BLUE HILL BAY WATERSHED NEEDS ASSESSMENT

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EXECUTIVE SUMMARY

This report is a preliminary assessment of the environmental, economic, and social assets and needs of Blue Hill Bay Watershed. The watershed is a component of integrated systems including water, transportation, housing, agriculture, forestry, fisheries, recreation, and much more.

Blue Hill Bay represents a cross section of Maine's great coastal resources. The bay is rich in marine life, providing employment and valuable exports. Flanked on the west by the Blue Hill Peninsula and east by greater Mount Desert Island and Acadia National Park, the bay and its watershed are popular destinations for tourists and seasonal and year-round residents seeking recreation and scenic touring opportunities.

This study presents findings from historical and scientific research, with input from conservation and planning specialists, fishermen, businesses, and residents. Findings are presented in four substantive areas: fisheries, recreation and tourism, water quality, and land use and development. The data portray a healthy bay with good water quality and many healthy wildlife species. The regional economy shows steady growth with many jobs tied directly or indirectly to the bay.

The bay also confronts several challenges. Fisheries have been subject to unsustainable practices historically, leaving some species severely depleted. Tourism and recreation are highly seasonal, creating significant swings between labor scarcity and high unemployment rates. Competing interests for coastal frontage pushes traditional marine-dependent users inland to make way for seasonal homes and tourism businesses. Water quality challenges result from numerous point source and non-point sources of contaminants.

This study endeavors to bring these strengths, weaknesses, opportunities, and threats to light and suggest strategies to balance economic and environmental goals. This report is preliminary in nature and as a result does not cover topics in full depth; nor does it assume that all possible topics of concern are covered. All concerns and recommendations stated in Chapters 3-7 are based on public input as well as information from existing research and management plans and the opinions of professional resource specialists queried during the process.

Funding for this study was provided by the National Oceanic and Atmospheric Administration, U.S. Department of Commerce through the Maine Coastal Program.

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CHAPTER 1
PURPOSE AND ORIGIN OF THE PROJECT

1.1 What is a Needs Assessment?

A Needs Assessment is generally defined as a systematic process for determining and addressing gaps between current conditions and desired conditions (NOAA, Costal Services Center 2012). It is often used as the preliminary part of a larger more comprehensive planning process and as a tool for improvements in education, organizations, or communities. By clearly identifying needs, decision making and resources, such as funding and staff, can be directed toward developing and implementing feasible and applicable solutions to the identified needs.

The Blue Hill Bay (BHB) Watershed Needs Assessment is a multi-town, multi-stakeholder initiative designed to engage communities, businesses, residents and local organizations in an effort to assess Blue Hill Bay resources, identify existing and potential threats to bay ecology and make informed decisions about coastal activities that impact these resources.

The needs assessment engages the eight communities in the bay watershed located in Hancock County, Maine: Trenton, Ellsworth, Mount Desert, Bar Harbor, Tremont, Surry, Blue Hill, and Brooklin. These eight communities enjoy the economic and aesthetic benefits of the bay's resources, such as fisheries, tourism, and recreation. They also contribute to the health of the bay through local programs and policies, such as ordinances affecting land use, waste management, and water resources. The bay provides a common asset for towns that are in many ways geographically isolated from one another.

The BHB Watershed Needs Assessment focuses on four major topics: fisheries (Chapter 3), recreation and tourism (Chapter 4), water quality (Chapter 5), and land use and development (Chapter 6). Each chapter explores the current status of each resource, threats to the resource's health, and an identification of needs or suggestions for improvement to the resource.

1.2 Origin of the Project

This project is the direct outcome of a symposium conducted in November 2011 by Friends of Blue Hill Bay titled "*Behold the Bay: a symposium celebrating the marine resources of Blue Hill Bay*." Over 60 people attended the day-long event including numerous local residents, fishermen, and representatives from several state and federal agencies, area land trusts, municipal government, and charitable and conservation organizations. Speakers emphasized the need to protect species diversity (e.g., diadromous and near-shore marine fisheries), improve conservation and management, and relate communities to healthy ecosystems. Symposium participants identified the need for better planning and resource management building on regional collaboration.

Also during that time, a survey conducted by HCPC (2011) to rank Coastal Zone Management needs indicated that the top 5 coastal issues of concern as well as those issues needing the most training, ordinances, planning, and inter-municipal interaction were waterfront planning, water quality, public access, coastal hazards, and impacts of development. In the same survey, participants stated that they supported "no discharge zones" and some "marine protected areas that are off-limits to dragging to protect benthic and sub-tidal eelgrass habitats." Other survey comments included a request for "best building practices brochure for coastal bank erosion" and "meaningful procedures to ensure species protection with the habitat." Additionally, when towns were asked if they will work regionally on addressing these issues, they responded overwhelmingly in support for collaborating on water quality, waterfront planning, and coastal hazards.

This needs assessment augments and enhances similar initiatives that have been developed in neighboring bay communities including Taunton Bay (www.friendsoftauntonbay.org), Frenchman Bay (www.frenchmanbaypartners.org), and Friends of Penobscot Bay. Together these initiatives represent a larger and more regional collaborative planning and capacity building process for all of coastal Hancock County. Likewise, these groups may serve as a model for regional cooperation for the communities and organizations in Blue Hill Bay.

The most promising model for municipal and organizational cooperation is neighboring Frenchman Bay Partners. The Frenchman Bay Partners is comprised of stakeholder groups and individuals interested in working together toward a sustainable future for Frenchman Bay. Their two primary roles include information gathering and sharing, and taking action: initiating projects that ensure a healthy future for the bay. Some of their projects include creating a Frenchman Bay Plan, producing a Frenchman Bay Atlas, publishing State of the Bay Reports, and facilitating discussion and resolution of issues that arise among stakeholders.

1.3 Methodology

Several data sources and resources were used by the authors in order to better understand the bay and its community's needs. The sources, listed below, include existing research and bay management in Blue Hill Bay and other coastal areas in Maine, state, and federal agency data sources, Geographic Information Systems (GIS), and public participation.

All public meetings were advertised in the three area newspapers (MDI Islander, Ellsworth American and Blue Hill Packet). Also, email announcements were sent to all town offices and representatives from area organizations. Approximately 100 people were sent numerous email announcements throughout the 18 month process. Meeting minutes can be viewed at www.hcpc.org/bluehillbay. All concerns and recommendations stated in Chapters 3-7 are based on public input as well as information from existing research and management plans and the opinions of professional resource specialists queried during the process.

1.3.1 Existing Research on Blue Hill Bay

- Union River Watershed Coalition Baseline Study 2005 Field Season Report (URWC 2005)
- Blue Hill Bay Monitoring Project by Marine Education Research Institute @www.meriresearch.org.
- Circulation Study of Blue Hill Bay (Pettigrew 2005)

1.3.2 Bay Management Initiatives

- Taunton Bay – Bay Management Study 2005 -2007 (Friends of Taunton Bay)
- Blue Hill Bay Symposium Fall 2011 (Friends of Blue Hill Bay)
- Frenchman Bay Partners Conservation Planning 2009-2012

1.3.4 Data Sources

- Maine Department of Marine Resources
- HCPC Coastal Zone Management Survey
- Blue Hill Bay Map inventory Project 2007-2008 (FOBHB at www.fobhb.org))
- Geographic Information Systems (Maine Office of GIS)
- US Census and American Community Survey Data

1.3.5 Public Participation (See Appendix B for agenda and speakers)

- Personal Interviews with community specialists (e.g., harbor masters, marine harvesters, select persons, riparian landowners, businesses)
- Town Committee Meetings (e.g., Planning, Conservation, Shellfish committees)
- Five public meetings were held in Ellsworth in 2012-2013:
  - Kick Off Meeting March 5, 2012
  - Fisheries Meeting April 23, 2012
  - Waterfront Planning Meeting July 9, 2012
  - Economic Importance Meeting November 29, 2012
  - Presentation of the Completed Draft Needs Assessment Meeting March 11, 2013

In addition to the selectpersons and committees of the eight watershed towns, the following organizations and agencies were also invited to participate in the stakeholder process:

- Acadia National Park
- Maine Sea Grant
- College of the Atlantic
- Downeast Audubon
- Blue Hill Heritage Trust
- Maine Coast Heritage Trust
- Frenchman Bay Partners
- Friends of Acadia
- Department of Marine Resources
- Department of Environmental Protection
- Healthy Peninsula
- Healthy Acadia
- Blue Hill Friends and Neighbors
- Marine Environmental Research Institute

CHAPTER 2
INTRODUCTION TO THE BLUE HILL BAY WATERSHED

2.1 Organizational Description

As stated earlier, the Blue Hill Bay Watershed (see Map 1) includes drainages on the western half of Mount Desert Island (Bar Harbor, Mount Desert, and Tremont), all of Ellsworth, and the three communities on the eastern half of the Blue Hill Peninsula (Surry, Blue Hill, and Brooklin). The city of Ellsworth has population of 7,741 (2010 Census) and is the primary regional service center and Hancock County seat. Bar Harbor and Blue Hill serve as secondary service centers in the region.

Ellsworth is the one city in the watershed. It also has the only fully staffed planning department. The other towns operate on a town meeting/selectmen/town council form of government. The towns of Blue Hill, Bar Harbor, Tremont, and Mount Desert have town managers. In Brooklin and Surry, the selectmen oversee the day-to-day management of the town. Municipal land use ordinances are evaluated in Chapter 6 (Land Use and Development).

Located on Mount Desert Island, Acadia National Park has significant lands in the watershed and is a major tourist destination, drawing up to 2,500,000 visitors in 2011 (Stynes 2011). The park and its visitors are a major source of revenue to the community. Visitors spent $186,282,000 in Acadia National Park and in communities near the park in 2011 and that spending supported 3,189 jobs in the local area.

2.2 Demographic and Socio-Economic Trends

The total year-round population of the eight towns increased from 16,463 in 1980 to 22,819 in 2010. This represents an increase of nearly 32 percent (Table 2.1 and Map 2). The population growth has been uneven amongst the towns. Trenton's population grew by over 100 percent. Blue Hill saw a 63 percent increase and Ellsworth grew by nearly 50 percent.

Several trends can be identified in Table 2.1. First, Brooklin and Mount Desert lost population between 2000 and 2010. This is indicative of the high cost of housing in coastal communities and limited job opportunities. Second, Ellsworth had the largest numeric increase and was, according to the U.S. Census, the fastest growing city in Maine between 2000 and 2010. Third, the population is aging. The median age increased in all bay towns (Table 2.2). This is reflective of the trend of the young people leaving the area and in-migration by retirees. As seen in the following paragraphs, the year-round economy faces several challenges.

Table 2.1 Change in Population, Blue Hill Peninsula, 1980-2010 (US Census 2011)											Change 1980-2010	
Town	**1980**	**1990**	**Change**	**% Change**	**2000**	**Change**	**% Change**	**2010**	**Change**	**% Change**	**Number**	**%**
Bar Harbor	4124	4443	319	7.7%	4820	377	8.5%	5235	415	8.6%	1111	26.9%
Blue Hill	1,644	1,941	297	18.1%	2,390	449	23.1%	2,686	296	12.4%	1,042	63.4%
Brooklin	619	785	166	26.8%	841	56	7.1%	824	-17	-2.0%	205	33.1%
Ellsworth	5,179	5,975	796	15.4%	6,456	481	8.1%	7,741	1,285	19.9%	2,562	49.5%
Mount Desert	2,063	1,899	-164	-7.9%	2,109	210	11.1	2,053	-56	-2.7%	-10	-0.5%
Surry	894	1,004	110	12.3%	1,361	357	35.6%	1,486	105	8%	342	66.2%
Tremont	1,222	1,324	102	8.3%	1,529	205	15.5%	1,563	34	2.2%	341	27.9%
Trenton	718	1,060	342	47.6%	1,370	310	29.2%	1,481	111	8.1%	763	106.3%
Total	16,463	18,431	1,968	12.0%	20,876	2,445	13.3%	22,819	1,943	9.3%	5,245	31.9%

Table 2.2 Change in Median Age, Blue Hill Bay Communities, 2000-2010 (US Census 2011)		
Town	**2000**	**2010**
Bar Harbor	40.6	45.3
Blue Hill	44.7	49.5
Brooklin	45.9	52.9
Ellsworth	40.5	41.9
Mount Desert	43.6	50.7
Surry	41.1	49.0
Tremont	41.6	48.5
Trenton	40.7	45.9
Hancock County	40.7	46.3

Table 2.3: Socio-Economic Data ([1] 2010 U.S. Census; [2] Bureau of Labor Statistics, February 2012.; [3]U.S . Census Bureau, 2006-2010 American Community Survey)

Data	**HCPC Service Area**	**Maine**	**National**
Population	53,372[1]	1,328,361[1]	308,745,538[1]
Unemployment	11.7%[2]	8.2%[2]	8.3%[2]
Poverty Rate	12.3%[3]	14.4%[3]	15.9%[3]
Per Capita Income	$26,876[3]	$25,802[3]	$26,708[3]

Socio-economic data are shown in Table 2.3. While per capita income in Hancock County is higher than the state as a whole, these data do **not** accurately reflect the disparity between wealthier retirees and those of working age who depend primarily on local salaries to support their households. The high rate of unearned income is due in large part to the in-migration of relatively well-off retirees. Data from the 2006-2010 American Community Survey indicate that 22.2 percent of household county income is derived from interest, dividends, and rent compared to 15.8 percent for the state. Income from salary and wages accounted for 61.6 percent of income in the county compared to 70.1 percent rate for the state.

The median wage is low. In 2010, the Maine Department of Labor reported that the median annual wage in Hancock County was $30,056. It also reported that a livable wage for a two-person (one adult, one child) household was $36,442. The median wage is only 82 percent of what is needed for a livable wage for a two-person household.

The region is being hit hard by the recession. According to the Bureau of Economic Analysis, the county's economic output, as measured by income, decreased $50,478,610 from 2001 to 2010 in inflation-adjusted dollars. The regional economy is seasonal with many residents having a higher summer income than winter. Maine Department of Labor data report an unemployment rate of 11.7 percent in February 2012 compared to 6.8 percent in July 2012.

The marine sector, once a mainstay of the economy, is vulnerable. Apart from lobsters, most fishing-related jobs have ended due to over-fishing and federal restrictions on catches. The lobster sector faces its own challenges. According to the Maine Department of Marine Resources (DMR), Maine wholesale lobster prices dropped from $4.40 a pound in 2007 to $3.31 a pound in 2010, $3.19 a pound in 2011 and $2.69 a pound in 2012. The DMR maintains the 2012 price was the lowest on record since 1994. This is at a time when boat fuel and lobster bait prices were increasing. Fisheries resources are discussed Chapter 3 of this report.

Other parts of the economy are also suffering. The Verso Paper Mill in Bucksport, once the major employer in the county, has reduced its labor force from 1,252 in 1989 to 697 in 2011. Based on the trends in Maine's paper industry, the number of jobs is expected to continue dropping. Census data indicate that 12.6 percent of jobs in 1990 were in manufacturing compared to 10.7 percent in 2010. Retail trade also decreased. Census data indicate that there were 3,799 people employed in that sector in 1990 (18 percent of the labor force) compared to 3,430 (12.3 percent) in 2010.

Housing prices are high when compared to income. According to the Maine State Housing Authority (MSHA), the housing affordability index for a household of median income in 2009 (the last year for which data are available) in Hancock County was 0.85. The affordability index is an indicator of the relationship between a home sales price and income. An index below 1.00 indicates that homes are unaffordable. The high cost of housing compared to income is emblematic of a challenge faced by the county. Higher income summer residents and retirees create a demand for housing, making it hard for lower income people to live in the county. The county is undergoing a form of gentrification. Businesses in the resort town of Bar Harbor report employees traveling as far as 60 miles one way on their daily commute to work.

Shorefront property is particularly expensive. Land values for 2012 are shown on Map 3. Unless protected by conservation easements, shorefront land values are among the highest in the watershed. One notable exception to this trend is key commercial properties in the service centers. These high land prices make the acquisition or expansion of public access points to the shore very expensive. The map titled "Property Values" illustrates the much higher land values assessed for properties fronting on Blue Hill Bay compared with most interior land with the primary exception

of high-value commercial properties. Among waterfront properties, locations with deep water frontage where piers, floats and moorings are feasible are particularly valued

2.3 Geographical Description

A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place (EPA 2012). For the purpose of this project the BHB watershed is defined as the land and water that drains into Blue Hill Bay including the Union River estuary, which begins at head of tide in downtown Ellsworth. It drains approximately three miles to the mouth of the river and the head of the bay in the towns of Trenton to the east and Surry to the west. The bay extends to the southernmost tip of Tremont to the east and Brooklin to the west and out to Placentia and Swan's Island. Blue Hill Bay includes several smaller bays and harbors including Union River Bay to the north, Western Bay, Pretty Marsh Harbor, and Bass Harbor to the east, and Morgan Bay, Blue Hill Harbor, and Salt Pond to the west. Significant islands in the bay include Long, Harwood, Bartlett, Tinker, and Alley islands.

The total area of the watershed is 720 square miles. In addition, the bay area is approximately 125 square miles, of which approximately 114 square miles are water and 11 square miles are islands. The region is depicted in the map titled Blue Hill Bay Watershed.

The BHB watershed drains the Union River watershed, which is one of several coastal sub-basins in the headwaters of northern Hancock and southern Penobscot counties. The Union River watershed is approximately 500 square miles, with a total stream length of 484 miles and 81 lakes and ponds (COA 2004). Other smaller areas on Mount Desert Island, Blue Hill and Brooklin also drain into Blue Hill Bay.

2.4 Biological and Natural Resources of Blue Hill Bay

Topographically, the watershed is mostly hilly, although marshes, bogs, and forested wetlands are also present (Map 4). The wetlands above Blue Hill Bay, in the larger watershed, provide important water retention, filtration and reproduction functions. These wetlands are summarized in Table 2.4 and in Map 5. The marine area only includes water to the mouth of the Union River. The map titled Blue Hill Bay Watershed Wetlands indicates the locations of these areas.

Table 2.4. Wetlands in Blue Hill Bay

Type	Acres	Sq Miles
Riverine	761	1.19
Non-Forested	20,219	31.59
Marine	8,083	12.63
Lacustrine	34,447	53.82
Forested	18,766	29.32
Estuary	1,764	2.76

A more detailed analysis of the sub-tidal and intertidal areas of Blue Hill Bay indicates that there are a variety of wetland types including rocky, gravelly, sandy and muddy shores areas (Table 2.5 and Map 6). These areas range from thin strips along deep water frontage to significant mud flats where slopes are less steep. The largest area, approximately 100 square miles, is underwater all of

the time. Other major classifications include marine intertidal aquatic bed algal flooded and marine sub-tidal aquatic bed algal.

Table 2.5. Blue Hill Bay Marine Wetlands Classifications (Source: National Wetlands Inventory)				
Class	**Description**	**Locations**	**Acres**	**Sq Miles**
M1AB1L	Marine Subtidal Aquatic Bed Algal	40	840	1.31
M1AB1N	Marine Subtidal Aquatic Bed Algal Flooded	1	13	0.02
M1RB1L	Marine Subtidal Rocky Bottom	1	8	0.01
M1UBL	Marine Subtidal Unconsolidated Bottom	1	64,274	100.43
M2AB1L	Marine Intertidal Aquatic Bed Algal	1	1	0.00
M2AB1M	Marine Intertidal Aquatic Bed Algal Exposed	1	47	0.07
M2AB1N	Marine Intertidal Aquatic Bed Algal Flooded	324	2,708	4.23
M2RB1N	Marine Intertidal Rocky Bed Bedrock Flooded	3	9	0.01
M2RS1N	Marine Intertidal Rocky Shore Bedrock Flooded	102	364	0.57
M2RS1P	Marine Intertidal Rocky Shore Bedrock Flooded	68	122	0.19
M2UB2N	Marine Intertidal Unconsolidated Bottom Sand Flooded	3	19	0.03
M2US1N	Marine Intertidal Unconsolidated Shore Cobble-Gravel	2	9	0.01
M2US2M	Marine Intertidal Unconsolidated Shore Sand Exposed	11	280	0.44
M2US2N	Marine Intertidal Unconsolidated Shore Sand Flooded	35	179	0.28
M2US3M	Marine Intertidal Unconsolidated Shore Mud Exposed	2	5	0.01
M2US3N	Marine Intertidal Unconsolidated Shore Mud Flooded	20	212	0.33

In addition, the following measurements describe the Blue Hill Bay area.

- Includes all of the Union River WS = 550 square-miles in upland portion.
- Marine frontal drainage = 407 sq mi
- 59% is open wetlands and water and 32% forests
- Diverse wildlife habitats: shorebirds, shellfish, marine mammals, near-shore and diadromous fish stocks, crustaceans, and mollusks.

In addition to eagle nesting, brook trout, deer wintering, and seabird nesting and feeding habitat (Map 7), the bay is also one of the primary harbor seal pupping areas in New England waters with up to 50% of the breeding population utilizing both Blue Hill and neighboring Penobscot Bay from mid-April to mid-August (Gilbert 2005).

Common marine species typically found in the bay include (DMR 2012):

- gray and harbor seals
- whales
- dolphins
- porpoises
- lobsters
- crabs
- shrimp
- mussels
- scallops
- oysters
- sea urchins
- haddock
- pollock
- alewife
- rainbow smelt
- eels
- tomcod
- sea-run brook trout

CHAPTER 3
FISHERIES AND MARINE HABITAT OF BLUE HILL BAY

3.1 Economic Importance of Commercial Fisheries

One of the greatest resources of BHB is its fisheries both commercial and non-commercial. Fisheries in Blue Hill Bay are directly linked to the Maine state fisheries economy, which according to NOAA (2012) landed over 270 million pounds of finfish and shellfish and netted over $426 million in 2011 (Table 3.1). Although the total volume of the catch is small in comparison to other states, thus ranking Maine eighth in the nation, the value of Maine's landings ranks it third among all states.

Table 3.1. Maine state and BHB fisheries landings and values, 2011. (NOAA 2012 and DMR 2012)

	Maine	Blue Hill Bay	% BHB /Maine
Total Landings (lbs)	270,000,000	9,259,347	3%
Total Value ($)	$426,000,000	$23, 220,096	6%
Lobster Landings (lbs)	104,700,000	6,988,858	7%
Elver Landings (lbs)	9,300	866	9%
Clam Landings (lbs)	15,700,000	279,725	2%

Figure 3.1. 2011 Landings and values for fisheries in Blue Hill Bay (DMR 2012). See N.B. below.

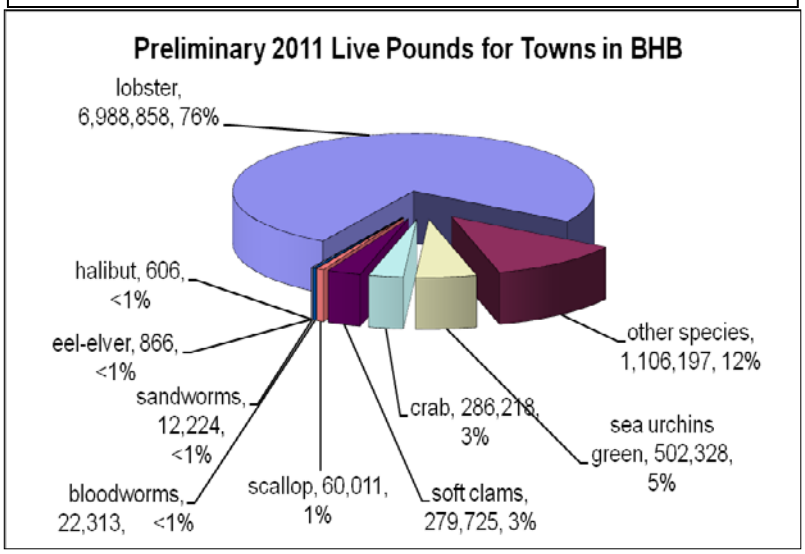
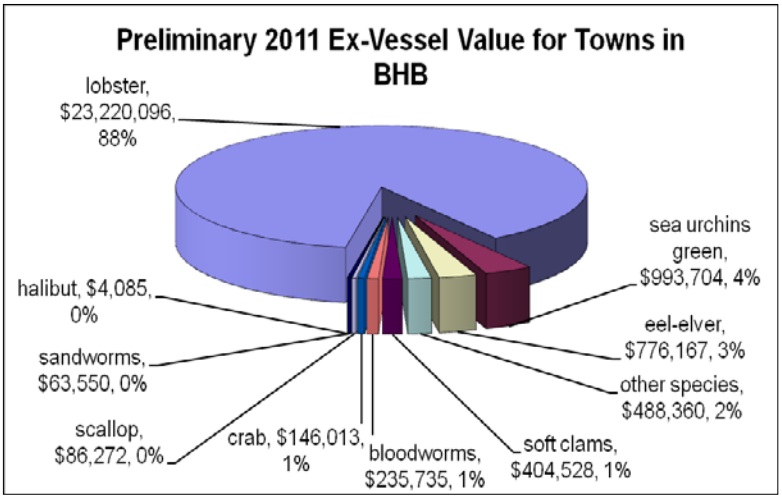


Figure 3.1 shows all of the species that are fished by residents of the eight towns surrounding the bay. BHB fisheries contribute 3% to the total state volume and 6% to the state value overall. BHB lobster landings represent 7% of the state's total lobster landings while elver (juvenile eels) fishing represents almost a tenth of the state's landings. Likewise, while lobster landings represent 76% (6,988,858 lb) of the total landings in BHB, they represent 88% of the total value ($23, 220,096), again illustrating the value of lobster over other fisheries.



N.B. Maine state confidentiality laws prohibit release of information when there are less than 3 harvesters in the data-request region. In such cases, data are combined to protect the confidentiality of the harvester. "Other species" refers to alewives, mussels, seaweed, and quahogs each of which have fewer than 3 harvesters in BHB.

In 2011, there were approximately 9,000 harvesters representing 9 counties in the state of Maine, with harvesters from Hancock County representing 22% and BHB representing 5% of the state total (DMR 2012). In BHB 472 harvesters hold 651 licenses and commercial harvesters make up approximately 5-7% of the working population of the eight towns in BHB. In addition to this, most lobster harvesters hire one-two sternmen (who do not require a license) thereby increasing the percentage of harvesters in the region's working population.

Sixty-one percent of BHB harvesters fish for lobsters while the state average is 50%. The town of Blue Hill has the highest number of harvesters (122) followed by the towns of Bar Harbor (99) and Ellsworth (91). It should be noted that although Ellsworth is farther inland than the other bay communities, it is in the coastal zone and has the third highest number of harvesters and second highest number of lobster tags (traps) in the bay (Table 3.2).

Table 3.2. Commercial harvesters, dealers, and lobster traps in BHB, 2011. (DMR 2012)

Town	**Harvesters**	**Dealers**	**Lobster Tags**
Blue Hill	122	10	5660 (22%)
Bar Harbor	99	25	3751 (15%)
Ellsworth	91	13	4115 (16%)
Mt Desert	54	5	3870 (15%)
Brooklin	42	4	4059 (16%)
Trenton	34	11	1785 (7%)
Surry	29	2	2455 (9%)
Tremont	1	0	N/A
TOTAL	**472**	**70**	**25,696**

3.2 Aquaculture

In addition to the harvest of wild marine species, the bay also has several aquaculture sites. As of fall 2012, BHB had 15 aquaculture lease sites totaling approximately 160 acres. Thirteen of the sites are shellfish leases (quahogs, mussels, oysters) and two are finfish (salmon) leases off Swans

and Black islands. Two more lease applications are pending: one shellfish lease in Morgan Bay and one sea urchin lease in Squid Cove. Figure 3.2 shows the location of the 15 sites; shellfish sites are in the inner bay while the finfish sites are at the outer reaches of the bay off Swan's Island. Cultured blue mussel data (DMR 2012) indicate that while the amount of pounds harvested in the bay has remained relatively steady, the value of cultured shellfish has nearly doubled over the last five years (Table 3.3).

Figure 3.2. Aquaculture sites in Blue Hill Bay, 2011 (DMR 2012).

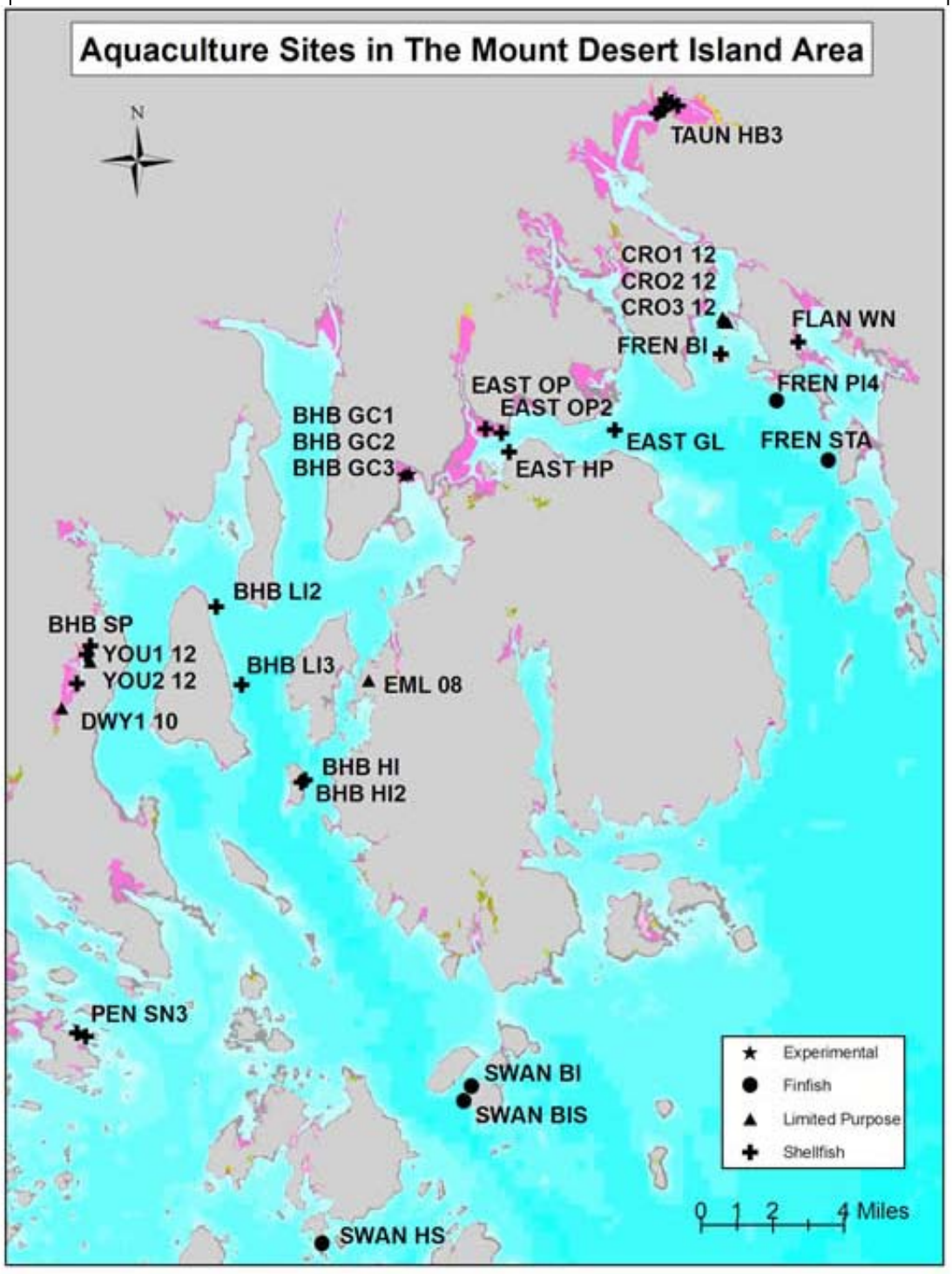


Table 3.3. Cultured Blue Mussel Data, 2006-2010 (DMR 2012).		
Year	**Pounds Harvested**	**Value ($)**
2006	369,283	309,227.00
2007	276,800	345,020.00
2008	318,540	450,160.00
2009	433,175	600,895.00
2010	391,843	558,228.00

The Department of Environmental Protection issues General Permits to salmon aquaculture facilities throughout the state authorizing the discharge of certain pollutants EXCEPT in the case of BHB. Due to the unique nature of current and circulation patterns in BHB, applicants who wish to conduct finfish aquaculture must apply for an individual National Pollutant Discharge Elimination System (NPDES) permit, which limits discharges from facilities based on the characteristics of individual water bodies and typically includes numeric effluent limitations for specific pollutants (DEP 2012). Consequently, there are currently no finfish aquaculture lease sites operating in BHB.

3.3 Fisheries of Concern

While the lobster fishery appears to be currently sustainable, several other fisheries in the bay are of concern because of depleted or diminishing stock or management and conservation issues. In the state of Maine, most commercial marine fisheries are managed at the state level with little input from municipalities so many of those fisheries will not be addressed here. The following is a brief review of fisheries for which community members voiced concern. It is not meant to be a comprehensive review of all fisheries in the bay.

3.3.1 Clams

In 2011, 279,725 lbs of softshell clams were harvested in BHB at a value of $776,167 by 119 harvesters (DMR 2012). Clamming is conducted in mud flats around the bay and some of the most productive areas include the western shore of Trenton and the eastern shores of Blue Hill and Brooklin. Clam harvesting is limited in BHB by a number of factors including loss of traditional access, sanitation (bacterial) closures, and lack of productive beds and/or effective conservation measures. Sanitation closures will be covered in the Chapter 5 Water Quality.

Suggestions for improving clam productivity in BHB include the following:

1. **Regional Shellfish Ordinances:** All of the eight towns in BHB, with the exception of Tremont and Surry, have shellfish ordinances, shellfish committees, and wardens. Trenton

and Ellsworth are also part of the seven-town, regional shellfish ordinance in Frenchman Bay, whose goal is to establish a shellfish conservation program for the participating communities and to insure the protection and optimal utilization of shellfish resources within its limits.

It has been suggested that the towns of Blue Hill Bay might create a similar multi-town ordinance in an effort to reduce costs of license administration and warden fees, enhance conservation efforts, provide recreational opportunities and water quality improvement incentives, and enhance harvester involvement in decision making. Specifically the towns of the Blue Hill Peninsula could work regionally with Ellsworth and on the east side of the bay; Tremont might consider joining towns on Mount Desert Island. For more information about the Frenchman Bay Regional Shellfish Conservation Ordinance visit: http://cityofellsworthme.org/pdfs/ords/ord57.pdf

2. **Public Access:** In recent years much of the coastal land ownership in BHB has changed hands, thus putting public access to clam flats at risk. In Maine, waterfront land is owned to the mean low tide by the property owner. The right to use that private land is limited to fishing, fowling, and navigation. In order to ensure access, towns can work with land trusts or directly with landowners to acquire the land (or partial rights to the land) and/or enter into private agreement with landowners for access. Visit www.accessingthemainecoast.com for a comprehensive website that helps waterfront users, government, public entities, and private waterfront landowners address coastal access issues in their communities.

3. **Shellfish Conservation:** Many clam flats in the bay are believed to be under-productive and as a result some towns are initiating conservation measures. In the town of Blue Hill over one million clam seeds (less than 2" long) have been replanted by taking seed clams from the closed flats (closed to digging due to water quality problems) and moving them to open flats. The goal is to reseed all the open flats in Blue Hill and to make clams a sustainable and renewable resource for future generations. Other conservation measures that could be initiated include restricting the areas where harvesting can occur (flat rotations); applying tree brush or fencing to encourage the settlement of juvenile clams; applying wire fencing or plastic netting to deter green crab predation and encourage juvenile clam recruitment to the flats; and enhancing stocks on flats with hatchery-reared, or cultured clam seed.

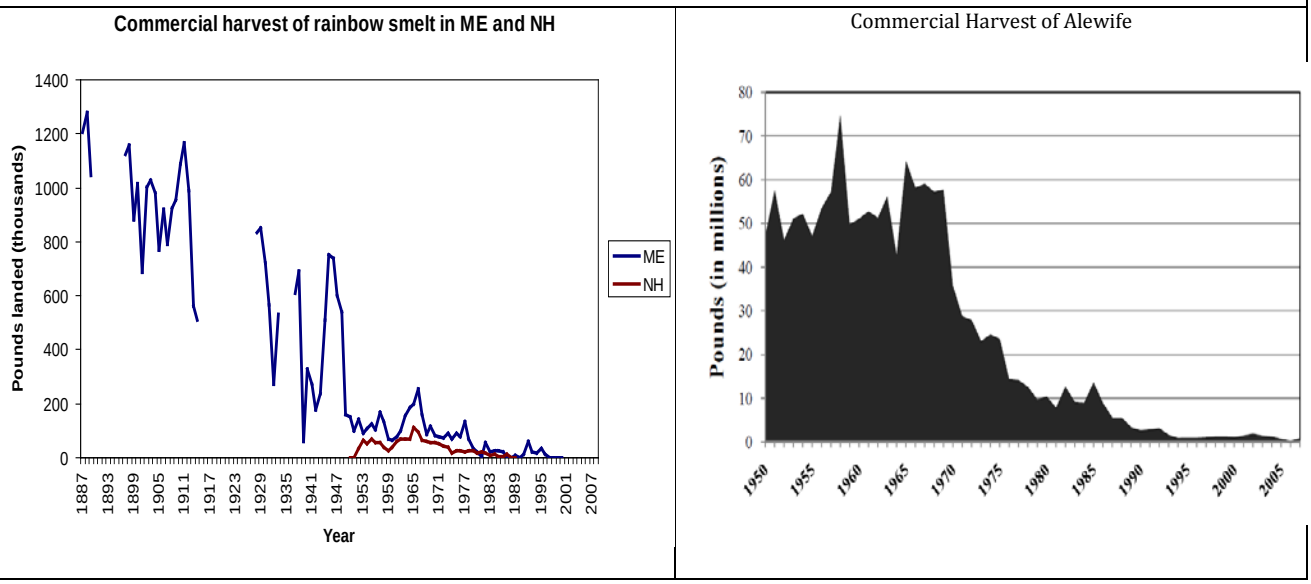
3.3 .3 Migratory Fish

Migratory fish species (also called diadromous fish) are those species that spend part of their life in freshwater and part in salt water. In the Gulf of Maine, eleven species (sea lamprey, shortnose sturgeon, Atlantic sturgeon, alewife, blueback herring, American shad, Atlantic salmon, brook trout, rainbow smelt, Atlantic tomcod, striped bass) spawn and rear in freshwater and migrate to sea at

maturity while one species (American eel/elvers) spawns and rears at sea and migrates into freshwater to mature.

Alewife, rainbow smelt, and elvers (young eels) are of particular interest in BHB since all three are actively harvested. However, smelt and alewife are identified as at-risk by NOAA Fisheries (2012) due to population declines (Figure 3.3). Only those towns that have a DMR-approved management plan in place by January 1, 2012 are permitted to harvest alewives. Possible threats to spawning include water quality (acidity, nutrification, habitat alteration) and obstructions to passage (dams, poorly functioning culverts).

Figure 3.3 Commercial landings of rainbow smelt (left) and alewife (right) in Maine (DMR 2012).



Suggestions for improving migratory fish runs in BHB coastal streams:

1. P**assage.** Passage from the marine environment to freshwater streams, lakes, and ponds is necessary for all migratory fish species. The following streams have known smelt runs: Peters Brook, Meadow and Patten streams, Union River, and Card, Lords, Heath, Parkers Cove, and Tinker brooks (Figure 3.4). In addition, many of these streams also have alewife and elver runs specifically Patten Stream, Union River, and Seal Cove Brook (Figure 3.5). In order to ensure fish passage and to support healthy migratory fish runs, towns should inspect all stream crossings (bridges, culverts, etc.) and repair those crossings that do not provide adequate passage. In some cases, there is federal funding for repairing passage in streams with endangered species. For more information, visit NOAA Habitat Conservation Funding Opportunities at http://www.habitat.noaa.gov/funding/northeast.html. More information on alewives in the Union River can be found at: http://www.gulfofmaine.org/kb/files/9409/Alewife%20reintroduction%20report.pdf

Figure 3.4. Anadromous rainbow smelt spawning grounds and runs in green (DMR 2012).

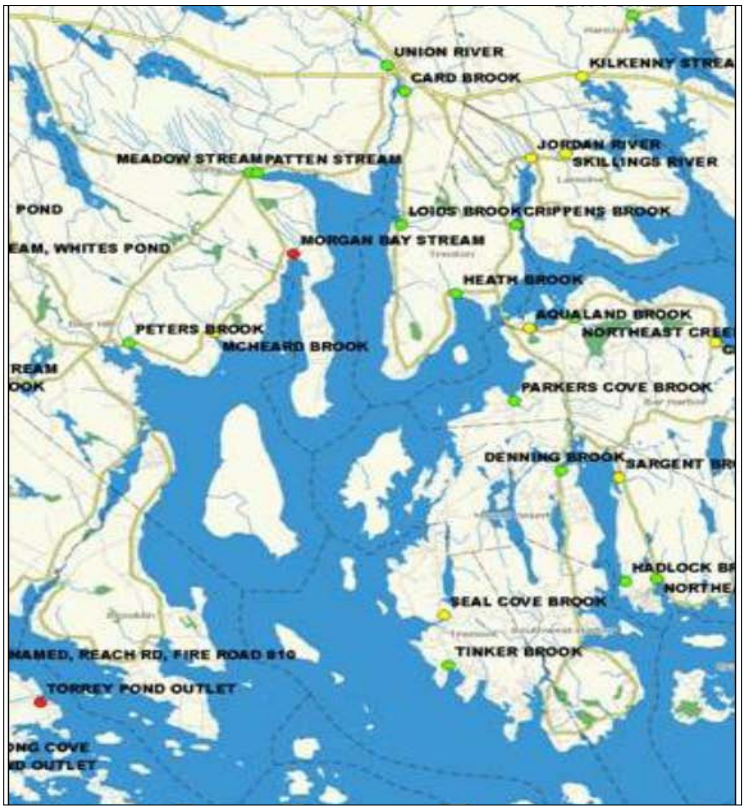
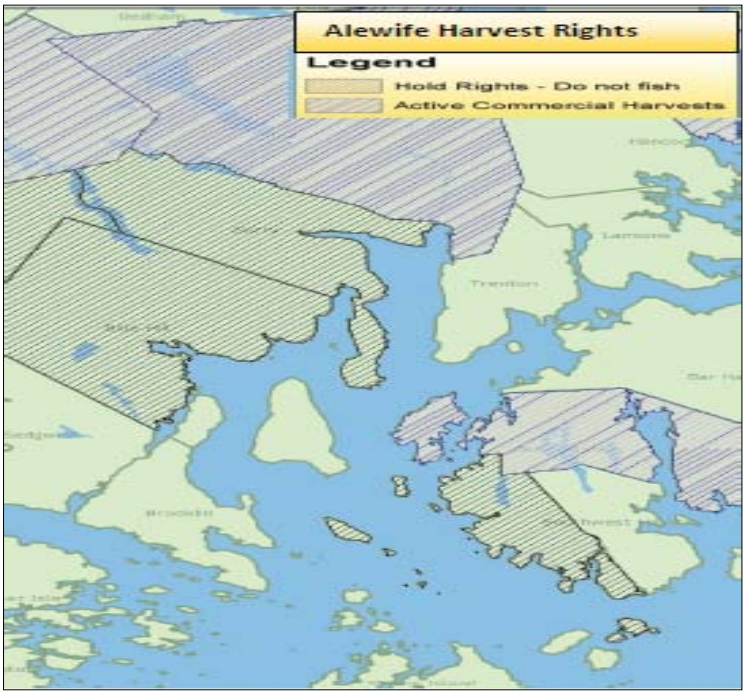


Figure 3.5. Alewife harvest rights by town in BHB (DMR 2012).



2. Union River Dam Relicensing: The current operating license for the Black Bear Hydro operation in Ellsworth on the Union River (below Lake Leonard) expires on December 31, 2017. In preparation for the relicensing, the company is required to conduct an environmental assessment and scoping sessions. Currently, the operators trap and transport migratory fish, including river herring and anadromous Atlantic salmon, from the Ellsworth collection station to upstream stocking areas during the spawning migration. Commission staff will consider and assess all alternative recommendations for operational or facility modifications which could include providing for "volitional fish passage" (fish passing the dam on their own volition without assistance from trucking and transport) for migratory species. Community members are encouraged to contact state (IF&W and DMR) and federal officials (NOAA and USFWS) to voice their concern. To receive mailings for the Ellsworth Project send a request by email to efiling@ferc.gov.

3. Habitat Protection. All freshwater and near-shore marine species benefit from intact and functioning ecosystems. Estuaries, bays, and small streams serve as nurseries for many juvenile species and as such should be protected from habitat deterioration. Towns can ensure this protection by helping riparian landowners reduce pollution and maintain riparian buffers and stable embankments. This can be achieved through town planning, the use of protective ordinances, and through educational programs from various state agencies or state-funded programs such as DEP or NEMO (Non-Point Education for Municipal Officials) and conservation organizations.

3.3.4 Scallop Dragging

Upper BHB and Blue Hill Harbor were closed to scallop fishing for several years to allow the area's scallops resource to rebound. When the bay was opened on December 3, 2012, more than 30 boats from all over eastern Maine began dragging Union River Bay and upper BHB. Community members have raised concern over the intensity of harvesting, number of harvesters, and the subsequent damage that was done to the bay. Scallops are usually obtained by means of a heavy metal dredge that is pulled over the sea bottom. Most studies of the impact of this gear type have shown that larger invertebrates, in particular, are severely disturbed (Watling et al. 2001). Specifically, the intense one -day harvesting in Blue Hill's inner harbor destroyed much of the town's mooring field.

1. Since the state's fisheries belong to all citizens of the state, DMR and fishermen should make a specific effort to communicate with community members about their resources and the harvesting practices of each resource. While there are several fisheries advisory boards, there is currently little effort in DMR to engage municipalities, land owners, conservation organizations, or community members. Municipalities and others should advocate for a stronger voice in the management of marine resources. At the time this report was prepared, LD 946 (an act to allow municipalities to petition the DMR to establish dive-only areas for scallops in mooring fields) was being drafted. Community members should follow up on its status and participate in the rule making process

3.3.5 Aquaculture

Concerns continue to surface regarding the siting of aquaculture leases in the bay, specifically from riparian landowners, town governments, and conservation organizations. Included in these concerns is the potential negative impacts of aquaculture on the recreational use and tourism value of the area; concerns about riparian access, navigation, and fishing; and most importantly, proper aquaculture husbandry.

Suggestions for improved aquaculture lease siting include:

1. **Mapping "Appropriate" Areas for Aquaculture.** Design a project that brings together shellfish growers, landowners, municipal officials, and community members to discuss and map out areas are appropriate for safe sustainable aquaculture by species. For example:
   - The areas that will grow mussels are broad and limited by protection from weather, accessibility and other mussel leases. Hard clams and oysters have more specific needs for safe sustainable culture and the growing areas for these two species are very limited.
   - Areas that are appropriate and sustainable for aquaculture from the community's perspective, including aesthetics, property value concerns, recreation, and environmental and ecological concerns.
   - What areas are closed due to bacterial or other pollution and what is the source?
   - Where does the community feel aquaculture *should* be in the Bay?

- Where and how large are the current wild shellfish populations?

2. **Advocacy.** Community members should advocate to the state legislature to change the existing aquaculture siting laws to include the economic impact to tourism, recreational, and real estate values. Furthermore, community members should advocate for the adoption of more sustainable aquaculture practices including research and development of land-based fish rearing systems, which are currently being explored in Canada.

3.3.6 Groundfish

According to the Penobscot East Resource Center (PERC 2012), the groundfish fishery (e.g., halibut, cod, flounder) in eastern Maine collapsed by the early to mid 1990's and has not rebounded as in other parts of the Gulf of Maine. The reasons for the decline include lack of protection, discarded by-catch that included juvenile groundfish, targeting of spawning aggregations, and simply too much fishing pressure in too small an area. PERC's Downeast Groundfish Initiative (DEGI) is designed to diversify the regional fisheries-based economy by restarting the once highly productive groundfish fishery in eastern Maine. As stakeholders in rebuilding depleted stocks, fishermen can be an integral part of the governance of fishing, taking responsibility for its sustainability.

For more information about the DEGI, visit
http://www.penobscoteast.org/downeast_groundfish_initiative.asp.

CHAPTER 4
TOURISM AND RECREATION

Blue Hill Bay provides a range of opportunities for tourism and recreation. This chapter considers trends in recreational use of the bay by residents and visitors, current economic benefits, and future prospects for emerging industries like eco-tourism. The need for new infrastructure resulting from anticipated and latent consequences of recreational use will also be considered.

4.1 Brief History of Recreation and Tourism on Blue Hill Bay

European settlement began in earnest around the perimeter of Blue Hill Bay in the 1700s. The towns began organizing at this time based on economic activities including fishing, logging, boat building, and granite mining. The natural environment that was conducive to these resource-based activities also inspired a variety of recreational uses.

Perhaps the most colorful recreational movement began in the late 1800s as "rusticators" built camps on Mount Desert Island and the Blue Hill Peninsula. Daily train and steam ship service enabled well-heeled families to build Downeast summer homes within reach of Boston and New York City. Large hotels were built to accommodate tourists that would stay for weeks or months at a time.

The rusticators had a significant impact on local trades, stimulating jobs in construction, transportation, domestic services, boat building, and agriculture. The rusticators may have felt they were escaping urbanity, but they brought many of their cultural values and introduced new recreational pastimes (Maine Memory Network: Blue Hill 2012).

The Rockefeller family continued to purchase and donate land and infrastructure through the early 1900s to create Acadia National Park, so named in 1929. The depression years slowed the pace of tourism and many of the big hotels were lost. These difficult years played an important role in redefining regional tourism. Public works projects funded through the Civilian Conservation Corps created a variety of recreational venues from park facilities on Mount Desert Island to the Sea Plane Ramp in Trenton.

The pace of tourism and the size of the recreation industry accelerated following World War II, with improvements in the highway network, widespread ownership of reliable automobiles, and resurgence in nature-based recreation. The new tourists were drawn from a much wider range of economic backgrounds and created new demands for temporary lodging, campgrounds, restaurants, and recreation.

4.2 Current and Future Recreation and Tourism Activities

A 2011 Maine Office of Tourism study found that overnight visitors to the Downeast and Acadia region are primarily drawn from a higher socio-economic status segments. A remarkable 84% of visitors indicated that they had a college degree or higher, and 52% listed incomes in excess of $100,000. (DPA 2011).

Bar Harbor and Acadia National Park continue their dominance as destinations. 7% of a random sample of Downeast and Acadia overnight tourists visited Blue Hill, 23% visited Ellsworth, while 79% visited Bar Harbor. The primary activities for visitors included touring (42%) and outdoor recreation (40%), while other primary activities fell below 10%. When asked about all activities, visitors indicated a much wider variety of responses including shopping (69%), Sightseeing (59%) and Scenic Views (62%). Big attractions included hiking, visiting the beaches, swimming, biking, boating and fishing (DPA 2011).

Day visitors in the 2011 study shared similar characteristics with the overnight visitors. They were though not quite as affluent and spent less on average. Not surprisingly, day visitors draw more heavily from Maine residents.

A 2011 Maine Office of Tourism Traveler Segmentation Study identifies seven equal-sized segments of visitors to Maine, including Non-stop Activity Seekers, Effortless Travelers and Nature Embracers (DAP 2012). The published study does not discriminate between regions of Maine, though most of the segments would find reason to visit Downeast.

Popular recreational activities on the bay include swimming, kayaking, sailing, motor boat cruising, fishing, and bay tours. Outdoor recreational activities around the coast of the bay include scenic touring, bird and wildlife watching, and hiking.

4.2.1 Sales

A number of local businesses sell watercraft, fishing, and swimming supplies primarily in Ellsworth but also in surrounding communities. These include specialty businesses such as Branch Pond Marine, sports outfitters including Cadillac Mountain Sports, and department stores including Walmart and Mardens. Specific sales figures for these items are not published, though demand is sufficient to justify the widespread availability of these goods.

4.2.2 Rental

Those that arrive without gear may use gear rental services located in several towns including Bar Harbor, Ellsworth, and Blue Hill. Most common among these are the kayak rental services.

4.2.3 Guides

A number of small businesses operate as guides on Blue Hill Bay. The two most common forms of guiding are motor boat tours, often in lobster boats, and kayak tours. Local businesses include Old Quarry Ocean Adventures, Coastal Kayak Tours, and

Aquaterra Adventures in Bar Harbor.

4.2.4 Service

Recreationists and visitors require a wide assortment of service information, health care, boat repairs, and even emergency rescue. However, the most significant service activities for residents and visitors are food and lodging. The financial impacts of these sectors are highlighted below.

4.3 Economic Impacts of Recreation and Tourism

4.3.1 Establishments, Employment, and Payroll

The 2010 US Census County Business Patterns (CBP) illustrates the important role that tourism plays in Hancock County. Direct employment in marine-based recreation is not easily captured, even within the highly detailed taxonomy of the North American Industrial Classification System (NAICS). The Census derives the CBP report based on the Business Register, a system that attempts to track all business establishments (Table 4.1). Seasonality presents a particular challenge for outdoor recreations as many establishments operate less than six months per year. Other substantial establishments, like large discount chains, do not fit into an identifiable recreation-related NAICS, despite their high volume of sales of fishing, boating, swimming, and other water-based recreation equipment.

A second caveat is that the data are not disaggregated into county subdivisions or towns. As a result, the data for Hancock County include the very recreation-rich Penobscot and Frenchman Bays. Businesses in the county serve all three major bay systems, and one might assign use roughly into thirds.

Table 4.1. North American Industrial Classification of Establishments in Hancock County (County Business Patterns, 2010)

NAICS	Industry	Number of Establish-ments	Employ-ees	1st quarter payroll ($1,000)	Annual payroll ($1,000)
441222	Boat dealers	6	a	90	510
483	Water transportation	6	21	110	933
483112	Deep sea passenger transportation	1	a	D	D
483114	Coastal passenger transportation	4	19	100	781
4883	Support activities for water transportation	2	a	D	D
488310	Port and harbor operations	1	a	D	D
488390	Other support activities for water transportation	1	a	D	D
487	Scenic and sightseeing transportation	10	13	130	1,633
487110	Scenic and sightseeing transportation, land	2	a	D	D
487210	Scenic and sightseeing transportation, water	7	12	119	1,151
487990	Scenic and sightseeing transportation, other	1	a	D	D
71	Arts, entertainment, and recreation	81	205	1,096	7,276
71393	Marinas	15	37	191	1,115

72	Accommodation and food services	301	1,440	5,093	52,224
721	Accommodation	117	360	1,602	22,074
7211	Traveler accommodation	103	339	1,460	20,436
721110	Hotels (except casino hotels) and motels	58	278	1,305	17,775
72119	Other traveler accommodation	45	b	155	2,661
721191	Bed-and-breakfast inns	37	b	112	2,278
721199	All other traveler accommodation	8	a	43	383
72121	RV parks and recreational camps	14	b	142	1,638
721211	RV parks and campgrounds	10	a	41	875
721214	Recreational and vacation camps (except campgrounds)	4	a	D	D
722	Food services and drinking places	184	1,080	3,491	30,150
722110	Full-service restaurants	111	668	2,103	21,587
72221	Limited-service eating places	53	317	944	6,109
722211	Limited-service restaurants	42	291	873	5,422
722213	Snack and nonalcoholic beverage bars	11	b	S	687
2007 North American Industry Classification System (NAICS)					
Meaning of 2007 North American Industry Classification System (NAICS)					

With these limitations in mind, the data indicate a relatively limited number of establishments that cater directly to water-based recreation. Taking these industries as a whole, Hancock County is reported to have 36 establishments, 70 employees, and $3,709,000 in annual payroll. If we could include sales and service from large diversified establishments, such as large discount chains, these figures would be much higher. While the data do not distinguish recreational activity of residents and tourists, comparison of the first quarter payroll suggests that resident demand may account for half of the total demand in some industries and less than half in others.

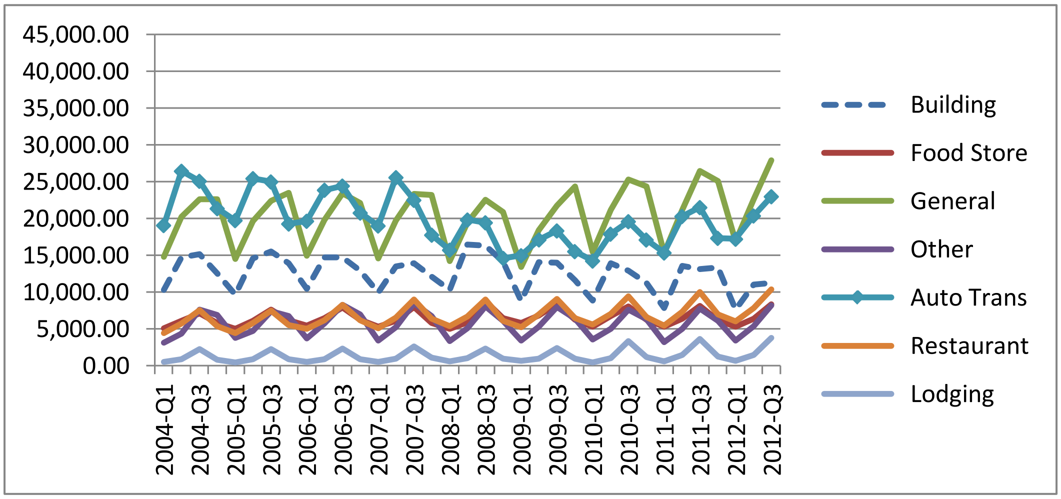
The indirect benefits of tourism to Hancock County are more substantial. Considering the most identifiable industries of restaurants and lodging, the figures for restaurants are 184 establishments, 1,080 employees, and an annual payroll of $30,150,000. For lodging the numbers are also substantial with 117 establishments, 360 employees, and annual payroll of $22,074,000. Lodging is the most seasonal of industries, with only 7% of annual payroll distributed in the first quarter.

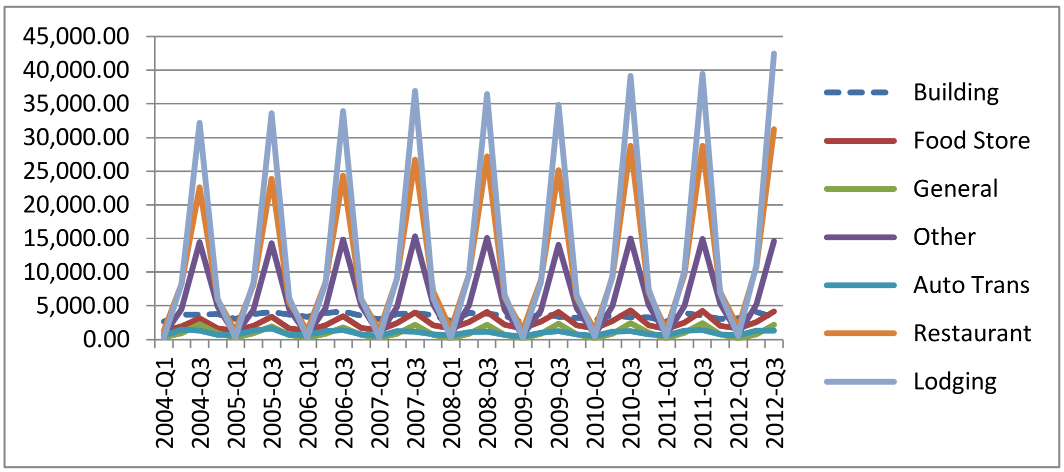
4.3.2 Sales Tax as an Economic Indicator

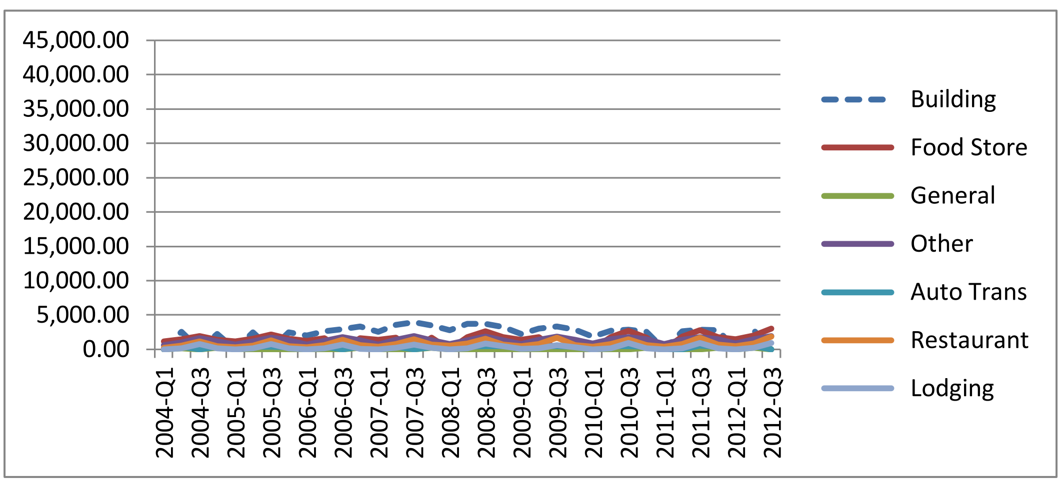
Sales tax receipts for Hancock County indicate that the economy grew throughout the period from 2000 – 2008 (Figure 4.1), but the impacts of the banking crisis were being felt by 2009 in several sectors. Tourism particularly impacts spending on restaurants and lodging, which by 2009 had grown to the 3rd and 5th largest economic sectors respectively in Hancock County.

Taxable sales are reported quarterly for by economic area in Hancock County. These economic areas include the Blue Hill, Ellsworth, and Bar Harbor sub-regions. While these sub-regions include areas outside of the Blue Hill Bay watershed, they show general trends.

Figure 4.1. Ellsworth, Bar Harbor, and Blue Hill Taxable Sales (Ellsworth top, Bar Harbor middle, and Blue Hill bottom) (Maine DACF 2013).







Sales data do not distinguish residents from tourists. However, quarterly sales tax revenues indicate that the restaurant and lodging sectors spike dramatically during the summer tourist season, ahead of all other sectors, and plummet during the off season to produce fewer revenues than any other sectors. The case for Bar Harbor is exceptional, while the Blue Hill Peninsula operates at much lower levels of economic activity. The recent economic downturn appears in the data, particularly affecting auto sales and building supplies, but appearing to have less impact on restaurants and lodging.

Attribution of sales tax revenues to Blue Hill Bay as opposed to other tourism activities is not possible with aggregated county-level tax receipts. Most visitors, like their early rusticator counterparts, engage in a variety of recreational activities. Further, there are intrinsic values to the bay that are not connected with being on the water. For instance, the value of land-based recreation, such as hiking and scenic touring, are influenced by the value of the scenic views, including the view over Blue Hill Bay. Taken as a whole, however, tourism during the summer and autumn months is extremely important to the regional economy.

4.4 Recreation and Tourism Values and Concerns

This section of the report summarizes the recreation and tourism values and concerns that were identified by participants in three Blue Hill Bay Needs Assessment public meetings held in Ellsworth on March 5. November 26, 2012, and March 11, 2013 in addition to outreach meetings held with the participating communities over the course of the study. Many of the issues and recommendations overlap with concerns expressed in fisheries, water quality, land use, and development. All discussions were held as plenary sessions including all of the attendees. Attendance in all cases was open to the public and encouraged through press releases, website announcements and social media. Information on attendance is included in the appendices.

4.4.1 Assets

- Healthy, natural environment, beauty, birds, and wildlife (Map 7)
- Recreation including boating, sailing, kayaking, scenery, hiking (CCGIS Map)
- History, culture, and archeology (CCGIS Map)
- Economy – serving residents and visitors recreating on Blue Hill Bay
    - Natural resources
    - Working waterfront
    - Creative economy
    - National Park and other conserved lands (Map 8)
    - Summer residents – contributions to the economy

The natural environment is widely accepted to be among the most significant asset for this region. Coastal natural resources touch on all of the senses, providing sustenance and aesthetic benefits. The property valuation map is one indicator of the dollar value of proximity to Blue Hill Bay, as shorefront land commands much higher prices.

Recreational opportunities were also recognized as strengths of the bay. While swimming and boating constitute a measurable share of the bay tourism market, a much larger segment of visitors come near to the shore, walking in parks or public waterfront area, or simply touring along the perimeter.

A smaller segment of heritage tourists visit the Blue Hill region to discover the history and culture (see www.eastpenobscothistory.org and www.downeastexplorer.org for links to area historical societies). While visitation data to area museums and historical societies is modest, there is a higher level of demand for walking through historic village centers and working waterfronts.

4.4.2 Concerns

- Threats to Water Quality:
  - septic systems, overboard discharge systems, or other point source polluters
  - discharges from boats,
  - lack of privies at recreational areas
  - toxic chemicals – such as bromated flame retardants
  - Non-point pollution such as runoff from parking lots, roads
- Cultural Changes – perceptions:
  - Loss of Public Access – for fishing and for recreation
  - Lack of "all tides" access for boat ramps and docks
  - User conflicts, including fishing, dragging and recreation
- Land Use:
  - Incompatible land use
  - Impacts of development, rising property values and taxation on working waterfronts (not necessarily connected with recreation)
- Natural Systems:
  - Sustainability of fishing, dragging, clamming, lobstering, seaweed harvesting
  - Monoculture - lobsters
  - Conservation of breeding habitat
  - Climate Change –acidification, temperature change, storm surges, and sea level rise
  - Invasive species

(Source: Blue Hill Bay Public Meetings. March 5, 2012 and November 26, 2012)

The significance participants placed on natural resources, history and culture is reflected in their concerns about threats to the Blue Hill Bay. These concerns go beyond the scope of recreation and tourism, including climate change, toxic chemicals and sustainable fisheries.

Of these concerns, recreation and tourism were considered to be problematic in a few cases. These include the impact of tourism and recreation on Blue Hill Bay ecology and the local economy.

Environmental concerns included fears of contaminants and litter being discharged from fishing and recreational boats, yachts and cruise ships into Penobscot, Blue Hill and Frenchman Bays. On the land-side, concerns were also raised about the capacity of local septic and sewer systems to

handle the spike of summer visitors. There are few public restrooms or privies available at popular shore paths and beaches, which can result in runoff pollution.

While recreation and tourism were recognized as a net-positive for the economy, some concerns were also noted. Visitors come in part to enjoy traditional Maine villages, working waterfronts, pristine coastline and local cuisine. Their visits have latent consequences for these very assets, including land-price pressures, service demands, and expectations for amenities.

For instance, recreational boating can place new demand on existing boating infrastructure. Local fishermen are able to work around the limitations of high-tide only boat ramps, timing their use with the tides. Recreational users, particularly day visitors, need all-tide access, which in turn creates demands for channel dredging, ramp and dock extension. The cost of creating all-tide access where tidal variations can reach 15 feet is not trivial. Recreational users compete for moorings, finger floats for dinghies, and space on piers that can generate conflicts as well.

Recreational users may also present challenges to commercial fisheries practices such as aquaculture, early morning operations, and odor from bait, traps and other gear. Discussion of whether to enhance public access is ongoing in all of the Blue Hill Bay communities.

Concerns were also expressed about changes in the local environment and economy that may depress recreation and tourism. The collapse of ground fish stocks greatly reduced the viability of sport fishing on Blue Hill Bay. Threats of invasive species in combination with change in pH and temperature may create new challenges. Recreation and tourism also benefit where there is easy access to the bay. When informal access points disappear, the remaining public access points become more congested and less enticing for visitors.

4.5 Summary of Recreation and Tourism Needs

Recreation and tourism on Blue Hill Bay rely on many of the same assets that support fisheries, water quality, land use and development. When these assets are diminished, such as the loss of near-shore ground fish stocks, visitation may also decline.

Participants in the Blue Hill Bay public meetings indicated a number of needs that would support future tourism and recreation.

4.5.1 Improving the Planning Process

- Ongoing, inter-local process for managing critical natural resources and public infrastructure

  The recent effort of many towns in neighboring Frenchman Bay to coordinate clam harvesting, while not directed to recreation, has been recognized as a success. When towns work together, issues like public access, preserving water-dependent users, all tides boat launches, recreational fishing and kayaking, and waste management may move ahead more efficiently. More effort is required to prevent crises before they occur.

Blue Hill Bay is surrounded by eight towns, with several more at hand. The Mount Desert side of the bay has a regional collaborative body in place called the MDI League of Towns. The MDI League of Towns consists of local government representatives, typically a selectman, administrative assistant or town manager from Bar Harbor, Mount Desert, Southwest Harbor, Tremont, Trenton, Lamoine, Swans Island, Cranberry Isles, Ellsworth (recently joined) and Acadia National Park. The MDI League provides forum for member towns to discuss issues including shared municipal services, county and state policy, transportation priorities and tourism management. A comparable inter-local planning group for the west side of the bay has existed intermittently over the last decade, but is not currently active. The MDI League is a particularly effective body because it made up of town representatives that have the authority to work between their local elected government and the regional organization.

- Public participation in the planning process brings out additional resources.

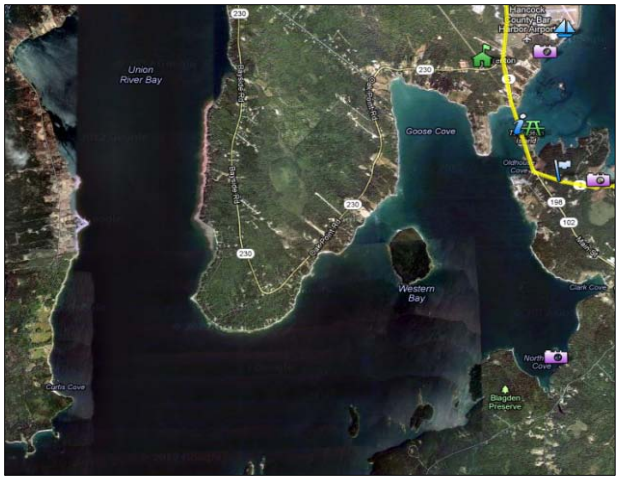
  In addition to local governments, business and non-profit organizations can contribute to the planning process. Several regional Chambers of Commerce, conservation organizations, and land trusts contributed to this study. Land trusts play an important role in creating public recreation venues while the Chambers of Commerce help to organize and market local sales and services relating to recreation. Another important partner is the non-profit organizations working directly on health and recreation. Among these are Friends of Acadia, Healthy Acadia, and Healthy Peninsula. These organizations provide important resources for building trails, creating informational brochures, and engaging the youth in civic activity.

4.5.2 Investing in Infrastructure

- Additional infrastructure for recreation can benefit the local economies
- Public access to all-tides boat ramps and docks
- Bayside trails and shoreland for walking
- Sites for camping, picnics, kayak tours and public events
- Sanitary "pump-outs" in harbors

All of the towns surrounding Blue Hill Bay provide some level of public access. Several operate at all tides, while some are not accessible at low tide. All of the facilities would benefit by a mix of additional investments, including all-tides access, piers, floats, pump-outs for boat septic tanks, additional moorings, parking, services, and more. Most of the existing facilities operate without a harbormaster present. HCPC is currently working with a number of towns planning recreational sites, though at this time there are no projects being built on Blue Hill Bay. A significant effort is underway in Trenton at the Airport Sea Plane Ramp facility to create a scenic turnout and improved boater access. This site lies just to the east of the Blue Hill Bay area with the MDI Narrows restricting boat access during low tide.

HCPC is working with the towns of Trenton and Bar Harbor to implement a corridor management plan for the Acadia Byway (www.acadiabyway.org). The only moment when the Acadia Byway provides a clear view of Blue Hill Bay is crossing the Thompson Island Bridge onto Mt Desert Island and looking over Goose Cove and Western Bay, as depicted in this map.



Acadia National Scenic Byway

4.5.3 Environmental Sustainability

- Diverse fish stocks will benefit recreational fishing as well as local restaurants. Local guide services, boat rentals, sales, and service are likely to grow when recreational fishing is viable. Invasive species can have negative consequences for recreation and tourism.

- Recreational use is enhanced by clean water, particularly fishing and swimming. Water quality recommendations are addressed in Chapter 5. Infrastructure improvements, particularly pump out stations for septic waste in boats can contribute to preserving water quality.

- Community events celebrate the environment. Acadia National Park is working with Mount Desert area towns to promote a night sky festival every autumn. Other communities celebrate local products, such as the Machias Blueberry Festival and the annual Down East Salmon Federation Smelt Fry in Columbia Falls. Guides are taking kayakers out at night for bioluminescent paddles. Additional opportunities for celebrating Blue Hill Bay natural resources should be explored.

CHAPTER 5
WATER QUALITY

5.1 Introduction and Water Classification

The term water quality refers to the biological, chemical, and physical characteristics of water, and in the state of Maine it is a measure of habitat for fish and other aquatic life and its suitability for designated uses (e.g., navigation, drinking water, agriculture). As such, the state establishes water quality goals through its water classification system, which is governed by Maine statue, 38 MRSA Sections 464(2), 464(2-A) and 464(3). Table 5.1 shows the classification of various waters in Blue Hill Bay Watershed. Class AA is the highest classification for freshwater while Class SA is the highest classification of estuarine and marine waters; Class C and SC are the lowest classifications.

Most streams in the drainage are Class A or B with the exception of Carleton Stream (Table 5.1 N.B.). Although there are no Class SA waters in the bay, several marine waters adjacent to Acadia National Park are. This classification is applied to waters that are outstanding natural resources and should be preserved because of their ecological, social, scenic, economic or recreational importance. For more information, see DMR link for Class SA waters: http://www.maine.gov/dep/water/wd/vessel/SA/area_c.pdf

Table 5.1. Classification of Maine Waters (38 MRSA Sections 464(2), 464(2-A) and 464(3) 2012)

Water Body	**Classification**
Union River	
Mainstem from the outlet of Graham Lake to tidewater	Class B
Tributaries entering below the outlet of Graham Lake	Class B
Outlet of Green Lake (Ellsworth)	Class B
All other tributaries including East and West Branch	Class A
Minor Drainages	
All brooks, streams and segments of those brooks and streams that are within the boundaries of Acadia National Park	Class AA
Carleton Stream, main stem, between First Pond and Second Pond	Class C *
Carleton Stream, main stem, from the outlet of First Pond to tidewater at Salt Pond	Class C *

All other waters draining directly or indirectly into tidal waters	Class B
Estuarine and Marine Waters	
All estuarine and marine waters	Class SB

** Late in 1972, Kerramerican, a subsidiary of Kerr Addison of Toronto, commenced production at the Black Hawk Mine in Blue Hill. The ore was processed on site for zinc and copper concentrates and water flowing from the tailings ponds was either recycled in the milling process or discharged to Carleton Stream. In 1975, untreated mine tailings were released directly to Carleton Stream through broken pipes and valves. Analytical results of source samples collected from the property in 1995 and 1999 indicated the presence of arsenic, silver, mercury, iron, cadmium, lead, zinc, copper, and chromium. Affected media at the site include soil, surface water and sediment, and groundwater (Interstate Technology Regulatory Council 2013).*

5.2 Nonpoint Source Pollution

Nonpoint source (NPS) pollution comes from many diffuse sources and is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and ground waters. Nonpoint source pollution can seriously impact water quality standards and degrade a body of water to the point where it no longer meets its classification.

5.2.1 Urban Runoff

Card Brook upstream of Water Street.
(Photo: Maine DEP Biomonitoring Program)

Water quality monitoring performed by the Maine Department of Environmental Protection (MDEP) in August 2006 indicates that 1.2 miles of Card Brook in Ellsworth does not meet the water quality standards for bacteria, dissolved oxygen, and aquatic life for a Class B stream. The stream flows from its headwaters in Lamoine and Hancock through a wetland and developed areas until it flows under High Street and Water Street and into the Union River near Indian Point (City of Ellsworth 2011). The source of impairment is related to impervious surfaces in the developed areas, such as roads, parking lots, roofs, and compacted soils (Map 9).

In response to this impairment, the City and Card Brook Watershed stakeholders are working on identifying specific sources of stormwater runoff, addressing these issues with best management practices and low-impact development strategies, and providing for the prevention of future

degradation through improved stormwater control ordinances. The City has applied for federal funding to create a Watershed Management Plan under Section 319 of the Clean Water Act. Watershed Management Planning works to actively involve all stakeholders in planning for the long-term improvement and protection of water quality. In addition to reducing the impacts of impervious surface, reductions in other sources of runoff such as lawn and garden fertilizers and pesticides should be implemented.

5.2.2 Sewage Pollution from Boats

Human and animal waste contains fecal coliform and other bacteria and viruses which can cause severe human health problems. The untreated sewage from two recreational boaters in one weekend puts the same amount of bacterial pollution into the water as does the treated sewage of 10,000 people (MDMR 2011). It is therefore illegal for boaters to discharge untreated sewage directly into the water, unless they are 3 miles or farther offshore. While on the boat, fecal matter and other solid waste should be contained in a U.S. Coast Guard-approved marine sanitation device (MSD) (toilet). Portable toilets should be emptied into approved shoreside waste handling facilities, and holding tanks should be discharged into approved pump-out stations. Blue Hill Bay has three pump-out boats and one pump-out station available in the region:

- Ellsworth Harbor Park and Marina Pump Out Station
- Blue Hill: Kollegewidgwok Yacht Club 374-5581 Channel 9 M
- Bass Harbor: Morris Yachts 244-5509 Channel 9 P
- Bass Harbor: Red Fern Boat/Up Harbor Marina 266-0270 9 M

5.2.3 Bacterial Closures of Shellfish Growing Areas

Clams, and other bivalves living in coastal tide flats, are filter feeders. They acquire nutrients from plankton which they absorb from sea water that they siphon through their digestive tract. If the water that covers the clam flat at high tide is contaminated with fecal bacterial pollution, clams can accumulate unhealthy levels of bacteria. The state's Growing Area Classification Program evaluates all shellfish growing areas in the state to determine their suitability of harvest (MDMR 2012). Each growing area is classifies as one of five classifications based on marine water sampling (Table 5.2).

The following growing areas have conditional, restricted, or prohibited closures (Map 10 or visit DMR for more information http://www.maine.gov/dmr/rm/public_health/closures):

Growing Area EF: Western Blue Hill Bay [Naskeag Pt, Brooklin to Burnt Pt, Newbury Neck, Surry (including Long, Tinker, Bar, Trumpet and Ship Is)] *1863* Area No. 39 Blue Hill Harbor and vicinity (Brooklin, Sedgwick, Blue Hill)
Area No. 39-C Herrick Bay and Eastern Flye Point (Brooklin)

Growing Area EG: Eastern Blue Hill Bay [Burnt Point, Newbury Neck; the causeway at Mount Desert Island Narrows to the eastern point forming Bennett Cove, Southwest Harbor] *1862/1863* *Area No. 40 Northern Morgan Bay (Surry), Union River Bay, Patten Bay and Heath Brook (Surry, Ellsworth, Trenton), Goose Cove (Trenton)

Table 5.2. Maine Shellfish Classification Definitions (DMR 2011)

Classification	Status	Shellfish Harvesting Activity
Approved	Open	Harvesting allowed
Conditionally Approved	Open	Harvesting allowed except during specified conditions (rainfall, STP bypass or seasonal)
	Closed	Harvesting NOT allowed
Restricted	Open	Depuration and/or Relay harvesting only
Conditionally Restricted	Open	Depuration and/or Relay harvesting allowed except during specified conditions (rainfall, STP bypass or seasonal)
	Closed	Harvesting NOT allowed
Prohibited	Closed	No harvesting allowed or water use allowed for processing (administratively imposed precautionary closure)

The economic loss to clammers and the local economy from clam flat closures can be in the thousands of dollars. Fixing pollution sources to improve water quality and increase harvestable shellfish areas can be an expensive process for individual landowners and towns. However, there are several grants and loans available from a variety of state and federal sources that can be used to fund projects. Table 5.3 lists several possible sources.

Table 5.3. Grants available to improve water quality (DMR 2012).

Funding for:	Who Can Apply:	Type:	Agency:	Name:
Septic Systems	Individual	Grant	USDA Rural Development	503 Repair & Rehabilitation Grant Program
	Individual	Loan	USDA Rural Development	503 Repair & Rehabilitation Loan Program
	Individual	Loan	Maine State Housing	Septic Loan Program
	Municipalities and Sewer Districts	Loan	ME State Planning Office	Great American Neighborhood Sewer Extension Loan Program
OBDs	Individuals, Local and Regional Government	Grant	Maine DEP	Overboard Discharge Re-placement Grant Program
Nonpoint Source Pollution	Government and Nonprofit Organizations	Grant	Maine DEP	319 DEP Nonpoint Source Water Pollution Control Grant Program
Education, Outreach, and Conservation		Grant	Maine Sea Grant	Program Development Funds
	State Natural Resource Agencies	Grant	Maine Outdoor Heritage Fund	Maine Outdoor Heritage Fund Grants

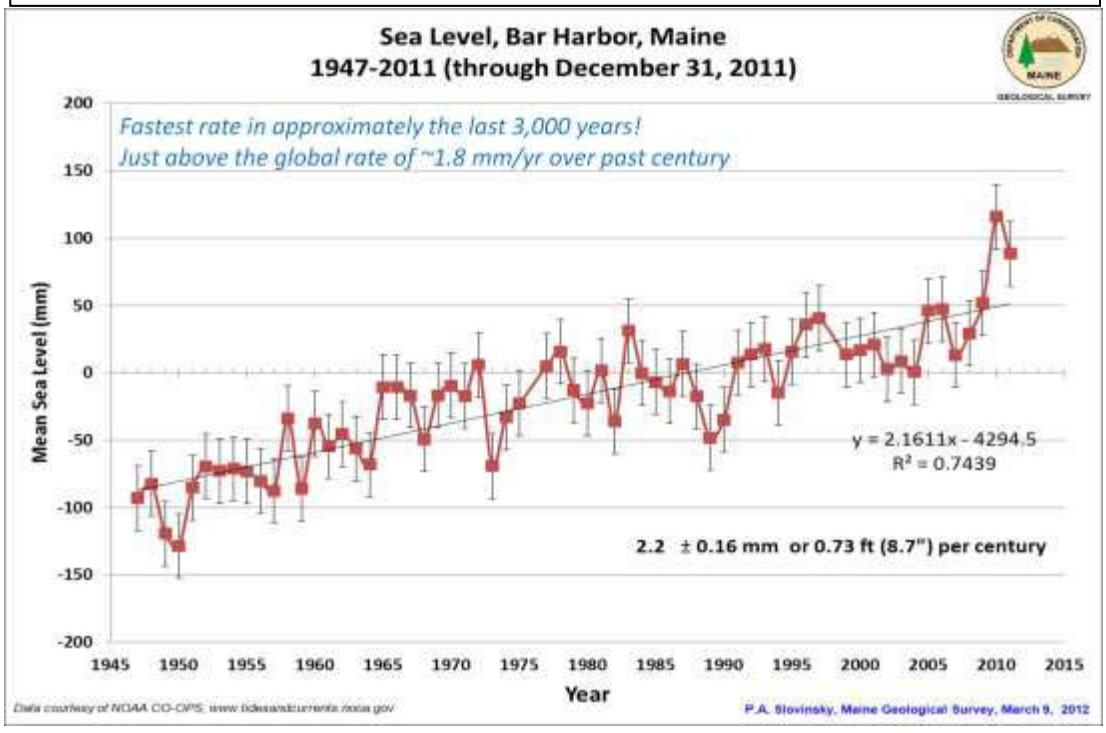
5.2.4. Erosion and Sea Level Rise

Data documented by NOAA (Figure 5.1) indicate that Gulf of Maine sea levels have increased approximately 8.7 inches in the last century due to atmospheric warming, volume increases from melting glaciers, and global climate variations (e.g., El Nino and La Nina). Sea level rise is both gradual and extreme. During extreme precipitation events, flooding may cause serious erosion and subsidence in low lying coastal areas and damage infrastructure.

Suggested adaptation strategies when planning for sea level rise and storm events include (Slovinsky 2012):

- Ensure that water-based infrastructure is adequately constructed and away from high water.
- Retrofit storm drains against tidal flow.
- Elevate or retrofit vulnerable infrastructure, including stormwater pumping stations, roads, culverts and bridges.
- Remove tidal restrictions and consider the use of tidal flow control techniques.
- Use natural and mixed buffers against erosion and flooding.
- Identify and conserve areas of undeveloped uplands which may allow for the landward migration of coastal marches and tidal floodplains.

Figure 5.1. Sea Level Rise, Bar Harbor, Maine (NOAA 2011)



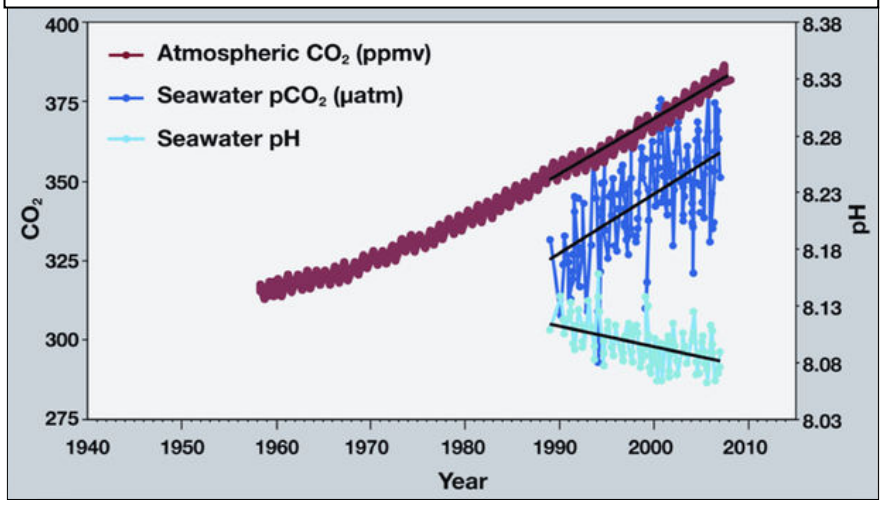
5.3 Marine Environmental Research Institute Water Quality Monitoring

The Marine Environmental Research Institute (MERI) has monitored 45 sites in the bay between April and October since 2004. The nine-year trend shows that water temperature in the bay has increased 1.56 degrees Celsius in Blue Hill Bay. Coastal salinity has increased an estimated .06 ppt/year or .51 ppt over the course of MERI's monitoring. Offshore salinity has increased an estimated .23 ppt/year or 1.96 ppt over the course of MERI's monitoring. Chlorophyll-a has increased an estimated 0.4 ug -L/year or 3.03 ug/-L over the course of MERI's monitoring. In 2012 the DO at offshore sites ranged from 7.01-10.15 mg/L. High DO levels indicate that we are not experiencing eutrophication in Blue Hill Bay. The nitrate levels were well below the EPA reference value of 10 mg/L and phosphates were also normal, indicating that the sites that MERI monitors are not adversely affected by local agriculture and fertilizer treatments. MERI has not found any clear sign of ocean acidification in Blue Hill Bay, but a longer time series and more frequent measurements will give a more accurate picture of the trends in pH in the Bay. Data can be accessed at: http://www.gulfofmaine.org/kb/2.0/record.html?recordid=9782

5.4 Ocean Acidification

Ocean acidification occurs as a result of the burning of fossil fuels and the subsequent increase in atmospheric carbon dioxide (Figure 5.2). Acidification has a particularly strong impact on shellfish because shells are made of calcium carbonate and acidity can cause the shells to dissolve or not form properly. Ocean acidification is suspected by many clammers to be the cause of low seed set in some of our regional clam flats (DMR 2011).

Figure 5.2. Correlation between rising carbon dioxide levels in the atmosphere and nearby ocean at Mauna Loa, HI (DMR 2011).



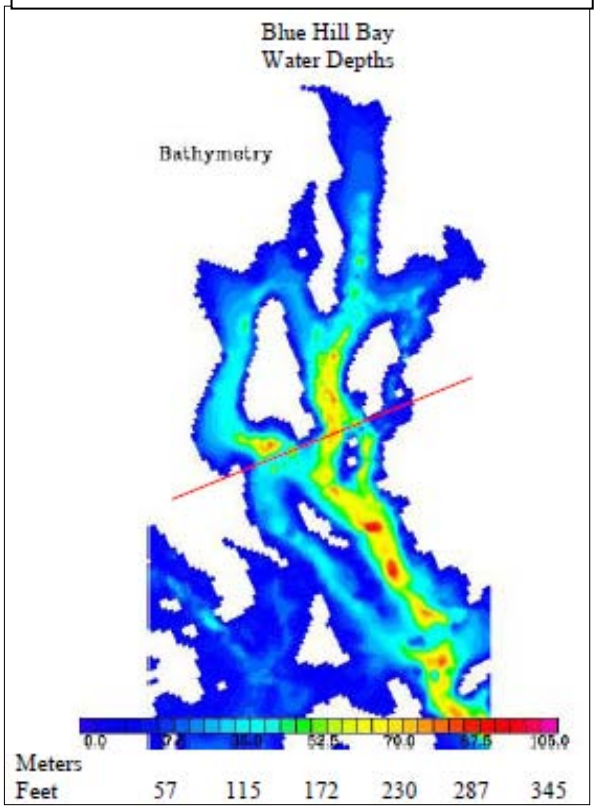
In June 2012, the Frenchman Bay Shellfish Committee discussed the possibility of adding shells to clam flats in order to raise the pH and decrease the acidity with DMR. The concept is based on studies conducted in Wiscasset and Waldoboro that showed an increase of pH on clam flats and a viable set of juvenile clams after 4 oz. per square foot of crushed clam shells were spread across the flats. They worked closely with DMR and DEP to set up the project. Over two years, members of the shellfish committee spread 12 tons of crushed clam shells over 7 shellfish flats. Although the results are still inconclusive, and it will take a few years to see the full impact of the project, to date, the flats appear to be seeding well.

5.4 Current and Circulation Patterns

The following studies by Neal R Pettigrew, University of Maine, review circulation and current patterns in Blue Hill Bay and can be found at: http://www.fobhb.org/projects.html

- **Circulation Study of Blue Hill Bay**
  Dr. Neal Pettigrew developed a model of Blue Hill Bay that demonstrates its low current velocity, seasonal stratification, and limited ability to absorb nutrients. Maximum flows in Upper Blue Hill Bay are extremely slow and their pattern is chaotic. This sluggish circulation means that the residence times of the effluents within the Bay are undoubtedly long and flushing is poor for the system as a whole (Figure 5.3).

Figure 5.3. Bathymetry of Blue Hill Bay (Pettigrew 2002).



- **Physical Processes in Blue Hill Bay and Net-Pen Aquaculture**
  Dr. Pettigrew's research presents findings on the flushing rates of Blue Hill Bay and shows how they play a key role in determining the environmental impact of discharges from fin-fish aquaculture. Studies of the circulation and hydrography of Blue Hill Bay conducted in the summer of 1999, suggest that the overall flushing time of Blue Hill bay is on the order of months. In contrast, the flushing time of Cobscook Bay, the site of the much of the salmon aquaculture in the state, is on the order of days.

5.5 Summary of Water Quality Recommendations

- Municipalities should apply for grant funding to repair sewage problems that cause bacterial clam flat closures. There are programs in MDEP, MDMR, and Maine Coastal Program that can provide technical assistance and some funding.

- Municipalities should encourage the adoption of Low-Impact Development standards and practices at all new and/or retrofitted development sites. This can be accomplished by either an educational program and/or the adoption of ordinances.

- Municipal shellfish committees should consider implementing a clam flat buffering program to offset the impacts of ocean acidification. Committees can work with MDMR, MDEP, and the Frenchman Bay Shellfish Committee for technical assistance.

- Municipalities should increase education and outreach efforts that encourage boaters to use the pump-out stations and pump-out boats.

- Municipalities should consider sea-level rise and storm event planning when conducting infrastructure construction and retrofits.

CHAPTER 6
LAND USE AND DEVELOPMENT

6.1 An Overview

The Blue Hill Bay communities, like much of the Maine coast, have seen considerable land development in recent years. This has occurred in both residential and non-residential (primarily commercial) construction. Land development affects the watershed in several ways.

First, it has meant an increase in the number of bay users. This increases the demand on public access points. Second, changes in landownership have meant the loss of some informal access points as more land is restricted by new owners by the posting of no trespassing signs. Third, there is the risk of greater stormwater runoff due to the increase of impervious surfaces. This chapter reviews development trends and how towns are managing these trends. A map indicating existing and new impervious surfaces is included in the appendices (Map 9). The analysis dates to 2007, and thus does not reflect new construction after that time. A further caveat is that most additions to impervious surface are too small to see in a regional map, such as new parking lots added to Myrick Street. As a result of increased impervious surface, Card Brook in Ellsworth has been prioritized by MDEP for additional mitigation from stormwater runoff before it drains into the Union River and Blue Hill Bay.

6.2 Residential Land Development Trends

According to the 2010 U.S. Census, the number of year-round housing units increased in all eight communities between 1980 and 2010 (Table 6.1). The overall rate of increase was approximately 41 percent (from 6,950 to 10,451), which is faster than the 23 percent rate of increase for year-round population. This is due to smaller household sizes as there are more families with few or no children. During this same time period, there was a 94 percent increase (from 2,975 to 5,781) in the number of second homes (Table 6.2). There were a total of 16,232 dwelling units (year-round and seasonal) compared to 9,925 in 1980, a 63 percent increase.

The number of second homes is not static due to conversions between year-round and second homes. Some second homes are converted to year-round use and year-round homes are converted to seasonal use. These trends explain the 11 percent decrease in second homes shown for Blue Hill between 1980 and 2010 and the 3 percent decrease in year-round homes in Mount Desert between 2000 and 2010. A decrease in year-round and seasonal units usually means that homes are changing classification between year-round and seasonal.

The primary implication of a strong second home market is that there is a seasonal increase in population that affects Bay resources. It also means that a town can lose year-round population while the number of homes increases. Another source of seasonal

Table 6.1 Change in Year-Round Housing, Blue Hill Bay Towns, 1980-2010 (US Census Bureau 1980, 2010).

Town	1980	1990	Change	% Change	2000	Change	% Change	2010	Change	% Change	Number	Percent
Bar Harbor	1,751	2,132	381	21.8%	2,281	149	7.0%	2,427	146	6.4%	676	38.6%
Blue Hill	741	911	170	22.9%	1,074	163	17.9%	1,279	205	19.1%	538	72.6%
Brooklin	302	375	73	24.2%	391	16	4.3%	397	6	1.5%	95	31.5%
Ellsworth	2,079	2,636	557	26.8%	2,879	243	9.2%	3,305	426	14.8%	1,226	59.0%
Mount Desert	872	930	58	6.7%	1,017	87	9.4%	984	-33	-3.2%	112	12.8%
Surry	349	437	88	25.2%	575	138	31.6%	673	98	17.0%	294	77.6%
Tremont	518	633	115	22.2%	705	72	11.4%	723	18	2.6%	205	39.6%
Trenton	308	468	160	51.9%	597	129	27.6%	663	66	11.1%	355	115.3%
Total	6,950	8,522	1,572	22.6%	9,519	997	11.7%	10,451	932	9.8%	2,825	40.6%

Table 6.2. Change in Second Homes, Blue Hill Bay Communities, 1980-2010 (US Census Bureau 1980, 2010).

Town	1980	1990	Change	% Change	2000	Change	% Change	2010	Change	% Change	Number	Percent
Bar Harbor	343	454	111	32.4%	524	70	15.4%	1,068	544	103.8%	725	211.4%
Blue Hill	741	421	-320	-43.2%	412	-9	-2.1%	657	245	59.5%	-84	-11.3%
Brooklin	243	287	44	18.1%	306	19	6.6%	477	171	55.9%	234	96.3%
Ellsworth	424	566	142	33.5%	543	-23	-4.1%	935	392	72.2%	511	120.5%
Mount Desert	676	770	94	13.9%	883	113	14.7%	1,303	420	47.6%	627	92.8%
Surry	157	325	168	107.0%	338	13	4.0%	446	108	32.0%	289	184.1%
Tremont	205	314	109	53.2%	370	56	17.8%	537	167	45.1%	332	162.0%
Trenton	186	202	16	8.6%	219	17	8.4%	358	139	63.5%	172	92.5%
Total	**2,975**	**3,339**	**364**	**12.2%**	**3,595**	**256**	**7.7%**	**5,781**	**2,186**	**60.8%**	**2,806**	**94.3%**

population is short-term visitors residing in transient accommodations such as hotel rooms and campgrounds. There are also day visitors from adjacent communities. The high volume of visitors adds to the bay's economy and also has environmental impacts (see Chapter 4).

6.3 Non-Residential Development Trends

Commercial development has occurred primarily in the service centers and along highway corridors. While there are no firm, readily available data on the rate of commercial development, a rough estimate can be derived through a review of aerial photographs.

There has been a major increase in commercial development in Ellsworth due to the construction of "big box"' stores. This expansion has resulted in more impervious surface. This has meant more stormwater runoff into the bay. Blue Hill is also experiencing commercial growth along South Street, and Bar Harbor has seen growth in the Town Hill area.

6.4 Evaluation of Water Quality Protection Measures in Current Land Use Ordinances

Apart from state environmental laws such as the Natural Resource Protection Act, most water quality protection measures are found in municipal land use ordinances such as town-wide zoning and site plan review ordinances. All municipalities are required to have shoreland zoning standards that meet state guidelines. With the exception of Brooklin and Blue Hill, all towns have town-wide zoning (Table 6.3). Towns vary in their ability to manage land development within their share of the Bay's watershed.

All municipalities have some standards for stormwater runoff and erosion and sedimentation. In some cases, these are very general. Several refer to the state stormwater laws. Protection could be enhanced if all towns were to enact town-wide zoning, but this option has proven unacceptable to voters in some towns. Similarly more detailed site plan review standards could be enacted. These could address various ways that runoff and erosion can be contained on site. There are sample low impact development techniques that could be adapted for each town.

Effective stormwater runoff mitigation requires design standards based on the frequency of a given storm event. A 25-year storm is the frequency used in the land use regulations of several of the towns. This means that standards are based on a storm event likely to occur once in 25 years. Given the recent increase in severe storm events and projected future storm trends, the 25-year storm measurement may have to be revised. As of early 2013, the city of Ellsworth is reviewing its stormwater drainage design standards. The expected outcome of this review is new design standards that reflect more intense storm events.

These revised standards can serve as examples for the other towns. A related measure is to ensure that public works operations follow best management practices that minimize threats to water quality. Examples of these practices include assuring that road salt is loaded onto trucks in a covered area of impervious surface that is cleaned promptly following any spills. Fueling

operations could also be restricted to a covered area. Rather than push snow to a corner of a paved parking lot, it could be pushed onto a grassed area so it melts more gradually.

Table 6.3. Land Use Ordinances in Blue Hill Bay Communities: An Analysis Of Their Water Resource Protection Measures, 2012 (Complied by HCPC 2012).

Town	**Town-Wide Zoning?**	**Other Water Resource Protection Ordinances**	**Comments**
Bar Harbor	Yes	Site plan review contained within zoning ordinance	Has detailed stormwater runoff and erosion & sedimentation standards that reflect low impact development guidelines
Blue Hill	No	Site plan review ordinance	Has general stormwater runoff and erosion & sedimentation standards.
Brooklin	No	Site plan review	Has 1 short paragraph on water pollution
Ellsworth	yes	Lake watershed	Has detailed stormwater runoff, erosion & sedimentation standards. Planning Dept. concerned that stormwater standards do not reflect more intense storm events. Further revisions are being proposed.
Mount Desert	Yes	No	Has detailed stormwater runoff and erosion and sedimentation provisions
Surry	Yes	Site plan review	Has minor stormwater provisions but with a reference to need a DEP permit for projects over a certain scale
Tremont	Yes	No	Has provisions related to vegetative clearing, stormwater, water quality and erosion.
Trenton	Yes	No	Contains stormwater drainage provisions based on 25-year storm, also erosion & sedimentation standards

6.5 Evaluation of Waterfront Access and Proposed Improvements

Waterfront Access is an important part of a bay needs assessment. A bay's economic health depends on access for commercial fishing and recreational uses. Residents are more likely to feel "ownership" of a bay, if they are assured adequate access. As seen in Table 6.4 below, public access opportunities vary by town and are, in some cases, very limited.

The summary also identifies improvements that are proposed in the various towns. These include Small Harbor Improvement Program (SHIP) grant applications to the Maine Department of Transportation. Proposals in Trenton and Surry were not funded in this round, though Swans Island did receive funding.

Table 6.4. Status of Public Access Points on Blue Hill Bay, 2012 (Analysis by HCPC based on SHIP applications and comprehensive plans, 2012).

Town	Access Points	Evaluation	Proposed Improvements
Bar Harbor	There are two land access points and the Trenton Bridge from Eastern Bay to reach Blue Hill Bay via Western Bay. The land access points to Western Bay are at Clark Cove and Northwest Bay. There is no improved boat-launch facility. Access via the Trenton Bridge is tidal dependent, a few hours on either side of high tide.	These two land access points can be used by small vessel owners only.	None pending
Blue Hill	Blue Hill town wharf- public wharf, ramp and dinghy float. South Blue Hill Wharf-public wharf, ramp and dinghy float. Herrick property in Peters Cove-no dock. Town Park-gravel beach, no dock.	Town Wharf- is accessible by vessel for about 4 hrs through high water. At all other times it dries out for about 100 yards surrounding the wharf. There is a public launching ramp, a small dingy dock and limited parking for 8 cars. South Blue Hill Wharf-The wharf is accessible most of the time except low drain tides only through the dock extension. The launching ramp is useable from mid and high tides only. There is adequate parking and a small dinghy tie-up float. Herrick Property-a small gravel	Town sought funds for a SHIP grant. Project would consist of a combination crib structure and pile supported structure creating a breakwater/wave fence approx. 300' in length. It would include a 5' wide walkway on top of it.

		& sand beach on the northern side of the Peters Cove on route 176. This area drains out at low water, has no facilities and limited parking. Town Park-The Town Park has about 100 feet of gravel beach, which drains out at low tide. There are no docks or facilities.	
Brooklin	There are three public access points. These are at the Dodge's Wharf area, Center Harbor and Naskeag Point. There are no floats, ramps or piers at any of these sites. There is heavy use of the Naskeag Point site by commercial fishermen and recreational boaters. There is limited use of the Center Harbor facility due to the lack of parking.	All town landings require major improvements. The town has not made major investments in its harbor facilities in recent years. They have many deficiencies that need to be addressed. One major deficiency is the lack of a town pier.	None-planned
Ellsworth	Ellsworth has a trail beyond the library. It would like to expand it to reach the bottom of the falls and back out onto Central Street. There are trails at Indian Point also providing access to the Union River. The river channel was dredged in early 2000s. Provision for all-tide access has benefitted the city. Since then the Harbor Park has seen many improvements including expanded parking and boat slips, a pump out station, and an on-site vendor.	The city would like to have a trail from the bridge to Indian Point. It would also like for the trail beyond the library to reach the bottom of the fall and back out onto Central Street.	The city plans to expand the park after the new wastewater treatment plant comes on line and it can demolish the old one.
Mount Desert	Public lands, including Acadia National Park and the Town of Mount Desert provide access and leisure areas, scenic vantage points, trails, parks, campgrounds, boat ramps, piers, and floats	None	None planned for facilities on Bay
Surry	There are two town-maintained locations. The town landing is located in the center of the village just off Route 172. A ramp allows small boat access to Patten Bay.	The build-up of the bar at the mouth of the harbor has greatly limited the use of the landing.	Town is seeking SHIP funds for engineering designs of an all tide boat lunch to be used by commercial and

	The Carrying Place is a stretch of gravely beach on Union River Bay located on the Newbury Neck road about 4.5 miles from the village. It is used exclusively during the summer for swimming and picnicking.		recreational fishermen and boaters. Erosion control on the northern side of the boat launch consisting of building a retaining wall 30 ft + - northeasterly by 60 ft + - north toward Meadow Stream.
Tremont	There are three public access points: the Bernard Pier (9,883 square feet), the Bernard ramp and the Seal Cove ramp (5,382 square feet). All three access points also have an associated area of floats.	Parking is inadequate, particularly at the Bernard lot and the Bass Harbor Ferry Terminal. There is also severe overcrowding at the wharves.	Dredging is planned for Bass Harbor
Trenton	The only public access point for boat launching in Trenton is the seaplane ramp adjacent to the airport.	SHIP grant would have funded enlargement of existing boat launch ramp by 10 feet and 180 feet in length and construction of 10 new finger floats at the Town Wharf at end of Rice Road.	The ramp is being improved and the town sought SHIP funding to add a pedestrian ramp and floats.

6.6 Recommendations for Overall Land Use and Development

The study recommends that the towns that border Blue Hill Bay protect water quality and preserve and expand public access to the shore. This can be accomplished through the following steps:

6.6.1 Water Quality-Land Use Ordinance Measures

a. In order to mitigate the impacts from storm water run-off, it is recommended that the towns enact low impact development standards that minimize the volume of storm water runoff that leaves a property where new construction occurs.

b. Given the increase of severe storm events, towns are urged to assess their culvert design specifications and other stormwater standards to assure that they reflect anticipated stormwater flows.

c. Review and, if necessary, revise outdoor storage of material standards to reduce the likelihood of stormwater runoff carrying contaminants to the bay.

d. Assure adequate enforcement of current shoreland zoning standards.

6.6.2 Other Water-Quality Measures

a. Continue and expand septic tank inspection programs that identify systems that are a threat to water quality and seek grant funds to assist income-eligible home owners in upgrading or replacing problem systems.

b. Assess the adequacy of current boat pump-out stations in terms of number of stations and the capacity of those currently in operation. If proven necessary, add new systems and expand the capacity of existing stations.

c. Review harbor management regulations to determine if they are adequately managing operations with the potential to cause water contamination. These include, but are not limited to, boat washing, boat and related equipment construction and repair, bait storage, and pier and dock maintenance.

6.6.3 Public Access Measures

a. Encourage towns to undertake a comprehensive public access/harbor needs assessment with active input from the various stakeholders and technical support from planning, engineering, design, and public meeting facilitation professionals. The purpose of this assessment is to assure that improvements are done in accordance with a plan that reflects public support.

b. Retain and, if necessary, revise water dependent use standards in shoreland zoning ordinances for those sites where commercial fishing operations are proven viable.

c. Implement parking policies at public access points that reserve adequate space for launching boats, allow for nearby boat trailer packing, and motor vehicle parking. It is recommended that parking areas be designed in accordance with sight distance standards, allow for bicycle parking, and are pedestrian-friendly.

d. Promote cost-effective measures in those towns with inadequate all-tides access to increase the hours when access is available. Specific steps may include, but are not limited to:

    i. Dredging;
    ii. Pier expansion into deeper waters; and
    iii. Development of new sites

e. Explore opportunities for new or enhanced public access sites through programs such as Right of Way Discovery and Shore and Harbor Planning Grants.

CHAPTER 7
CONCLUSIONS

This needs assessment for Blue Hill Bay Watershed is the first step in planning for a sustainable future for the environment and a prosperous economy for the neighboring towns. The needs assessment provides a glimpse into several key factors that will determine the fate of the bay, including maintaining clean water, recovering fish populations, thriving recreational programs, and sustainable development. The needs assessment brought stakeholders together to identify important strengths, weaknesses, opportunities, and threats. We found common ground in many important areas.

A logical next step will be to extend the findings of this study to building local support for plans and actions to bring about the shared goals of residents and area businesses. Achieving consensus is never easy, particularly across multiple towns and interest groups. The details of public access to the water, the ways we produce and harvest sea products, the kinds of development we encourage along the shoreline and the means by which we manage human waste and stormwater runoff, for example, will require careful planning. The following bulleted points summarize many of our findings and suggest steps for future implementation.

7.1 Key Findings and Issues

- Local governments have a limited capacity to address watershed planning.
- The total year-round population of the eight towns in the watershed increased by 32 percent from 16,463 in 1980 to 22,819 in 2010. Some towns however are losing population as more young people leave the area and year-round homes are converted to seasonal use.

7.2 Summary of Recommendations: these are discussed in-depth in their respective chapters

7.2.1 Fisheries

- Regional Shellfish Ordinances: The towns of Blue Hill Bay might create a multi-town shellfish ordinance in order to reduce costs of license administration and warden fees, enhance conservation efforts, provide recreational opportunities and water quality improvement incentives, and enhance harvester involvement in decision making.
- Public Access: In order to ensure access to the shore, towns can work with land trusts or directly with landowners to acquire the land (or partial rights to the land) and/or enter into private agreement with landowners for access.

- Shellfish Conservation: Continue reseeding efforts to make clams a sustainable and renewable resource for future generations and undertake other conservation measures.

- Fish passage: In order to ensure fish passage and to support healthy migratory fish runs, towns should inspect all stream crossings (bridges, culverts, etc) and repair those crossings which do not provide adequate passage.

- Aquaculture: Design a project that brings together shellfish growers, landowners, municipal officials, and community members to discuss and map out areas are appropriate for safe sustainable aquaculture by species.

7.2.2 Tourism and Recreation

- Inter-local management of critical natural resources and public infrastructure: Cooperative, multi-town efforts in promoting public access, preserving water-dependent uses, all tides boat launches, recreational fishing and kayaking, and waste management should be explored to avoid duplication of effort.

- Infrastructure Investment: Additional infrastructure is needed for public access to all-tides boat ramps and docks, bayside trails and shoreland for walking, sites for camping, picnics, kayak tours and public events, and sanitary "pump-outs" in harbors

Environmental Sustainability

- Diverse fish stocks: Local guide services, boat rentals, sales, and service are likely to grow when recreational fishing is viable. It is important to diversify fish stocks while avoiding the introduction of invasive species that can have negative consequences for recreation and tourism.

- Clean water: Recreational use is enhanced by clean water, particularly fishing and swimming. Water quality recommendations are addressed in Chapter 5. Infrastructure improvements, particularly pump out stations for septic waste in boats can contribute to preserving water quality.

- Community events that celebrate the environment: Additional opportunities for celebrating Blue Hill Bay natural resources should be explored. Examples include Acadia National Park's night sky festival every autumn the Machias Blueberry Festival, the annual Down East Salmon Federation Smelt Fry in Columbia Fall, and guided nighttime bioluminescent paddles for kayakers.

- **7.2.3 Water Quality:**

- Municipalities should apply for grant funding to repair sewage problems that cause bacterial clam flat closures. There are programs in MDEP, MDMR, and Maine Coastal Program that can provide technical assistance and some funding. HCPC has drafted manuals on how to implement small-scale shared water and wastewater disposal systems.

- Municipalities should encourage the adoption of Low-Impact Development standards and practices at all new and/or retrofitted development sites. This can be accomplished by either an educational program and/or the adoption of ordinances.

- Municipal shellfish committees should consider implementing a clam flat buffering program to offset the impacts of ocean acidification. Committees can work with MDMR, MDEP, and the Frenchman Bay Shellfish Committee for technical assistance.

- Municipalities should increase education and outreach efforts that encourage boaters to use the pump-out stations and pump-out boats.

- Municipalities should consider sea-level rise and storm-event planning when conducting infrastructure construction and retrofits.

7.2.4 Land Use and Development

- Water Quality: In order to mitigate the impacts from storm water run-off, it is recommended that the towns enact low-impact development standards that minimize the volume of storm water runoff that leaves a property where new construction occurs. Towns could continue and expand septic tank inspection programs. They could also assess the adequacy of current boat pump-out stations and if proven necessary, add new systems and expand the capacity of existing stations.

- Public Access: Encourage towns to undertake a comprehensive public access/harbor needs assessment. Retain and, if necessary, revise water dependent use standards in shoreland zoning ordinances for those sites where commercial fishing operations are proven viable. Implement parking policies at public access points that reserve adequate space for launching boats, allow for nearby boat trailer packing, and motor vehicle parking. Promote cost-effective measures in those towns with inadequate all-tides access to increase the hours when access is available.

7.3 Next Steps

As stated in Chapter One, a Needs Assessment is the preliminary part of a larger more comprehensive planning process. The goal of this project was to introduce the concept of the bay as a shared resource and how the surrounding communities can work together to sustainably protect and manage the resource. Next steps for the communities include:

- Form a group of dedicated stakeholders representing each town who will gather regularly to continue discussion of the concerns already raised. If successful, the group could use the model proposed by the Frenchman Bay Partners. Details can be found at: http://www.frenchmanbaypartners.org/

- Once a stakeholder group is formed, the communities should continue the planning process. Although many of the towns have comprehensive plans, a regional stakeholder group could develop a regional comprehensive plan for the watershed.

- Once a regional group and regional plan are developed, communities should work closely with state and federal agencies to implement the recommendations from the Needs Assessment and any other additional plans. For example, there was considerable interest in developing more comprehensive fisheries management and conservation resources. HCPC could work with towns to raise funds to develop the resources suggested in the plan.

- The most important next step is for communities to keep their concerns on the "front burner." By working closely with conservation organizations, the planning commission, municipal governments, and community health and economic organizations, community members can strengthen their voice and effectively develop solutions for resource concerns.

- If funding permits, the Needs Assessment authors and planners will visit cooperating towns to discuss suggestions to enact specific projects. Furthermore, the towns may be asked to "sign on" to developing a cooperative planning model and committing representatives to the process.

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APPENDIX A
MAPS OF BLUE HILL BAY

Visit: www.hcpcme.org/bluehillbay for large scale reproducible maps.

Map 1. Blue Hill Bay Watershed

Map 2. Population Change

Map 3. Land Value

Map 4. Land Cover

Map 5. Watershed Wetlands

Map 6. Marine Wetlands

Map 7. Ecological Habitat

Map 8. Conserved Lands

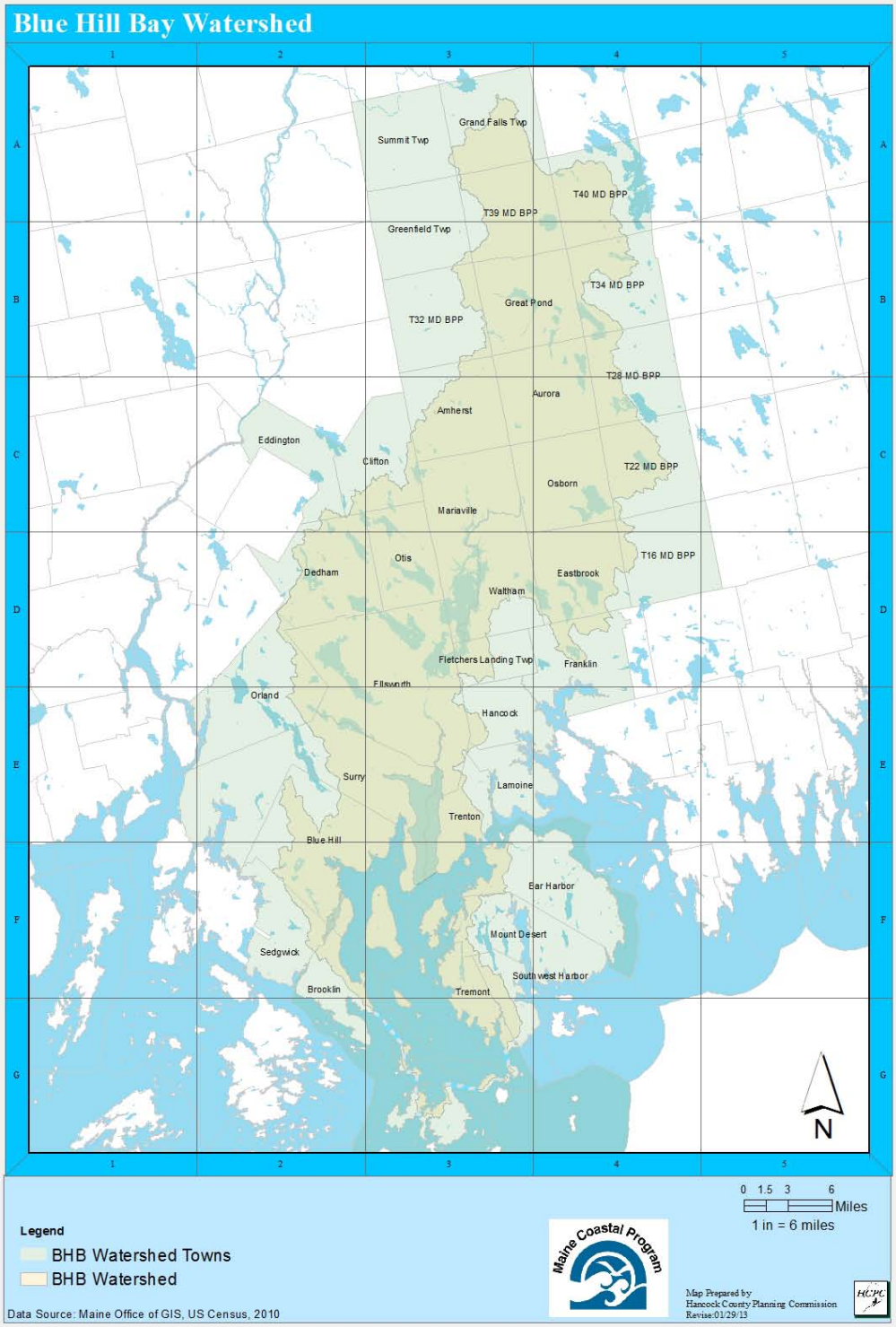
Map 9. Impervious Surface

Map 10. Shellfish Closures

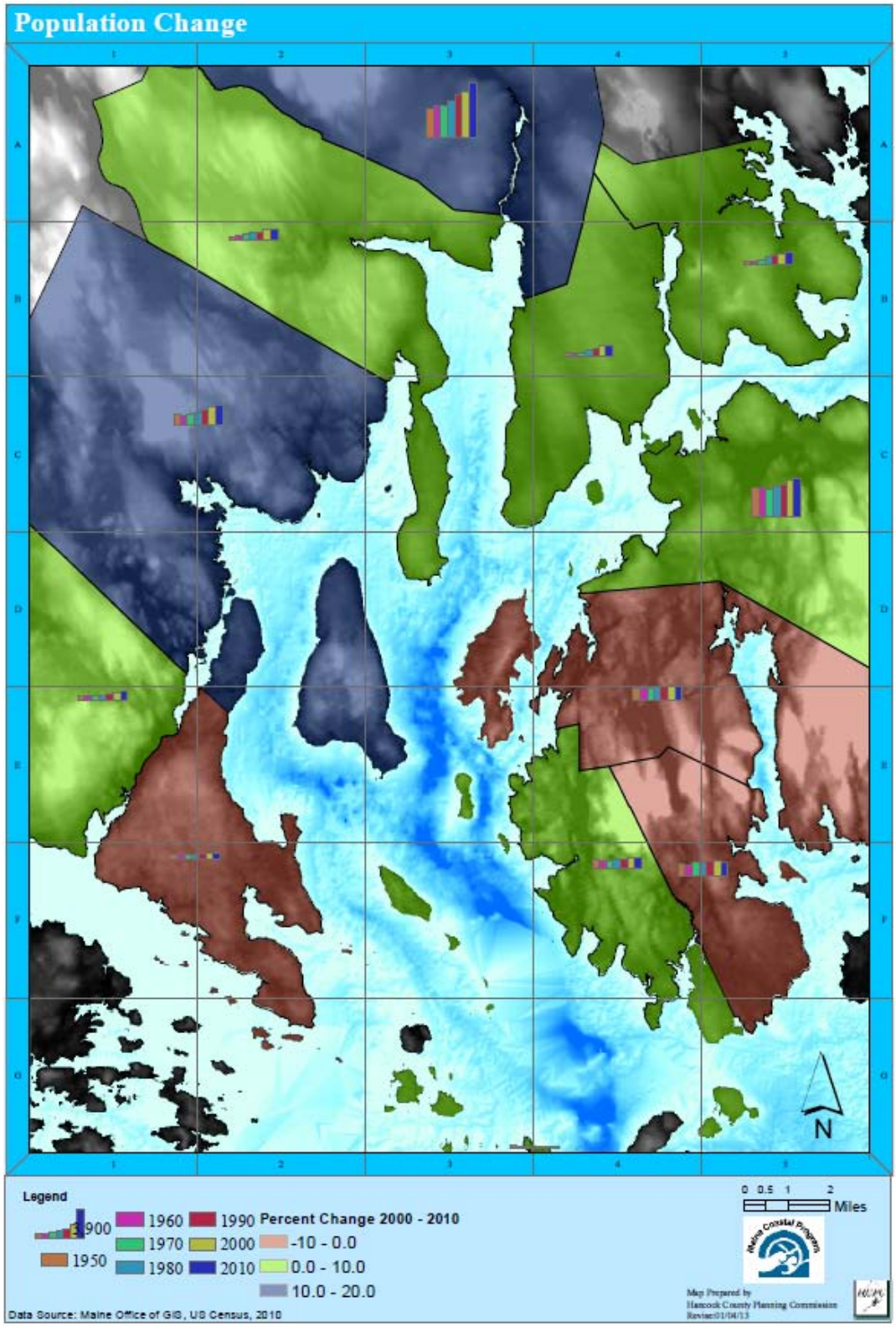
Map 11 Aquaculture Leases

Map 12 Water Quality Monitoring Sites

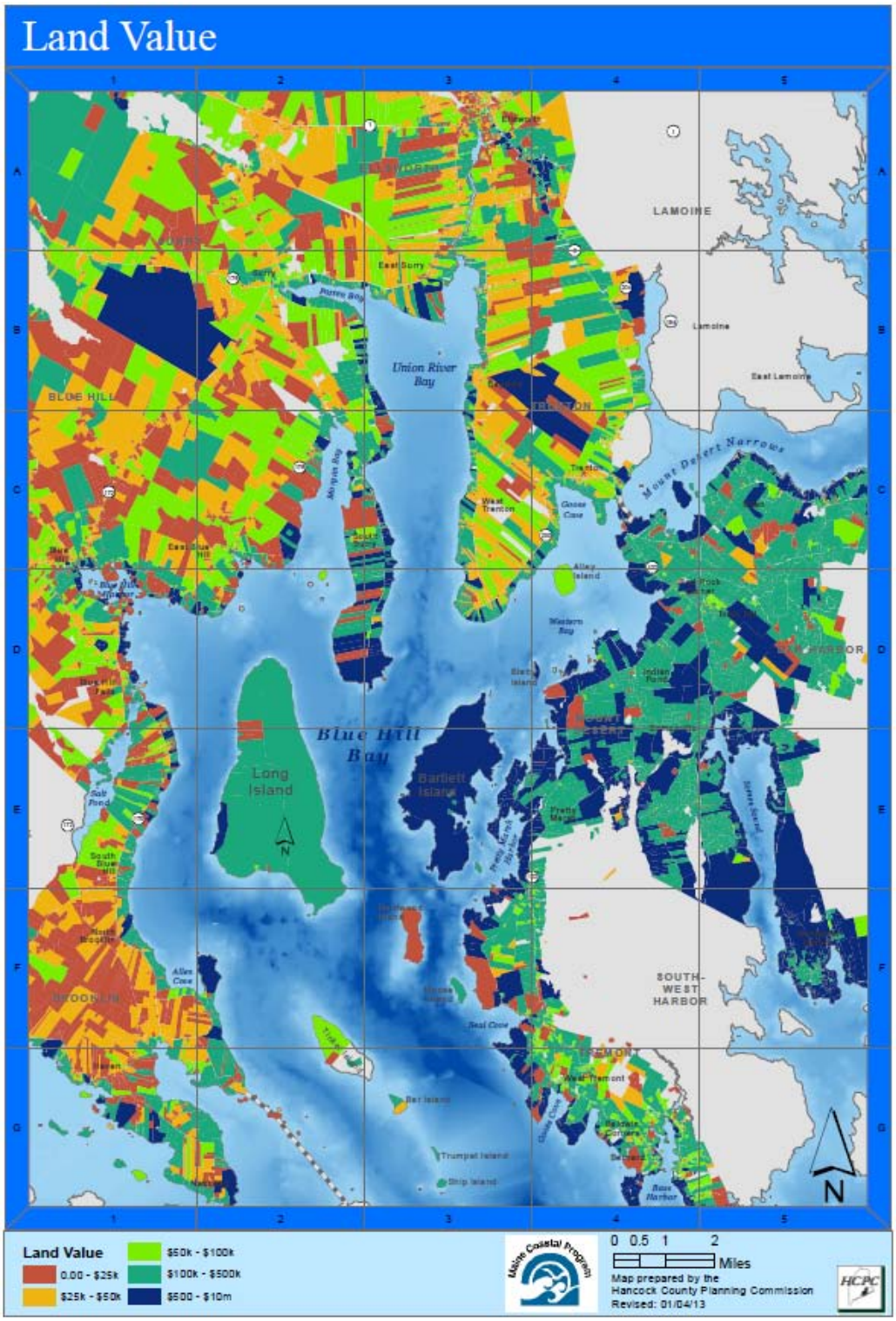
MAP 1. BLUE HILL BAY WATERSHED



MAP 2. POPULATION CHANGE

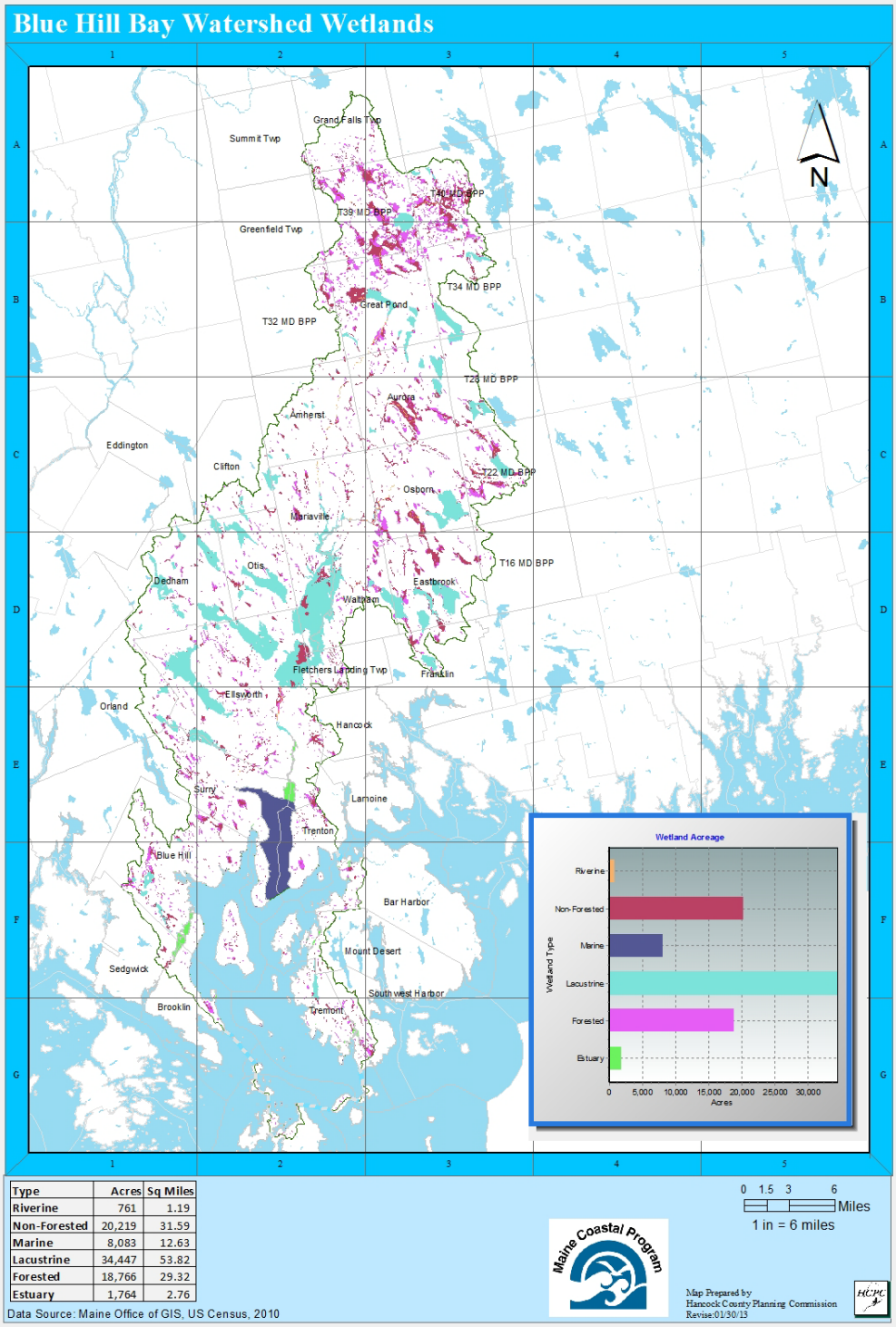


MAP 3. LAND VALUE

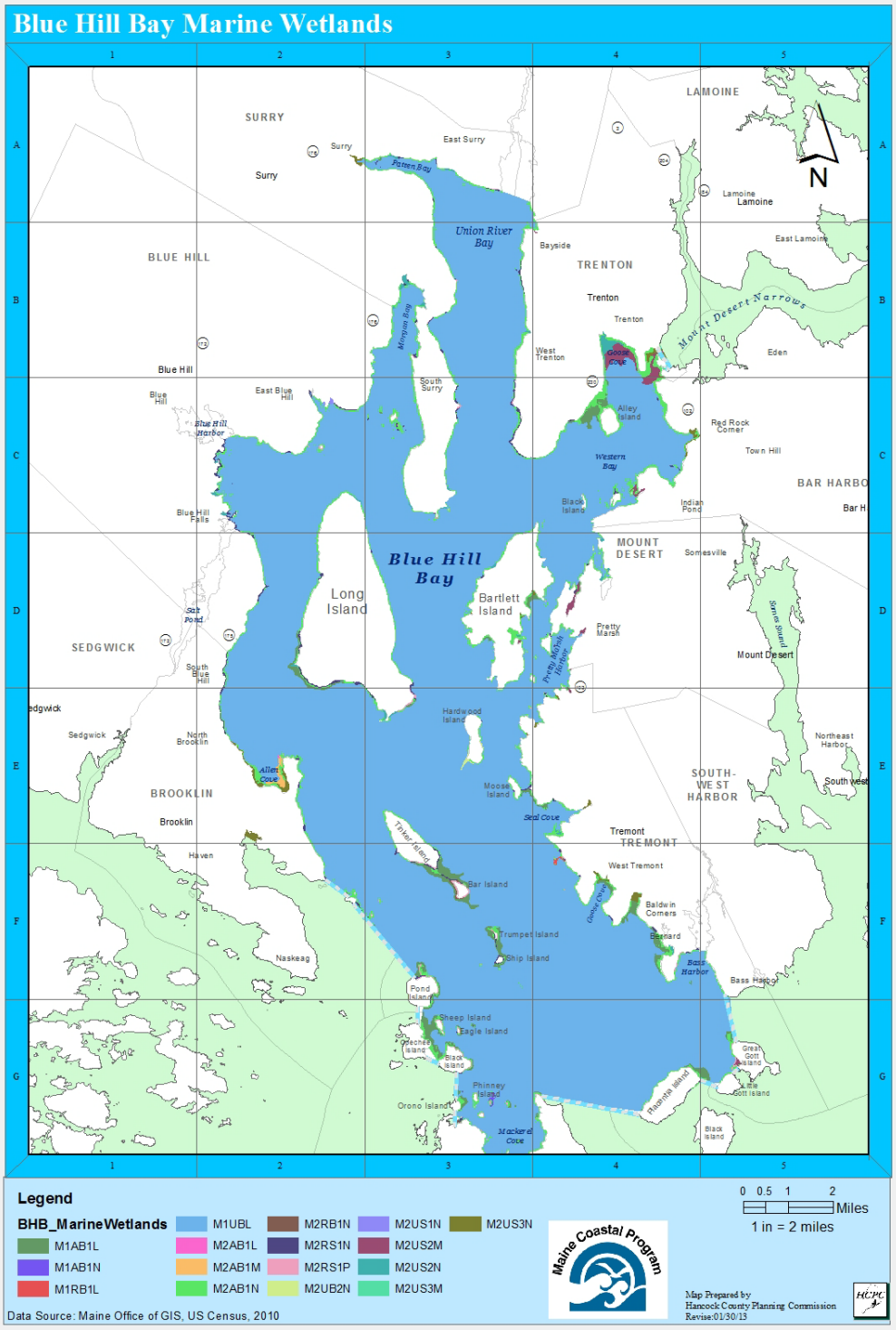


MAP 4. LAND COVER

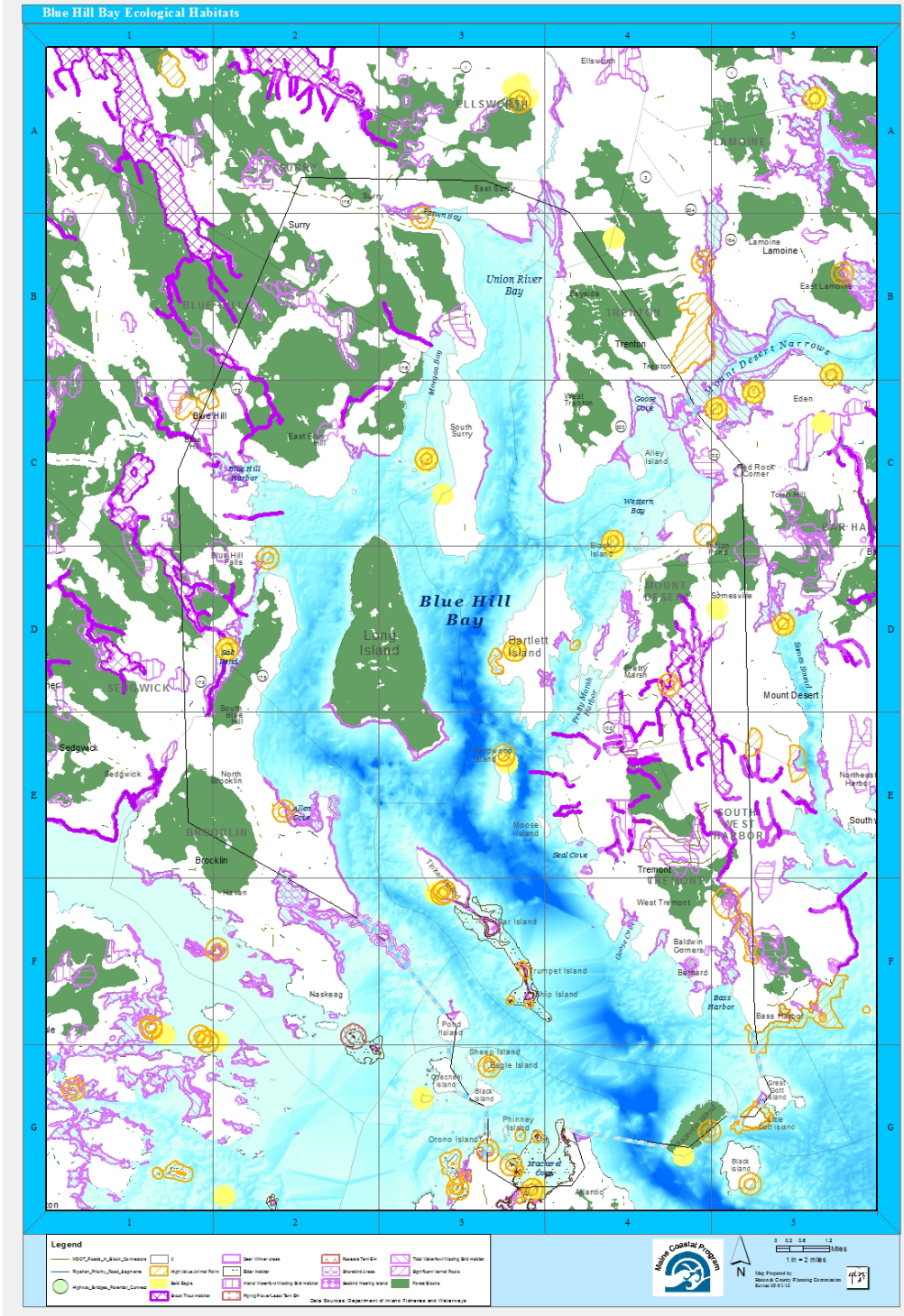
MAP 5. BLUE HILL BAY WATERSHED WETLANDS



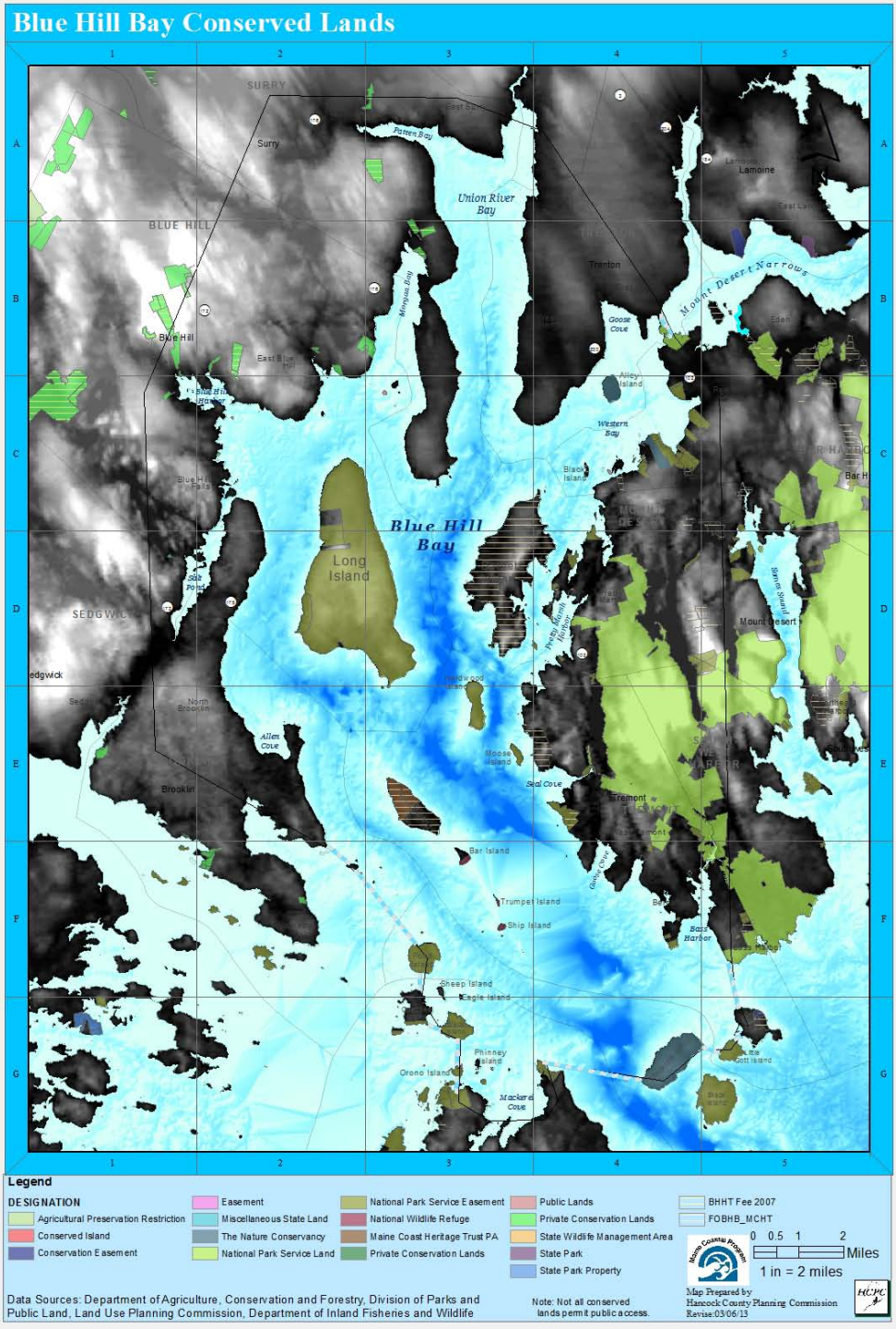
MAP 6. BLUE HILL BAY MARINE WETLANDS



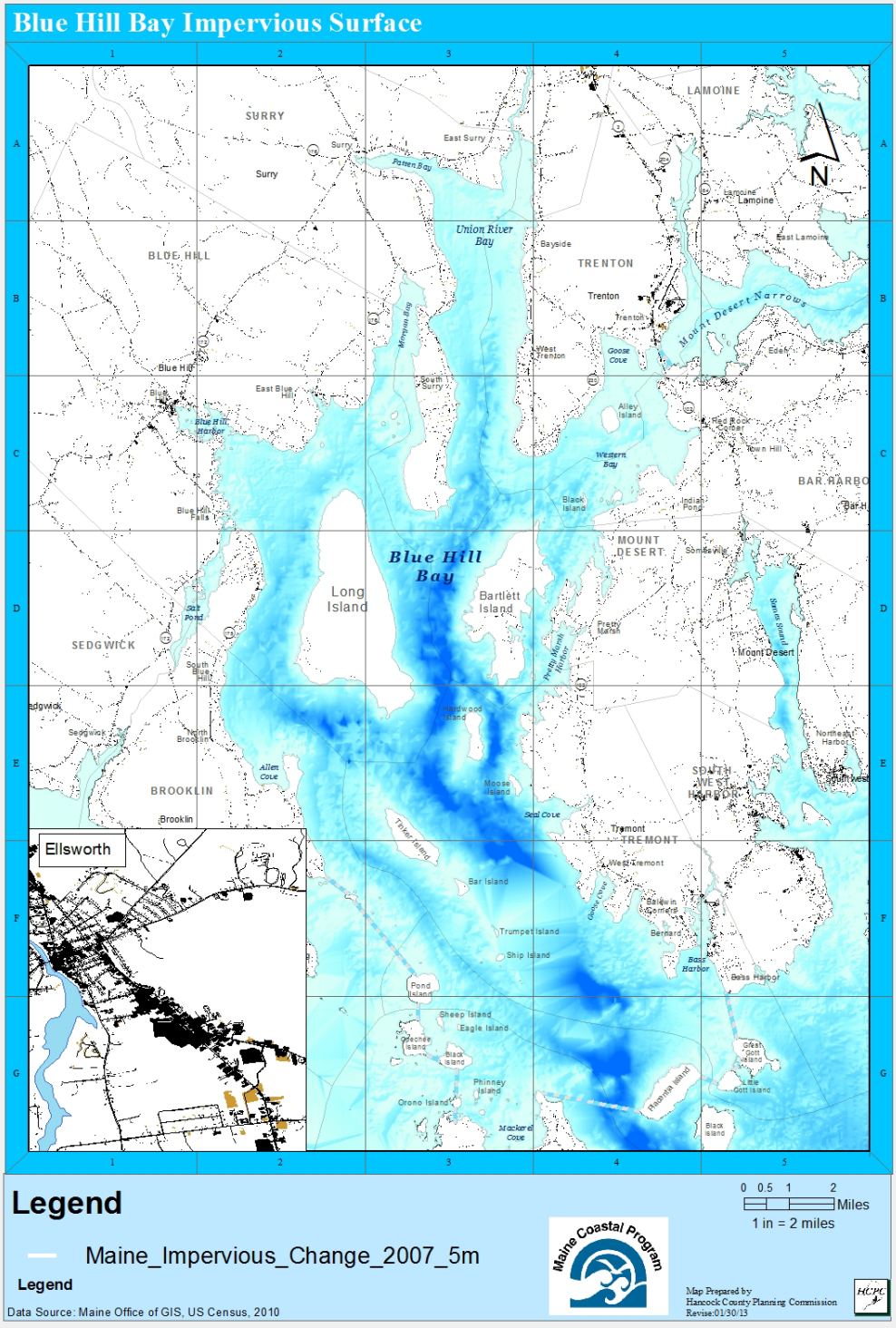
MAP 7. BLUE HILL BAY ECOLOGICAL HABITATS



MAP 8. BLUE HILL BAY CONSERVED LANDS

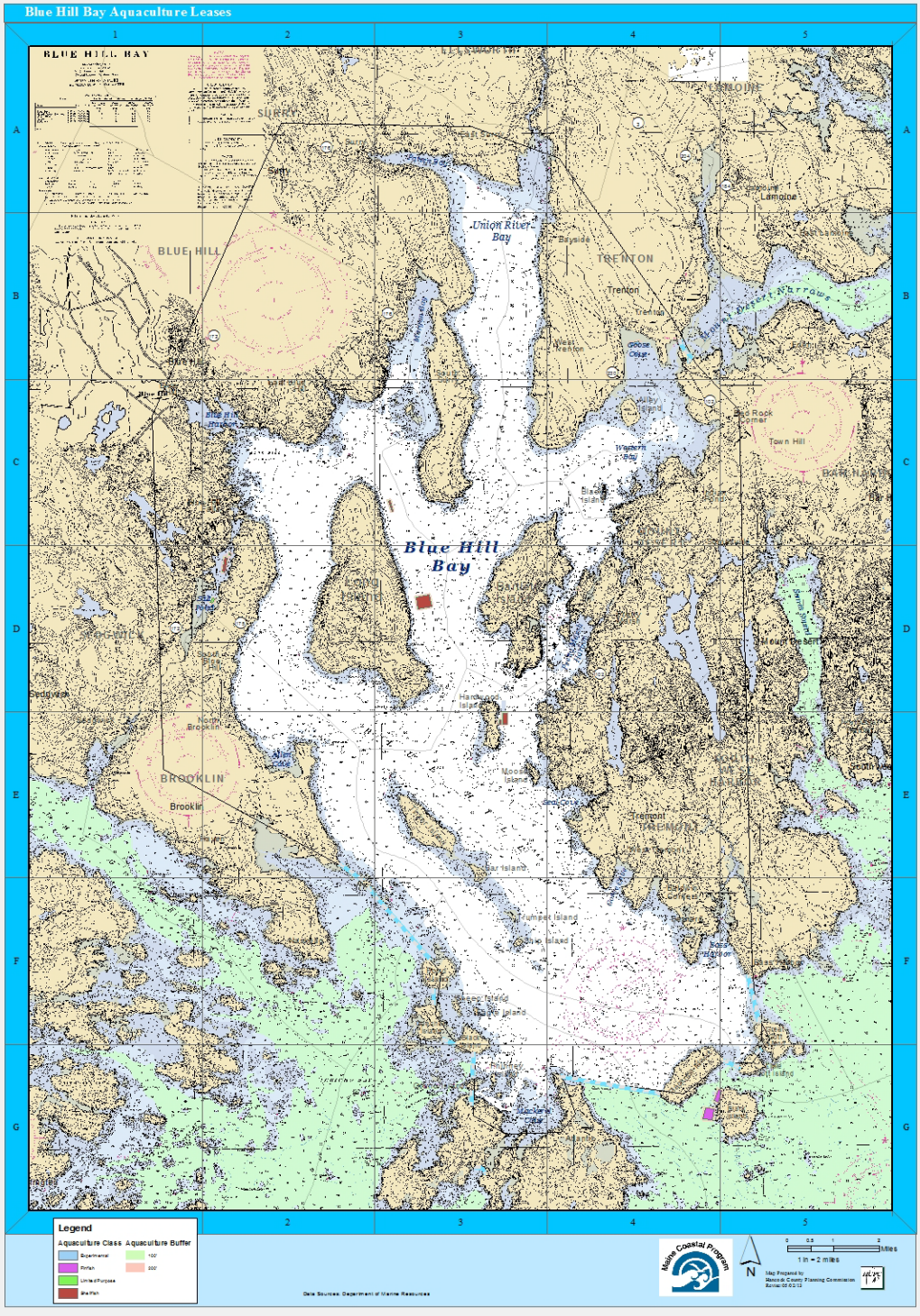


MAP 9. BLUE HILL BAY IMPERVIOUS SURFACE

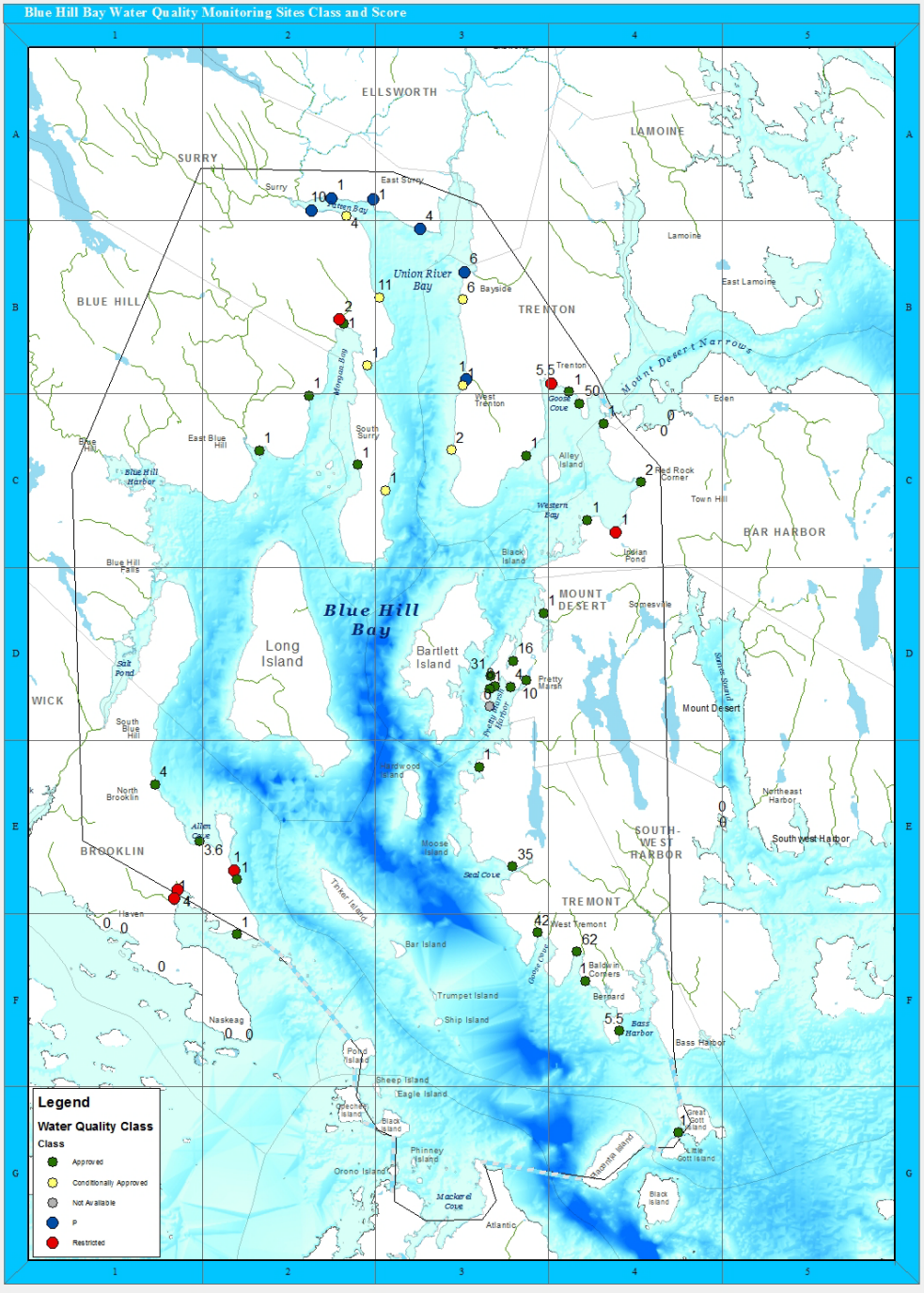


MAP 10. BLUE HILL BAY OVERBOARD DISCHARGES AND SHELLFISH CLOSURES

MAP 11. BLUE HILL BAY AQUACULTURE LEASES



MAP 12. WATER QUALITY MONITORING SITES



Data Sources: Department of Marine Resources
For more information, visit: www.maine.gov/dmr/rm/public_health/G_A_reports/
* Score of "1" represents a test score '< 2'.

APPENDIX B
MEETING AGENDAS AND NOTES

Please visit the HCPC website for meeting agendas and notes:
www.hcpcme.org/bluehillbay