TOWN OF MASHPEE
BLUE PAGES

A Citizens' Guide to Protecting Cape Cod Waters

Shannon Cushing, Grade 11

Acknowledgements

This information is reprinted from the *Island Blue Pages*, courtesy of the Martha's Vineyard Shellfish Group and the Wampanoag Tribe of Aquinnah. For a complete version of the *Island Blue Pages*, visit the website www.islandbluepages.org. or contact tbe Martha's Vineyard Shellfish Group at 508-693-0391. The *Island Blue Pages* is an adaptation, with permission, of the *Puget Soundbook*, a game plan for maintaining the health of our sister estuary on the West Coast. To learn more about the original project and the inspiration for the *Blue Pages*, visit www.forsea.org/pugetsoundbook/

Thanks to Jim Kolb and Diane Bressler, the creators of the *Puget Soundbook*, which continues to inspire us with its words and illustrations.

The Town of Mashpee, with permission, undertook the task of adapting the *Orleans Blue Pages* to reflect conditions specific to Mashpee. Thanks to the Orleans Pond Coalition, www.orleanspondcoalition.org, for their guidance and assistance with our project.

The Mashpee Environmental Oversight Committee, appointed by the Mashpee Board of Selectmen designated the Mashpee Environmental Coalition (MEC) with the adaptation tasks. MEC is a Chapter 501-C3 not-for-profit organization whose mission is to inform, engage and mobilize our community to make Mashpee the cleanest, greenest town on Cape Cod. Please visit our website at www.mashpeemec.us.

The *Mashpee Blue Pages* booklet was produced with the following goals in mind:

1. To ensure that all Mashpee residents and visitors are provided with information regarding the natural resources located in our town.
2. To ensure that all Mashpee residents and visitors are provided with information regarding the protective actions they can take to improve and protect our natural resources.
3. To motivate and encourage all Mashpee residents to become actively involved in the stewardship of our natural resources.

Thanks to everyone whose contributions helped make this project a reality, with special thanks to the following:

Town Manager Joyce Mason for successfully obtaining the necessary funding.
Board of Selectmen, Theresa Cook, Chairperson, for their strong support of this project.
Mashpee Environmental Oversight Committee (appointed by the Board of Selectmen) chaired by Selectman John Cahalane, whose strong leadership and determination resulted in the publication of this booklet.
Paula Peters, Mashpee Wampanoag Tribe
Superintendent of Schools Ann Bradshaw, for directing the Blue Pages Art Contest and to all the students who participated.
Town Planner Tom Fudala

We all want to protect our water resources, but often we do not know what we can do. This booklet will give you some ideas. It begins with the big picture – providing everything you need to know about the Cape's water cycles – and then identifying actions that each of us can take to safeguard our region's waters. Many of the solutions are simple; some will even save you money. Let's get started!

After all, what is the cost to our community in terms of public health, recreation, economics and other factors of NOT participating as active environmental stewards of our natural resources?

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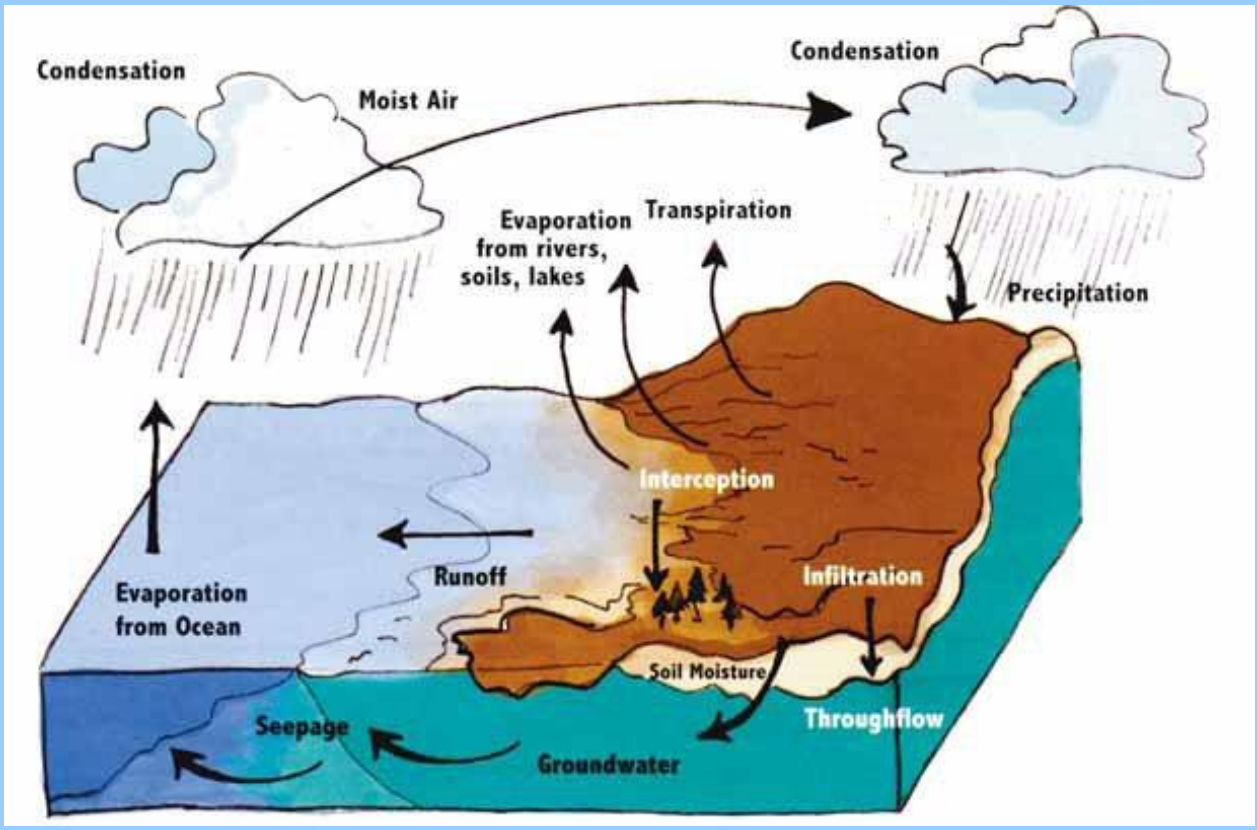
A Water Primer

Our Beautiful Blue Planet

From outer space, our earth appears blue. Over three-quarters of its surface area is covered with water. Water is a miraculous substance. It is the universal solvent; just about every element can mix or dissolve in it. Over most of the globe, water exists in its liquid state. In constant motion and dissolving everything in its path, water is the lifeblood of our dynamic planet. This vast cycling and recycling process is called the water cycle.

The Water Cycle: What Goes Around Comes Around!



If 5 gallons represented all the water in the world, all of it except for 2 cups would be found in the oceans. The remaining 2 cups break down as follows:

Glaciers ..... 1-1/2 cups
Groundwater ..... a tad under 1/2 cup
Inland seas ..... 1/2 teaspoon
Freshwater lakes ..... 1/2 teaspoon
Rivers ..... less than one drop
Water vapor ..... less than one drop

The human body is 70% water. Our eyes are 99% water. Plants contain from 70% to 90% water.

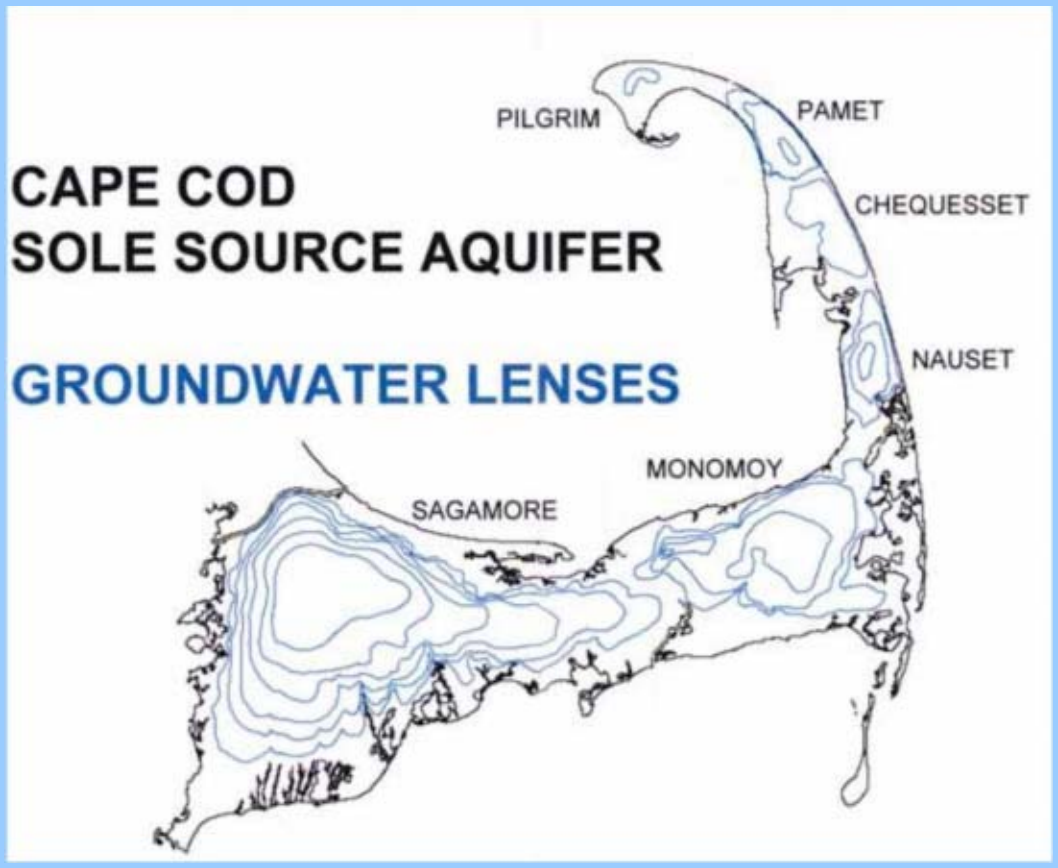
Earth never gets any new water; it just changes form. The water you drink today might have watered the gardens of ancient Egypt.

FROM GLACIERS TO KETTLE PONDS

Some 10,000 years ago, as the last glacier receded from this, its southernmost reach, the Cape was formed by the deposit of sand and debris over an ancient clay base. Colder, denser blocks of ice remained embedded in the substrate, and when these finally melted, the terrain collapsed, producing hollows. These then filled with groundwater, forming the freshwater ponds and lakes of Mashpee. Later, as the sea rose some 300 feet the estuaries and salt ponds (Hamblins, Jehu, Sedge Lot, and Great Flat) were formed.

Cape Cod Aquifers

All of our drinking water, whether from municipal water supplies or from private wells, comes from the rain and snow that falls on Cape Cod and soaks into the sandy soils left by the glacier. The entire layer of groundwater beneath the Cape is referred to as the Cape Cod Sole Source Aquifer and is made up of six separate freshwater lenses. Lenses can be thought of as mounds of groundwater bordered by marine water at the edges, bedrock on the bottom, and separated from each other by tidal rivers or inlets that cut across the Cape peninsula. Groundwater is the subsurface water located beneath the water table, in soils and geologic formations that are fully saturated.



The drinking water for Mashpee and surrounding towns and villages is drawn from one large aquifer that lies beneath these towns. The soil types and geologic deposits are relatively continuous and allow water to move through them. This large aquifer is called the Sagamore Lens. This lens is approximately 300 feet thick, deeper than the height of the Provincetown Monument, and is the sole source of drinking water for a multitude of homes and businesses.

- *In 1982, the Environmental Protection Agency designated the Cape's water supply as a "Sole Source Aquifer." This designation recognizes that the Cape's groundwater is our only source of drinking water.*
- *About 40% of the annual rainfall seeps into the ground to replenish our aquifer.*

Mashpee's freshwater lakes and ponds are windows on the aquifer where low areas in the ground surface intersect with the water table. Groundwater typically discharges into a pond on one side and the pond water recharges the lens on the other side. As groundwater flow reaches the coastline, it discharges directly into ocean waters as fresh water seepage. Because of this interconnection, all uses of water – whether for drinking, swimming, boating, shellfishing, fishing or farming – are dependent on maintaining the quantity and quality of the lenses.

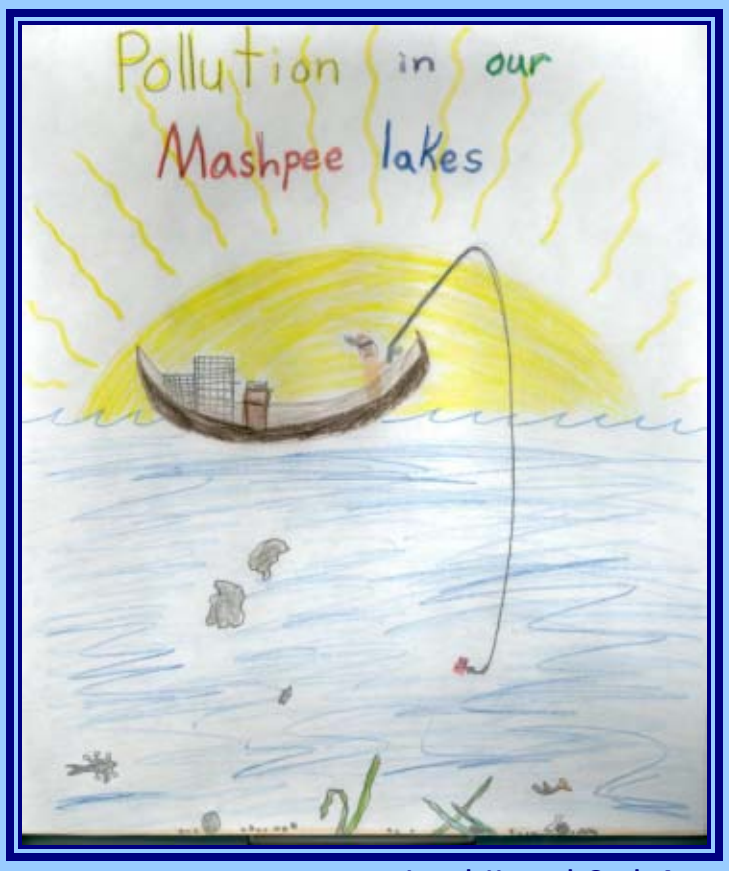
Protecting Our Waters

Together let us make the difference!

WHEN we think of Cape Cod, we think of water. Water dominates our landscape and our history. The region's landscape was shaped by multiple glacial ice ages. Human- kind's history on the Cape traces back through the Nausets and Wampanoag Tribes to over 10,000 years ago.

Archaeological evidence of shoreline campsites, extensive shell mounds and water-centered legends attest to the central importance of water in the lives of the Cape's first inhabitants.

Early settlers from Europe also built their villages around harbors or along freshwater streams that provided water for livestock, shallow wells, and dams to harness the water's energy for mills. Like the Native Americans, they depended heavily on fish and shellfish harvested from the great ponds and the ocean. In later years, marine commerce, fishing, boat building, and whaling became the Cape's economic mainstays.



Joseph Howard, Grade 4

Ashlynne McNally, Grade 5

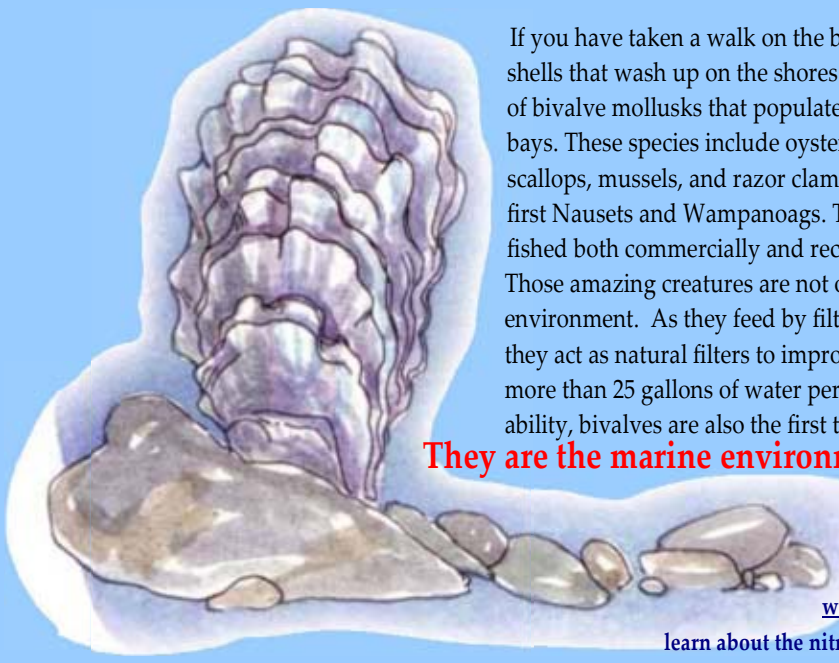
Today the well-being of our towns is still intimately linked to the health of our waters. We are never far from our ponds and beaches. Many of us fish local waters for sustenance or sport. Seasonal residents and tourists flock to the Cape to bask and hike on its beaches, swim in its waters, catch and eat local fish and shellfish, and go boating on its sparkling bays.

During the past several decades, Cape people have noticed that the water quality of our salt ponds, harbors, and shorelines has been deteriorating. The water grows greener and murkier in the summer months. Slime algae proliferate on rocks and dock ladders, the number of valued fish and shellfish are declining. Studies by local scientists and shellfish wardens confirm that areas in some estuaries lack enough oxygen to sustain life.

Many of our current water quality problems result from land use practices, rapid local development and population growth. Every additional septic system and newly fertilized lawn further pollute the waters. *Each individual house may seem unimportant by itself, but multiply the impact of a single household by thousands of households and it becomes clear why our irreplaceable water resources are deteriorating before our eyes.*

Cape Cod Neighbor

Bivalves: Nature's Water Filters



If you have taken a walk on the beach, you've noticed the incredible diversity of shells that wash up on the shores. Those shells are the remains of many species of bivalve mollusks that populate the shallows of our salt ponds, harbors and bays. These species include oysters, quahogs, soft shell clams or steamers, bay scallops, mussels, and razor clams. Shellfish harvesting can be traced back to the first Nausets and Wampanoags. Today, the local shellfish beds continue to be fished both commercially and recreationally.

Those amazing creatures are not only delicious, they are also great for the environment. As they feed by filtering microscopic particles from the water, they act as natural filters to improve water quality. A full-sized oyster can filter more than 25 gallons of water per day! Because of their incredible filtering ability, bivalves are also the first to suffer from pollution and poor water quality.

They are the marine environment's "canaries in the coal mine".

Mashpee's Shellfish Dept., directed by Warden Rick York, has established an excellent oyster propagation program. Visit Mashpee's website, www.mashpeema.gov then click on shellfish dept. to learn about the nitrogen remediation that this program is achieving.

Kayla Baggs, Grade 7

Chapter 1

ABOUT MASHPEE

Mashpee is a town with a unique history compared to other Cape Cod towns. Its historic roots are those of the Wampanoag people, whose respect for the earth has been adopted by many who have come to share this place with them. We draw our roots from a culture that has treasured this place for millennia.

Mashpee is situated on the southwest end of Cape Cod, bordered by Sandwich on the north, Barnstable on the east, Nantucket Sound on the south, and Falmouth on the west. It consists of 27.24 square miles with a land area of 23.48 square miles and 1,614 acres of ponds. Mashpee is blessed with over five miles of beaches on Nantucket and Vineyard Sounds, water frontage on Waquoit and Popponesset Bays, four of the largest freshwater ponds on Cape Cod, rivers, streams, estuaries and protected open space acreage with walking trails. Mashpee offers many opportunities for hiking, swimming, kayaking, boating, fishing, and shellfishing.

Mashpee property owners have long supported environment-protecting measures to enhance everyone's quality of life. Their actions have achieved the acquisition of many acres of open space that has resulted in the protection of the Town's semi-rural character, as well as providing excellent potable water supplies, walking trails, vistas, fresh and salt water beaches and boat launching facilities.

Individuals driving through our town via Routes 151 and 28 may have no idea about the many features Mashpee contains. While the skeptic may think of Cape Cod as "Sand and Scrub Oak", we who know Mashpee have a much different view. We are abundantly aware of the fresh, salt and brackish waters with their recreational and harvesting attributes. We know the "capture and taste delights" from many fin-fishing and shellfishing locations. We have experienced the environmental richness of our town by walking the trails, enjoying our surface waters, exploring the "Pine Barrens", hiking the Mashpee River Woodlands' trails, viewing cedar swamps, frost valleys, wetland and other natural resource features. Mashpee residents and visitors have come to believe that our town is one of the Cape's most gifted with natural beauty.

There is a role for each of us to play in protecting and preserving the gifts nature has bestowed upon us. Let's all participate together as community natural resource stewards. This booklet will help get us started !

Quetila Deornela-Rice, Grade 3

Paula Peters writes:

If you ask a member of the Mashpee Wampanoag Tribe, "How long have your people lived here?" you are likely to get one of two answers:

"Thirteen thousand years," because that is what archeological evidence confirms regarding Wampanoag existence in this region.

Or you may hear, "The creator made us and put us here," because that is our spiritual understanding.

We also believe it to be true that the earth does not belong to us; we belong to the earth and honor it, like a child to a mother, as a living host to life. Our role is to preserve it for generations yet unborn. And so, you may often hear us refer to our continent as "Turtle Island" and our planet as "Mother Earth."

It is where we apply our knowledge of the natural order of things and respect for all living things and our place in the circle of life, a circle that places us in equal importance to the blade of grass, the drop of rain, the ray of sun, the winged, four legged, and finned – all things in nature.

It is that belief along with our traditional ways and long history with this place that makes our relationship with the environment and our love for Mashpee unique and special.

In 2007, after a 30-year wait, the Mashpee Wampanoag became one of two Federally Recognized tribes in the Commonwealth of Massachusetts. This sovereign status puts us in a better position to acquire and preserve more of our ancestral homeland and strive to live sustainably and in balance with nature.

In recent years the Mashpee Wampanoag Tribe has teamed with the town to employ this philosophy along with state and federal resources to help restore, protect and preserve our ancestral homeland.

In 1995 the tribe partnered with the towns of Mashpee and Falmouth and several other organizations including the Falmouth Rod and Gun Club, Cape Cod Beagle Club, Orenda Wildlife Land Trust, the Massachusetts Department of Fish and Game, the Massachusetts Department of Conservation and Recreation, National Oceanic and Atmospheric Administration, and US Fish and Wildlife to form the National Wildlife Refuge. That refuge protects and maintains more than 5000 acres in Mashpee and Falmouth including more than 4000 acres in Mashpee.

In 2007 the Mashpee Wampanoag Tribe established a Natural Resource Department (NRD) with a grant from the Environmental Protection Agency. The following year the tribe began working with the town to collect baseline data with water monitoring devices purchased with a grant from the BIA Water Resources Program.

Those water monitoring devices were installed in Santuit Pond, Mashpee River, and Popponesset Bay. Then, in 2009 the NRD established the Mashpee Water Collaborative with the town of Mashpee and The University of Massachusetts Dartmouth to conduct water quality analysis and monitoring of embayments.

The tribe continues to collect and analyze data from the water monitoring devices regularly. The NRD reports became critical in determining the primary source of algae blooms in Santuit Pond. While it is clear that over-development around the pond including septic systems and road run off have contributed pollutants causing a serious phosphorus loading problem, the NRD analysis showed that 70 percent of the algae blooms are being re-generated from the muck existing at the bottom of the pond. Mitigation recommendations under consideration include dredging, nutrient inactivation, and artificial circulation.

In 2009 the tribe's NRD became involved in the restoration of Popponesset Bay through oyster propagation with a grant from US Fish and Wildlife Department. The NRD seeded the bay with more than 750,000 oysters each capable of filtering 8 gallons of water a day to reduce nitrogen. This year, 2010, data collection from the Mashpee Water Collaborative and the NRD monitoring devices shows that the program has held the line on the increase of nitrogen in the Bay.

As a co-sponsor of the New England Cottontail Identification Program the NRD has been tracking local New England Cottontail and gathering samples critical in determining that the rabbit is now a candidate for the endangered species list. Now the NRD is involved in trying to create new habitat for the New England Cottontail which would involve obtaining more open space to provide critical corridors for the rabbits to thrive.

The Mashpee Wampanoag are in many ways like the New England Cottontail.

At one time Wampanoag territory encompassed all of Southeastern Massachusetts, into Rhode Island and as far west as Worcester where it is estimated that more than 100,000 Wampanoag lived in roughly 70 villages. Colonial exploitation fueled by the papal Doctrine of Discovery and driven by Manifest Destiny led to King Phillip's War, oppression and genocidal policies that were devastating to the Wampanoag.

Mashpee was deeded to us "forever" late in the 17th century and remains today our critical corridor for cultural survival. As the population has burgeoned here in the last 50 years, it is not lost on us that the herd of deer are thinned, the herring are scarce, and septic systems pollute our ponds and rivers and shellfish breeding grounds. The natural order of things has become woefully unbalanced and dominated by man not knowing his place in the circle of life.

Fortunately, Mashpee continues to be rich with treasured natural resources worthy of protection and partners passionate about preserving them.

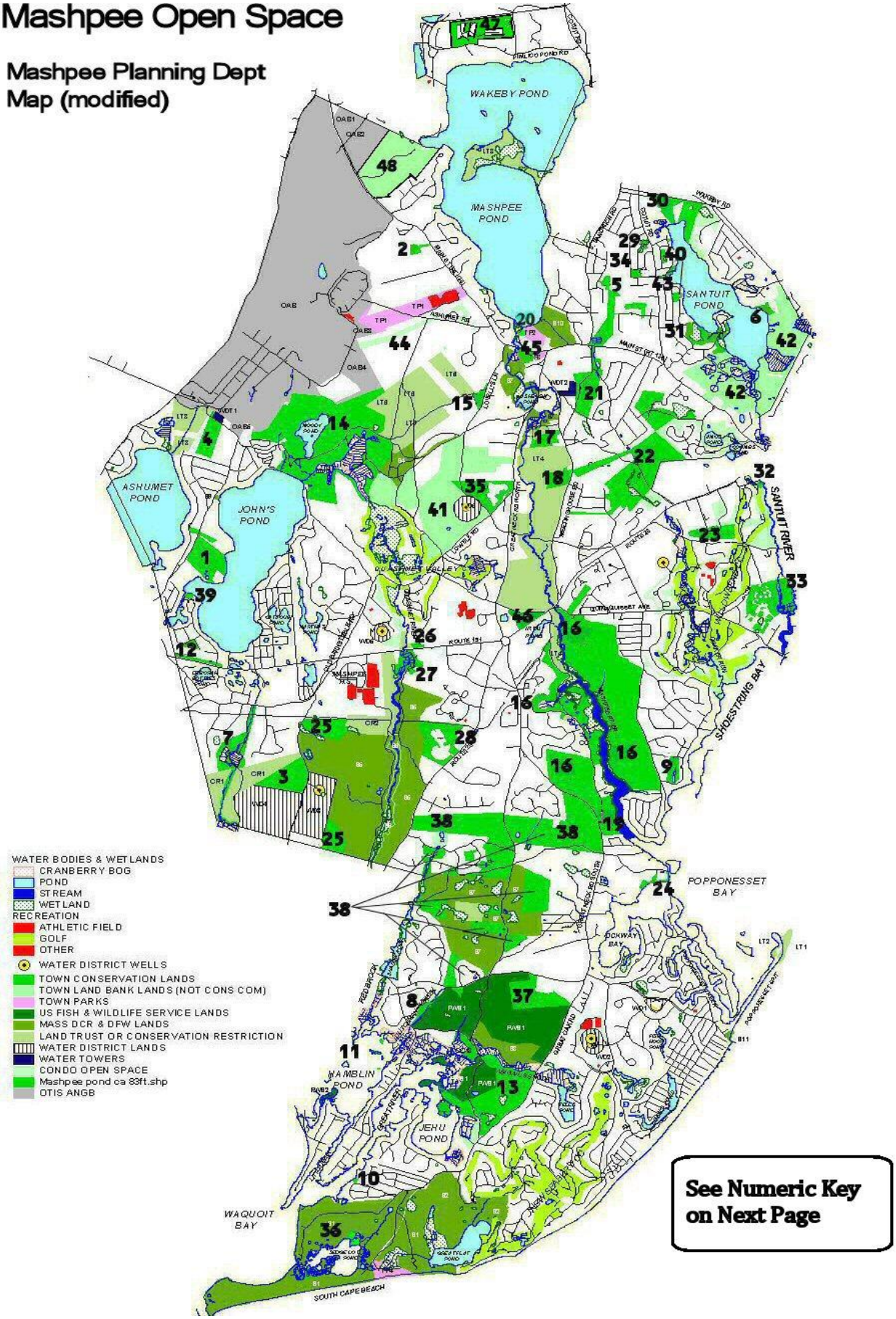
Photos Courtesy of Mashpee Wampanoag Tribe

Mashpee Neighborhoods

Map Prepared by the
Mashpee Planning Department
August 2002

Mashpee Open Space

Mashpee Planning Dept Map (modified)

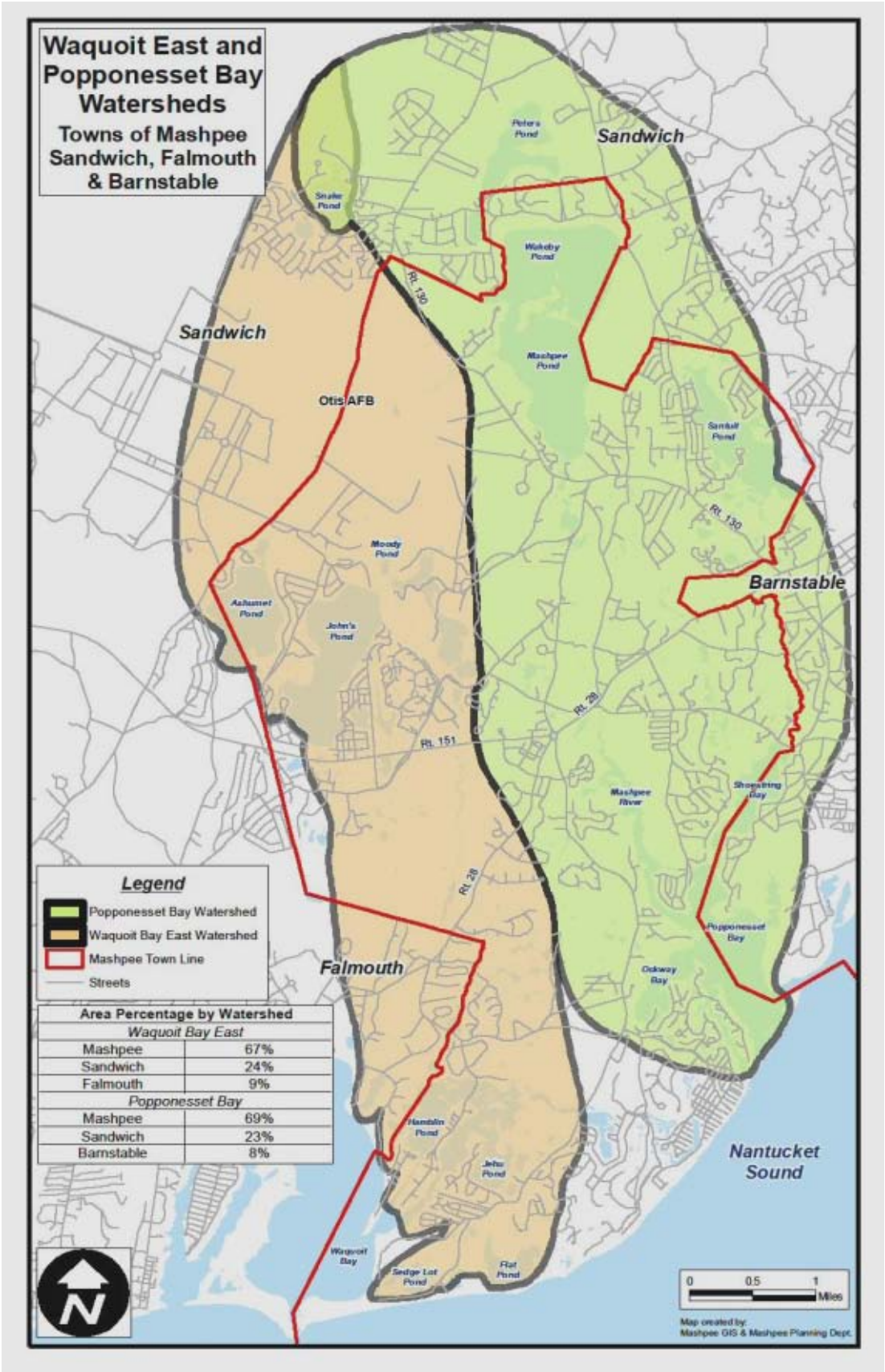


See Numeric Key on Next Page

TOWN OF MASHPEE OPEN SPACE AREAS

MAP KEY	PARCEL	MAP/BLOCK	ADDRESS	ACRES	USE	PUBLIC ACCESS
1	Alper CA	57/26&47	103&140 Hooppole Rd.	33.280	OS	Good
2	Anchor Donation	19/11 part	600 Main St.	2.43	OS	Fair
3	Andrade CA	86/1&2	137&185 Turner Rd.	32.70	OS	Poor
4	Back Rd.	41/34	Back Rd.	19.36	OS	Good
5	Besse Bog CA	6 lots	311 Main St.	23.76	OS/C. Bog	Good
6	Bickerstaffe CA	30/117	6 Chopchaque Rd.	3.50	OS/Wetland/Water	Fair
7	Childs River CA	5 lots	694 Old Barnstable Rd.	37.80	OS/Stream/Bogs	Poor
8	Dutchman's Cr. CA	109/7, 20-23	80 Monomoscoy Rd.	8.27	OS	Good
9	Frog Pond CA	90/89	20 Frog Pond Close	7.78	OS	Fair
10	Great River CA	125/155	77 Wippoorwill Cir.	0.50	OS/Water access	Good
11	Hamblin Pond CA	114/1-4,4A	islands in Hamblin Pond	1.48	Island	Island
12	James Circle	71/16,77,84&164	James Cir./Rt. 151	5.73	OS	Good
13	Jehu Pond CA	115/12-16,19 121/100, 102	Great Oak / Great Hay Rd.	109.490	Os/Wetland/Water	Good
14	Johns Pond Park CA	19 lots	Back Rd./ Grafton Pocknett Rd	308.024	OS/Beach/	Good
15	Lovell's Lane, CA	2 lots	101-125 Lovells Ln.	4.90	OS	Good
16	M.R. Woodlands CA	9 lots	Quinaquisset Ave/ Mashpee Neck Rd/ River Rd/ G.N. South	391.410	Trails/Canoe/ Picnic/Fishing	Good
17	M.R. Woodlands - Lopez	45/9	127 Meetinghouse Rd.	15.22	OS/Trails	Good
18	M.R. Woodlands - Fitch	53/81	233 Meetinghouse Rd.	11.20	OS/Trails	Good
19	MR. Woodlands - Desrosiers	95/47	408 Great Neck Rd. South	13.70	OS/Trails	Good
20	Mashpee Pond CA	27/45	28 Lake Av.	1.80	OS	Excellent
21	Noisy Hole CA - Als	36 /35&38	Goodspeeds Rd.	32.20	OS/Wetland	Good
22	Noisy Hole CA - South	9 lots	Noisy Hole Rd.	129.18	OS	Poor
23	Pheasant Run CA	62/152, 63/6	Cape Dr.	13.61	OS/Power Line	Good
24	Punkhorn Point CA	100/14	end of Punkhorn Point Rd.	2.60	OS/Landing	Fair
25	Quashnet River CA	*79/17, 8014, 92/4*	off Turner Rd.	44.28	OS	Poor
26	Quashnet River CA - Bates Road	73/33	153 Nathan Ellis (Rt. 151)	1.64	OS	Good
27	Quashnet River CA - Dawson	73/11	166 Nathan Ellis CRt. 151)	14.50	OS /Wetland	Good
28	Quashnet Woods	80/120,121&122	2 Quashnet Woods Dr.	26.961	OS	Unofficial
29	Radcliffe Rd.	22/34,114&115	35 Radcliffe Rd.	2.01	Vernal	Good
30	Sachem's Field CA	16/5,6&8 + land In Sandwich	Wakeby Rd.	27.200	OS/Trails	Poor
31	Santuit Pond CA	27 lots	Shields Rd.	16.17	OS/Trails	Fair
32	Santuit River CA – North	55/2	off Rt 28	0.86	OS	None
33	Santuit River CA	46 lots	Popponesset Ave	37.15	OS/Trails	Good
34	Scituate Rd.	22/135	Scituate Rd.	2.61	OS	Good
35	Sconset Village	52/146-148	Lowell Rd.	21.32	OS	Good
36	Sedge Lot Pond CA	130/20,134/21 &22	South Cape Beach	10.30	Marsh	Poor
37	Sipps Road CA	110/67,70&71	50 Sipps Rd.	32.25	OS	Good
38	South Mashpee Pine Barrens CA	21 lots	Great Hay Road	278.990	OS/Trails	Good
39	Sunset Circle	64/22	59 Sunset Cir.	0.31	OS/Water access	Good
40	Timberlane Lots	11 lots	Timberlane Dr. & Autumn Dr.	5.18	OS	Good
41	Quashnet Woodlands (Belcher and Cape Club)	44/46,51/5	between GN North & Lowell Rd./	192.95	OS	Good
42	Santuit Pond Preseve	15 lots (not including portion in Barnstable)	off Rt. 130 and Newtown Rd.	185.89	OS	Fair
43	Silva	22/22	105 Timberlane Dr.	0.460	OS	Good
44	Johnson Road (Jackson)	35/7	64 Johnson Rd.	0.12	OS	Poor
45	Attaquin Property	28/3, 36/10 & 36/80	400,409 & 415 Main St.	9.3	OS	Good
46	Mashpee Place	67/76-77,68/104-105	between Great Neck Rd. North, Rte 28 / Old Barnstable Rd.	16.46	OS	Good
47	Lipnosky CA	2/107	Off John Ewer Rd	25	OS	Poor
48	Vinhaven	9/1	Off Rte 130	77	OS	Good
	TOTAL ACRES			2,238.80		

Mashpee's Watersheds

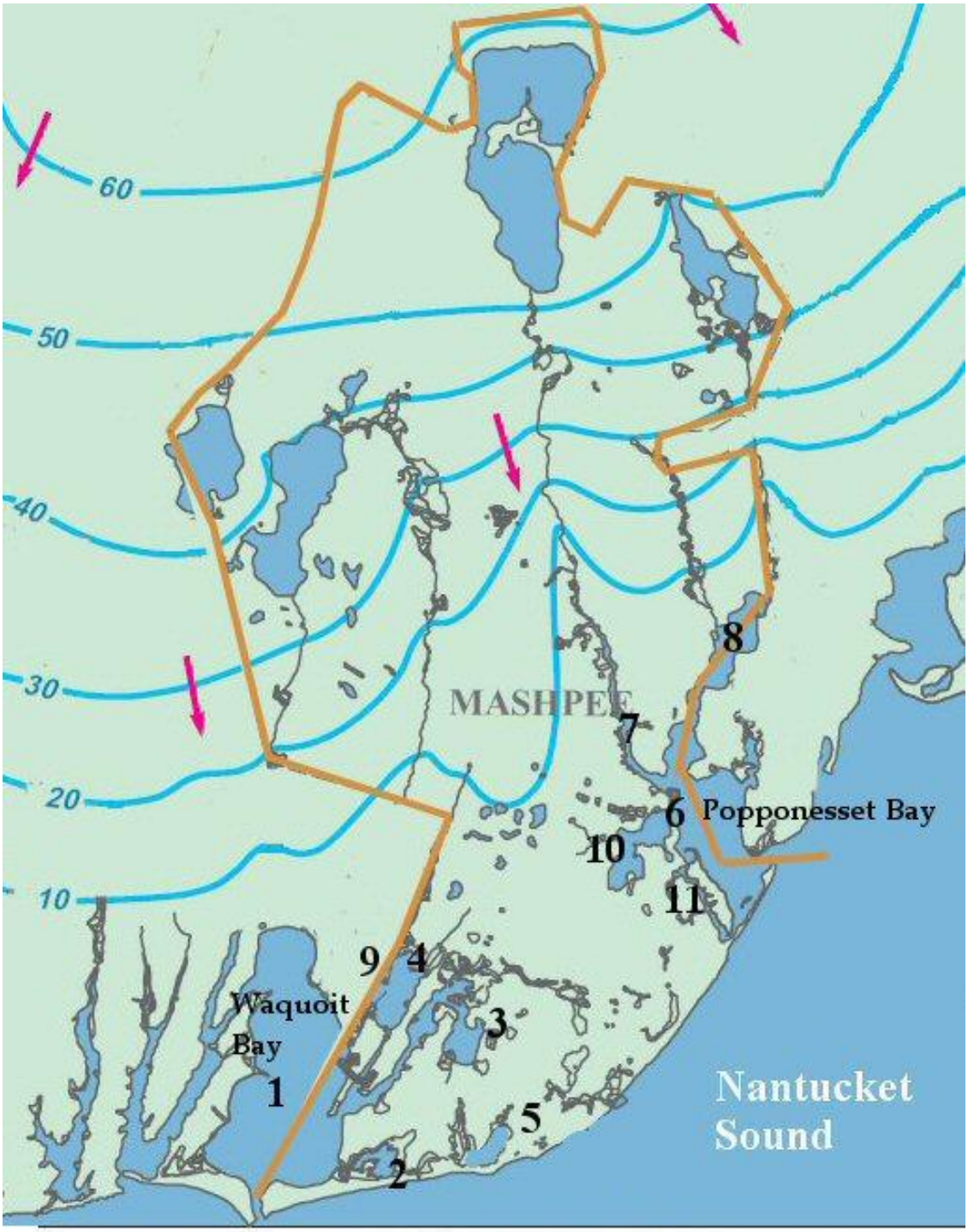


Groundwater does not recognize or stop flowing at town boundaries.

Mashpee's watersheds depicted on the map to the left are shared with our adjacent towns of Barnstable, Falmouth and Sandwich.


Ponds and Streams
Wakeby
Mashpee
Santuit
Mill
Washburn
Moody
Amos
Ashumet
Coombs
Mashpee River
Santuit River
John's
Cataquin
Martha's
Quaker Run
Trout
Flashy
Flying Squirrel
Childs River
Quashnet River
Frog
Red Brook
Frogs Leap
Witch
Fish Hook
Dutchmans Creek
Abigails Brook
Fells
Deans
Lily
Flat

Estuaries and Salt Ponds



10 — WATER-TABLE CONTOUR—Shows altitude of water Contour interval is10 feet.

DIRECTION OF GROUND-WATER FLOW

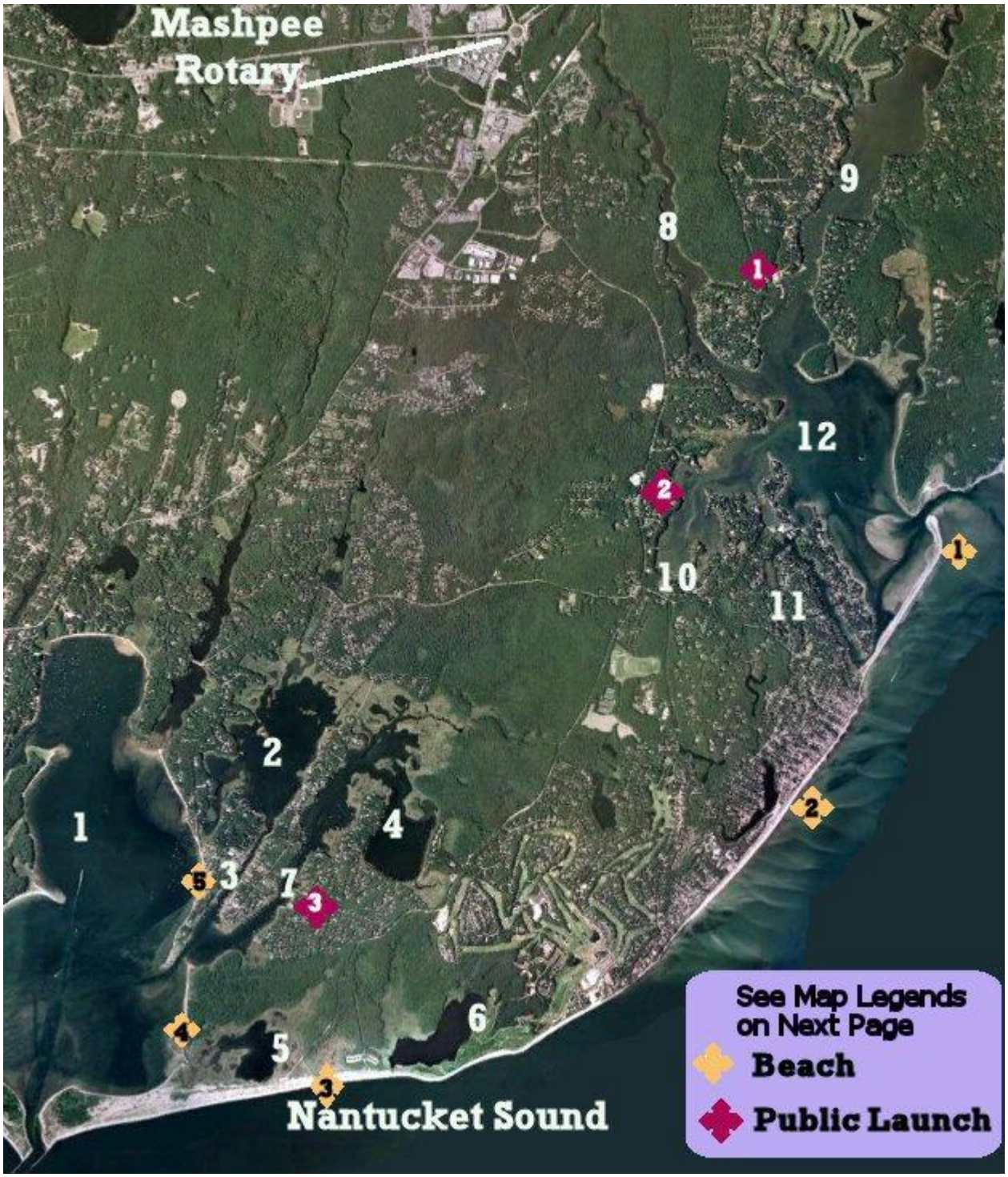
TOWN BOUNDARY

0 1 2 3 4 5 MILES

0 1 2 3 4 5 KILOMETERS

An estuary is a partially enclosed body of water formed where freshwater from rivers and streams flows into the ocean, mixing with the salty seawater. Estuaries and the lands surrounding them are places of transition from land to sea, and from fresh to salt water.

The tidal, sheltered waters of estuaries support unique communities of plants and animals, specially adapted for life at the margin of the sea. Estuarine environments are among the most productive on earth.



Keys to Estuarine Waters Map, Page 17

White Key #	Name	Waters
1	Waquoit Bay	Salt
2	Hamblin's Pond	Salt
3	Little River	Salt
4	Jehu Pond	Salt
5	Sedge Lot Pond	Salt
6	Great Flat Pond	Brackish
7	Great River	Salt
8	Mashpee River	Brackish
9	Shoestring Bay	Salt
10	Ockway Bay	Salt
11	Popponesset Creek	Salt
12	Popponesset Bay	Salt

Key to Beaches

Tan Key #	Name	Ownership	Waters	Access
1	Popponesset Spit	Private, public allowed	Popponesset Bay	Boat or walking
2	Popponesset Beach	Private	Nantucket Sound	N/A
3	South Cape Beaches	State & Town (2 public beaches)	Nantucket Sound	Auto or walk to parking
4	10 acre site	Town	Waquoit Bay	Dirt road
5	Seconset Causeway	Town	Waquoit Bay	Road shoulder parking

Key to Public Boat Launching

Red Key #	Name	Ramp Type	Access
1	Mashpee Neck	Paved	Paved road
2	Ockway Bay	Paved	Paved road
3	Great River	Paved	Paved road

WATER QUALITY CLASSIFICATIONS (Massachusetts Estuaries Project)
(Numbers correspond to the white numbers on Estuaries Map, Page 17)

#1 Waquoit Bay Moderately impaired	#6 Great Flat Pond Undefined	Quashnet River (Frsh Water, not shown) Significantly impaired
#5 Sedge Lot Pond Undefined	#12 Popponesset Bay Moderately impaired	#10 Ockway Bay Significantly impaired
#4 & 7 Jehu Pond / Great River Significantly impaired	#8 Mashpee River SEVERELY DEGRADED	#11 Popponesset Creek Moderately impaired
#2 & 3 Hamblins Pond / Little River Moderately Impaired	#9 Shoestring Bay SEVERELY DEGRADED	

Watersheds: Pathways to Our Wetlands

As you can see from the map on Page 14, Mashpee has two major watersheds: Popponesset Bay and East Waquoit Bay, with a small portion of land draining directly to Nantucket Sound. Freshwater ponds, streams, and salt marshes are destinations for all the ground and surface fresh water flowing through each watershed. Groundwater moves slowly – maybe one foot a day. Even though it may take years, contaminated groundwater will eventually reach our freshwater ponds and coastal waters. We are all part of the larger environment. Even if you don't live right on the water, your everyday activities impact the water bodies in your watershed as nutrients and pollutants travel through runoff and groundwater. As the groundwater beneath your property makes its journey to our coastlines it carries along your nutrient and hazardous compound contributions.

USING THE NEIGHBORHOOD MAP ON PAGE 11 AND THE WATERSHED MAP ON PAGE 14,
LOCATE YOUR HOME ADDRESS AND YOUR "WATERSHED ADDRESS"
AND TRACE THE GROUNDWATER PATH TO THE COASTLINE.

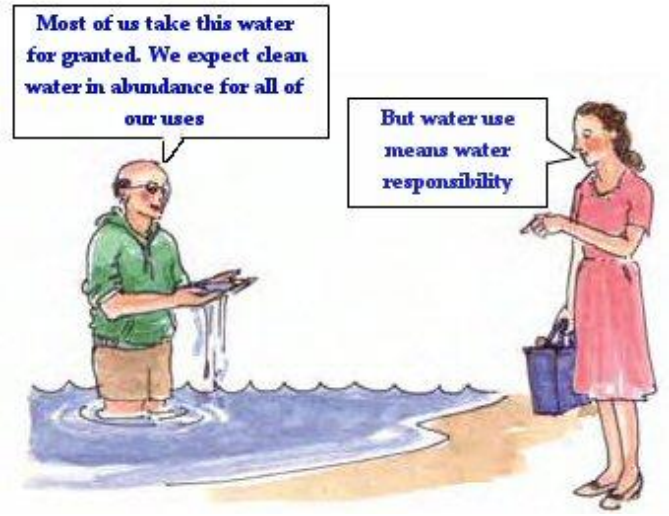
Emma Jones, Grade 3

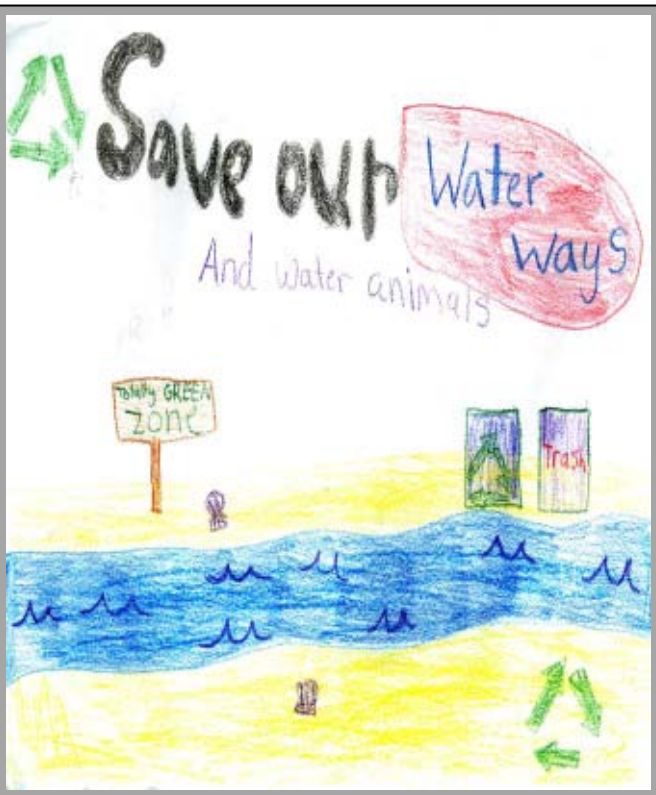
Devon Gomes, Grade 7

- *Barry Commoner's First Law of Ecology states that: "Everything is connected to everything else." What you do on your land may have widespread impact beyond the boundaries of your property. In a sense, each and every one of us ‚lives on the water.'*
- *We all live downstream!*
- *Many of our watersheds include parts of several towns. This makes the protection of our water resources a regional issue.*

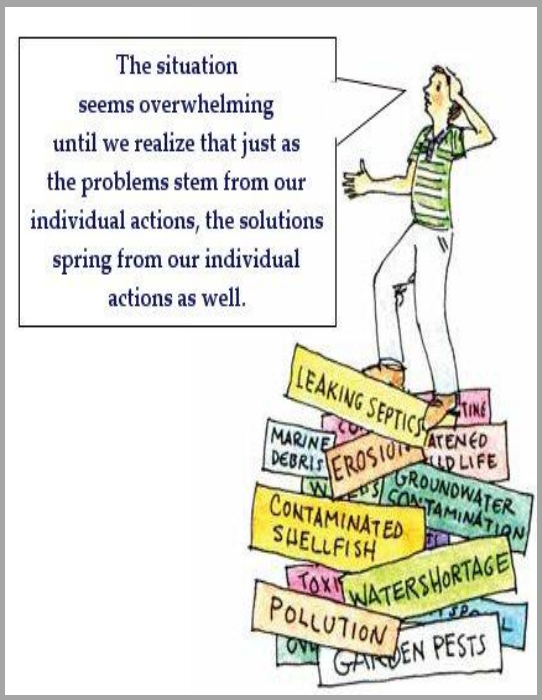
Why Should We Care About Watersheds?

Water is the universal solvent. While dissolving essential minerals, it makes them available to the microscopic life that forms the base of aquatic food chains. But water also dissolves and carries pollutants into the ground and into our freshwater ponds, estuaries, and offshore waters. These pollutants range from the nitrogen and phosphorus in our fertilizers and septic systems, to stormwater runoff and gasoline additives.





Sophie Ward, Grade 4



How Does a Watershed Affect a Salt Water Estuary's Ecosystem?

In a saltwater pond or estuary, the marine plants at the base of the food chain require nutrients in order to grow and reproduce. When a watershed supplies too much of the nutrient nitrogen, the algae grow rapidly.

- Microscopic phytoplankton increase dramatically, causing the water to become "cloudy" and, in extreme cases, green or brown.
- Slime algae increase on the surfaces of pilings, rocks, and eelgrass blades.
- Drift algae grow to excess, break loose, and pile up onto the shore or eelgrass beds.

In salt water, nitrogen is the element that causes excessive rapid growth of algae.

Eelgrass is a vital component of shallow estuaries. It is a rooted marine plant that provides habitat for bay scallops, blue crabs, tautog, winter flounder, and tomcod, among others. Because eelgrass is very sensitive to poor water quality and algal growth on its leaves, its decline is a warning bell that must be heeded.

Shellfish help to improve water quality as they feed by filtering microscopic particles from the water. One study has calculated that 100,000 rapidly growing oysters can cancel the nitrogen pollution from 27 people living in the watershed.

Fertilize Your Estuaries and Salt Ponds with Nitrogen Only if You Like Them Green!

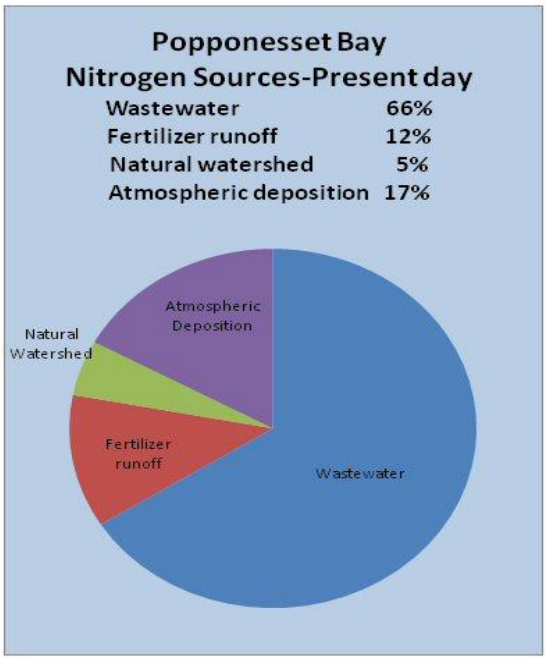
The rampant growth of microscopic algae causes the green, murky look that makes salt ponds and sea water uninviting and unhealthy. This excess plant material, when it dies, takes oxygen out of the water, suffocating marine life. Algae blooms also reduce the amount of sunlight that can penetrate the water. Valuable marine plants like eelgrass cannot photosynthesize in cloudy water and soon die off. In the last decade, eelgrass meadows have disappeared from Popponesset and Waquoit Bays in the town of Mashpee.

Mashpee is blessed with salt and brackish coastal ponds, marshes, bays, and harbors. The water quality in every coastal waterway is affected by the addition of nitrogen from its watersheds and from acid rain.

Where Does Nitrogen Come From?

Us !

A significant source is wastewater from human waste. Although your septic system takes out about a third of the nitrogen present in urine, the wastewater that leaves your leaching field is still concentrated with nutrients --- 10,000 times more concentrated than the desired levels of nitrogen in our coastal waterways. For most of the estuaries, wastewater is the source of more than half the annual nitrogen input.
The breakdown of nitrogen sources for Popponesset Bay is typical of the proportions found in many embayments. Fertilizers used on lawns, gardens, and golf courses are also sources of nitrogen. If too much is applied or if the ground is heavily irrigated after being fertilized, the nitrogen will dissolve in the water and travel beyond the reach of the grass roots and into the groundwater.



Another source of nitrogen is precipitation run-off which carries animal droppings, street litter, oils, metals, bacteria, sediments, and a myriad of chemical residues used in building, cleaning, and landscaping projects.

Nitrogen also comes from acid rain which is rain water polluted by auto exhaust and smokestack emissions from power plants and heavy industry. These contaminants travel from as far away as the Ohio Valley or as nearby as the local electricity generator.

Phosphorus, Another Nutrient, Affects Our Freshwater Ponds

As nitrogen encourages growth in saltwater plants, plants in our freshwater ponds are typically encouraged by phosphorus. To control an overabundance of freshwater algae, phosphorus inputs must be restricted. Phosphorus sources include wastewater, acid rain, street runoff, fertilizers, and soil erosion. A step in the right direction has been the removal of phosphorus from laundry and dishwasher detergents. It is usually the wastewater systems within a few hundred feet of the pond that are phosphorus sources; however, over time, phosphorus will travel hundreds of feet through the groundwater.

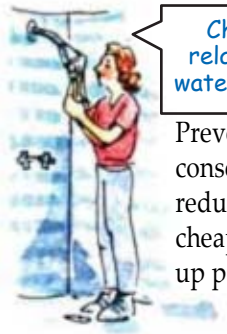
A small change in your habits can make a big difference to our ponds and waterways. Spend some time with this guide to learn and develop your plan on how to become a good Cape Cod citizen, and then take the first steps.

Just because you don't see it doesn't mean it won't hurt you!

Chapter 2

A Quick Start for the Water-Wise

Changing our behavior is tough. Start slowly; begin by incorporating three new actions into your daily life. Don't expect miracles overnight, but do expect miraculous change over time.



Choose one action that relates to conservation of water or reduction of waste.

Preventing pollution by conserving water and reducing waste is far cheaper than cleaning up pollutants afterwards.

Choose one action that relates to household hazardous waste.

Many of the products we use around the home find their way into our waters. So use the safest alternatives, suggested in Chapter 5.

Add new actions as your first choices become part of your daily life.

If you like to garden, choose an action from Chapters 7 and 8 on soil erosion and landscaping. If you're a boater, choose an action from Chapter 10, on good boating practices.

Ten Simple Things you <u>Can Do Right Now</u> to Begin Caring for our Local Waters.

Conserving water at home and in the office can reduce the volume treated by your septic system or sewage treatment plant

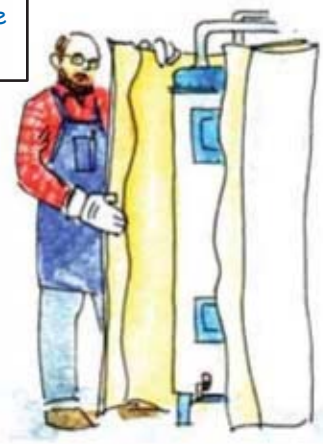
1.

Saving water is as important as keeping it clean. Chapters 3 and 4 offer many ideas about how to avoid wasting water.

Insulate your hot water heater, caulk or replace leaky windows, upgrade to Energy Star rated appliances, and insulate your home to reduce its energy demands.

2.

For a free energy audit and financial assistance information, contact the Cape Light Compact.



Dispose of your hazardous wastes during special collection days **NOT IN** your regular garbage pickup or down storm drains.

3.

For information about hazardous waste see Chapter 5.

4.

Motor vehicles are the biggest contributor to air pollution and they impact water quality as well. Plan ahead to do several errands in one trip. Car-pool or use public transportation whenever possible. Encourage our local transit authority to meet your needs.

Use your car less!

Recycle used motor oil.

5.

One gallon of oil can foul one million gallons of freshwater. That's a year's water supply for 30 people! There are only two ways to safely dispose of waste oil: return it to the place you bought it (along with the receipt), or bring it to the hazardous waste collection site at the transfer station.

Pre-cycle by considering product packaging when purchasing.

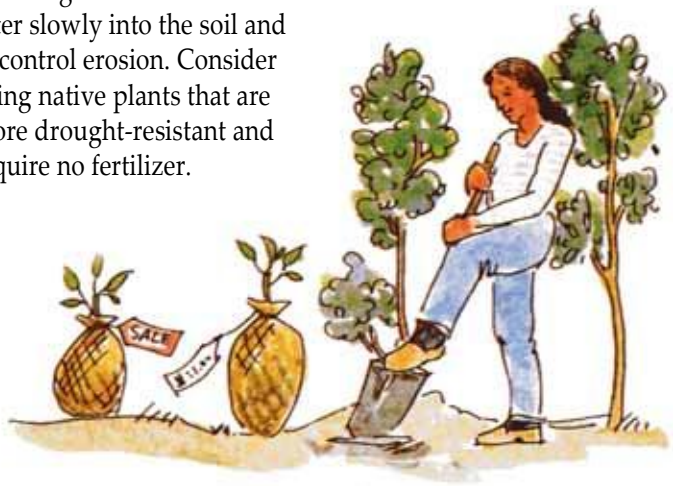
6.

Packaging makes up 33% of our household waste, and all of it must be shipped off-Cape for disposal. Look for products with limited, recycled, or reusable packaging. Buy foods in glass and aluminum containers. See Chapter 6 on recycling for more hints.

Protect the established trees around your home and in your neighborhood.

7.

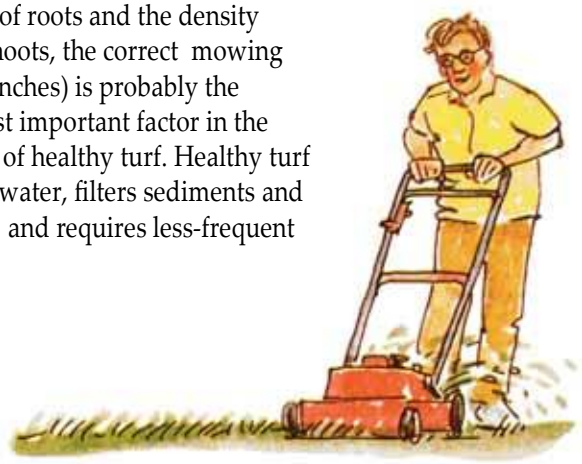
Plant new trees and shrubs to encourage excess rainwater to filter slowly into the soil and to control erosion. Consider using native plants that are more drought-resistant and require no fertilizer.



Reduce runoff from lawns by properly adjusting your lawn mower; reduce herbicide use.

8.

Because mowing height determines the depth of roots and the density of grass shoots, the correct mowing height (3 inches) is probably the single most important factor in the formation of healthy turf. Healthy turf holds rainwater, filters sediments and chemicals, and requires less-frequent watering.



Eliminate your use of lawn fertilizers, pesticides, and herbicides.

9.

You can have a healthy lawn and a beautiful garden without using toxic chemicals. Refer to Chapter 8 on landscaping and Chapter 9 on lawn care for sound gardening and pest control tips.

Rinse and scrub your boat hull and decks with a brush instead of using soap. You will be helping to keep our waters clean.

10.

If your boat is stained, use phosphate-free soap or any of the alternatives listed in Chapter 5 on Hazardous Waste. See Chapter 10 on boating for more hints.

Chapter 3

Water, Water Everywhere

Sound Water Use

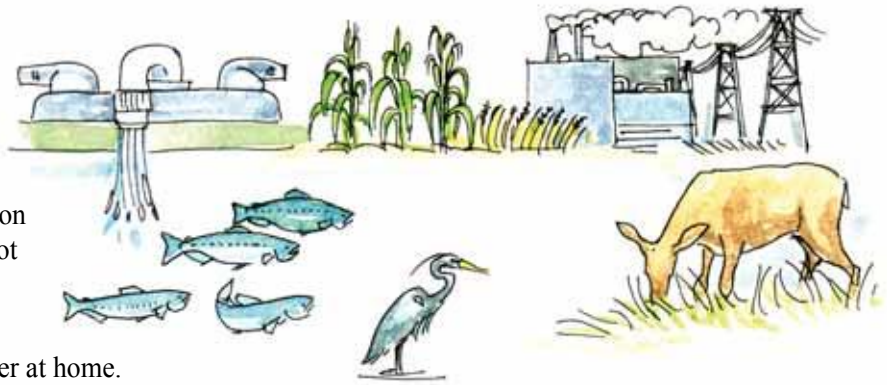
Most of the Earth's water is not readily available for human use; 97% forms our oceans and 2% is frozen. We depend on the remaining 1% which is contained in streams, rivers, ponds, and in the groundwater.

Saving water is as important as keeping it clean.

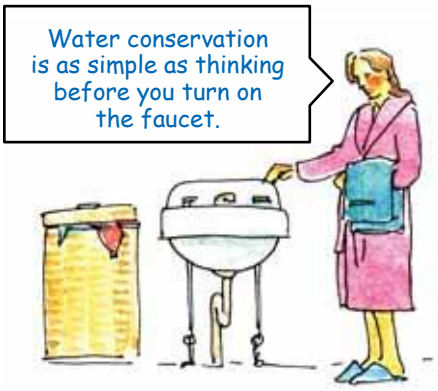
The Cape's water comes from its aquifer. Although the population grows and the need for services increases, the capacity of the aquifers remain finite. Yet we expect clean, clear water for drinking, irrigating our crops, and allowing fish and wildlife habitats to thrive.

Using less water saves more than just the water; it also saves you money.

Conserving water helps protect our ponds by reducing the demand on septic systems and sewage treatment plants. If your sewage treatment and maintenance costs are based on water consumption, water conservation can save you even more money. And saving hot water also means saving energy.

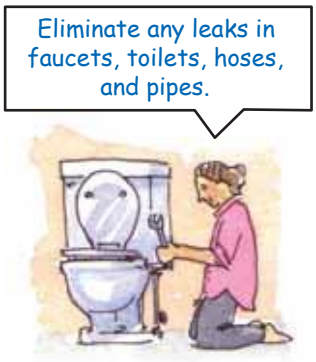


Every day, each person who is not already conserving water uses about 65 gallons of water at home. How much of this do you actually drink? Most of us can decrease water consumption in our homes by 15% to 20% without much discomfort or expense. All we have to do is acquire good water-use habits.



Less than 1% of the Earth's water is available for drinking.

Here are some tips to get you started...



- **Check for leaks.** Check your water meter or your well pump while no water is being used. If the dial moves, or if the pump comes on, you have a leak. **A hole in your water line 1/32 of an inch in size wastes 750 gallons of water a day.**

- **Install low-flow faucet aerators.** Your water pressure will seem stronger, but you'll actually be saving water while reducing flow as much as 50%.

...in the bathroom

- **Check toilets for leaks** by adding food coloring to the toilet tank. If color appears in the bowl, without flushing, there is a leak. A leaking toilet can waste 200 gallons of water a day without making a sound.
- **Flush only when necessary.** Each flush in older toilets uses about 6 gallons of water. Never use the toilet as a wastebasket.
- **For older toilets,** try filling one or two half-gallon plastic bottles and placing them in your tank to reduce water used for each flush. Or consider replacing the old one with a new, lower flow toilet which only uses 1-1/2 gallons per flush.

- **A shower or a bath?** Only the shortest shower saves more water than a partially filled tub. A full tub, however, can use 30-50 gallons of water: more than a short shower. Consider bathing small children together.
- **Install water-saving shower heads** or flow restrictors. Shower heads with an on/off valve are also available, allowing the water flow to be stopped and restarted without readjusting the temperature.
- **Don't let the water run** in the sink while shaving, brushing your teeth, or lathering your face and hands.

...in the kitchen and laundry

- **Fill your dishwasher.** Only use it when you have a full load. Use the cycles with the least number of washes and rinses. Buy detergents with zero phosphates.
- **Avoid running water** continuously when washing dishes in the sink. If possible, use two dishpans when washing dishes by hand: one to wash and one to rinse.
- **Wash dishes once a day.**
- **Keep a bottle** of drinking water in the refrigerator to avoid running the tap to get a glass of cool water.

- **Fill your washing machine.** Pre-soak clothes only when absolutely necessary. Set the water control level appropriately. Permanent press cycles may use an extra 10-20 gallons of water.
- **Buy a front loading washing machine** when you replace your present machine; it saves water and energy.
- **Avoid garbage disposals.** Many local towns prohibit garbage disposals because they use a great deal of water and can add grease and solids to your already hard-working sewage and septic systems.

...outdoors

- **Lawns – the Cape Cod way.** Plush, green lawns are not the norm here, and for good reason: they require too much water and fertilizer. It's better to decrease the size of your lawn and landscape with native, drought-resistant plants.
- **Water your garden only when necessary.** Water only in the early morning or at night to avoid rapid evaporation. Keep in mind that watering the sidewalk and street wastes water.
- **Use a broom, not a hose,** when cleaning driveways and walkways.

- **Water root areas of your plants,** preferably with a drip irrigation system which can save up to 60% over other watering techniques.
- **Wash your car only when necessary**, with a bucket and a hose with a shut-off nozzle. Use a high-pressure, low volume nozzle that has a pistol-grip.
- **Locate and label the master water supply valve** for ease of response in case of a major leak or broken pipe. Consider turning off your water and hot water heater when going on a trip.

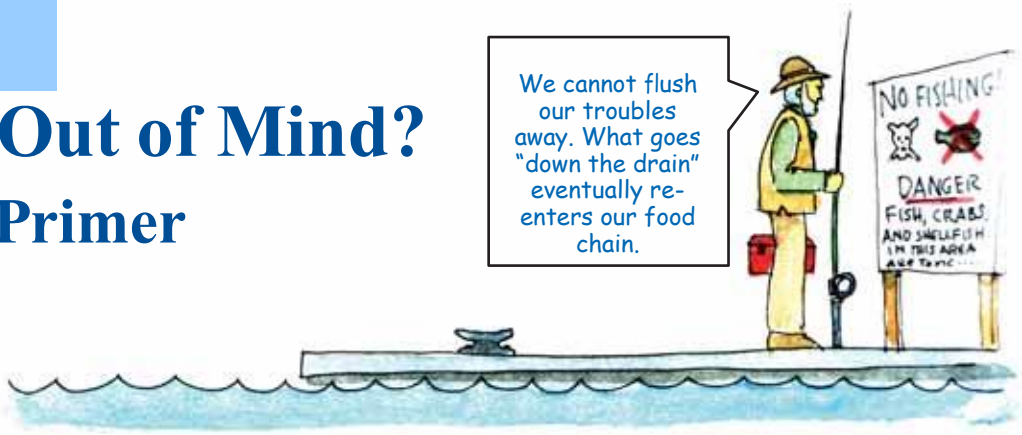
Cape Cod Neighbor

Eelgrass: Lean and Green

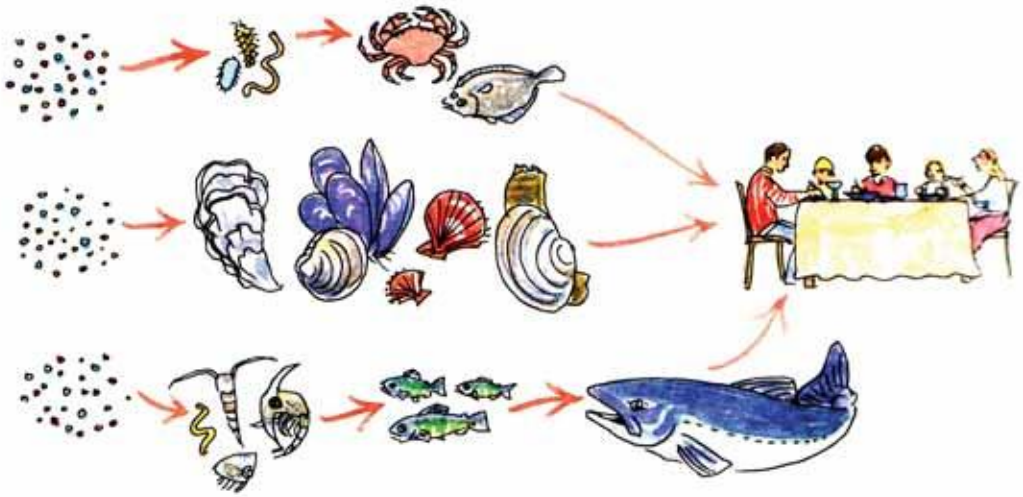
Eelgrass is often mistaken for seaweed. Unlike seaweed, it has roots and even flowers underwater. One of the most important roles of eelgrass is to provide underwater shelter for species of fish and shellfish, especially bay scallops. Young scallops that attach themselves to the eelgrass leaves are less vulnerable to bottom predators like crabs and starfish. When eelgrass washes up on the beach, its brown piles provide cover for the small invertebrates that nourish wandering shorebirds. Decreased scallop populations followed the decline of eelgrass beds in the 1930s. While eelgrass populations have increased since then, they are now declining again due to poor water quality.

Chapter 4

Out of Sight, Out of Mind?
A Wastewater Primer



Human wastes carry viruses, bacteria, antibiotics, and nutrients and must be disposed of with care. These bacteria are not suited to survive for long outside the human body; however, the viruses and nutrients can persist. If not carefully disposed of, wastes can contaminate drinking water. The nutrients contained in wastewater, especially nitrogen, can also affect the quality of drinking water and cause a serious decline in coastal marine habitat, wiping out eelgrass and shellfish beds.



Toxic materials should never be disposed of in your septic system. They may seep into the groundwater, contaminating drinking water and the food chain.

Wastewater Treatment: A Brief History

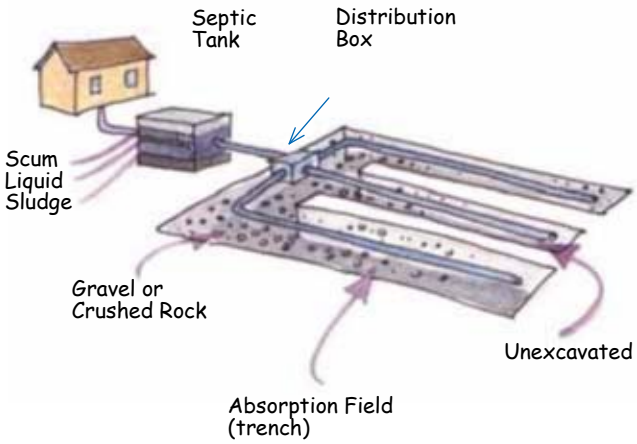
Historically, the goal of treatment is to remove the disease-causing pathogens and dissolve the solids enough to be able to dispose of the wastewater in the soil. Human beings have a long history of disposing of their wastes into the ground. This method isolated wastes and allowed chemical and biological processes to break down solids and destroy the pathogens. But this only worked as long as the population remained small. The addition of clean water to carry the waste out of the dwelling and into cesspools was a natural next step. However, the water also leached nutrients, viruses, and to a lesser extent, bacteria away from the cesspool, and toward the water sources.

Modern wastewater systems contain two components: the tank and the soil absorption field. The septic tank was a step forward from the cesspool because it provided a watertight tank to store the solid wastes and release the liquid slowly to infiltrate into the ground. Separating the solids from the liquids is called primary treatment. It helped prolong the life of the soil absorption system by removing grease and solids that once clogged the soil around cesspools.

Backyard disposal: The septic system and how it works

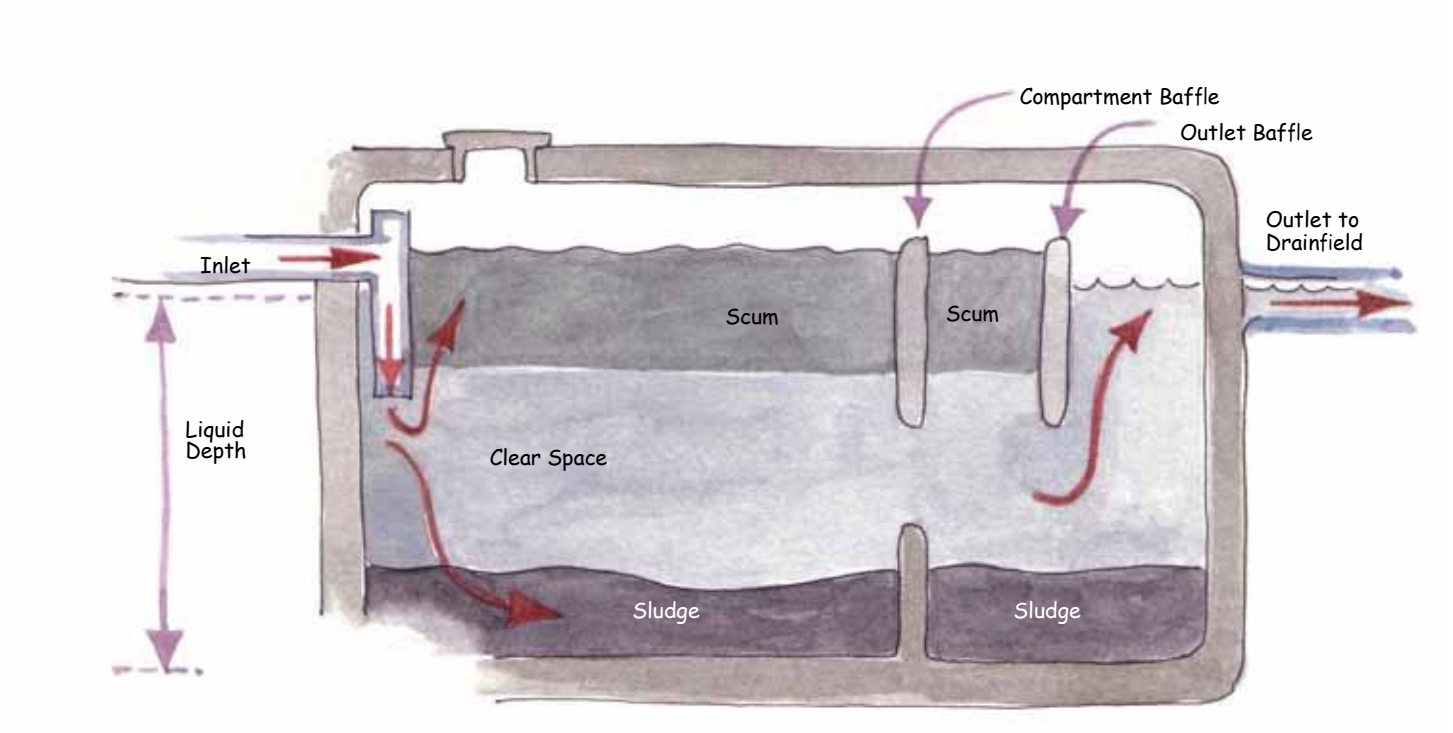
The septic system is an adequate disposal technique where housing density is low and groundwater does not carry the dissolved chemicals into bays and ponds.

However, septic systems are still used by the vast majority of homes in our region even though population densities are increasing. Newer systems consist of the tank - a cement or fiberglass container with a T-shaped outlet pipe that keeps the floating grease layer in the tank - and a soil absorption system that infiltrates the liquid portion of the wastes into the ground. Older systems, cesspools and leach pits perform similar functions. The Board of Health oversees these systems and enforces the state sanitary regulations under Title 5.



Your septic system requires regular maintenance in order to function effectively !

Typical Septic Tank



Septic systems effectively eliminate almost all bacteria and many viruses. The effluent leaving the tank contains tens of thousands of fecal bacteria, but after percolating through four feet of soil, the bacterial count is reduced to one per gram of soil. But nutrients like nitrogen are not completely removed during their transit through a typical septic system. So it proceeds into the groundwater and eventually into the coastal waters. The septic tank serving a family of three releases enough nitrogen to contaminate hundreds of gallons of marine water on a daily basis.

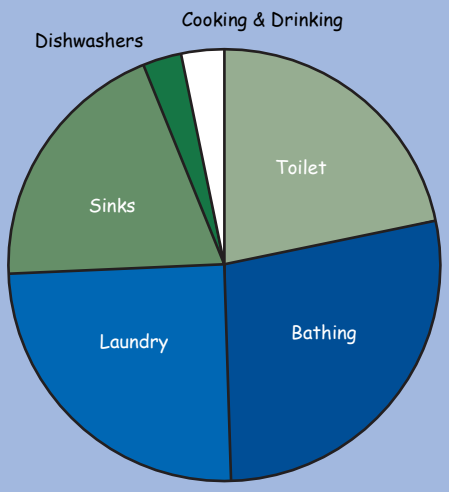
Excess nitrogen entering a salt pond or bay in the form of nitrate leads to:

- Phytoplankton blooms, causing cloudy or greenish coloring.
- Excess growth of macroalgae.
- Decline or outright loss of eelgrass beds.
- Decrease of shellfish like scallops and soft shell clams.
- Odors from decay of excess vegetation.

As the density of housing development increases, so does the risk of nitrates contaminating nearby wells.

How much water do we use?

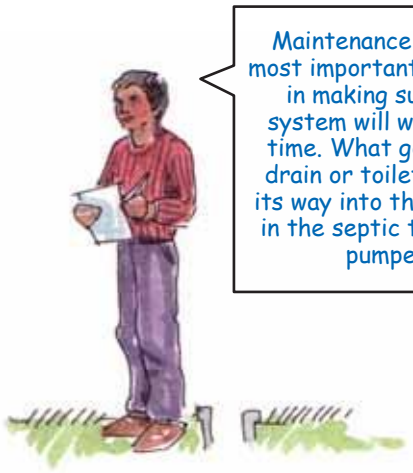
The average person uses about 65 gallons each day. With household water conservation, EPA estimates water use at 45 gallons per person day. This is how the water is used:



Source: U.S. Environmental Protection Agency

Take Care of your Septic System

- **Have it pumped out regularly:** The system should be regularly pumped to remove the sludge and the floating scum. The frequency depends on how you use your system and what goes down the drain. All systems should be pumped every three to five years to avoid septic system failure.
- **Conserve water:** Reducing the flow through your system will reduce the movement of solids and scum into the soil absorption system.
- **Don't overload the system:** A dripping faucet or a leaky toilet can add hundreds of gallons of water to the system each week. If you are going to have a large gathering, rent a portable toilet to reduce the demand on your septic system. Stagger your washing machine and dishwasher use to spread out the flow.
- **Don't install or use a garbage disposal:** These devices add large amounts of grease and organic matter to the system and will shorten the life of your soil absorption field.
- **Don't kill the bugs:** Flushing chemicals down the drain can kill bacteria in your septic tank. When these bacteria stop working, the sludge accumulates and is more likely to escape the tank and clog your leaching system.
- **Don't flood the soil absorption system:** Roof drains and stormwater runoff should be diverted away from your system to prevent periodic flooding.
- **Don't compact the soil absorption area:** Don't park your car on or drive over the system. The compaction of the soil from the weight of the vehicle will reduce the system's capacity.
- **Compost it:** Don't use the sink as a garbage disposal. This will add solids and grease to the tank that may exceed the ability of the bacteria to digest it. Compost what you can and dispose of greasy waste in your regular trash.



- **Don't flood the system with Hot Tub water:** Releasing a large volume of hot, chlorinated water into the septic system will kill the bacteria that are busily breaking down the sludge. If you must drain your Hot Tub, do it over a period of three days. This will allow the water temperature and the chlorine levels to drop, and the abrupt passage of hundreds of gallons of water won't flush solids out into your leaching field.

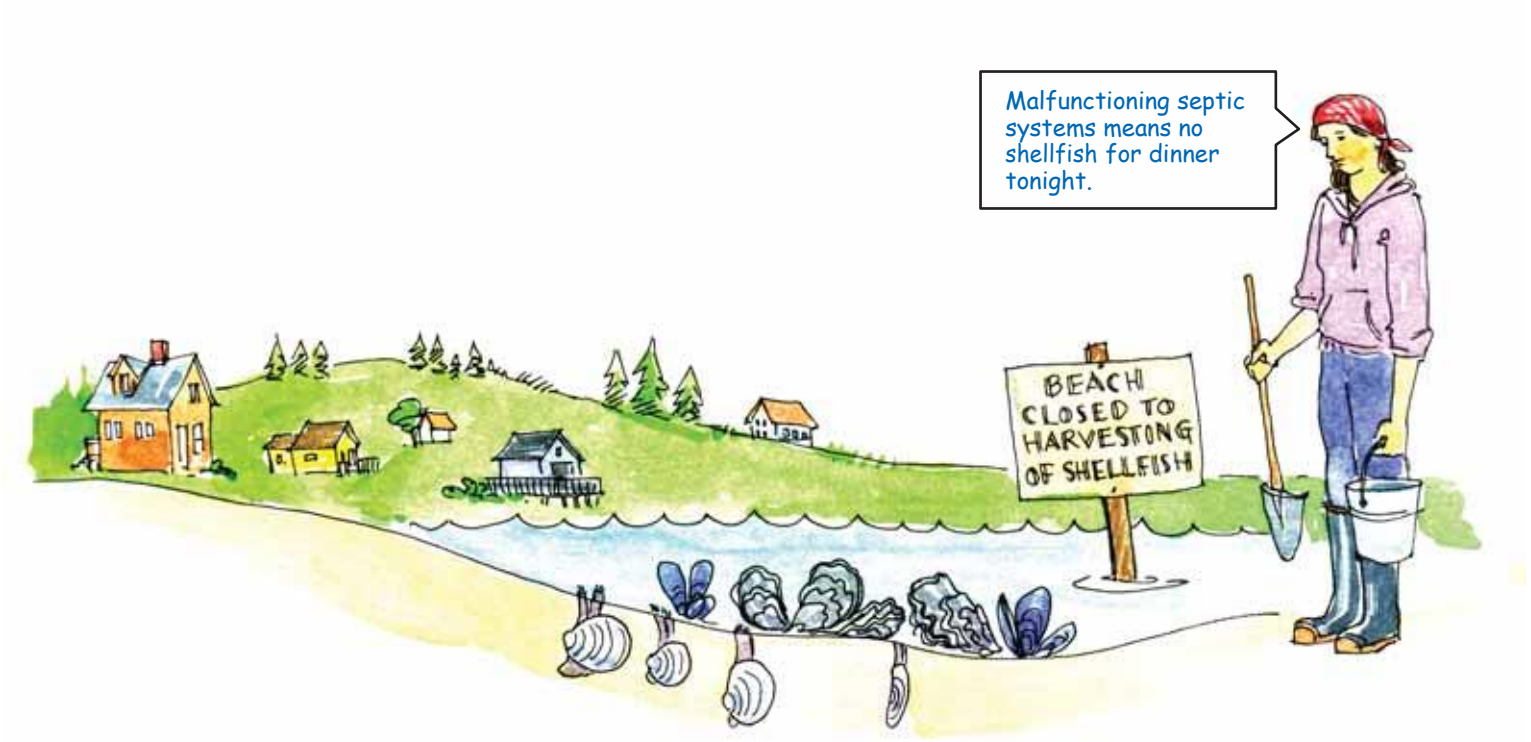
A septic system pump-out and sludge disposal usually costs a few hundred dollars.
Replacing a septic system may cost well over $20,000!

Advancing Beyond the Septic System

Excessive nitrogen originating primarily from the septic systems of our growing population has led to significant decreases in water quality in coastal ponds and estuaries in southeastern Massachusetts. Mashpee citizens recognized many years ago that water quality had diminished. The results of years of water sampling data and studies clearly provide the scientific basis for the indication that Mashpee's saltwater embayments are over-enriched with nitrogen and freshwater ponds suffer similarly from phosphate impacts.

Mashpee relies on clean, productive, and aesthetically pleasing waterways for its citizens' and visitors' uses including recreational swimming, fishing and boating, as well as for commercial fin fishing and shellfishing. **Failure to reduce and control nitrogen loads has resulted in the replacement of the highly productive eelgrass habitats with algae that smother the bottom community, causing extremes in dissolved oxygen concentrations, fish kills, and widespread occurrence of unpleasant odors and scum.** As a result of these environmental impacts, recreational and commercial use of our bays and coastal waters has been negatively impacted.

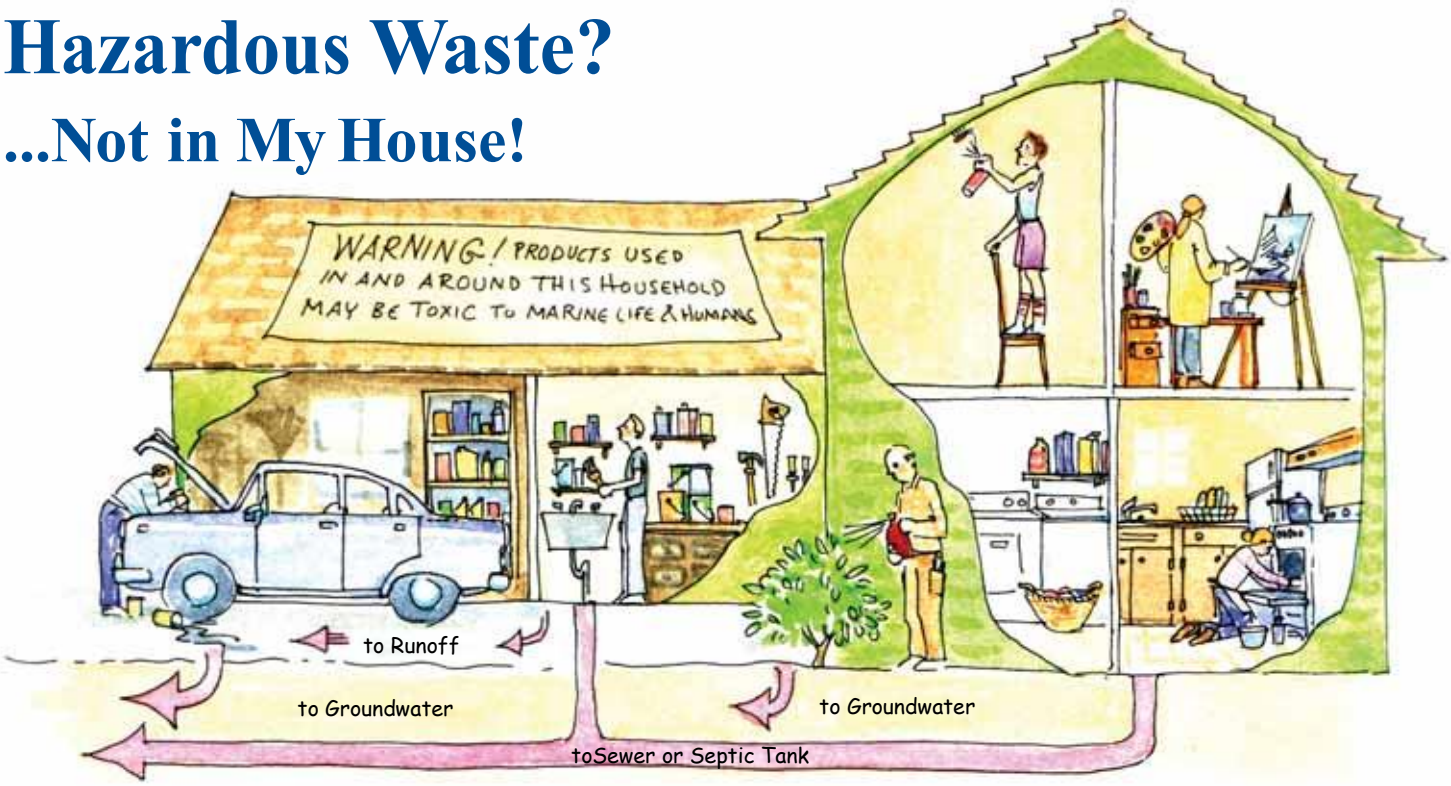
The Clean Water Act mandates that we clean up the pollution of our waterways. The Massachusetts Department of Environmental Protection (D.E.P.) has issued mandates for the amount of nitrogen that must be removed from each of our watersheds. The Mashpee Sewer Commission is currently exploring the best and most cost-effective actions that will produce the state mandated Total Maximum Daily Load (TMDL) of allowable nutrients to our watersheds.



Chapter 5

Hazardous Waste?

...Not in My House!



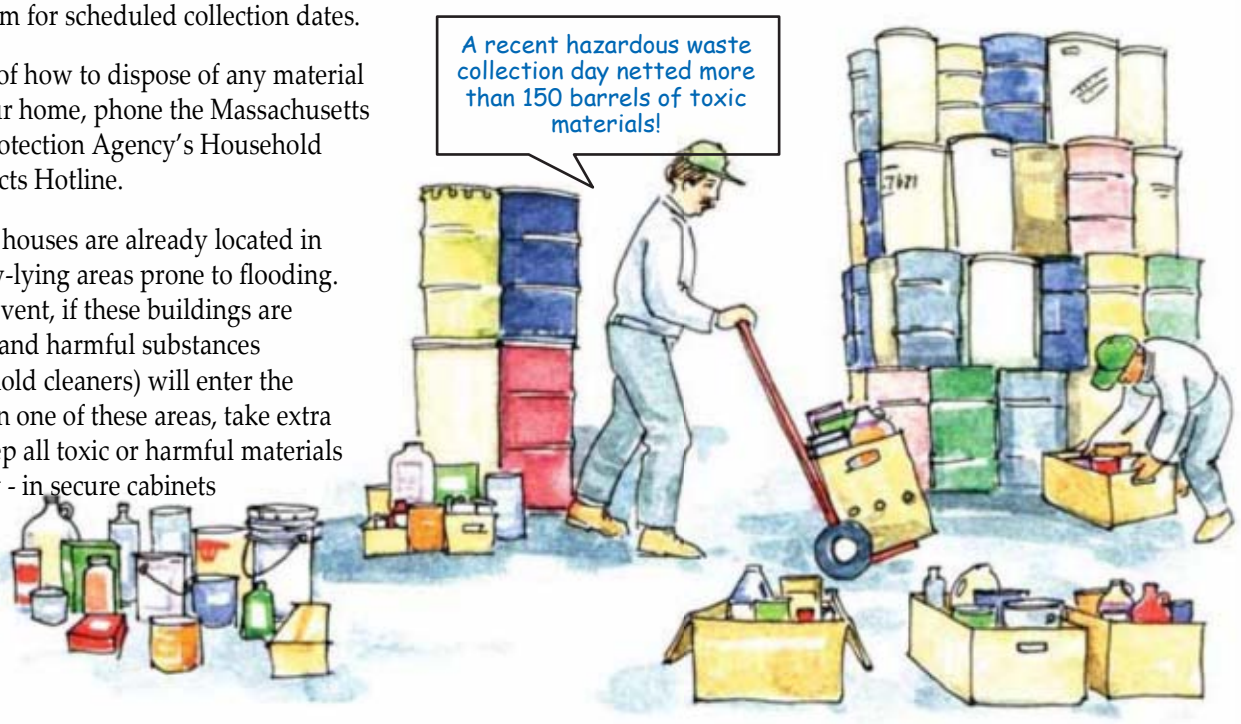
Thousands of common household products contain toxic ingredients that should be kept out of our waters. If we bring hazardous products into our homes, it is our responsibility to use, store, and dispose of them safely.

Never pour toxic materials down your drain. They will flow into your septic tank where they can destroy essential bacteria and pass into the groundwater that supplies our drinking water. If buried in the ground or dumped into storm drains, the toxins may flow straight into our creeks, ponds or bays.

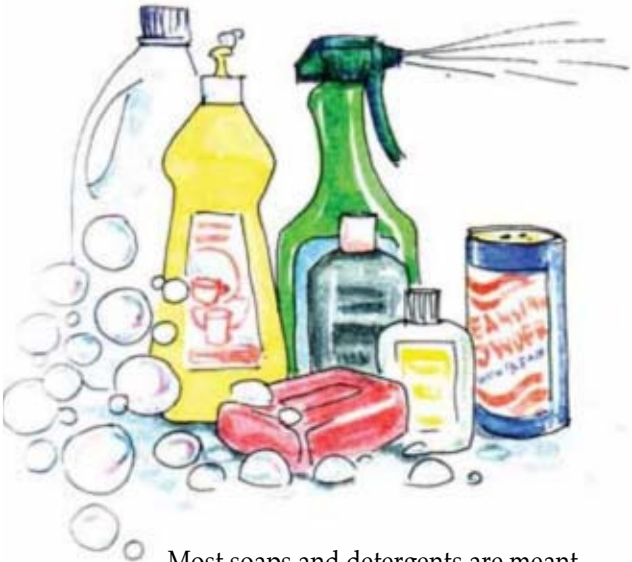
To help us dispose of these substances, the Barnstable County Department of Health And The Environment holds special hazardous waste collection days once or twice a year. The waste is then shipped off-Cape to an approved disposal site. Don't hesitate to call them for scheduled collection dates.

If you are unsure of how to dispose of any material found around your home, phone the Massachusetts Environmental Protection Agency's Household Hazardous Products Hotline.

Remember, many houses are already located in flood zones or low-lying areas prone to flooding. In a major storm event, if these buildings are flooded, the toxic and harmful substances (including household cleaners) will enter the bays. If you live in one of these areas, take extra precautions to keep all toxic or harmful materials out of harm's way - in secure cabinets high above any potential floodwaters.



Household Cleaners



Most soaps and detergents are meant to be washed down the drain. They are biodegradable and, if the wastewater from your home is properly treated, they pose no problem to the environment. Other household cleaners are a different story. Most drain openers, oven and toilet bowl cleaners, and bleach are poisonous. Furniture polish and spot removers are flammable, and ammonia-based cleansers and disinfectants contain strong chemicals which may be harmful.

Read the labels of products in your cleaning closet. Do they contain such toxic components as *lye, phenols, petroleum distillates, chloride and dichlorobenzene*? Note also the words *danger, warning, toxic, corrosive, flammable, or poison*. These identify products that may contain hazardous materials.

Use and store these substances carefully. Keep them in their original containers. Do not remove their labels. Never mix them with other products. Incompatible products might react, ignite, or explode.

Corroding containers require special handling. Call the Board of Health or Fire Department for instructions on transporting these safely to a hazardous waste disposal site.

Chlorine is such a common ingredient in household cleaners that many people are surprised to learn that it is highly toxic. Chlorine is corrosive and a strong irritant to the lungs and mucous membranes. Chlorine-based cleaning products can also destroy essential bacteria in septic tanks, eventually causing system failures. Chlorine can also combine with other materials present in the home and environment to form new toxic substances. NEVER mix chlorine (or products that contain chlorine) with ammonia products; the resulting chemical reaction creates a poisonous gas that can be fatal.

Phosphates may boost cleaning power but, in bodies of fresh water, they act as a fertilizer, stimulating excessive plant growth. Ultimately this growth reduces oxygen available to support aquatic life forms. Laundry and dishwasher detergents are now required to be phosphate-free. When you shop, read the labels and try to buy only phosphate-free products.

Fluorescent whitening agents, also known as optical brighteners, are ultraviolet dyes contained in many laundry detergents that make fabrics seem brighter and whiter. These brighteners are toxic to fish and other aquatic life and are extremely slow to biodegrade. Laundry product manufacturers are not required to list individual ingredients, so choose one that does not boast a brightening feature.

Disposal

Avoid dumping cleaners or wash water down your drain. Instead dilute well with water and toss onto a gravel driveway or around deep-rooted plants to be absorbed slowly. If you must put it down the drain, flush with PLENTY of water. Then start fresh with a nontoxic, inexpensive alternative. For more suggestions on disposal, call the Massachusetts EPA Household Hazardous Products Hotline.

Solvents and Paints

Oil-based paints and preservatives, paint thinners and removers, rust removers, furniture strippers and even nail polish and polish remover are highly toxic to aquatic life and can contaminate groundwater.

Disposal

Solvents and oil-based paints should never be incinerated or put down any drain, sewer or septic system. Bring oil-based paint to a hazardous waste collection or use it up on a basement wall or inside a closet. Give away partly filled cans - they make a good freebie at garage sales! To dispose of latex paints, just take the lid off the can and let the liquid evaporate. Or fill it with kitty litter and put the dried solids in your regular trash. You can also dry it by painting a piece of plywood, and peeling it off and disposing of dried paint; latex paint can go in the regular garbage, but oil-based should go to the hazardous waste collection. Set aside used paint thinner in a closed jar until the paint particles settle out, then pour off the clear liquid and reuse. When the remaining paint sludge is dry, wrap it in plastic for hazardous waste disposal.

Alternatives

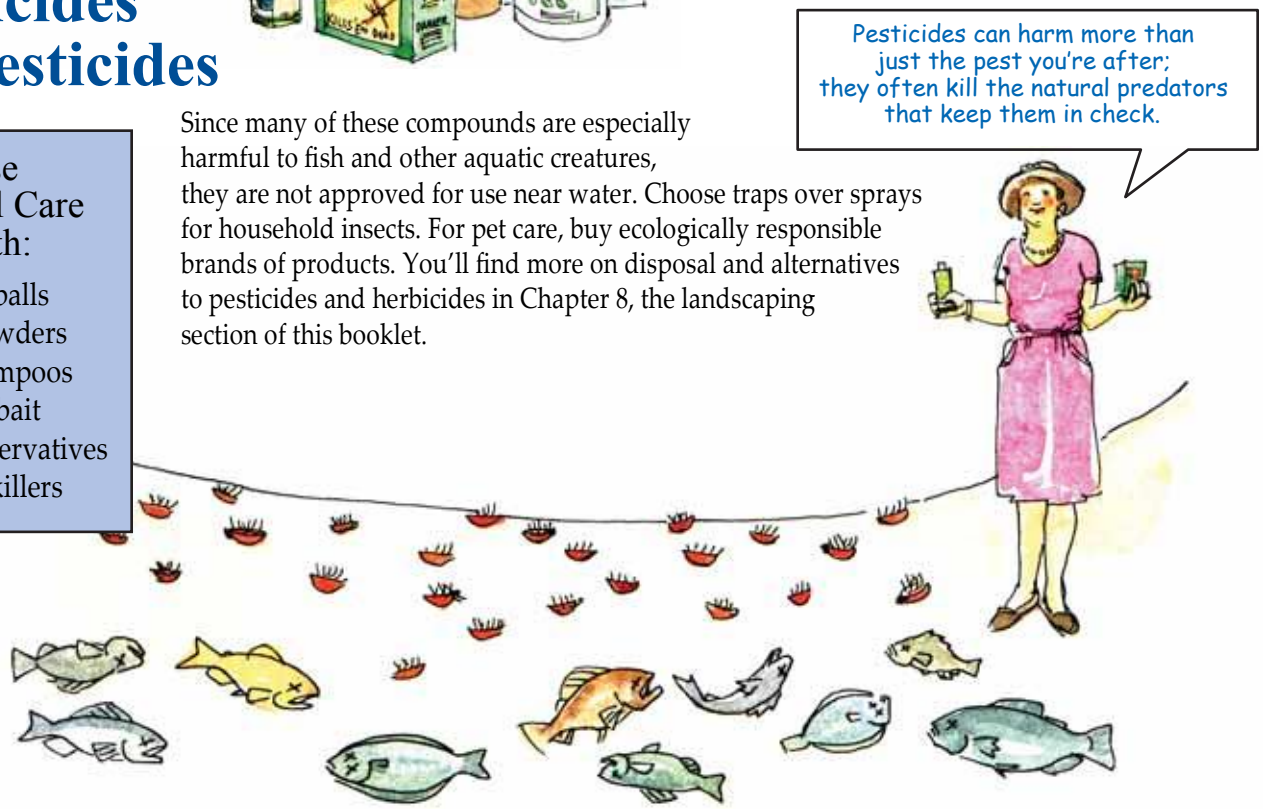
Choose latex paints instead of oil-based. Latex cleans up with soap and water and does not require thinner. Use whitewash – a nontoxic mixture of limestone, milk, and linseed oil – for fences, barns and basements. Buy unused paint from garage sales. Use a citrus-based solvent to clean up oil paint and brushes. Look for citrus-based removers. They work well without the fumes and don't require hazardous waste disposal.

Herbicides and Pesticides

Since many of these compounds are especially harmful to fish and other aquatic creatures, they are not approved for use near water. Choose traps over sprays for household insects. For pet care, buy ecologically responsible brands of products. You'll find more on disposal and alternatives to pesticides and herbicides in Chapter 8, the landscaping section of this booklet.

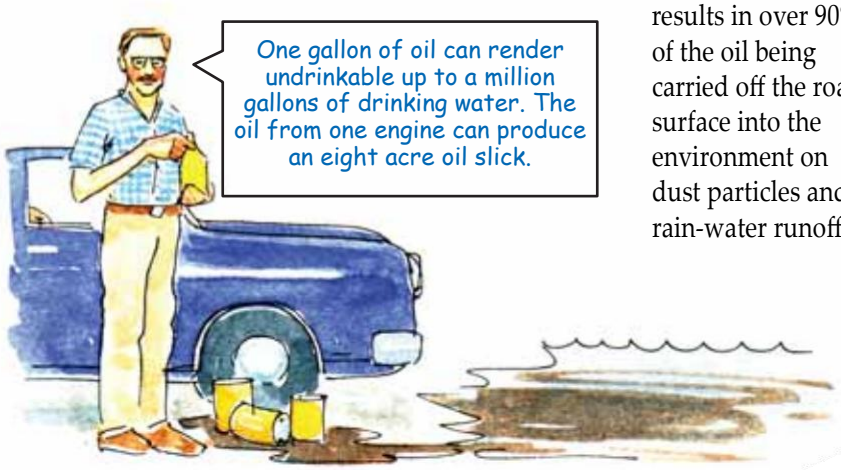
Use Special Care With:

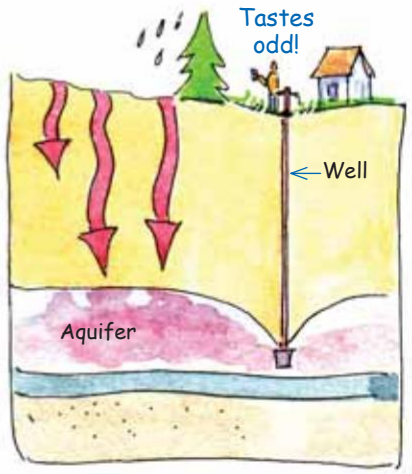
mothballs
flea powders
pet shampoos
slug bait
wood preservatives
weed killers



Car Care Products

Our vehicles require a lot of toxic chemicals to run and to be maintained; nontoxic alternatives are far in the future. **Never dispose of these substances yourself.** When these fluids are poured on the ground or down storm drains they flow directly into our waters. When put into the trash, they can contaminate groundwater. The archaic practice of applying oil to dirt roads for dust control results in over 90% of the oil being carried off the road surface into the environment on dust particles and rain-water runoff.





Keep your car and other motorized equipment in good running order. Fix leaks promptly. When washing or servicing your car, park on grass or gravel. Use soap and water rather than detergents, and use a bucket or pistol-grip nozzle to minimize runoff into storm drains.

Disposal

Store your car care products - separately, not mixed - in sturdy, lidded containers, out of the reach of children. Dispose of them at a hazardous waste collection. Return used car batteries and dispose of waste oil at the Mashpee Transfer Station. Call the State EPA motor oil info line for more information.

Other Car Care Products

Treat antifreeze as hazardous waste. It contains ethylene glycol, which is poisonous to wildlife and people. Many cats and dogs have died after drinking the sweet-tasting puddles of antifreeze left on driveways. Buy an ecologically responsible brand for your car and boat.

Winterize your plumbing with "plumber's antifreeze." It is made with propylene glycol and is non-toxic to your septic system.

Use Special Care With:

antifreeze
battery acid
brake fluid
degreasers
engine cleaners
gasoline and diesel
liquid car wax
motor oil
radiator flushes
rust preventatives

Items That Contain Heavy Metal

Use Special Care With:
computers
home thermometers
smoke detectors
televisions
energy-saving bulbs
fluorescent bulbs
mercury thermometers

Many common items in our homes contain heavy metals like mercury, cadmium, arsenic, and lead. These metals are dangerous, particularly to fetuses and children. They should also be treated as hazardous waste. Alkaline batteries can be disposed of in your regular trash but not the rechargeable or small button-type batteries, for example, those used in watches or hearing aids. Bring them to the recycling area at the Mashpee Transfer Station. Empty print cartridges, printers, computers, laptops, monitors and fax machines can also be recycled at the Mashpee Transfer Station. Your local office supply store may also accept these types of items.

Above ground oil tanks are also a threat to groundwater. These tanks rust from the inside. Every year many tanks fail and leak into the underlying soil and groundwater. The costs of cleanups are staggering. If your tank shows signs of corrosion or is over twenty years old, it should be replaced with a new, safer stainless steel tank.

Taking Action

Our household activities have a serious impact on water quality. Many of the products we find in our home are toxic, and the list keeps growing as more research is done.

- Become informed.
- Read labels so you know what you are buying and what the potential hazards are.
- Follow the directions on the label.
- Use the least toxic product you can find and buy only what you need.
- Never use more of the product than the manufacturer recommends.
- Dispose of your unwanted household hazardous materials properly.
- Use alternative water-kind cleansers for your home. (see following page)

And Lastly...

Consider walking, bicycling, car pooling, or taking the Cape's public transportation system.

Alternative Water-Kind Cleansers for your Home

"Make Your Own Non-Toxic Cleaning Kit!"

Assemble a few spray bottles, empty jars, and the basic ingredients: baking soda (for scouring and deodorizing), white vinegar (removes mildew, odors, bacteria, and scale from hard water), borax and washing soda (degreases, cleans), citrus solvent (cleans oils and grease, some stains), lemon juice (removes gums, tarnish and dirt), and lemon and tea tree oil (disinfectant). Any of the above ingredients can be safely mixed together. Label clearly and store out of the reach of children.

Note: There are also many non-toxic commercial cleaners available on the market made with these same ingredients.

All Purpose Cleanser: Mix 1/4 cup white vinegar, 2 tsp borax and 1-2 tsp tea tree oil or lemon in 1 quart spray bottle of very hot water. Shake vigorously. Add more borax for disinfecting.

Bleach: Use oxygen bleaches, borax, or let the sun bleach your fabrics on an outdoor clothesline. Also try an old-fashioned bluing product to whiten whites.

Carpet Stains: Immediately apply club soda or equal parts white vinegar and water, blot dry, repeat, then clean with a brush or sponge using warm soapy water.

Deodorizers: In your refrigerator and other closed spaces, use an open box of baking soda. Sprinkle it on carpets and upholstery, wait 15 minutes, then vacuum. Simmer cinnamon and cloves, or place white vinegar in open dishes.

Drain Cleaners: Instead of chemical cleaners, use a plunger or a plumber's "snake." Then add 1/4 cup baking soda followed by 1/4 cup vinegar. Wait 15 minutes, and rinse with 2 quarts of boiling water. **Caution: do not use this method after trying a commercial drain opener – the vinegar can react with the chemicals to create dangerous fumes.**

Dusting: Use 1/4 cup white vinegar per quart of water and apply with a tightly wrung soft cloth. Or use a micro-fiber dusting cloth.

Floor Cleaner: Add 1/4 cup baking soda and 1/4 cup borax to hot mop water; rinse with 1/2 cup white vinegar in clear water. For vinyl floors, simply add 1 cup vinegar to mop water.

Glass Cleaner: Mix 2 Tbsp vinegar and 2 tsp lemon juice and 1 tsp liquid soap in 1 quart warm water. Shake well, spray on, then buff with crumpled newspapers.

Metal Polish: *Silver:* Line a pan with aluminum foil and fill with water; add 2 tsp each of baking soda and salt. Bring to a boil and immerse silver. Polish with soft cloth. *Brass or Bronze:* polish with a soft cloth dipped in a lemon juice and baking soda solution. *Copper:* soak a cotton rag in a pint of boiling water with 1 Tbsp salt and 1 cup white vinegar. Apply to copper while hot; let cool, then wipe clean.

Mildew Remover: Make a solution with 1/2 cup vinegar, 1/2 cup borax and 1 quart of very hot water. Spray on and leave for 10 minutes. Wipe clean. Or add 2 tsp tea tree oil in 2 cups hot water in a spray bottle, shake to blend, and spray on problem areas. Do not rinse. For grout, mix one part hydrogen peroxide (3%) with two parts water in a spray bottle and spray on mold. Wait at least one hour before rinsing.

Paint Brush Cleaner: For oil-based paints, use citrus-based solvents available commercially.

Scouring Powder: Make a paste of baking soda and vinegar. Rub gently.

Toilet Bowl Cleaner: Mix 1/4 cup baking soda and 1/2 cup vinegar, pour into bowl, let stand, and brush well.

Wood Polish: Rub with 1 Tbsp of lemon oil mixed with one pint olive oil. Buff with soft cloth.

Chapter 6

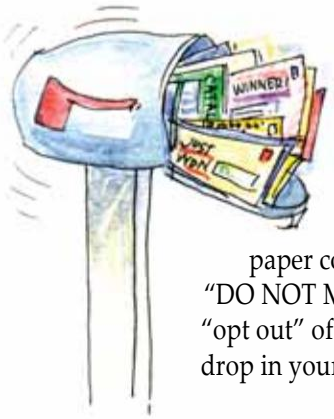
Rethink / Reuse / Recycle

In years gone by, all garbage generated was either buried or burned. Today, all Cape landfills are closed and trash is shipped off Cape, where it is incinerated to generate electricity.

Mashpee operates a Transfer Station facility where trash and recyclables are collected. These are then transported off-Cape. Check the town website www.mashpeema.gov Go to town departments, select Public Works, additional links, then click on Transfer Station for the latest disposal regulations.

Paper and Cardboard

account for one-third of our trash

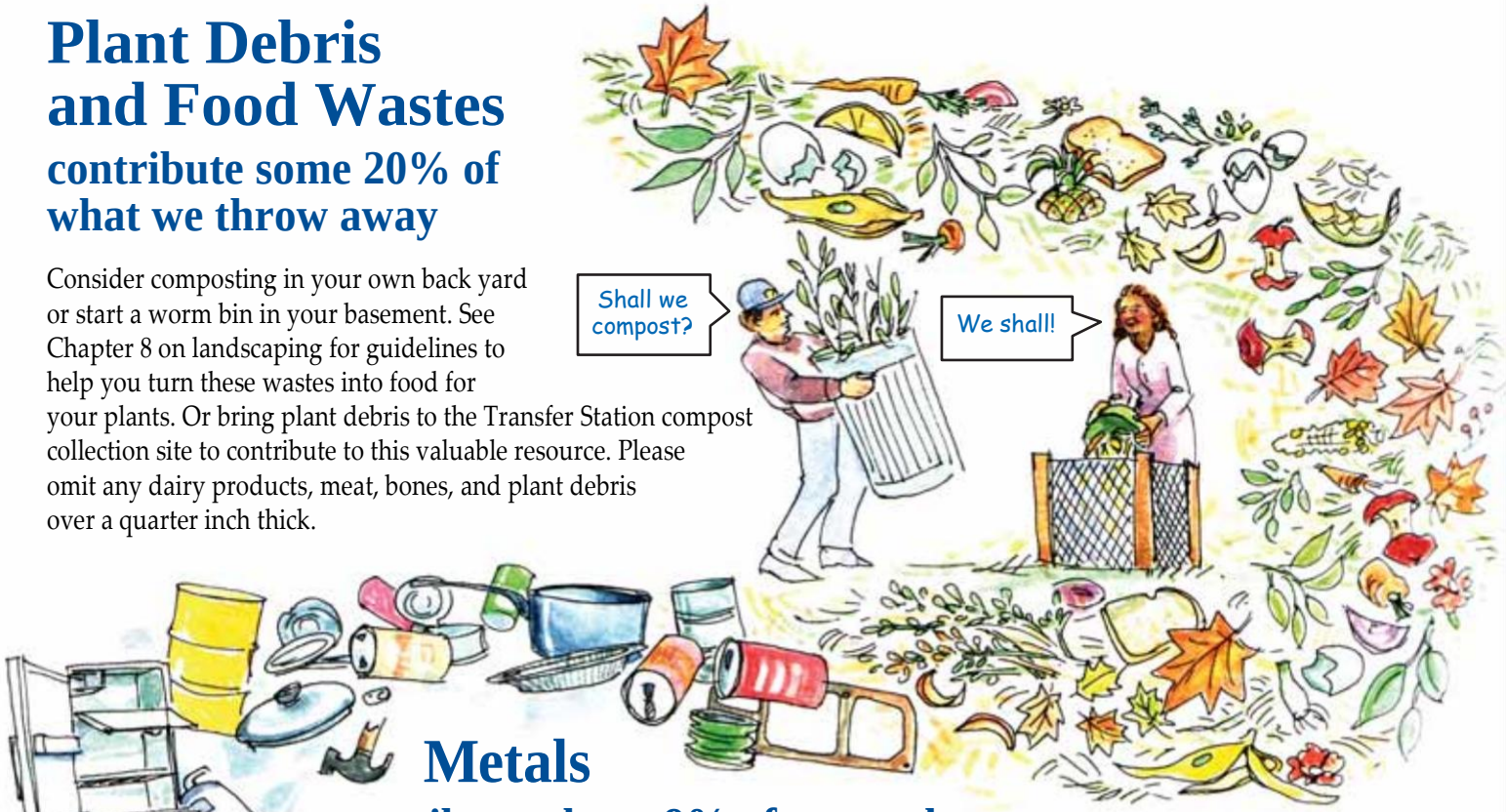


Here is where we can make a big difference! The pulp paper industry, source of new paper, is one of the largest water polluters in the world. The production of paper using recycled fibers reduces water pollution by roughly a third and air pollution by over half. Fortunately, newspaper, magazines and cardboard are now recyclable. So bag, box, or tie up your paper recyclables and bring them in! Reduce the flow of paper coming into your household. Get on the "DO NOT MAIL" list, contact catalogue sources, and "opt out" of credit card offers, and you will see a dramatic drop in your direct mailings.

Plant Debris and Food Wastes

contribute some 20% of what we throw away

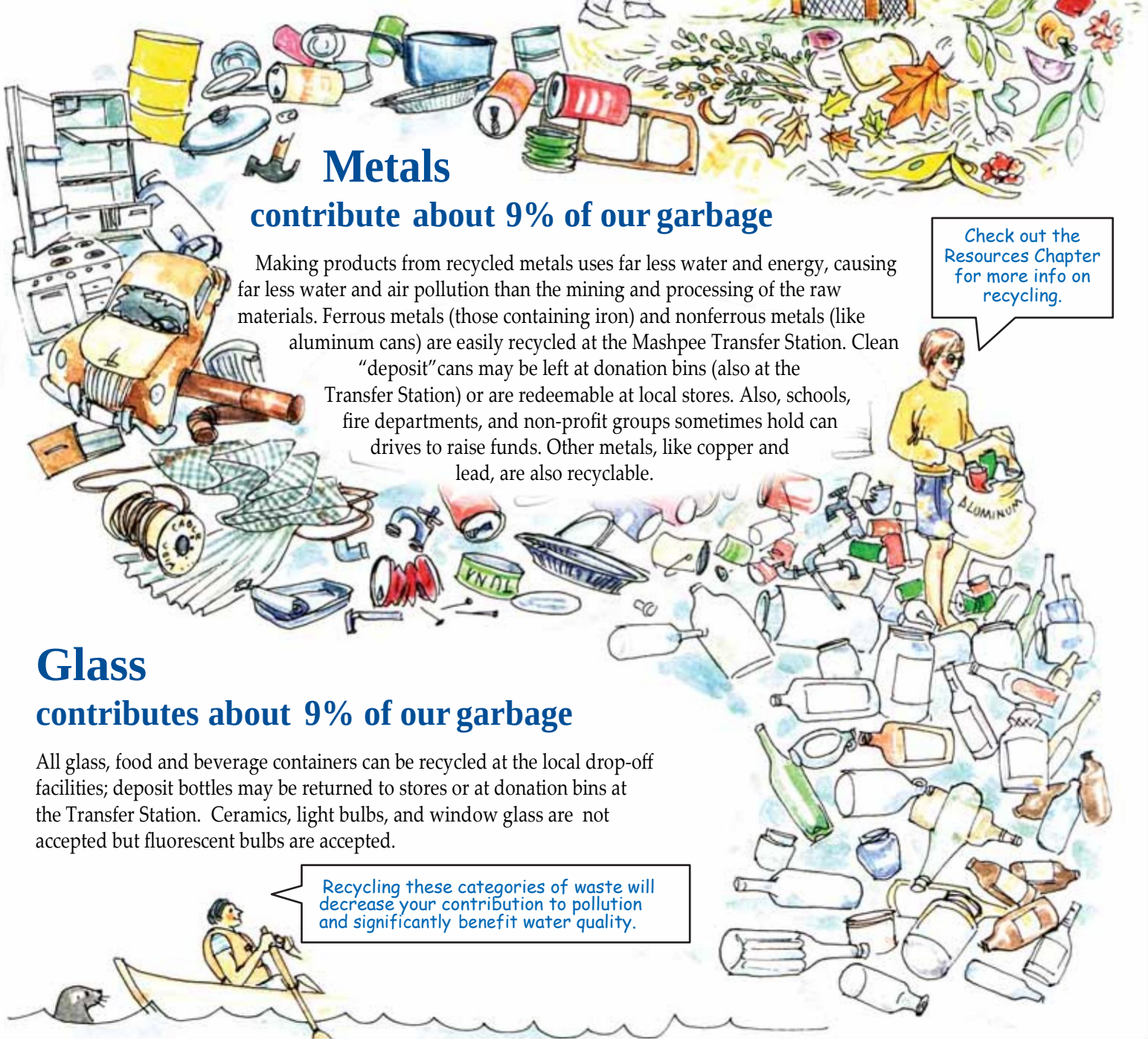
Consider composting in your own back yard or start a worm bin in your basement. See Chapter 8 on landscaping for guidelines to help you turn these wastes into food for your plants. Or bring plant debris to the Transfer Station compost collection site to contribute to this valuable resource. Please omit any dairy products, meat, bones, and plant debris over a quarter inch thick.



Metals

contribute about 9% of our garbage

Making products from recycled metals uses far less water and energy, causing far less water and air pollution than the mining and processing of the raw materials. Ferrous metals (those containing iron) and nonferrous metals (like aluminum cans) are easily recycled at the Mashpee Transfer Station. Clean "deposit" cans may be left at donation bins (also at the Transfer Station) or are redeemable at local stores. Also, schools, fire departments, and non-profit groups sometimes hold can drives to raise funds. Other metals, like copper and lead, are also recyclable.



Glass

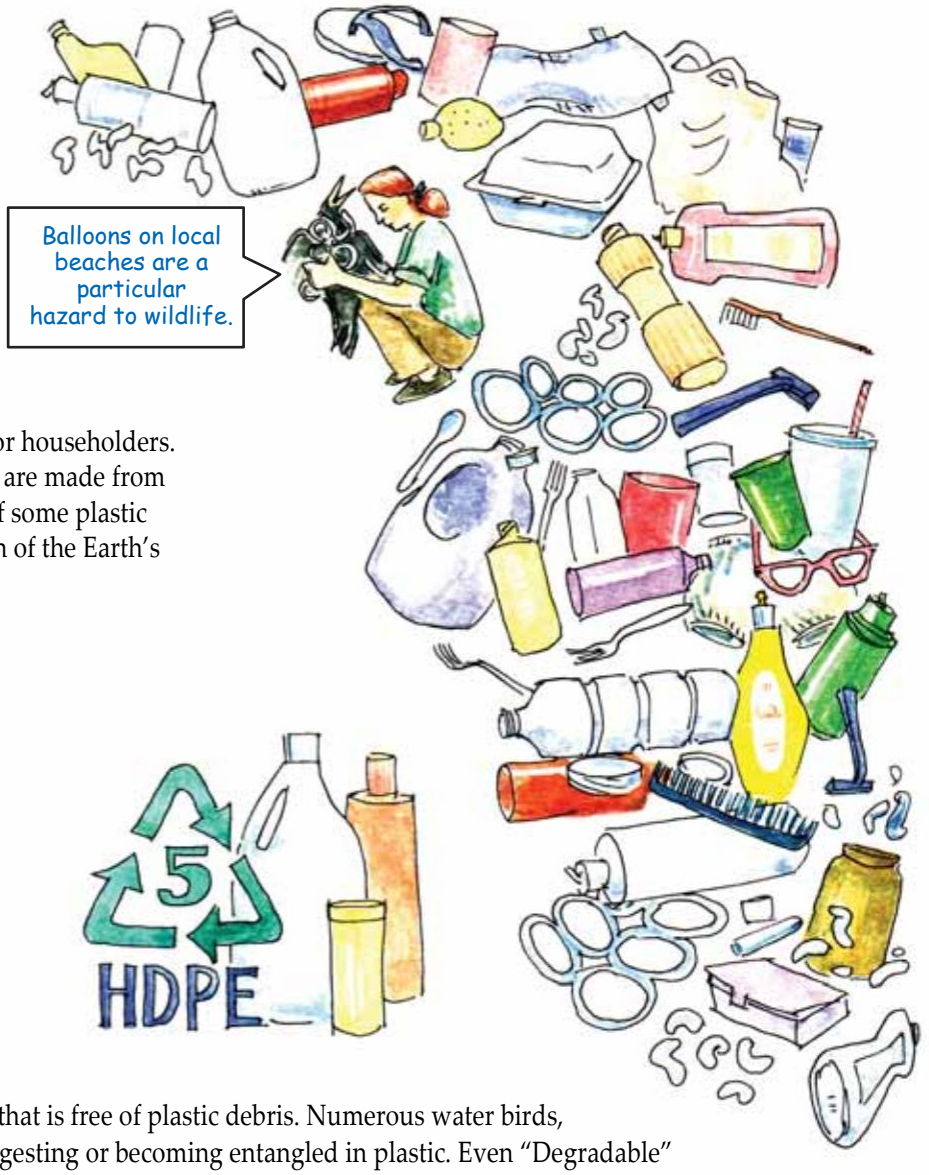
contributes about 9% of our garbage

All glass, food and beverage containers can be recycled at the local drop-off facilities; deposit bottles may be returned to stores or at donation bins at the Transfer Station. Ceramics, light bulbs, and window glass are not accepted but fluorescent bulbs are accepted.

Plastics

contribute about 10% of our total garbage

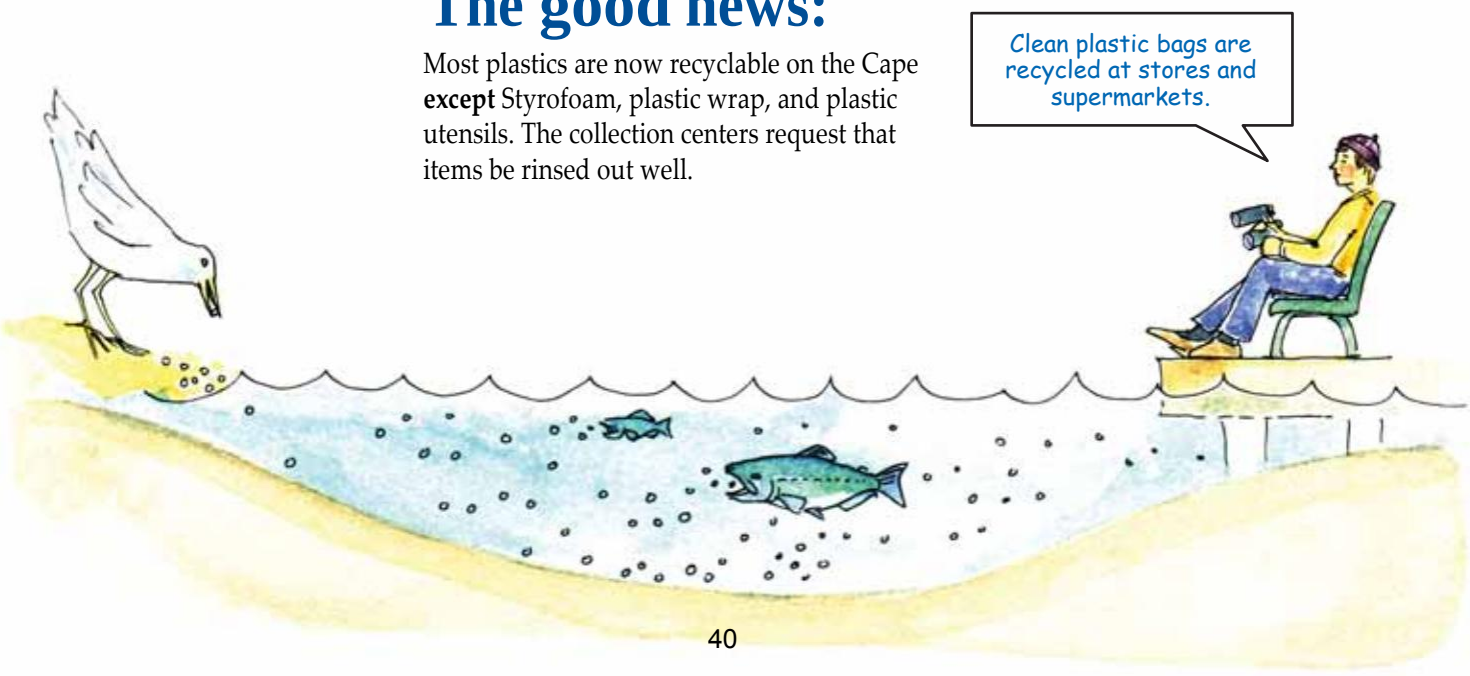
Plastics present some of the biggest challenges for householders. They take 300 years or longer to decompose and are made from non-renewable petroleum. The decomposition of some plastic foams is believed to play a role in the destruction of the Earth's ozone layer.



It's hard to find a Cape beach or pond shoreline that is free of plastic debris. Numerous water birds, marine mammals, and fish die each year from ingesting or becoming entangled in plastic. Even "Degradable" plastics that are made to break into small particles in sunlight or in the soil raise concerns. While these products may lessen the danger of animal entanglement, many environmental scientists fear that the small particles pose a greater hazard than the larger, more unsightly plastic discards.

The good news:

Most plastics are now recyclable on the Cape **except** Styrofoam, plastic wrap, and plastic utensils. The collection centers request that items be rinsed out well.



...and lastly:

Reusable Goods

Find a home for your intact or repairable home appliances, household goods, clothing, building materials, or any other items that can be repaired or used again. Have a yard sale, advertise items for sale in your local papers, donate them to local church thrift shops, or utilize the clothing and books donation bins located at the Mashpee Transfer Station.

Six Simple Actions

to help improve water quality by recycling and reusing...

1. Precycle

When you shop, look for products with limited or reusable packaging. Buy foods in recyclable containers or buy in bulk. Buy concentrates and items in refillable containers.

2. Use Cloth Diapers

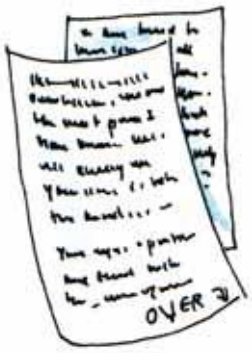
The average baby uses nearly 4,500 diapers before being toilet trained. Unrinsed and improperly disposed of plastic diapers can contaminate our surface and ground waters. A week's worth of cloth diapers adds one or two extra loads of laundry a week.

3. Avoid Disposables

By toting your own lidded travel mug and water bottle, you can buy hot and cold beverages without adding to the thousands of foam and plastic cups that find their way onto our beaches. Avoid using disposable plates and utensils.

4. Reuse Writing Paper

Use both sides of paper sheets, make two-sided copies, and use blank sides for scratch paper and rough drafts. Buy and use paper products made from recycled paper.



5. Tote Bags

Telling the clerk "I don't need a bag" is a better solution than "paper or plastic." Choose a size you can easily carry when full.

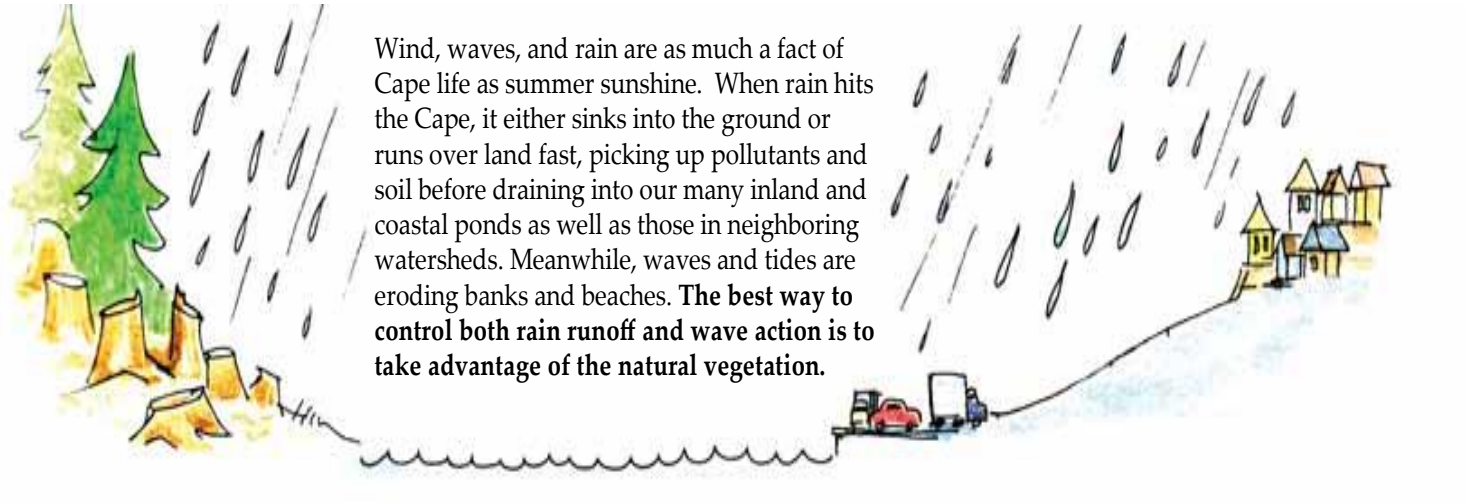
6. Buy Smart

Choose quality products that last a long time and don't have to be thrown out and replaced frequently.

Chapter 7

Spare those Trees & Shrubs!

Do Your Part to Control Runoff and Erosion



Wind, waves, and rain are as much a fact of Cape life as summer sunshine. When rain hits the Cape, it either sinks into the ground or runs over land fast, picking up pollutants and soil before draining into our many inland and coastal ponds as well as those in neighboring watersheds. Meanwhile, waves and tides are eroding banks and beaches. **The best way to control both rain runoff and wave action is to take advantage of the natural vegetation.**

WHEN RAIN BECOMES A PROBLEM

by Joan Martin

"What a beautiful day!" I'll bet the image that brings to mind is not a cloudy drizzle or a thunderstorm. We love a beautiful sunny day and usually react to rain as a nuisance that hopefully will soon be gone. Consequently, we don't design rain into our lives.

We especially don't design rain into our built spaces. We design our buildings and landscapes in a fantasy, as if rain didn't exist. Then, when the rain falls, we have a problem that we call "stormwater," which we try to move off the site as efficiently as possible, usually through a system of drains. The typical solution is to run it to the creek.

However, this approach has serious repercussions for the environment around our community. We can have much better designs if we ask for them, and it would be a great gift to our grandchildren if we did. Our guide to a desirable design lies in the natural environment.

We don't talk about stormwater in the woods because very little of the rain leaves the site. On the other hand, when it rains in town, the water cannot soak into the ground so most of the stormwater flows rapidly off the site, washing the impervious pavement and the roofs. You can see the results of washing the streets and other surfaces when you notice the trash that ends up in the river. The chemicals we use on our lawns and the oil and dirt in the streets are also washed into the stream, polluting it. Equally damaging are the physical effects of the stormwater on the creek. When a great surge of stormwater flows rapidly to the creek, it changes a steady gentle stream into a powerful torrent that gouges the channel, tearing away the banks and clogging with dirt the gills of fish and the homes of streambed creatures.

It is very understandable that our response to the excess water has been to remove it from the city and hasten its trip to the nearest stream. It wasn't part of what we planned in our life. However, a far better way to handle the excess water is to recreate what we have lost in order to keep the water from leaving the site on which it falls.

What would our civilized world be like if we did include rain in the design? We could provide a place for water, both by utilizing the natural systems that hold and cleanse rainwater, such as wetlands and floodplains, and by constructing reservoirs and beautiful "wet gardens" - gardens filled with water-loving plants that absorb excess nutrients and other contaminants from the water.

Let's appreciate and accommodate the rain. Let's ask each developer to design buildings and roads around the natural features that affect the flow of water (such as steep slopes and special soils) and preserve wetlands and floodplains, which have a great capacity to handle stormwater.

The next time you hear that a new development might be built in your community, ask what it will do with the rain.

Ms. Martin's article is reprinted with permission from "The Volunteer Monitor", Spring 2001 Issue.
www.epa.gov/owow/volunteer/vm_index.html

Trees and Rain

When land is left in its natural state, the majority of rain and snowfall falls into forests and meadows and into lawn, tree, shrub and garden areas of our individual properties. As it soaks slowly into the earth it is filtered by tree, shrub and plant roots that results in the settling out of pollutants. This naturally filtered precipitation eventually feeds our streams, lakes, and underground aquifers.

Trees capture and hold rainfall in leaves and branches to reduce stormwater flow. Trees improve water quality by filtering rainwater and holding soils in place. They provide shade that lowers air and runoff temperatures. Trees are suitable for all soil types and in almost any location, and are highly recommended as a stormwater management technique because their strong root systems provide an efficient precipitation-filtering capability.

However, development has replaced existing meadows and forests with roofs, concrete, compacted earth areas, sloped lawns, driveways and walkways; all of which do not allow rain/snowfall melt to penetrate into the earth. Instead the falling precipitation runs off roofs, over driveways, walkways, paved roads and parking lots into storm drains, all without the benefit of the natural process treatment mentioned above.

As stormwater runoff flows, it becomes an efficient transporter of contaminated water. It picks up soil sediment, pet manure, salt, pesticides, fertilizers, oil and grease, antifreeze, leaves, grass clippings, pine needles, cigarette butts and other types of litter as it travels down roadways into our storm drains and eventually into our water bodies and groundwater. Excess nutrients carried in stormwater runoff to our storm drains also negatively affect our water resources.

Tools for dealing with surface runoff pollution

Take ownership of the precipitation (rain and snow-melt) that falls on your property. It's your valuable resource. Use it and re-use it. To the extent possible, don't allow it to become stormwater runoff.

Review the following suggested actions.

See if they fit with your particular property.

- **The first step is to learn what happens to the precipitation that falls on your property. Identify any areas where it runs off your property. Does your property make the most effective use of precipitation falling upon it?**

- **The next time you are home during a rain shower, head outdoors with your boots and umbrella and watch where the rainwater goes.**

- **Make a sketch of your property, drawing arrows showing the direction that storm water flows off driveways, rooftops, sidewalks, lawn and yards. Does water soak into the ground quickly, or does it puddle in places and flow off lawns and driveways? Your soil type affects water infiltration (soaking into the ground). As you might expect, water infiltrates sandy soil quickly but has a hard time seeping into fine-grained silt or clay soils.**

- **During your walk, note how far it is to the nearest storm drain, ditch, wetland, stream or body of open water. Note whether runoff flows onto your land from adjacent streets, lands or storm water systems. If you live at or near the bottom of a hill, you may have special problems. Be sure to go out during more than one rain shower to get a good understanding of runoff flow during small and large storms.**

- **Your house roof, like pavement, sheds water. If downspouts from roof gutters empty onto vegetated areas, the water will have a chance to soak into the ground. Aim downspouts away from foundations and paved surfaces. For roofs without gutters, plant grass, spread mulch, or use gravel under the drip line to prevent soil erosion and increase the ground's capacity to absorb water. Consider using rain barrels to catch rainwater for watering lawns and gardens in dry weather.**

- **Roof drainage should be directed to a flower bed or rain garden or, if not feasible, to a grassy area away from the foundation and paved surfaces.**

- **For additional resource material, please refer to Chapter 13 "Where To Go For Help".**

Quick Tips for decreasing household runoff problems:

Where impermeable surfaces are already in place, divert rain from the paved surfaces onto grass or into vegetation to allow gradual absorption.

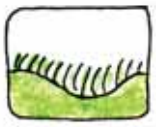
Preserve established trees and shrubs and plant new ones to encourage excess rainwater to filter slowly into the soil. Plant and maintain a vegetated buffer strip at the base of steep slopes and along water bodies.

Landscape with less lawn area and more natural vegetation.

When removing unhealthy trees, leave the stump and roots in place to hold the soils.

Don't throw Christmas trees or yard debris over banks or onto dunes or beaches; they smother the vegetation that holds the soil in place. (Christmas trees can be taken to the town Transfer Station.)

Reduce your use of impervious surfaces: use spaced paving stones instead of concrete, groundcover instead of grass, and pervious asphalt instead of standard. Many local driveways feature crushed quahog shells.



Avoid using chemical fertilizers, pick up litter and animal waste, and keep your car in good shape to avoid leaks.

Install gravel trenches along driveways and patios to collect water and allow it to filter into the soil.

Use grass-lined swales, berms, and basins to control runoff on your property, reduce its speed, and increase the time over which the runoff is released.

If you build a new home, ask your builder to leave as much of the original vegetation as possible on site. Before the start of construction make sure that hay bales and a silt fence are installed around the work site to contain sediment and control erosion.

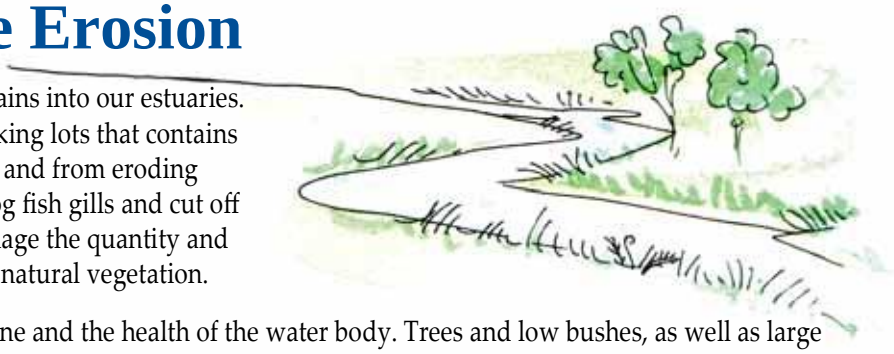
Discover "Soft" Paving Surfaces

Because so many of human landscape features are impervious, a few words about using permeable surfaces seem in order. There are many paving surfaces that provide the durablilty of concrete while allowing rainwater to soak into the ground. Bricks and flat stones, for instance, make an attractive, durable driveway and, if placed on well-drained soil or on a sand or gravel bed, allow rainwater to filter into the ground.

Wood decks, usually installed for their functional good looks, can also serve as a form of porous pavement. Redwood and cedar, for example, are as durable as most other paving surfaces. The space between the deck boards allows rainwater to drain directly onto the soil surface and soak into the ground. Maintaining a distance between the soil surface and the decking will minimize the risk of wood rot.

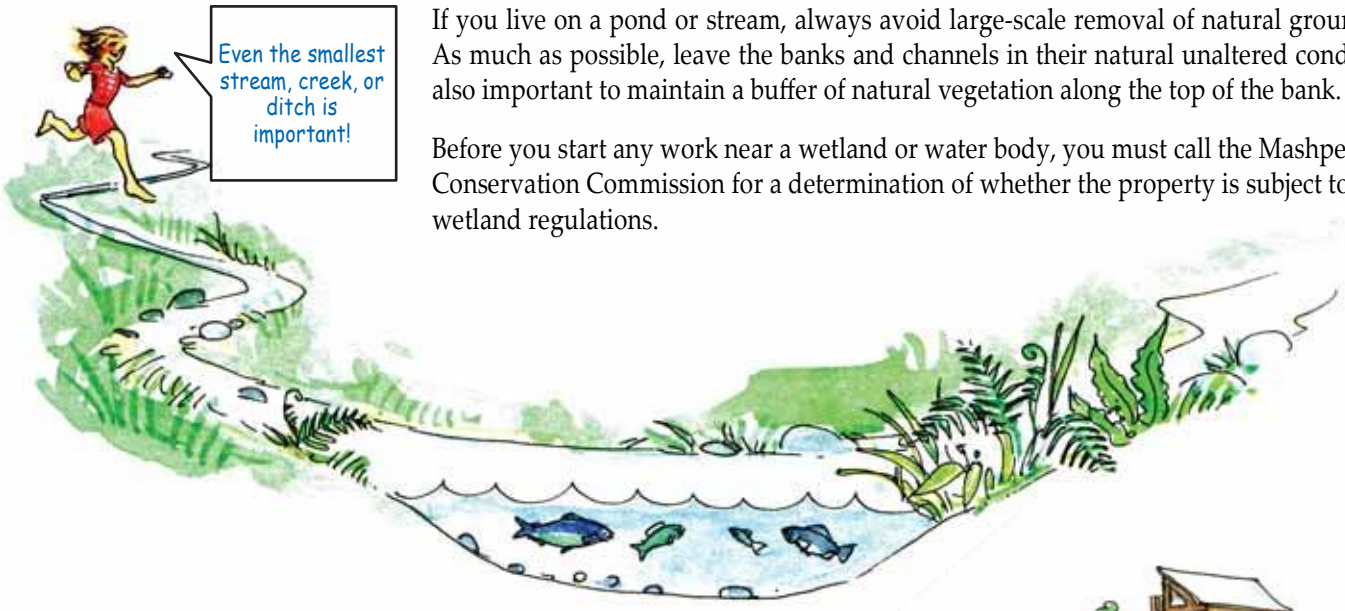
Other new porous materials are also becoming available.

Pond and Streamside Erosion



Our creeks and streams form the network which drains into our estuaries. They carry runoff from lawns, fields, roads and parking lots that contains pollutants and soil particles. Sediments from runoff and from eroding stream and pond banks can smother aquatic life, clog fish gills and cut off the light needed by underwater plants. We can manage the quantity and quality of water entering our estuaries by using the natural vegetation.

Vegetation is vital to both the stability of the shoreline and the health of the water body. Trees and low bushes, as well as large snags and other natural structures, protect the banks from severe erosion. They also make great habitats for many fish species and help regulate water temperatures by providing shade.



If you live on a pond or stream, always avoid large-scale removal of natural ground covers. As much as possible, leave the banks and channels in their natural unaltered condition. It is also important to maintain a buffer of natural vegetation along the top of the bank.

Before you start any work near a wetland or water body, you must call the Mashpee Conservation Commission for a determination of whether the property is subject to wetland regulations.

Controlling Waterfront Erosion

Coastal erosion caused by wind and wave energy is a natural geological process and is the primary source of sand and cobble for our beaches, dunes, and barrier beaches. However, we can inadvertently accelerate this process by clearing shorefront areas, altering marshes, and building too close to the shoreline.

For controlling coastal erosion, scientists recommend natural vegetative solutions over hard structures like sea walls, jetties, and rock bulkheads. The latter were built to protect against erosion but often have the opposite effect. Natural structures like salt marshes, beaches, dunes, and vegetated banks are more efficient in dissipating wave action and protecting against severe erosion. When enjoying the beach, look for dune grass. It is the primary protector of our beaches. It traps sand and holds the beach in place which is why it is never a good idea to walk or drive over it.

- *When water and land wrestle, the water always wins.*
- *Walking over coastal dunes or sliding down coastal bluffs accelerates erosion.*

The key to success is using the right types of plants. Plants with strong root systems help stabilize banks while salt-tolerant plants work best on dunes. Only a few plants can thrive on the coast and each one has its place in the shoreline environment. These are some plants that help absorb surface runoff and stabilize coastal banks: ***Beach Plum, Bayberry, Highbush/Lowbush Blueberry, Seaside Goldenrod, Winterberry, Bearberry.***

- Contact your the Mashpee Conservation Commission for help in permitting and designing a shoreline vegetation plan.
- Join your neighborhood pond association.
- Ask the Mashpee Selectmen and Public Works Director these questions: "Is it possible to use less asphalt, more pervious surfaces?" "Why not let that roadside vegetation grow to reduce runoff rate and filter pollutants rather than cut it down?"

Cape Cod Neighbor

Plankton: The Ocean's Pasturage

Plankton may be small, but they are mighty. Little known and nearly invisible, these exquisite organisms exist in astounding numbers and are the foundation of life in our waters. Plant plankton (phytoplankton) produce the lion's share of the Earth's oxygen. Phytoplankton is eaten by animal plankton (zooplankton), which in turn is eaten by many other animals in the food web. Finfish, shellfish, and crustaceans begin their lives as plankton. Without plankton, our water ecosystems would collapse. Viva plankton!

Cape Cod Neighbor

Blue Crab: Beautiful Swimmers

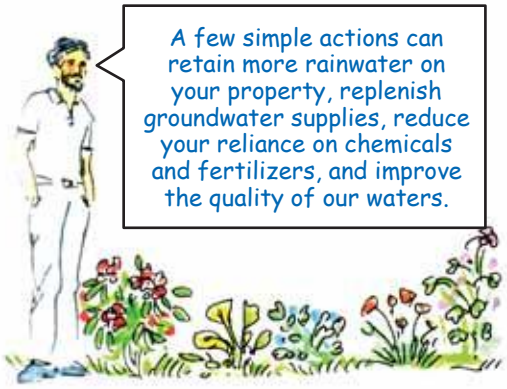
The scientific name of the blue crab, *Callinectes sapidus*, means beautiful swimmer. This name comes from its two paddlelike back appendages that help the blue crab glide gracefully through the water. A common denizen of our shallow estuaries, it prefers brackish waters to open bays. Cape Cod is at the northernmost edge of the blue crab's East Coast habitat.

Chapter 8

Landscaping for Healthy Watersheds

From Bourne to Provincetown, most of the rainfall that reaches this area eventually finds its way into our ponds, lakes, and bays. We can manage this flow and keep our waters clean by landscaping wisely.

Thoughtful landscaping can change the volume, velocity and quality of the water that flows from our properties. Trees, shrubs, and groundcover which enhance the appearance and value of your property also help reduce runoff, which transports excessive sediments and pollution to local waters.



Getting Started...

If you are building a new home, retain as much of the native vegetation as possible. This will not only reduce runoff and pollution, it will give you a head start on your final landscaping and may save you money. Before you start work on the site, consult the Mashpee Conservation Commission to learn if there are guidelines governing landscaping in your location. They can provide you with lists of native plants for your planting conditions, suggestions for Cape Cod landscapers and designers, and places to buy native plants for your property.

Lawns do not belong next to water; wetlands regulations control the cutting of vegetation adjacent to water bodies. If you abut a pond, stream, or estuary, it is particularly important to leave a vegetation buffer to absorb excessive runoff and prevent erosion. Without a buffer, nutrients transported from the land flow directly into the waterways, stimulating excessive proliferation of algae and seaweeds. These plants can dramatically reduce oxygen levels in the water, making it impossible for the local fish and shellfish to survive. Vegetative buffers also provide natural habitat for native insects and animals.

Well-planned landscaping offers other benefits. You can reduce your heating and cooling costs by as much as 30% just by planting and clearing wisely. Trees, shrubs, and groundcover also attract wildlife and require much less maintenance, fertilizers, and pesticides than grass.

Appropriate Plants for Upper Cape Landscapes

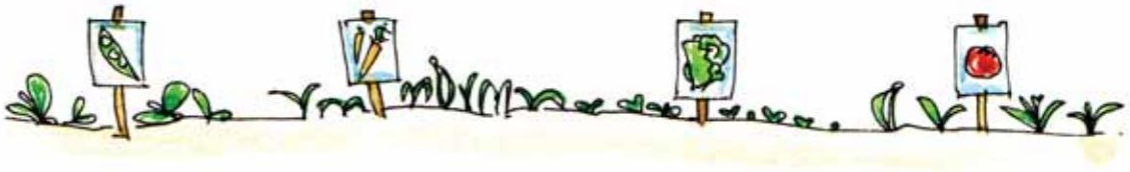
Before you head to the nursery, consider the growing conditions that define your land. Different plants require different kinds of soil, nutrients, and exposure to the sun. Parts of your property may also be subject to wind, foot traffic, or salt spray.

Check the soil. Plants that require good drainage grow well in sandy loam. Clay holds water so plants that like constant moisture thrive in it. You can guess your soil type by taking a handful of moist soil and squeezing it into a ball. If it holds together slightly before breaking up, you have sandy loam. If it stays together, you have clay or a clay blend. Better yet, have soil samples tested for type, pH (acidity), nutrient availability, and mineral content. Check the Resources Chapter for information and kits for soil testing.

How to Choose?... Go Native!

Matching the needs of your plants to the conditions of your landscape decreases the need for extra water and fertilizer and increases your plant's resistance to disease and pests. Plants native to the Cape are well adapted to our climate, soil, and water supply; they are less bothered by salt, disease, and pests than plants introduced from other areas. Visit the Mashpee Conservation Commission or garden clubs to obtain lists of native plants suitable for planting in our area. Other sources of information include the Heritage Plantation Museum and Gardens in Sandwich, Cape Cod Museum of Natural History, National Seashore Visitor Center, Mass. Audubon's Wellfleet Bay Wildlife Sanctuary, and the Cape Cod Cooperative Extension office of the University of Massachusetts; all these locations provide additional publications. Local nurseries will help you select plants appropriate to your yard and soil type.

Plants to Avoid



Some plants introduced to the Cape are invasive and spread quickly, choking out the indigenous plants. These include autumn olive, purple loosestrife, pampas grass, porcelain berry, phragmites, Asian bittersweet, Japanese knotweed, knapweed, Japanese honeysuckle, Scotch broom, tree of heaven, multiflora rose, bamboo, and barberry. (For a complete list, see the Invasive Species Brochure on the Mashpee Town website, www.mashpeema.gov click on Conservation Commission).

Gardening

Whether our garden is in a window box or on a large farm, many of us enjoy growing our own vegetables, fruits, flowers, and herbs. By using effective gardening techniques, we can produce plants to be proud of while preserving the soil, enhancing the absorption of rainfall, and protecting local streams and ponds from sediments and chemicals.

Start by picking the right spot for planting. Choose a sunny location with good natural drainage. Whenever possible, avoid sloping areas and drainage channels that let topsoil wash away during heavy rains.

If your garden is on a slope, use the same techniques that farmers use on hilly fields. Terrace the site or plant across the slope, not up and down the hill. Each terrace or row helps keep soil and plant nutrients from washing downhill. On long slopes, it's a good idea to leave strips of groundcover or grass running across the slope. This will slow the flow of runoff, allowing it to soak into the soil. Make your strips wide enough to allow easy access to your plants and vegetables.

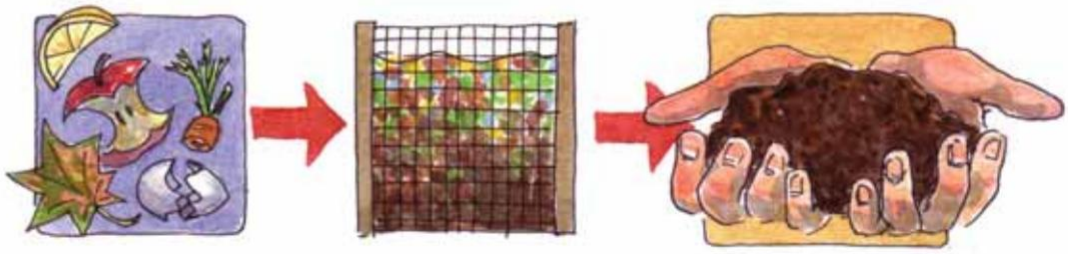
Mulching

Mulch is a protective covering of compost, straw, grass clippings, or leaves placed around plants, although many also like to use seaweed. Mulch can add nutrients, make the soil more workable, aid rainwater penetration, help control weeds, and improve the moisture-retaining capacity of the soil near roots. Mulch also minimizes losses of nutrients and topsoil.

Avoid using landscaping plastic beneath decorative rock or bark.

Composting

Compost is a dark, crumbly, and earthy-smelling form of decomposing organic matter. Perfect for mulch, compost enriches soil and improves plant growth. Composting is a practical way to transform yard, kitchen, and garden wastes into a valuable resource.

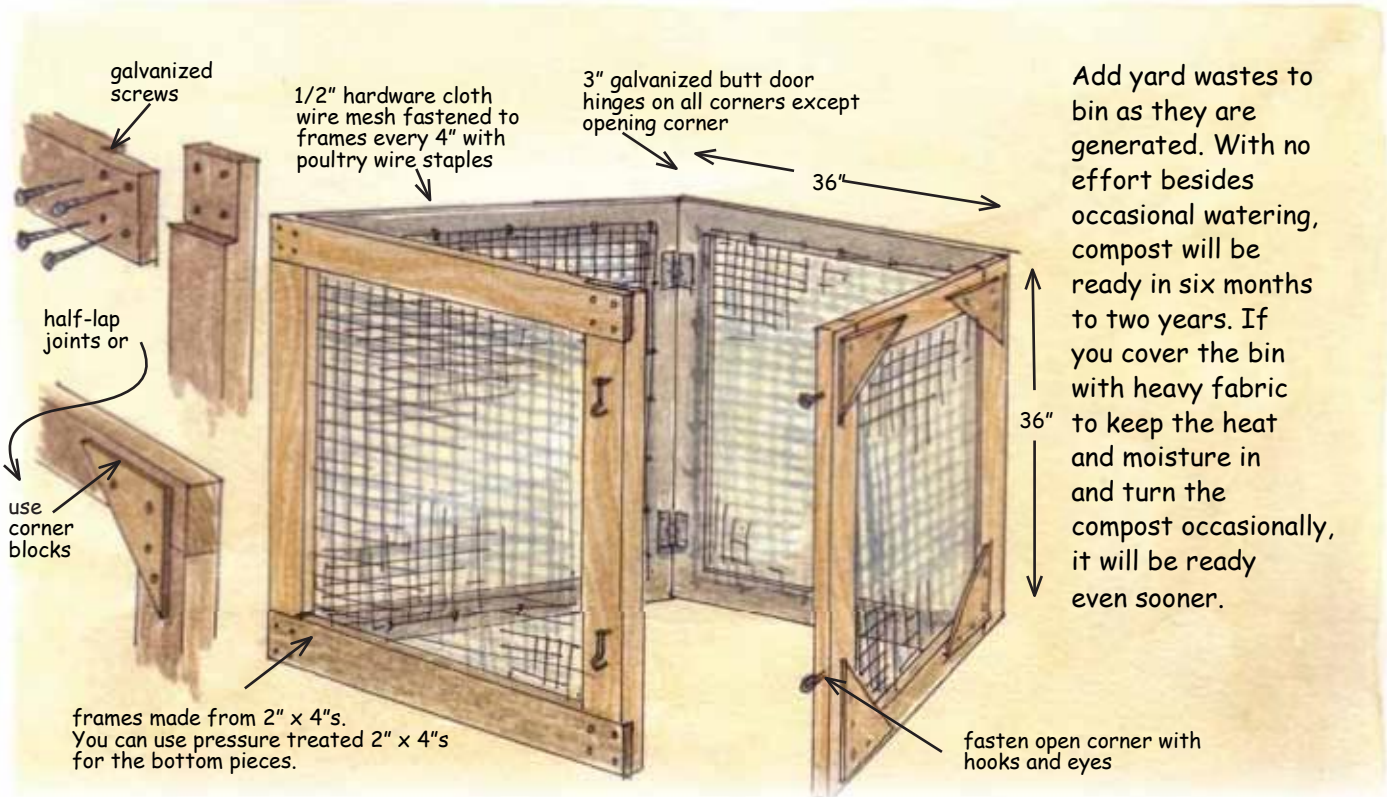


Leaves, cuttings and other yard wastes contribute some 10% to the average household's garbage. Since it is illegal to dispose of yard wastes near water bodies or by burning, (except at specific times of the year under certain conditions - check with the Mashpee Fire Department to obtain a permit) and because all Cape landfills are now closed, composting lawn and garden wastes has become the perfect way to save money and protect our environment. It is particularly damaging to dispose of yard wastes in or near shorelines and pond banks. The process of breaking down plant materials competes with aquatic animals for the limited oxygen dissolved in our waters. Some plant materials contain chemical components that can alter the balance in the marine environment. These unsightly wastes can create obstructions and dangers to boats, divers, and swimmers, and most often end up on your neighbor's beach. In Mashpee, you can choose to compost these wastes yourself, or you can take grass clippings, leaves and pine needles to the Mashpee Transfer Station free of charge. The town turns your yard waste into compost, which then is made available free of charge. Homeowners should consider the option of creating their own compost system since composting is also the answer for up to 10% of your garbage created by food wastes other than meat, bones, and fatty foods.

A compost pile is really a teeming microbial farm that breaks down anything left over from your gardening activities. Great joy can be had from a properly working compost pile that produces wonderful soil conditioner from garden and household waste.

Many composting efforts, both large and small, are improved by using red worms that consume nitrogen. For more information on other compost designs or where to purchase worms, see the Resources Chapter.

A Simple Portable Composting Bin

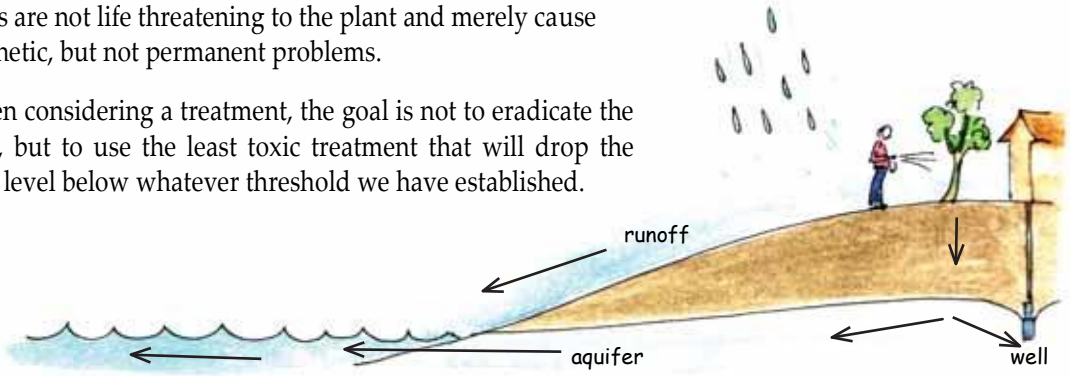


Pest Management

For years, pest control has meant chemicals. Once viewed as safe and effective for insect control, chemical pesticides are now considered ecologically harmful. They poison wildlife, contaminate water and soil, and harm humans, especially children, and pets. Many pesticides last a long time. When they enter the aquatic system, they can move from place to place, causing problems all along the way.

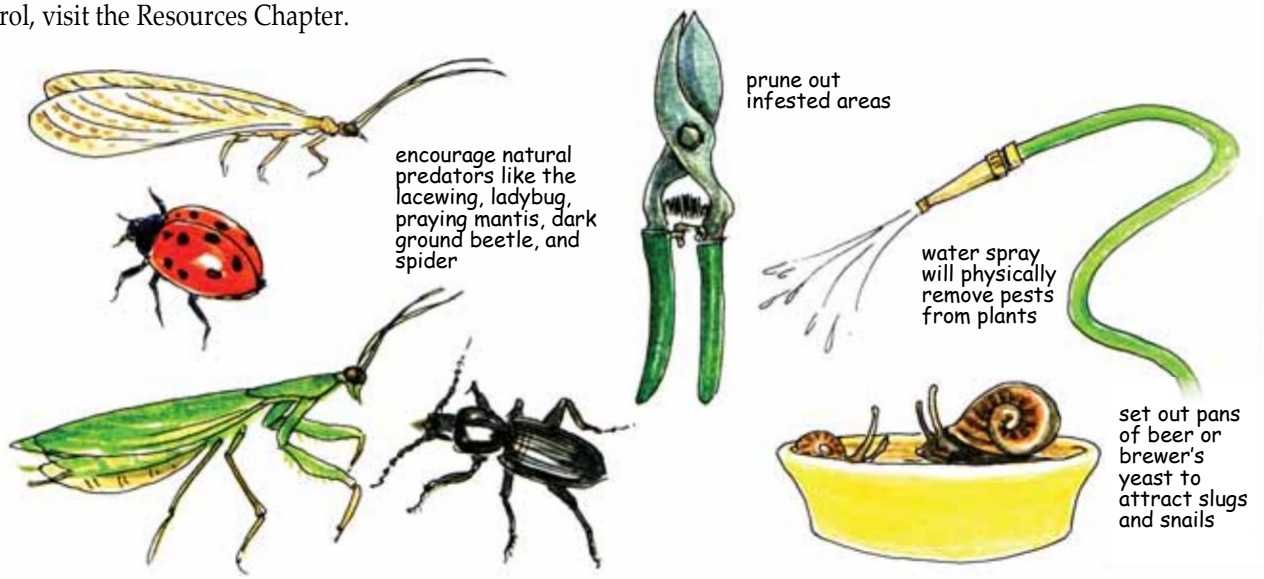
After planting adapted plant varieties, providing the necessary nutrients and moisture, and following through with good maintenance practices, gardeners should determine the threshold level of weeds or insect damage they are willing to accept. Setting our pest tolerance too low results in unnecessary treatments and possible environmental damage. Most pests are not life threatening to the plant and merely cause aesthetic, but not permanent problems.

When considering a treatment, the goal is not to eradicate the pest, but to use the least toxic treatment that will drop the pest level below whatever threshold we have established.



Here are some simple things we can do:

- Encourage natural predators like the lacewing, ladybug, praying mantis, dark ground beetle, and spider.
- Prune out infested areas.
- Use water spray to physically remove some pests from plants.
- Set out pans of beer or brewer's yeast to attract slugs and snails.
- Cut down on the number of mosquitoes breeding in your area by removing old tires and other areas of standing water.
- Avoid planting and harvesting when insects are most abundant.
- Buy plants that are resistant and free of pests and diseases.
- Provide plants with the growing conditions that they like best. This helps them resist pests and diseases.
- Remember that gardens with a variety of plant types are less susceptible to insect damage.
- Use organic products if possible. Your local garden center can suggest useful products.
- Encourage insect-eating birds by providing bird houses and baths. For more information on nontoxic alternatives to pest control, visit the Resources Chapter.



What Else Can I Do?

- Participate in municipal composting at the Mashpee Transfer Station.
- Request and buy organically grown food. This will help encourage the many farmers who want to use non-toxic pest control techniques.
- Find out how public areas are treated, for example, roadsides, municipal parks or golf courses.
- Research alternatives and suggest improvements through the Mashpee Conservation Commission and Department of Public Works.

Cape Cod Neighbor

Great Blue Heron: Walking in the Wetlands

That large graceful bird that you see walking among the marsh grass is undoubtedly a Great Blue Heron. Note its long legs and beak, grayish blue color, and its S-shaped neck. In flight, the heron's wingspan exceeds six feet from tip to tip. The Great Blue catches fish by standing quietly and then spearing them with its sharp beak. The survival of this beautiful bird relies on healthy wetlands.

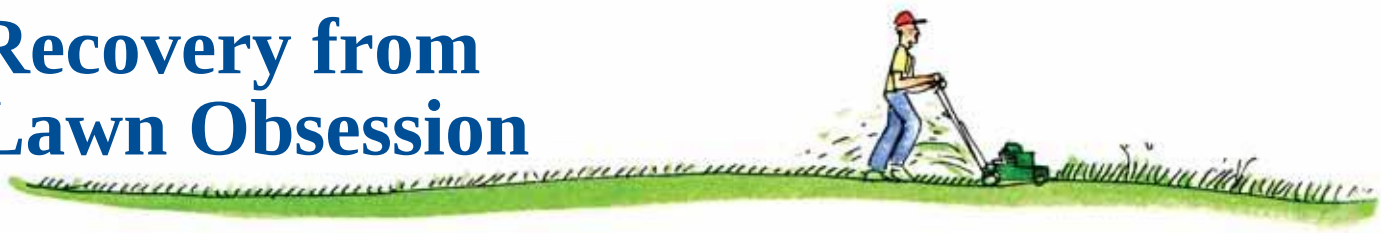
Cape Cod Neighbor

Osprey: Famous Fish Hawk

A coastal superstar, the osprey's resurgence on the Cape is a success story. The osprey's decline resulted from the disruption of nesting sites and the use of the chemical DDT, which thinned their eggshells. With the banning of DDT and the construction of nesting poles, the population of ospreys has grown in Mashpee and adjacent towns. Ospreys rely on our waters for food and habitat. An osprey family of four requires more than six pounds of fish.

Chapter 9

Recovery from Lawn Obsession

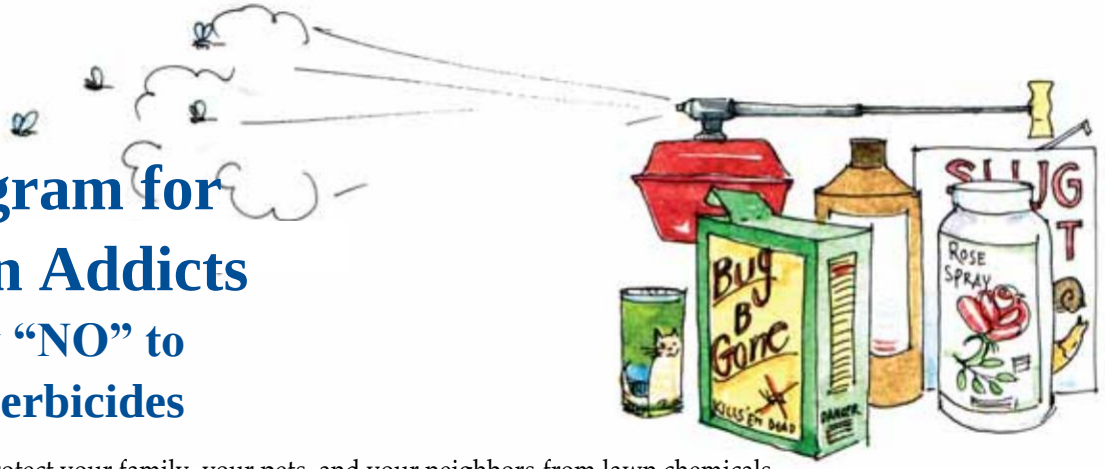


Are you or someone you love addicted to a dream lawn? You are not alone...

The perfect suburban lawn has become an American obsession, turning us into lawn-chemical junkies who require increasing amounts of pesticides, herbicides, and fertilizers to satisfy our cravings for immaculate turf. Billions of dollars are spent on television advertising to convince us to buy the latest lawn care products and to look with alarm at stray dandelions or clover.

But there's a catch. **Dream lawns are not safe for people, pets, or the countless wild things that normally inhabit our yards.** Lawn chemicals poison our drinking water and contribute to the deteriorating health of our ponds and bays - artificially green lawns produce green waterways.

Right here on the Cape, there is an easy and inexpensive remedy for the American lawn habit: **the traditional Cape yard**, a natural habitat that includes a variety of indigenous grasses, mosses, lichens, and wildflowers. These native ground covers survive summer heat and drought without pampering, poisoning, or polluting. They also feed birds, bees, butterflies, and are safe for children and pets.



12 Step Program for Dream Lawn Addicts

Step 1 - Just Say "NO" to Pesticides and Herbicides

Make a firm commitment to protect your family, your pets, and your neighbors from lawn chemicals.
The first step is to dispose of all your old pesticides, herbicides, and fungicides at the next local hazardous waste collection day. If you plan to use a professional lawn care company, hire one of the region's organic landscapers. If you decide to go cold turkey, get support for kicking the lawn chemical habit. Research the dangers of these substances or consider the following:

- By State law, all schools in our region now restrict pesticide use to protect children. It's up to you to protect them at home.
- The risk of canine malignant lymphoma doubles with the use of herbicide 2,4-D on a dog owner's lawn.
- Many Canadian municipalities have banned or severely restricted the use of common lawn-care pesticides including the herbicides 2,4-D and MCPP.
- So called "inert" ingredients in lawn chemicals can amount to 95% of the product and be more toxic than active ingredients.
- Golf course maintenance crews working with toxic lawn chemicals face elevated risks of dying from brain cancer, lymphoma, prostate cancer, and large-intestine cancer.

67 million pounds of pesticides are used on American lawns every year.

Lawn pesticides get carried indoors on shoes and paws and can persist for months in your home and the air or trapped in carpets, dust, toys, etc.

Step 2 - Be Patient, Poisoned Soils Need Time to Heal

The sooner you stop using toxic chemicals, the faster your soil will regain its natural health. Past use of lawn chemicals may have destroyed the microbiotic life that exists in healthy soil; it may take three years for your soil to recover its natural defenses. Meanwhile, there are nonpoisonous methods to treat for pests; consult the Resources listed in Chapter 13.

Step 3 - Reduce the Size of Your Lawn

Reduce your grass area enough to allow hand-powered reel mowing. It will provide you with a good cardiovascular workout without gym fees or air and noise pollution. In surrounding yard areas, create a **Cape Cod meadow** for native grasses and wildflowers that will sustain butterflies, bees, and lightning bugs. The Conservation Commission can provide you with suggestions for meadow plant mixtures for your planting conditions and tell you where you can buy the seed. Mow your meadow only once a year, in early May, to eliminate encroaching woody plants. Replace other lawn areas with native bushes and trees, a vegetable garden, and fern and moss beds for shady places. Plant groundcovers on steep slopes where mowing is dangerous. If the above steps seem too extreme for you, reduce your lawn gradually; simply mow fewer rows each year.

Step 4- Let the Clippings Fall Where They May

Keep mower blades sharp and mow to a height of 3 inches. Mow often enough so that no more than 1/3 of the grass height is removed with each cutting. Forget raking. If left on the ground, grass clippings provide more than a third of the nutrients your lawn needs. They decompose quickly thanks to earthworms and microorganisms. Clippings also conserve water by shading the soil from the sun and reducing moisture loss from evaporation. If you end up with extra grass clippings use them in the compost pile.

Step 5 - Fertilize with Compost Only

The best and safest alternative for the Cape Cod lawn is no fertilizer. Approximately 15% of the nitrogen that washes into our bays is from residential fertilizer use. Native grasses and wildflowers have always done well on their own. If you enjoy working on your patch of grass, feed it compost made from your own kitchen and yard wastes. If you're still hooked on fertilizer from a bottle or a bag, go organic or *insist that your lawn company does.* Measure and calculate your lawn's square footage. Apply slow release insoluble organic fertilizer in spring and fall, adding no more than 1 pound of actual nitrogen per thousand square feet of lawn. The more you fertilize the more you mow.

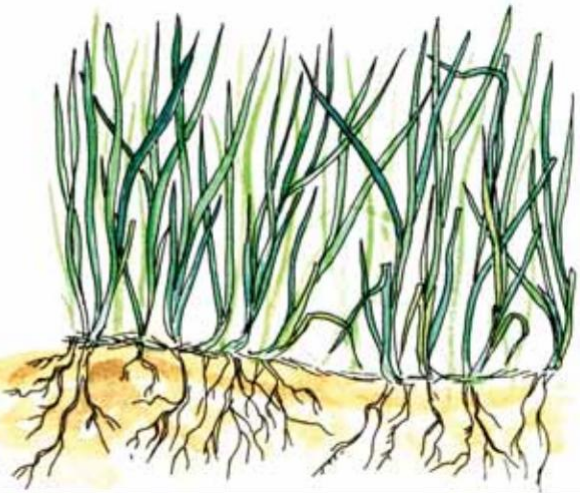
3 million tons of fertilizers are used annually on American lawns to keep them greener than normal or necessary.

Step 6 - Leave Watering to the Clouds

Summer dormancy is a natural rest period for your lawn. When hot dry weather turns your grass golden, don't fret; it will recover with autumn rains. Save summer watering for your favorite places in the yard and water early in the morning to cut down on evaporation.

30% of the water consumed on the East Coast goes to watering lawns.

Step 7 - Mix Those Seeds



If you must have an all grass patch of lawn, use fescue, rye, and clover. These are hardier and more drought resistant than bluegrasses. Clover contains nitrogen-fixing bacteria that will naturally fertilize your lawn. Look for seed containing fungi that are repellent to certain lawn pests. Seed in the fall when cooler and wetter days provide ideal conditions for germination and deeper root growth.

Step 8 - Forget the Lime

Cape soils are naturally acidic allowing a wide variety of mosses to thrive. Celebrate moss in your lawn as it stays green all summer and won't need mowing. For creative ways to landscape with moss see the Resources Chapter.

Step 9 - Leave Thatch and Aerating Woes to the Microbes

Organically managed lawns are alive with earthworms and beneficial microbes that naturally recycle thatch and aerate your lawn. If you must toil over your grass, get down on your knees, break up and aerate compacted areas by hand, and apply compost before reseeding.

Step 10 - Celebrate Diversity

Train your eye to appreciate variety in your lawn. As many as 50 species of plants may grow in a typical nonherbicided lawn. Daisies will naturally adjust to bloom below the height of a cutter bar; so will other wildflowers. Yellow wood sorrel adds texture and makes refreshing summer soups. You'll never have to mow patches of moss and lichens. As your dream-lawn addiction subsides, you will begin to appreciate additions of color and texture to your lawn. When weeding mania hits, do it by hand, or, if you must apply something, use "green"products for pre-emergent weed control.

Step 11 - Take a Walk on the Wild Side

Feeling seduced by the perfect turf on TV? Suffering from lawn envy? Take a walk in any of the Cape's nature preserves and appreciate the beauty of diverse grasses, wildflowers, lichens, and mosses that support bees, butterflies, and wildlife of all kinds. Find a field full of fireflies and you know you're in the right place. Try replicating that environment in your own yard.

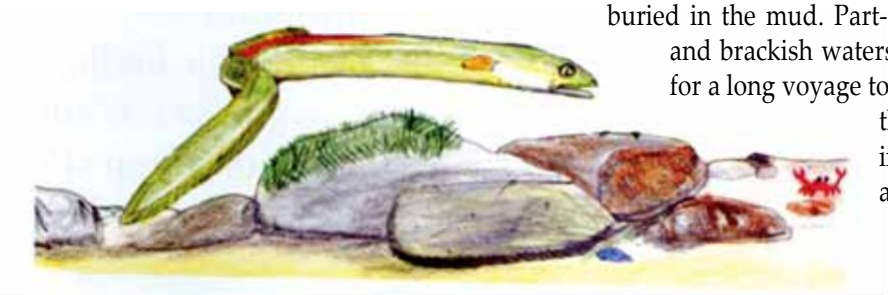
Step 12 - Become an Advocate for the Cape Cod Lawn

How will you know when you and your lawn have completely recovered? You will be spreading the word and not the poison. Share the good news with dream-lawn addicts, landscapers who use lawn chemicals, or the stores that sell them. If you play golf, find out what chemicals are being used on your greens; alert the groundskeepers to their increased risk of cancer. Help monitor what goes into the lawns of local parks, businesses, schools, and municipal greens. We can all help keep the Cape environment healthy and beautiful, our water drinkable, and our shellfish beds thriving.

Cape Cod Neighbor

American Eel: A Well-Traveled Fish

Since there are no sea snakes in Cape waters, the long, slimy animal you might encounter is the American eel. This fish has a narrow, streamlined body that helps it swim rapidly. Eels are nocturnal; they spend their days buried in the mud. Part-time residents, eels leave the fresh and brackish waters of our local waterways in the Fall for a long voyage to the Sargasso Sea, off the coast of the Bahamas, where they gather in great numbers with eels from around the world to reproduce.

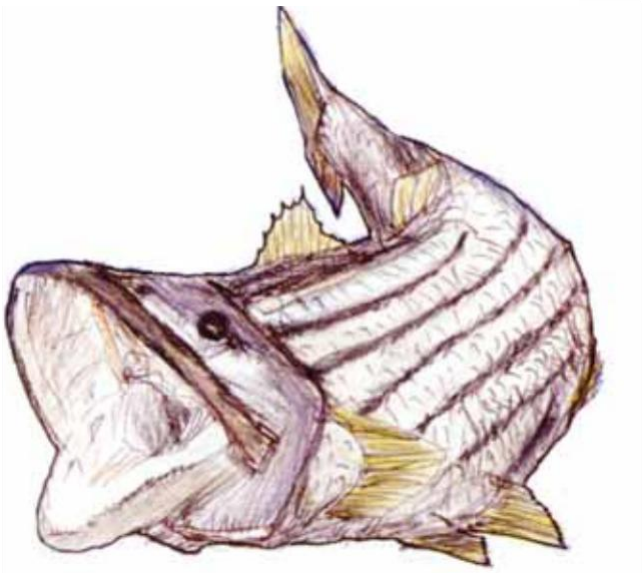


Cape Cod Neighbor

Lobsters: Life on the Ledge

Once known as poor man's food, lobster has made a comeback at dinner tables. Nearly 90% of legal-sized adult inshore lobsters are harvested every season. The heart of the local lobster fleet is based in Nauset Harbor and Chatham. Nocturnal scavengers, lobsters eat almost anything they can find by crushing and ripping food with their large claws. Most lobstering in New England occurs during the spring, summer, and fall.

Cape Cod Neighbor

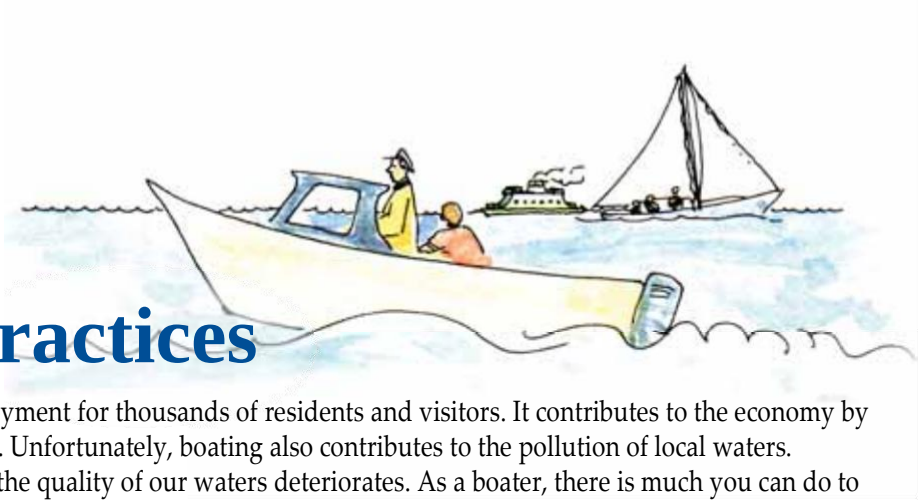


Bluefish and Striped Bass: The Angler's Favorite

Bluefish and Striped Bass are the most sought-after Cape fishes providing great sport through catch and release fishing, and great eating when you catch a "keeper." Striped Bass is the largest fish available to the nearshore angler ranging from one to over 60 pounds. Bluefish are usually ravenous and will strike at just about anything you give them. Watch out for those teeth! Whatever your favorite fishing spot, remember that only healthy waters provide the ideal habitat for your future dinner.

Chapter 10

Getting Out on the Water - Good Boating Practices



Recreational boating provides relaxation and enjoyment for thousands of residents and visitors. It contributes to the economy by providing jobs in boat manufacturing and service. Unfortunately, boating also contributes to the pollution of local waters. All of us - especially boaters - have a lot to lose if the quality of our waters deteriorates. As a boater, there is much you can do to help protect the waters that bring you so much pleasure.

Maintaining Your Boat

Many of the cleaning, dissolving, and painting agents used for boat maintenance are toxic to marine and aquatic life. A few simple precautions can prevent these chemicals from harming our coastal ponds, sounds, and harbors.

Bottom Paints

The more traditional copper and tributyltin (TBT) bottom paints that were used to prevent fouling cause environmental damage. "Fouling" refers to the whole host of organisms that can attach to and grow on the hulls of boats, affecting their performance. TBT has been shown to damage our shellfish populations and has been banned nationally. Other environmentally friendly alternatives are now available. These work by producing peroxides that kill the fouling organisms while they are still microscopic. The peroxide quickly breaks down into water and oxygen, so it is safe to use and does not hurt the environment. When scraping the boat bottom, catch the scrapings with a drop cloth. Use sanders with vacuum attachments and sweep up any scrapings or dust that may escape your drop cloth. Bring them to your next hazardous waste collection day.

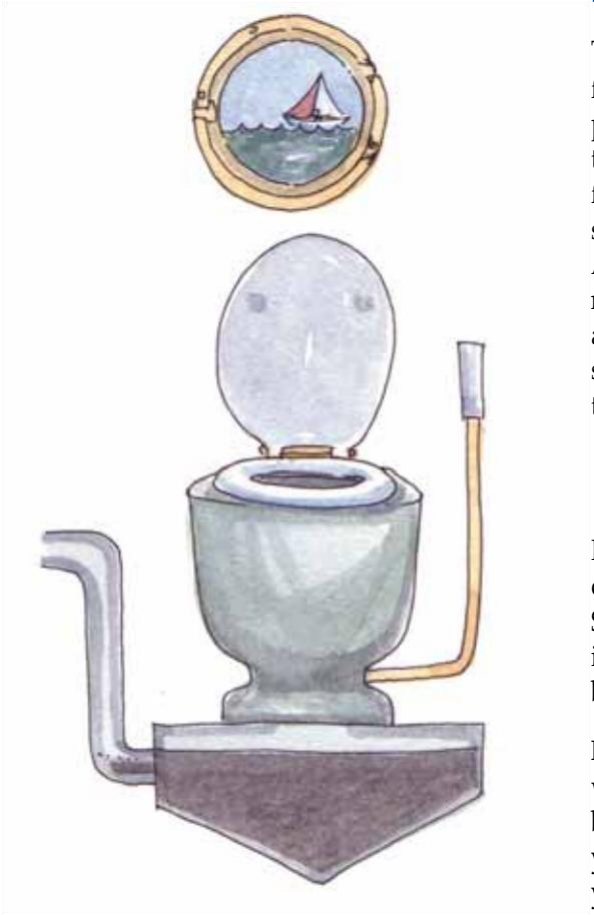
Cleaning Your Boat

Rinse and scrub your boat with a brush or power washer after each use instead of using soap. If your boat is stained, use phosphate-free soap or laundry detergent, or any of the alternatives suggested in Chapter Five on hazardous waste. When possible, avoid products that remove stains and make your boat shine. They are extremely toxic. As a rule, avoid any products with a "Toxic" warning on the label; they can kill marine life if washed overboard or accidentally spilled into the water.

Bilge Wastes

Bilgewater presents a major challenge for boaters. Since bilgewater often contains oily wastes, boaters are often tempted to add detergent to it and pump it overboard. The detergent, already harmful on its own, breaks the oil into small floating droplets spreading the area of impact to the larval stages of the many marine creatures that inhabit the surface water. This practice is not only environmentally damaging, it is illegal and punishable with a fine of up to $10,000.

Is the best solution to take the oil/water mixture to the oil recycling container at the local marina? Unfortunately, no: the signs indicate "Oil only - no bilge wastes." What can a conscientious boater do? First, fix any leaks that might contribute oil to the bilges. Next, before pumping the bilgewater overboard, capture the floating surface oil with oil-absorbent pads, paper towels, or old nylon stockings. A product called a "bilge sock" can be used to sop up oily bilgewater. Bilge socks are available at local marinas.



Fuel

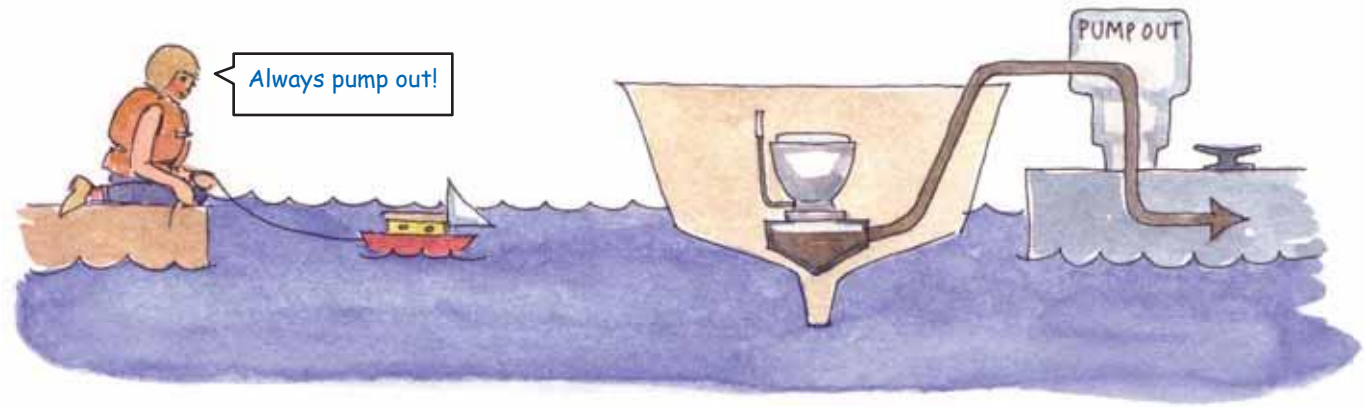
The traditional method for determining a full fuel tank is watching for fuel spilling from the tank over-flow vent. Fuel overflows are dangerous to people and toxic to fish and other aquatic life. Small fuel spills are subject to federal fines of up to $5,000. Several commercial products are available from marine supply stores to help you prevent these overflows. The simplest is a container that attaches to the fuel vent to capture overflows. A more sophisticated tank vent surge protector works with automatic nozzles to shut off the fuel flow when your tank is full and with non-automatic nozzles that gurgle when it is time to stop pumping. Another similar product changes pitch when the tank is full. Even small spills need to be wiped up immediately to keep them from reaching the water.

Sewage

Human waste contains disease-causing bacteria and viruses that compromise safe public swimming and contaminate shellfish beds. Sewage is a source of nutrient overload in coastal salt ponds, bays, and inlets. Nutrient enrichment "fertilizes" the waters and contributes to algae blooms and oxygen depletion, which kill marine life.

Be responsible with your waste. It is ***illegal*** to dump untreated sewage into the water, and violators are subject to a $2,000 fine. If you have a toilet on your boat, it must be equipped with a Marine Sanitation Device (MSD). Acquaint yourself with the use and maintenance of the type of MSD on your boat. If your boat does not have an installed toilet, consider using a portable toilet. Many marinas have dump stations to empty portable toilets.

Regardless of what type of MSD your boat has, sewage pump-out stations or portable pump-out units should be used to empty holding tanks when moored or docked in marinas and harbors. This service is FREE in many harbors. Check with the local Harbormaster to find the nearest pump-out facility.



Trash

Trash is the most visible pollution in our waters. Designate a storage area on your boat specifically for trash and regularly take the trash to shore for proper disposal. Beverage cans, Styrofoam cups, plastic bags, fishing line fragments, and other debris can trap, injure, and kill aquatic life and birds. Most of this debris doesn't disintegrate; instead it remains in the waterways for years and continues to kill wildlife, foul propellers, and clog engine-cooling water intakes. It is illegal to dispose of trash in the water. Call the Coast Guard if you see any boat, commercial or recreational, dumping plastics or other trash overboard.

Erosion

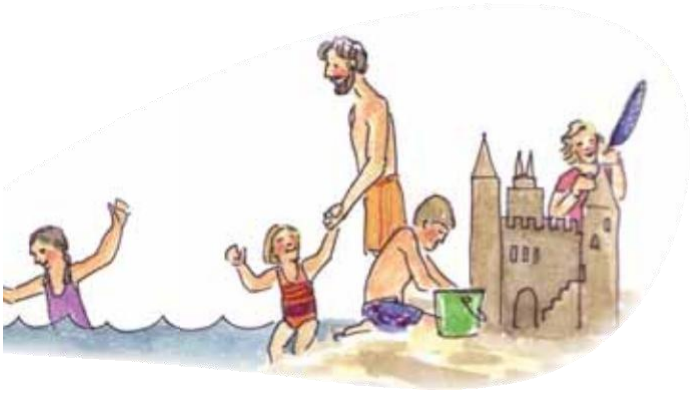
Boat wakes contribute to shoreline erosion, especially in narrow streams and inlets. This loss of land is a problem for Cape towns and also affects boaters. Eroded sediments can cause unwanted shoals and shallows, cut off light to underwater life, especially plants, and create tremendous problems for aquatic ecosystems. The extent of shoreline erosion caused by boat wakes depends on the wake's energy. This energy is based on four factors: distance from the shore, hull size, speed, and water depth. The closer to the shore, the greater the hull size, and the shallower the water, the more damage a boat wake can cause. To minimize shoreline erosion, boats should reduce wakes within 500 feet of the shore. Many habitats near the shore, and the animals and plants that inhabit them, are sensitive to disturbance. Boaters, skiers, and jet skiers should avoid speed and excessive traffic in these fragile areas. Erosion from boat prop wash (agitation produced by the boat's propeller while the engine is in gear) is very often seen along docks and piers. If the boat is run in gear while tied up, sediments are stirred up and washed away, creating an artificial dredged area beside the dock. As these sediments resettle, they suffocate marine life in the surrounding area.

Docks and Piers

Excessive numbers of private docks collectively have negative impacts on our coastal bars and ultimately depreciate the value of waterfront homes. They may impair water circulation, alter bottom sediments, shade eelgrass and restrict access to shellfish beds. Rather than imperil the water body you live on with a new dock, consider sharing a communal pier or keeping your boat on a mooring. Further, many docks and piers are constructed with pressure-treated wood. The toxic materials used to help the wood last longer in the marine environment leach out slowly over time, killing marine plants and animals. Alternatives such as heart wood and many new plastic construction materials should be considered for new structures, repairs or replacements. Keep in mind that boats tied to docks can cause sediment changes that can destroy shellfish habitat.

Chapter 11

Not Just for Kids



Goin' Fishing. When you're trying to catch a big one, consider that lead sinkers and fishing lines are a hazard to wildlife. Water birds can swallow the sinkers lost from your line and die from lead poisoning. Instead of lead, use plated steel sinkers or washers and plated steel hooks. And be sure to properly dispose of your fishing lines so it won't entangle wildlife. Local tackle stores provide boxes for you to dispose of old line.

Beach Trash Pickup. Always carry out your own trash and any other trash you find on the beach.

Watershed Address. Find your Watershed Address on the maps in Chapter 1 of this booklet. Where does the rain that falls in your yard go?

Water Watch. Who's wasting water in your house? Be a water detective; check for leaky faucets and turn off the water while brushing your teeth or washing dishes. Learn about water-saving devices such as low-flow shower heads and appliances and talk to your parents about installing them.

Reduce, Reuse, and Recycle. We make a lot of unnecessary trash. Reduce the amount of trash you make: buy things with less packaging, fix things instead of buying new ones, recycle, and compost organic wastes.

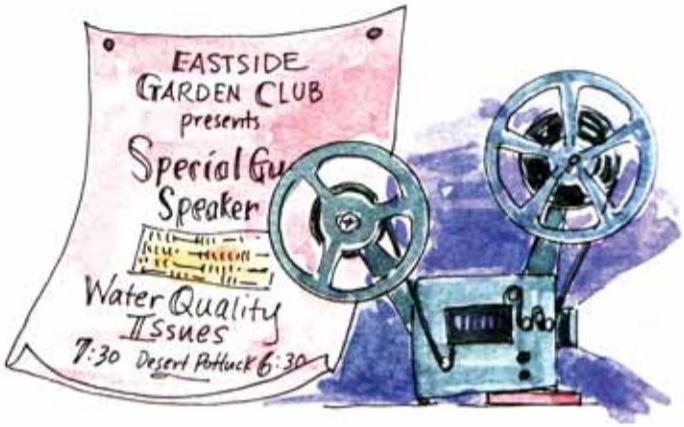
Get Your School Involved. Talk to your teacher about taking a field trip to a local pond, bay, or estuary and learn all you can about the waters around you. Cape Cod Museum of Natural History, Wellfleet Bay Wildlife Sanctuary, and Cape Cod National Seashore all provide outings for students.

For Teens. With your parents, read the section on hazardous waste, then go on a toxics hunt around your house. Look for these warnings on the labels: **DANGER, CAUTION, WARNING, POISON, CORROSIVE, CAUSTIC, INERT, FLAMMABLE, OR EXPLOSIVE.** When these items are ready for disposal, they should go to the Hazardous Household Materials Collection Day, sponsored each year by the Barnstable County Department of Health and the Environment. Why not find out how these hazardous wastes are collected? Learn about alternatives to these products and use them when you can.

Chapter 12

Taking Action: The Big Picture For You and I…….

If we make healthy choices for our bodies, the chances are we'll be healthier. The same goes for our environment. We residents and visitors alike, are stewards of our phenomenal water resources; our lakes, ponds, streams, tidal estuaries, wetlands, and harbors – and most precious of all, the groundwater aquifer. The health of these resources depends on the choices we make.



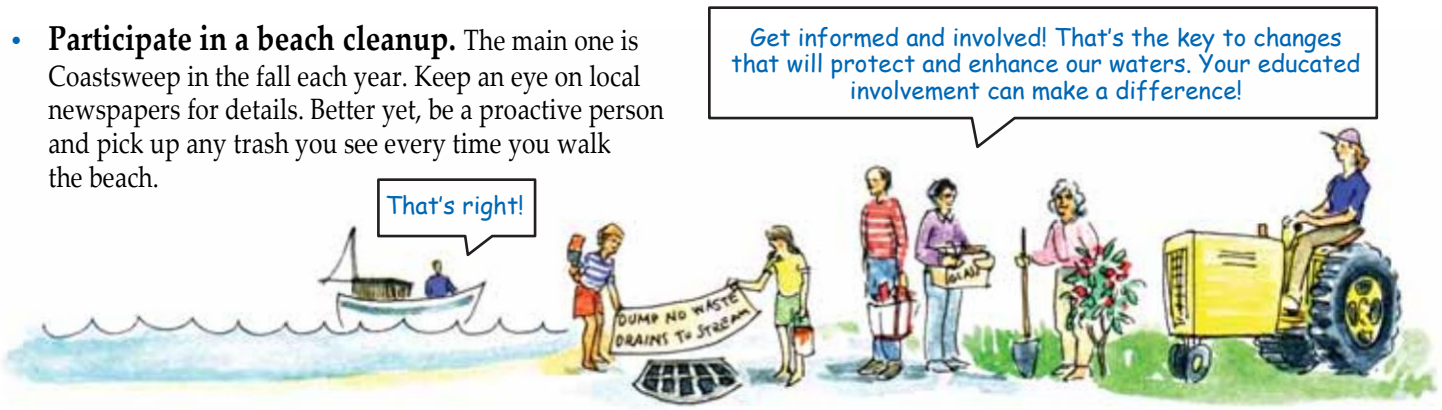
First: Everyone lives on the water. Refer to the maps in Chapter 1 of this booklet. Which watershed do you live in? Become familiar with your watershed. Think about what its resources mean to your daily life. How would your life be changed if you didn't have clean water to drink and swim in, and fish and shellfish to eat?

Second: Put into practice as many of the suggestions offered here as you can. You don't have to adopt them all at once. Start with one, or maybe several, and when they become part of your routine, add a few more. Talk with your family, friends, and neighbors about what you're doing "waterwise". Spread the "water word"!

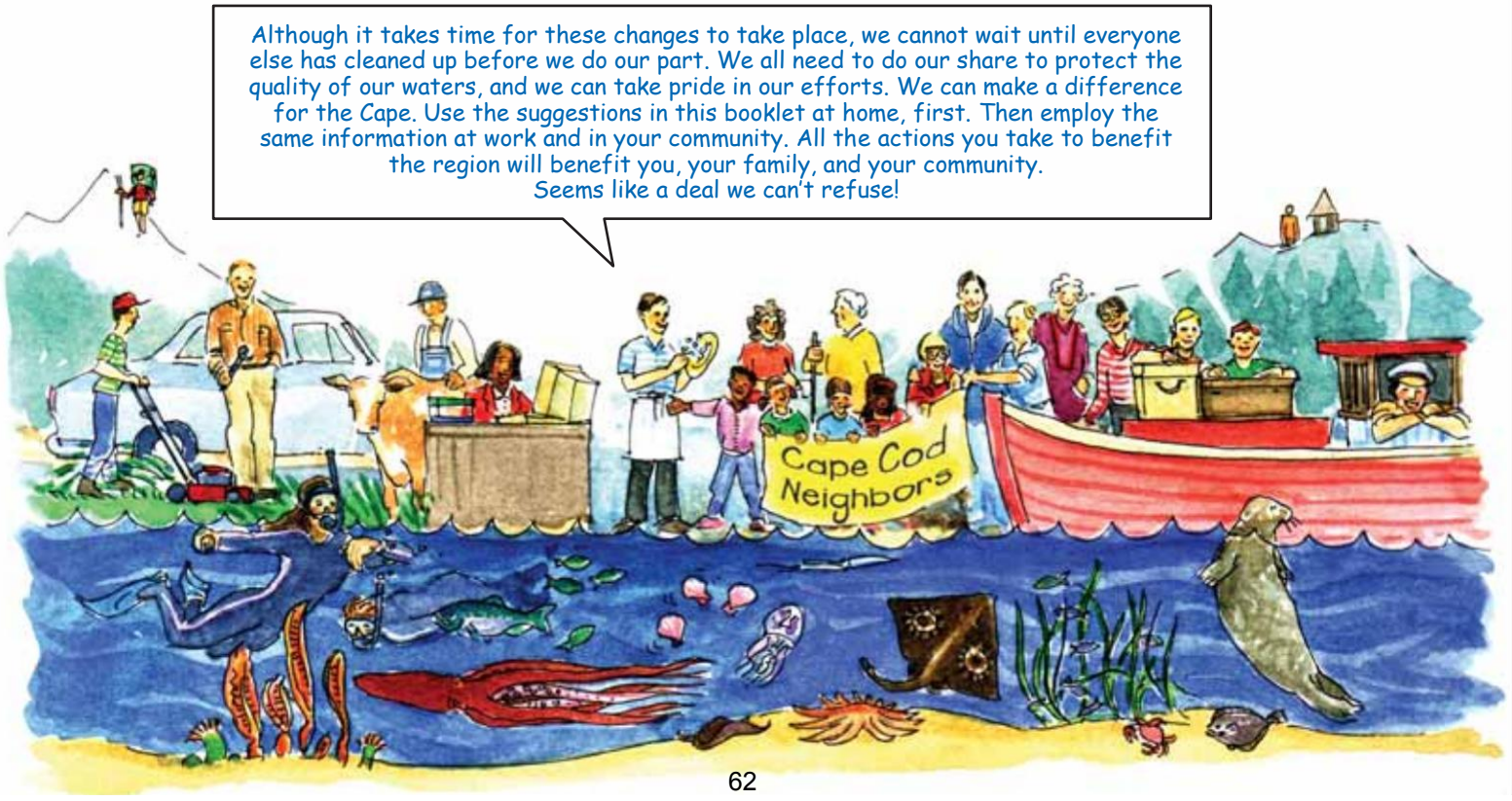
Third: Individual actions are important, but organizations are also essential. If you already belong to a group that is active in protecting our water resources – TERRIFIC! If you don't, remember, there are many ways to get involved. No matter what your interests and skills, no matter how little time you think you can offer, there's a place for you. Serve on a town board, environmental group or volunteer at a special event. No matter what you do, you'll be joining others who share your concerns and want to make a real contribution to safeguard our water resources. Here are some activities you may wish to consider:

- **Join your local watershed group** such as the Mashpee Environmental Coalition, or a local "Friends of" environmental group. If there is no watershed group in your area, **start one!**

- **Participate in a beach cleanup.** The main one is Coastsweep in the fall each year. Keep an eye on local newspapers for details. Better yet, be a proactive person and pick up any trash you see every time you walk the beach.



- **Volunteer to help at the Household Hazardous Waste Collections** held each year.
- **Help organize a public presentation on water issues.** Events are scheduled throughout the year.
- **Become an advocate for nitrogen removal technologies** for both home and municipal facilities. You can help inform others about new technologies that remove nitrogen from our waste and can help save our ponds and estuaries.
- **Help educate the next generation about the importance of protecting our water** by volunteering on school field trips to water resource areas, wastewater treatment facilities, and town wells.
- **Start your own initiative!** There are new approaches to water-related issues appearing daily. Maybe you have an idea no one has thought of. Every step forward counts. The goal is to protect our precious water resources, any way we can. Everyone has a stake in our water resources.



Chapter 13

Where to Go for Help…

Resources for taking the next steps

Citizen Advocacy Groups

Mashpee Environmental Coalition, www.mashpeemec.us
Buzzards Bay National Estuary Program, www.buzzardsbay.org
Orleans Pond Coalition, www.orleanspondcoalition.org
Association to Preserve Cape Cod, www.apcc.org
Friends of Santuit Pond, www.sites.google.com/site/friendsofsantuitpond

Sustainable Energy

Cape Light Compact, www.capelightcompact.org
Cape Cod Community College, www.capecod.edu/envirotech
Cape and Islands Self Reliance, www.reliance.org
Massachusetts Department of Energy Resources, www.mass.gov/doer/programs/renew
Massachusetts Department of Environmental Protection, www.mass.gov/dep/energy.htm
Massachusetts Technology Collaborative, www.masstech.org/
Vineyard Energy Project, www.vineyard-unplugged.org

Regional Planning

Cape Cod Commission, www.capecodcommission.org
Cape Cod Water Protection Collaborative, www.barnstablecounty.org/bbwastewater.htm
Pleasant Bay Resource Management Alliance, www.pleasantbay.org

Conservation, Education, and Research Groups

Cape Cod Community College, www.capecod.edu/envirotech
Cape Cod Museum of Natural History, www.ccmnh.org
Center for Ocean Science Education Excellence, www.cosee-ne.net
Coastal Resources Committee, www.capecodcommission.org/coastal
Audubon Society, Wellfleet Bay Wildlife Sanctuary, www.massaudubon.org
Massachusetts Estuaries Project, www.oceanscience.net/estuaries/index.htm
The Nature Conservancy, www.nature.org
Coastal Systems Group, www.smast.umassed.edu/Coastal/research/estuaries.html

The Ocean Conservancy, www.oceanconservancy.org

Provincetown Center for Coastal Studies, www.coastalstudies.org

Woods Hole Sea Grant Program, www.whoi.edu/seagrant

Woods Hole Research Center, www.whrc.org/capecod/index.htm

Local, State, and Federal Government Resources

Town of Mashpee, www.mashpeema.gov

Barnstable County, www.barnstablecountyhealth.org/bsorleans.htm

Cape Keepers, www.capekeepers.org

Wampanoag Tribe, www.mashpeewampanoagtribe.com

Cape Cod Conservation District, (508) 771-8757

Cape Cod Cooperative Extension (Coastal Explorer Mobile Marine Science Exhibit), www.capecodextension.org/home.php

Gerry E. Studds Stellwagen Bank National Marine Sanctuary, http://stellwagen.noaa.gov

Massachusetts Office of Coastal Zone Management, Be a Coastal Caretaker, www.mass.gov/czm/coastguide/online/caretaker.htm

Monomoy National Wildlife Refuge, http://monomoy.fws.gov

The Estuaries Project: Watershed/Embayment Nitrogen Management
www.smast.umassd.edu/Coastal/research/estuaries/estuaries.html

Massachusetts Bays Program, www.mass.gov/envir/massbays/capecod.htm

Massachusetts Department of Environmental Protection, www.mass.gov/dep/water

U.S. Environmental Protection Agency, www.epa.gov/ebtpages/water/html

Water Quality Testing

Provincetown Center for Coastal Studies, www.coastalstudies.org

Fisheries and Shellfish Groups

Cape Cod Commercial Hook Fishermen's Association, www.ccchfa.org

Martha's Vineyard Shellfish Group, Inc., www.mvshellfishgroup.org

Town of Eastham Aquaculture Technology and Training Center, (508) 240-3833

Town of Orleans, Shellfish and Harbormaster, (508) 240-3755

Wampanoag Tribe Shellfish Hatchery, (508) 645-9420

Division of Marine Fisheries, Commonwealth of Massachusetts, www.state.ma.us/dfwele/dmf/index.html

Agriculture/Horticulture Research

Agriculture/Horticulture Research Cape Cod Cooperative Extension: www.capecodcooperativeextension.org

Barnstable County Conservation District, www.capecodcd.org

Cape Cod Cooperative Extension, www.capecodcooperativeextension.org

University of Massachusetts Cooperative Extension, www.umassextension.org

Chapter Reference Material

Introduction – A Water Primer

Chapter 1 – About Mashpee

EPA Wetlands, Oceans and Watersheds, www.epa.gov/owow/
Mashpee Planning Dept.,Town of Mashpee, www.mashpeema.gov
Mashpee Wampanoag Tribe, www.mashpeewampanoagtribe.com
Massachusetts Department of Environmental Protection, www.mass.gov/dep/water
United States Geological Survey groundwater information,
Mashpee Environmental Coalition, www.mashpeemec.us

Chapter 2 – A Quick Start for the Water Wise

Groundwater Guardians, www.capecodcommission.org/gwguardians/home.htm
100 Water-Saving Tips, www.wateruseitwisely.com/100ways/ne.shtml
Water Awareness Test, www.getwise.org

Chapter 3 – Water, Water Everywhere

Save Our Planet: 750 Everyday Ways You Can Help Clean Up the Earth, MacEachern
Water saving devices, www.eartheasy.com/live_water_saving.htm

Chapter 4 – Out of Sight, Out of Mind

Title 5 Septic Systems, Massachusetts Department of Environmental Protection,
www.mass.gov/dep/water/wastewater/septicsy.htm
For more information on alternative systems:
Alternative Septic System Test Center, www.buzzardsbay.org/etimain.htm
Department of Environmental Protection, www.state.ma.us/dep/brp/wwm/t5itprog.htm
National Small Flows Clearinghouse, www.nesc.wvu.edu/nsfc/nsfc_index.htm

Chapter 5 – Hazardous Waste? Not in my House!

Cape Cod hazardous waste collections, www.barnstablecounty.org
Household hazardous product collections, www.capecodextension.org/home.php
Massachusetts EPA Household Hazardous Products Hotline, (800) 343-3420

Chapter 6 – Rethink/Reuse/Recycle

Transfer Station, www.mashpeema.gov
Donate computers, www.cristina.org
Recycle electronics and more, http://earth911.org
Massachusetts EPA Motor Oil Information, (617) 556-1022
Used motor oil recycling, www.recycleoil.org
Get on "Do Not Mail" lists: send a letter with your name, home address and signature to Mail Preference Service, Direct Marketing Association, P.O. Box 643, Carmel, NY 10512
Stop receiving unsolicited credit offers, (888) 567-8688, www.optoutprescreen.com
For more tips on reducing your junk mail, www.globalstewards.org or stopthejunkmail.com
Cape Cod Cooperative Extension: www.capecodcooperativeextension.org

Chapter 7 – Spare those Trees & Shrubs!

Save Our Planet: 750 Everyday Ways You Can Help Clean Up the Earth, MacEachern
Sea Grant Woods Hole, "Focal Point" Newsletters:
"Cape Cod Coastal Erosion: A Case Study", April 1998
"Shoreline Change and the Importance of Coastal Erosion," April 2000
"Sustaining Coastal Landforms," January 2001
"Evaluation of Coastal Erosion Hazards: Results from a National Study and a Massachusetts Perspective," August 2001
"Coast Lines," the annual magazine of the Massachusetts Office of Coastal Zone Management

Commonwealth of Massachusetts, Department of Environmental Protection brochure:
"Clean Water Tips - Nonpoint Source Pollution and What Can You Do To Help"
Massachusetts Wetlands Protection Act and Regulations, contact Orleans Conservation Commission, Town Hall.
DEP Nonpoint Source Program, www.mass.gov/dep/brp/wm/wmpubs.htm
DEP Southeast Regional Office, (508) 946-2714
Massachusetts Coastal Zone Management, www.mass.gov/czm
Sea Grant Program, Woods Hole Oceanographic Institution, www.whoi.edu/seagrant
Cape Cod Cooperative Extension, www.capecodcooperativeextension.org

Chapter 8 – Landscaping for Healthy Watersheds

The Cape Cod Garden – A Handbook for Successful Planting, C. L. Fornari
The Gardener's Guide to Common-Sense Pest Control, William Olkowski
A Guide to Invasive Plants in Massachusetts, Wetherbee, Somers and Simmons
Native Plants of the Northeast – A Guide for Gardening and Conservation, Donald J. Leopold
Seascape Gardening, Anne Halprin
For testing soil samples, www.capecodextension.org
Bayscaping, www.peconicbaykeeper.org/getinv/bayscp.htm
Compost designs and suggestions, www.epa.gov/compost, www.compostumbler.com
Composting and rain barrels, www.cityfarmer.org, www.rainbarrelguide.com
Benefits of insect-eating birds, Massachusetts Audubon Society, www.massaudubon.org
Cape Cod Cooperative Extension, www.capecodcooperativeextension.org
Edible Cape Cod, www.ediblecapecod.com/pages/articles/summer *See Tim Friary - Organic gardening*
Red worms for composting available on the Internet.

Chapter 9 – Recovery from Lawn Obsession

Redesigning the American Lawn, A Search for Environmental Harmony, F. Bormann et al.
Alternative Pest Controls for Lawns and Gardens, Rachel Carson Council, www.members.aol.com/rccouncil/ourpage
US Environmental Protection Agency, www.epa.gov/pesticides/controlling/garden.htm
www.chem-tox.com/pesticides
www.grassrootsinfo.org
www.ecochem.com/pesticides.html
To landscape with moss, www.mossacres.com
Buzzards Bay National Estuary Program, http://www.buzzardsbay.org/lawncare.htm
Cape Cod Cooperative Extension, www.capecodcooperativeextension.org
Massachusetts Department of Environmental Protection, www.mass.gov/dep/

Chapter 10 – Getting Out on the Water

Coast Guard Auxiliary, http://nws.cgaux.org/visitors/ve_visitor/index.html
Eco-friendly boating, www.eartheasy.com/play_eco-friendly_boating.htm
Environmental tips, aquatic nuisance species, online boating course and more,
www.boatus.com/foundation/toolbox/EnvirTips.htm
Many resources on good boating practices, www.americanboating.org/goodstuff.asp

Chapter 11 – Not Just for Kids

Cape Cod Museum of Natural History, www.ccmnh.org
Cape Cod Pathways, www.capecodcommission.org/pathways/home.htm
The Ocean Conservancy, www.oceanconservancy.org.
Wellfleet Bay Wildlife Sanctuary, www.massaudubon.org
Woods Hole Science Aquarium, www.nefsc.noaa.gov/nefsc/aquarium

Chapter 12 – Taking Action

Coast Sweep, www.coastsweep.umb.edu
Friends of Pleasant Bay, www.fopb.org
Orleans Pond Coalition, www.orleanspondcoalition.org

What to do if you encounter a stranded, injured or dead marine mammal?

Call Cape Cod Stranding Network: (508) 743-9548.
www.capecodstranding.net

To report a dolphin, whale or seal in distress, call (508) 754-9548.