

DRAFT MARINE RESOURCES

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This chapter identifies and describes the marine resources located in the Town of Kittery, the facilities operated by the Town to provide access for residents and visitors to the water and waterfront areas, and associated topics.

MAJOR MARINE RESOURCE AREAS

This section discusses the primary water areas within the Town of Kittery's jurisdiction, including a portion of the Isles of Shoals. The discussion and analysis emphasizes the waterfront and near shore areas of the mainland portion of the town.

Kittery's harbor and waterfront areas are located on the north side of the mouth of the Piscataqua River, and have approximately 34 miles of shoreline including rock outcrops, salt marshes, sandy beaches, mud flats, waterfront recreational areas, coves and mooring, marine commercial facilities, and a major federal installation at the Portsmouth Naval Shipyard. The waterfront and marine resources have played an important role in the history and development of Kittery. Much of the shoreline is in private ownership, with several large public parks such as Fort Foster and Fort McClary.

KEY WATERWAYS WITHIN KITTERY

Piscataqua River: Leading out to sea along the Kittery shoreline, the Piscataqua is an authorized navigation channel over 6.2 miles of its 13 mile length, with a depth of 35 ft. Mean Low Water (MLW) and width of 400 to 600 feet. The Piscataqua is used by a wide range of shipping interests, including freighters and cargo

vessels, US military and Coast Guard, commercial fisherman, and recreational boaters. The river separates Maine from New Hampshire, and is crossed by three bridges: the Memorial Bridge (reconstructed in 2013), the Sarah Mildred Long Bridge carrying US Route 1, and the Piscataqua River Bridge carrying Interstate 95. The Memorial Bridge and Sarah Mildred Long Bridge are both lift bridges to accommodate shipping. The Piscataqua River has an extremely fast tidal current of approximately 4 knots (4.6 mph), and is considered the second-fastest-flowing navigable river in the nation. The lower six miles of river is part of the Portsmouth Harbor.

Summary of Key Points

- Kittery has a complex waterfront, with large-scale commercial and military craft, marina and docking facilities, commercial fishing, and recreational boating.
- Swift currents and obstructions can pose a hazard to navigation
- There are a wide variety of natural habitats and environmental resources in Kittery, including the open ocean, river channels, protected bays, and estuarine and intertidal areas.
- Limitations exist on access to the waterfront from crowded shorefront launching facilities and long waiting lists for moorings, and boat traffic is increasing
- Contamination from wastewater treatment outfalls and other sources has affected shellfishing and overall water quality. Runoff from impervious surfaces contributes to water pollution, and there are no pesticide or fertilizer ordinances in place to reduce infiltration into adjacent waterbodies.
- Sea-level rise has the potential to increase floodplains, storm damages, and reduce public access to recreation areas on the waterfront.



Figure 1 Commercial vessel transiting Piscataqua River with assistance from tugs, after passing Sarah Mildred Long Bridge

Spinney Creek: located just north of the Interstate 95 Bridge, this subtidal creek features a commercial aquaculture facility, several private float landings, and a private marina in Eliot, ME at the confluence of the creek with the Piscataqua River. There is a fixed road bridge carrying Route 103 over the creek. While there is non-point pollution in Spinney Creek, the water quality in the Creek has improved; as of the 2012 Maine Marine Resources report, continues to meet the “Restricted” standard for shellfish cultivation.

Back Channel

This waterbody, an offshoot of the main Piscataqua River, runs from the western end of Badger’s Island easterly to Spruce Creek between the mainland and Seavey Island, the location of the Portsmouth Naval Shipyard. The channel has depths ranging from 17-25 feet at Mean Low Water (MLW), although depths can be shallower at the western end of Badger’s Island. There are two public access launching areas along the channel, as well as several private wharves and landings. The Back Channel is important for recreational boaters, particularly those docking on the northern side of Badger’s Island. The channel is the waterbody closest to the revitalized commercial area in the Kittery Foreside.



Figure 2 - View of Back Channel from Memorial Bridge

Chauncey Creek

The creek runs from the eastern end of Pepperrell Cove to Seapoint Beach (also referred to as Sea Point Beach), separating Gerrish Island from the mainland; due to its shallow depth, it is used primarily by small water craft. The creek does not reach open water at Seapoint Beach, but it does reach Brave Boat Harbor at high tide. The fixed bridge to Gerrish Island crosses the creek. Several private docks and a popular waterfront restaurant are located on the banks. Chauncey Creek is classified as a “Prohibited” area for shellfish cultivation due to the presence of Overboard Discharges (OBD) systems, which discharge treated effluent into the water. However, with the recent conversions to septic systems on numerous properties, only three OBDs remain active on Chauncey Creek. This has led to an improvement in water quality. Carry-in boat access to the creek is found at the intersection of Cutts Island Lane and Seapoint Road.

Spruce Creek

A significant estuarine resource, Spruce Creek is a three square mile tidal saltwater estuary fed by five freshwater streams which runs roughly up the middle of Kittery. At low tide, approximately 2.5 miles of clam flats are exposed. There is an unmarked channel with depths from 22 feet at the confluence with the Back Channel, lessening to 13 feet or less near Shepherds Hill Cove. The confluence is crossed by the Route 103/Whipple Road Bridge to Kittery Point.

Pepperrell Cove

Adjacent to Kittery Point and Fort McClary State Park, this is the primary mooring area in the town, with numerous moorings under the jurisdiction of the Kittery Port Authority. The majority



Figure 3-Chauncey Creek, looking upstream

of these moorings are used seasonally by recreational boaters, and a significant number of year-round commercial fishermen.

The Frisbee Wharf, used by commercial and recreational boaters, provides boating access into Pepperrell Cove through two municipally-owned piers: Frisbee Pier, which is primarily used by commercial fishermen, and Pepperrell Pier, which is primarily used by recreational boaters. Depths in the anchorage area range from 13 feet to 7 feet at Mean Lower Low Water (MLLW), or less in certain areas.

Brave Boat Harbor

Used primarily by small craft due to shallow depths, Brave Boat Harbor has limited private landings and no public facilities. The harbor is exposed to the ocean and is thus prone to choppy

waters and high winds during storms. It is located within the Brave Boat Harbor Division of the Rachel Carson National Wildlife Refuge. The refuge, which was 11 divisions along the Maine coast, was established in 1966 in cooperation with the State of Maine to protect valuable salt marshes and estuaries for migratory birds. Residents report increasing boat traffic in recent years, including larger power boats. The Kittery Harbor Master patrols in Brave Boat Harbor in season, and responds to emergency calls and complaints for unsafe boating operation, such as excessive speed and no-wake zone violations.



Figure 4-Pepperrell Pier at Pepperrell Cove

KEY WATERFRONT NATURAL AREAS

Seapoint Beach

This area is considered to be environmentally sensitive, and a highly valuable environmental asset because of the number of marine invertebrates and shorebirds found here, and the extensive salt marsh. The area is a popular location for visits by residents and non-residents, and has expansive views of the ocean. The beach is a popular location for residents and visitors to bring dogs, which has created issues concerning the appropriate disposal of pet waste.

Rachel Carson National Wildlife Refuge

Part of an 11-division coastal wildlife refuge, this facility features high-quality habitats and estuarine areas. Visitors are allowed within the facility, and carry-in boat access is available on Chauncey Creek at the intersection of Cutts Island Lane and Seapoint Road. Brave Boat Harbor is located in the central portion of the Refuge property.

Fort Foster

This historic military structure and the accompanying 88 acres of parkland and several thousand feet of ocean shoreline are managed by the Town of Kittery, and receive many thousands of visitors each year. There are three beaches (including “Scuba Diving Beach”), extensive trails, picnic areas, and restrooms in season. Lifeguards are not provided, and due to strong tidal currents, there is no swimming or diving allowed from the pier. The pier was constructed for the loading and unloading of deep draft vessels. Citing the currents in the area and exposure to storm wind and waves, the municipal recreation department has not installed floating docks at the pier. Non-motorized craft such

as windsurfers and sea kayaks are allowed to be launched from the portion known as “Windsurfer’s Beach”. Commercial tours using non-motorized craft, such as sea kayak tours, are not allowed to launch within Fort Foster. A large freshwater wetland complex runs generally north to south through the park; the marsh at the southerly end of the park is particularly valuable to nesting birds, and the entire complex is valuable habitat to a wide variety of species.

Nearshore Islands

The largest islands within Kittery are Badger’s Island, home to a marina, restaurants, and housing, and Seavey Island, site of the 278-acre Portsmouth Naval Shipyard. A facility of the US Navy, the Shipyard is responsible for the overhaul, repair, and modernization of naval submarines. The Shipyard also serves as the home port for three “medium endurance” US Coast Guard cutters. Shipbuilding in the region began in the late 1600s, with numerous ships built at the Naval Shipyard in the 1800s.



Figure 5-Shoreline of Badger's Island

There are a number of small islands in the nearshore waters of Kittery, including Wood Island, Fishing Island, White Island, and Gooseberry Island. The majority of these islands are uninhabited. Wood Island is the home of the **Wood Island Life-Saving Museum**. Owned by the Town of Kittery, the Wood Island Life Saving Station was built in 1907 to accommodate men of the US Life Saving Service (forerunner of the US Coast Guard) who performed rescue missions, using small rowing boats, to mariners in distress. It is a rare and historic building eligible for the National Register and is currently in poor condition. It stands near the entrance to the Piscataqua River and consists of the Station, two sea walls (north and south) and a marine railway for boat launching. The non-profit Wood Island Life Saving Station Association (WILSSA) has led efforts to restore the building, sea walls, and marine railway, and to build a new pier to create a maritime museum open to the public, accessible by boat. WILSSA has raised over \$750,000 to support this effort. WILSSA is also attempting to secure the involvement of the Maine National Guard to help rebuild the sea walls and marine railway, and construct the pier. Work to clean the building of hazardous materials and repair its exterior was contracted in June 2016. Funds for the restoration were recently provided by Environmental Protection Agency (EPA), National Park Service, and the State of Maine, each providing \$200,000 for the remediation and exterior renovation projects.

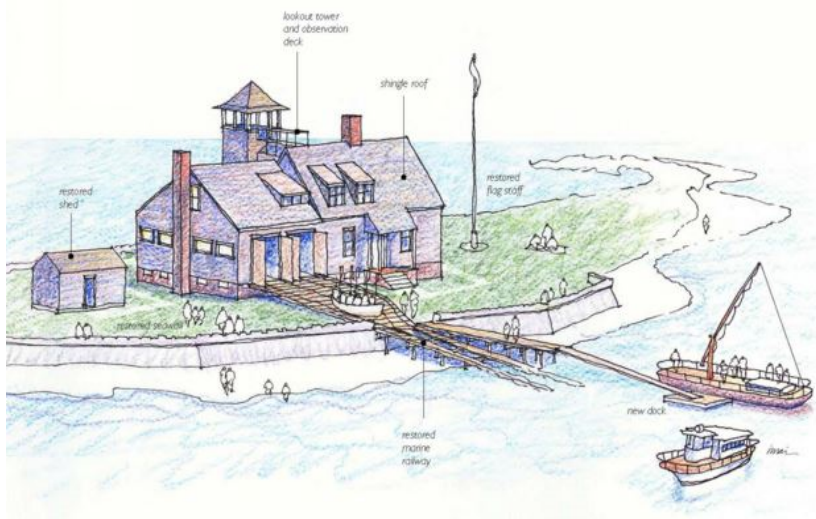


Figure 6-Conceptual Sketch of Restoration at Wood Island Life Saving Station

Isles of Shoals

Located approximately nine miles offshore from Pepperrell Cove, this archipelago contains eight main islands and a number of islets, rocks, and ledges. With an extensive history of fishing and habitation, the Shoals are a significant historic and environmental resource. The Town of Kittery has jurisdiction over the five main islands within State of Maine waters: Cedar, Smuttynose, Malaga, Appledore, and Duck. The boundary line between Maine and New Hampshire runs through the center of Gosport Harbor and between Star and Cedar Islands. Appledore Island is the largest of the islands in Kittery's jurisdiction, and is home to the University of New Hampshire/Cornell University Shoals Marine Laboratory, and several private homes.

Gosport Harbor is extensively used by private boaters to the Isles of Shoals, and by the Isles of Shoals Steamship Company for its excursion and supply boats docking at Star Island. These docks are maintained by the non-profit Star Island Corporation. The Harbor can be reached by several deep channels and is protected from all but westerly winds.

WIND, CURRENT, AND TIDE CHARACTERISTICS

The prevailing winds tend to be from the north and northeast during the winter and from the southwest during the summer. Thus, Kittery's waterways are relatively sheltered, although those areas facing the Atlantic Ocean are exposed to southeasterly winter winds. Exposed areas of note include Fort Foster and Brave Boat Harbor. The mean tidal range at Kittery Point is 8.7 feet, while at Portsmouth it is 7.8 feet.

Navigation in the Piscataqua River can be complicated by strong and variable tidal currents, which can vary greatly depending on the width, depth, and adjacent tributaries. Tidal currents are considered to be very strong in the main channel of the harbor, although they are much less in the coves and estuarine areas. The Maine Natural Areas Program lists the area off the Naval Shipyard near Four Tree Island in Portsmouth as the fastest flowing tidewater on the U.S. east coast.

A U.S. Army Corps of Engineers (USACE) study in 1984 measured current velocities in various places on the Piscataqua River and the waters near Badger's and Seavey Islands. The highest velocities were recorded in the River near the western tip of Badger's Island where currents reached 4-6 knots in mid-channel

on the flood tides. In the back channel of Badger's Island, the current velocities were measured at 2-3 knots. Near Seavey Island in the open water, velocities reached four knots; near the mouth of Spruce Creek, currents were approximately two knots. The National Oceanic and Atmospheric Administration (NOAA) has conducted tidal measurements at the mouth of Portsmouth Harbor off Wood Island, and found currents to typically run from 1-3 knots.

Currents of this velocity can pose a hazard to small craft, particularly to human-powered craft such as kayaks.

FEDERAL NAVIGATION PROJECTS

The USACE is responsible for three navigation projects in Kittery's harbor area: the Piscataqua River Channel, the Pepperrell Cove Anchorage area, and Gosport Harbor. In 1986, Congress authorized a project to widen various sections of the Piscataqua, with completion of this work in 1992. No recent USACE activity has occurred in Kittery's waterways.

Portsmouth Harbor

Within this harbor, a federally-designated channel provides for a 35-foot deep channel that ranges in width from 400 to 700 feet wide and extends from New Castle and Clark's Island in Kittery to the Atlantic Terminal in Newington. The USACE dredged the area across from the New Hampshire Port Authority south of the Sarah Long Bridge to construct a turning basin.

Gosport Harbor

The USACE constructed three breakwaters connecting Star, Cedar, Smuttynose, and Malaga Islands to create an anchorage for local fishermen, recreational boaters, and excursion boats from Portsmouth, and is responsible for maintaining these structures. The tidal range in the harbor is 8.7 feet.

HAZARDS TO NAVIGATION

There are a number of dangerous rock ledges near confluence of the Piscataqua River and the Atlantic Ocean, as well as within more sheltered areas, including:

- Moore's Rock near the entrance to Brave Boat Harbor is unmarked and has a five-foot cover at low tide.
- A series of unmarked bedrock shoals between Brave Boat Harbor and Seapoint Beach, including East and West Sister shoals.
- The area at the confluence of the Piscataqua River and the open ocean has a number of potentially hazardous areas including Whaleback Island and Reef, Phillips Rocks, and the waters between White and Wood Island. Whaleback Island is marked by the historic Whaleback Light, which is still in operation.
- A set of wooden cribs from a World War II submarine net between Wood Island and Fort Foster.
- The shoal associated with Hicks Rock as well as several shallow areas in the back channel.

- Shoal areas near Gosport Harbor that are well marked but require caution, particularly in strong winds. Duck Island is surrounded by ledges and shoals and can be hazardous.

Several low bridges pose hazards to navigation, especially to fishermen and recreational boaters; these include the Badger's Island Bridge, Bridges 1 and 2 over the Back Channel to Seavey Island (Portsmouth Naval Shipyard), the Kittery Point Bridge on Route 103, and the Gerrish Island Bridge over Chauncey Creek. The vertical clearances for these structures range from six to eight feet at high tide.

There are railroad trestles from defunct rail lines still in place in Spruce Creek, Chauncey Creek, and Brave Boat Harbor. These trestles were placed for the Boston & Maine Railroad and the Electric Trolley. The trestles could be a potential hazard to boats, particularly at low tide, and are slowly deteriorating.

REGULATED NAVIGATION AREA

For security reasons, a regulated navigation area has been established by the U.S. Navy in the vicinity of the Naval Shipyard. The west end of Seavey Island from Henderson Point along the shore to the road/railroad bridge across the Back Channel is designated as a restricted area within which civilian navigation is prohibited. At the east end of Seavey Island, the cove between Clark's, Seavey, and Jamaica Islands is designated as exclusionary zone within which local control is prohibited. The regulations governing this area are published in Chapter 2, U.S. Coast Pilot 1. Additions or revisions to Chapter 2 are published in the Notice to Mariners. As noted on the navigation chart for the area,



Figure 7- Shoreline of Seavey Island and Regulated Navigation Area

information concerning the regulations may be obtained at the Office of the Commander, 1ST Coast Guard District in Boston, MA.

DREDGING AND MAINTENANCE PRIORITIES

In the 1999 Update of the Comprehensive Plan, the Kittery Port Authority established the following priorities for dredging:

1. Pepperrell Cove Anchorage: The anchorage was last dredged in 1916 to a depth of twelve feet. The navigation chart for the area shows depth of 11 to 7 feet at MLW, with local sources stating water depths are six to ten feet in half of the anchorage area.

2. Gosport Harbor and Breakwater: these granite structures are exposed to wind and waves during storms, and require periodic maintenance
3. North Side Channel: This channel by Badger's Island west of Rice Avenue has filled in since the turning basin for ships west of Badger's Island was dredged in 1991. At mean low water, the western end of the channel is shown as having only ½ foot of depth.

There are no currently developed plans for dredging these areas.

WATER QUALITY AND CONTAMINATION

To monitor water quality for shellfish cultivation, the Maine Department of Marine Resources has assigned "Growing Area" designations to different zones along the coast. Kittery is within Growing Area WA, along with South Berwick and Eliot. This Growing Area is located between the Piscataqua River and Sisters Point in Kittery, and includes the Isles of Shoals. There are restrictions on shellfish cultivation within Area WA due to pollution. The most recent annual review for Area WA is the 2010 document, which has a report date of January 30, 2012. Major sources affecting the Piscataqua River are wastewater treatment plant (WWTP) outfalls from South Berwick and Kittery in Maine, and from Portsmouth and Newington in New Hampshire. The Portsmouth outfall is the greatest in volume, with the largest impact on water quality. The Portsmouth Naval Shipyard is also a major pollution source, and significant portion of its wastewater is treated by Kittery's treatment plant. The presence of several municipal and residential overboard discharges (OBD) is a contributing factor to pollution levels. A significant number of OBDs on Chauncey Creek have been removed in recent years,

with only three now in active use. All of the Piscataqua River is classified "prohibited" for shellfish cultivation down to Gerrish Island, including Spruce Creek and Chauncey Creek. Spinney Creek is classified as restricted due to non-point pollution; the mouth of the river at Gerrish Island is classified approved, and the Isles of Shoals are classified prohibited due to point source pollution.

Run-off from non-point and point sources, such as impervious surfaces in commercial properties and from residential lawns, is a contributing factor to the reduction in water quality.

Spruce Creek is an area of special concern with regards to pollution. The creek's watershed is 9.6 square miles, with 90% located within the Town of Kittery. The watershed empties into the Piscataqua River 1.5 miles north of the river's confluence with the Gulf of Maine. The watershed is fed primarily by six freshwater streams (Wilson Brook, Fuller Brook, Hill Brook, Hutchins Creek, Chickering Creek, and Crocketts Brook), and contains approximately three square miles of tidal area consisting of high salt marsh, ledge, and mud flats. As noted in the 2008 *Spruce Creek Watershed Improvement Project* document, "Spruce Creek, particularly the tidal portion, is being intensely manipulated and impacted by people's desire to live near the water and to have water views, and by polluted stormwater."

The report continues to state, "Due to poor water quality, Spruce Creek is listed in the State of Maine's 305(b) report as impaired under Category 5-B-1: Estuarine and Marine Water Impaired by Bacteria (TMDL Required), for nonpoint pollution sources". The watershed is also identified by Maine Department of Environmental Protection as a "nonpoint source pollution priority watershed" due to bacterial contamination, low dissolved

oxygen, toxic contamination, and a compromised ability to support commercial marine fisheries”. The Maine DEP also lists the Spruce Creek watershed as one of the seven coastal watersheds in the state being “most at risk from development”.

The Town of Kittery has been monitoring coastal and inland water quality on an annual basis for the last ten years, and these efforts are ongoing. The Town has been awarded a fourth round of US Environmental Protection Agency (EPA) Section 319 grant funding for the Spruce Creek Watershed Improvement Project (SCWIP) which aims to help reduce bacteria inputs, improve water quality, and reopen shellfish harvesting areas in Spruce Creek. A proposal for 2016 sampling is currently before the Town Council for funding approval. Spruce Creek is monitored closely by the Maine Division of Marine Resources (DMR), which samples nine sites six times per year for fecal coliform bacteria. The Town of Kittery-funded sampling effort tests for *Escherichia coli* (E. coli) bacteria and the Maine Healthy Beaches program samples for Enterococci bacteria at Fort Foster and Seapoint Beach.

Kittery has developed a local plan to identify and eliminate pollution sources through its Watershed Based Management Plan (2008) and updated in 2014. Through the Section 319 grant, Kittery has been actively trying to identify point sources of bacteria and remedy them when located. Kittery is also subject to the Maine General Municipal Storm Sewer System (MS4) Permit which requires the Town to have a non-stormwater discharge ordinance and an illicit discharge (defined as any discharge not entirely composed of stormwater) control measures.

The shellfish harvesting areas (flats) in Kittery have been closed since 2005, due to contamination from nonpoint sources of

bacteria. Shellfish harvesting in the past was done on a recreational, and not commercial, basis.

There are limited public waste pumpout facilities for boaters between Great Bay and the mouth of the Piscataqua River. The State of New Hampshire operates a pumpout vessel, the service has limited hours, requires an appointment, and the vessel must cover a large area of operation. At present, there is no land-based public waste pumpout facility in Kittery.

Portsmouth Naval Shipyard is a high-density industrial area with 376 buildings on site. It was built on Dennett, Seavey, Jamaica, and Clark Islands, connected by 90 acres of fill material. The EPA states in its on-line Superfund Site Profile for the Naval Shipyard that “hazardous wastes have been stored, disposed of, spilled, or treated at more than 30 acres on site. Following immediate actions to protect human health and the environment, site investigation and long-term cleanup planning are ongoing”. The EPA notes that from 1945 to 1975, untreated wastes were discharged into the Piscataqua River via industrial waste outfalls; from 1945 until about 1978, 25 acres of tidal flats were filled with various chemical and industrial wastes, and dredged sediments from the Piscataqua River. In the late 1970s, “dredge sediment samples collected near the industrial outfalls were found to be contaminated with elevated concentrations of metals, polychlorinated biphenyls (PCBs) and other contaminants. The US Navy has indicated that the probable source of the contaminants is the industrial outfalls at the Shipyard. Groundwater supplies drinking water to 10,000 people within four miles of the site. However, grounded beneath the PNS (the island) is not hydraulically connected to the groundwater that supplies drinking water.”

The long-term remediation plan for the Shipyard includes capping of the Defense Reutilization and Marketing Office (DRMO) Storage Yard, stabilizing the DRMO shoreline, removing underground storage tanks, and removing the mercury burial vaults. Work is currently underway at seven areas; in addition, preliminary evaluations of several areas are determining whether a remedial investigation should be performed at those areas.

A significant portion of the land area of the Portsmouth Naval Shipyard lies within the FEMA Special Flood Hazard Area (SFHA), which is the area subject to inundation by the 1% annual chance flood. Rising sea levels would expose more of the Shipyard to flooding, with the accompanying concern that hazardous waste-containing areas may be more exposed to flooding (and rising groundwater) and thus increase the potential for the release of pollutants into surrounding waters.

MUNICIPAL MANAGEMENT OF MARINE RESOURCES

The Town of Kittery has a Port Authority, one of three in the State of Maine, and a Harbor Master. The Port Authority is responsible for overall management of the town's marine facilities; e.g.; piers, docks, and 575 moorings, the majority of which are at Pepperrell Cove. The Port Authority is an independent entity, authorized by State statute. Funding is derived primarily from collection of mooring and docking fees, and the Kittery Town Council approves the Port Authority's budget. The mooring fees are \$150 per year for vessels 25' or less in length; vessels over 25' are charged \$6 per foot. The Port Authority has seven members, including a chairperson, who serve five-year terms. The serving chairman has

stated they would like to prepare a strategic plan for the operation and management of facilities under its management.

The Port Authority employs the Kittery Harbor Master, who oversees operations at the various facilities, and provides marine law enforcement, rescue and education services to boaters within the tidal waters of the community. The Port Authority and Harbor Master work with commercial fishermen, recreational boaters, marina owners, and other marine law enforcement agencies on the Piscataqua River and adjacent waterbodies. The Harbor Master can write tickets for boating violations, such as exceeding speed limits in no-wake zones, and provides emergency response in the Town-owned boat. One of the chief responsibilities of the Port Authority and the Harbor Master is management of the Town-owned landside and State-owned waterside mooring facilities at Pepperrell Cove, the largest of the public docking areas in Kittery. The Port Authority has an annual budget of approximately \$125,000. On the 2015 mooring registry, there are a total of 513 registered moorings, with 105 assigned to commercial vessels, 43 to the Kittery Point Yacht Yard, 45 to riparian fishing vessels, and the remainder to pleasure craft. There is a twelve to fifteen-year waiting list for mooring spaces in Kittery. The town removes its floating docks in October or November each year, and recreational boaters will typically store their vessels on land over the winter to avoid exposure to high wind and waves.

The Kittery Port Authority has issued a Storm Preparedness Plan to ensure that all boaters in Kittery are aware of approaching hazardous conditions and to aid in preparation. The plan establishes a series of alert levels and recommended actions to be taken:

- Alert Level 0: begins at the start of hurricane season on June 1. Monitor National Oceanic and Atmospheric Administration (NOAA) weather radio
- Alert Level 1: when tropic conditions exist within 1,000 mile radius of Kittery. Prepare an action timetable for this particular storm.
- Alert 2: 72-48 hours until landfall, under a storm threat. Monitor storm track and begin preparations for a direct landfall; alert all boaters, particularly those in Pepperrell Cove; implement plan for securing all facilities, including the removal of floats and ramps.
- Alert 3: 48-24 hours until storm landfall. Hurricane watch issued at this time. Communicate with police, fire, Maine Emergency Management Agency (MEMA) and Coast Guard. All waterfront tasks should be completed by this time.
- Alert 4: 24-0 hours until landfall. Hurricane warning issued at this time; all persons working at waterfront to wear a life jacket; monitor NOAA radio, television, and any official communications; no unnecessary activity at waterfront, and prepare to evacuate waterfront.
- Alert 5: Hurricane. Remain in safe shelter; no waterfront activity allowed.

The storm preparedness plan provides detailed description of options available to boaters, with emphasis on personal safety over the protection of vessels. The best option for trailerable boats is to remove them from the water and place them in safe storage, such as a garage or covered area. Information is also provided for boats that cannot be removed from the water, with specific instructions for securing boats at moorings or

anchorage. The plan states that taking a vessel offshore (to “ride out”) a storm is not a viable option unless it is over 100’ in length and the captain has heavy weather experience. A detailed set of guidelines and timetable are provided for preparations to be made at Pepperrell Cove. The plan notes that the Port Authority should strongly consider setting moorings in Chauncey Creek for storage of the Pepperrell Cove floats during storms.

FACILITIES UNDER JURISDICTION OF KITTERY PORT AUTHORITY

Pepperrell Cove

Located in Kittery Point, this is the primary location for Town-operated moorings and launching within the community, with approximately 400 moorings. The facility is used for access to boats moored in Pepperrell Cove, and for the associated storage of dinghies to reached moored vessels. The majority of the Town’s moorings are in Pepperrell Cove. A commercial fishing pier (Frisbee Pier) was constructed in Pepperrell Cove in the 1990s, and thus the adjacent Pepperrell Pier is primarily used by recreational boaters. The approximately twenty Town-owned parking spaces on the wharf, and the spaces available in a privately-owned fee-for-parking lot across Pepperrell Road/Route 103, are an important resource for boaters. The privately-owned lot is part of the former Frisbee Market property. The Harbor Master’s office is located on the pier, and there is a bathroom for public use, 24 hours a day and seven days a week, in season. The bathroom uses a holding tank, which requires pumping out, and is maintained by the Harbor Master. The bathroom is closed when the water supply to the Cove is turned off at the end of the season.



Figure 8-Frisbee Pier at Pepperrell Cove, primarily used by commercial fishermen

Beyond the pier and parking areas, which were donated to the Town by the Frisbee family in 1955, the Town of Kittery does not own real estate at the site. Following an application in 2010, Kittery was awarded a Boating Improvement Grant (BIG) Program to construct a new pier, ramp and floating dock system for 12 transient, non-trailerable vessels 26 feet or longer on Pepperrell Pier. The floating docks provide dinghy tie-up spaces, and the 80-foot ramp from the pier to the float system is compliant with the access provisions of the Americans with Disabilities Act (ADA). The project addressed long-term needs for additional transient boating, and for the replacement of the dilapidated pier constructed in 1954. The provision of additional dock space is intended to support small businesses in the area in providing services to boaters, and to provide greater access to Kittery's waterfront areas.

The pier landform is man-made, and expansion of the facility would require additional construction in the water the purchase

of adjacent real estate. The docks are installed and removed by crane, and stored on-site during the off-season. While storage of the docks on the pier reduces on-site parking, the removal of the docks to an off-site location would require an extensive operation to move them on to the land, and identification of a storage location.

When no moorings are available, vessels are directed to the nearby anchorage area at historic Fort McClary.

Traip Academy Boat Launch

The Town maintains a floating dock and paved public launch for trailered or hand-carried vessels, such as kayaks, adjacent to the Traip Academy school. The launch can be used at any point in the tidal cycle, and is used by commercial fishermen and recreational boaters. The launch and floats receive the greatest use during the summer, and on weekends in later spring and early autumn. The school and boat launch share the use of a parking area, which is possible due to the relative timing of boating usage and the school calendar. There are approximately 15 moorings in the area, on the Back Channel. The float system was recently extended under Small Harbor Improvement Grant (SHIP) from the Maine Department of Transportation.

Government Street Pier

This facility is located in the Kittery Foreside, on Town Wharf south of Government Street. The dock is approximately 40 feet long by 30 feet wide, does not have a ramp or float system, and is primarily used by commercial fishermen for loading and unloading vessels. Approximately 30 fishermen regularly use the pier, which is a key facility for the working waterfront. Bait and fuel trucks will make deliveries here, and catches are offloaded. There is no

public parking at the dock. The facility is within close walking distance to the businesses of Wallingford Square in the Foreside.



Figure 9- Government Street Pier

Back Channel

There are a significant number of moorings in the Back Channel, particularly east of the Wyman Avenue Bridge to Seavey Island. While there is sufficient water space to increase the number of moorings, or to add “pony floats”, there are no dedicated areas for parking and landside dinghy storage.

Gosport Harbor at Isles of Shoals

The Town of Kittery maintains moorings in Gosport Harbor, which are leased to permit holders.

MARINE-DEPENDENT USES

Access to the water has played an important part in the commercial development of Kittery. Waterfront usage has stayed relatively consistent in recent years, with some decline in commercial fishing, and an increase in waterborne tourism. The redesign of Pepperrell Pier and addition of floating docks for transient vessels prioritized its use for recreational over commercial users, although it is still used by commercial fishermen. The main shore facility location for commercial usage is the Government Street Pier, which is used by lobstermen for loading and unloading supplies, equipment, and catch. Large vessel repair and maintenance activities continue at Portsmouth Naval Shipyard.

There are a number of marine dependent uses in the community, which include:

Marinas

Facilities for docking, launching, supply, and repair of private vessels are found at several sites in Kittery, including Badgers Island Marina, Kittery Point Yacht Yard, and Great Cove Boat Club. The American Marine & Boat Sales business on Badger’s Island has a ramp to the Piscataqua River, and Seafari Charters & Marine Services operates from Badger’s Island. There are additional marinas in neighboring Portsmouth and New Castle.

Lobster Pounds and Waterside Restaurants

Lobsters in the Rough on Badger’s Island, Warren’s Lobster House, and Chauncey Creek Lobster Pier are located on the waterfront.

Portsmouth Naval Shipyard, Seavey Island

As a site for construction, repair, and overhaul of large military vessels, the Shipyard has extensive water access and maintains regulated navigation areas in the adjacent waterway to ensure safe operation of boats through channel separation.

Although not marine-dependent usages, the businesses in Kittery Foreside and in Kittery Point near Pepperrell Cove benefit from proximity to water, and have a potential for increased visitation from people arriving by boat.

Excursion Boats Operating in Kittery Area

There are a number of private or non-profit organizations operating boating tours and passenger services in the greater Portsmouth Harbor and Kittery areas. These include:

- Gundalow Company: This non-profit organization constructed a reproduction of the early cargo vessels known as gundalows which operated on the Piscataqua River from the late 1600s until the beginning of the 20th century. The ship *Piscataqua* provides public sails daily during the season, along with educational sails and private charters.
- Portsmouth Harbor Cruises: Offers motorized cruises of Portsmouth Harbor and areas along the Kittery Point and Gerrish Island shorelines, the inland Piscataqua and Great Bay, and to the Isles of Shoals.
- Captain & Patty's Cruises operates a historical boat tour of the Piscataqua River basin, starting in Pepperrell Cove,

including historic forts, lighthouses, the Portsmouth Naval Shipyard, and Portsmouth and New Castle Harbors.

- Isles of Shoals Steamship Company: This multi-vessel firm offers day visits to Star Island, a tour of the Isles of Shoals, a Portsmouth Harbor tour, and brings supplies and visitors for extended stays to Star Island.

COASTAL AND NEARSHORE LANDUSE REGULATION

The primary working harbors and shorefront facilities for commercial boating are found in the Kittery Foreside (including the Government Street Pier), on Badger's Island, and at Pepperrell Cove. Mixed-use zones cover the Kittery Foreside and Badger's Island, and a Business-Local (B-L) zone covers the area adjacent to the Frisbee Pier.

There are three zoning overlay districts in Kittery that cover coastal and nearshore areas: the Resource Protection (OZ-RP), Shoreland Protection Area (OZ-SL), and the Commercial Fisheries/Maritime uses (OZ-CFMU) overlay districts.

The Shoreland and Resource Protection Overlays are designated to limit potential water pollution sources; protect spawning and birding grounds; and preserve access and views to coastal waters. The Resource Protection Overlay primarily covers inland parcels where fresh water bodies or wetland occur, while the Shoreland Protection Overlay covers inland freshwater resources and the coastal shoreline of Kittery. The zone, based on Maine Department of Environmental Protection (MDEP) mandatory shoreland zoning, encompasses a 250 foot buffer from the upland

edge of the protected resource. The required setback is 100 feet, reduced to seventy-five feet in the Kittery Foreside and Badger's Island mixed use districts. Within the overlay by-right uses are extremely limited. Within most zoning districts the only use permitted within the overlay is public open space or recreational uses, with some exceptions for civic uses. All other uses that would otherwise be allowed in the underlying zoning district are required to be permitted through Special Exception.

The Commercial Fisheries Overlay provides for the development and expansion of water-dependent commercial fisheries/maritime activities. Areas in the overlay have been chosen based on suitability criteria that include shelter from prevailing winds/waves, slope of the land, depth of the waterbody within one hundred fifty feet of the shoreline, and compatibility with adjacent uses. This district extends into the upland area 75 feet from the normal high-water line, or to the property boundary line as identified on the municipal zoning map. Parcels that fall under this overlay district are primarily located along the Foreside, Kittery Point, Badger's Island, the Shipyard, and select parcels up the coast along Pepperrell Road and Chauncey Creek Road. The permitted uses under the overlay include all functionally water-dependent commercial fisheries and maritime uses, as well as the permitted uses under the base zoning districts. This zone designation applies to Badger's Island, the Foreside, Pepperrell Cove, and the shoreline of Seavey Island (Portsmouth Naval Shipyard).

FLOODPLAIN

Floodplains are determined and mapped by the Federal Emergency Management Agency (FEMA) and the National Flood Insurance Program (NFIP), which produce Digital Flood Insurance Rate Maps (DFIRMs). The FIRMs delineate the 1% Annual Chance of Exceedance (ACE) flood and the 0.2% ACE flood. In common terminology, these flood events are known as the "100-year" and "500-year" floods, respectively. The 1% ACE floodplain is referred to as the Special Flood Hazard Area (SFHA) or A-Zone; within this zone, property owners with federally-backed mortgages are required to carry flood insurance. In coastal areas such as Kittery, the SFHA includes a zone on the immediate shoreline known as the "VE Zone", or velocity zone (also known as wave impact zone). The VE Zone is subject to inundation by the 1% ACE flooding event, with additional hazards associated from storm-induced waves. Such waves pose a danger for buildings, and may lead to extensive damage or collapse.

Kittery's floodplain areas are included on specific map panels within the larger York County, ME flood map. The flood map now in effect for York County was adopted in 1984. The floodplain includes the shorelines and adjacent areas along the open shoreline, such as Gerrish Island; the shoreline of Kittery Point and Kittery, extends up the Piscataqua River and Chauncey Creek, and includes an extensive area in the Spruce Creek watershed.

Within the SFHA, locally-adopted floodplain management codes regulate the building of new construction and (if reaching the threshold of "substantial improvement") the retrofit of existing structures, in order to reduce impacts from flooding.

In November 2013, FEMA issued a Preliminary Digital FIRM (DFIRM) for York County. The map was based on two-foot contour topography and updated flooding frequency and elevation data and modeling analysis. The 2013 maps presented an expanded floodplain over the 1984 edition. The following areas were included in the expansion of the floodplain boundary in the 2013 Preliminary DFIRMs:

Changes to the Flood Zone Study limits: The velocity zone was extended to include the southeast side of Badger's Island. Previously, this zone terminated at the eastern tip of Seavey Island at the mouth of the Back Channel. There are areas previously within the A zone that are now in the AE zone (flood zone with an identified Base Flood Elevation). The flood zone boundary was extended further landward in intermittent areas along the coastline: east of Wyman Avenue along the Back Channel; from Bowen Road to Gerrish Island Lane; the southwester portion of Fort Foster; the northeast side of Gerrish Island; and the coastline east of Thaxter Lane north of Seapoint Beach. There are changes to the boundary further inland that are mainly located in several places along Bartlett Road.

The effect of these changes was to newly include approximately 75 structures in the floodplain, with 65 in the coastal area and the remainder in the inland area.

The Town of Kittery, and other municipalities along the southern Maine coast, did not agree with the revised floodplain boundaries and Base Flood Elevations shown in the November 2013 Preliminary DFIRMs, and took exception to the specific modeling techniques applied to determine wave heights and flood depths. In December 2014, FEMA announced the withdrawal of the

Preliminary DFIRMs for all municipalities in York and Cumberland Counties. In April 2015, FEMA participated in a binding arbitration process known as the Scientific Resolution Panel (SRP). The Town of Kittery was represented by a coastal engineering consultant at the SRP. As of this time, FEMA has not yet issued a revised Preliminary DFIRM for York County, and thus the 1984 floodplain map remains as the legally adopted basis for local floodplain management regulations.

It is anticipated that FEMA will issue a revised Preliminary DFIRM for York County in 2016.

SEA LEVEL RISE AND CLIMATE CHANGE

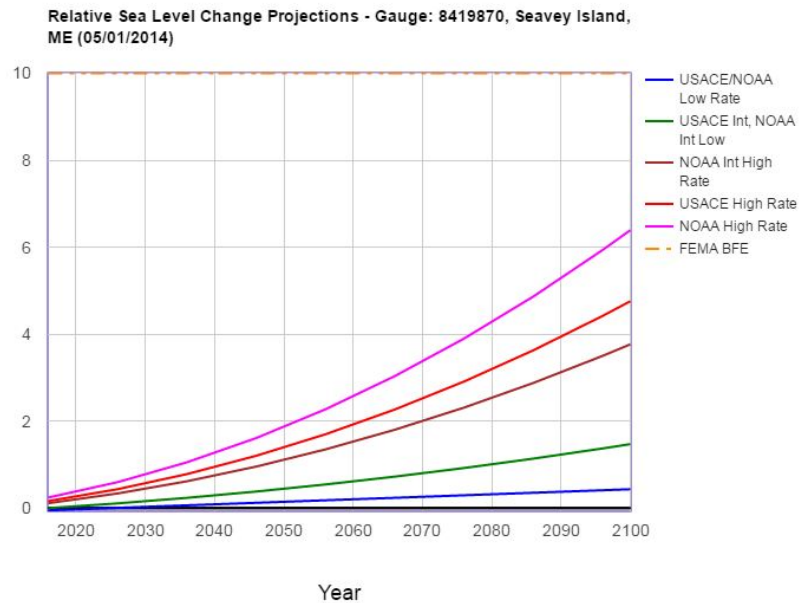
As a coastal community, with a densely developed shoreline, extensive recreational areas and a working waterfront, Kittery is subject to changes in sea level rise and associated impacts.

The Town of Kittery has not prepared a sea level rise or climate change adaptation plan. As noted in the *Climate Change Adaptation Report: Georgetown, Maine* (2015), Gulf of Maine waters are warming faster than 99.8% of the world's oceans, with 5.5 degrees Fahrenheit of increase in the last decade. Warming ocean temperatures can have notable increases on commercial fishing, through altering habitat and suitability for species long found in the area. Warmer waters can also lead to increased frequency and intensity of coastal storms.

Forecasts for the rate of sea level rise have been prepared by the USACE and NOAA, based on different sets of assumptions and annual increases. A chart showing the range of predicted increase

KITTERY COMPREHENSIVE PLAN EXISTING CONDITIONS INVENTORY

at Seavey Island (Portsmouth Naval Shipyard) is shown below. The rates of predicted change are grouped by the “curve” used. These curves present low, intermediate, and high assumed rates of changes, with the accompanying increase in sea level over present day, shown in feet.



The different scenarios typically show an increase in the rate of change in the 2050-2060 timeframe. For ease of comparison, selected rates and predicted levels of rise (in feet) for future years are shown below.

Future Year	USACE/NOAA Low	NOAA Intermediate High	NOAA High
2036	0.06	0.62	1.05
2056	0.18	1.35	2.27
2100	0.43	3.77	6.39

Note: Values shown are relative sea level change in feet over present-day

Source: US Army Corps of Engineers Sea-Level Change Curve Calculator

Sea level increases, particularly those predicted in the intermediate high and high scenarios, could have a range of impacts, including: extending floodplain areas landward, increased depths of storm surge during coastal storms, increased damage to shorefront infrastructure (such as stormwater infrastructure such as culverts and roadside ditches, roads, bridges, and utility lines) and to homes and businesses. Other impacts could be seen on public recreation areas on the waterfront and to environmentally sensitive areas such as wetlands and intertidal areas. Because of the rocky shoreline in many areas of Kittery, wetlands may tend to drown in place rather than migrate landward in response to rising water levels.

Extensive areas of the Portsmouth Naval Shipyard are already in the Special Flood Hazard Area; elevated water levels would likely increase inundation of the shipyard during storm events, and may impact the polluted areas on-site. One concern would be the potential for the leaching of contaminants during floods or due to elevated water levels.

PUBLIC AND VISUAL ACCESS

As discussed, Kittery has extensive public open space areas, which provide excellent visual access to the Piscataqua River, Portsmouth Harbor, the Gulf of Maine, and the Atlantic Ocean. These areas include Fort McClary State Historic Site, Fort Foster, and the Rachel Carson National Wildlife Refuge-Brave Boat Harbor area. Commercial areas such as the Foreside and Badger's Island also provide visual access to surrounding waters. Landside public access to interior waterways, such as Spruce Creek, is somewhat limited due to extensive private ownership and development of interior areas. A notable exception is Rogers Park, a 27-acre property dedicated to public recreation and open space preservation, adjacent to Broad Cove within Spruce Creek. A discussion of scenic views is provided in the Natural Resources chapter.

IDENTIFICATION OF PRELIMINARY ISSUES, CHALLENGES AND OPPORTUNITIES

The following is a preliminary list of issues, challenges and opportunities posed by the findings of the inventory of existing conditions of Kittery's marine resources. Please note that these are subject to change with the preparation of goals and objectives, not yet drafted (at the time the inventory was prepared).

- Demand for access to the waterfront and for boating access is consistently high, and is greater than the ability of existing landside facilities and moorings to meet.
- A significant portion of the available parking near the Pepperrell Cove wharf is in private ownership (as part of the former

Frisbee Market property), and the property is currently for sale. The parking lot parcel on the north side of Route 103/Pepperrell Road has deed restrictions stating it can only be used for parking. However, the deed does not stipulate that the parking lot be available for use of the general public, or for pier users.

- Run-off and direct source pollution have led to contamination of area waters and led to shellfishing restrictions and prohibitions in certain areas.
- Development pressure in Spruce Creek watershed further threatens water quality.
- Commercial fishing operations based in Kittery have decreased from previous years.
- Commercial and non-profit boat tour traffic has increased in recent years, and many of the cruises visit Kittery waters. However, there is at present no convenient location for boats to dock in town for day visits.
- Kittery has high-value environmental resources and parks that serve as a powerful draw to residents and visitors.
- The Kittery Foreside is a successful commercial area in close proximity to the waterfront.
- Wood Island Life Saving Station offers a unique resource for education and visitation in the near future.
- Major anchorages such as Pepperrell Cove have not been dredged in decades, leading to limitation on vessels that can safely moor and transit the area.
- Storm winds and waves limit opportunities for additional moorings in exposed areas such as Fort Foster. Locations for storage of floating docks during storms should be evaluated, such as setting moorings in Chauncey Creek for storage of Pepperrell Cove floats during storm events.

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INTERVIEWS

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