# A Natural History of Camden and Rockport.

By E. C. Parker. Minus graphics. Transcribed 9/16/12

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Foreword

By Lew Dietz Few Maine towns lack a local history, annals which tell the present how it was in the past and chronicle the happenings which shape the destiny of a community. Such histories tell the village inhabitants who they are and from whence they came. The Maine native who is inclined to take for granted the natural world around him does so at his peril, for the land rather than the people who settled upon it is his prime and precious heritage.

There was a time in Maine's early history when man's battle was against nature. The "howling wilderness" was the dark enemy to be subdued. Today we have come to the belated realization that, if we are to survive, we must side with nature. Thoreau wrote, "Strange that so few ever come to the woods to see how the pine tree lives and grows and spires, lifting its evergreen arms to the light, to see perfect success; but most are content to behold it in the shape of so many board feet and deem that its true success."

E. C. (Beedy) Parker has re-written, or perhaps more accurately, gathered together a natural history of a special region to remind us of the primacy of the land and to instruct us in understanding the wonders of this special environment.

Call it a natural history primer, for it is designed to serve the old and the young alike as a guide to a deeper appreciation of this small place those of us who reside here call home.

- Lew Dietz, Rockport, Sept 1984

## Introduction

In this place, under low mountains on the shore of the bay of the Atlantic Ocean there is an enormous variety of plant and animal life. The animals and plants of the area are presented here as they appear in the particular places – habitats – in which they are usually found. Each habitat has its typical range of temperature humidity and availability of nutrients. Accordingly, certain plants and animals are able to live in inter dependence in each habitat on this matrix of the living and not living, our human species exists. Our past, present and future lives are strongly influenced by our environment and we in turn have a significant impact on our surroundings, often unintentional. In particular, the observer should note that richness of life at the water's edge, both fresh and salt. The great mass of plant and animal material comes from these zones, water being the medium that most easily transported nutrients. These areas are most vulnerable to human business and also the most difficult for us to observe, understand and appreciate. The soils of an area are also a delicate medium of transmission of nutrients that is often overlooked or taken for granted by the humanity.

By using this guide, the observers should be able to know what to look for in a particular have attached dash in the woods, by the shore, on the mountain. I hope that a natural history will prove useful to all people making use of this land: students, householders, sports people, builders, administrators and visit tours. Perhaps people in other areas will be inspired to make similar natural guides for their homelands.

## Acknowledgments

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Elizabeth C. Parker
Camden 1984

1. WEATHER

The climate, where we live on the west side of the Penobscot Bay latitude 44° 12, Longitude 69° 04, is moderated by the ocean. It is damp, cool and temperate, as demonstrated by the following statistics:

Average annual temperature  46° F
Average winter temperature  24° F
Average summer temperature  66° F.
Average annual precipitation  47 inches
Wettest month November  6 inches average rainfall
Driest month August: less than 3 inches average rainfall
Average annual snowfall: 58 inches. Equivalent of 5.8 inches of rain.
Number of clear days: 100 - 140
Number of days with snow on the ground: 40 - 80
Average relative humidity in July at noon: over 70%
Frost free days (for warm weather crops). 115 growing days average.
Cool weather crop growing days: 200 plus.
Heating degree days: 7700 - 8000 per year.

Our weather comes mostly from the west. At our letter to 44° N the prevailing winds are westerly, as oak post did that easterly trade winds at 20° N. We often hear about weather systems approaching from the Midwest several days before they get to us. The islanders in the bay to the east of us look west to Mount Megunticook to see what their weather will be. If the sky sits low on the mountain they know they will have rain. Our large scale weather is influenced by the

[CALENDAR OF SEASONS GRAPHIC]

dry cold continental polar air masses in the winter and by warm moist maritime tropical air masses in the summer.

In the winter, the Camden Hills provide some shelter from the cleared cold northwest wind, but a careless sailor out of the harbor could be blown across the bay. Any more local winter phenomenon is the offshore breeze that blows off the colder land, over the warmer see. The city, because it holds heat longer than the land, maintains a more even temperature year dash around, while null and cools and he eats more quickly according to the weather saw on air temperature wind speed. In the summer, in contrast, the afternoon breeze is off the sea, “ onshore “ or sea breeze as they head inland sends the warmed air up and pulls in the cooler air off the water’s surface. This breeze keeps a school and comfort a bowl on summer afternoons. The Camden Hills may exaggerate these off- and onshore breezes with their slope and heat mass.

Another winter phenomenon over the water is sees smoke or vapor, low streamers of steam rising vertical leap from the water’s surface on very cold column days, as the cold air condenses the water vapor lying over the warmer water surface.

There are several different kinds of mirages visible over the bay. All and still, it clear days the island’s seem to float above the surface of the water, looming, as of the light is backed by surface layers of error of different densities. Looming is considered to be a sign of changing weather, of an



“out wind” coming from the south the next day.

Icing is a problem in the winter for boats on the water in blowing winds. The spray can freeze in icy layers on the rigging and upper parts of the boat until the craft becomes unstable on rough seas.

The harbors ice over sooner than the open shore, because the freshwater coming in from the rivers has a higher freezing point them the saltier water offshore. Shore ice is heaved up by the tides and storm winds and damages waterfront structures. In 1868, 1877, 1904, 1918, 1923, 1933, 1947 parts of the update froze over and people could walk from the islands to the main.

On land, the moderate winter temperatures mean that there is much melting Henry freezing of snow and ice. The snow cover often melts, to the distress of skiers, and road surfaces can be glazed with ice which requires careful driving.

Between winter and spring is in the mud season, about three weeks in March, when the ground thaws and refreezes. The sap rises in the trees on the warm days after the freezing nights. The surface layer of the ground thaws, but below is several feet of frozen earth. The wet surface cannot drain downwards and it must hold the moisture. It becomes jelly-like or soupy when compressed by feet or vehicles. The mud only occurs where the ground cover is destroyed it and weep trample the soil. We cause it and are likewise inconvenienced by it.

Spring comes late along the coast. The inland gardens dry out and warm up much sooner than the coastal gardens. The cold water keeps the coastal and cool and fought be well into June. But by September the water in the bay has slowly warmed and it serves to keep the coast frost-free during September and much of October, giving us a late growing season after the inland gardens have already had a “black frost”.

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WEATHER

In the summer, the southwest winds predominate. This is the wind that sent sailing vessels down east along the coast, from Boston to Eastport and the Maritime Provinces. Sometimes the summer weather moves up from the south.

The warm moist maritime air masses from the tropical Atlantic and the Gulf of Mexico blow onto the cool Gulf of Maine and hit the cold air over the Labrador Current that winds down from the north. Banks of fog buildup over the grand banks and along the coast - and a south east wind can roll them up to the land. The weather often seems to form a line along the coast and to push back and forth so that no general weather forecast can be made as to whether it will be cloudy or sunny, wet or dry. This effect is quite striking when seen from the air; the whole bay studded with islands might be shining clear with a bank of clouds over the mainland, stopping sharply at the shore. Or the land could be sunny and the bay clouded over.

Sometimes, on still warm days, we have a temperature inversion: warm air above traps cooler air below and holds in the pollution from tourist traffic exhaust on route one. The error is bad to breathe on these days.

In Camden the differences in temperature and humidity between the coast and inland is striking. As one walks down the hill toward the harbor, the temperature 10 dropped noticeably and the air fills with humidity. In general the inland temperatures are more extreme than on the coast. In the winter, Hope might be -10° F, Camden and Rockport 0° F and the islands might be

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plus 10° F. In the summer we could have the reverse: hope 85°Camden Rockport 75° and the island's 65°.

Our storms are generally formed by warm and moist air moving up from the south and encountering the edge of a cold high pressure air mass. A counterclockwise a swirl of wind farms along this edge and the resulting storm moves in from the southwest and often hits us with the northeasterly winds that spin off its northern leading edge. It blows hard, slams us with rain and is called a "nor'easter ".

To fisherman, a wind that changes from northeast to northwest "backens" in the counter clockwise motion that means a low pressure zone and storm. When it "veers" in the other direction clockwise, it means that fine weather is moving in.

Storms hit Camden hardest from the south east and east, while Rockport is completely open to the south and most vulnerable to wind and waves from that direction. Storm damage is also affected by high tides, which averaged 9.6 feet in the mid coast area.

We are strongly affected by the climate and varying weather. The weather is not a frivolous topic of conversation. It governs our lives and those of the plants and other animals around us. Unusual weather will cause some plants to flourish and hold others back. Some animal populations will explode and others seem to disappear. Our energy use, our work, productivity, play and travel are all influenced by the weather. We learn to respond to what the day and the season bring us on the variable coast: we cut wood in the cold, boat in good weather, do indoor work and rest in the storms, and stay out of the fields and woods during mud season.

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Geology. Underneath our houses and streets, under the forest and ponds, under Penobscot Bay beside us, are layers of ancient rocks, laid down beneath old seas. Laid down beneath old seas. Most of this old rock is covered over by the debris of the more recent glaciers and sediments from the most recent advance of the sea. But the old bedrock shows itself in places. You see it when you walk along the rocky shore, when you climb Mount Battie or Bald mountain, on the Millerite ledges over Megunticook lake, in the road cut on the turnpike (Route 52) and on any ledges or outcroppings.

Most of our upper bedrock was deposited as sediments of clay, silt, send and marine life along the edge of the ancient continent and Cambrian and board of the sea and times, between 60 and four hundred million years ago (mya).

These sediments, over time and under the weight of underlying overlying layers, turned into sedimentary rocks: shales, sandstones, limestones. The events that followed it can be explained by continental drift. According to this theory, our continents were made from the splitting and sliding of an ancient continent (Pangaea), which broke up and reassembled several times in the past 700,000,000 years. It appears, from the geologic record left in the bedrock of Maine, that the old continental plate donned wonderland, with what is now Africa on its leading edge, began pushing towards North America about 440 m.y.a. and continued for about 50 million years until the edge of Africa collided with where we are now, in Maine. On the leading edge of Africa, volcanoes produced igneous rocks (rhyolite,

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GRAPHIC How the Continents may have drifted

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tuff, andesite) that are now found on some of the islands of Penobscot Bay (Vinalhaven and North Haven). As the continents squeezed closer together, the earlier sedimentary rocks buckled into great mountain folds along a north east south west direction. They were pressed and heated and became metamorphosed: changed into schists, quartzite and marble, which is what we have now underneath us. The fossils in the limestone were compressed beyond recognition except for some metamorphosed fossils, from the Ordovician, to be found over on Benner hill. Mount Battie is quartzite, Mt. Megunticook is schist.

We have quarried bands of “marble” under Rockport, Rockland, Lincolnville, Thomaston and Union, to extract the lime used in making cement and plaster.

The great pressure also caused beds of rock to break and slide along each other, up and down, or one layer over another. There is such a fault going right through Camden, up Mechanic Street and between Ragged and Bald Mountains.

Page 9 GRAPHIC BEDROCK

Page 10 GRAPHIC BEDROCK 2

In some places, blocks of lower rock were pushed up to a higher level: the marble layers in Rockport and Rockland were such horsts pushed up from below.

The southeast sides of Appleton Ridge and Dodge mountain are along thrust faults. Route 90 seems to run along another fault. The southwest sheer faces of Megunticook, bald and ragged mountains may have been caused by faulting as well as by scraping glaciers.

Under the great folds, stronger changes were taking place. Some rocks were changed into granite and darker diorite: heated, melted and, very slowly, re-crystallized. Hot melted rock (magma) was injected into cracks in the older rock, cooling to form darker or lighter veins (dikes).

All this happened at the same time the Appalachian Mountains were being formed, by the same forces, before 300 million years ago, before much life had made its way out of the water. Since then, the “collided“ continent’s drifted apart again (200 mya in the Triassic) leaving the Atlantic Ocean between Maine and its possible twin on the edge of Africa. (The rocks on this part of the Maine coast appear to match those on the northwest coast of Africa.)

Amphibians, reptiles, and finally mammals slowly colonized the land, following the plant life that emerged first. But there is no record in the rock of all that. Several miles of overlying rock were eroded away by water & then scraped by great glaciers one million years ago in the Pleistocene. It has as though nothing had happened for 300 million years.

There had been glacial advances before, but most of the evidence we find here is from the last of the four Pleistocene glaciers: the Wisconsin Advance which started only 55 thousand years ago. Think how recent that is,



Compared to the age of the bedrock beneath, 450 million years old. As the ice built up, about a mile thick, it pressed the land down under its great weight. It scraped and scoured the old mountain folds, pushing slowly to the southeast, out of the focus in Labrador, leaving its tracks diagonally across the lines of the old folds and faults.

Where the ice found valleys in the same direction, it sheared off the walls into steep cliffs, like the Millerite Ledges and the southwest sides of Bald and

Ragged Mountains.

The steep face of Mount Battie probably had its bare face “plucked” by the overriding glacier. Many other land features show the direction of the glacier.

There are scratches (striations) on ledges where stones were dragged along by the glacier over bedrock (Clam Cove, Mount Battie). There are crescent chips knocked out of bedrock by rocks embedded in the glacier (Rock island in Megunticook Lake near Bog Bridge. Great long (½ mile) mounds of mixed till called drumlins, that point in the direction of the glacier, were dumped as the glacier went over small obstructions. When you look at a topographic map of Lincolnville, you can see that many of the cleared fields lie NW – SE because of the way the glacier left the land (the fields are on better drained high lands.)

Some ponds have been gouged out in this direction; others lie northeast – southwest in the direction of the valleys between the old mountain folds.

As the glacier retreated, about 12,000 years ago, it left a broad layer of mixed “till” (sand, gravel and boulders), a “ground moraine” on the land.

The retreating edge of the melting ice dropped series of “washboard moraines”, ridges of sediment left by each short period of melting. Lincolnville is covered with them and

Page 13 illustration Map of Glacial Deposits

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there are some series along Megunticook River, under Upper Washington and Upper Mountain streets. Some moraine deposits blocked the drainage of old rivers, causing marshes, bogs and strange contorted drainage patterns. We dig into the till under us at places where it is sorted (usually moraines) to get gravel for building and road making (gravel pits under Mount Battie, or Spruce Mountain, near Oak Hill cemetery, etc). The glacier also left large rocks (erratics) in strange places like Balance Rock on Lake Megunticook. It is possible that the fanged in Lake Megunticook, with its little train of islands, is a boulder train left where two arms of the glacier met. The rushing melt waters of the glacier left the beautiful round polished stones that we find on some of our beaches.

The rising sea followed the melting glacier back over the buckled land. Under its waters, impermeable clays and fine silts were laid down (marine sediments).

The sea made islands of Beech hill, Bear hill, Dodge Mountain, Melvin Heights,

Mount Megunticook and Ragged Mountain, Spruce Mountain, Mount Pleasant were on long peninsulas that reached into the sea.

About 10,000 years ago, the land gradually rebounded and the sea retreated to where it is now. The sea works constantly on our coasts, cutting at the exposed rock, rolling the boulders, sorting the sand

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and mud in the sheltered places.

Our cover of soil and forest is very recent. We don't have rich layers of topsoil like the Central Plains. Our soils were formed on the base of glacial till and bedrock. These soils are typically brown or gray brown, of the Spodsol family, formed by the erosion of acid rocks and debris where there is a fair amount of rain (40 inches a year). Decomposed leaves and needles of the forest trees, and now acid rain from the industrial Midwest, further contribute to the acidity of the soil. Percolating rainwater leaches many of the minerals and nutrients out of the surface layer, so those soils may not be very fertile.

The type of soil depends on the slope of the land, the temperature and rainfall, though in nature and permeability of the parental material, in our case mostly schisty glacial till and some marine clay. Much of our soil is sandy loam, which may dry out too quickly if it is shallow, sloped and close to the bedrock. Or the soil may not drain well for part of the year if it is less sloped, in a depression, and underlain by compact impermeable till or marine clays. Unsorted glacial till is almost as impermeable as clay, because those smaller particles of sand and silt pack tightly into all the spaces between the rocks and gravel. So, much of our land is waterlogged

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IMAGE Food Web of the Soil

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from late fall to spring and shows gray mottling and rust spots in the profile.

Another phenomenon is "mud season", usually in March, when the top layer of soil defrosts first but cannot drain away because of the frost in the ground below. The soil structure is very easily damaged at this time and should not be compressed. We also have some muck and peat soils that are never really drained, so the plant material is not broken down because of the low oxygen

content.

In the dark humus layer on the surface of the soil, many organisms are working to break down the organic matter material that falls to the forest floor: leaves, wood, bodies of animals. These organisms, bacteria, fungi, worms, crustacea, insects and some small mammals, change the decaying plant material into nutrients to be used by the living plants, while building thicker layer of topsoil.

Our soils can be made fertile by increasing the humus content. We must care for and build up what we have. We must keep it covered with protective vegetation so that it doesn't erode. We must also protect our water supplies.

Unwise tree cutting and the construction of roads and houses can disrupt the watersheds that collect our ground water and fill our lakes. We must take care that pollutants do not drain into the groundwater in the glacial and bedrock aquifers below so that we do not toys in our water supply.

Page 18 GRAPHIC GEOLOGY

Page 19 TABLE KEY TO SOILS

Page 20 GRAPHIC SOILS SIMPLIFIED

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ROCKY SHORE.

We live on the edge of the rocky shore of the Penobscot Bay. The last heavy glacier scraped it there and pressed it down until the melting sea reached into the old river valleys and turned the outer hills into islands.

You can go down to the sea and walk along the rocks. Most of the shoreline is privately owned but there are some lending places and public Parks. (1) Here are more different kinds of animals to be seen here than in any other place nearby except perhaps in a drop of pond water or in garden soil. You must go down at low tide. Lift the mat of seaweed to see what is hiding under them.

Look into pools of water left above the tide. You will see animals belonging to most of the groups on the evolutionary tree, from simple sponges to vertebrates (which include you.) The variety of body forms is greater than anything imagined in science fiction.

The creatures of the rocky shore must be able to survive out of water part of the

time, or else to follow the tide down. They must resist the drying action of the sun and wind. They must also be able to hang onto the rocks and withstand the force of the waves, or else hide between the rocks and under the seaweed.

Every day the tide comes in and out twice, as this part of the earth swings under the pulling line of the Moon. The average height of the tide in our area is 9.6 feet. Twice a month the earth, the Moon and the sun are in line, which makes a very high and very low tide, the “spring” tides. The gentler tides in between not so high and not so low, are called “neap” tides.

Different plants and animals will live on a level of the shore according to how much of the time it is covered by seawater. The show were used to house divided into zones, highly visible bands of plants and animals. The highest



band is reached only by the highest spring tide and the lowest band is almost always underwater. In between, the shore is covered by water only part of the time, except in the tide pools, little natural aquaria where the water is caught and many interesting things live. These zones are easiest to see where steep rock faces the sea, and on the wood pilings under docks and piers.

The highest level is the black zone, made by a film of blue – green algae that clings to the rock. It is black when dry but turns dark green and slipper eight when wet. Above it is bare rock, and then perhaps some orange or gray lichens.

Just below the black band, there may be a line of rough periwinkles. They can close up tight and stay without moisture for long periods if they need to.

Below them is the barnacle zone; the rock is white with the cases of barnacles. They also closed tight when the tide is spelled but when it rises, they open their doors and reach out their feathery limbs to rake in tiny organisms floating in the water. Here and there, on bare rock, there might be a limper; a little volcano shaped shell clinging tightly to the rock.

Below the barnacles is a thick dark band of rockweeds, brown algae, with blue mussels growing between it and under them. The mussels are well attached to the rock by fine byssus threads. They too close when the tide is down and open when the water is up, to siphon the food-filled water through their gills. The brown seaweeds here are mostly bladder and spiral rack, with pimply reproductive tips, and knotted wrack, which looks like black shoe laces with oval air bladders. The rockweeds hold tight to the rocks and are floated up by the air bladders when the tide is in. They lie flat and sprawled in the low tide.

Underneath there are crabs lurking, reddish rock crabs and little green crabs.

Hiding in wet pockets are shrimpy little amphipods called “scuds”. There are great



numbers of another kind of periwinkle, the common periwinkle, roaming over the rocks and seaweed, scraping the algae coating off with their rasp-like tongues. Closer to the low tide, there are pretty little smooth periwinkles, some bright yellow, some striped. The white, rippled, pointy snail shells you find once belonged to dog whelks that prey on the mussels and barnacles by drilling holes in their shells.

Other creatures live of attached to the seaweeds: bryozoa, or “moss” animals, live in tufty, bristly little colonies (e.g. Bugala) that look like plants themselves. Another bryozoans called sea lace membranipora leaves very delicate skeletons of its animals like a coating of lace over the seaweed.

Sometimes minute coiled worm tubes Spirorbis are attached to the seaweed, looking like flecks of paint. There are also tufty little red seaweeds (polysiphonia) hanging onto the knotted wrack.

Further down again, always wet, usually underwater, is the Irish moss zone, covered by the dark reddish brown, frilly red algae. Irish moss is gathered in some places by people in boats, to be made into carrageenan, the food thickener. Carrageenan is made in Rockland from Irish moss, once gathered along this coast but now imported from far away.

You can only reach for the Irish mosses own at lowest tide. Under the seaweed there are starfish and some see urchin’s. There are even more blue mussels.

The starfish feed on mussels and clams by pulling their shells open with their arms and tiny tube feet. There are tiny skeleton shrimp that creep like inchworms over the seaweed.

Still further down is the kelp zone. This is always underwater but you can see the flat and broad leather red-brown seaweeds washed up on the shore, their hold fasts clutching a stone or big horse muscle. Some kinds of kelps are shaped like palm fronds, with long fingers (oar weed) some have holes like colanders.

They make forests below the low tide level, inhabited by starfish, sea anemones, sea squirts,

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Graphic: Seaweed

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sea cucumbers, swimming worms, tube worms, brittle stars, rock crabs, sea slugs, and of course the lobster.

There are fish hunting in the kelp forest and off the rocks: contour, sculpin, gunnel (rock eel), tommy cod, eels, sea raven and toadfish.

These bands of sea animals and plants vary in width along the shore. You can tell how strong the waves are in each place by what lives there. A steep exposed wall will be white with barnacles, while a sloped beach of small boulders, more sheltered, will have a broad expanse of rock weeds, mussels and periwinkles.

Back up the rocky shore, you might find small tide pools that hold the still sea water when the tide goes out. The bottom of such a pool may be encrusted with pink calcareous algae and lumpy looking greenish “crumb of of bread” sponge. Hiding in the sponge and under stones are flat worms, scale worms, brittle starfish. Sea anemones and bushy hydroids cling to the sides and under overhanging rock, sheltered from waves and sun. Small scud ( shrimp-like) scoot across and hide in crevices. Here you can see the barnacles open and fishing; perhaps a chiton is moving across the bottom. A hermit crab picks its way along the floor, wearing a large periwinkle shell. A fierce hunting sandworm (Nereis) might be resting under a rock ‘til nightfall.

Besides rock weed and Irish moss, there could be a piece of bright green sea lettuce (Ulva) and tufts of pink coralline algae, looking like the bryozoan animals.

On the surface of the pool, there are sometimes wriggling clusters of tide pool insects (Anurida) purplish-grey in color, suspended by surface tension on top of the

Page 27 Graphic: Shore Fish

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water. These tiny primitive insects also scurry about on the dry rocks,

scavenging.

Another place to see rocky shore creatures is on the wood pilings of dwarfs as the tide goes out. You can see the same re-zoned on the post's: black blue green algae, white barnacles, blue and ash black mussels, and, down low where the Irish moss would be: sea anemones, starfish, see sports, see Grapes, see beaches. (1) In the summer, people go down to fish at the town landings with drop lines. They catch the rocky shore fish and the fish that come up to river mouths. Some of these fish are good eating though there is debate about how clean harbor fish are. (2)

Unlike the mud flats and marshes, the exposed rocky shores are quickly washed clean of sewage and other types of water – soluble pollution that is allowed to flow into the sea. But these edges of the land are all vulnerable to oil spills. The oil clings to everything and is absorbed by the tiny organisms low on the food chain. It suffocates the breathing gills of small invertebrates and coats the feathers of sea birds. It works its way up the food chain, interfering with the life cycles of many creatures, poisoning as it goes.

GRAPHIC Shag and Gull

FOOTNOTES:

(1) These last three species are all tunicates, related to vertebrates in that they have a notochord, a short nerve cord, in their juvenile forms.

(2) Caught at Camden Town Landing: pogy, herring, smelt, rockfish, sea perch, flounder, sculpin, mackerel, tommy cod, (cod), dogfish, sucker, bluefish, harbor Pollock.

(3) also the great Black-backed gulls (28-31 inches) much larger and with black wing backs

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GRAPHIC Shoreline Camden & Rockport

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Inshore - Offshore.

Beyond the edge of the lowest tide that can be explored on foot is another world of deeper water, the air above it, the bottoms below and the islands and banks

beyond. Who lives where, out there, depends on the kind of bottom, the depth of the water and on the change in temperature and salinity of the water.

Some fish are bottom dwellers ( “ground fish”). They feed on the crustaceans ( shrimp crabs) , mollusks shellfish, seaworms, echinoderms, (sea urchins, starfish) that inhabit the bottoms. Many of these fish are members of the flatfish family (blackbacks or winter flounder, fluke or summer flounder, yellowtail flounder, dab and the great halibut). They like a sticky, muddy sandy bottom that they can hide in or on. Many bottom fish take the color of the ground they lie on. Most of the cod family lives near the bottom two. Herds of red hake graze along muddy bottoms, groping along with their feelers.

Haddock are more on sand and gravel and cusk hide in boulder bottoms.

The cod does a lot of bottom feeding itself. Of other families, the lumpfish clings to rock surfaces with a suction desk, skates flap along like a flatfish. The goosefish sits on the bottom, dangling a lure, and opens its great mouth to suck in passersby. The wolf fish crushes shellfish with its strong jaws. The lobster lives here too, feeding like the bottom fish, hiding by day in rock crevices or mud burrows and coming out at nights to feed.

Some fish live near the surface.

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GRAPHIC Bottom types of Penobscot Bay

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GRAPHIC Inshore Offshore Fish

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Large schools of herring and menhaden (pogy) live on the plankton that float near the surface of the water. This great body of plankton is the basis of life in the sea.

The phytoplankton, tiny plants, many one-celled like diatoms, photosynthesize their food and must live near the sun’s light on the surface. They are eaten by the zooplankton, (animal plankton) protozoa, other simple animals, copepods, the tiny larva of crabs, jellyfish, fish, etc. The herring schools come into the harbors in the summer, showing as a fine ripple on the water and luminescent firing trails at night, as the phosphorescent plankton light up with their motion.

The menhaden make a ripple like a light breeze, and nose out of the water.

Mackerel schools come in the summer too, following tiny herring and krill (planktonic shrimp). These small fish are themselves pursued by cod, schools of voracious bluefish, squid, dogfish, pollack, whiting and striped bass.

Seagoing mammals also pursue the fish but don't venture into the dangerous harbor. The harbor seal, harbor porpoises and sometimes blackfish (pilot whales).

The small fish are also devoured by sea birds – cormorant (shag), herring and black-backed gulls, terns and guillemot.. Some of these birds nest on small islands in the bay – their nests, eggs and guano covering the bare rocks. The winter

Page 34 Ducks that raft in the bays (eiders, old squaw, bufflehead, scoter, Merganser) eat the bottom creatures and small fish. (See Salt Marsh).

Some fish moved in and out, inshore and offshore, north and south, according to the season. Although the temperature of the water is much more stable than the air temperature, especially the deeper water, the surface cools to near freezing in the winter. Menhaden, striped bass, bluefish only come north in the summer.

Summer flounder and mackerel and herring come inshore in the summer.

Most northern shrimp avoid warmer inshore summer temperatures, seeking colder waters offshore. Some fish spent part of their lives in fresh water, (anadromous fish). They swim up the rivers to spawn in running streams and lakes.

These are the smelts, shad, alewives that come up the Saint George River in the spring.

Salmon run up Ducktrap in the fall. Lampreys go up the Penobscot.

Larger animals are feeding out in the waters of Penobscot Bay and the Gulf of Maine. Occasionally in the summer a huge basking shark drifts along with its mouth open, eating plankton like a baleen whale (the plankton eating whales).

Sometimes there are minke whales and even larger finback whales, among others. Red arctic jellyfish float along, their long tentacles falling far below. They can grow as large as 8 feet but they all die in the winter,

their offspring surviving in another form over the winter. Animals can grow to enormous size in the water without changing their form, because the water supports them. In comparison, large land animals need huge heavy bones to support their great weight.

The little northern shrimp live out in the colder, deeper water, eating plankton.

The fishermen of our coast go out to catch them, and the fish that feed over the shoals and offshore banks. In the shallow offshore waters, there is more food for the fish because the seaweeds can photosynthesize nearer to the light.

The waters of the rivers, the Penobscot Bay, the Gulf of Maine and the Atlantic Ocean are generous to us in their gift of fish, seafood and seaweeds.

The kind and amount of life in these waters varies with the water temperature, pollution and overfishing. The sea has been warming over the last generation, so there are fewer herring here and more menhaden than there used to be. The cold water shrimp sometimes disappear altogether. The occasional red tides of toxic plankton which makes some of our shellfish dangerous to eat are partial to warmer water.

Our shores are always in danger of oil spills from tankers and we are constantly letting oil escape from the our boat engines and from our cars and trucks (crankcase oil usually ends up in the sea). If oil is pumped out of offshore sites, there will be even greater danger of serious oil spills affecting our coast.

Over-fishing (taking too many creatures and too small) may be so serious at times that it takes a population a long time to rebuild, if it can. We



have overfished halibut, cod, haddock, winter flounder and shrimp in the past.

We may be taking too many lobster. Lobsters and other bottom dwellers are also affected by the accumulation of synthetic gill nets fouling the bottom. Their rope does not rot as the old hemp did. There are also “ghost traps”, lost traps that go on catching lobsters indefinitely on the bottom.

The fish that go up the river as part of their breeding cycle were stopped by the building of power dams in the 19th century. Many of these dams are gone now, and fish ladders have been built around some of them, so that the alewife,

smelt, salmon, shad can “climb” to their spawning grounds. But Megunticook still has some dams and only the powerful eels can find their way around them.

We still do fish. Our lobstermen place their traps along the shore and some catch crabs off-season. Some boats drag for scallops across the bay. Anglers fish from the docks in the summer. Fishermen still takes smelt under the ice, and salmon going up the Ducktrap River. Eels are still trapped in the river. The Rockland boats go out for shrimp and fish (cod cusk, hake, flounder and redfish (ocean perch) on Georges Bank, to be made into fish sticks at the packing company. We still catch herring for sardines, bait, animal feed and fertilizer.

Clams are still dug on the flats of the Saint George River. Until recently there were weirs here and there are along the coast. And in summer 1979 a stop seine was rigged across Rockport Harbor to catch herring as in past years. We are still the biggest predators in the sea.

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GRAPHIC Fishing Calendar

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GRAPHIC Inshore / Offshore Foodweb

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SALT MARSH.

A salt marsh is an expanse of waving cord grasses and winding salt water creeks that form at the shallow mouth of a river. It is a sheltered from the waves of the open sea by rocky headlands or sand barriers. The marsh is fed by silt and nutrients washed along by the river and by the minerals brought in by the tides of the sea. Where the river meets the tide, it is slow down, drops its load and a marsh is built.

There is one salt marsh near us, on the little Weskeag River in south Thomaston. Further south the marshes are larger, but here the Maine coast is too rough and new to have much marshland. Not enough sediment washes off our rocky land and our river mouths are not sheltered enough.

If when the silt in the river mouth (estuary) is built up to a level where it is bared by the tide more than half the time, coarse tall cordgrass (spartina) begins to take hold. It slows the water further and holds the silt so the marsh builds up

further.

The river and the tides now wind through mud banked creeks, the “brackish” mixture of salt and fresh water. There are pools in the marsh that are only connected to the creeks at high tide. And there are treacherous potholes with quicksand bottoms where the peat has rotted away. Tall thatch cord grass lines the creek banks like a shaggy fringe. Just above it, in waving beds, is the smaller salt hay cordgrass. The name “Weskeag” is shortened from ‘Wessa Weskeag’ “Land of many points” It is also called the Waldo Tyler Marsh for the man who wrote many articles about the marsh. Thatch grass was used by early colonists to thatch houses. The salt hay was harvested to feed cattle OK

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There are patches of wiry black rush and sweet grass higher above the tide. At the top of the marsh the freshest part where the river enters, are taxed tales. Under the water, where the creeks empty, there is no grass, a real underwater flowering plants.

Tiny algae, blue green and Karen, live on the cord grass and across the surface of the mud banks, giving them a greenish hue. Others float in the water in wash in and out with the tides. Maps of algae grow across the bottoms of the shallow pools, spongy and bubbly as they photosynthesize. The mats dry in lumpy crusts if there is little rain and the tides are not rising high. Tiny diatoms hide in the mud at high tide and at night and come to the surface in daylight to catch the sunlight.

All these plants use the sunlight and the rich nutrients brought from the land and the sea to make food which is necessary for the life of the marsh. All other life depends on them. They are eaten alive and dead. They can produce a 5 to 10 tons of food organic matter per acre, twice as much as good farmland.

So there

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is plenty of food to support the many animals and live on the salt marsh.

The grasses are eaten by grasshoppers, crickets, sucking fifth plant hoppers, grass fly larvae, nematode worms in the roots. Grass seeds are eaten by sparrows, golden finch and mice. Further upland, the muskrat ate the cattails, before the muskrat were trapped out.

When the grass dies down in winter, it is broken and beaten down by the weather and tides and decomposed by bacteria. Decayed plant and animal bodies are mixed with the mineral rich mud by the moving waters to make a nutrient soup of detritus. The detritus and algae that float and settle are consumed by other marsh animals who use a variety of filters and strokes to take in their food. Tiny protozoa, animal larvae plankton and nematodes (round worms) eat the algae and bacteria. Relatives of the earthworm and clam worm eat their way through the rich mud. Little snails, (periwinkles, mud snails and marsh snails) scrape along the muddy surface and up grass stalks, eating algae.

Mosquito larvae eat detritus in the marsh pools and puddles.

Mussels lie in the mud and pull detritus filled water through their special filters when the tide is in, building up great hummocks in the marsh with the wastes they deposit. Some fish are detritus eaters too.

The marsh is full of life during the bright warmer months. It is full of animals that have come to eat the detritus eaters and the grass eaters.

There are spiders, predatory bugs, robber flies and dragonflies. Marsh wrens, swamps and savannah sparrows, Red-winged blackbirds and swallows eat insects too. The voracious larvae of the deer fly and marshfly wriggle through the mud



and eat other small animals. Small, shrimp like crustaceans (or scud), ) amphipods), catch tinier animals in the pools and on the mud. Sharp tailed sparrows run mouse-like through the grass, eating the sandhoppers.

Little mummichog fish and sticklebacks eat mosquito larvae in the pools. Raccoon come to the marsh to dig clams, catch fish and little green crabs. Mink and otter come, too. Bigger fish come swimming in with the tide to eat smaller water animals, (flounder, codling, Tommycod, smelt, eels.)

Great numbers of birds come to the marsh to feed. They come up the coast in the spring, (May or June), following the greening Grasses and settling to feed in the pools and reeds. First comes back Canada geese, followed by many others: blue winged teal, mallard, Merganser (all ducks) plover, yellow legs, sandpiper, dowitcher, snipe*, willet, godwit, rail*, great blue heron*, green heron*, snowy egret, bittern*, kingfisher*, terns and gulls. Some will settle in the marsh for the summer and nest there. (* marks nesting birds.). Others go on to places farther

north. As the days grow shorter and of late summer and fall August and November, they make their way south again, feeding as they go. Some northern birds follow to winter in our marsh and out in the Bays: goldeneye ducks (“whistlers”), and

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buffle head, mallard ducks and mergansers. And some birds stay year round as the herring gull and black ducks.

These birds gather their food in different ways. The dabbling ducks (black duck teal and mallard) paddle in the ponds and “bottom up” to scoop plants and occasional animals from the pool bottoms with their white bills. But diving ducks swim under the deeper ocean water to catch fish and crustaceans: goldeneye, mergansers and sea ducks.) Many shorebirds sandpipers, godwits, yellowlegs, etc have long pointed beaks that they can drive down into the mud or pool bottoms at low tide to pull out worms, mollusks, and small burrowing shrimp (‘scud’ again). The great blue heron fish in the polls with their sharp long beaks.

Sometimes a hawk hovers above the marsh: Sharpshin, Cooper’s or Broad-wing. Down nearer the sea and open water there are a for fish. Crows and gulls feed on the marsh and scavenge the leavings of other animals. Bonaparte gulls fly in from the bay.

The Grasses and algae are not the only plants in the marsh.

Page 44 Graphic “Cross section of marsh” / “Life in the marsh”

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There are the stubby glassworts on the saltier parts, with thick fleshy little branches. They turn a beautiful red in the fall, giving patches of color to the fading marsh. There is yellow seaside goldenrod and delicate seaside lavender, yellow vetchling and silver weed. Seaside plantain (goose tongue), and orach are edible, and glassworts were once made into pickles.

On the outland edges of the marsh are bayberry, alders, hawthorn and poison ivy.

Always the tide goes in and out of the marsh, drawn twice a day by the Moon. The plants and animals of the marsh must have special ways of living with the constantly changing water level and the varying concentrations of salt and oxygen. The cordgrass can survive because of its high internal salt level and

little glands that excrete extra salt. It has air passages that carry oxygen down to its roots and help provide oxygen to organisms in the airless mud. Sometimes a marsh pool is cut off from the tides and dries out; the salt becomes so concentrated that nothing but a few bacteria can live there.

Many mud dwellers need to stay wet, so when the tide goes out, they go with it, or bury themselves in the mud, or close up as do mussels and barnacles. Some animals must stay dry and breathe the air, so they leave the marsh on foot or wind, or they climb up grass stalks as do the marsh snails. Nothing that cannot cope with the tides and salt of the marsh can live there, and still it is the richest kind of land.

Until recently, salt marshes were not considered valuable by town people. The Indians have always used the marshes for hunting and gathering. Early colonists use the grass for thatch and hay. Our own hunters and bird watchers know the value of the marsh. But during the last 150 years, we have been dumping garbage in marshes, polluting their Rivers that run through them, and trying to fill them in to build houses as fast as we can. The animals are overhunted and overtrapped.

But now we are beginning to remember the value of the marshes. We have learned how much more productive they are than other kinds of land. We know that many important fish (2/3 of the commercial



catch) come into the marsh during some point of their life cycle: some to spawn in the marsh, some to spend a sheltered childhood, some to feed during the summer (flounder, smelt, codling, sculpin). The marsh feeds them all. We cannot lose the marshes without losing the fish.

With this new understanding, in 1967 the state of Maine passed a law requiring anyone wanting to change a marsh to obtain a permit. Permits are difficult to get and this protects the marsh. The state also has a program to buy valuable wetlands in order to protect them from development.

The Weskeag is partly owned by the state. In the past, the cement plant in Thomaston (see map) scattered white lime dust over the whole region, choking the vegetation and animals of the marsh. In 1972, scrubbers were installed in compliance with new air pollution laws, and not as much dust comes from the plants now. All the measures of the government will not be enough to protect this resource unless we know its value and are willing to keep it.

NOTE 1. the Weskeag is too short and small in river to have fished running our kids to spawn in fresh water.

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GRAPHIC

SALT MARSH FOOD WEB]

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MUD FLATS AND SANDY BEACHES

Mud flats are formed in shallow bays where that water currents are slow enough to deposit fine mud particles and the waves cannot beat in to carry it away. Mud flats are sheltered from the direct force of the sea by protective points of land, but they are not protected enough to permit grasses to grow and build up sod as in the salt marshes. They are swept there by the tides and nothing shelters the creatures that live there but the mud itself. Such animals must burrow in the mud for shelter and to stay moist while the tide is out.

The soft surface of the mud at low tide has a thin scum of dark greenish plants plankton, diatoms and blue green algae. These tiny plants photosynthesize food which is consumed by animals. Several inches below the surface lies a black airless layer, colored by the purple, sulfur-based photosynthesizing bacteria that can live without oxygen. The creatures that live in the mud, mostly worms and mollusks, must get their oxygen and food from the water above when the tide is in. They cannot filter their food if they live in very fine mud because the filters would become clogged by the tiny mud particles, so they either eat their way through the mud like earthworms or create currents in their burrows to wash the food through. These animals that live in a sandier area however, can filter food without clogging because the sand particles are larger.

We have at least two mud flats nearby - Sherman’s Cove and Clam Cove (at Glen Cove). Clam Cove is closed to clam digging because of pollution but Sherman’s Cove recently reopened to diggers with the town permit. Ducktrap north of Lincolnville Beach is still open and clam diggers still go out on the Saint George River flats near Thomaston.

In Clam Cove part of the flat is muddy and part more sandy so you will find different creatures according to the amount of sand. On the surface of the

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mud flat, you will see the tracks of little mud snails, (Nessa) and periwinkles winding over the mud ripples scavenging what they can. There are clumps of blue mussels, clinging together and anchored cord as best they can to the few stones near the edge.

Some barnacles live on the mussel shells. On the sandier portions there are sometimes moon snails' sand collars revealing the presence of the fierce moon snail who can dig inches down to attack a clam. Below the surface of the flats there are soft shell clams, their finger-size holes showing on the surface. These holes squirt when you step nearby. A large wedge shape hole may be made by a razor clam - also very good to eat. On the sandier parts, there are usually more razor clams and at lowest water, here are some big hen clams.

You may see many other mysterious holes and bumps in the mud, all clues to what lies below. Some belong to different kinds of annellid worms (like earthworms,) that stick their heads out to feed when the tide is high. The lug worm (Arenicola) makes a pile of castings at the mouth of its burrow. The ornate worm (Amphitrite) has a little volcano shaped mound at the top of its burrow.

Little groups of straw sized chimneys sticking up means there are bamboo worms (Clymenella) underneath. A black dime-sized smudge on the flat may mean that a trumpet worm lives below (Cistenides). The point of its trumpet casing may stick up above the mud surface - or you might find the empty case: cone-shaped and made of sand particles. Bits of waving shell or seaweed in shallow water may mean that decorator worms (Dioptera) are underneath. Another worm that hides in the mud flat is the clam worm (Nereis) that comes out at high tide and swims around to catch its food. Some people dig clam worms to use for bait. They can bite painfully.

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GRAPHIC Mudflats and Worms]

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Digging about, you might find purple–pink bloodworms (Glycera), which are also dug for bait, and the simple ribbon worms Cerebratulus. long, flat, pale things that can also swim when the tide is in. They also can grow enormously long, to 18 feet.

There are few larger plants on the mud flat – a bit of rockweed here and there clinging to a stone or clump of mussels.

Below the low tide level, there may be some seaweed such as Enteromorpha intestinalis.

Eelgrass used to grow here, in groves in the shallow water, but it was killed by a disease in 1931- 1932 and it is only now beginning to grow back on this coast. Eelgrass is actually a flowering plants that lives as a seaweed and harbors a whole community of creatures such as sand dollars, stickleback, and pipefish. The loss of the eel grass means that the mud flats have become less stable, less sheltered, so fewer animals, including clams, can live there.

The mud flats are visited by scavenging people and herring gulls and by migratory shorebirds (see calendar in “Salt Marsh” section. When the tide is up, fish swim into hunt the worms and mollusks: flounder, skate, sculpin, silversides and others. In the winter, rafts of sea ducks (eider, buffle head, old squaw scoter and black duck), with an occasional loon and coot, float over the shallow bays and off the rocky shore, diving for their food. The black duck dabbles for weeds and shellfish and crustaceans.

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We have very few sandy beaches in our area. Lincolnville Beach and the Camden public beach and a few tiny private beaches. Here the particles are bigger and harder (mostly quartz) because these places are slightly steeper and more exposed to wave action and the mud flats. Here seaweeds are washed up by storms and high tides to form several windrows winding along the beach. In the piles of drying and decaying weed you will find hopping sand fleas (orchestra) that scatter as you probe reacting as they would to a long-beaked shore bird. There are bits of crab carapace, sea urchin skeletons, fish vertebrae, pieces of clam and mussel shell, periwinkles, an occasional big horse mussel shell, a chunk of white coral like algae, a skate egg case, a bit of dead man’s fingers sponge. The seaweeds are mostly knotted wrack with an occasional strand of kelp.

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Mud flats are very sensitive to pollution by human wastes. The water currents are not strong enough to flush them clean. Wind sewage from nearby houses and more to boats in the Bays empties into the water, the human bacteria and viruses in the wastes are harbored in the creatures of the mud flats that absorbed the wastes as they eat. The germs are then taken in by humans have data NT the clams from the flats. For this reason the department of marine resources must close the flats to protect people from their own wastes. As we

learn to take care of our sewage properly, we are again able to harvest clams again from these flats.

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FRESHWATER AND WETLANDS

When the glaciers retreated, the land below was left pockmarked with lakes, ponds and little depressions filled with water.

During 10-12 thousand years, these watery places have gradually filled with eroded silt and sand, and matted vegetation. Ponds have become shrubby swamps and wet patches of forest. Rock bottomed lakes have become shallower and mud-bottomed. Reed marshes have inched out from the shores. So we have a range of wetlands: tiny mountaintop bogs, the great Oyster River Bog, swamps of cedar or red maple, alder and willow swales, sedge and reed marshes along the edges of lakes, and the lakes and ponds themselves.

The acid bogs are poorly drained (See bog section) but the other wetlands are charged and drained by springs and the flow of streams: fast rushing forest streams and small flowing rivers like the Megunticook and the Goose River. The movement of the water joins all the lands, moving from the sky, through the land, to the sea and back again. The plants and animals that live in these wet habitats are united by the water that flows through them. One habitat blends with another: the lake turns into a swamp which turns into forest. The fast stream flows into the lake which empties into the slow stream, and so on.

These living places are teaming with plants and animals of all shapes and sizes, but because of the wetness, we don’t always see much of them. One way to look at wetland plants and animals is from a slow canoe, paddled along the edge of the pond, looking down at the bottom and scoping stuff out to look more closely. Wading in is good too. Different associations of plants and animals live in wet places

Note 1. see map of wetlands
Note 2. Wet places to visit: Bog Bridge, Barracks Cove, Goose River golf course, Fernald Neck, Off-Road on Beauchamp Pt.

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according to their needs for light, oxygen, pH (acidity), heat, type of bottom, speed of water and amounts of nutrients.

A fast flowing rocky mountain stream is cold, has plenty of oxygen and few nutrients. It is hard for living things to avoid being washed away by the currents. Blue green algae live in the fast stream, with dark mosses(fountain moss) and some insect larvae that can cling to the rocks or crawl under them.

The spring black fly larvae cement themselves onto boulders in the rushing water, looking like a mat of dark moss. The sweet tiny diatoms algae cells into their mouths.

Where the stream slows a bit (note 1), there is gravel, and then sand, on the bottom and more life. Some water weeds can root and worms (nematodes, bristleworms and flatworms may find shelter along with many insect nymphs and larva that crawl about eating plant and animal matter. Sponges and bryozoans coat the sheltering undersides of stones. The caddisfly larvae make themselves heavy sand cases, to weight themselves down as they crawl about eating

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GRAPHIC Freshwater Life

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GRAPHIC Freshwater Plants

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mostly plants. Mayfly nymphs eat small plants, animals and organic debris. Stonefly nymphs hide on the bottom and eat other animals.

These larval forms hatch into flies that are greedily eaten by brook trout as they swarm over the stream. Freshwater smelt may spawn in the sheltered corners, laying eggs that cling to the bottom with adhesive pads. The smelts make their way up small streams from the lakes to lay their eggs. Saltwater smelt, fished through the ice, run up the Rivers to spawn.

As the streams slows further in flatter terrain, the bottom becomes muddy and pond-like. In the slow river edges and sheltered pond shores, wilted plants float up from the bottom: pond weeds, naiads, marsh smartweed, water lilies, cowlilies and floating bladderworts. Poking out of the water are arrowheads, pickerel weed, spikerush, water parsnip, pikewort, sedges, burreed, bullrush and cattails. (See purple loose strife page 110)

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GRAPHIC Microscopic and Very Small Water Life

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The tiny animals swimming about are almost invisible - water fleas (Daphnia) copepods, isopods (water asel) amphipods, (shrimplike scuds) and scarlet water mites. Tiny hydra and bryozoa colonies cling to the plant stems. Water bears lie in the mud. They are all eating debris, plant scraps or catching the even smaller protozoan that swims about: amoeba, vorticella, paramecia, and flagellates like Euglena.

These in turn are eating bacteria and tiny plant cells like diatoms, desmids, green algae like Spirogyra, and blue green algae Oscilatoria anabacna and Nostoc. The plant cells are too small to be seen without a microscope, although their bodies may color the water green or form a scum on top during an algae bloom.

The warmer waters team with creatures. The caddisfly nymphs here have lighter twig cases. May fly and damselfly numphs comb the bottom for food. Big leathery crane fly larvae forage in the muck at the forest edge.

Dragonfly nymphs, horse flyand deer fly larvae, big hellgramites dobsonfly numphs stalk the bottoms and stems for animal prey. Giantt water bug grab small fish and tadpoles; backswimmers, with two long oarlike

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legs catch smaller animals. Water boatmen, with similar paddle legs, eat only algae and debris on the bottom. Little beetles shoot through the water, each carrying a silver bubble of air from which to breathe.

Some creatures use the surface film of the water as their hunting ground (see page 2). The surface molecules of water cling tightly together (surface tension) and light insects can stand on top or cling from below. Crowds of shiny black whirligig beetles dart around on still surfaces like carnival bumper cars. Long legged waters striders scoot across the top, each foot resting in a dimple in the water. Mosquito larvae hang under the surface film in still shallow water; they breathe through their tails and wave microscopic life into their mouths underwater. Some ponds snails cling under the surface film, or crawl up and down the plant stems, scraping plant food with their rasp-like tongues. Along the shallow, muddy shores of the less acid ponds, there are freshwater clams, sifting the water with their siphons (Note 1).

Fat leeches hunt for frogs' eggs, insect larva, worms, and suck the blood of unlucky vertebrates (human beings and other). Leeches can also venture out of the water into damp woods.

In the slowest, most polluted and airless waters (Note d) only blood worms larvae of midge flies, mosquito larva, tubifex worms and the rattailed maggots of the hover fly can live. The worms have hemoglobin in their red blood, to better hold the little oxygen there is, and the mosquito larvae and rat tailed maggot suck their air from the surface.

The many freshwater insect nymphs eventually crawl out of the water, and emerge from their split skins as mayflies, mosquitoes, black flies, deer fly, hoverfly, midges, no-see-ums, crane flies, older flies, stone flies, Dobson flies, delicate damselflies and the great dragonflyies that hawk over the water, hunting for other insects.

Many fish live in the still edge

[Note 1] in the dammed part of Megunticook River and lake and in Lake Chickawaukee

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waters, to eat the creatures that breed and feed there. The smallest are minnows, algae and plankton eaters such as golden shiners, and the insect-eating chub. Next in size are the sunfish - bluegills, pumpkin seeds and crappies, and the bigger largemouth bass of the same family.

Bull heads or hornpout, a brown catfish, feel over the muddy bottoms with their long whiskers. Their young swim together in long snaking masses along the shallow edge. White suckers eat small animals and plants with their fat sucking lips. A still pickerel floats in the reedy water, in wait for small fishes or unwary frogs that come by. Brown eels feed on smaller fish, crustaceans and insects. They're born in the Sargasso Sea and come as tiny dark elvers, up the rivers and around the dams, to the quiet fresh waters where they've lived their adult lives until it is time to go back to the sea to spawn. White perch, smallmouth bass and trout [note one] like somewhat cooler waters, deeper and further from shore; brown trout in the warmer lakes, (rainbow trout and lake trout togue) in cooler parts, feeding on insects, crustaceans and smaller fish.

The Atlantic salmon years to come up the Rivers from the sea to spawn, as did the striped bass but now only the Ducktrap River and Lincolnville has a fall

salmon run [see chart in inshore offshore]. They need fish ladders where the dams have been built. Alewives still come up the Saint George and Ducktrap Rivers, smelt come up the smaller brooks [Note 2].

Megunticook, a deeper cooler lake, has landlocked salmon, and landlocked alewife. Hosmer Pond, a shallower muddy lake, and others like it, do not have enough oxygen in their warmer waters for salmon and most of the trout. Fishermen consider most of the warm shallow water fish to be trash [note three] fish, honoring the trout and salmon as game fish.

Many amphibians live in the warm water edge. They lay their eggs in the still waters; great masses of wood frog eggs, strings of toad eggs, round blobs of spotted salamander eggs in clear jelly, can be found

[Note 1] one introduced and stopped from fish hatcheries by Maine department of inland fisheries and wildlife.

[Note 2] Great Brook and Rock Brook in the state park and the brook to the Lily Pond.

[Note three] freshwater “trash” fish: sunfish, perch, suckers, eels, chub.

Opinions vary over time.

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GRAPHIC Freshwater Fish

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in the spring. They make good food for other pond animals. The frog eggs hatch into the many tadpoles we see in the spring. They eat tiny plants and animals until they lose their gills, grow legs and become frogs. The huge bullfrog tadpoles take two years to do this. Then they eat insects. The spring and summer air is full of the meeting song of male frogs and toads: the early spring peepers, the clucking chorus of wood frogs, twanging of leopard, pickerel and green frogs, and the great vibrating bass of the bullfrog. Toads have a sweet musical trill.

Except for laying eggs, they live away from the water, in gardens and woods, hunting insects and slugs. The salamander and newt eggs hatch into little fish-like larva with feathery gills and tiny legs. Adults spotted salamander live in the damp woods.

Big snapping turtles live in the ponds and the dammed part of Megunticook River, eating fish, crustaceans and even unweary ducklings. Painted turtles live in the

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the shallow water edge, eating water plants, insects and other small animals. They bask in the sun on rocks and logs sticking out of the water.

Many birds live on the plants and animals of the pond and river waters. Black duck, wood duck, mallard and teal dabble in the water weeds for their food.

Canada geese, come out on the banks of the Megunticook and by the Lily Pond, to feed on the grass and weeds. Herring gulls rest on the river. Loons sit low in the water of Lake Megunticook and their long cries can be heard across the water. Cormorants (shag) come in from the bay to fish in fresh water. Sometimes great blue heron wade in the swampy inlets of Megunticook Lake, and an osprey may fly over, looking for fish. In the cattail marshes, Red-wing blackbird, grackles and the little long billed marshwren nest. Kingfishers dive for small fish from branches overhanging the pond or river. Tree or barn swallow skim over the water, hunting flying insects with the dragonflies. Shrubby plants grow along the water edges and in swampy thickets: button-bush, leather leaf and

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sweetgale, willows and alders, and winter berry (“black alder” a holly).

Small birds shelter, nest and hunt insects in these thickets: tiny warblers (yellow throats, water thrush), flycatchers (Phoebe, least, alder), veery, sparrows (swamp and song), and gold finches in the more open places. In the wet m eadows, there are bobolinks and nesting killdeer. The killdeer cry out at night sometimes – a long high cry.

Many mammals visit the wet places for food and some make the edge their home. Water shrews hunt smaller water animals. Little brown bats and other bats hunt flying insects in the warm dusk. Meadow jumping mice, star-nose moles, meadow voles, bog lemmings and big Norway rats all live in the damp edges. Muskrats build island houses of cattails; the cattail was also their favorite food. The beaver often add to the marshlands with their dams, forming ponds that protect them in their large beaver lodges made of sticks and mud. Beaver dams are important in flood control as they slow the runoff in the spring thaw

[Note one] Beavers eat water plants, twigs and inner bark of popple, birches and willof that grow near the water. They store sticks underwater for winter eating. Raccoons like to forage ing in the wet places, looking for frogs, large insects and small mammals. Mink catch [

Note 1] Old beaver lodges behind bog bridge – some trial launches by young beavers.

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fish, young birds and mice. The river otter still fishes in some quiet streams. And the great moose wades in the water in the summer in hidden places, eating water plants, pond weeds, water lilies and sedges.

In the spring, they eat the early leaves of alders and willow, wetland shrubs . [Note 1]

Human beings have long been the dominant predator of the wetlands, hunting birds, trapping fur bearers, and catching fish. The swamps and rivers have provided animal and vegetable food for people since the glaciers retreated.

On the wetlands map you will see many patches of forested wetlands. These are only a few of the tiny boggy places in the forest around us. Depending on the acidity of the soil, these areas may be acid bogs of Tamarack and black spruce [Note 2], red maple swamps, sweet-soiled cedar swamps of northern white cedar (arbor vitae) [note 2] (Beauchamp Point) or willow and alder swales. The alders usually grow in wet parts of fields that have been cleared and allowed to grow back.

These plants, much hated by the landowners, are actually nitrogen fixers, holding and enriching the soil as legumes do. The red maple and cedar swamps are carpeted by mossy hummocks, gold thread, clumps of large ferns (cinnamon, ostrich, marsh fern, crested shield fern, oak fern, New York fern – see forest section). Jack-in-the-pulpit and great skunk cabbage grow in less acid swamp woods (Beauchamp Pt)

In the understory are highbush blueberry and arrowhead Viburnum. Along the sunny edge: buttercup, forget-me-not and touch-me-nots. Many

Note 1 Moose stick to forested wetlands and pond shores where few people live, like the Oyster River bog and bogs in Appleton, Searsmont and Northport.
Note 2. See “bog”, “forest” and “roadside” sections

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Insect- catching birds, warblers and flycatchers etc, live in the rich wet woods.

Freshwater wetlands, rivers and ponds are very susceptible to environmental damage. Things are always draining into wet places. Eroded soil washes in from earth-moving projects, road building, house building, plowed fields and logged hillsides where the forest has been carelessly caut and the plant cover destroyed by heavy vehicles. The silt fills rivers and ponds and suffocates the water animals by clogging their gills. We have a fair amount of new construction in the area; earth is left bare during storms and silt runoff is a common occurrence.

The construction of beaches and landing places along pond shores can harm habitats of the shore creatures [Note 1]. Fresh concrete and creosoted wood in pierd poison the surrounding water. The least harmful structures are removable floats and floating docks. The plants and animals are relatively undisturbed.

The small dams were built on our Rivers to provide water power for mills, but they also changed the nature of the river upstream, making small ponds where there had been fast running water. The populations of plants and animals changed accordingly and the spawning fish runs [Note 2] declined and largely disappeared, with resulting drops in saltwater fish catches of river – spawning fish.

Pesticides used on crops, forests and roadside brush are carried into the streams where they poison plant and animal life. In our general area, apple orchards, blueberry fields and roadsides are regularly sprayed.

Sometimes, too many nutrients nitrogen and phosphates are washed into ponds from septic tanks

[Note 1] E.g. the sand at Shirttail spreads over the bottom and not much can live there.

[Note 2] alewife, salmon, smelt, striped bass.

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That leak, leach fields that are overloaded and raw sewage from lakeside cottages. Fertilizer on fields and manure heaps can leech into cons. This can cause algal blooms on the water. A bright green spring bloom is caused by abundant algae and usually does no harm. But the late summer blooms, caused

by blue green algae like Anabacna can form a smelly windblown scum, and the bacteria that decomposed the algae after they die can use up so much of the waters oxygen that the animal life suffocates. This occurred several years ago on Norton's Pond in Lincolnville and it can happen in small ponds near chicken houses. [Note one]

Landfills and dumps can leach toxic wastes into surrounding wetlands and streams. This is a worry we still have. Our old dump is drained by sluggish red stream which goes to the Lily Pond. The limestone quarry hole beneath the dump is water filled and likely to leach into the surrounding groundwater. Any solvents, motor oil, paints and household cleaners that we threw out are likely to get into the water system of the land around.

Acid rain, which comes from acid air pollution [note two] could make our lakes too acid for fish to live, as has happened in the Adirondacks of upper New York State.

We need to pay attention to these hazards and try to moderate our construction and waste disposal habits, so that our wetlands, ponds and rivers will continue to be the rich living places they are.

[Note 1: a golden "bloom" seen in the spring on the waters of Lake Megunticook is only pine pollen

[Note 2: mostly SO2 from sulfurous fuel (used in industrial cities of the Midwest) and NO2 from automobile exhaust (local). See FOREST section.

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GRAPHIC Wetlands map

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GRAPHIC Freshwater food web graphic

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BOG

The shape of our land was left as it is by the last retreating glacier. The great weight of the advancing ice scoured the mountains smooth with grinding rocks and gouged out hollows in the land. As the glaciers retreated, the melting ice dumped barriers of gravel that blocked the drainage of the hills. The seas rose

with water from the melting ice and impermeable clays were deposited in the depressions. As the land gradually rose again, released from the weight of the glacier, these undrained hollows were left full of water that doesn't move. Some of these lakes and ponds became bogs.

In motionless water, the oxygen is quickly used up by living organisms and is not replenished as in moving waters. Without oxygen, bacteria cannot break down the bodies of the plants that colonized the water filled depression. [Note 1]. The water becomes more and more acid because of the accumulated organic acids of the undigested plant material [Note 2]. High acidity of the water makes it difficult

[Note 1] the bodies of animals are not broken down well either in a peat bog, which is why the bodies of the bog people of Denmark has been dug up in perfect condition.

[Note 2] Bog pH is @ four, whereas pure neutral water preferred by most living things is PH @ 7 (or slightly acid 6.5).



for plants to absorb minerals. At this point only plants that can survive these acid conditions remain. Sphagnum is a moss which lives and grows under these conditions. These moss plants have large water storage chambers cells and can absorb water like a sponge. The sphagnum plants make a springly waterlogged mat over the surface of the bog, partly floating on the water. The dead material falls off the bottom of the mat and accumulates in thick layers of peat [Note 3] on the bottom. Eventually the whole bog is filled with compressed, undecomposed plant bodies: Peat which can be used and gardening work, cut into bricks, dried and burned as a fuel [note three].

The sphagnum also keeps the bog water and air cool, by holding water in, allowing it to evaporate, like a great air conditioner. The other plants that live on the sphagnum tend to be northern, acid tolerant species. Many are of the Heath family (like blueberries) and very similar in appearance: Labrador tea, leather leaf, bog rosemary, rhodora, lamb kill. They are all low shrubs with small leathery leaves.

These plants are living in water but they can't use it because it's too acid, so they have the kind of leaves that preserve the fresh rainwater they get.

A few common bog plants have a special way of getting the minerals they need but cannot absorb from the acid water. They resort to catching and digesting

insects to obtain the nitrogen and other nutrients they need. The tiny sundew plants and sticky globules on the tips of the hairs on their leaves. These shine in the sun and attract insects which are then stuck fast. The hairs bend inwards and the blade of the leaf folds around the victim, which is then absorbed. The pitcher plant attracts flies to its pink sugared “lip”. The fly slides down the slippery inner wall and is digested by an enzyme in the liquid inside the pitcher. Another animal eating plant, the bladderwort, lies floating in bog pools. It has threads hanging below the surface of the water. On these threads are small bladders, one 10th of an inch wide,

[Note 3] Peat is used in Ireland, Scotland and other countries in Northern Europe, as fuel.

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GRAPHIC Bog Plants

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which open suddenly when microscopic animals swim by, sucking them in.

The bog is arranged in an orderly fashion. Around the border [Note a] on more solid land, are red maple, red spruce, white pine,, white birch and red oak. On the forest floor beneath are mosses and ferns, especially big cinnamon ferns, and the same spring flowering plants that live in other Maine forests. The black spruce, more tolerant of the cool acid soil, edges into the wet bog. The boldest trees are the hackmatacks (larch tamarack), on island hummocks and peninsulas made by their roots, out on the sphagnum mat.

The next zone is that of the heath shrubs and other shrubs, shallow rooted on the compressed sphagnum. Fragrant sweet gale (a relative of bayberry ) and Labrador Tea give off an incense smell as you brush through the thicket. There are pink masses of blooming rhodora in the spring, and patches of white tufted cotton grass that blows in the wind.

Underfoot are creeping cranberry stems and tiny sundews. You might see colorful orchids blooming in the early summer: Arethusa(Dragon mouth) rose pogonia, and grass-pink. As you venture closer to open water, the ground becomes springier. You are now on a mat floating over water. Stand on a firm grassy hummock and bounce, gently, with arms outstretched. The hackmatack on the next hummock will bounce too, as your motion is transmitted across the mat.

In the center of the younger bog [Note c] is open water [Note 4] it looks like a real pond, with rushes and water lilies, frogs and dragonflies.

In the spring, the bog and the woods around are full of flying insects: mosquitoes, black flies and no-see-ums. You venture in to see the flowers and hear

[Note 4] this is true of the Oyster River or Rockland Bog, because of the work of the bogs beavers.

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the birds at your peril. The black flies cluster on dark clothing, attracted as to the dark pelt of moose or bear. The woods are also full of warblers that have come north to nest and feed on the insects. Each kind of bird has its characteristic song with which the male claims and holds its territory. The air rings with their challenging cries.

The streams leading out of the bog are frequented by beaver. Their works raise the water level in the bog. Moose visit the edge of a bog in season; they are especially adapted to make their way through the water-laden ground. Their wide splayed feet keep them from breaking through the matted surface into the mire below. The moose are like the bog plants, creatures of the more northern climate, that still live in this coold damp place left by the glaciers.

For a more detailed list of animals living near the bog, see the mammal habitat chart.

The Oyster River Bog Association, with members from Rockport, Rockland, Thomaston and Warren who own property in the bog and its surrounding woods, are working together to preserve the bog and its special plants and animals.

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GRAPHIC Land Mammal Habitats

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FOREST

The land around us is covered by forest. Trees grow over the mountains, along lakes and streams, down to the edge of the sea. Everywhere that there is enough soil that is not covered by water, there are trees growing. People have

cut them back to make fields in places, but they grow back in time unless the soil is washed away or the land is paved over. [Note 1]

This forest grows in our region because there is enough soil and rainfall to support trees which then shade out other sun loving plants, like grasses. The plants that live under the trees must make do with what sun they get.

A woods may be deciduous (of trees with broad leaves that fall in the autumn), coniferous (evergreen cone bearing) or mixed. The plants and animals that live in their shelter vary accordingly.. The deciduous forest may be thought of as being organized in horizontal layers.

Highest is the canopy or tree layer, receiving most of the sun in the summer. These are the Maples, ash, birches iand oak [Note two]. Below the canopy is the under story or shrub layer, catching the light that filters through the leaves above.

Here are witch hazel, striped maple and mountain maple, the Viburnums ( witherod, nannyberry, highbush cranberry, maple leaf vibunum, hobble bush), alternate leaved dogwood, elderberry, honeysuckle, raspberry, black berry,

[Note 1] see “roadside and field” section for description of how the forest grows back after a field is abandoned.

[Note 2] Our beeches seem to be mostly small, having been infected by a beech scale disease which killed many larger beeches, 20 to 30 years ago. In Rockport, there is a grove of healthy of American chestnut trees, remnants of the great trees that lived before the chestnut tree blight spread to the east coast of the U.S. (Early 1900s.)



blackberry, shad bush, hawthorn,hazelnut, buckthorn, winter berry. Many of these shrubs are harder for us to tell apart thann the trees, but the browsing animals of the forest, like the deer and the snowshoe hare, consume their leaves, twigs and berries with discrimination.

Below the shrub layer is the herb or ground layer, which blooms in that brief time of sun in the spring before the leafy canopy closes above. Here are, roughly in order of their seasonal appearance: blood root, mayflowers ((trailing arbutus), violets, bellwort, foamflower, jack in the pulpit, Red trillium, gold thread, wild sarsaparilla, which is everywhere, Solomon’s seal, bunchberry, Clintonia, starflower, twisted stalk, lady’s slipper, Canada mayflower, false solomon’s seal,

Indian cucumber-root, twin flower. [Note 1.]

Close to the ground, evergreen under the snow in the winter, are wintergreen (Teaberry, checkerberry), partridge-berry, mosses and club mosses. Ferns flourish on the shady floor of the summer forest. Below the

[Note 1] Common flowers are starred * rare flowers = 0

Page 80 GRAPHIC DECIDUOUS TREES

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ground in the layer of leaf mold and inside of the moldering trunks of dead trees is an active world of soil makers [NOTE 1].

The main food of the forest are the trees themselves: their leaves, seeds, sap, bark and wood.

As the air and earth warm in the spring, the insect life that sleeps in the ground and in the trees, wakes, moves, changes and begins to eat. Flies and moths hatch out of pupating grubs and hasten to lay their eggs in fertile places. Overwintering egg masses become masses of caterpillars that chew the leaves of the forest: cankerworms, inchworms sawfly larva, spruce budworm, forest tent caterpillars. Aphids and leaf hoppers suck sap from the leaves and young stems.

Most insects specialize in particular plants. As the insects emerge with the warming trend, many birds arrive from the south to eat them: vireos, thrushes, many kinds of warblers, living in particular habitats, swallows, wrens, fly catchers. The air is filled with the sound of buzzing insects and the songs of birds competing for nesting territories. The forest is consumed in a frenzy of activity. Under the bark & wood of sick and dead trees, bark beetles, wood boere grubs are tunneling and eating. Woodpeckers drill into the punky wood of dead limbs and to extract the grubs and beetles. Graceful ichneumon flies carefully deposit eggs in borer grubs with their long delicate oviposters. Wasps carry off caterpillar pieces for their own young to eat after hatching. In the evening

[Note one ] See soil foodweb in geology section.

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GRAPHIC: SHRUBS, SMALL TREES – DECIDUOUS FOREST

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Bats come out to hunt the flying insects. A few amphibians and reptiles live on the forest floor, living largely on insects and worms: red efts (newts) , salamander, tree frogs. DeKay snakes.

Other animals also eat the trees and the plants under them. The lumbering porcupine eats inner bark of the trees, perching incongruously on the branch against the truck. The smaller rodents, chipmunk, woodland jumping mouse,, white footed mouse, boreal red backed vole, red squirrel (coniferous trees) and gray squirrel (deciduous trees) all eat seeds, nuts, berries and occasional insects. The ruffed grouse finds seeds and berries near the ground.

All these animals, and the browsing deer and snowshoe hare, find more food close to the edge of the forest where more light enters and there are more shrubs with berries, buds and leaves to eat. For this reason we have more deer in Maine now that people have cut clearings. Before the settlers came there were relatively fewer deer and more moose, who eat the popple and birch and alder leaves and water plants along the edges of streams, lakes and bogs.

The plant eaters are in turn eaten by weasels, including the fisher, who prefers porcupine, red fox, raccoon, and skunk.

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GRAPHIC FOREST FLOOR – SPRING FLOWERS

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GRAPHIC FOREST CALENDAR

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The coyote, a dog relative who has been moving into Maine since the 1930s, preys on weakened whitetail deer, in competition with human predators and their dogs.

The black bear that once lived here has retreated to more remote northern forests and hills as the population has grown, though there have been signs of them recently. Our hawks, broadwing,, red-tailed and red shouldered, that normally prey on rodents and songbirds have almost disappeared, probably because human use of pesticides has disturbed their ability to reproduce.

When the leaves of the trees and the remains of animals fall to the forest floor, they are returned to the soil by the labor of bacteria, and fungi, fly and beetle larvae. The soil of the deciduous and mixed forest is rich and well aerated, containing earthworms and other animals that plow and redistribute the decomposed organic and mineral material needed by the plants of the forest. The roots of the trees reach deep below the humus layer to bring up dissolved minerals of the current parent rock material below. Carbon and nitrogen from plants and animal remains are drawn out of the humus layer. The cycle begins again with the rebuilding of plant material in the tree canopy.

In the winter, the forest becomes very quiet. Most of the birds leave as the insect life subsides in the autumn, from cold and lack of food. Only the seed eaters, the scavengers and the woodpeckers remain. Grouse peck over dried berries and seed heads. Grosbeaks, crossbills and finches break open seed capsules.

Black capped chickadees find seed and dormant insects. The woodpeckers, nuthatches and tiny brown



creepers study the tree bark for overwintering larva and pupae. Crows and jays scavenge everything animal and vegetable. The great horned owl watches for rodents. But we have few owls; they have gone, like the hawks. Some years we have an "invasion" of snowy owls from Canada, during especially cold winters.

The leaves fall as the light fails, so that the plants will not dry out in the cold, dry winter winds. Some animals retreat into shelters to sleep. (Bats, chipmunk, jumping mice). The tracks of snowshoe hare, whitefoot mouse, fox cross the fresh snow.

In years of deep snow, the deer yard up under sheltering evergreens where they trample the slow down and use short trails to reach the evergreen boughs and deciduous buds which they eat during the winter. They cannot manage deep snow with their slender legs and sharp hooves.

Most of our forest on the Camden hills is "mixed", but in some places there are dense stands of conifers, usually spruce, but sometimes pine in dry places, or cedar in wetter places. The conifers can resist drying winter winds with their tough waxy needles.

They catch sunlight earlier and later in the year than the deciduous trees. The forest floor below them is dark and covered with a dense layer of needles. There is no shrub layer, although the young balsam fir may grow here and there in

small stands, never reaching a great height. There is very

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a little ground cover: some clumps of moss, lichens on fallen trees, some ferns. The dense coniferous forest is a much more limited environment than these deciduous forest . The acid soil and the acid tree needles inhibit the action of soil bacteria and earthworms; most of the breaking down is done more slowly via a network of fungi mycelia under the ground. The mycelia send up spore bearing bearing mushrooms after rains. The roots of the trees are shallow and use symbiotic fungi (mycorrhiza) to absorb soil nutrients. The soil is typically poor and leached by rainfall.

Fewer animals live in this habitat then in the deciduous forest: larva (like the spruce budworm), wood boring beetles, wood ants, wood wasps, red squirrels and crossbills who can extract seeds from cones. The evergreen forest feels quiet, dark and empty in comparison with the busy deciduous forest.

The coniferous forests were an earlier stage of vegetation over our land. These trees could live on the early soils left by the glaciers. They could stand the cold winds, poor drainage and acid soils. Before them were the earlier soil builders, the lichens and then the mosses

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GRAPHICS

WINTER TWIGS & EVERGREENS

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GRAPHICS EVERGREEN GROUND COVER

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GRAPHICS MIXED FOREST FOOD WEB

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GRAPHICS FERNS

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and ferns. This succession of soil building plants can be seen again on the

erratic boulders strewn over the forest floor, where the soil is being carefully built, first by crustose lichens, then by foliose lichens. The mosses follow where enough organic debris is accumulated. Here and there a fern may grow out of the moss mat or from a crack in the rock with organic matter in it. And one daya tiny fir, pine or maple seedling may root in the rock-borne bedding. One boulder can hold all these stages, the steeper, more exposed face bearing the lichen pioneers, the pockets of debris holding the young seedlings. Here is the history of the forest in miniature.

Our forests are very important to us . We must cut wood carefully in them, never leaving the soil bare to be washed away, never conpacting it with heavy vehicles. (Note 1) This forest cover helps to absorb the water of our heavy rains and snows, providing us with fresh groundwater that would otherwise run off quickly, taking soil with it, silting and flooding rivers and causing later droughts. The forest moderates the climate with the moisture that is transpired from its leaves, cooling the air in the summer, and evening out the seasons' temperature just as evaporation from the ocean does. We are protected from extreme heat, cold and dryness. We must be sure that we do not destroy animal habitats or cause an imbalance in the number of animals by indiscriminate hunting or use of pesticides. We need the water, soil, air, food and materials that the forests provide.

Note 1 Compacted soil has no air in it and cannot absorb water. It cannot support a protective plant cover and so it is easily washed away.

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GRAPHIC

APPROXIMATE TREE COVER

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There are many ledges of bare exposed rock on the Camden hills. They were scraped smooth by the weight of the last glacier that poured over these mountains. The hills themselves are not very high (Mt. Battie is under 800 feet above sea level Mount Megunticook is almost 1,400 feet, Ragged Mountain 1,300feet and Bald Mountain 1,270 feet), not high enough to create a subarctic environment like that of mountaintops above the tree line (Note 1). But the ledges are bare of soil, exposed to harsh, cold, drying winds in the winter, to the drying effects of ice, the burning sun and beating rain. Only very hearty plants live there, and not many animals. The ledges look as though they're above the tree line even though they're not.

As you emerge from the wooded slope of Mount Battie and scramble up the ledge, all the plants seem to huddle closer to the ground. Wherever there is enough soil between the rocks, scrubby red oaks grow up, the same kind as the tall trees in the woods but on Mount Battie they are bent by the wind and stunted. Their leaves near the ground are large and spreading to catch the light, while the leaves on the upper branches are small and spiky to avoid drying out. There are a few small red Norway pines, able to grow on the ledges better than the eastern white pine of the richer woods. Their roots must spread far over the rocks to get a grip.

Note one: the tree line here would be at about 6,000 feet for our latitude.

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and find water and soil. Some of the trees have died and left their branches stark and gray against the sky, bare as drift wood: wood-rotting organisms cannot break them down in such dry bright places ,so only the wind and rain can work on them.

Among the small shrubs are the pin or fire cherry, that thrives on burned-over ground, and some bay berry, that withstands salty air.

These plants cannot stand the competition of other plants, but here there is little competition. There is spreading dwarf juniper, prick-needled, with pale green berries (Note 2), shiny bearberry, with mealy red berries, and mats of broom crowberry, like tiny spruce branches, all lying low on the ground. There are low bush blueberries, some huckleberries, and an occasional sheeps laurel (lambkill) (Note 3). Chokeberry bushes are everywhere, and three toothed cinquefoils grow in the smaller crevices, looking like dried up strawberry plants. All of these plants are adapted in two important ways to the environment: they have leaves that are small or waxy and don't easily dry

Note 2 Juniper berries are used to flavor gin

Note 3 because it is poisonous to sheep.

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and they are low lying plants which cannot easily be blown away.

The rocks themselves are not completely bare. On rock faces that are shaded part of the day, low crustose lichens are growing up; they appear as areas of

different shades of gray with edges like the borders of countries on a map, or areas of gray mud cracks with black fruiting dots or small patches of bright yellow-green and bright orange-green boulder lichen that spreads like tree rings in different shades. There are some patches of rock tripe, a foliose lichen, like black crackly dried leaves attached to the rock. On some sheltered ledges that are flatter and more moist, there are mats of spongy reindeer lichen and cloud lichen, like tiny silvery white trees.

These lichens can withstand the harsh climate. The tough fungi protect the photosynthesizing algae inside. Their spongy cover absorbs water in wet weather and prevents its loss in dry weather.

The lichens are pioneers on the barren rock ledges, just as their ancestors were on the barren early land, slowly breaking down the surface of the rock while they live off the food provided by their captive algae. The lichens help form a thin base of soil for higher plans to live on; the moss that hangs out of a shady crack will come next.

There are few flying insects or small birds on the ledge. They would be blown away too easily. An occasional ant can be seen scurrying across the rock, or a grasshopper in warm weather. Strong winged hawks soar overhead, riding on the rising currents of warm air and watching for small birds and other prey farther down the hills. This is a world of rock and crouching plants-not a rich enough hunting ground for animal life.

Note 4. Crusty texture as opposed to a foliose(leafy) and fruiticose (fruited) lichens.

Note 5. These can be eaten as survival food.

Note 6. Hawks over the mountain -red-shouldered, broad wing, red tail, sharp shin, Cooper's, goshawk-mmature bald eagle -(over Bald Mountain). Also, turkey vultures on Bald Mountain.



ROADSIDES & FIELDS - disturbed environments

When we walk along a country road, or look out of the window of a car, we see plants along the roadside, in the ditch, up the bank of the road and a little way into with any fields that border the road. This is the most that many of us see of wild plants and animals.

The roadside and field might both be called "disturbed environments" because they are formed when human beings disrupt the soil, drainage system and plants that are natural to the area. In making a road, we dig out some parts and build up over other parts. We digdrainage ditches along the side and make a hard impermeable, heat absorbing surface on the top. In making a field, we often do little more than cut down trees to let grasses grow in the sun. Sometimes we plow and seed it for hay or crops, and even use herbicides and pesticides to make sure that only the plants we want grow there.

In both cases, we have changed the environment, and as a result, the plants and animals that live there also change. If we had done nothing there would still be mixed forest of leafy deciduous trees and needled coniferous trees because that is the type of vegetation that naturally grows in the soils of our climate of cold, below freezing winters with 40 - 50 inches average yearly rainfall. If we do nothing more, the mixed forest will slowly return, shading out the sunloving field plants. Sunny fields or clearingsare also created naturally by forest fires.

Many of the plants (c. 50 %) that live by our roadsides and in our fields are not native American plants. They have followed the Europeans and their agriculture from its origins in the near east, for as long as 12,000 years . We tend to call these plants "weeds" because they spring up quickly in disturbed ground without being planted by us, and they often interfere with our crops. The colonists from Europe brought some of these weed seeds unintentionally in their belongings. These plants are sun loving and particularly tough. Their seeds germinate quickly inthe trail of disturbed soil that we leave - and is why we see them along the roadside.

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GRAPHIC

TOUGH LOW PLANTS on the HARDPACKED SHOULDER

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GRAPHIC

ROADSIDE CROSS SECTION

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Here is a short list of these European and Asian plants, our followers: witch grass, plantain (called "white man's footsteps"), Queen Anne's lace (wild carrot),

dandelion, burdock, mullein, yarrow, oxeye daisy, sow thistle, Saint John'swort, hopclover, sweet clover, tansy. to to not all are away side plants came in the last few hundred years. Many are native Americans know Quaid, the golden rods, most of the pastors, Lukens, sunflowers, black eyed Susan, Julie, evening primrose . The farther back from the road you walk the more native plants to find.

All these plants need sun. We cut back the forest and this huge variety of some loving plants spring up - many more times than grow in the forest. The roadside has several different environments; dry, wet, fertile, sterile.

On the hard packed, gravelly shoulder of the road you will see plants that can stand being walked on, driven over and parched by the extreme heat radiating from the blacktop. They must be resistant to road salt, exhaust fumes and oil spills. They must be able to get nourishment from poor soil. On the portion that is "scraped" by the snowplow, a tough sparse grass spreads. Soft fuzzy grey rabbit-foot clover lines the road in mid-July and is replaced by yellow hopclover by August. Other plants are plantain, pineapple weed, knot weed, cudweed, shepherds purse, ragweed (because of the heat from the blacktop) and, sometimes wild strawberries.

In the wet ditch by the road, where all the runoff from the pavement must go, you see plants that like moist habitats or even marshes: jewelweed (in shadier places), sensitive fern, creeping buttercup, and blue flag (iris) and cattails in the wettest places places with rushes and sedges ( see purple loosestrife page 110).

Up the sunny bank beside the road, masses of wildflowers grow, if the bank is not mowed too often and is not heavily eroded. This is a very long list: lupines, dandelions, strawberries, oxeyed daisies, daisy fleabane, cow vetch, red clover, daylilies, goats beard, Queen Anne's lace, hawkweeds, milkweed, tansy, yarrow, evening primrose, mullein, goldenrod, sunflowers, astors and many different kinds of grasses. There are clumps of shrubs and young trees springing up:

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GRAPHIC

ROADSIDE BANK - FIELD PLANTS

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sumac, raspberry and blackberry brambles, wild rose, arrowwood, red osier,

dogwood, young chokecherries and black cherries (with black knot fungus in them often), common elderberry and sometimes , young popple (quaking Aspen) trees. Here and there are old apple trees.

On shady banks, overhung by woods, there are more ferns, mosses, woodland floor plants like bunchberry, patches of colts foot in gravelly places, violets and poison ivy.

In the fields, back from the road, grow many of the "sunny bank" plants, the variety depending on how often the field is mowed or cut back and on what the soil and drainage is like. You might see masses of milkweed, sometimes dogbane: patches of wild strawberry, clumps of hard hack (steeple bush), tangles of bedstraw, of stitchword (chickweed), and yellow rattle (note one). Where the land has been filled or packed down, as in a vacant lot or abandoned work area, there may be tall mugwort, fireweed, sweet clover, mullein, burdock, thistles; where the ground is moist, there will be sedges and violets, and along small streams and ditches, there will be shrubby willows, (pussy willows & others) and alder thickets (note two).

Always the forest is trying to grow back to the "climax" condition of mixed hardwoods and coniferous trees that are native to Maine. This happens in very much the same way it would if there had been a fire in the forests (A) first the grasses and annual "weeds" move in, the same plants that sprout from seeds quickly and need sun... (B) Then come perrenial herbs and grasses, golden rods, astors and brambles (raspberries and blackberries). (C) After ten years or less, you will see stands of sumac near bogs

Note 1 "yellow rattle", because the seeds rattle in the dry pods.

Note 2 The hated alder can fix nitrogen like a legume and is important in the erosion and flood control.



poppies, fire or pincherry and black cherry, gray birch ( the very white kind that doesn't peel). Ashes, white pine move in, followed by maples. (D) The the last trees to establish themselves are the slow growing oaks and beeches that cast a solid shade, and in some places, stands of spruce. And so the forest has grown again. Parts of the sequence can be seen on the roadside and in the field. Areas that are going through the successional stages are important to wildlife because of the many berries, seeds and tender leaves (See FOREST)

If you are in a car, most of the animals you notice will be dead ones, killed by

other cars. The road, besides disturbing the natural drainage of the land and contributing to erosion and flooding, makes a barrier in the world of the animals that live in the forest and field. They often try to cross it unsuccessfully.

You will see skunk, raccoon, porcupine, woodchuck, toads, chipmunks, turtles, grouse, snakes, songbirds, dogs and cats that have been hit by cars. The most frequent live animal is the crow, who comes to take what it can of the remains. The crow is wise enough to fly when a car comes, but these other animals are either too slow or blinded by car lights or confused by the speed of the approaching car.

If you were walking along the road in the summer, you will see insects eating the roadside plants. Broad winged grasshoppers crouch invisible on the road shoulder and fly up with rattling wings as you approach, to land nearby, invisible again. Ants scurry about on the sandy edge. Many of the insects in the grass and flowers are adapted to eat only one kind of plant. There are monarch butterfly caterpillars in the milk weed, sulfurs in the clover, cabbage butterflies on mustard (cabbage family) plants, tiny beetles in goldenrod. In the Grasses and on weed stems, you will



see the foam above spittlebug nymphs, hiding in the wet bubbles the protect their soft bodies from drying out. Fat grasshoppers and tiny leaf hoppers fly up and disappear as you push through the grass into the field. On the goldenrod stands you may see the swollen galls where a tiny gall insect has laid its eggs and the plant has overreacted around them, forming a nest for the larva.

In the young cherry trees by the road, there may be tent caterpillars, defoliating the tree by day and returning to their tent nests at night. In the fall, there may be banded woolly bear caterpillars, foolishly trying to cross the road. On warm days and nights in the late summer you will hear the singing insects in the grasses, the males of each species making their special signal to attract a female of the same kind. Some of the songs are of: meadow grasshoppers - long buzzes separated by zips+ bzzzz, zip zip zip-bzzzz

Field crickets - "cricket+ - "cricket" (chirps)
Tiny crickets shrill "prrrrr...".

There are birds eating the grass seeds, other seeds and the insects: songs sparrows, a cat bird in the shurbs, goldfinch on the thistleheads. Red wing blackbirds are stationed in the cat-tails, each male a respectable distance from the next along the road, maintaining their territories. Swallows swoop after flying

insects and gather in the late summer on the telephone wires before flying south for the winter. In a wet meadow, there might be nesting killdeer that cry out in shrill voices as they fly, sometimes in the night. Hordes of robins feed by the road in the early spring when they first arrive and before they establish their territories.

Hidden down in the grasses of the field are the meadow-

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GRAPHIC ROADSIDE SHRUBS AND YOUNG TREES

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mice (voles), whose tunnels in the grass may be seen in the spring when the snow melts . There are kangaroo mice too, and tiny short-tail shrew that devour insects constantly. Garter stakes eat the mice and earthworms, and frogs in the ditch. The earthworms are working away if the soil is not too wet or acid aerting and enriching the soil. They also eaten by moles under the ground.

Norway rats (also people followers from Europe) haunt the banks and fields, adapted to eat anything they can find: small animals, insects, wild fruit, seeds and bits of human garbage. Fat woodchuck dig burrows in the field, eating clover, grasses and weeds. The little brown bat flits over the field in the early dusk, eating flying insects as the swallows do by day. The deer venture out to browse in the evening, on shrub tips and fallen apples.

These animals are hunted by other animals. The sparrow hawk perches on an electric wire, watching for rodents, small birds and large insects. The red fox comes at dusk, hunting rodents, birds, eggs, grasshoppers and foraging berries and seeds. Skunks and raccoons hunt mice, frogs, eggs, insects , berries, seeds, roots and grubs (the skunk). And in the fall hunting season, men are seen in red caps, flushing out game birds.

The roadside varies in color and texture through the year as different plants green, flower and die back. There are the first green daylily spears and pussy willow buds in March and April, the yellow of dandelions in May, blue of lupins in June, and blowing white daisies , orange of daylilies in July, goldenrod yellows starting in August, astor blues and whites in September,

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GRAPHIC WINTER WEEDS

PAGE 109 GRAPHIC

ROADSIDE CALENDAR

in October the fall colors of the red maple, red blueberry plants and poison ivy. And after that, all that is left are the weed stalks and seed heads, and tracks in the snow.

There are several kinds of environmental problems that arise on the roadside. In the spring thaw and during rainstorms, enormous run-off from the road can wash the side of the road away and erode the bank over the ditch, carrying silt into streams and suffocating the water life. The impermeable road cannot absorb water, and disturbed soil does not hold it well either. Drainage is often poorly planned with water backing up or flowing too fast and causing flooding. If the roadsides or fields are sprayed, the wildlife is slow poisoned, with the resulting disappearance of some insects, the birds that eat them, and the animals and birds that eat them in turn, especially the hawks.

If the road is salted in the winter, this salt is washed off into the roadside where it kills plants and soaks into the water table, contaminating nearby wells. We must consider carefully before we build new roads because of the drastic effect on the land they are built on and on the plants and animals that live there.

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HUMAN USE OF NATURAL RESOURCES - CULTURE

Living things vary in their ability to adjust to different habitats. Some plants and animals can only live in one special kind of place: the periwinkle can only live on the wave washed rocks on the edge of the cold sea. The tiny sundew plant can only live in acid wet places where other plants can't compete with it. Some creatures, animals in particular, can adapt to a fairly wide range of conditions, finding different kinds of food in different places. Most of these wide-ranging animals are omnivorous (eating plants and animals), or scavengers (eating dead and living food). Raccoons are such animals; so are Norway rats and herring gulls. Human beings also have this ability to adjust.

Human beings are able to make a living in a wide range of habitats, by changing their eating habits and by using different materials for shelter, clothing and tools, according to what is available. They also are able to alter their environment considerably to suit their purposes. Like other animals, they alter their environment unintentionally as well, sometimes destroying the habitat that

sustains them.

Over the thousands of years that human beings have existed, they have discovered different ways of making use of their environment. The knowledge of these ways is passed from generation to generation within each group of people. These ways are called the people's "culture". We have several different cultures in this area - sometimes coexisting - sometimes one displacing and destroying another.

Native Americans

The first human beings to make use of the natural resources of our area were probably people who follow the return of vegetation north after



the glaciers retreated. Humans had come from Asia to North and South America about 40 to 30 thousand years ago. Remains of their fires, stone tools and bones and shells other animal prey have been found in other parts of the Americas. They certainly also gathered plants to eat and to use to make nets and containers, but nothing remains of the plant materials. Probably these Paleo- Indians as they're now called, came to Maine from the south and west between 13,000 and 8,000 years ago. From that time on, different peoples, or, at least, peoples who left somewhat different rubbish behind for archaeologist to find have lived in Maine. The Paleo people hunted large mammals and left behind long graceful fluted spear points. From 10,000 years ago to 4,500 years ago, the "Archaic" people, who hunted smaller game after the large mammals were killed off, left smaller points and ground stone tools. The later people left red ochre (iron oxide) paint in their cemeteries, so we call them "Red Paint" people (4,500-3,800 years ago).

Another group cremated their dead and resembled people living in the Susquehanna Valley in Pennsylvania, so they are named "Susquehanna" (3,800-3,400 years ago). From about 2,300 years ago, the people living here began makingpo ttery out of the clay they found.

About 1,000 years ago, they began to cultivate a few plants as crops. They were known as Woodland Indians because they lived in the forested east coast and they were probably the same natice

(1) see timeline
(2) y.a. = years ago
(3) from Mount Katahdin

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American (Note 1) peoples encountered by the European explorers in the 1500's and possibly by earlier Vikings.

The people who made their living by the streams, woods and bays of Camden and Rockport were of the eastern Abenaki (Note 2) culture and language group of the great Algonquin peoples who live across the north of the U.S. and Canada, mostly in the woods and lakes left by the glaciers. Tribes occupied river valleys or drainage systems, the water divide between the river systems serving as a rough boundary. The rivers were used for transportation and defined the territory (Note 3)

The Saint George River valley was occupied by the Wawenok of th4 Kennebec group; the Penobscot Bay and River was the territory of the Penobscot people. Beyond to the east were the Passamaquoddy in the Saint Croix river valley, and the Malecite in the Saint John river valley. (Note 4)

Note 1 The term "Native American" is used instead of "Indian" to correct the confusion caused by Columbus, who thought he'd reach the Indies.

Note 2 Abenaki = "Eastener"

Note 3 see map of major watersheds

Note 4. Malecite were called Etchemins" by the early explorers while the MicMacs who live in Nova Scotia and New Brunswick were called "Tarratines".

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The population would have been very low in our area, compared to now, possibly several dozen people and certainly no more than 200, and that according to season. Captain John Smith, in 1614, reported a village that was probably in Camden called "Mecaddocut". Other names reported by the early explorers for our region and mountains are: Megunticook, Medumcook, Beda bedec and Medembottox, which sounds like Mount Battie even though it's supposed to be Dodge Mountain in Rockland.

The people who lived here may have migrated seasonally, moving inland in the winter, to hunt, and fish through the ice, and coming back to the shore and the islands in the summer to gather shellfish and crustaceans & to catch fish in their weirs. These native peoples made efficient and careful use of their

surroundings.

Their food, materials for clothing, shelter and tools all came from this region. They found the things they needed in the forest, rivers, marshes, mud flats and rocky shore. The things that they traded, like red iron oxide from Kentucky, fine stone spear points and ornaments - were not necessary for survival.

Many of their needs were supplied by the plants of the area. The women and children gathered these for the group to eat (Note 1). Some of the food plants growing here are: cattails (B), providing tubers, stem pith and pollen "flour", bulrush tubers, arrowhead tubers, ground nuts (A) a kind of wild bean with'roots', Jerusalem artichokes(wild sunflowers with edible tubers), milkweed (young greens, young pods, flowers), skunk cabbage (root and young greens), Astor and dock greens, seaweed and spring fiddle heads of the ostrich fern.

(1) do not eat these plants unless you know someone who has eaten them and will show you how A-mentioned but uncommon B-common but not mentioned.

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GRAPHIC

SOME LOCAL EDIBLE PLANTS

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GRAPHIC

TABLE SOME EDIBLE WILD PLANTS (Probably available to Abenaki)

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In the spring, they gathered shoots, fiddleheads and grains; in the summer they picked berries, in the fall there were a few kinds of nuts (hazel and beech). The main staples: roots and tubers, could be dug in the spring and fall, when they are fat and full, and the frost is out of the ground. In the winter, the inner bark of basswood, maple, birch, popple and even hemlock, pine, spruce and tamarack could be eaten as emergency food. And, of course the maples and birches were tapped for their sweet sap in late winter. "Algonquin means "tree eater" and these people used the trees for food and much else.

The paper birch supplied bark for making canoes, covering their houses, for water tight containers and raingear. Winter teas were made from evergreen

needles. Cords and netting were made from twisted fibers of basswood inner bark, dogbane, moosewood and spruce and tamarack roots. Medicines and smoking tobacco came from various plants. Bows were made from oak & maple, arrow shafts from arrowwood(a Viburnam shrub). Peat moss provided diapers and dressing for wounds.

Animals also provided food and materials for the Abenaki. Their clothes were made from skins: kilts, leggings, breechclout for men, shirts or tunics for women. Heavier boots for winter were made of moosehide. Twisted strips of rabbit skin were made into warm jackets for children. Skins were used to make bags, animal bladders to store some foods (fats). Moosehide was used to cover quickly- made canoes that were later dismantled.

Here's a list of some of the animal foods they at: Birds' eggs, game birds, (partridge, ducks, shorebirds),



moose, bear, deer, muskrat, woodchuck, snowshoe hare, beaver, seal, porpoise, alewife, eels, salmon, cod, clams, mussels, periwinkle, crab and lobster.

they used particular animal bones, forums and shells to fashion tools: needles, hold punching holes, skins scrapers, points at cetera. They chipped flinty stones such as chart, Jesper and fell site, to make it arrow and spearhead some and they used rocks for pounding grain and heating food. Some may have made pottery and growing crops in the summer: quorum, beans and pumpkin, in small gardens.

Thus the native Americans supplied their needs with the materials at hand, needing to trade very little. They ranged far if they wish to, traveling lately in easily to the lake, forest and short country that they understood. But usually they stayed in the home river basin that form the territory of each group. They had strong rolls against using too much of anything: taking too many fish, killing two many moose, cutting live trees, digging too many clams, so there would always be more for the next year, for their children and grandchildren.

Colonial - (Pre-industrial - around 1800).

The first European settlers did not come to live in this part of Maine 'till the late seventeen hundreds. They were English-speaking and mostly from Massachusetts, which had been settled some 150 years earlier.

Since the early 1500's, European fishermen had made camps on some of the further islands (Monhegan, Damariscove) to salt and dry their catch before taking it back to Europe.

French explorers, fur traders and missionaries had considerable contact with the Abenaki on the coast but never made settlements near here. Agents of the British navy landed to mark, cut and take the largest pine trees to make masts for their ships.

When the first settlers arrived on the "Maine" land in Camden and Rockport in 1768-69, there were few Abenaki



living here.

They had been attacked by plagues brought by earlier Europeans. Their social system was disrupted by the new tools (metal knives and guns) that they received from the Europeans and by alcohol which changed their behavior.

They had been killed by Europeans and they had fought with other native groups- The Abenaki against the Etchemin (Passamaquoddy and Malecite) and the Tarratines (Mic Mac). There were only a few families left when the first settlers came.

The Europeans who came here used many of the same resources that the Abenaki did: the clean water and air, the plants and animals of the woods, rivers and shore. But they used more of these resources, for they had no restraints built into their culture and laws.

The settlers dug clams, hunted moose and bear, just like the Abenaki. But they killed many more of them every year. They were amazed by the amount of game and the huge trees when they first arrived, but the game was soon depleted and the clearing of the land begun.

The wood from the forests was used to build cabins and boats. It was burned for fuel to cook and warm the cabins, and to make charcoal for iron work. These people worked iron into tools, and that took a lot of fuel. They made utensils, furniture and containers largely out of wood, cutting it with iron tools. Still, iron was scarce and they used very little of it compared to later years.

Much of the wood was sold, shipped south to cities

(Note one) "The number of bear killed in Camden by Mr. Richards amounted to 30 and the number of moose to 70. " account of the 1780's in Locke's History of Camden.

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"A plan of the Town of Camden in the county of Lincoln in the Commonwealth of Massachusetts. May 1795 - surveyed."

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and to the west Indies, and to Europe. After several decades most of the coastal forests were gone and, with them, the animals that live from them. In their place were hayfields, pastures for cows and sheep, and fields for wheat, barley, oats, flax and, of course, Indian corn.

Stones were used to build foundations, to grind corn, and piled into walls to mark the property boundaries.

The coastal settlers fished a great deal, and gathered shellfish, and crustaceans. But they used weirs to trap fish as theAbenaki did and as their European ancestors had. Their clothing was partly of skins, but the skins were usually turned to leather by a tanning process using hemlock bark. They traded for woven cloth from the south until they began spinning and weaving their own wool and flax into cloth.

They did not gather many plants, nor as many kinds of plants as the Abenaki had. They used berries and spring greens, but did not bother with the roots and small nuts of the area. Instead they used the soil to grow their own vegetables: European cabbage , carrots, turnips, lettuce, potatoes and the native crops of corn, pumpkin and beans.

They planted fruit trees near their houses. They did not depend so much on wild game but kept their own chickens, pigs and cows.

They were most different from the Abenaki in their forms of transportation and use of energy. They used the water to travel by boat, far along the coast and to other countries. Great sailing vessels that harnessed the wind came to load lumber and bring settlers. The settlers used primitive dugouts and then plank rowing boats at first, but soon they began building

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sailboats for themselves, to carry and sell wood, and for fishing. On land, they walked on narrow trails at first, but soon they had oxen to pull sledges loaded with lumber and stones, and then carts widened the trails with increase traffic. Quite early, in 1806, permission was given to build a turnpike (Route 52) from Camden to what is now Lincolnville along the edge of the lake.

They built mills on the little rivers: Megunticook, Goose River, Oyster River and Mill River (see watershed maps). Around these mill sites, tiny towns sprang up. By 1800 there were fifteen small houses in the village of Camden. Altogether about 900 people lived at the time in the whole town of Camden, which then included Rockport. The settlers built more mills up Megunticook until there were between nine and thirteen mill sites by the 1850s. The anadromous fish could no longer move up the streams to spawn and they largely disappeared from the area. Only the eels still wriggled up to spend their adult lives on land.

For all their use of water, wind and draft animals, these early settlers still lived largely by the strength of their own muscle. They used the energy from the food they raised and gathered here. They traded wood for some tools, utensils and clothing, but most of the materials they used came from the land around them. They lived from the land as the Abenaki had done, but in a different way.

INDUSTRIAL (mid 1800s to 1930s

By the mid nineteenth century, things had changed dramatically in Camden and Rockport. About 5,000 people lived in the town from Camden to Glen Cove. This is about the same number people we have had living here until quite recently. Settlements around the mill sites had grown

Page 123 GRAPHICS

Major and Minor watersheds of the area / Megunticook River mill sites.

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GRAPHIC

MAJOR WATERSHEDS

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larger, with Camden on the Megunticook being the busiest. In Camden, in addition to the usual grist mill, sawmill and boatbuilding shops, there were mills producing sashes and blinds, plugs and dead eyes, oakum, a bark mill and

tannery, woolen mills, a wheelwright shop and an iron foundry and a powder mill. On Spring Brook, there was a stave and shingle mill. Goose River, as Rockport was called, had a grist mill, sawmill, stave mill and lime kilns.

All these little factories were hooked up to the water power of the small but strong rivers of the area and the communities clustered around them. The people who lived here were attached to the river systems but in a different way from the Abenaki, who had used them for travel and fishing.

The fields were cleared for miles around, though there was still timber on the mountains. On this land, hay, grain, sheep and cattle were still raised, though the soil had not proved as fertile under European methods of agriculture as the first settlers had hoped. Many of the early farmers had left for the Middle west when Ohio opened up in 1815 (Note 1). The farmers of the area still lived more like the early settlers than the town people did, but they raised less of their food and bought more tools. They still built their houses and barns out of local lumber. The hunting was not very good, the rivers were not passable to fish and they now carried the waste of the bark mills, tannery and Woolen washing. But the clams were still good to dig and there were fish to be had in the bay.

The people of the region now specialized: some in growing food, like apples, some in fishing, some in shipbuilding, both for the region and for outsiders. Others worked in or managed the small factories, producing

(Note 1.) In 1816, there was a killing summer frost following the explosion of a volcano in the Pacific. The crop damage was such that many New Englanders left in the following years.

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GRAPHIC

HISTORIC SITES FROM 1856 MAP

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things that were largely sold and used outside the region instead. People now bought, if they could afford it, cloth for clothing and ready-made clothes. Their shoes were usually from somewhere else. They bought dishes and cooking utensils made in other regions, even other countries. Some of their food already came from the Middle West. All kinds of tools and ingenious machines were traded for the money made from the town's products.

Many of the products of the region were made from wood that grew here: the ships, the barrel staves, furniture, shingles, bark for tanning. The wool could be produced locally. Another product that was exported by the region was lime, for use as cement in building. It was made from the limestone (actually a dolomite marble) mined in the quarry we now use as a dump, and from the quarries of Simonton's Corner. The stone was "cooked" in kilns in Rockport and Camden, using wood brought in on boats. The "quick" lime was shipped out in locally made barrels. Even the ponds were mined in the late nineteenth century. Ice was cut in the Lily Pond, stored in ice houses and shipped to warm southern ports to cool ice boxes. And the ships of Camden and Rockport made the fortunes of famous sea captains who traded all over the world.

The richer townspeople really belonged to a much larger region then Camden and Rockport. They were connected, through their trade and travel, to other cities on the east coast, to the Midwest, to the West Indies, to Europe and to the Far East. They had better roads, horses and carriages, and eventually, horseless carriages. There was a telegraph system from the 1850's and even a horseless trolley from Thomaston into Camden (1900 to 1930) .

The people with less money still lived largely on the land, hunting, gathering some plant food

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GRAPHIC CAMDEN AND ROCKPORT

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GRAPHIC Human Seasonal cycle

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like the people before them, growing some food, building with the materials at hand, wood and stone, and still using their muscles to make their living. Meanwhile, the "money making" resources of the region began to give out. Lumber had to be brought from farther and farther away. When coal replaced wood as a fuel, the local lime kilns lost their advantage and the industry died. Wooden ships were replaced by metal ones built elsewhere, except for the wooden hulled minesweepers built here in World War II.

Electric refrigerators replaced ice boxes, so the ice industry stopped. The towns became poorer. Toward the end of the century, people began to come here from the southern cities to "use" the scenery and the cool summer air, just as the

Abenaki once came down the coast in the summer to fish and escape the black flies and mosquitoes. This is a new way of "trading" the region's resources.

The late nineteen hundreds, now,

Now, 100 years later, the people of Camden and Rockport depend even less on the resources of the region. Most of us belong to an enormous "region" that encompasses most of the earth. Very little of our food, clothing or shelter originates here. Our "goods" are mostly from far away.

The land which was used to grow food in the 1900's has grown up into woods again and many of the plants and animals have come back. Our food now comes from the Middle West, from California, Florida and Central America. Our household goods and clothing came largely from Eastern Asia and the South where people work for very low wages. Some of the material for building our houses (sand and gravel, shingles, some lumber) come from nearby . The ways that people used to get their food and goods are now considered hobbies, or sports, or something that only the unemployed have time for. Except for lobster and a few chicken farms and apple orchards, people are not making a living in hunting, gathering or agriculture

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GRAPHIC

PLANT COVER AND LAND USE 1977

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here at the moment.

To buy the things we need, we trade our labor. We work in the tannery or the woolen mill (Note 1), or in small boat building yards, just as we did 100 years ago. But we also make tiny electronic devices and lightweight tents. We publish magazines and books. The materials we use in these industries come from far away; even the wool, and the hides for the tannery are mostly from outside the country. We work for the summer people, sailers and boat owners, tourists and retired people. Some of us are craftspeople and artists, and our works are sold far away. Some of us commute to far cities to make money to live here.

Our transportation is almost entirely by automobile and truck, using gasoline energy that comes from far away. We have fairly good roads, but no trolley or railway, because we have all been able to afford cars and gasoline. We no

longer use the water power of the rivers or the force of the wind, except for recreation and sailboats. We don't use water for transportation of goods or people. We use engines and motors run by oil or the electricity from oil or nuclear power to do most of our work(Note 2) We rarely use hand tools of the sort the early settlers had. We no longer use the force of our muscles or the muscles of domestic animals for work.

In some ways, we resemble the early settlers more than our parents did. We are using more wood now to heat our houses. We must take care of this renewable resource and not cut the forest faster than it can grow. Some of us are beginning to produce more of our own food as energy prices increase, and food from far away costs more.

We resemble the Abenaki more in that we are trying to control our use of resources -i.e.we try not to hunt too many deer or take lobster that are too small. We are learning to keep our water clean. We are thinking about limiting our wood cutting by good woodlot management. We have set land aside as forest in the State Park. In the future, good land may be protected for agricultural use.

Note 1 converted to synthetic felts (1982)

Note 2 One sixth of our electricity is produced by water power (1984)

Note 3 converted to synthetic felt 1982

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GRAPHIC

Hiking Boating Swimming gathering

Page 134 GRAPHIC

WILDLIFE

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We still need to use the water and air of the region. We must guard our water supplies by maintaining forested watersheds and by protecting the aquifers from pollution. We must be sensitive to the quality of air tht is threatened by car and truck exhausts, careless woodburning and by air systems moving east from more industrial regions, carrying acid rain.

We already use our wood. We may need our soil in the future and must protect it

from erosion and compaction. We have changed our environment considerably already, by building houses and roads, damming rivers and allowing wastes to flow into water air and soil. What changes will we make in our environment in the years to come? Will we be able to make a living in this land in the future and in what ways will we do so?

1999 Update

Bear have come back, and coyote have moved in. Many new houses and their roads have been built into the woods, on the hills and the water's edge. the car and truck population has risen sharply and strip deveopment is growing. The offshore fisheries have collapsed; elvers are being netted aggressively in the spring; lobstering is still strong. The dump now recycles and the leachate is pumped to the sewage plant.

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VIEW FROM MOUNT BATTIE

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TIME LINE

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