D. NATURAL RESOURCES

Pembroke and Perry are small rural communities in eastern coastal Washington County. They each have extensive frontage on the northern coves and inlets of Cobscook Bay and, in Perry, the open waters of Passamaquoddy Bay. In addition to several small tributaries feeding these bays the towns include the Pennamaquan River and Boyden Stream (impounded to form Boyden Lake). Most homes obtain drinking water from groundwater but an intake from Boyden Stream provides drinking water to the Passamaquoddy Water District which serves Pleasant Point and the City of Eastport.

The mudflats in Cobscook Bay are a significant source of shellfish and the coastline supports coastal and wading waterfowl, several productive fisheries and bald eagles. These resources contribute to the town's attractiveness as a place to work, live and visit.

LOCATION AND TOPOGRAPHY

The towns of Pembroke and Perry are located in the easternmost part of coastal Washington County, Maine. The towns are situated approximately 20 miles southeast of Calais and are bordered on the north by the towns of Charlotte and Robbinston respectively. To the south Pembroke and Perry share the shores of Cobscook and East Bays. Pembroke is bordered to the west by the town of Dennysville and Perry is bordered to the south by the Pleasant Point Reservation of the Passamaquoddy Nation. Further to the east is Deer Island in Canada.

The land area of Pembroke is 35.9 square miles (24,658 acres) and of Perry is a comparable 35.4 square miles (24, 285 acres). For general contour elevations see Map 3: Topography, Steep Slopes and Flood Zones at the end of this section. The tidal movement and the topography of the Bay of Fundy create large fluctuations in water level. The waters are cold and produce a cool humid oceanic climate.

GEOLOGY

The geology of both towns derives in large part from relatively recent (10,000 to 15,000 years ago) glacial activity. There are thus many deep deposits of glacial materials at the lower elevations. Most of the soils were deposited by the glaciers in small pockets so that a soils map looks very much like a mosaic. Much of the land in both towns is composed of glacial till and water deposited soils that are often shallow and with good drainage. Other types of soils found in great quantities are Scantic silt loam, and Buxton silt loam. A soils map is provided on Map 5 Soils Classification. More detailed information on soils is provided below.

LAND SUITABILITY FOR DEVELOPMENT

Soils

Neither Pembroke nor Perry has public sewage facilities. While Boyden Lake is a public water supply it provides water to users outside of both Pembroke and Perry. In both towns development depends on the private provision and maintenance of safe and adequate septic systems and wells. Septic systems should always be designed and constructed carefully, but this is especially crucial when such systems are placed in areas with poorly drained soils, shallow bedrock soils, and soils with high water tables. Development on poorly suited soils is the underlying cause of many environmental and economic problems. A community pays for improper land use through water pollution, high mitigation and maintenance costs on individual wells and public services, closure of shellfishing areas, and destruction of existing wildlife and scenic areas.

The United States Department of Agriculture (USDA) Soil Conservation Service (SCS) released digital soil classification maps for the first time in Washington County in 2007. Soils in Pembroke and Perry are of several types: glacial till thinly deposited in the uplands; thick glacial till on northwest slopes and in bedrock depressions; marine silts and clays in the valleys and more sheltered locations, and glacial outwash or ice contact sands and gravels.

Soils in both towns are depicted on Map 5 – Soils Classification and include soil suitability indices that predict suitability for development based on soil characteristics that influence the cost of construction. Prime agricultural soils are also noted on Map 5.

Soil Potential for Low Density Development (LDD)

Very few areas of Pembroke or Perry or indeed of Maine in general, have large tracts of land that are ideal for residential development. The Natural Resources Conservation Service of the USDA has produced a handbook of Soil Survey Data for Growth Management in Washington County. The soil suitability indices on Map 5 – Soils Classification are interpreted from this publication

The rating of soil potential for low density urban development – provided in the legend on Map 5 - is used to guide the concentration of development in the growth areas in Pembroke and Perry. Under this system soil potentials are referenced to an individual soil within the county that has the fewest limitations to development (depth to water table, bedrock etc.). This reference soil is given a value of 100 points. Costs that are incurred to overcome limitations to development are developed for all other soils. These costs, as well as costs associated with environmental constraints and long term maintenance, are converted to index points that are subtracted from the reference soil. The result is a comparative evaluation of development costs for the soils in the county. The overall range is large with values between 0 and 100. These numerical ratings are separated into Soil Potential Rating Classes of very low to very high. Thus a soil with a Very High rating has very good potential for development.

These maps and the data available from the Soil Conservation Service are useful to the town to predict the sequence of development; develop future land use plans and update zoning. They also indicate areas where streets or sewers may be prohibitively costly and identify where environmentally sensitive land should be protected. Individuals can learn problems or development costs associated with a piece of land and the advantage of one piece of land over another prior to purchase. The information will help answer whether the site can support a septic system, if the basement will always be wet, if there is a high potential for erosion, and the bearing capacity of the soil.

Soil survey maps do not eliminate the need for on-site sampling, testing, and the study of other relevant conditions (for example, pockets of different soils having completely different qualities may be present), but they are an important first step that should precede development decisions.

Highly Erodible Soils

The removal of surface vegetation from large areas of land can cause erosion, which is a major contributor of pollution to surface waters. Highly erodible soils have a potential to erode faster than normal. Soil composition affects its susceptibility to erosion but the combined effects of slope length and steepness are the greatest contributing factors when identifying highly erodible soils.

Most development and intensive land use can and should take place on areas with slopes of less than 15 percent (representing an average drop of 15 feet or less in 100 feet horizontal distance). On slopes greater than 15 percent, the costs of roads, foundations and septic, sewer and other utility systems rise rapidly. Map 3: Topography, Steep Slopes and Flood Zones identify the location of steep slopes in Pembroke and Perry.

FARM AND FOREST LAND

The U.S. Department of Agriculture defines prime farmland as the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment. Prime farmland is also often targeted as prime property for low-density residential development. Very few of the soils in Pembroke or Perry are listed as Prime Farmland, the exception being several pockets along river corridors, near certain bays and some interior lands (see Map 5 – Soils Classification). Several others are classified as Prime Farmland but only if either drained or irrigated.

Much of the soil in both towns is not conducive to agriculture. Most of the past farming efforts occurred where deep deposits of glacial till are found and soils have moderate to good drainage but are somewhat lacking in organic materials. There is little large scale farming in Pembroke or Perry today. In Perry there are two cattle herds, one beef operation of approximately 30 animals and one dairy of about 20 animals. There is one large horse farm

in Pembroke and 3 large horse operations in Perry providing boarding, training and riding facilities. There are no large animal herds in Pembroke but there are dispersed fields used for hay production in both towns. Both towns also have many small farms on which individuals raise one or two horses, one or two hogs, chickens, vegetables, orchards and the like. There is commercial cranberry production and some wild blueberry harvesting in Perry. There is also at least one maple sugaring operation in Perry.

Maine's forests and forest industry still play a vital role in the state's economy, especially in Northern and Eastern Maine. Forested areas provide abundant and diverse wildlife habitat for both game and non-game species and contribute to many recreational and aesthetic experiences. About eighty per cent of each town is forested (see Map - 7 Land Cover for proportionate land cover areas) with a maritime spruce-fir forest that also includes patches dominated by fir, heart-leaved paper birch and, mountain ash and extensive areas of forested wetlands. There are several designated Tree Farms in both towns.

Soils rated with a woodland productivity of medium or above are qualified as prime forestland soils. These soils are rated only for productivity and exclude management problems such as erosion hazard, equipment limitations or seedling mortality. In Pembroke and Perry the forestlands are predominantly medium to high woodland productivity ratings according to the Washington County Area Soil Survey and Subpart C – Ordination System, National Forestry Manual (see Table D-2).

Table D-1 Woodland Productivity Ratings for Pembroke and Perry

Woodland Productivity Rating	Square Meters	Percentage of Total land area
Total Very high	1,025,002	0.66%
Total high	70,131,818	45.26%
Total medium	48,635,717	31.39%
Total low	21,001,301	13.55%
Total very low	1,567,170	1.01%
Total not rated (hydric, water, sand etc.)	12,581,208	8.12%
Total	154,942,217	100.00%

Source: Soil Survey Data for Growth Management in Washington County, Maine USDA, 1997

Timber harvesting conducted in Pembroke and Perry is recorded from annual landowner reports. It is conducted primarily on a selection harvest basis (see Table D-1).

Table D-2 SUMMARY OF TIMBER HARVEST INFORMATION

YEAR	Selection harvest, acres		Shelterwood harvest, acres		Clearcut harvest, acres		Total Harvest, acres		Change of land use, acres		Number of active notifications	
	Pembroke	Perry	Pembroke	Perry	Pembroke	Perry	Pembroke	Perry	Pembroke	Perry	Pembroke	Perry
1991	200	103	80	0	65	4	345	107	3	0	6	8
1992	581	238	0	20	0	0	581	258	30	0	6	5
1993	407	404	0	0	0	0	407	404	0	0	3	7
1994	85	503	0	0	20	12	105	515	20	0	3	9
1995	276	409	0	3	20	0	296	412	0	0	9	13
1996	155	1087	29	5	8	1	192	1093	0	0	7	18
1997	268	342	0	32	0	2	268	376	0	2	7	13
1998	140	330	0	40	0	20	140	390	0	0	6	13
1999	57	263	0	10	0	0	57	273	0	0	10	17
2000	535	175	25	75	0	0	560	250	0	3	14	18
2001	125	207	0	0	0	0	125	207	0	2	13	14
2002	274	130	68	0	0	0	342	130	11	0	15	10
2003	353	103	0	28	0	0	353	131	0	0	9	10
2004	262	142	0	20	0	0	262	162	2	2	10	15
2005	48	457	0	22	0	0	48	479	0	1	9	14
2006	433	110	1	10	0	0	314	120	1	2	26	16
2007	486	99	75	2	0	0	561	101	1	0	35	10
Totals	**4,685**	**5,102**	**278**	**267**	**113**	**39**	**4,956**	**5,408**	**68**	**12**	**188**	**210**

Source: Year End Landowner Reports to Maine Forest Service, 2008 (Note: to protect confidential landowner information, data is reported only where three or more landowner reports reported harvesting in the town)

WATER RESOURCES

The water resources of Pembroke and Perry are vital to the community for commercial fishing, recreational fishing, sight-seeing, and various water-based recreations. Many of the tidal waters provide fish and shellfish habitat while others are used for various marine-related or recreational activities. The freshwater wetlands serve as storm water recharge areas and wildlife habitat. This section provides an overview of the town's water resources, the quality of those resources, and a review of existing or potential threats to the water resources of both towns. A more detailed examination of marine waters and marine resources is considered in the following section.

Watersheds

A watershed is the land area in which runoff from precipitation drains into a body of water. The Pennamaquan River and Boyden Stream (impounded to form Boyden Lake) and their tributaries form the predominant watersheds in the two towns. In addition, the small estuarine streams that feed Dennys Bay, East Bay and other coves drain toward Cobscook and Passamaquoddy Bays. There are many dispersed wetlands, mostly forested, throughout the town. The largest are in the upper watersheds. There are several scattered open water wetlands and freshwater ponds, and one great pond, Boyden Lake within Perry.

The marine water quality in Pembroke and Perry is affected by land uses in the two towns and in the neighboring towns of Pleasant Point, Dennysville, Edmunds Township and the city of Eastport. The portion of the watershed that has the greatest potential to affect a body of water is its direct watershed, or that part which does not first drain through upstream areas. Anything that can be transported by water will eventually reach and impact the quality of a water body. Development activities, such as residential, commercial and road construction, transportation facilities, and timber harvesting, may disturb land, increase the amount of impervious surfaces and contribute pollutants and other substances to waterbodies, degrading water quality. Activity anywhere in the watershed, even several miles away, has the potential to impact water quality.

To assess what portion of Maine's rivers, streams, and brooks meet the goal of the Clean Water Act; the Maine Department of Environmental Protection (MDEP) uses bacteriological, dissolved oxygen, and aquatic life criteria. All river waters are classified into one of four categories: Class AA, A, B, and C. These classifications are defined by legislation, with Class AA being the highest classification with outstanding quality and high levels of protection. Class C, on the other end of the spectrum, is suitable for recreation and fishing yet has higher levels of bacteria and lower levels of oxygen. There is one standard for the classification of great ponds and natural lakes and ponds less than 10 acres in size: GPA. All estuarine and marine waters are also classified into a similar set of three categories: SA, SB and SC.

The streams, lakes and marine within Pembroke and Perry are classified by the DEP "bluebook" and summarized in Table D-3.

Table D-3 WATER QUALITY CLASSIFICATIONS IN PEMBROKE AND PERRY

Waterway	**Classification**[1]
impoundments of the Pennamaquan River	Class B
All other waters	Class B
Impoundments greater than 10 acres	Class GPA
Tidal waters west of a line running from the easternmost point of Leighton Neck to the easternmost point of Youngs Point in Lubec -	Class SA.
All other estuarine and marine waters	Class SB

Threats to water quality come from point and non-point discharges. Point source pollution is discharged directly from a specific site such as a municipal sewage treatment plant or an industrial outfall pipe. Point sources are also any pipe that discharges to surface water. There are no point sources or licensed Overboard Discharge Permits within the towns of Pembroke or Perry. Pembroke and Perry have applied, and continue to, for Small Community Grant Program funds from the DEP to correct malfunctioning septic systems.

Non-point source pollution poses the greatest threat to water quality in Maine communities and Pembroke and Perry are no exception. The most significant contributing source comes from erosion and sedimentation as well as excessive run-off of nutrients. Additional contributing factors include animal wastes, fertilizers, sand and salt storage, waste lagoons,

[1] Summaries of the designated uses ascribed to Maine's water quality classifications (more specific and detailed description can be found in Title 38 § 465. Standards for classification of fresh surface water):

Class AA - The highest classification and applied to waters which are outstanding natural resources and which should be preserved because of their ecological, social, scenic or recreational importance. Drinking water supply after disinfection, recreation in and on the water, fishing, navigation and a natural and free flowing habitat for fish and other aquatic life.
Class A - The 2nd highest classification Drinking water supply after disinfection, recreation in and on the water, fishing, industrial process and cooling water supply; hydroelectric power generation, navigation, and unimpaired habitat for fish and other aquatic life.
Class B - - The 3rd highest classification. Suitable for the designated uses of drinking water supply after treatment, recreation in and on the water, fishing, industrial process and cooling water supply; hydroelectric power generation, navigation, and unimpaired habitat for fish and other aquatic life.
Class C - The 4th highest classification. Drinking water supply, recreation in and on the water, fishing, industrial process and cooling water supply; hydroelectric power generation, navigation, and a habitat for fish and other aquatic life.
Class GPA -- Suitable for the designated uses of drinking water after disinfection, recreation in and on the water, fishing, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other aquatic life. The habitat shall be characterized as natural.
Class SA – Class SA shall be the highest classification and shall be applied to waters which are outstanding natural resources and which should be preserved because of their ecological, social, scenic, economic or recreational importance. suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish and navigation and as habitat for fish and other estuarine and marine life. The habitat shall be characterized as free-flowing and natural.
Class SB – The 2nd highest classification. Suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other estuarine and marine life. The habitat shall be characterized as unimpaired.
Class SC – The 3rd highest classification. Suitable for recreation in and on the water, fishing, aquaculture, propagation and restricted harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation and navigation and as a habitat for fish and other estuarine and marine life.

faulty septic systems, roadside erosion, leaking underground storage tanks, and hazardous substances. Identification and regulation of these sites is important in safeguarding both surface and ground waters.

Shorelands and Floodplains

Shorelands are environmentally important areas because of their relationship to water quality, their value as wildlife habitat and travel, and their function as floodplains. Development and the removal of vegetation in shoreland areas can increase runoff and sedimentation leading to an increase in the amount of nutrients and other pollutants that reach surface water. This can lead to algal blooms and closure of shellfishing areas. Steep slopes with highly erodible soils are particularly susceptible to erosion. The Shoreland Zoning Ordinance, with revisions adopted by Pembroke in 1995 and by Perry in 1995, is designed to provide protection to shorelands. Both towns operate according to the state minimum ordinance standards.

Floodplains serve to accommodate high levels and large volumes of water and to dissipate the force of flow. A floodplain absorbs and stores a large amount of water, later becoming a source of aquifer recharge. Floodplains also serve as wildlife habitats, open space and outdoor recreation without interfering with their emergency overflow capacity. Flooding can cause serious destruction of property. Activities that increase paved or impervious surfaces can change the watercourse, quantity and rate of runoff on floodplains possibly creating flooding impacts downstream.

The 100-year floodplains within Pembroke and Perry have been identified by the Federal Emergency Management Agency (FEMA) for administration of the Federal Flood Insurance Program. A 100-year flood is a flood that has 1 chance in 100 of being equaled or exceeded in any 1-year period. Local flood plain areas fall into two major categories: areas prone to flooding and velocity zones or areas susceptible to damage from wind-driven water during coastal storms. One hundred year floodplains are associated with the shorelands of Passamaquoddy and Cobscook Bays as well as the riparian corridors along Boyden Stream, Pennamaquan River, Crow Brook, Taylor Brook, Meadow Brook, Stephen and Eastmen Streams and other small streams feeding Cobscook and Passamaquoddy Bay. See Map 3: Topography, Steep Slopes and Flood Zones. Pembroke and Perry each adopted a Floodplain Management Ordinance in May of 1999 and in June of 1997, respectively, that both include construction standards to minimize flood damage within the 100-year floodplain.

Wetlands

The term "wetlands" is defined under both state and federal laws as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support prevalence of vegetation typically adapted for life in saturated soils." Wetlands include freshwater swamps, bogs, marshes, heaths, swales, and meadows. Wetlands are important to public health, safety and welfare because they act as a filter, absorb excess water, serve as aquifer discharge areas, and provide critical habitats for a wide range of fish and wildlife.

Riparian areas also offer habitat for many plants and animals and can serve as wildlife travel corridors. Some wetlands have important recreational and educational value providing opportunities for fishing, boating, hunting, and environmental education. Planning efforts should take into account the constraints of these areas.

Vernal pools are natural, temporary to semi-permanent water bodies that occur in shallow depressions. Typically, vernal pools fill with water during the spring or fall and become dry during summer months. The presence of breeding amphibians in vernal pools contributes significantly to healthy forests ecosystems both as a protein-rich food source for many species; and because of the effect that amphibians associated with vernal pools have on controlling insect species known to attack the roots of maturing timber.

Beginning in September 2007, activities (including construction, forestry and earth moving) within 250 feet of significant vernal pools will be regulated under the Natural Resource Protection Act (NRPA). The standard requires landowner to obtain a permit for many activities within this zone; it does not require a set back or no build-zone. However, the standard does require preservation of the depression and at least 75% of associated habitat; additionally certain activities may not be permitted within the 250 foot radius of significant vernal pools.

Detailed mapping of significant vernal pool habitat is not currently available. Significant vernal pools may exist both within and outside the boundaries of the shoreland zone. Classification of vernal pools as significant is made in the field based on the documented presence of at least one of four indicator species: wood frogs (Rana sylvatica), spotted salamanders (Ambystoma maculatum), blue-spotted salamanders (Ambystoma laterale), and fairy shrimp (Eubranchipus sp.); or use of the pool by threatened or endangered species. DEP encourages landowners who are unsure as to the status or presence of a vernal pool on their property to seek the advice of a trained wetland or wildlife ecologist early in the permitting process. The classification of vernal pools can change based on the continued absence of indicator species (or the presence of indicator species in pools where they were previously absent).

The MDEP has identified some wetlands located within Pembroke and Perry, as illustrated on Map 4: Water Resources and Wetlands. These wetlands were identified by aerial photo interpretation and confirmed by soil mapping and other wetland inventories. Field verification of the location and boundaries of the wetlands should be undertaken prior to development.

The MDEP has jurisdiction over freshwater wetlands and floodplain wetlands under the Natural Resources Protection Act (NRPA)/Wetland Protection Rules and Site Location of Development Act. Finally, the Mandatory Shoreland Zoning Law provides protection to mapped non-forested wetlands.

Freshwater Fish

The Maine Department of Inland Fisheries and Wildlife (IF&W) has rated the streams in Pembroke and Perry regarding their value as fisheries habitat. Each water body is rated as to whether it receives cold water or warm water fisheries management. Cold water management supports salmonid species such as salmon and trout, while warm water management supports black bass, chain pickerel, and perch.

Pembroke and Perry streams that have high value habitat are identified below. Anywhere the Maine IF&W designates high value habitat they suggest that the town designate 100' Resource Protection shoreland zone for both sides of the stream with no cutting or development allowed.

Table D-4 FRESHWATER FISHERIES AND HABITAT VALUES

Fishery	Stream Name	
	Pembroke	**Perry**
high value fisheries and habitats for wild Eastern Brook Trout	Crow Brook Meadow Brook Ohio Brook & tribs Eastman Stream Stephens Stream Davis Shores Brooks	Pottle Brook & Tribs Frost Brook Bay Stream Sipps Brook Golding Brook Porcupine Mtn. Brook
high value fisheries and habitats for wild Eastern Brook Trout and anadromous smelt	Leighton Point Brook	Smelt Brook
high value fisheries and habitats for wild Smallmouth Bass		Boyden Lake
high value fisheries and habitats for wild Eastern Brook Trout and anadromous Brook Trout	Wilson Stream	
high value fisheries and habitats for wild Eastern Brook Trout, anadromous Brook Trout and anadromous smelt	Willow Brook	
high value fisheries and habitats for wild Eastern Brook Trout and for stocked and wild Brown Trout	Pennamaquan River	

Source: Inland Fisheries and Wildlife, 2008

Where crossings are proposed Maine IF&W suggests open bottomed and arched bridge design to preserve the natural stream bottom and natural hydraulic roughness for fish traction and passage. Thus a bridge or open bottomed arch culvert is recommended as a first priority with a corrugated culvert as a last resort. The span of the bridge, arch or culvert should be 1.2 times the full bank width to both protect the integrity of the road and allow all aquatic and terrestrial organisms to pass under the road. No slip-lined or smooth bore culverts should be used unless there is a dead water situation because they do not have hydraulic traction[2] for fish passage in areas with slope. Hydraulic traction for fish passage is also preserved with the use corrugated culverts. As with any construction around water, Maine IF&W recommends that best management practices be used at any crossings and that work be done by a certified best management practices contractor.

Also, Maine IF&W recommends that for any stream with high value brook trout habitat the town should seek to ensure public access along these riparian zones for the purposes of

[2] Hydraulic traction is provided by a varied and mixed sized substrate similar to a natural stream bed.

fishing for a public resource. This can be done through a variety of conservation techniques available to public and non-profit conservation entities.

Groundwater - Sand and Gravel Aquifers

Aquifers may be of two types: bedrock aquifers and sand and gravel aquifers. A bedrock aquifer is adequate for small yields. A sand and gravel aquifer is a deposit of coarse-grained surface materials that, in all probability, can supply large volumes of groundwater. Boundaries are based on the best-known information and encompass areas that tend to be the principal groundwater recharge sites. Recharge to these specific aquifers, however, is likely to occur over a more extensive area than the aquifer itself.

The Maine Geological Survey has identified several aquifers to the west of the Pennamaquan River in Pembroke including one area that exceeds 50 gallons per minute. There are no sand and gravel aquifers within Perry. Perry does contain a source protection area for the Passamaquoddy Water District that includes the intake for this surface water source of drinking water. There are several Public Water Supply Sources in Pembroke and Perry (see Map 4: Water Resources and Wetlands for location); details for each follow:

Table D-5 PUBLIC WATER SUPPLIES

Water System Name	Public Water Supply Type[3]	Source Name	Source Type	Location
Country View Apartments	Community	Bedrock Well, 410 feet	Groundwater	PEMBROKE
Crossroads Motel and Restaurant	Transient; Non-community	Bedrock Well, 137 feet	Groundwater	PEMBROKE
MSU 104 Pembroke Elementary School	Non-transient, non-community	Bedrock Well, 250 feet	Groundwater	PEMBROKE
MSU 104 Pembroke Elementary School	Non-transient, non-community	Bedrock Well, 250 feet	Groundwater	PEMBROKE
MSU 104 Perry Elementary School	Non-transient, non-community	Bedrock Well, 800 feet	Groundwater	PERRY
New Friendly Restaurant Inc.	Transient; Non-community	Bedrock Well, 72 feet	Groundwater	PERRY
~~Knowltons Seashore Campground~~	~~Transient; Non-community~~	~~Bedrock Well, 225 feet~~	~~Groundwater~~	~~PERRY~~
~~The Lobster Crate~~	~~Transient; Non-community~~	~~Bedrock Well, 168 feet~~	~~Groundwater~~	~~PERRY~~
Passamaquoddy Water District	Community	Boyden Lake Stream Impoundment	Surface water	PERRY

Source: Maine Department of Human Services, Bureau of Health, Division of Health Engineering, Drinking Water Program; October, 2009. NOTE: The Lobster Crate is no longer active as a public water system.

Map 4 can be used to identify surface sites that are unfavorable for storage or disposal of wastes or toxic hazardous materials. It is important to protect groundwater from pollution and depletion. Once groundwater is contaminated, it is difficult, if not impossible, to clean. Contamination can eventually spread from groundwater to surface water and vice versa. Most aquifer and surface water contamination comes from non-point sources including faulty septic systems, road salt leaching into the ground, leaking above ground or underground storage tanks, auto salvage yards, and landfills.

The Maine Drinking Water Program follows an EPA-approved assessment matrix to determine the risk of contamination at a public water source due to its 1) well type and site geology; 2) existing and future risk of acute contamination and 3) existing and future risk of

[3] The Maine Rules Relating to Drinking Water (Chapter 231) define a "public water system" as any publicly or privately owned system of pipes or other constructed conveyances, structures and facilities through which water is obtained for or sold, furnished or distributed to the public for human consumption, if such a system has at least 15 service connections, regularly serves an average of at least 25 individuals daily at least 60 days out of the year or bottles water for sale.

1. Community Water System: A public water system which serves at least fifteen service connections used by year-round residents or regularly serves at least twenty-five year-round residents.
2. Non-Community Water System: A public water system that is not a community water system. There are two types of Non-Community Water Systems. These are:
   a. Non-Transient, Non-Community Water Systems: A Non-Community water system that serves at least 25 of the same persons for six months or more per year and may include, but is not limited to, a school, factory, industrial park or office building, and
   b. Transient Non-Community Water Systems: A Non-Community water system that serves at least 25 persons, but not necessarily the same persons, for at least 60 days per year and may include, but is not limited to, a highway rest stop, seasonal restaurant, seasonal motel, golf course, park or campground. A bottled water company is a transient, non-community water system.

chronic contamination. Accordingly, the risk of contamination in the community water supplies is provided for Pembroke in Table D-6 and for Perry in Table D-7.

Table D-6 RISK ASSESSMENT MATRIX FOR PUBLIC WATER SUPPLIES IN PEMBROKE

Risk of Contamination due to:	Community Water Supply				Risk Assessment is based on:
	Country View Apartments	Crossroads Motel and Restaurant	MSU 104 Pembroke Elementary School	MSU 104 Pembroke Elementary School	
well type and site geology	Moderate	Low	Moderate	Moderate	Well type and overburden thickness
existing risk of acute contamination	Moderate	Low	Low	Low	Coliform tests, nitrate test; septic system(s) within 300 feet, animal feedlot(s)/manure pile(s) within 300 feet of the well
future risk of acute contamination	High	Low	High	High	Status of land control
existing risk of chronic contamination	--	Low	Low	Low	Detection of chronic contaminants
future risk of chronic contamination	--	Low	High	High	Legal control of entire wellhead protection area

Source: Final Source Assessment Report - Source Water Assessment Program; Maine Bureau of Human Services, Bureau of Health, Division of Health Engineering, Drinking Water Program, 2006

The well at the Country View Apartments received moderate and high risk ratings because there is a septic system within 300 feet of the well (risk of acute contamination), legal land control is unknown or less than a 150-foot radius of property around the well (future risk of acute contamination), and there is no landownership or legal control of the entire wellhead protection area (future risk of chronic contamination).

The two wells at the Pembroke Elementary School received moderate and high risk ratings because the overburden thickness is unknown (well type and site geology), legal land control is less than a 150-foot radius around the wells (future risk of acute contamination), and there is no legal control over the entire wellhead protection area (future risk of chronic contamination). The town of Pembroke should assist MSU 104 in the acquisition of land to increase the legal control of activities within the well head protection areas.

Table D-7 RISK ASSESSMENT MATRIX FOR PUBLIC WATER SUPPLIES IN PERRY

Risk of Contamination due to:	Community Water Supply					Risk Assessment is based on:
	Knowltons Seashore Campground	MSU 104 Perry Elementary School	New Friendly Restaurant Inc.	The Lobster Crate	Passamaquoddy water district	
well type and site geology	Moderate	Moderate	Moderate	Low	See discussion of 2003 Surface water Assessment and 2007 Source Water Protection Plan below	Well type and overburden thickness
existing risk of acute contamination	Moderate	Low	Moderate (see text below for upgrades conducted since 2003)	Moderate		Coliform tests, nitrate test; septic system(s) within 300 feet, animal feedlot(s)/manure pile(s) within 300 feet of the well
future risk of acute contamination	Low	High	Low	Low		Status of land control
existing risk of chronic contamination	Moderate	Low	--	--		Detection of chronic contaminants
future risk of chronic contamination	Low	high	--	--		Legal control of entire wellhead protection area

Source: Final Source Assessment Report - Source Water Assessment Program; Maine Bureau of Human Services, Bureau of Health, Division of Health Engineering, Drinking Water Program, 2009

The well at the Perry Elementary School received moderate and high risk ratings because the overburden thickness of the well is unknown (well type and site geology), the legal land control or control status is unknown or less that a 150-foot radius around the well (future risk of acute contamination), and there is no landownership or legal control of the entire wellhead protection area (future risk of chronic contamination). As in Pembroke, the town of Perry should assist MSU 104 in the acquisition of land to increase the legal control of activities within the well head protection areas.

The well at the New Friendly Restaurant received moderate risk ratings because the overburden thickness of the well is unknown (well type and site geology), and there is a septic system(s) within 300 feet of the well. However, since the 2003 sourcewater assessment was completed the septic system on the site was substantially upgraded.

The well at Knowltons Seashore Campground received moderate risk ratings because the overburden thickness of the well is 10 feet thick (well type and site geology), and there is a septic system(s) within 300 feet of the well. Knowltons Seashore Campground closed in 2007 and the land is currently is use for private homes.

The well at the former Lobster Crate received one moderate risk rating because there is a septic system(s) within 300 feet of the well. However, as noted above, this site is not currently in use as a public water system.

The drinking water source owned and managed by the Passamaquoddy Water District in Boyden Stream was included in the State Source Water Assessment Program completed by the Maine Department of Human Services Drinking Water Program (DWP) in 2003. The purpose of the program was to evaluate the susceptibility of each public drinking water

source in Maine to contamination. The State found the overall susceptibility of Boyden Lake and the Stream Impoundment to contamination to be moderate.

The drinking water source owned and managed by the Passamaquoddy Water District in Boyden Stream was included in the State Source Water Assessment Program completed by the Maine Department of Human Services Drinking Water Program (DWP) in 2003. The purpose of the program was to evaluate the susceptibility of each public drinking water source in Maine to contamination. A Source Water Protection Plan for the Passamaquoddy Water District was prepared in 2006-2007 with the goal of reducing or eliminating existing and potential risks to Boyden Lake and the Stream Impoundment. The Impoundment is a sole-source drinking water supply for the Water District, which provides fire protection and drinking water to approximately 2,600 people in Eastport and Pleasant Point. Boyden Lake is the up-gradient water-body which flows to Boyden Stream. The sourcewater protection plan consists of a series of tasks aimed at public education, watershed protection and security, while avoiding unnecessary adverse impacts to other activities in the watershed. In addition, the Passamaquoddy Water District is exploring the option of obtaining future water supplies from other groundwater sources.

MARINE WATERS AND RESOURCES

The town contains expanses of tidal waters ranging from deep water offshore of Perry to secluded coves. The town's tidal waters are of critical importance to a wide variety of interests including traditional fishermen, aquaculturists, shipping interests, recreational boaters, those who enjoy the view, underwater photographers, and divers. Potential for conflict among the various interests may be avoided with reasonable controls planned out in advance.

Map 6, Marine Resources, depicts the location of Molluscan shellfish habitat, areas closed to shellfish harvest in 2008, commercially harvested marine worm habitat, aquaculture lease locations, anadromous and catadromous fish locations and historic locations of herring weirs. These habitats and other fisheries of commercial significance are described below.

Marine Water Quality

As already noted, the Maine Department of Environmental Protection classifies surface waters according to their desired use and water quality necessary to support that use. The majority of the tidal waters in the town are classified Class B Saltwater (SB). Quality in these waters should be suitable for recreation in or on the water, fishing, aquaculture, propagation and harvesting of shellfish, marine related industry, industrial process and cooling water supply, hydroelectric power generation, navigation, and as the habitat for fish and other estuarine and marine life. Discharges of pollutants to Class SB waters are regulated by state DEP wastewater permitting process.

The marine water quality surrounding Pembroke and Perry is affected by land uses in both towns and the other municipalities surrounding Cobscook Bay (Dennysville, Lubec, Eastport, the unorganized territories of Edmunds and Trescott, and the Pleasant Point Tribal

Community) and with frontage on Passamaquoddy Bay (Robbinston). Threats to water quality come from point (pollution is discharged directly from a specific site such as a municipal sewage treatment plant) and non-point discharges.

Nearby, the city of Eastport has one point source discharge – the sewage treatment plant. As noted above however it is non-point source pollution that poses the greatest threat to water quality in Maine communities. The most significant contributing sources are the same as for freshwaters: erosion and sedimentation as well as excessive run-off of nutrients from animal wastes and fertilizers, sand and salt storage, waste lagoons, faulty septic systems, roadside erosion, leaking underground storage tanks, and hazardous substances.

Shellfish Management

The shorelines of Pembroke and Perry vary widely from rocky cliffs to small tidal inlets to areas of extensive flats with potential commercial shellfish value. The relationship between activities on the land and water quality concerns is different in these varying situations. Each town has adopted a Shellfish Management Ordinance (adopted in Pembroke in 2003 and in Perry in 2002) containing provisions for commercial and recreational licensing. Shellfish Committees in both towns, working with the Department of Marine Resources and the Cobscook Bay Resource Center, work to improve the flats.

The extent of shellfish closure areas is depicted on Map 6 – Marine Resources. The Annual Shellfish Management Review for Perry (2007), provided by the Department of Marine Resources concludes that enforcement of the town shellfish management ordinance is satisfactory though enforcement could be improved by more hours patrolled. Current management activities include flat roughing and brushing, removal of predators (mussels and green crabs, and seeding of the flats (2008).

The Annual Shellfish Management Review for Pembroke (2006 - most recent one available), provided by the Department of Marine Resources concludes that enforcement of the town shellfish management ordinance is satisfactory though enforcement could be improved by more local support. Current management activities include flat surveys and closures for conservation (Youngs Cove in 2006).

Commercial Fishing

As the Table D-8 describes, commercial fishing in Pembroke and Perry is of some significance to the local economy but less so than in many Washington County communities.

Table D-8 FISHING PRESENCE IN WASHINGTON COUNTY

Community	State License	Clam License	Total Per town	Clam Data Source
Winter Harbor	55	0	55	CEI Report
Gouldsboro	133	17	150	Town manager
Steuben	138	21	159	Town office
Milbridge	144	70	214	Town manager
Harrington	109	57	166	Jim Layton
Addison	151	40	191	CEI Report
Jonesport	191	73	264	CEI Report
Beals	191	12	203	From town clerk
Jonesboro	79	44	123	From annual report
Roque Bluffs	41	58	99	From annual report/town clerk
Machias	88	0	88	No flats
East Machias	50	27	77	Town office
Machiasport	150	79	229	CEI Report
Cutler	87	43	130	Town office
Whiting	16	6	22	Town clerk
Trescott Twp.	7	n/a	7	State issues
Edmunds Twp.	8	n/a	8	State issues
Lubec	209	59	268	Town office
Eastport	43	4	47	CEI Report
Pembroke	**58**	**35**	**93**	**Harbor master**
Perry	**39**	**22**	**61**	**Town clerk**
Robbinston	8	0	8	Flats are closed
Calais	12	0	12	No requests
Totals	**2007**	**667**		

Source: Paths and Piers: A Study of Commercial Fishing Access in Downeast Maine Coastal Communities, Sunrise County Economic Council, April, 2003

Data from the Department of Marine Resources, shown in Table D-9 indicates that the number of residents holding marine resource licenses (dealers and harvesters) has remained relatively stable over the past 6 years in both towns. The count of lobster traps fished by residents has increased somewhat since 1999. The total number of lobster trap tags has increased in Pembroke between 2002 and 2004 with some fluctuations in both towns over the entire period of 2002 to 2007, a reflection of fluctuations in the lobster harvest throughout the region. Lobster fishing is conducted both within and outside of each town while clamming is contained within a town's boundaries.

Table D-9 MARINE LICENSE HOLDERS IN PEMBROKE AND PERRY 2002 – 2007

	Pembroke						Perry					
Year	2002	2003	2004	2005	2006	2007	2002	2003	2004	2005	2006	2007
Residents Holding Marine Resource Licenses - Dealers	3	2	2	2	3	4	2	2	2	3	2	2
Residents Holding Marine Resource Licenses - Harvesters	71	81	71	72	60	56	113	163	143	169	158	146
Lobster Traps Fished by Residents – Total Trap Tags	1335	1825	2205	2305	2605	2105	3323	2923	3626	3776	2570	3320

Source, Maine Department of Marine Resources, 2008

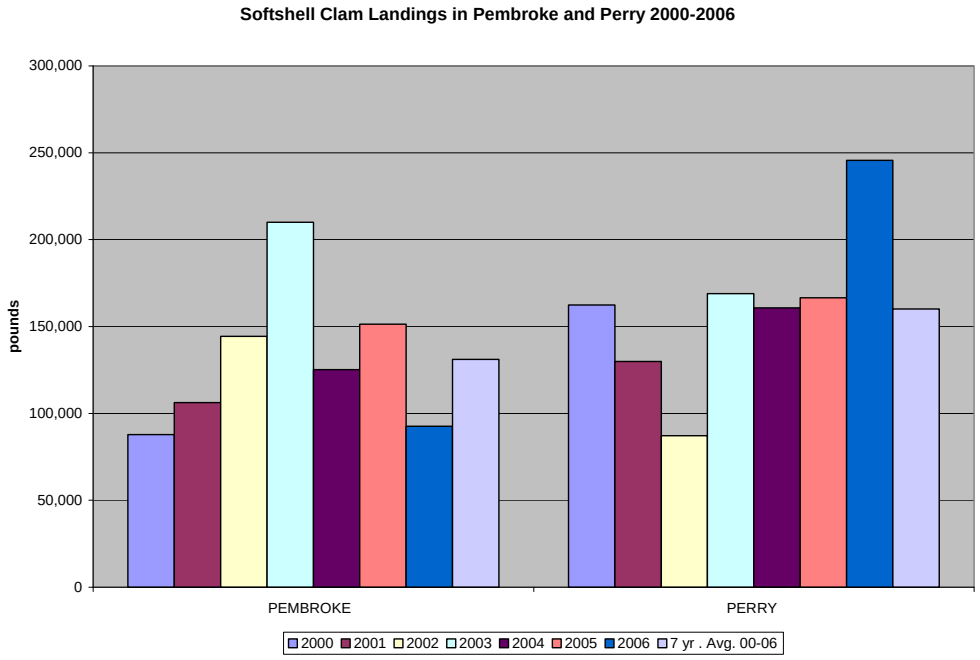
The diversity of target species (See Table D-10) indicates that year round income comes from a variety of sources for individual harvesters and the industry as a whole.

Table D-10 FISHING LICENSES IN PEMBROKE AND PERRY BY HARVEST SPECIES 2003-2008 (NOTE "-" means no data from DMR)

	Pembroke						**Perry**					
Licenses Held By:	2003	2004	2005	2006	2007	2008	2003	2004	2005	2006	2007	2008
Commercial Fishing, Single Operator	41	45	40	27	21	19	14	17	22	22	15	16
Commercial Fishing, With Crew	2	2	2	3	5	4	12	11	12	11	12	12
Commercial Shellfish	46	35	35	27	18	7	13	11	11	16	12	12
Commercial Shellfish +70	0	0	0	2	1	1	0	0	0	0	0	1
Demo Lobster	-	-	-	-	-	-	0	1	1	1	0	0
Green Crab	1	2	1	0	0	0	2	2	1	1	1	1
Lobster Meat Permit	0	0	0	1	1	0	-	-	-	-	-	-
Lobster/Crab Apprentice under 18	0	1	1	1	1	1	-	-	-	-	-	-
Lobster/Crab Apprentice	2	4	3	2	3	1	3	3	1	0	0	0
Lobster/Crab Class I	3	2	2	2	1	2	5	6	6	6	6	5
Lobster/Crab Class II	2	2	2	2	2	1	3	3	3	4	4	3
Lobster/Crab Class III	2	2	2	2	2	3	6	6	4	5	6	7
Lobster/Crab Non-Commercial	3	3	5	9	8	8	4	4	3	3	4	2
Lobster/Crab Over Age 70	1	1	1	1	1	1	1	1	1	0	0	0
Lobster/Crab Student	0	0	0	0	1	3	1	1	1	1	1	1
Marine Worm Dealer	1	1	1	1	1	0	-	-	-	-	-	-
Marine Worm Digging	3	3	3	1	1	2	0	0	2	0	0	0
Mussel – Dragger	-	-	-	-	-	-	2	1	1	1	1	1
Mussel - Hand	1	0	0	0	0	0	-	-	-	-	-	-
Pass Comm Fish	-	-	-	-	-	-	0	1	4	1	1	0
Pass Comm Shellfish	-	-	-	-	-	-	0	3	4	3	2	1
Retail Seafood	1	1	2	3	3	2	2	2	2	1	1	1
Scallop-Diver	1	0	0	0	0	0	5	3	3	2	4	4
Scallop-Dragger	9	9	9	7	9	16	15	15	13	11	13	17
Scallop, Non-Commercial	1	1	3	2	2	2	3	3	3	4	4	2
Sea Urchin-Diver	-	-	-	-	-	-	5	4	4	4	4	4
Sea Urchin-Dragger	6	6	6	6	6	6	8	8	7	7	7	7
Sea Urchin-Raking	-	-	-	-	-	-	1	1	1	1	1	1
Sea Urchin/Scallop Tender	-	-	-	-	-	-	2	2	2	2	2	2
Seaweed	2	3	1	2	3	5	1	0	0	0	0	4
Seaweed, non-res Supplemental	0	0	0	0	0	1	-	-	-	-	-	-
Seaweed, Supplemental	0	0	0	1	5	0	-	-	-	-	-	-
Wholesale Seafood, No Lobsters	0	1	0	0	0	0	-	-	-	-	-	-
Wholesale w/ Lobsters	0	0	0	0	1	0	1	1	0	1	1	1
Wholesale w/ Lobsters, supp	-	-	-	-	-	-	0	0	0	1	1	1

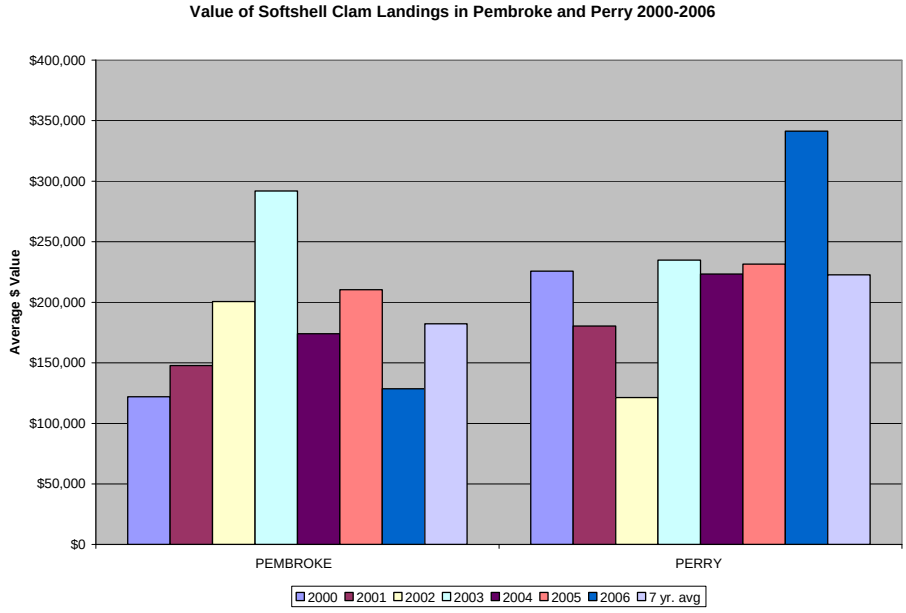
Source, Maine Department of Marine Resources, 2009

Commercial fishing thus remains an important source of income to residents.



Softshell clam landings in both towns have been relatively stable over the past seven years with some larger harvests in individual years.

The value of the harvest is a reflection of the size of the harvest as the overall market price has remained relatively stable.



Aquaculture

There are three aquaculture lease sites in the two towns as depicted on Map 6 – Marine

Resources. All are in Cobscook Bay, two are finfish and one is a scallop operation. The aquaculture industry grew significantly in the 1990s but has been devastated by the occurrence of Infectious Salmon Anemia (ISA) within the pens. These issues are being managed and aquaculture continues as an existing and potential contributor to the local economy. The Comprehensive Plan Committee chose to depict the location of existing aquaculture lease locations so that current and prospective property owners will know the location of existing or future aquaculture facilities.

Access to the Marine Resource

According to a study in 2003 prepared by the Sunrise County Economic Council, the Towns of Pembroke and Perry have more than 95 miles of coastline and are home to 154 commercial fishermen – see Table D-11. Access to the waterfront in both towns is provided at only 1 commercial or private waterfront facility in each town, neither of which are dedicated to commercial fishing use. These public access points are depicted on Map 2 – Public Facilities.

Table D-11 TOWN OF PEMBROKE AND PERRY BOAT ACCESS & WATERFRONT FACILITIES DATA – 2003 STUDY SUMMARY, see updated comments after table

	Perry	Pembroke	Other Downeast Towns
Miles of Coastline	43.39	52.27	1242.51
Total Commercial resource harvesters	61	93	2,674
Fisheries impacted by loss of access	lobster, sea urchin, clam, seaweed, other fisheries	lobster, sea urchin, clam, seaweed	Groundfish, Lobster, Sea Urchin, Clam, Worm, Seaweed, Mussel, Scallop, Lobster Pounds, Bait Dealers, Boat Yards, Fuel & Ice, Co-ops, Other, No Answer
Boat Access:			1,604
Total current boat access (moorings+berthing+slips+tie ups) commercial & recreational	20	21	76%
Percent of total current boat access used by commercial fishermen	75%	71%	142
Facilities:			
Number of commercial private & public waterfront facilities in 2002	1	1	65
Number of commercial private & public waterfront facilities dedicated to commercial fishing	0	0	32%
The percent of commercial fishing access that is achieved through private residence (pier/wharfs) that are owned or leased by fishermen.	0%	0%	68
Number of "Other" access points (beaches, land, property crossing) not actual facilities.	2	0	
The percent Population Change 1990-2000	8%	4%	-5%
The percent Change in Housing 1990-2000	24%	21%	11%
Annual taxes per acre in 2001	$31.49	$33.50	$95.80
Land valuation per acre in 2001	$1,197.68	$1,064.76	$1,720.42
Waterfront Issues:			
Commercial Fishing access is a problem	No	No	30% said "Yes"
Current threats to commercial fishing access	A decline in the commercial fishing industry	Higher taxes Decline in the commercial fishing industry Conversion of res/comml property to residential	44% said both "Higher taxes" and "Development pressures" Infrastructure deterioration
The town/town is planning to address commercial fishing access	No	No	61% said "Yes"
The top 3 useful tools to address commercial fishing access were:	None	Property tax relief Deeded access	Property tax relief Planning assistance Purchase access rights
Commercial Fishing Access Vulnerability Rating	**6**	**4**	(See explanation below)

Source - Paths and Piers: A Study of Commercial Fishing Access in Downeast Maine Coastal Communities; January 2003, Sunrise County Economic Council for the State Planning Office and the Maine Coastal Program

The commercial fishing access vulnerability rating in the Paths and Piers study sought to evaluate the vulnerability of losing commercial fishing access within a community. Ratings were derived from a matrix that analyzed the following factors:

- Whether commercial fishing access is a community priority
- Whether or not a community has strong ordinances
- Whether or not a community has a dedicated fishing pier
- Development pressures
- Number of harvesters

Vulnerability ratings ranged from a low of 1 and a high of 7 with communities falling in the 1-3 category having the least vulnerability to a loss of commercial fishing access, those in the 4-5 category having a moderate vulnerability and those in the 5-7 range having the greatest vulnerability to loss of commercial fishing access.

Pembroke with a rating of 4, according to the *Paths and Piers* study, is thus moderately vulnerable to loss of access and Perry, with a rating of 6, has a high vulnerability to loss of access without taking measure to correct specific access problems. The analysis in Table D-11 from the *Paths and Piers* study indicates that the Pembroke could improve commercial fishing access by providing property tax relief and obtaining additional deeded access. No tools were identified in the *Paths and Piers* study for Perry. However, obtaining additional deeded access is under discussion in other parts of this Comprehensive Plan. Commercial fishing access is insufficient in Perry and discussions are underway about commercial and industrial waterfront access in Gleason Cove.

Responses to the public survey in August of 2007 indicated very strong support for both towns to obtain more public shore access.

Protection of Access

The Land for Maine's Future (LMF) program provides funds to help purchase, preserve and protect key properties on the coast that provide access to and support commercial fisheries activities. When a project receives funding, the working waterfront property's development rights are extinguished through the sale of a working waterfront covenant or other legally binding deed restriction held by the Department of Marine Resources. The covenant protects all current and future fisheries related uses of the land by prohibiting all conflicting non-fisheries activities (i.e. condos, marinas). The covenant does allow a degree of mixed use and provides the property owner with the flexibility to manage the property as needed to remain viable. The property owner also retains all other rights of ownership; they are free to sell or lease. If and when the property owner chooses to sell the property, the State has a "right of first refusal" to assure that the land will be valued at its working waterfront value and thus remain affordable to those who would purchase it with the intent to continue commercial fishing activities.

Marine Resources Summary

Current regulatory and non-regulatory provisions influencing land use patterns along the shoreline and near coast area include implementation of the minimum state-mandated shoreland zoning regulations, harbor management pursuant to the locally adopted Harbor Management Plan, and efforts to identify and maintain services at the access points to the commercial fishing resource.

CRITICAL NATURAL RESOURCES

Maine Natural Areas Program

The Natural Areas Program is administered by the State Department of Conservation whose job it is to document Rare and Unique Botanical Features. These include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities. There are no such rarities in Pembroke or in Perry.

Wildlife Habitats

Conserving an array of habitats and their associated wildlife species will help in maintaining biological diversity and ensuring that wildlife and human populations remain healthy. To feed and reproduce, wildlife relies on a variety of food, cover, water, and space. Development can result in the deterioration of habitats and diversity through habitat fragmentation and loss of open space and essential travel corridors.

Essential Wildlife Habitats - Essential Wildlife Habitats are defined under the Maine Endangered Species Act as a habitat "currently or historically providing physical or biological features essential to the conservation of an Endangered or Threatened Species in Maine and with may require special management considerations". These sites are identified by the Maine Department of Inland Fisheries and Wildlife (MDIFW). In summary, any project within the Essential Habitat that requires a state or municipal permit, or uses public funding, requires IF&W review. The Essential Habitat includes land within ¼ mile of the identified site. This consultation rarely stops development, but projects may be modified to protect the eagles. According to MDIFW, neither Pembroke nor Perry have any eight sites of essential wildlife habitat see Map 8 –Habitat.

Significant Wildlife Habitat - Significant Wildlife Habitat, as defined by Maine's Natural Resources Protection Act (NRPA), is intended to prevent further degradation of certain natural resources of state significance. NRPA-defined Significant Wildlife Habitats in Pembroke and Perry are illustrated on Map 8 - Habitat and include seabird nesting habitat (in Eastport), high and moderate value inland wading bird and waterfowl habitat, high and moderate value coastal wading bird and waterfowl habitat.

Rare Animals - In addition to Essential and Significant Habitat, MDIFW tracks the status, life history, conservation needs, and occurrences for species that are endangered, threatened or otherwise rare. Pembroke and Perry support habitat for one species that is threatened, endangered or of special concern in Maine, the bald eagle (*Halieetus leucocephalus).* The location of these animals and their associated habitats is mapped on Map 8 - Habitat.

Atlantic Salmon - In December 1999, the State of Maine banned angling for Atlantic salmon statewide. In November 2000, the National Marine Fisheries Service and the US Fish and Wildlife Service officially declared as endangered the Atlantic salmon populations in eight

Maine rivers (Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap and Sheepscot Rivers and Cove Brook). There are no Atlantic salmon spawning or rearing areas identified in Pembroke or Perry.

The Maine Audubon Society conducts loon counts, a short (half-hour) survey designed to capture a "snapshot" of Maine's loon population each year. The goal of the loon count is to generate a population estimate for the southern half of the state (south of the 45th parallel, which runs approximately between Rangeley and Calais) that can be compared from year to year. The annual loon count, conducted by volunteers for the Maine Loon Project (part of Maine Audubon), happens every year on the third Saturday of July. It is timed in mid-July to assess the population soon after the majority of breeding is complete, so generally counts young chicks, not necessarily the chicks that fledge from an individual lake. Also, if chicks are not counted during the official "count window" (7-7:30 a.m.), they are not included in the count data (even if they show up later in the day). This allows the estimate to be consistent from year to year. The counts started in the early 80's but were standardized to a repeatable, comparable format starting in 1986. The survey is timed so that in most years the majority of breeding loons will be finished nesting and will be with young chicks. Loon count data for Boyden Lake are provided in Table D-12 below.

Table D-12 LOON COUNTS 1984-2004

	Boyden Lake (Perry)		Pennamaquan Lake (note – the majority of Pennamaquan Lake is in the Town of Charlotte but is connected to Pennamaquan River in Pembroke)	
Year	Number of Adults	Number of Chicks	Number of Adults	Number of Chicks
1984	7	0	8	0
1985	0	0	3	0
1986	2	1	1	0
1987			2	1
1993	6	2		
1994	8	1		
1995	12	0		
1998	4	0		
1999	5	0		
2000	8	1		
2002	8	1		
2003	4	0	3	0
2004	9	0	4	1

Source: Maine Audubon Society Loon Counts

STATE PARKS AND PUBLIC RESERVED LANDS

In Pembroke there are a total of 917 acres owned for public purposes. Of these, 725 are state owned, made up mostly of the Pennamaquan Wildlife Management Area, and 192 are federally owned land, part of the Moosehorn National Wildlife Area, Edmunds Unit. According to the area calculation field included in the Maine Conserved Lands layer compiled by OGIS, the Pennamaquan WMA covers 2,083 acres, of which 416 acres of land

area are located in Pembroke, 311 acres of land area are located in Charlotte, and 1,356 acres are open water (split between the two towns).

In Perry there are a total of 34 acres owned for public purposes. Except for Gleason Point, comprised of 32 acres, all are small islands, one acre or less in size.

These areas are depicted on Map 2 – Pembroke and Perry Public Facilities. Additional public accesses, picnic areas and cemeteries are also noted on Map 3.

There are additional lands owned by private land conservation entities in Pembroke. Whether these lands are open for public use is determined according to the landowner's wishes and the terms of the conservation easement specific to each property.

NATURAL RESOURCE PROTECTION

There are a variety of laws and legal incentives that protect the natural resources in Pembroke and Perry. Those of greatest significance are summarized below.

Pertinent Federal and State Laws:

- Maine Natural Resources Protection Act (NRPA) – regulates activities in, on, over or adjacent to natural resources such as lakes, wetlands, streams, rivers, fragile mountain areas, and sand dune systems. Standards focus on the possible impacts to the resources and to existing uses.
- Maine Storm Water Management – regulates activities creating impervious or disturbed areas (of size and location) because of their potential impacts to water quality. In effect, this law extends storm water standards to smaller-than Site Law – sized projects. It requires quantity standards for storm water to be met in some areas, and both quantity and quality standards to be met in others.
- Maine Site Location of Development Law – regulates developments that may have a substantial impact on the environment (i.e., large subdivisions and/or structures, 20 acre plus developments, and metallic mineral mining operations. Standards address a range of environmental impacts.
- Maine Minimum Lot Size Law – regulates subsurface waste disposal through requirements for minimum lot size and minimum frontage on a water body. The minimum lot size requirement for a single- family residence is 20,000 square feet; the shoreland frontage requirement is 100 feet. The requirements for multi-family and other uses are based on the amount of sewage generated.

Pertinent Local Laws - At the local level, Pembroke and Perry have adopted minimum shoreland standards, as required by the State Mandatory Shoreland Zoning Act. Surface waters in Pembroke and Perry are also protected through the Plumbing Code and the local Subdivision Ordinance. Pembroke and Perry have a Floodplain Management Ordinance to protect the marine waterfront by restricting building to reduce flood damage and other problems. Pembroke and Perry last revised their shoreland zoning ordinance in 1995 and 1995 respectively.

Pertinent Tax Incentive Programs - A variety of programs provide financial incentives for landowners to keep land undeveloped and managed for long term productivity. They include the following:

- Farm and Open Space Tax Law - (Title 36, MRSA, Section 1101, et seq.) encourages landowners to conserve farmland and open space by taxing the land at a rate based on its current use, rather than potential fair market value.

In 2007 Pembroke had 1 parcel of 194 acres in farmland and open space tax status. In the same year Perry had 2 parcels totaling 31 acres in farmland and open space tax status. To be eligible for the farmland program parcels must be at least five contiguous acres, utilized for the production of farming, agriculture or horticulture activities and show gross earnings from agricultural production of at least $2,000 (which may include the value of commodities produced for consumption by the farm household) during one of the last two years, or three of the last five years.

The Open Space portion of this program has no minimum lot size requirements and the tract must be preserved or restricted in use to provide a public benefit by conserving scenic resources, enhancing public recreation opportunities, promoting game management or preserving wildlife habitat.

- Tree Growth Tax Law - (Title 36, MRSA, Section 571, et seq.) provides for the valuation of land classified as forestland on the basis of productivity, rather than fair market, value.

In 2007 Pembroke had 34 parcels totaling 3278 acres in tree growth tax status and, in the same year, Perry had 31 parcels totaling 3,981 acres in tree growth tax status.

These programs enable farmers and other landowners to use their property for its productive use at a property tax rate that reflects farming and open space rather than residential development land valuations. If the property is removed from the program, a penalty is assessed against the property based on the number of years the property was enrolled in the program and/or a percentage of fair market value upon the date of withdrawal.

The Cobscook Bay Resource Center (CBRC) was created in 1998 as an expansion of the Clam Restoration Project and the Sustainable Cobscook Project. Funded by the Maine Community Foundation and the Ford Foundation the goal of the project was to help local people plan their own futures to enjoy greater economic growth and stability while protecting

and sustaining the area's natural resources. The Clam Restoration Project contributed to the opening of over 2,000 acres of flats previously closed due to fecal coliform pollution by identifying and helping residents upgrade faulty septic systems.

The mission of the CBRC is to encourage and strengthen community-based approaches to resource management and sustainable economic development in the Cobscook Bay Region, the Bay of Fundy, and the Gulf of Maine. The center performs local ecosystem monitoring working with the Department of Marine Resources, including phytoplankton and fecal coliform levels. Using the Cobscook Geographic Information System (GIS) the center is able to distribute data pertaining to the Bay and surrounding communities. The center also conducts shoreline surveys to determine sources of pollution and works with property owners to find funds to replace failed septic systems.

The CBRC is active in providing information to the community, including a resource atlas, resource library, webpage (http://www.cobscook.org), and publications on local marine resource issues. They also provide technical assistance to various organizations, support marine resource education in local schools, and participate in community-based research.

SUMMARY

Pembroke and Perry currently offer protection to their natural resources with locally adopted shoreland zoning regulations and subdivision regulations. These ordinances will be updated to be consistent with the requirements of state and federal regulations and to ensure that Pembroke and Perry retain their character as maritime towns. Protecting public shore and water access and maintaining a healthy balance between development and natural resources is crucial for future economic development. Water quality will be protected and improved through the continued educational, research and regulatory efforts of the town and local resource management agencies. Investments will be made in infrastructure that improves both shellfish harvest opportunities and drinking water quality. Maritime industries, both traditional and new, will be supported through access for commercial fishing, regulatory districts that support maritime activities and research into ways to diversify aquaculture and other marine trades.