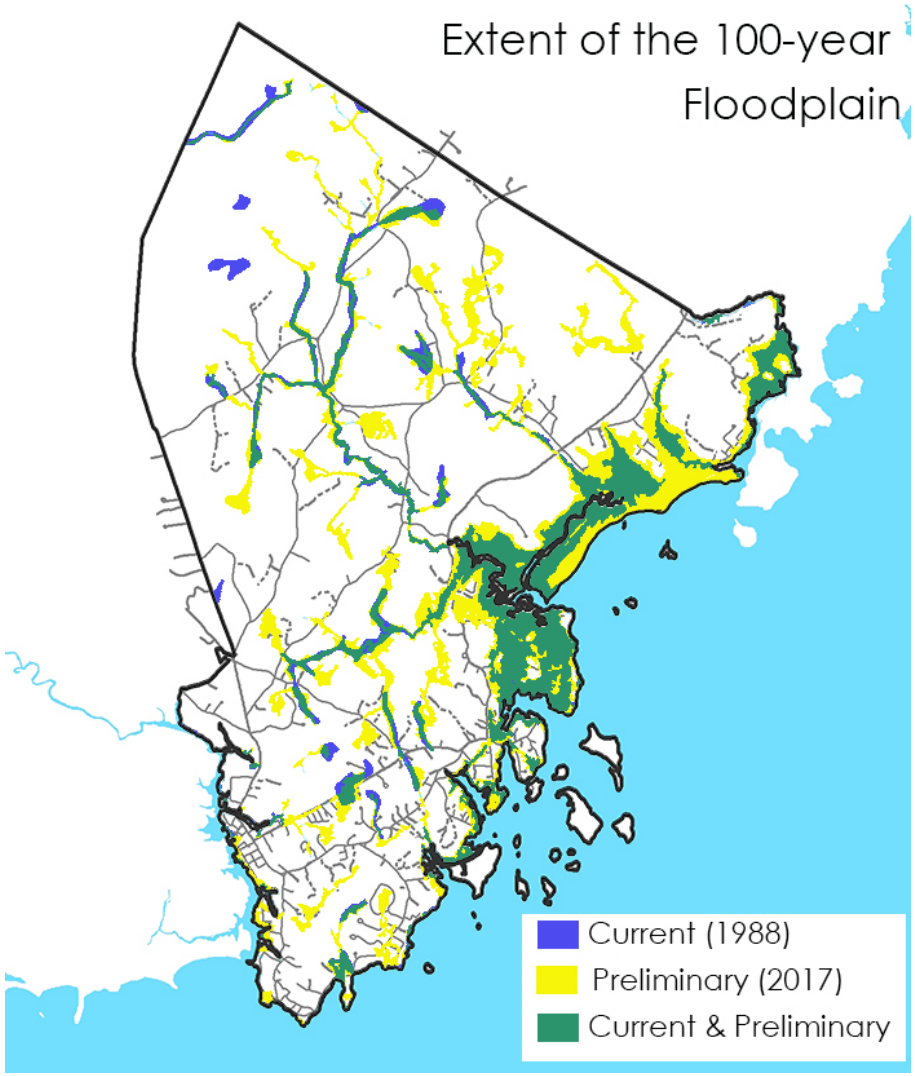

Figure 8-9 Approximate extent of the current and updated FEMA 100-year floodplain. Areas shown in green are areas that are included in both the current and preliminary floodplain extent. The current floodplain is based on Q3 map and does not reflect any map amendments. The portion of the floodplain that extends beyond the coastline into the ocean is not shown in this figure.

data and does not reflect any map amendments. The data is intended to provide a general indication of the location of SFHAs.

The preliminary FIRMs are based on more detailed topographical data with contours every two feet compared to the 10 to 20-foot contours of the 1988 maps. The FIRM update provides much more accurate information about flood vulnerability. The update will result in changes to flood zones and base flood elevations. Properties that did not previously fall within the 100-year floodplain may be mapped into this area (see yellow areas in Figure 8-9) and properties that were within the 100-year floodplain may no longer be located in the 100-year floodplain (see blue areas in Figure 8-9).

Under the NFIP, flood insurance is required for properties within the SFHA that have a mortgage. As of October 2020, there are 373 policy holders with a total coverage of $112,640,000 in Kennebunkport. Since joining in 1975, there have been 159 claims in town, totaling $2,336,042. This averages to about 3.5 claims and $52,000 in claims per year. Seven properties in Kennebunkport have experienced repetitive losses, or multiple claims. Two properties, designated as severe repetitive loss properties, have experienced a total of 15 combined losses[17]. According to available GIS data, there are approximately 950 parcels that interest the SFHA in Kennebunkport.[18] This does not represent the number of structures in the SFHA.

The Town of Kennebunkport does not currently participate in the NFIP's Community Rating System, which is a voluntary incentive program that offers reduced premium rates to property owners in communities that exceed the minimum requirements for floodplain management. This program may be something the Town may wish to join.

THE UPDATED FLOOD MAPS WILL INCLUDE:

- NEW COASTAL FLOOD HAZARD ANALYSIS
- REDELINEATED ZONE AE'S IN COASTAL AREAS AND SOME INLAND AREAS
- NEWLY MODELED ZONE A'S IN AREAS WITH TWO-FOOT TOPOGRAPHICAL CONTOURS
- NON-REGULATORY FLOOD RISK PRODUCTS, SUCH AS MAPS THAT SHOW THE DEPTH OF FLOODING WITHIN THE 100-YEAR FLOODPLAIN.
- CHANGES TO ZONE DESIGNATIONS.

Source: DACF Maine Floodplain Management Program

33,000	NUMBER OF STRUCTURES AT RISK OF FLOODING IN MAINE
75%	HOMES AND BUSINESSES IN FLOODPLAINS THAT ARE NOT COVERED BY FLOOD INSURANCE
$959	AVERAGE ANNUAL FLOOD INSURANCE POLICY PREMIUM IN MAINE
9,000	NUMBER OF 9,000 FLOOD INSURANCE POLICIES IN EFFECT IN MAINE
$1.9 BILLION+	VALUE OF INSURANCE POLICY COVERAGE

Source: DACF Maine Floodplain Management Program

The Future Extent of the Floodplain

As precipitation increases and sea level rises, vulnerability to flooding will also increase. The extent of the area that has a 1% annual chance of flooding today will change. A greater number of coastal and inland properties will be vulnerable to occasional flooding. More properties will require flood insurance. One strategy to prepare for this is to require more separation between the base flood elevation (BFE) and the structures' lowest floors. Kennebunkport's Floodplain Management Ordinance already requires more freeboard[3] (two feet) than the one foot required by the 2015 International Residential Code, which will help reduce the vulnerability of structures. Another strategy to adapt to future flood conditions is to expand the extent of the regulated area to include locations vulnerable to sea level rise.

As shown in Figure 8-10, the extent of a 1.2 foot sea level rise scenario generally falls within the bounds of the 100-year floodplain. However, flooding caused by a very high future sea level rise scenario extends farther inland than the 100-year floodplain. Property owners within these areas that are outside of the 100-year floodplain but within areas that are vulnerable to sea level rise may not be aware of potential future flood impacts and likely do not have flood insurance. Actual future sea level rise will most likely fall somewhere in between the low (1.2 foot) and very high (10.9 foot) scenarios.

Kennebunkport's Floodplain Management Ordinance requires that the lowest flood (including the basement) of new construction or substantial improvement of any residential structure located within Zones AI 30, AO, and A to be elevated a minimum of two feet above the base flood elevation (BFE). In zones where the base flood elevation is not specified on the FIRM, the ordinance provides guidance about how to determine the appropriate elevation, which varies by zone. Non-residential structures in certain zones must similarly be elevated above the floodplain.

Photo Credit: Tom Morgan

[3] Freeboard is a factor of safety usually expressed in feet above a flood level for the purposes of floodplain management.

Figure 8-10 Map showing the preliminary FEMA floodplain with two sea level rise scenarios (Source: FEMA, ME Geologic Survey, CAI Technologies)

Water Quality

Classification of Maine Waters

Maine's water classification program (38 M.R.S §464-470) includes designated uses, criteria, and an anti-degradation statement to determine water quality. The purpose of the program is to guide management of surface waters, protect the quality of surface waters for intended management purposes, and direct the State in achieving intended purposes that are not met.[19]

Water Quality Classes in Maine
Freshwater rivers: AA, A, B, C
Marine and estuarine waters: SA, SB, SC
Lakes and ponds: GPA

If a waterbody meets all standards, including the criteria established for its assigned classification, a determination of water quality attainment is made. The water quality attainment determinations in the 2016 Integrated Water Quality Monitoring and Assessment Report, prepared by the Maine Department of Environmental Protection (DEP) in 2018, are based on monitoring data collected in 2013 and 2014. The report is required by the Environmental Protection Agency (EPA) and summarizes water quality data collected by DEP and other agencies and organizations.

Components of Water Quality Classification	Examples
Designated Uses	Drinking water supply, recreation in and on the water, habitat for fish and other aquatic life
Criteria	Bacteria, dissolved oxygen, biological criteria
Anti-Degradation	Natural, free flowing

Atmospheric deposition of mercury has led to a statewide fish consumption advisory for all freshwaters, including those in Kennebunkport. The non-tidal portion of the Kennebunk River is rated Class B. Below the head of tide the river is Class SB. These classes have fewer restrictions on activities than class A waters but still maintain high water quality criteria.[20] Development, recreational use, and agriculture are identified as the primary sources of impacts to the river. The river is listed as impaired for bacteria.

One of several monitoring locations on the Kennebunk River is located at the Route 9 bridge. As this is a tidal area of the river (assessment unit ME0106000301_622R01), it is discussed in the Marine Resources. A total maximum daily load (TMDL) (category 4-A) was approved by US EPA on September 28, 2009.[21]

Stream Gages

The USGS monitors stream flow on the Kennebunk River at a station located at Downing Road in Arundel. This location is upstream of the portion of the river that is located in Kennebunkport. Figure 8-11 summarizes flow rate data from the last decade. The highest flow occurs in March, while September typically experiences the lowest flow rate.

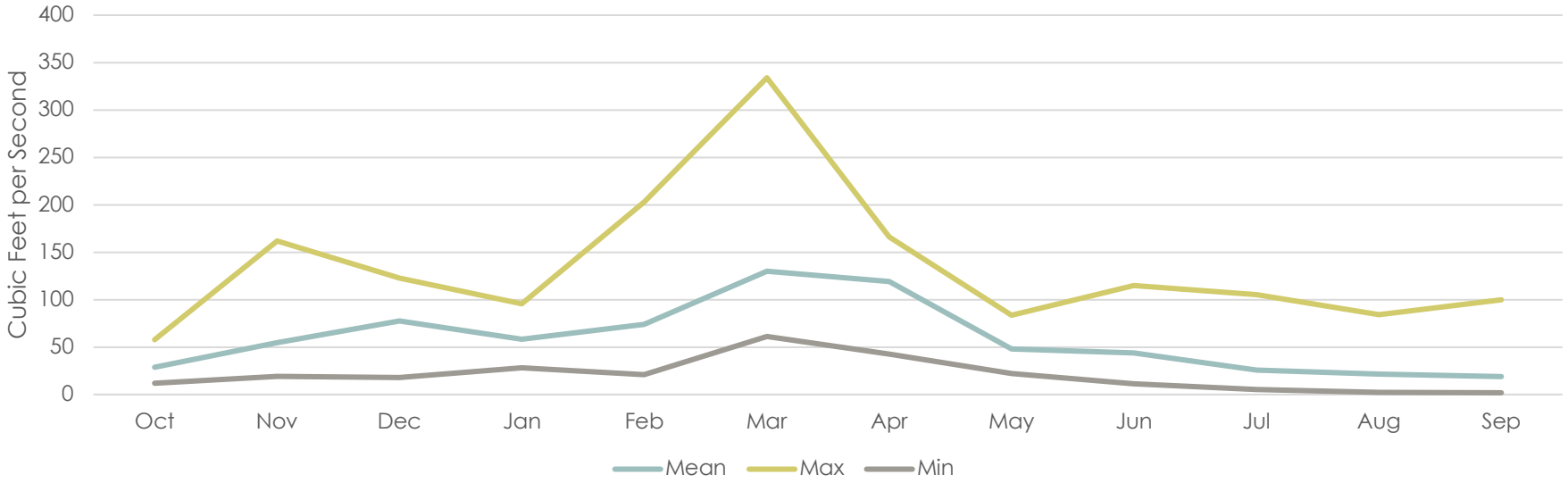

Figure 8-11 Kennebunk River Station 01067950 mean, maximum, and minimum flow by month between 2009 and 2019 (Source: USGS)

Threats to Water Quality & Water Resources

Non-Point Source Pollution

38 M.R.S. § 401-1 is the State's Nonpoint Source (NPS) Water Pollution Management Program. The program promotes the use of best management practices to prevent water pollution.

Non-point source and point source pollution are two categories of pollution that impact water quality. Non-point source pollution comes from a number of diffuse sources within a watershed, including stormwater runoff, underground storage tanks, and septic systems. The State defines non-point sources of pollutions as "facilities, activities, or any circumstance that cause rainfall, snowmelt, or irrigation water, running over land or through the ground, to pick up pollutants and to deposit them into rivers, lakes, coastal waters, or ground water."[22]

Stormwater runoff occurs when precipitation flows over surfaces rather than infiltrating into the soil. Stormwater runoff collects and carries pollutants such as sediment, fertilizers and nutrients, salts, metals, and other substances across impervious surfaces such as rooftops and paved areas, as well as other areas like lawns and farmland, to water bodies. Stormwater is managed to a degree by local land use regulations that limit impervious cover, require on site stormwater best management practices, and control fertilizer application.

Impervious Surface: That portion of a lot or site which is or will be improved with buildings, structures, driveways, parking lots, pedestrian walkways, signs and other improvements on the surface of the ground which are more impervious to water than the natural surface of the site. (Source: Kennebunkport Land Use Ordinance)

In Kennebunkport, development requiring review under LUO Article 10 Planning Board Site Plan Review must comply with performance standards established in Section C Stormwater Water Management. These standards require that surface water runoff is minimized and detained on-site if possible, and otherwise mitigated off-site. Drainage systems sized for a 50-year storm event are required for development that involves more than 10,000 square feet of impervious surfaces. Within Article 5 Shoreland and Resource Protection Overlay District, erosion and sedimentation control measures to are required to control potential runoff during construction, and all new construction and development must be designed to minimize stormwater runoff from the site in excess of the natural predevelopment conditions. Furthermore, standards of Article 5 prohibit discharge onto the ground or into waters of the State that would impair the designated uses or water classification of the water tributary stream or wetland. The Town's Subdivision Regulations require that a stormwater management plan be prepared in accordance with the DEP's *Stormwater Management for Maine: Best Management Practices* and an erosion and sedimentation control plan be prepared in accordance with the DEP's *Maine Erosion and Sedimentation Control Handbook for Construction: Best Management Practices.*

Kennebunkport is not designated as a Municipal Separate Storm Sewer System (MS4). Designation is based on the decennial US Census data for urbanized areas.

According to the State's database of registered storage tanks, there are two active underground tanks and one planned aboveground tank in Kennebunkport (Table 8-4). These tanks are located at Chicks Marina, Cape Porpoise Pier, and Kennebunkport Co in Dock Square. These locations are vulnerable to sea level rise, which could comprise the integrity of below ground tanks, in particular. Nearby, there are four active underground tanks along Western Ave and Beach Ave in Kennebunk. In Kennebunkport, nineteen registered underground tanks have been removed and six have been abandoned in place.

Table 8-4 Registered tanks in Kennebunkport

Facility	Chicks Marina	Cape Porpoise Pier	Kennebunkport Co
Status	Active	Active	Planned (installed 9/5/20
Registration Number	480	3361	17074
Address	75 Ocean Ave	81 Pier Rd	Spring Street & Cross

			Street
Near Public Water	N	N	N
Near Private Water	N	N	N
On Aquifer	N	N	N
Tank Material	Jacketed Tank – Double-Walled	Jacketed Tank – Double-Walled	Steel – bare or asphalt coated
Tank Volume	5,000 gal	2,000 gal	500 gal
Tank Leak Detection	Secondary containment with continuous electrical monitoring	Secondary containment with continuous electrical monitoring	Secondary containment with manual monitoring
Tank Type	Underground	Underground	Aboveground
Chamber(s)	Unleaded gasoline (3,000 gal), Diesel (2,000 gal)	Unleaded gasoline	Diesel

The Water District discovered trace amounts of perfluorinated compounds (PFAS) in its Kennebunk River Well supply and stopped using water from that location.[23] The amount found was below the US EPA's recommended Lifetime Health Advisory Level. In September of 2019, the well and a pilot study to test PFAS removal using pressurized granular activated carbon (GAC) filtration were shut down to allow for construction of a permanent facility for the GAC filter system.[24]

Point Source Pollution

Point source pollution, as defined by the U.S. Environmental Protection Agency (EPA) is any single identifiable source of pollution from which pollutants are discharged, such as a pipe, ditch, ship or factory smokestack.

Within Kennebunkport, there is one permitted wastewater discharge into the Kennebunk River. The Department of Public Works discharges an average of 700,000 gallons of wastewater from homes and businesses into the river. This discharge is permitted by the Maine DEP and treated at the Town's Wastewater Treatment Plant. Therefore, it is unlikely to be a source of pollution to the river.

Invasive Species

Aquatic invasive species pose a threat to water quality. According to the Maine Invasive Aquatic Plant Map there are no current or eradicated infestations of invasives (Variable Leaf Milfoil, Curly Leaf Pondweed, European Frog's Bit, Brittle waternymph, Hydrilla, or Eurasian Water Milfoil) in Kennebunkport as of January 2020.[25] Results of the State's vulnerability assessment and modeling of risk of becoming infested with an invasive aquatic plant show that Beaver Pond is at moderate risk of infestation.[26]

Dams & Culverts

Dams alter the flow of water, which can cause the temperature of streams, ponds, or reservoirs to heat up. This can impact habitat for fish and wildlife and impede fish passage. There are over 1,000 registered dams in Maine and many more small dams that impact stream connectivity. Less than 20% of dams generate hydroelectric power.[27] There are two dams in Kennebunkport: the Turbats Creek concrete dam near Oakwood Drive on Batson River-Goosefare Bay (D5045) and the Batson River Dam (D5110) on Batson River, which was built in 1990.

Road crossings also impact stream continuity, water quality, and habitat. Approximately 42% of the over 8,600 culvert crossings surveyed throughout the state since 2007 act as physical barriers to fish movement. Within the Kennebunk River Watershed, approximately 43% of the 60 culverts surveyed act as barriers to fish movement. Forty-eight percent are potential barriers and 8% have no barrier.[28] A map of crossings and barriers is available at: https://webapps2.cgis-solutions.com/MaineStreamViewer/. Well-designed stream crossings accommodate wildlife, protect stream health, and reduce erosion and structural damage. Undersized crossings, shallow crossings, and perched crossings are common stream crossing problems. Maine's Stream Smart Road Crossing Pocket Guide provides guidance on designing stream road crossings that meet stream smart performance goals.[29]

Principles for Stream Smart Road Crossings

- Set the crossing structure so that the natural, pre-disturbance streambed elevation is re-established or maintained.
- Size the span of the crossing to avoid pinching the stream channel and preferably, exceed the natural channel width. Tidal crossings will often require more span width than non-tidal crossings.
- Maintain natural slope and alignment of the stream channel.
- Ensure that natural substrate is maintained inside the crossing.

(Source: ME DMR)

Climate Change

Changes in the frequency and intensity of precipitation events will impact surface and groundwater in a variety of ways. Increased stream flow has already been measured. Over the last 75 years, annual average streamflow has increased at may sites in the Northeast.[30] Increased precipitation will cause an increase in stormwater runoff, leading to more erosion and sedimentation and pollution of water bodies.

Increased periods of extended drought will impact surface water levels and groundwater recharge. According to the US Drought Monitor, Kennebunkport was in an Extreme Drought (Category D3) as of October 2020. This stage is characterized by major crop and pasture losses and widespread water shortages or restrictions.[31] The September 2020 Quarterly Climate Impacts and Outlook for the Gulf of Maine Region notes the unusually hot and dry conditions in the region in the summer of 2020, with temperatures ranging up to 5°F above normal and precipitation ranging from 50 to 75% of normal rates.[32]

Warmer air temperatures also have an impact on freshwater ecosystems. Rising water temperatures can lower oxygen levels and alter

freshwater systems.[33] This can impact the viability of certain species. Already, annual high winter-spring flow is occurring more than 10 days earlier than the mid-1900s.[34]

Sea level rise will also likely impact freshwater resources as rising seas cause saltwater intrusion into groundwater resources. Kennebunkport's 2012 Comprehensive Plan recognized saltwater intrusion as a problem in neighborhoods along the shore, such as Windemere Place. Modeling of sea level rise induced groundwater rise in coastal New Hampshire found that groundwater is projected to extend up to 2.5 to 3 miles inland from the coast.[35] This will have implications ranging from declining viability of drinking water wells to increased threat of nonpoint source pollution from sources like septic systems.

Existing Protection & Preservation Measures

M.R.S.A. 38 §§435-449 require protection measures for shoreland areas within 250 feet of the normal high-water line of any great pond, river, or saltwater body, within 250 feet of the upland edge of a coastal wetland, within 250 feet of the upland edge of a freshwater wetland unless within 75 feet of the high-water line of a stream.

State laws that protect water resources include: Stormwater management and Site Location Law and Erosion and Sedimentation Control Law

Site Location of Development requires developers of large projects obtain permits from DEP before beginning construction.

M.R.S.A. §438-A requires that municipalities adopt zoning and land use control ordinances with minimum guidelines to protect water resources. The guidelines must include provisions governing building and structure size, setback and location, and establishment of resource protection, general development, limited residential, commercial fisheries and maritime activity zones and other zones. Regulations must include permitted uses, criteria for issuing permits and nonconforming uses, land use standards, and administrative and enforcement procedures.

Kennebunkport's Shoreland and Resource Protection Overlay Zones regulate uses within proximity to surface water resources. Figure 8-12 shows the location of Shoreland and Resource Protection Zones associated with different resources in Kennebunkport. Section 3.3 of the Town's Land Use Ordinance identifies the boundaries of the Shoreland Zone and Resource Protection Zone. Sections 4.13, 4.14, and 4.15 identify uses that are permitted without a permit in both the Shoreland and Resource Protection Zones, the uses permitted in the Shoreland Zone, and the uses permitted in the Resource Protection Zone, respectively. Uses that are allowed under 4.13 are generally limited to uses like recreation, natural resource management and analysis, essential services, emergency operations, timber harvesting, motorized vehicle traffic on road and established trails, mineral exploration disturbing less than 100 sq ft of ground surface area. Uses such as filling or earthmoving activities of less than five cubic yards of earth annually, clearing vegetation for construction, mineral exploration disturbing less than 100 sq ft of ground surface are examples of the types of uses permitted in the Shoreland Zone under Section 4.14, provided they are not in the Resource Protection Zone and are permitted in the underlying district. Uses permitted in the Resource Protection Zone

include timber harvesting, clearing of vegetation for construction, filling or earthmoving activity less than five cubic yards annually, and similar uses approved by the Code Enforcement Officer. The Planning Board may permit uses such as agriculture, accessory structures, road and driveway construction, and public utilities and essential services within the Resource Protection Zone. LUO Article 5 includes a purpose statement and performance standards that apply to land uses in Shoreland, Stream Protection, and Resource Protection areas.

In addition to regulating use in the Shoreland and Resource Protection Zones, several town-wide provisions and development standards protect water resources (Table 8.5).

Additional Protection Measures

Land conservation, discussed in the Land Use and Natural Resources Chapters, is an effective strategy for protecting watersheds. Approximately 30% of the Kennebunk River Watershed is conserved. The KKWWD owns 2,000 acres of land within the watershed.

Do public works crews and contractors use best management practices to protect water resources in their daily operations (e.g. salt/sand pile maintenance, culvert replacement street sweeping, public works garage operations)?

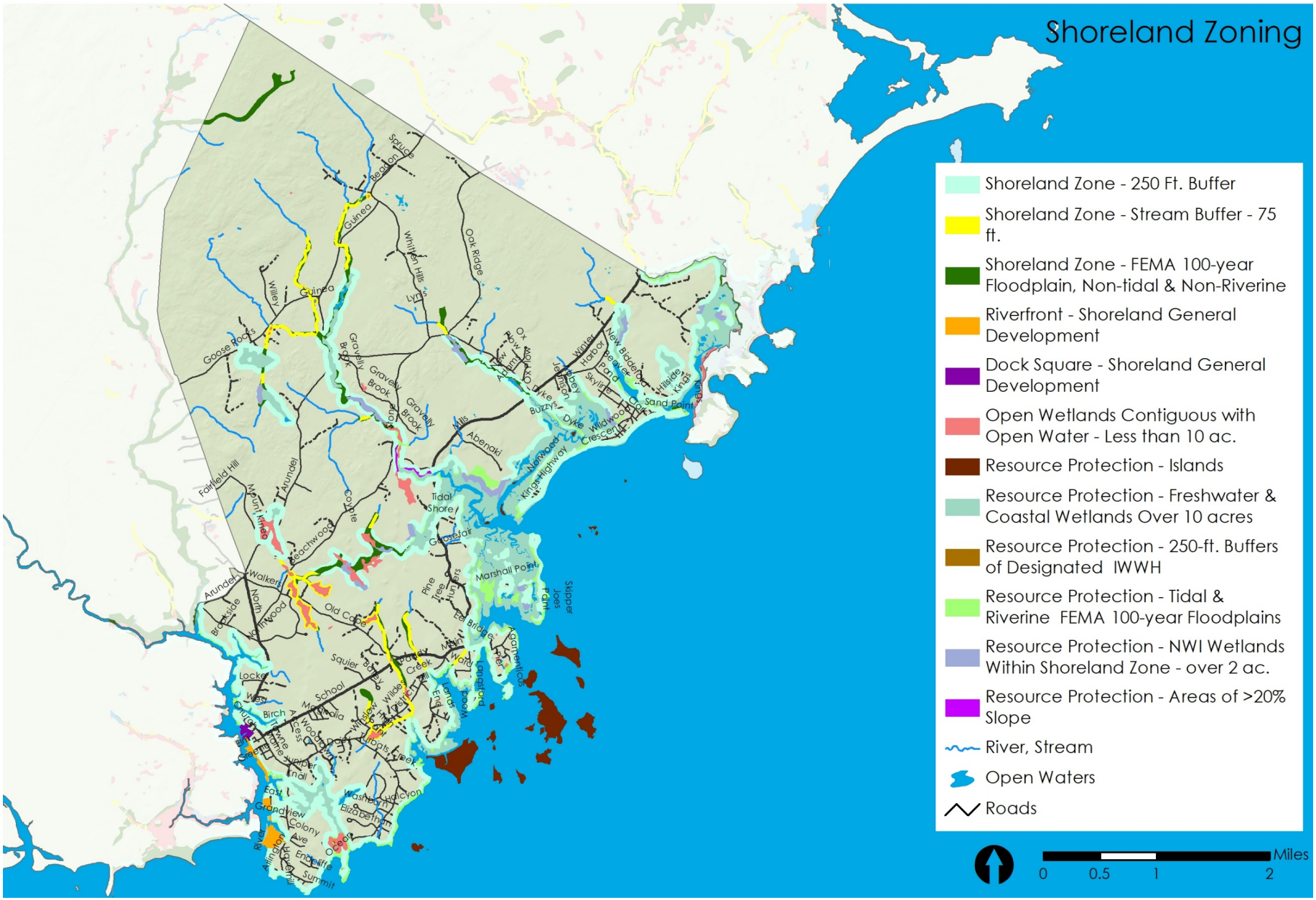

Figure 8-12 Shoreland zoning in Kennebunkport (Source: Planning Department)

Table 8-5 Water resource protection measures that apply town-wide and under the Site Plan Review process (Source: Kennebunkport LUO)

LUO Section	Summary
Section 6.4 Water Quality	• No activity shall locate, store, discharge, or permit the discharge of any treated, untreated or inadequately treated liquid, gaseous, or solid materials of such nature, quality, obnoxiousness, toxicity, or temperature that run off, seep, percolate, or wash into surface or ground waters so as to contaminate, pollute, or harm such waters or cause nuisances, such as objectionable shore deposits, floating or submerged debris, oil or scum, color, odor, taste, or unsightliness, or be harmful to human, animal, plant or aquatic life.
Section 6.11 Sanitary Provisions	• Requires that the system meets the requirements of the State of Maine Subsurface Wastewater Disposal rules, C.M.R. Chapter 241
Section 6.7 Construction in Flood Hazard Areas	• In areas designated within the 100-year flood plain, all new construction, additions, and modifications to existing structures, including piers, docks, wharves, bridges and causeways, shall conform to the Town's Flood Plain Management Ordinance.
Article 10: Planning Board Site Plan Review	• Requires review and approval for any use listed in Article 5 Shoreland and Resource Protection Performance Standards • Establishes performance standards for activities including erosion control, stormwater management, and buffers

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