

## Teachers on the Estuary (TOTE)

A National Estuarine Research Reserve System program

Supported by NOAA's Bay-Watershed Education and Training (B-WET) Program

### Teacher Guide

## ***Should We Ban the Use of Chemical Fertilizers in Our Town? A Role-Play Activity***

### Activity Summary

Students will review the effects of chemical lawn fertilizers on groundwater and estuaries. They will be given new identifications as stakeholders at an imaginary town meeting where a ban on chemical lawn fertilizers is under consideration. Ignoring their personal opinions during the role-play, students will think and act as their characters would during the meeting. After the vote is taken at town meeting, the students will learn about methods of ecological landscaping and lawn care.

### Source

The education staff of the Waquoit Bay National Estuarine Research Reserve (WBNERR) has developed this activity. It is modeled after other classroom role-play curricula, and was first tried out in their week-long summer course called *Teachers on the Estuary* (TOTE).

### Background, Waquoit Bay National Estuarine Research Reserve

Waquoit Bay is located in the towns of Falmouth (Waquoit) and Mashpee on the southern side of Cape Cod facing Vineyard Sound. Much of the Bay and surrounding land is protected under the auspices of the Waquoit Bay National Estuarine Research Reserve ([www.waquoitbayreserve.org](http://www.waquoitbayreserve.org)), known as WBNERR. It is one of a network of 28 National Estuarine Research Reserves (NERRs) in the US coastal and Great Lake states. The Reserve system is administered by the National Oceanic and Atmospheric Administration, NOAA (<http://nerrs.noaa.gov>). Each reserve is operated as a partnership between NOAA and the coastal state in which it resides. The lead state agency for the Waquoit Bay NERR is the Massachusetts Department of Conservation and Recreation; therefore, WBNERR is part of the MA state parks system.

The national reserves are protected areas established for long-term research, monitoring, education, and coastal stewardship. Each focuses on research and education relevant to its local and regional community. Waquoit Bay, and its many adjacent acres of critical habitat, is a representative example of shallow bays throughout the northeastern US, so research here improves the understanding of these

Background, Waquoit Bay National Estuarine Research Reserve, continued  
areas in general and promotes stewardship of the coast throughout the region. It is, in fact, one of the Northeast's most studied estuaries.

The reserve educates community members, teachers, and students on ecological landscaping and the tenants of good stewardship. This activity focuses on the role of coastal decision-makers - people who in their jobs or volunteer roles on town committees, make decisions that have important impacts on our coasts.

One of the mandates of NERRs is to translate the results of research carried out at the Reserves and elsewhere to coastal decision makers. The Coastal Training Program (CTP) is a national program which educates local stakeholders primarily on how humans impact coastal ecosystems and provides them with necessary information so they can make informed decisions. Examples of past coastal training topics at WBNERR have included Management of Nitrogen Pollution, Cleaning Up Our Coastal Waters, Ocean Outfall, Wastewater Treatment and Management, and many others... WBNERR and its partners work to preserve land and water, to consider issues facing the coasts, and to educate coastal decision-makers and the region's citizenry.



CTP Coordinator Tonna-Marie Rogers interacts with Tom Mayo, Assistant Town Administrator for the Town of Mashpee, during a CTP workshop.

**Career Focus: Coastal Training Program (CTP) Coordinator**

The job of the CTP Coordinator at each Reserve is to serve as a bridge between scientists and the local stakeholders. The CTP Coordinator holds trainings and workshops regularly to make sure the local stakeholders are receiving up-to-date scientific knowledge and are able to make informed decisions using this information. The CTP Coordinator also communicates information needs of local decision-makers to researchers who may take this into account as they develop and conduct research that addresses important coastal management challenges. To be a CTP Coordinator, a master's degree in environmental policy or natural sciences is required.

**Learning Objectives**

Students will be able to:

1. Explain the potential impacts of chemical lawn fertilizers on ponds, lakes, coastal bays, and groundwater, as well as the role that excess nitrogen plays in the environment.
2. Explain how a New England town meeting is run, and describe the central issues surrounding fertilizer use from many different viewpoints.
3. Give examples of ecologically safe methods of landscape and lawn care.

**Grade Levels**

Middle School, High School, Adult

**Teaching Time**

Three or four (45 minute) class sessions, depending on how involved the group gets in the role-playing activity; including a review of the effects of fertilizers, an explanation of town meeting procedures, and possible homework.

**Organization of the Activity**

This activity consists of six parts:

- Part 1 – Introducing the problem of chemical lawn fertilizers
- Part 2 - Learning how a New England town meeting is run
- Part 3 - Distributing the role-play character cards
- Part 4 – Role-Playing the town meeting
- Part 5 - Debriefing and discussing the outcome of the town meeting
- Part 6 – Learning about ecological landscaping and lawn care

**Background, Impact of Excess Nitrogen on Coastal Waters**

As the human population of coastal areas has increased greatly during the past 50 years, the amount of nutrients that have been added to sea via land runoff have increased substantially. Nutrients are naturally occurring chemicals that plants and algae need for growth.

In balanced coastal marine ecosystems, the waters typically have plenty of nutrients that plants require, with the exception of nitrogen (N). Nitrogen is considered the nutrient limiting growth in marine environments. When too much nitrogen is added, it causes excess algae growth, setting off a chain of events that upsets normal ecological balance in coastal environments like Cape Cod.

On Cape Cod, nitrogen pollution comes from three major sources. The main cause is water leaching from underground septic systems into the ground water and then traveling to the bay. This is a problem for all communities and will require a great deal of time and tax-payer money to solve. The two other sources are atmospheric deposition and fertilizers. Nitrogen enters the atmosphere in excess due to our burning of fossil fuels to heat homes, make electricity, and power cars. Fertilizers used on residential and commercial lawns, golf courses, farm plots, and other locations are the third major cause of nitrogen pollution in the Waquoit Bay watershed. These chemicals contain the nutrients that make grass and flowers grow. This classroom activity focuses on fertilizers and their contribution to problem of excess nitrogen in coastal waters. The same nutrients that help grass grow also allow algae- seaweed and pond weeds to grow. Too much “plant food,” can lead to algal blooms in the water and an excess of aquatic plants growing around the water bodies. This process is called eutrophication. Not only are blooms unpleasant to look at and swim in, but they greatly affect food quality and habitat for fish and other organisms. As the algae die off naturally, bacteria and other decomposers break down the dying algae and consume oxygen. This causes a depletion of oxygen in the water, which can result in a mass die-off of fish and shellfish species. Additionally, widespread algal

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

blooms block sunlight from aquatic plant species, such as eelgrass, which greatly reduces their ability to photosynthesize. Eelgrass, once an important habitat for many fish and shell fish species, has disappeared from Waquoit Bay due to the nitrogen pollution.



Planting native species, such as the Beach Plum shown here, can greatly reduce the amount of fertilizer required.

### Background

#### Preparation

Print student role-play cards

The classroom set up that works well for this activity is a table at the front of the room for the Selectmen to sit at, a podium for the Moderator, and a designated spot for the townspeople who wish to speak to stand.

#### Materials

##### Students

- Student reading
- Student role-play cards

##### Teachers

- Instructions

#### Procedure

##### Part 1 — Introducing the Problem of Chemical Lawn Fertilizers

Introduce the issue, Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? Begin right away in role-play mode by telling the students about the serious problem they face with regard to nitrogen pollution in their town's bays and ponds. Briefly introduce the causes and effects of nitrogen loading.

Many people who live in our town love to have a nice, green lawn around their homes. But, lawn fertilizers, especially when applied incorrectly, fertilize a lot more than just lawns. Excess nutrients, particularly nitrogen, are carried by runoff into streams, lakes, and bays. In our town, here on Cape

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

Cod, the nitrogen-laden waters filter down through the sandy, porous soils into the groundwater. From there they travel the watershed into bodies of fresh water and then move on to bodies of brackish and salt water.

The watershed's fresh water resources, as well as Waquoit Bay itself, are impacted by eutrophication - the excessive growth of algae - resulting from too many nutrients. While algae need nutrients to live, too much "nutrition" allows them to grow out of control. As large blooms of algae die naturally, bacteria and other decomposers consume the plant material. (As the decomposers feed, they use up a lot of the available dissolved oxygen in the water, greatly reducing the amount available for the fish. The algae can also shade out valuable habitats like eel grass where a lot of the fish and shellfish humans like to eat grow. Coastal eutrophication has many causes: current wastewater disposal practices (including leaching of residential septic tanks), atmospheric deposition from the burning of fossil fuels (oil and gas used to generate our electricity, heat our homes, power our vehicles), and excess use of fertilizers. This problem seriously threatens water quality in all the region's estuaries, and it is expected to continue or worsen until large-scale wastewater treatment and other solutions can be implemented.

### Part 2 – Learning How a New England Town Meeting is Run

Begin by asking what the students may already know about the structure of a town meeting and the identities of the various participants. Explain that there are several different types of town meeting, but this role-playing activity is based on the imaginary town of (*you name it*), MA. Basic information about this imaginary town and its meeting structure are provided in the student reading.

New England area teachers may want to research the town meeting format used in the town where they teach. A search on the town's name will yield this type of information, and some communities broadcast their town meetings on their local cable channel. Teachers are encouraged to change the activity to make it more appropriate for their town. If your school is not located in New England, you may want to choose Falmouth, MA and check their website for more information.

Teachers who wish to add a brief overview of Parliamentary Procedure and/or Robert's Rules of Order may do so; in this case, the role-play may take on a more formal tone.

### Part 3 – Distributing the Role-Play Character Cards

Hand out the character cards. Teachers may want to select certain student for the parts of Moderator and the five-member Board of Selectmen, since these roles require some strong acting and ability to keep things moving forward. Teachers may even want to take the role of moderator themselves if this is the first time the class is doing a role playing activity.

Give the students some time to read their cards and ask questions. Make sure the students understand their roles, especially, the Moderator. Either in class, or as homework, have the students think seriously about their character description and write a list of arguments that the individual might voice about the proposed ban on lawn fertilizers. Some students may need to do a little research to expand on the information written on the card; for instance, Mr/MsPipeworks and Mr/MsWaters should be able to speak about the problems caused by eutrophication.

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

Teachers may want to ask appropriate characters to make and show visual aids, such as poster with a data chart, graph, or diagram.

Be sure to explain to students that the role-playing activity is challenging in that they must forget their opinions and play a part, like an actor on a stage or in a movie. They will take on the persona of the character described on the card they receive. Forgetting their own personal views, they must argue their position based on what they think their character would say at the Town Meeting.

If there are students without formal roles, they might need a reminder about paying attention in order to form an opinion for the vote.

As a class, decide on how the vote will be taken, either by voice or a show of hands.

Arrange the town meeting seating.

### Student instructions:

After receiving your role-play card, read the card and make sure you understand your role and position. If you have any questions about your role, ask the teacher before the activity begins. Remember, you are to ignore your personal opinions during the activity.

### Part 4 – Role-Playing the Town Meeting

When the group is settled in their places and ready to begin, ask the moderator to open the meeting. If students are well-prepared, teachers may not need to say or do much more than keep track of time and make sure that each student who wants to, has a chance to argue their position.

The role-play could take about 30 minutes, but some groups may have a flair for drama and the ability to carry it on longer. An option is to invite another class to participate as the voting public at the Town Meeting.

### Part 5 – Debriefing and Discussing the Outcome of the Meeting

There are many options for follow-up after the role-play activity. Teachers might start by developing a discussion about what actually happened at Town Meeting while it is still fresh in the students' minds.

- What were some unexpected things that happened during the meeting?
- How did you feel playing your role?
- Which characters felt the most strongly one way or the other?
- Were any characters convinced to change their original opinions?
- Were there recommendations made that were, or should have been, treated as amendments?
- What if this were your own town? How would the banning of chemical lawn fertilizers affect you or anyone you know?
- Debrief and talk about how the game went. Did students play their parts appropriately?
- What might be done differently to improve the role-play activity in the future?
- Talk about the science behind organic vs. traditional fertilizers. Discuss a real town that went through this debate and what they finally decided. The Coastal Training Program (CTP) of the

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

National Estuarine Research Reserve system is an important tool for educating local officials about issues like this. CTP uses similar role playing activities to help local officials become more informed about an issue so they can make better decisions that help protect the environment. (15 mins)

### Part 6 – Check for Understanding

#### Reading about Ecological Landscaping and Lawn Care

After doing the activity, have students read the Falmouth Friendly Lawn brochure and Ecological Landscaping on Cape Cod and answer these questions:

See student worksheet

1. Explain the connection of fertilizers to water quality.
2. What can you, or your family, do, to lessen the effect of fertilizers on water quality?
3. Can you think of other ways that scientific research can be used in making decisions in your community or state?

### Selected Massachusetts Science Education Standards Connections

The following standards cover many parts of this activity and have been compiled based on the 2006 *Massachusetts Science and Technology/Engineering Curriculum Framework*.

#### Earth and Space Science

Grades 6-8, N/A

Earth and Space Science, High School, *Earth's Processes and Cycles*

#3.3 Describe the nitrogen cycle.

#3.4 Explain how water flows into and through a watershed. Explain the roles of aquifers, wells, porosity, permeability, water table, and runoff.

#3.5 Describe the processes of the hydrologic cycle, including evaporation, condensation, precipitation, surface runoff, and ground water percolation, infiltration, and transpiration.

#### Life Science (Biology)

Grades 6-8, *Living Things and Their Environment*

Grades 6-8, *Energy and Living Things*

#16. Recognize that producers (plants that contain chlorophyll) use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms

Grades 6-8, *Changes in Ecosystems Over Time*

#17. Identify ways in which ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans.

High School, *Chemistry of Life*

#1.1 Recognize that biological organisms are composed primarily of very few elements. The six most common are C, H, N, O, P, and S.

High School, *Ecology*

#6.2 Analyze changes in population size and biodiversity (speciation and extinction) that result from the following natural causes: changes in climate, human activity, or the introduction of invasive, non-native species.



## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

#6.4 Explain how water, carbon, and nitrogen cycle between abiotic resources and organic matter in an ecosystem, and how oxygen cycles through photosynthesis and respiration.

Physical Sciences (Chemistry and Physics)

Grades 6-8, *Elements, Compounds, and Mixtures*

#7 Give basic examples of elements and compounds

Chemistry, High School

#4.6 Name and write the chemical formulas for simple ionic and molecular compounds, including those that contain the polyatomic ions: ammonium, carbonate, hydroxide, nitrate, phosphate, and sulfate

#7.1 Describe the process by which solutes dissolve in solvents

**Scientific Inquiry Skills (SIS),**

Grades 6-8 and High School

SIS#4 Communicate and apply the results of scientific investigations

Construct a reasoned argument and respond appropriately to critical comments and questions  
Use language and vocabulary appropriately, speak clearly and logically, and use appropriate technology and other tools to present findings

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

### Student Reading, Town Meeting Information

Town Meeting is a form of local government practiced in New England since colonial times and since the late 1800s in some western states. It is an opportunity for residents of a town to gather as a legislative body and vote on proposed bylaws, zoning changes, annual budget, and other issues.

How the meeting is actually conducted will vary from town to town. The information presented here should be helpful for the activity but may not be true for every town. Among the officials of most towns are the Moderator and a Board of Selectmen. The Moderator is responsible for running the Town Meetings. The members of the Board of Selectmen are elected by the townspeople to represent them.

Articles (those matters that are to be acted upon at Town Meeting) are brought before the Board of Selectmen in advance of the Town Meeting. The Selectmen vote to endorse, or not to endorse, each article. In addition, members of the town's Finance Committee and Planning Board make their recommendations on each article. The Selectmen publish a listing of articles for consideration at the Town Meeting, called the warrant. Individual citizens can have articles placed on the town warrant if they gather enough signatures on a petition. The warrant is distributed to the townspeople through the newspaper at least a month in advance of the Town Meeting.

Town Meetings are usually conducted under rules of parliamentary procedure, and the rules are printed in the warrant booklet. Part of the Moderator's job is to see that the rules about speaking and voting are followed. All of the town's registered voters, residents, and taxpayers may speak for or against any article in the warrant. People who are not voters, residents, or taxpayers of the town may address the Town Meeting only with the consent of a majority of those present. Those who wish to speak must stand up and wait for the Moderator to acknowledge them. Once acknowledged, the speaker must identify themselves. Each speaker addresses only the Moderator and has one minute to

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

state their opinions or concerns. If a question comes up during the meeting about a procedure, it is called a "Point of Order" and should be directed to the Moderator.

When everyone who wishes to speak on an article has done so, or the Moderator calls an end to discussion, someone will make a motion to "move the question," or end debate on a pending motion. Then it is time for the townspeople to vote. Many Town Meetings use "declared votes," taken by voice. The moderator says, "All in favor, say, AYE," and then "All opposed, say No." The Moderator listens and determines which side has the "majority vote." If the vote is too close to call, the moderator asks those gathered to raise their hands when "AYE" and "No" are called, and hands are counted by town officials.

Larger towns have a slightly different model of Town Meeting where the town is divided into sections called precincts. The residents of each precinct elect several Town Meeting Members to represent them. Only the Town Meeting Members are allowed to vote on articles brought before the Town Meeting; they should cast their votes keeping the wishes of their precinct constituents in mind.

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

### Part 3 – Distributing the Role-Play Character Cards Characters:

**Mr/Ms Moderator:** *Leader of Town Meeting*

- Presides over and conducts all sessions of Town Meeting
- Brings meeting to order, introduces self, introduces Mr/Ms Myidea of the Board of Selectmen to read and comment on first article on warrant
- Allows the Selectmen, Planning Board and Finance Committee Chairmen to speak first
- Opens up the meeting to others who wish to speak after the Chairman of the Planning Board has finished; acknowledges each person who wishes to speak; makes sure they give their name and who they are before they deliver their statements
- Enforces the one minute rule for each speaker
- Maintains a neutral stance throughout the meeting and keeps the peace
- Makes sure that all who wish to speak have the opportunity to do so before others are allowed to speak again.
- Decides when to "move the question" (end debate on a pending motion and call for the vote)
- Restates the article, *The motion has been made to enact a law banning the sale and use of chemical lawn fertilizers in the town of \_\_\_\_\_ (name of imaginary town);* moderator can allow amendments (changes) to the wording of the article, but all changes must be voted on
- For a hand vote, says "All those in favor, please raise your hand" (the Town Clerk counts hands). Then says "All those opposed, please raise your hand" (Town Clerk counts hands). Asks for "Any Abstentions" (and Clerk counts).

Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

- Announces the majority vote on article(s), thanks the gathered townspeople, and concludes the meeting.

**Mr/Ms Myidea:** Board of Selectmen #1

*The Board of Selectmen prepares the warrant for Town Meeting  
The Board of Selectmen makes recommendations and is available to advise Town Meeting on articles in the warrant  
Members of the Board of Selectmen are elected by the townspeople to represent them*

- Myidea is the Selectman presenting the article at the Town Meeting
- Second person to speak, right after the moderator opens the meeting
- Refers to the warrant and reads the article(s) to be brought forth: *I move that we enact a law banning the sale and use of chemical lawn fertilizers in the town of \_\_\_\_\_ (name of imaginary town)*
- Feels strongly that lawn fertilizers are adding significant amounts of unnecessary nutrients to town’s watershed
- Has thoroughly researched the topic and believes that banning fertilizers is the best way to improve the quality of water in the town’s watershed and, ultimately, in its coastal waters

**Mr/Ms Earth:** Board of Selectmen #2

*The Board of Selectmen prepares the warrant for Town Meeting  
The Board of Selectmen makes recommendations and is available to advise Town Meeting on articles in the warrant  
Members of the Board of Selectmen are elected by the townspeople to represent them*

- After Myidea presents the motion to ban lawn fertilizers, the Earth character says, “I second the motion.”
- Earth is a “super environmentalist” homeowner who already practices organic gardening and lawn care
- Fully supports the proposed ban
- Tends to be a little over-zealous and outspoken, but subject is very important to him/her

**Mr/Ms Smith:** Board of Selectmen #3

*The Board of Selectmen prepares the warrant for Town Meeting  
The Board of Selectmen makes recommendations and is available to advise Town Meeting on articles in the warrant  
Members of the Board of Selectmen are elected by the townspeople to represent them*

- Smith speaks after Mr/Ms Earth
- Smith is always concerned with any aspect of local government that may control his/her life or the lives of others in the town
- Firmly believes that the decision to use commercial fertilizers is up to the individual homeowner
- Resents any attempts by the local government to control the people
- Has no strong opinion about fertilizers, but resists any government control in his/her life

**Mr/Ms Rydafence:** Board of Selectmen #4

*The Board of Selectmen prepares the warrant for Town Meeting  
The Board of Selectmen makes recommendations and is available to advise Town Meeting on articles in the warrant  
Members of the Board of Selectmen are elected by the townspeople to represent them*

Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

- Rydafence speaks after Smith
- This Selectman understands that he/she should be using environmentally friendly products on his/her own lawn, but just doesn’t go out of the way to do so
- Has not made up mind yet as to which way to vote
- Tends to play devil’s advocate at meetings

**Mr/Ms Fido:** Board of Selectmen #5

*The Board of Selectmen prepares the warrant for Town Meeting  
The Board of Selectmen makes recommendations and is available to advise Town Meeting on articles in the warrant  
Members of the Board of Selectmen are elected by the townspeople to represent them*

- Fido speaks after Rydafence
- Not sure that banning fertilizers is the best way to reduce nutrient pollution
- Sincerely believes the best way to reduce nutrients entering the watershed is to enforce the existing rules about pet-owners cleaning up pet waste (exaggerates the problem of pet waste and owner responsibility)

**Mr/Ms Frugal:** Finance Committee Chairman

*Job of Finance Committee members is to make sure the town is in good financial shape for the future.*

*Chairman is available to provide advice to Town Meeting  
If needed, reminds the assembled townspeople that any vote on an article that will result in spending money requires a “2/3rds majority” to pass*

- Pennypincher speaks after Fido
- Asks Moderator how much will it cost the town (As you all know, we have many expensive articles coming up in the next meeting, etc.)
- Asks how the town might make any money on this bylaw
- Suggests, on behalf of Finance Committee, voting for the ban and instituting a fine to be paid by anyone caught using chemical fertilizers; money from fines could be returned to the town’s budget to help pay the extra costs of organic fertilizers used around Town Hall and other landscaped public properties

**Mr/Ms Plannah:** Planning Board Chairman

*Job of the Planning Board is to help town plan its future development keeping in mind natural resource availability and management (especially drinking water), land acreage, population growth or decline, economic and business growth factors, open space, waste disposal and/or treatment (including wastewater), and housing  
Planning Board Chairman is available to provide advice to Town Meeting*

- Plannah speaks after Pennypincher
- Says that in addition to recommending the ban on chemical fertilizers, the Planning Board members would like to see “No Fertilizer Zones” posted along the borders of all bodies of water that empty into coastal waters.

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

### **Mr/Ms Scribe:** *Town Clerk*

- Town Clerk keeps a detailed journal of all Town Meeting procedures
- Counts and records all votes

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### **Mr/Ms Banall:** *Planning Board Member #2*

*Job of the Planning Board is to help town plan its future development keeping in mind natural resource availability and management (especially drinking water), land acreage, population growth or decline, economic and business growth factors, open space, waste disposal and/or treatment (including wastewater), and housing*

- Feels the ban needs to be for everyone (no matter how close or far they live from the coastal waters).
- This is because, although some pollutants are filtered out in the watershed, most nitrogen pollution that enters the watershed eventually ends up in the bay affecting water quality

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### **Mr/Ms Superbay:** *National Estuarine Research Reserve Manager*

- The lawn where the Research Reserve is located gets much foot traffic, and the staff does not fertilize, nor does it see any need to water
- Mr/Ms Superbay feels that this type of landscape best serves the purpose of the Reserve
- While the grass does turn brown in the late summer, the staff and visitors are okay with that because it's natural.
- Feels strongly about protecting water quality in the bay (there is such a wide range of habitats in the Reserve supporting such huge numbers of plants and animals)

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### **Mr/Ms Pipeworks:** *Head of the Department of Public Works*

- Head of the Department of Public Works
- Responsible for maintaining the town's waterways (streams, rivers, lakes, bays, etc.)
- He/she continually reminds assembled citizens that excess fertilizer can lead to excessive growth of algae and other water plants – he/she sees it all the time!
- The result can be seen in clogged waterways that can restrict water flow and recreational use

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### **Mr/Ms Waters:** *Head of Town Water Department*

- Responsible for maintaining clean drinking water supplies for residents of the town
- Explains that excess fertilizers are getting into the drinking water supply
- Asks, "Have you noticed that your water bill is going up?"
- Expensive, additional filtering and cleaning mechanisms have been installed at reservoirs and treatment plants during past few years; required to maintain clean drinking water for all

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### **Mr/Ms Copz:** *Chief of Police Department*

- Copz is *very concerned* about how the local police will be able to enforce the ban if it is passed
- Will need to monitor all the town's garden centers, hardware stores, big box stores to businesses and homeowners to be sure commercial fertilizers are not coming in to town to be sold

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

- Will need to monitor all companies that do work on lawns.
- Will need to monitor all homeowners when working in their yards
- The Department is already overextended
- The budget for patrol staff was seriously reduced at last year's town meeting
- Spring and summer in this tourist town are notoriously busy, and these are the same months during which the populace works on greening up their yards

### **Mr/Ms Lawne:** *Perfect Lawn Homeowner*

- Feels that having a perfect, lush, green lawn all summer long is vital
- Will take any steps necessary to achieve the "golf-course-look" of their grass
- Does not know or want to know what is in the products he/she uses on flowerbeds and grass
- "If it works, use it," is his/her motto, no matter what the environmental consequences may be

### **Mr/Ms C. Dewater:** *Waterfront Homeowner*

- This resident is most concerned about the impact of excess lawn fertilizers on the water that fronts his/her large, new home
- He/she certainly doesn't want big mats of stinky algae plaguing the beautiful waterfront property he/she calls home, as has happened in years past

### **Mr/Ms Greenthumb:** *Professional Organic Landscaper*

- Supports the fertilizer ban whole-heartedly
- Is already in compliance with the requirements of such a ban by using only organic products in his/her landscaping business
- Hopes that a ban would allow for growth and expansion of his/her business, as more people move from traditional to exclusively organic landscaping techniques

### **Mr/Ms Mower:** *Professional Traditional Landscaper*

- Believes that a ban on commercial fertilizers will place an undue burden on him/her, due to loss of business and income
- Would rather see Town Meeting members table the tonight's vote so that officials can have time to research the possibility of a less stringent law

### **Mr/Ms Mulcher:** *Traditional Garden Center Owner*

- He/she most worried about the impact a commercial fertilizer ban would have on their business, especially the sales of gardening products
- Believes if popular brands of fertilizers are removed from the market, his/her business will not make as much money

### **Mr/Ms Sprayer:** *Lawn Company Owner*

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

- He/she argues that thick, green healthy lawns help filter pollution
- Reducing the amount of fertilizer that residents are allowed to use might result in poorer lawns that could filter fewer pollutants out of the water that passes through them.
- Mr/Ms Sprayer would have to make drastic changes in their practices if the ban passes and fears theyb will lose a lot of money.

### Mr/Ms Labcoat: *Scientist*

- Explains clearly the impacts of excess nutrients entering coastal waters
  - Describes eutrophication and agrees that it is serious problem for the town
  - Describes how the nutrients in fertilizers, nitrates and phosphates, run off into lakes, estuaries, and streams where they can stimulate the overgrowth of algae
  - Algal blooms in shallow estuaries block sunlight needed for eelgrass to grow
  - When huge mats of algae die and sink to bottom, decomposers like bacteria consume it
  - Decomposers use up all the oxygen dissolved in the water, resulting in massive die-offs of fish and shellfish
- Describes how nutrients coming from the burning of fossil fuels, pet waste, and improperly treated wastewater can pollute the waterways as well

### Mr/Ms Grande: *Resort Owner*

- Mr/Mrs Grande owns the largest tourist attraction in town
- The resort is one of the town's largest employers
- The business depends on the image of "a perfect resort," with perfect grass and perfect landscaping to attract vacationers
- Is very concerned that a fertilizer ban would result in a loss of business for the resort, loss of jobs, and loss of business for the town as a whole

### Mr/Ms Greene: *Concerned Community Environmental Group President*

- Mr/Ms Green is representing the active, local environmental group of which he is president
- Group majority feel VERY STRONGLY that ban on commercial fertilizers should be passed
- It's a good idea and long overdue
- Group has been working hard for years to further this and other environmental issues
- Group works diligently to try to sway as many people to their point of view as possible

### Mr/Ms Composte: *Ecological Garden Center Owner*

- Eager for the law to be enacted
- His/her business already stocks organic fertilizers
- He/she wants people to know that using organics is far less detrimental to water quality
- Organic fertilizers are slow release, so the plants take up the nutrients as they need them; otherwise the excess nutrients would dissolve, enter the groundwater or run off the land into the coastal water
- Organics are also better for plant growth because of the micro nutrients they contain

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

### Mr/Ms Lawler: *Town Council (Lawyer)*

- Town Council provides legal advice to Town Meeting
- Town Council is called upon if anyone has a question about the legality of article under consideration
- If anyone asks about the legality of passing a fertilizer ban, the lawyer can list some other US communities that have successfully done so: towns in Michigan and New Jersey, more than three dozen cities and counties in Florida, a community near Lake George in New York, and many others areas throughout the country.

### Mr/Ms Buckz: *Town Administrator:*

- Town Administrator is the Chief Operating Officer; prepares and submits the budget to the Board of Selectmen and Finance Committee
- Is in charge of making sure the town is running smoothly based on laws and rulings from Board of Selectmen
- Provides advice to Town Meeting related to budget and to other articles on the warrant.
- Is very worried about how the town is going to be able to pay for the extra cost of organic fertilizers for landscaping for municipal buildings.

All other students are voting members of the community attending the Town Meeting, or additional identity cards can be created.



Teacher Answer Sheet, Part 6- Check for Understanding: Reading about Ecological Landscaping and Lawn Care

Extension activity: Fertilizer Figures (Math) (Optional)

Have the students use actual bags of fertilizer to figure out how much fertilizer should be used on their own lawn or the school's lawn. Discuss what the different numbers mean and why it's important to use the right amount of fertilizer if you do use fertilizer. See "How to Read a Fertilizer Label" in background information folder.

**Answer:** Answers will vary depending on lawn size

Extension Activity: Fertilizer Survey

Students can bring home the survey on the following page and fill it out with their parents. The results can be aggregated into graphs for more practice and analysis. Be careful not to judge students or their families for their landscaping practices but allow students to learn about the connections between fertilizers and water quality

Take Home Fertilizer Survey

Find the location of your house on a map, then figure out which pond or bay is closest to your home. Use the map key to determine the how far this body of water is from your house.

My house is \_\_\_\_\_ miles from the nearest pond or bay.

**Answers will vary depending on location of student's home**

Name of pond or bay:

**Answer:** Answers will vary depending on location of student's home

1. How much lawn area does your home have? (measure and multiply or estimate; a football field is about 15,000 square feet; ¼ acre is about 11,000 square feet).

- \_\_\_ a) 0-1,000 sq.ft (about 50' x 20')
- \_\_\_ b) 1,000 sq ft – 2,500 sq ft (about 50' x 50')
- \_\_\_ c) 2,500 sq ft – 5,000 sq ft (about 50' x 100')
- \_\_\_ d) more than 5,000 sq ft: estimate \_\_\_\_\_

**Answer:** will vary depending on size of students home

2. How often is fertilizer spread on your lawn?

Once a year \_\_\_\_\_ Twice a year \_\_\_\_\_ Three times a year \_\_\_\_\_

Fertilizer is not used on this lawn \_\_\_\_\_

**Answer:** Answers will vary

3. What type of fertilizer is used on your lawn? If your family has a lawn service, call and ask them.



\_\_\_ a) chemical

\_\_\_ b) chemical, slow release (at least 30% water-insoluble nitrogen, or WIN)

\_\_\_ c) organic

\_\_\_ d) none

**Answer:** Answers will vary

4. After reading the brochure "Guide to a Falmouth Friendly Lawn", write a sentence or two describing the link between fertilizer use and water quality.

**Answer:** Fertilizer cause nitrogen loading into local bays and estuaries. This causes algae to bloom and subsequently die off, both leading to low water quality (low light due to shading from algae and low oxygen due to algae decomposition during die off).



5. List two ways you could make your lawn more "friendly" to your local ponds and coastal waters.

1.

2.

Possible Answers

- Grow native shrubs
- Fertilize only once per year (fall)
- Recycle grass clippings
- Water only once per week
- Spread compost to enrich soil
- Buy only the necessary amount of fertilizer for your lawn.

**Resources:**

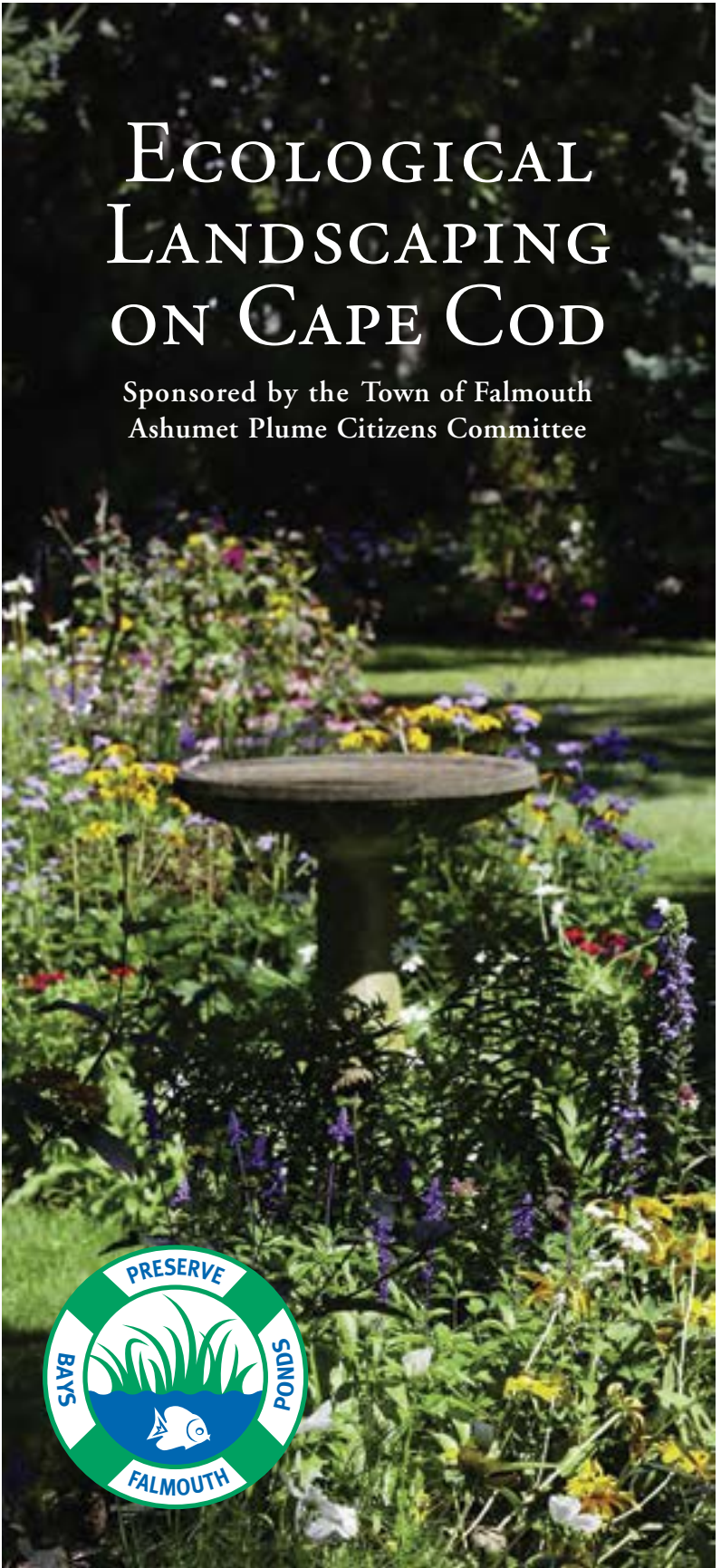
[www.opet.org/documents/FFL\\_brochure.pdf](http://www.opet.org/documents/FFL_brochure.pdf) Falmouth Friendly Lawn Brochure  
<http://www.buzzardsbay.org/lawncafe.htm> Buzzards Bay National Estuary Program Lawn Guide  
<http://www.newmandesign.com/ecobrochure.html> Ecological Landscaping on Cape Cod Brochure  
<http://www.fertilizer.org/ifa/HomePage/SUSTAINABILITY> International Fertilizer Industry Association  
<http://www.extremelygreen.com/fertilizerguide.cfm> Organic Fertilizer Guide  
<http://www.motherearthnews.com/Organic-Gardening/2006-06-01/A-Better-Way-to-Fertilize-Your-Garden.aspx> Homemade Organic Fertilizer  
<http://www.sciencedaily.com/releases/2009/08/090817190741.htm> Fertilizer ban article  
[http://www.chesapeakebay.net/news\\_vafertilizer11.aspx?menuitem=56867](http://www.chesapeakebay.net/news_vafertilizer11.aspx?menuitem=56867) Fertilizer ban article

Student Reading

Read the following brochures:

- Falmouth Friendly Lawns
- How to Read a Fertilizer Label
- Ecological Landscaping on Cape Cod





## WHY ECOLOGICAL LANDSCAPES?

The natural vegetation of Cape Cod is a varied mix that includes trees, shrubs, wildflowers and grasses. The Cape's natural beauty has attracted a burgeoning population who has replaced the local vegetation with houses and lawns, destroying part of what they came here to enjoy.

Native and non-native, low maintenance plantings need little tending beyond watering during establishment and occasional pruning. Contrast this with the time-consuming, high maintenance lawn that needs regular mowing.

Fertilizer is easy to misapply or over-apply. Fertilizers contain nitrogen, phosphorus and potassium, nutrients essential for plant growth but devastating to our coastal and freshwater ponds. Nitrogen leaching into salt water causes rapid algae growth while phosphorus leaching into freshwater ponds induces similar conditions. These algal mats block out the sunlight and deprive the underwater environment of its ability to maintain aquatic life. Studies show that 20% of the nitrogen pollution in our coastal waters comes from fertilizer sources.

You can help stop the flow of excess nutrients into our bays and ponds by creating your own ecological landscape and by following the recommendations of the Falmouth Friendly Lawn (FFL) campaign ([www.geocities.com/ashumet2001](http://www.geocities.com/ashumet2001)).



## SOMETHING TO THINK ABOUT

Native and non-native, non-invasive plants grown in the right place are low maintenance plants and the top choice for ecological landscapes. Native plants are those that were growing on Cape Cod before European settlement. Natives benefit wildlife and help maintain Cape Cod character. In addition, many non-native, low-maintenance plants also require minimal water and fertilizer.

Moist soils planted with summersweet and winterberry or sandy soil planted with bayberry, beach plum, bearberry, sweetfern or beach grass invoke the spirit of the Cape in a way that every visitor and resident alike can recognize.



## GETTING STARTED

Start small. Choose one or two places where you could create an ecological landscape. Is one spot suited to a shrub planting? Might another require groundcover? Are there existing natural areas to preserve?

Choose plants that suit your property. Before thinking about specific plants, note what parts of your property are sunny, shady, moist or dry. Are any areas subject to wind, foot traffic, salt spray or other physical conditions? Notice high and low spots, boulders and vistas. What about soil conditions? Cape soils tend to be mixtures of sand, loam and clay. Plants that require good drainage grow well in sandy loam. Clay holds water so plants that like constant moisture thrive in this soil. All soils benefit from the addition of compost or other organic matter.



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 holds together, you have clay or a clay blend. Better yet, have soil samples tested for type, pH (acidity), nutrient availability and mineral content (visit [www.umass.edu/plsoils/soiltest](http://www.umass.edu/plsoils/soiltest) or call 413-545-2311 for soil test information)

## INSTALLING THE NEW LANDSCAPE

Start in the fall by preparing the planting bed. Place 6-8 layers of newspapers over the selected area of grass or weeds and weight them down with organic materials such as chopped leaves, seaweed, pine needles, compost, mulch or manure. In the spring, rototill to prepare the bed for planting.



Select plants from the list inside this brochure, or use lists from the Falmouth Conservation Commission, Waquoit Bay National Estuarine Research Reserve and the FFL web site ([www.geocities.com/ashumet2001](http://www.geocities.com/ashumet2001)). Check local nurseries for low maintenance plants that appeal to you and fit your specific site conditions.

Make sure you are satisfied with the layout before you plant. Put the taller-growing plants in back followed by the medium high plants. The low growing shrubs will be in the front and the various heights will create a layered look. Avoid over-planting by spacing each plant according to the width information on the tag. Interplant low maintenance perennials for more color.

Mulch the new planting with an organic material and keep the area watered for the first two seasons. The planting will then be able to grow on its own.

## PLANTS TO AVOID

Some plants that grow well on Cape Cod have exceedingly bad habits. We call these 'exotic invasives,' or 'invasives' for short. An invasive plant:

- grows, matures and spreads rapidly
- lacks natural pest or disease control
- grows in many habitats
- is difficult to remove or control

Invasives crowd out native plants and the animals with which they have evolved by starving them of sunlight, water, nutrients and space. Consequently, aggressively-spreading exotics forever alter the natural environment in ways we have yet to understand.

Properly identify and remove any invasives from your property by pulling, mowing or cutting. Check with the Master Gardeners (508-375-6690), the FFL website, or the web address below if you need help identifying or eradicating them. Never plant any exotic invasives on your property.

Some invasives common in Massachusetts include:

Autumn Olive	Japanese and Shrub Honeysuckle
Bishops or Gout Weed	Multiflora Rose
Black Locust	Norway Maple
Black Swallow-Wort	Oriental Bittersweet
Common Reed	Porcelain Berry
Garlic Mustard	Purple Loosestrife
Japanese Bamboo	Shining or Common Buckthorn
Japanese Barberry	Yellow Iris

Visit the Massachusetts Invasive Plant Group ([www.newfs.org/conserv/invasive.htm](http://www.newfs.org/conserv/invasive.htm)) for an expanded list.

Brochure produced by members of the Falmouth Garden Club, the League of Women Voters of Falmouth and the Waquoit Bay National Estuarine Research Reserve.

For further information please visit [www.geocities.com/ashumet2001](http://www.geocities.com/ashumet2001) for more information.

Brochure design by Andrew Newman Design

SEE INSIDE FOR LANDSCAPING TIPS AND PLANT LIST

## BENEFITS OF ECOLOGICAL LANDSCAPING

An ecological landscape:

BUILDS a healthier environment by curbing the need for excess nutrients that can seep into groundwater, eventually entering freshwater ponds or coastal waters.

REDUCES water use. Ecological landscapes generally require watering only in their first two seasons.

SAVES money spent on pesticides, fertilizers and lawn maintenance. Once established, an ecological landscape adapts to seasonal conditions and does not require regular maintenance to maintain its health and vigor.

ATTRACTS birds, beneficial insects and wildlife by creating a more diverse habitat.

DECREASES time spent working in the yard mowing and maintaining the lawn. Ecological landscapes may need a little weeding or pruning, or no care at all, depending on personal preference.

ELIMINATES pesticides use making the property safer for kids, pets and wildlife. Using plants that have adapted to the Cape Cod environment, ecological landscapes are better able to resist pest and disease infestations.



## CREATING A FALMOUTH FRIENDLY LAWN

For areas where you still want some lawn, Falmouth Friendly Lawn care methods will keep grass healthy and prevent nitrogen leaching. If you are starting a new lawn, begin with the right pH level, soil depth and seed mixture (as below). You may need more fertilizer while the new lawn is growing in. For established lawns:

TEST your soil. The pH should be between 6.5-7.0. Follow the directions with the soil test results to adjust the soil pH.

CHECK to see that you have 6" of topsoil in the lawn area. If the soil amount is less, add 1/4 to 1/2" of loam or compost each spring and rake it in.

OVERSEED the new top-dressing with a seed mix of tall or fine fescues or a mixture of fescue and perennial ryegrass. These grasses will thrive with less nitrogen and are drought and shade tolerant.

MOW the lawn high, about 3" or at the mower's highest cutting height. Grass roots will be about as deep as the blade is high above ground; the deeper the root, the better the resistance to drought and disease. Prevent damage to the grass blades by keeping the mower blades sharp.

RECYCLE the clippings to return nutrients to your grass. Recycling provides the equivalent of one regular fertilizer application over the season.

FERTILIZE once in the fall as the grass is greening up if you need to fertilize at all. Use only a slow release fertilizer and be sure to use the right amount for your lawn size. If you fertilize twice a year, use only half the recommended amount each time. Always sweep up any fertilizer spill from walks, driveways and streets to prevent run-off.

WATER the lawn with 1" of water, once a week to encourage deep roots. Early morning is a good time to water. Use an empty tuna can to measure how much water the lawn gets each week.

WEED the lawn by hand or apply corn gluten, hot water, vinegar or a low toxicity spot-spray to weeds. Cover large patches of annual weeds with lime and compost. Over-seed next spring with fescues or fescues mixed with perennial ryegrass.

Brochure design by Andrew Newman Design, [newmandesign.com](http://newmandesign.com)  
Cover photograph by Daniel W. Webb

## CREATING A FALMOUTH FRIENDLY LAWN

For areas where you still want some lawn, Falmouth Friendly Lawn care methods will keep grass healthy and prevent nitrogen leaching. If you are starting a new lawn, begin with the right pH level, soil depth and seed mixture (as below). You may need more fertilizer while the new lawn is growing in. For established lawns:

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Cover photograph by Daniel W. Webb

Committee volunteers will respond to questions if you contact us at: [flawn@cape.com](mailto:flawn@cape.com).

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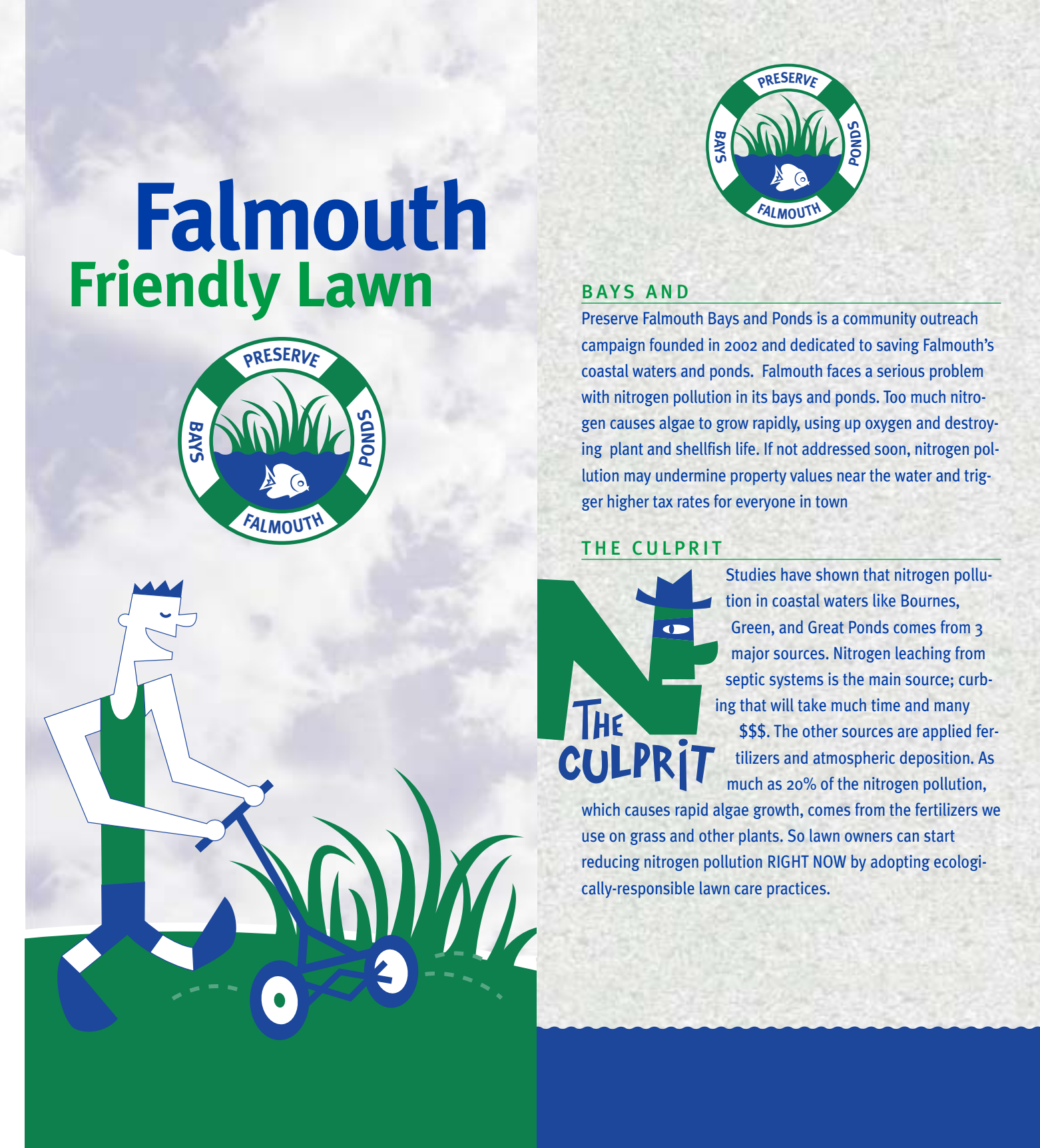
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# How to Grow a Falmouth Friendly Lawn

## TEST YOUR SOIL

Your soil pH should be 6.5 to 7.0. Below that, add lime that acts as a gatekeeper for plant nutrients.

- If you fertilize a lawn with a low pH, the nitrogen in the fertilizer won't be absorbed by the grass, short-circuiting the feeding and diverting the nitrogen into leaching and run-off.

The Master Gardeners offer soil testing clinics throughout the spring. You can contact them at the Cape Cod Extension Office in Barnstable by calling 508-375-6690. You can also bring in a sample to the Cape Cod Extension Office where they offer soil testing year round.

## ENRICH YOUR SOIL

Grass grows best with 6" of topsoil, which also helps to prevent nitrogen leaching. You can slowly build up the depth of topsoil by spreading a thin layer, 1/4' or less, of loam in spring or compost in fall on top of your grass.

- Loam that contains an equal blend of silt, sand and clay works best on the Cape.
- Use compost from your own compost pile or from a reliable commercial source to minimize impurities
- Overseed bare spots with a mixture of native fescues and perennial ryegrass; they need much less nitrogen than cultivars like Kentucky bluegrass.

If you decide to add nutrients to your lawn, you also can enrich soils by using organic fertilizers that contain organisms to promote soil conditioning through healthy biological activity.

## MINIMIZE ANY FERTILIZER NITROGEN

Recycled grass clippings and atmospheric deposition [mostly rain] are natural sources of nitrogen. In many cases this is all an established lawn needs—traditional Cape lawns endure for generations without any fertilizer.

If you feel you really have to use some fertilizer, buy only as much as you need for the area of your lawn.

- To determine lawn area, pace off its length and width. Assume

each pace equals three feet and multiply the length times the width to calculate the square footage of your lawn.

- A standard fertilizer bag covers 5,000 sq ft of lawn [or multiples thereof]; the coverage area is highlighted on the bag label.

Most bags are intended to apply nitrogen at the rate of about 1 lb N per 1000 sq ft of lawn. You can check the N rate yourself by dividing the nitrogen poundage [multiply the first number in the 3 number series highlighted on the label by the bag's weight] by the area it covers.

- For fescues and perennial ryegrasses, you only need 1 lb N/1000 sq ft of lawn for an entire year.

Use only as much of the bag as your lawn size needs; if you have a 2500 sq ft lawn, use only half of a 5000 sq ft bag. The label on the bag will tell you how to set your spreader for a 1 lb N rate. If you

want to apply a lesser rate, adjust the setting accordingly. Don't fertilize walks and driveways; sweep them up to prevent damaging run-off.

## THE RIGHT FERTILIZER

It takes time for grasses to absorb nitrogen. If applied in water-soluble form, most of the nitrogen that grasses don't absorb immediately will run-off or leach into groundwater. Avoid sprays; instead, use granular or organic slow-release nitrogen formulations [see "Guaranteed Content" on the bag label].

- Such formulations, often labeled Water Insoluble Nitrogen (WIN), are released over a period of weeks or months, depending on the percentage of WIN [or slow-release].
- The WIN should be 30% or higher. Remember that the higher the WIN means we all win!
- Organic fertilizers tend to have a high WIN and also promote soil enrichment.

Buy straight fertilizer. Avoid combination products containing herbicides and/or pesticides ("weed & feed") that spread chemicals across your entire lawn. If you need a pre-emergent, try gluten meal, a natural byproduct of corn processing.

## WHEN TO FERTILIZE

Fertilize only when the grass is growing vigorously: fall and spring. Never fertilize in summer when grass is dormant or growing slowly—don't end up just feeding the weeds!

- If you fertilize only once, do it in the fall to promote root growth for long term health; use a 1 lb N-rate.
- If you fertilize in both spring and fall, adjust your spreader setting to apply only a 1/2 lb N-rate each time.

## MOW HIGH, RECYCLE CLIPPINGS

Grass should be about 3 inches long after cutting to help retain moisture and choke out weeds.

- Re-sharpen blades at least once a year. Dull blades tear instead of cut grass.

Leave clippings on the lawn. That's right, no raking! Recycled clippings are a slow-release source of nitrogen.

- Scientific studies show that clippings contain up to half the nitrogen that lawns receive
- Recycled clippings do not promote thatch; instead, they break down and disappear.

## USE CAPE-TYPE GRASS SEED

The best grasses for Falmouth are blends of mostly fine fescues or tall fescues mixed with some perennial ryegrass.

- These blends require minimal fertilizer and water. They also have good drought tolerance and most new varieties resist surface-feeding insects.

Bluegrass needs twice as much nitrogen and more watering. If your lawn is mostly bluegrass, overseed with fescues and rye grasses. Multi-cultures also are less susceptible to disease.

## PULL WEEDS

If you find weeds, pull them out by hand. If weeds are a severe problem, spot treat them with an organic spray.

## WATER DEEPLY

Established lawns require only one inch of water per week, including rainfall; once a week in early morning promotes deeper roots and stronger drought resistance.

- How do you measure an inch of water? Position an open tuna can near each sprinkler as you water. A full straight-sided can equals an inch of water.
- Use a rain gauge or leave out one can for the season to monitor rainfall.

Of course, remember to obey any water restrictions that may be in effect.

## GROW NATIVE SHRUBS

You can reduce the amount of lawn area by creating a naturalized planting of low maintenance native shrubs and plants. Contact either the Master Gardeners at the Cape Cod Extension Office **508-375-6690**: the Cape Cod Conservation District at **508-771-8757** or WBNERR at **508-457-0495** for suggested plant materials.



For more information on Preserve Falmouth Bays and Ponds please visit:  
[www.geocities.com/ashumet2001](http://www.geocities.com/ashumet2001) or  
contact us at [fflawn@cape.com](mailto:fflawn@cape.com)

Sponsored by the Town of Falmouth Selectmen and  
Ashumet Plume Citizens Committee





# How to Read a Fertilizer Label

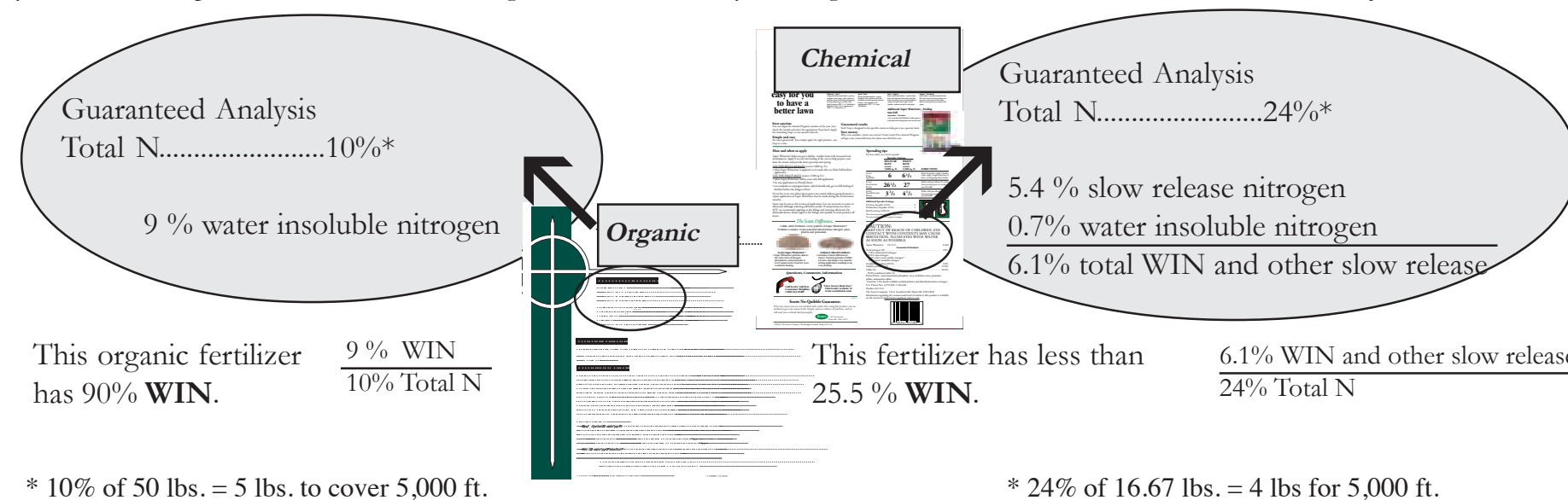
Buying and applying the right amount and type of fertilizer can **help your wallet as well as the water quality** of our ponds and bays. Check out the label yourself or ask for help from a salesperson.

## Buy Only What You Need

Fertilizer bag labels usually show in large type the area covered. The labels below are for 5000 sq ft of lawn [e.g. 50'x 100'] but many Falmouth lawns are smaller than that. **Know the size of your lawn**, not your whole lot, and don't waste money by buying too much fertilizer.

## Buy the Highest WIN

WIN stands for **W**ater **I**nsoluble **N**itrogen. WIN releases nutrients over weeks not days like soluble nitrogen. WIN gives plants time to use nitrogen effectively, not run off to pollute our coastal waters. Organic fertilizers usually have high WIN and contribute other beneficial matter. **Buy at least 30% WIN.**



take home lawn care tips ↘

## Should We Ban the Use of Chemical Lawn Fertilizers in Our Town? A Role-Play Activity

### Take Home Fertilizer Survey

Find the location of your house on a map, then figure out which pond or bay is closest to your home. Use the map key to determine the how far this body of water is from your house.

My house is \_\_\_\_\_ miles from the nearest pond or bay.

Name of pond or bay:



- How much lawn area does your home have? (measure and multiply or estimate; a football field is about 15,000 square feet; ¼ acre is about 11,000 square feet).  
\_\_\_ a) 0-1,000 sq.ft (about 50' x 20')  
\_\_\_ b) 1,000 sq ft – 2,500 sq ft (about 50' x 50')  
\_\_\_ c) 2,500 sq ft – 5,000 sq ft (about 50' x 100')  
\_\_\_ d) more than 5,000 sq ft: estimate \_\_\_\_\_

- How often is fertilizer spread on your lawn?

Once a year \_\_\_\_\_ Twice a year \_\_\_\_\_ Three times a year \_\_\_\_\_

Fertilizer is not used on this lawn \_\_\_\_\_

- What type of fertilizer is used on your lawn? If your family has a lawn service, call and ask them.

- \_\_\_ a) chemical  
\_\_\_ b) chemical, slow release (at least 30% water-insoluble nitrogen, or WIN)  
\_\_\_ c) organic  
\_\_\_ d) none

- After reading the brochure “Guide to a Falmouth Friendly Lawn”, write a sentence or two describing the link between fertilizer use and water quality.
- List two ways you could make your lawn more “friendly” to your local ponds and coastal waters.

1.

2.

