

Green Grass, Clear Water:

Water Quality-Friendly Lawn Care

NH LAKES Webinar Series
May 4, 2022

Julia Peterson

N.H. Sea Grant Extension Program Leader and Marine and Water
Resources Specialist, UNH Durham

Julia.Peterson@unh.edu

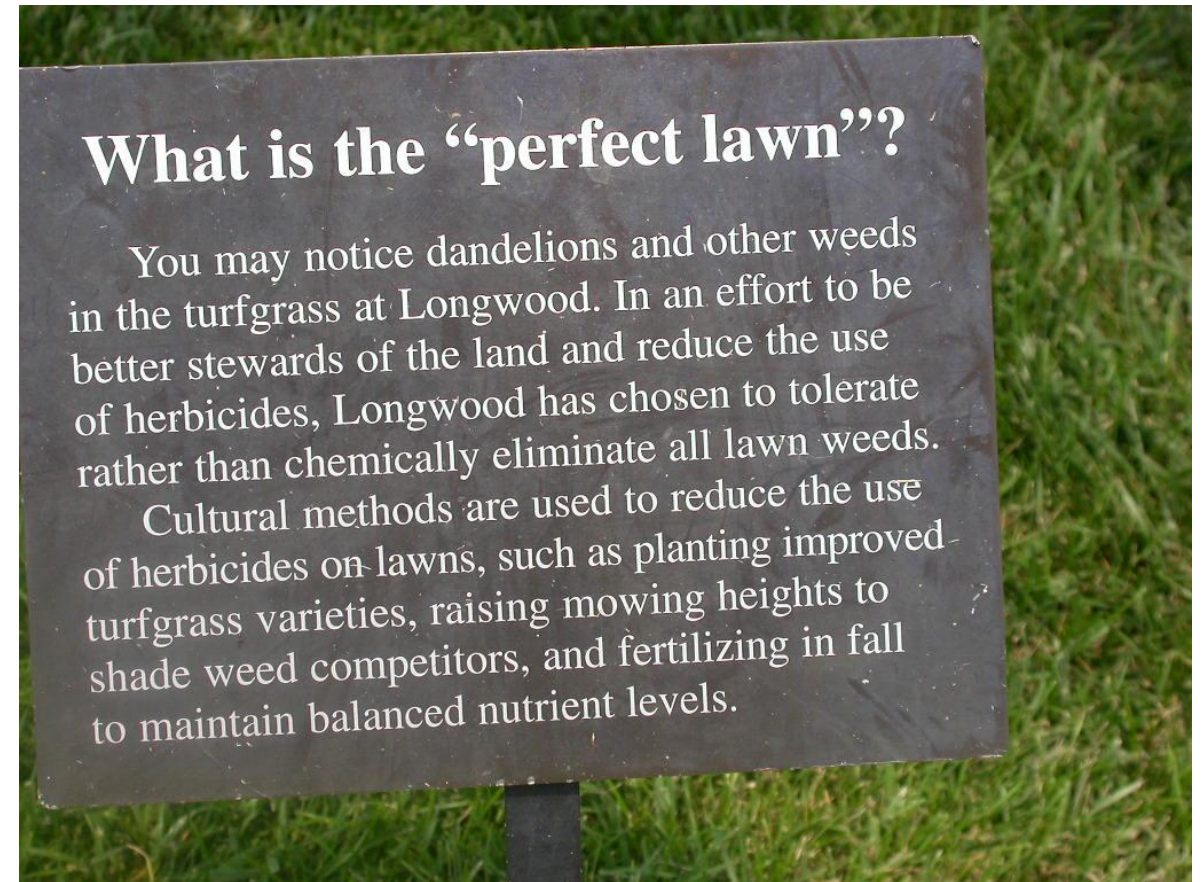
Emma Erler

Horticulturist at Squam Lakes Natural Science Center Garden
(Former) UNH Extension Landscape and Greenhouse Field Specialist



Our goals today:

1. Recognize the **connection** between lawn care and clean water
2. Learn **cultural practices** that encourage healthy turf and reduce pollution from lawns.
3. **Promote or adopt** at least one new or improved practice for your household.

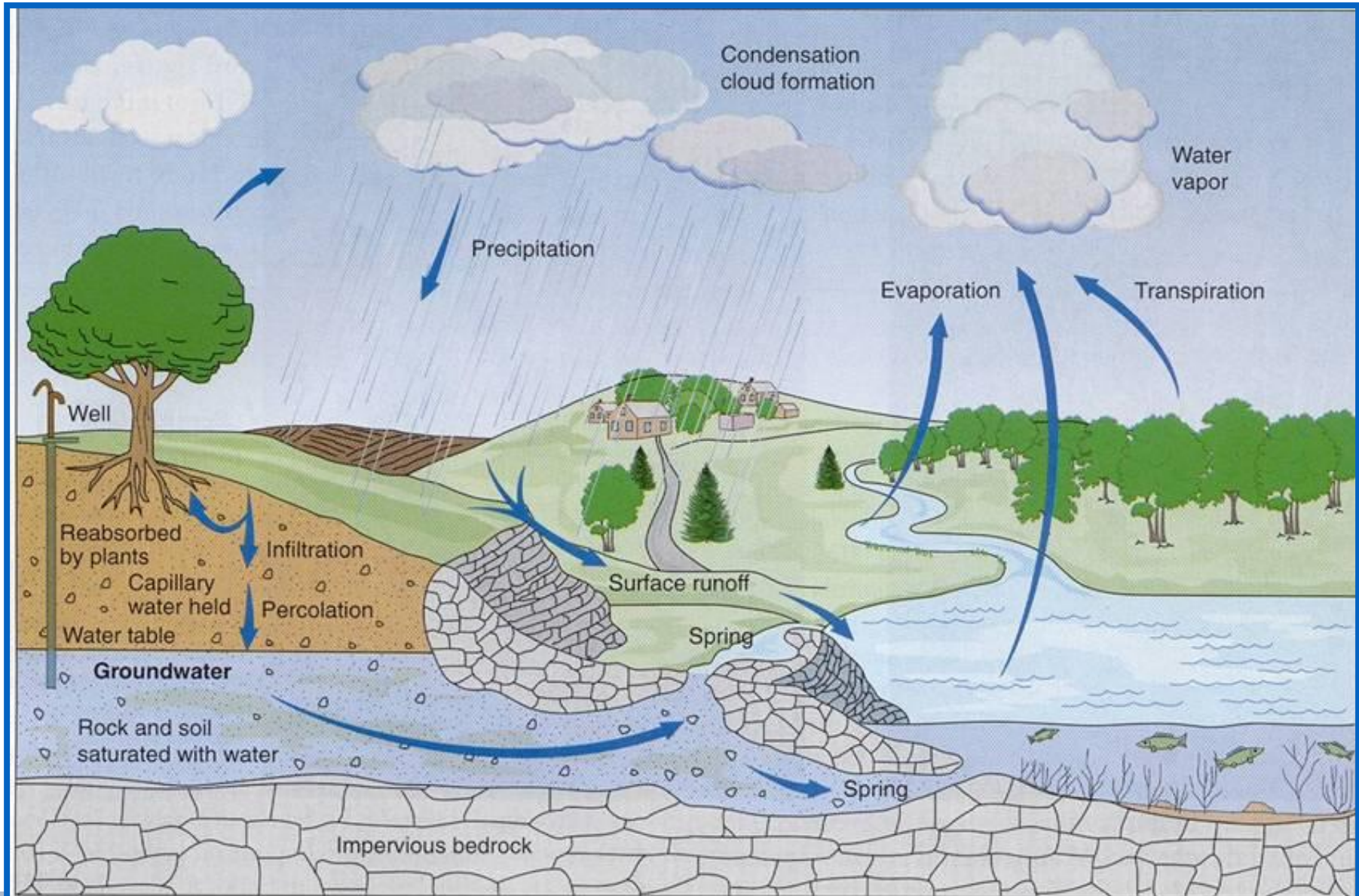


CHAT: Who takes care of your lawn?

Outline — Comments and Questions Welcome at Any Time

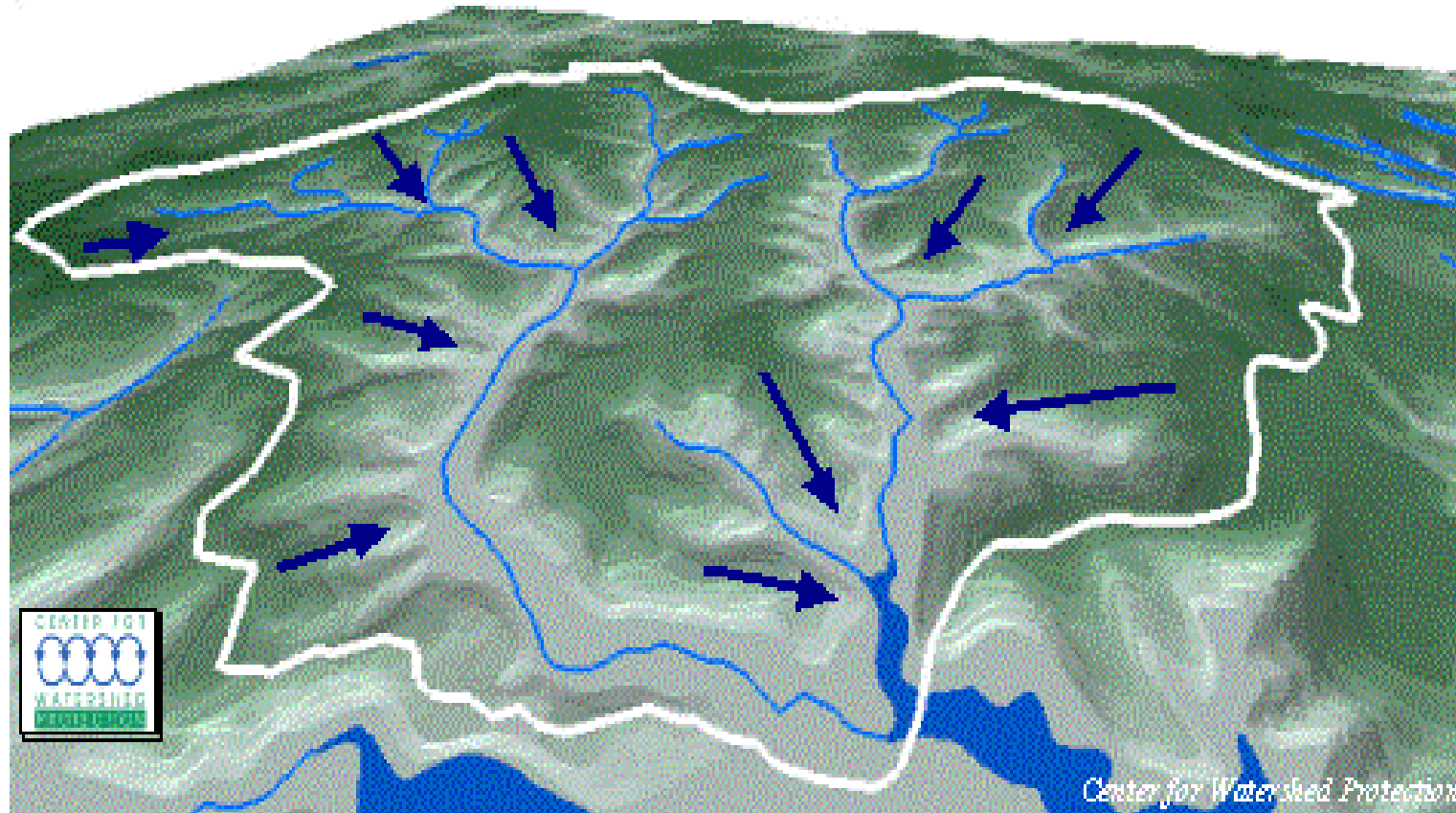
1. Land-water connection
2. Lawn care recommendations **without** fertilizer
3. Lawn care recommendations **with** fertilizer
4. Wrap up

Water Cycle



▲ **FIGURE 9-3 The hydrologic cycle.** The Earth's fresh waters are replenished as water vapor enters the atmosphere by evaporation or transpiration from vegetation, leaving salts and other impurities behind. As precipitation hits the ground, note that three additional pathways are possible.

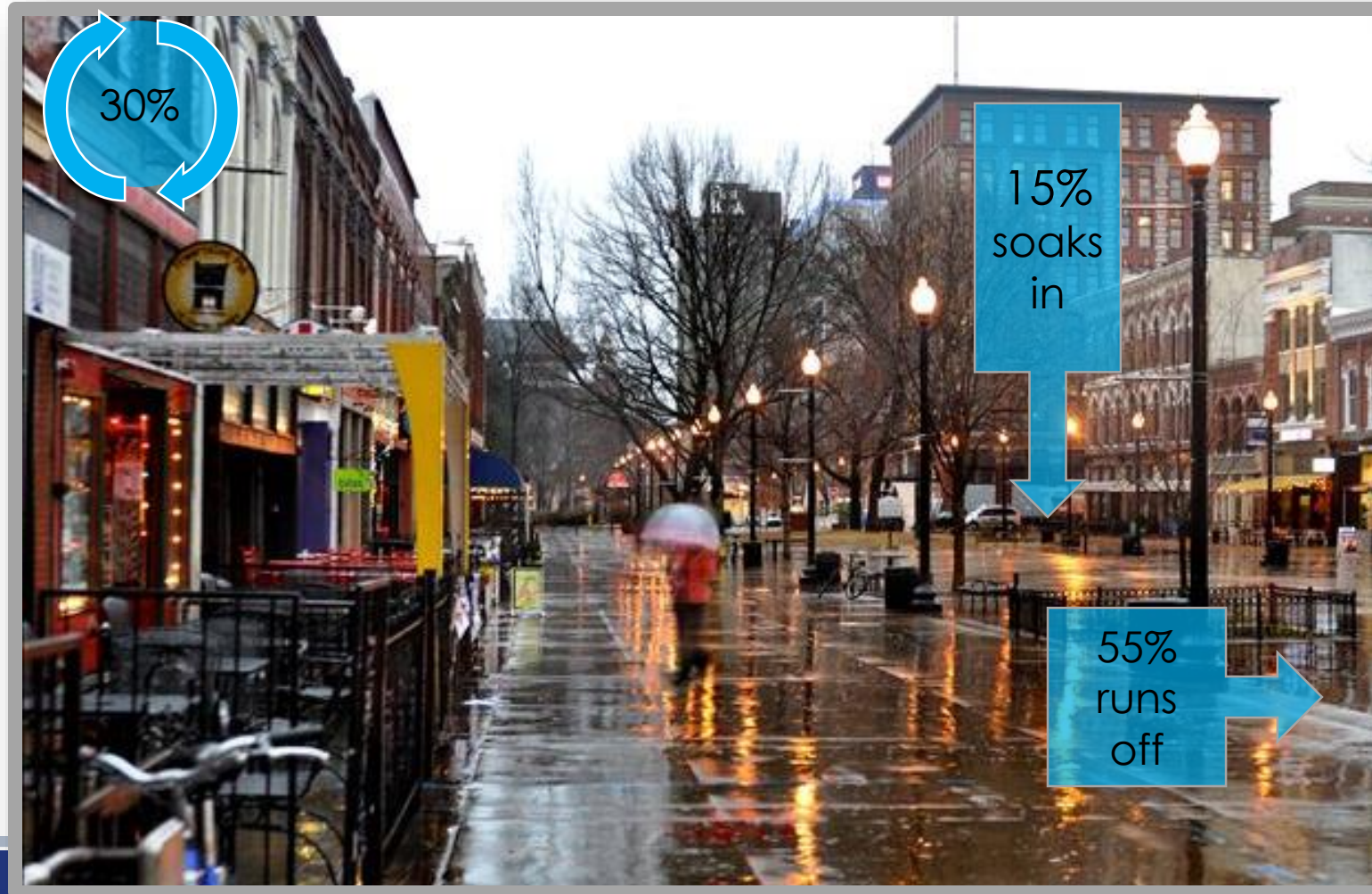
Watershed = the LAND AREA that drains into a particular waterbody



Undeveloped Area



Highly Developed Area



How does stormwater end up in waterbodies?



Major Types of Water Pollution in New England

- Sediment
- Pathogens
- Toxic contaminants
- Salt
- Excess nutrients



EXCESS NUTRIENTS – Nitrogen and Phosphorus



- **Necessary for life, but...**
- **Stimulate aquatic plant (algae) growth resulting in murky water and low dissolved oxygen levels.**
- **Can also trigger cyanobacteria blooms which can make pets and people sick when ingested.**
- **Nitrates are a health hazard in drinking water.**

Where Do Excess Nutrients Come From?

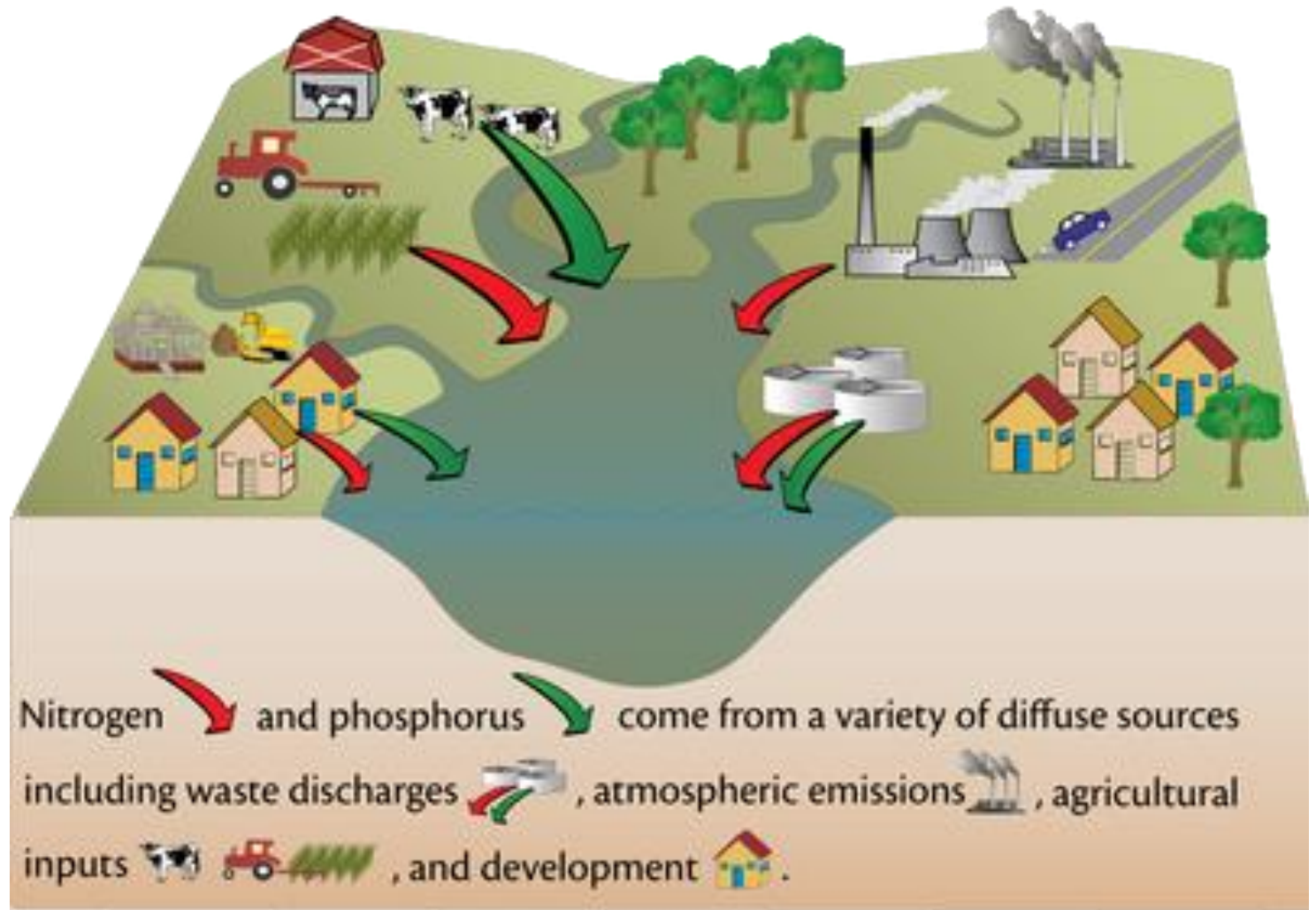
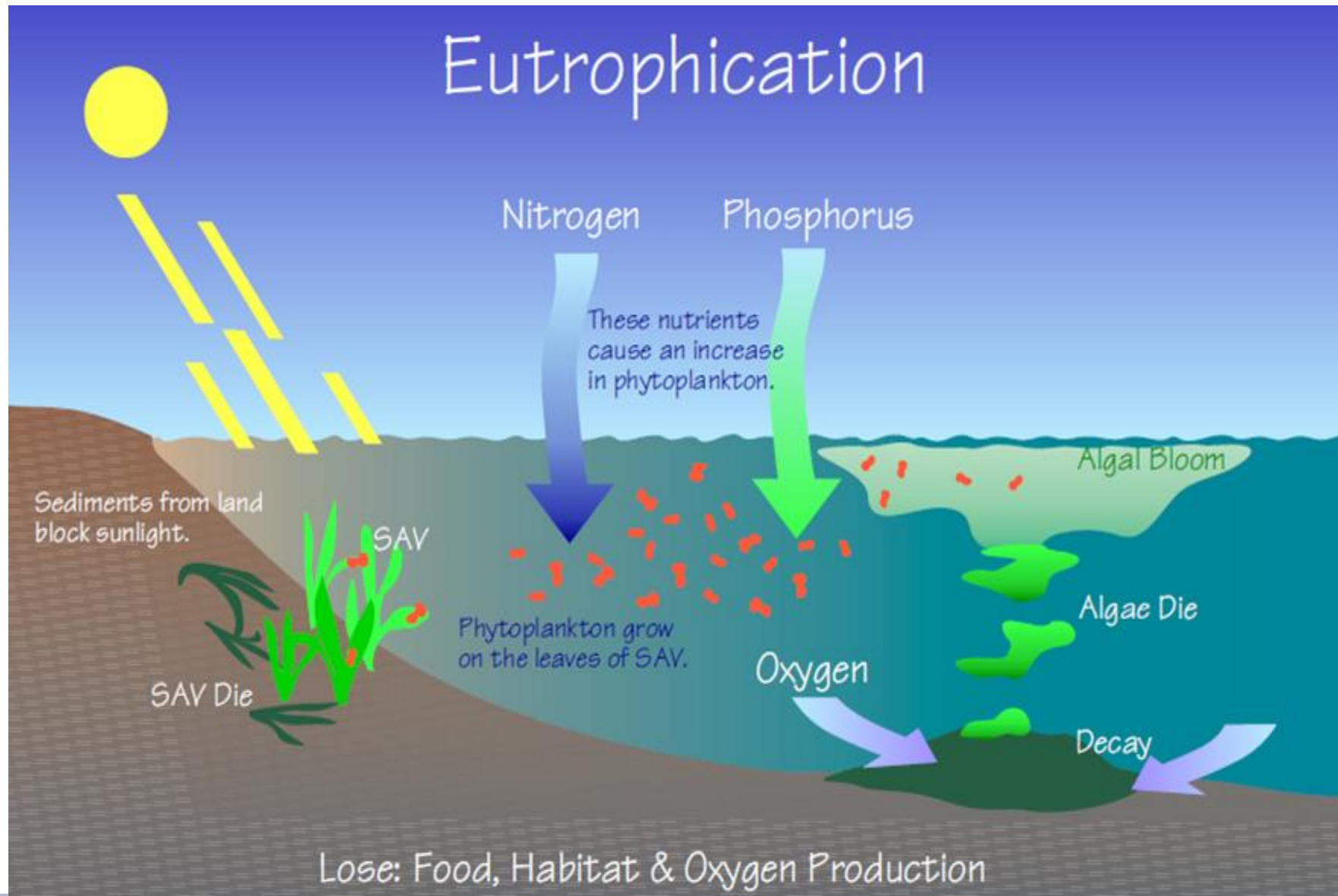


Diagram courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science. Source: Lane, H., J.L. Woerner, W.C. Dennison, C. Neill, C. Wilson, M. Elliott, M. Shively, J. Graine, and R. Jeavons. 2007. Defending our National Treasure: Department of Defense Chesapeake Bay Restoration Partnership 1998-2004. Integration and Application Network, University of Maryland Center for Environmental Science, Cambridge, MD.

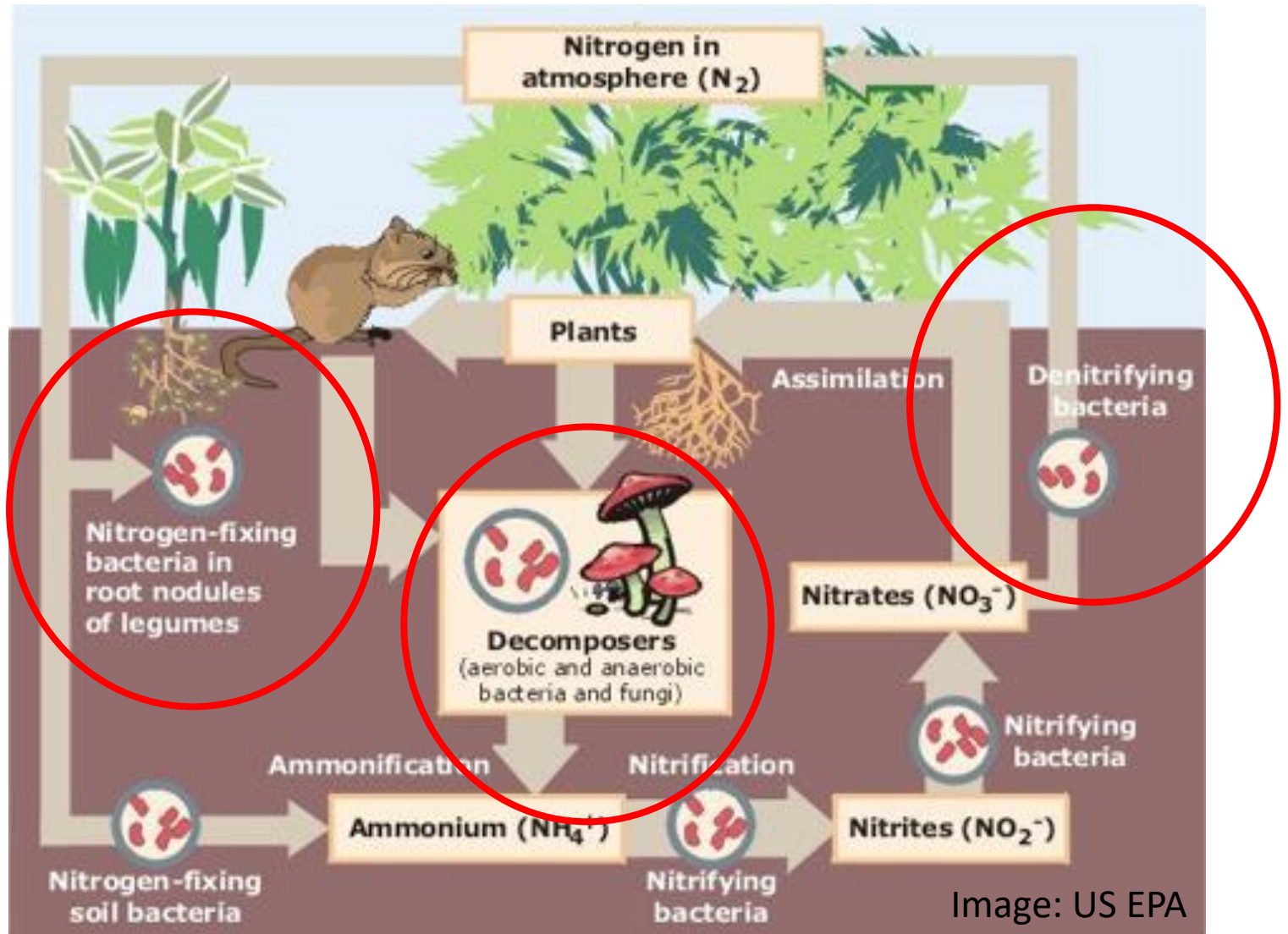
Eutrophication



Phosphorus and sediment



Nitrogen Cycle



Plants and healthy soils FILTER water



CHAT: Questions? Comments?

Changing Homeowner's Lawn Care Behavior to Reduce Nutrient Losses

USDA/NIFA 2006-51130-03656



Applying knowledge to improve water quality

**National
Water Program**

*A Partnership of USDA, NIFA
& Land Grant Colleges and Universities*



Applying knowledge to improve water quality

**Northeast States &
Caribbean Islands
Regional Water Center**

*A Partnership of USDA, NIFA
& Land Grant Colleges and Universities*



Water Quality Friendly Lawn Care Recommendations



Social Science Results and Recommendations for Outreach

Brian Eisenhauer, PhD
Plymouth State University

**From Report of Social
Science findings from
Changing Homeowner's
Lawn Care Behavior to
Reduce Nutrient Losses in
New England's Urbanizing
Watersheds**

**USDA CSREES (now NIFA) project
2006-51130-03565**

Changing Homeowner's Lawn Care Behavior to Reduce Nutrient Losses in New England's Urbanizing Watersheds



Social Science Results Summary

Nutrient losses from common lawn care practices, such as fertilization, have been identified as significant contributors to Non Point Source Pollution (NPS) in New England's watersheds. In order to create an effective educational outreach program to stimulate the use of more environmentally responsible lawn care practices, and reduce this source of NPS, a significant amount of social science research has been conducted to inform the design of a marketing program informed by the principles of community based social marketing. This executive summary highlights the key findings from the survey portion of the project to aid in the creation of outreach and education messages.

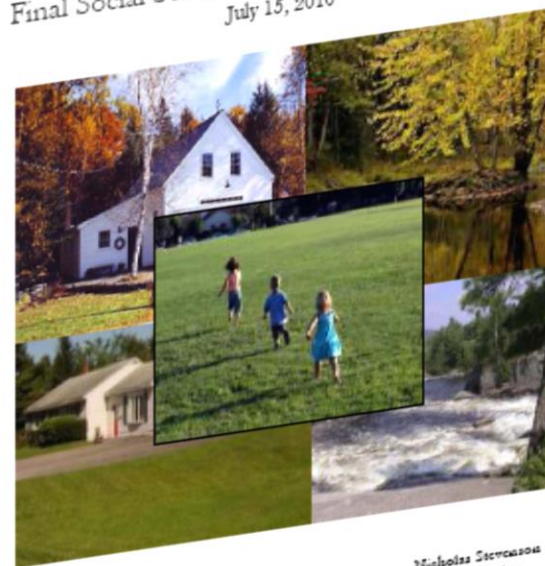
The question of what motivates environmentally responsible behavior in lawn care is important to the future of environmental health throughout the Northeast. Attempting to get landowners to lessen the negative impacts lawn care practices have on their watersheds has become a focus of Extension efforts throughout the region, however little research exists on the means for achieving this goal. Designing an outreach program that leads to measurable change in the practices scale landowners use to care for their landscapes is a challenge that can best be met through application of findings from hypotheses-driven social science research. Instigating behavior change among landowners in a watershed can be a complex task because of the myriad issues involved in fostering environmentally responsible behavior, however existing social science research provides a framework that can be used to successfully structure this inquiry.

The social science research was conducted using methodological triangulation by engaging qualitative, in-depth interviews with turf care opinion leaders throughout New England to ascertain their perceptions of, and opinions about, critical turf care issues related to water quality. In addition to being valuable information in its own right, the data collected and analyzed also used to inform the quantitative stage of data collection. The social science research of the project was designed with 4 goals:

1. Explore primary drivers of do-it-yourselfers' (DIYs) lawn care choices and practices, especially with regard to fertilizer application. Information from non-DIYs will also be analyzed.
2. Investigate perceived barriers and benefits to adoption of more water quality-friendly nutrient application practices.
3. Examine relative measures of trust and frequency of contact for various sources of care information by neighborhood residents.

Changing Homeowner's Lawn Care Behavior to Reduce Nutrient Losses in New England's Urbanizing Watersheds

Final Social Science Project Evaluation Report
July 15, 2010



Dr. Brian W. Eisenhauer
Associate Director
Center for the Environment
Plymouth State University

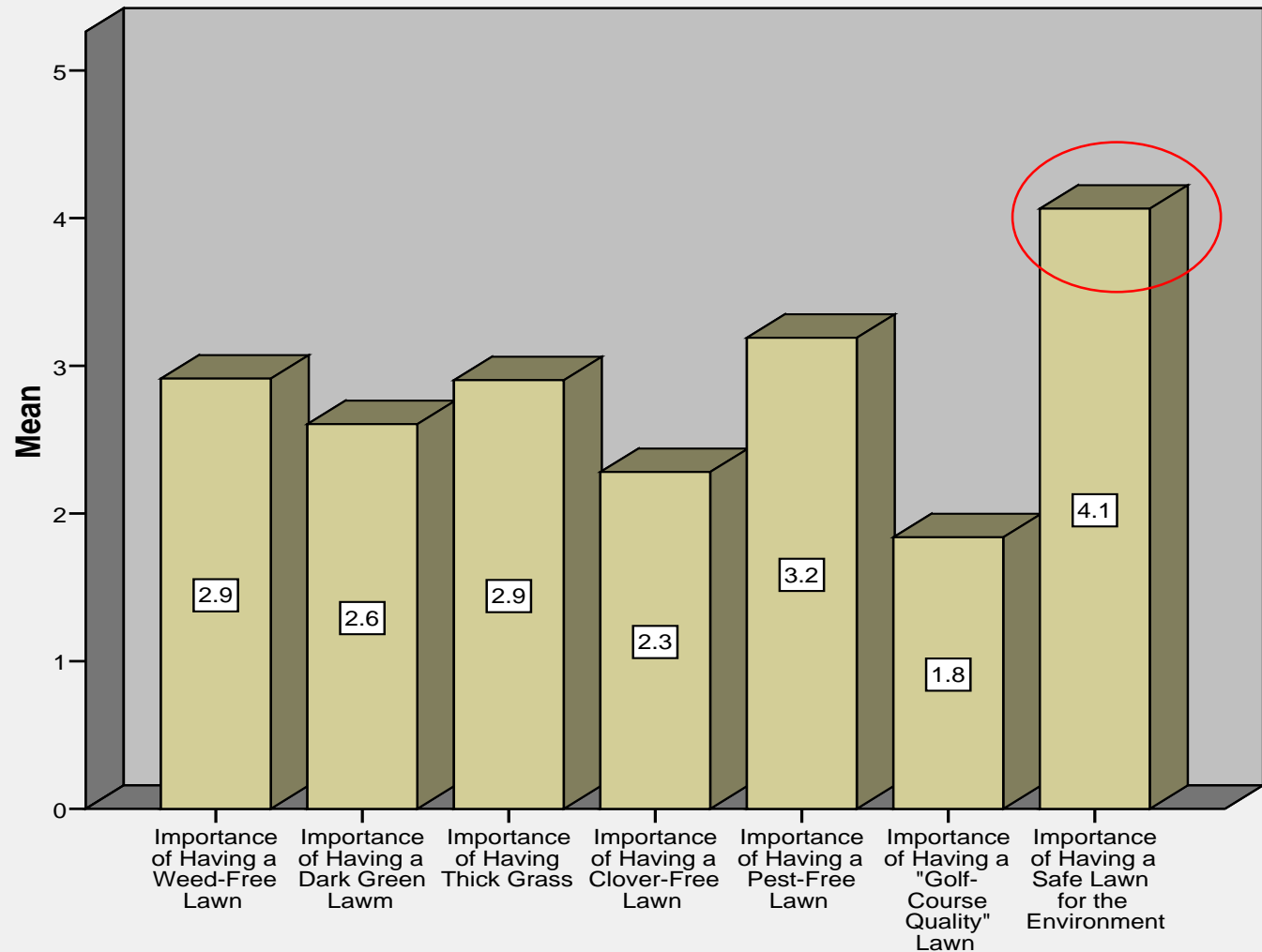
Julia Peterson
Extension Specialist
NH Sea Grant
University of New Hampshire

Nicholas Stevenson
Christian Weber
Center for the Environment
Plymouth State University

Poll: Which 3 of the following lawn characteristics are most important to you?

What Matters to People in New England Regarding Lawns?

Respondents Mean Rating of the Importance of Each Lawn Issue



Recommendations, part 1

Without fertilizer

Simple Recommendations for Every Lawn

1. Right place, right plants
2. Choose the right grass seed varieties
3. Mow smart
4. Don't overwater
5. Test your soil
6. Dispose of yard waste properly

1. Limit lawn areas to play and picnic places



Expectations: turf seasonal cycle

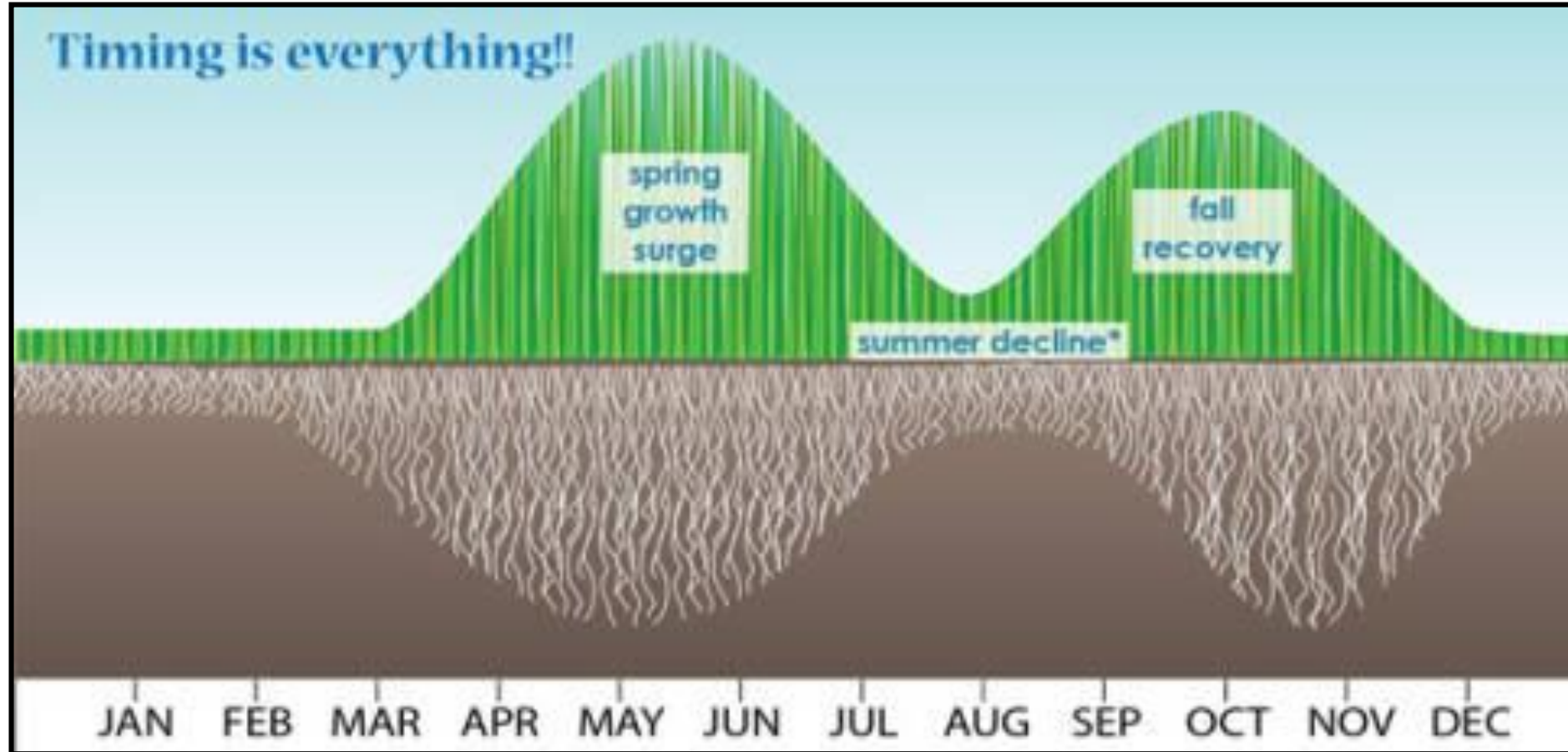
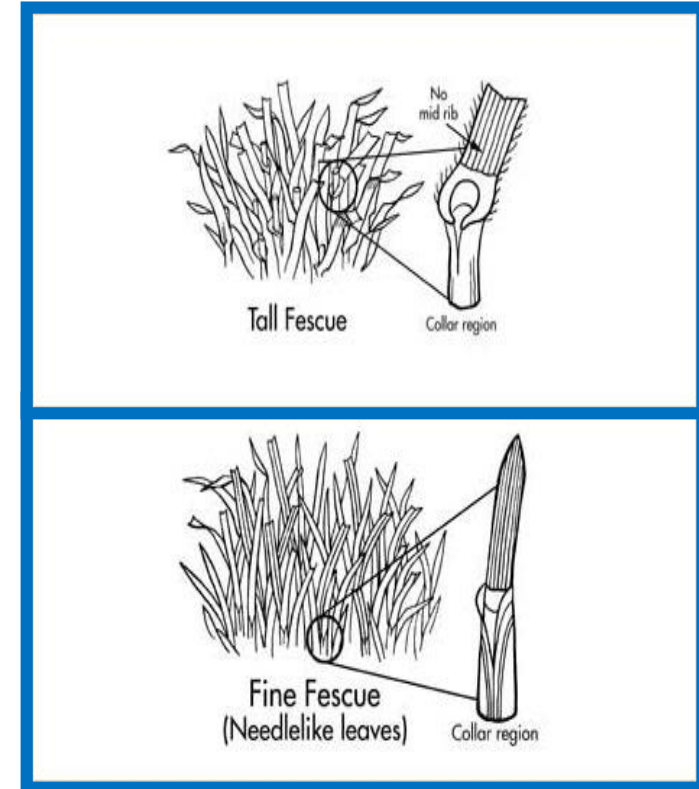


Image: University of Minnesota, Cornell University

2. Plant low maintenance grass varieties.

- Use recommended grass mixes
- Overseed when needed
- Plant new lawn in the early fall for best results (less weeds)



Choose the Right Seed Mixes

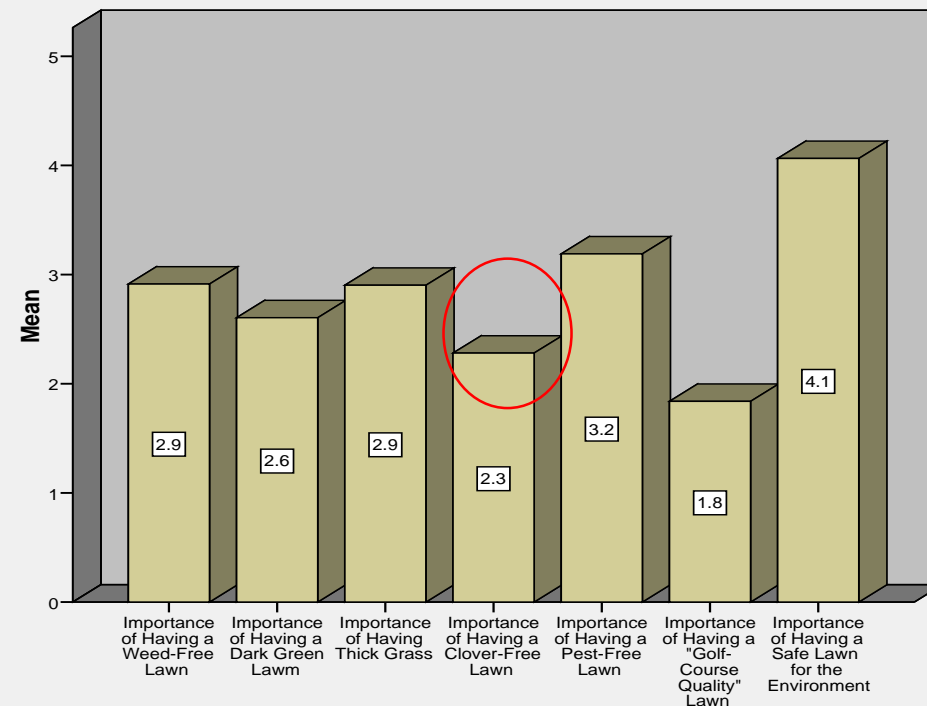
Turf Species	Tolerances	Limitations	Color and Best Conditions
TALL FESCUES (turf-type)	Heat and drought tolerant Fairly shade tolerant	Slow to establish Fair recovery potential	“New” ones are finer textured and darker green. Best in well drained soils & sun
FINE FESCUES (creeping red, chewings, hard, sheep)	Very tolerant of low pH and low fertility, drought and shade Become semi-dormant in heat & drought but recover quickly	Don't perform well under hot, humid conditions with high fertility	Narrow-leaf, medium to dark green Ideal for low maintenance
PERENNIAL RYEGRASS	Germinates rapidly and is quick to establish – good for overseeding Tolerant of wear and heat	Can be competitive Not tolerant of shade and drought Susceptible to ice cover injury	Fine to medium leaf texture and dark green color Best on well drained soils with moderate fertility
KENTUCKY BLUE GRASS	High tolerance for cold and wear Moderate tolerance for heat and drought Becomes semi-dormant in heat and drought; can recover	Requires higher amounts of N fertilizer May produce thatch	Fine to medium leaf texture and dark green color Best in well drained, sunny areas

Source:
<http://extension.umass.edu/turf/fact-sheets/selection-grasses>

Incorporate clover.

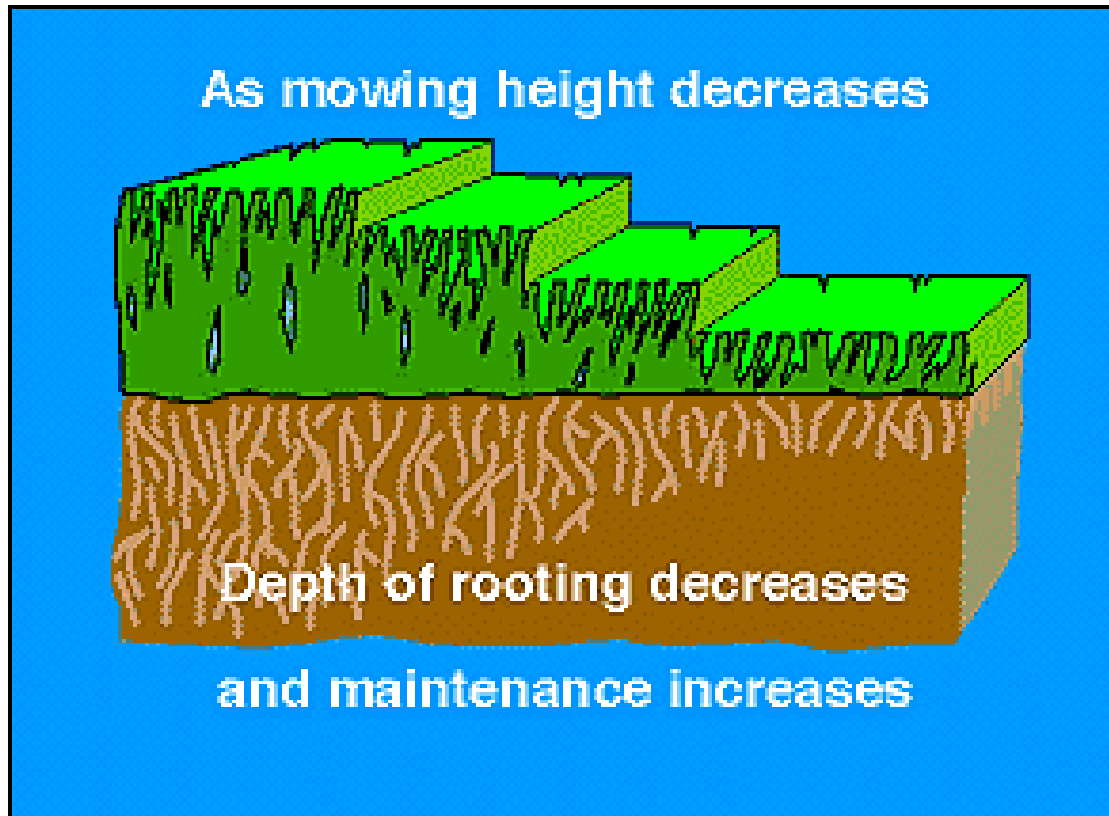


Respondents Mean Rating of the Importance of Each Lawn Issue



Clover fixes nitrogen naturally in the soil. **Keep clover <10% of seed mix.**
Disregard if there are allergies to bee stings in the household.

3. Mow Smart



Respondents' Mean Levels of Willingness to Engage in Practices to Reduce Nutrient Leaching and Runoff from Their Lawn (1=Not willing; 5=Very Willing)




Mow high 3" and leave clippings on the lawn.

4. Water wisely



5. Test Soil

Note pH
and Organic
Matter



Extension

Home Grounds and Gardens

Soil Report

Lawn

Lab ID: 41646

Lab Run Date: 08/07/19

Test Data

pH - Soil	6.20			Optimum Range
Calcium, Mehlich 3 (Ca)	530.80 (ppm)	L		800 - 1200
Magnesium, Mehlich 3 (Mg)	80.00 (ppm)	O		60 - 120
Potassium, Mehlich 3 (K)	62.00 (ppm)	L		170 - 280
Phosphorus, Mehlich 3 (P)	40.00 (ppm)	O		30 - 50
Lead, Mehlich 3 (Pb)	3.79 (ppm)	VL		
Org. Matter, LOI-360 (OM)	5.69 (%)			

Optimum Range Key

VL - Very Low

L - Low

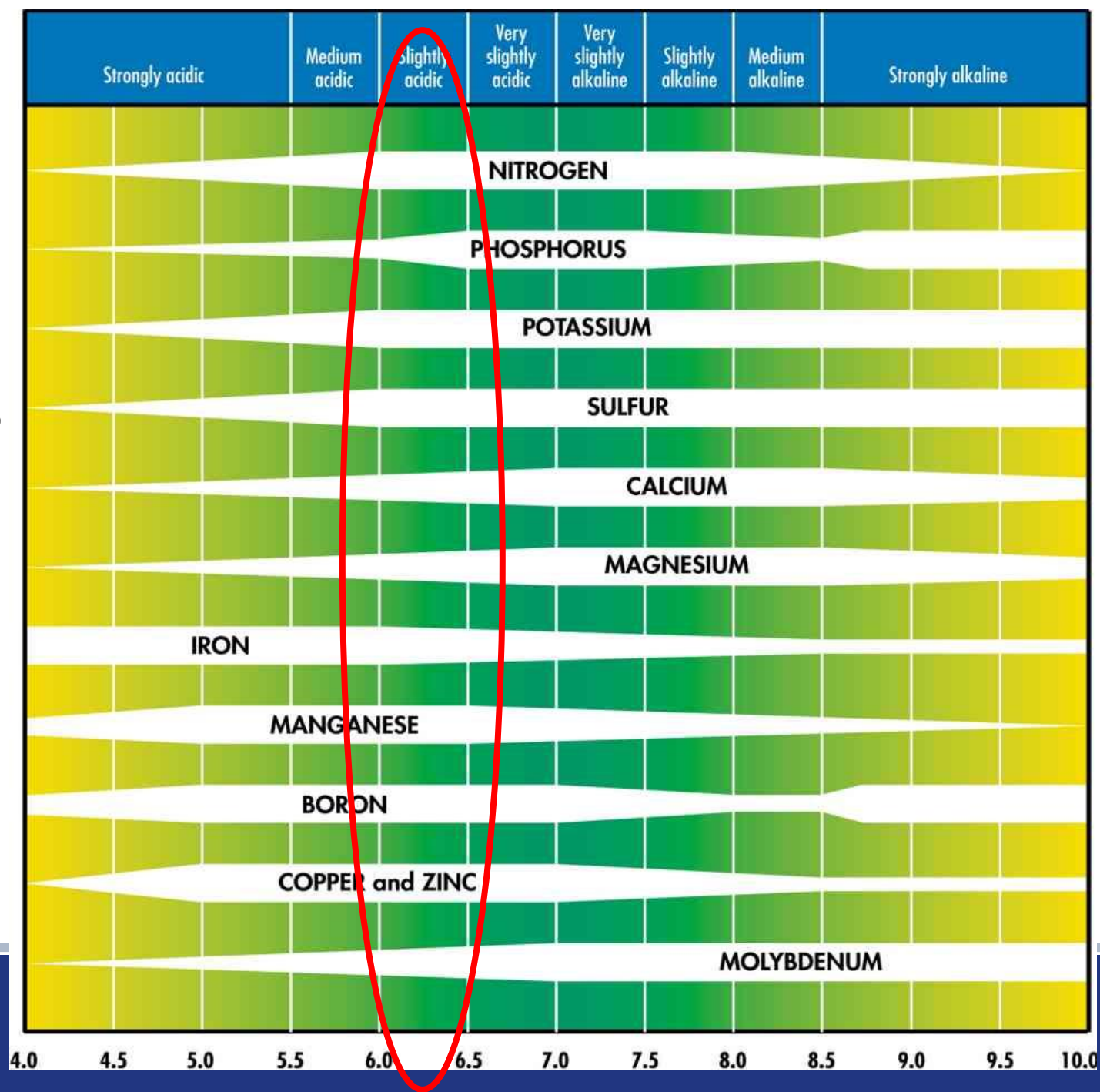
O - Optimal

H - High

VH - Very High

Soil pH

Ideal = 6.0-6.5



Soil Organic Matter: For NEW turf

Incorporate compost or another organic matter source to raise the organic matter content to at least 3%-5%.*

(NOTE: compost can have high phosphorus levels.)



Soil Organic Matter: For EXISTING lawn

Build up soil organic matter by **top dressing** with compost.

$\frac{1}{4}$ inch layer, gently raked in



6. Manage yard waste properly

- LEAVE clippings on the lawn *OR* COMPOST them if very heavy
- COMPOST leaves *OR* SHRED for mulch
- NEVER rake grass clippings, leaves, or plant material into a waterbody, drainage area or stormdrain catch basin



Is Your Unfertilized Lawn Acceptable To You?



CHAT: Questions? Comments?

Recommendations, part 2

With fertilizer use

Recommendations for Lawns That Need Fertilizer

1. Know what is needed and what is not
2. Determine how much to apply
3. Know when and where to apply
4. Choose the right fertilizer for the situation

1. Know the soil nutrients



N = nitrogen for growth and greening

P = phosphorus for new roots and shoots

K = potassium for stress resistance

What's in a bag of fertilizer (in our region)?

- Mostly nitrogen (N)
- Low or no phosphorus (P)
 - “starter” formulations will have P
- Some potassium (K)



Soil Test Results - Nutrients

Test Data

pH - Soil	6.20		Optimum Range
Calcium, Mehlich 3 (Ca)	530.80 (ppm)	L	800 - 1200
Magnesium, Mehlich 3 (Mg)	80.00 (ppm)	O	60 - 120
Potassium, Mehlich 3 (K)	62.00 (ppm)	L	170 - 280
Phosphorus, Mehlich 3 (P)	40.00 (ppm)	O	30 - 50
Lead, Mehlich 3 (Pb)	3.79 (ppm)	VL	
Org. Matter, LOI-360 (OM)	5.69 (%)		

Optimum Range Key

VL - Very Low

L - Low

O - Optimal

H - High

VH - Very High

Recommendations

Home Lawn (Target pH Range: 6.0 - 6.5)

Lawn Seeding

Lime: No Lime or Sulfur required at this time.

Fertilizer: For any single application, apply up to 0.9 lbs of total nitrogen per 1,000 sq. ft. of lawn using a fertilizer ratio of 1:1:1 or equivalent. Refer to the maintenance schedule below to determine how many applications you should make in 1 year. Do not apply more than 3.25 lbs of total nitrogen per 1,000 sq. ft. per year.

Lawn Maintenance

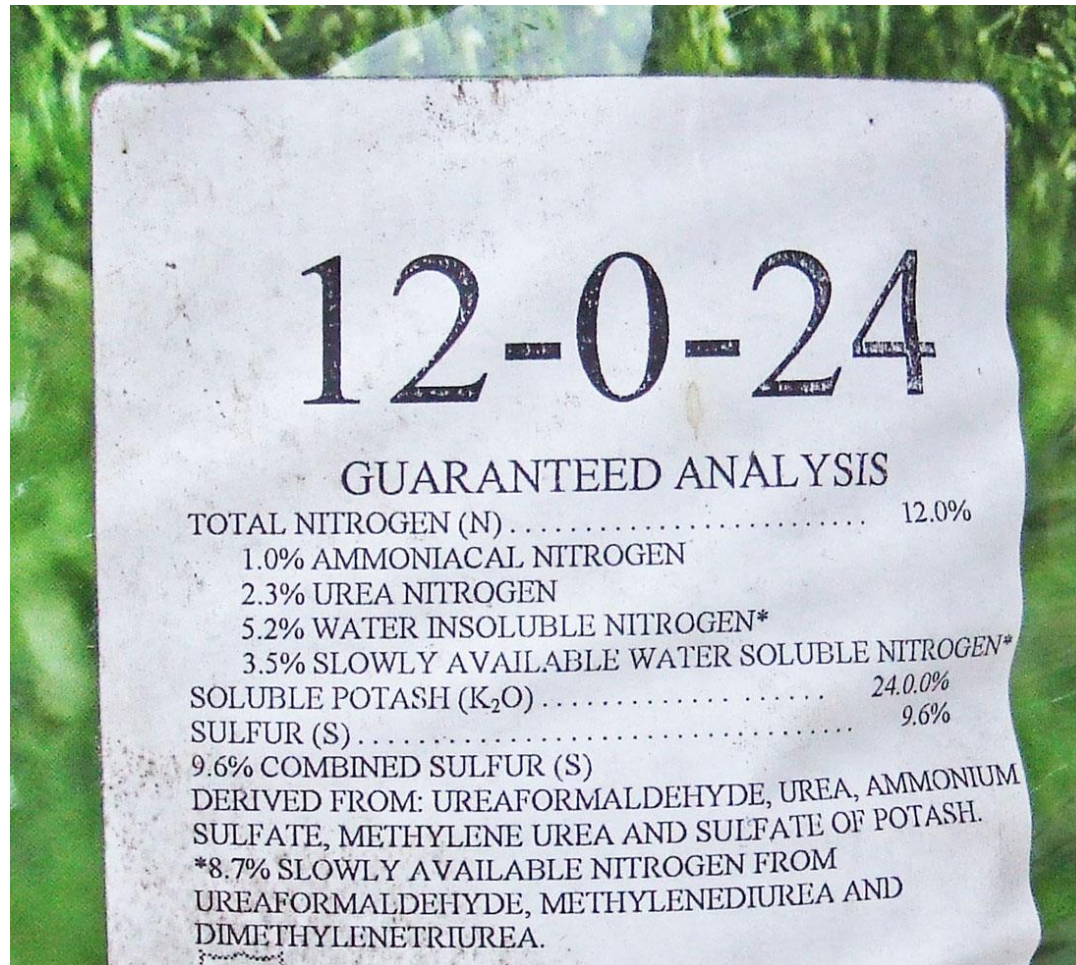
Lime: No Lime or Sulfur required at this time.

Fertilizer: For any single application, apply up to 0.9 lbs of total nitrogen per 1,000 sq. ft. using a fertilizer ratio of 3:0:3 or equivalent. Refer to the maintenance schedule below to determine how many applications to make in one year.

For spring and fall applications at least 25% of the total nitrogen in the fertilizer should be derived from slow release nitrogen. For a mid-summer fertilizer application at least 50% of the total nitrogen in the fertilizer should be derived from slow release nitrogen sources. Read the label on the back of the bag to see how much of the total nitrogen is in slow release form (which may be called water insoluble nitrogen on the label).

Where's the
Nitrogen result?

Reading a Fertilizer Label: N-P-K




2. Determine How Much to Apply



- A. Measure the dimensions to calculate AREA in square feet.
- B. Read label.
 - It states **how many pounds of product** to put down for each 1000ft² of lawn.
 - It **assumes a rate of .9 pounds of N per application** (in NH).
- C. Anticipate how many times you will apply this year (1-4).

Water Quality Friendly Recommendation:

*Apply NO MORE than 2 pounds N per year**



* For lawns greater than 10 years old where clippings are left.

1. Apply **one-half to one-third** of amount recommended on fertilizer bag.
2. Look for results...
 - quick release - within a couple weeks
 - slow release - over many weeks
3. Reapply at reduced rate only if lawn response is unacceptable.

4. Choosing fertilizer (+ positives / - negatives)

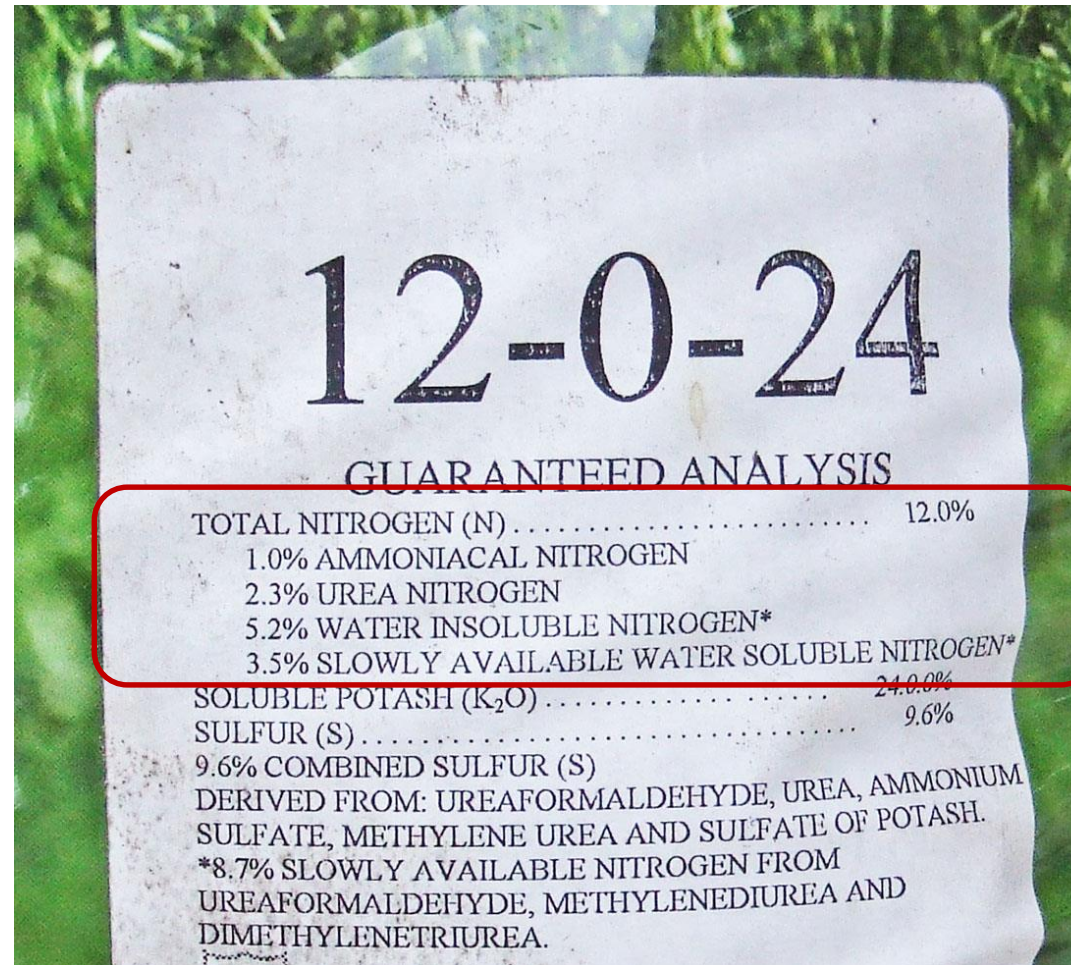
- SLOW RELEASE – is generally preferable for water quality considerations.
 - look for > 50% water insoluble nitrogen (win).
 - comes in synthetic and organic forms.
 - nutrient releases based on moisture levels or microbial activity depending on type.
- ORGANIC – is a slow release option
 - + non-petroleum based, is from natural sources in a plant or animal-based carrier
 - + good source of micronutrients
 - + feeds microbes
 - + adds organic matter
 - may lead to over-applying P in order to get adequate levels of N for turf

BE AWARE: Excess nitrogen is excess nitrogen, REGARDLESS of the source!

Choosing Fertilizer, continued:

- NORMAL RELEASE SYNTHETIC - may be preferable under very specific conditions
 - + Temperature is getting too low for slow release and supplement is needed
 - + Need to push growth quickly to prevent erosion
 - + Is typically less expensive
 - Is more prone to salt burn
 - Is more susceptible to leaching
- **AVOID – combination products** (often herbicide and fertilizer, aka weed and feed) unless you are certain it's needed.

Reading a Fertilizer Label – % slow release (WIN)



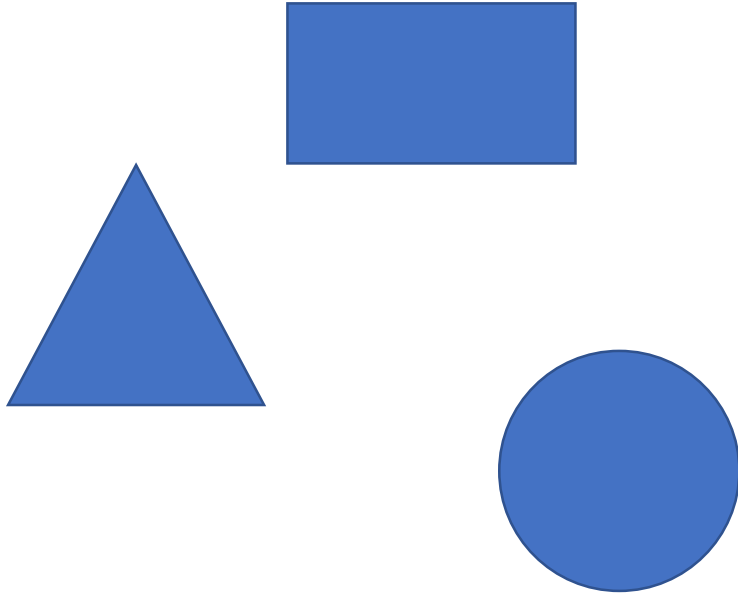
Poll: Do you know the square footage of your lawn?

Do people know the square footage of their lawns?

Does Respondent Know the Square Footage of their Lawn?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	399	52.9	55.4	55.4
	Yes	321	42.6	44.6	100.0
	Total	720	95.5	100.0	
Missing	Not Applicable	8	1.1		
	Missing	26	3.4		
	Total	34	4.5		
Total		754	100.0		

For Help: Determining square area and calibrating spreader



<https://extension.unh.edu/resource/calculating-lawn-fertilizer-rates-fact-sheet>

Is everybody applying?

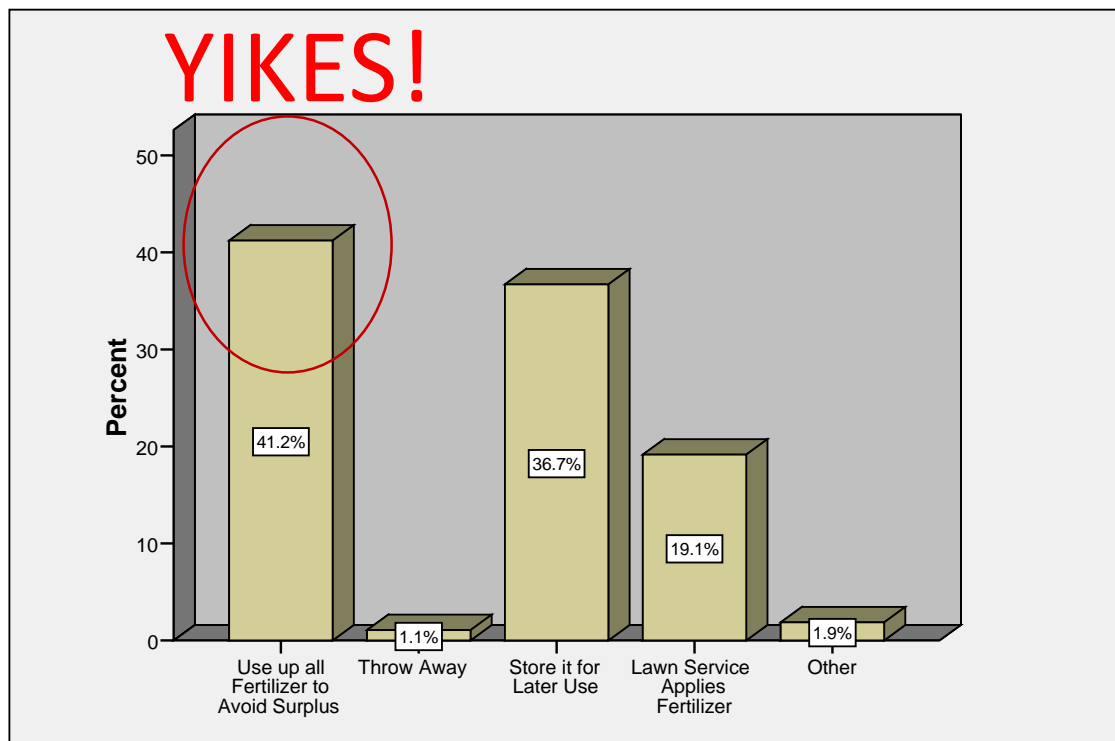
- About **half of survey respondents** indicate that they apply fertilizer to their lawns.

- Almost 10% apply less than once a year
- About 56% apply once or twice.
- Only 31% apply three or four times.

Poll: If you apply fertilizer, what do you do with leftover fertilizer?

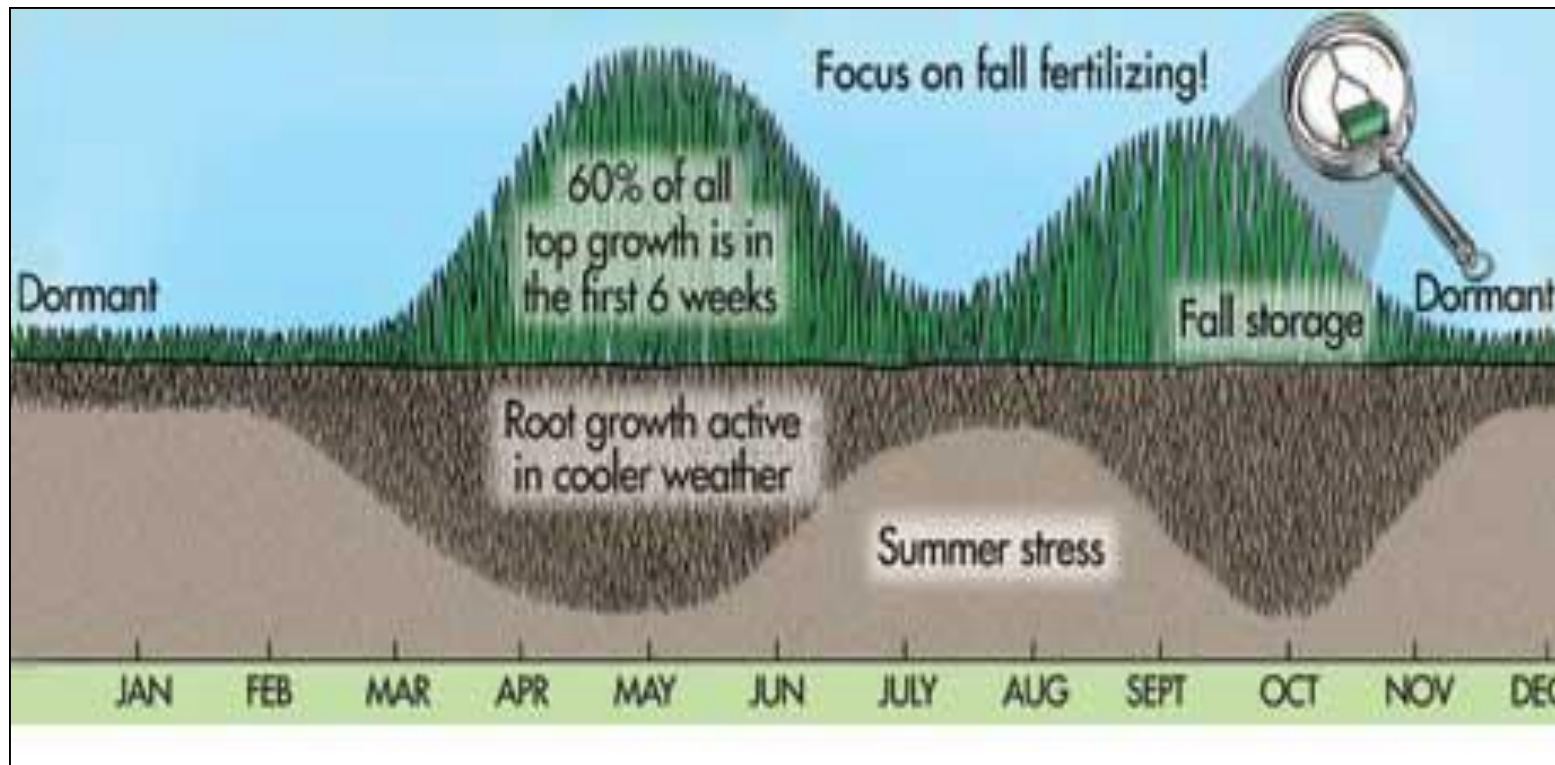
Use Only What You Need - Store or Give Away Extra

What Does Respondent do with Left-Over Fertilizer?



3. Know When to Apply

If needed, fertilize after spring green-up and no later than mid September.
Avoid fertilizing in the mid-summer.



What is this soil test result telling you about P and K?

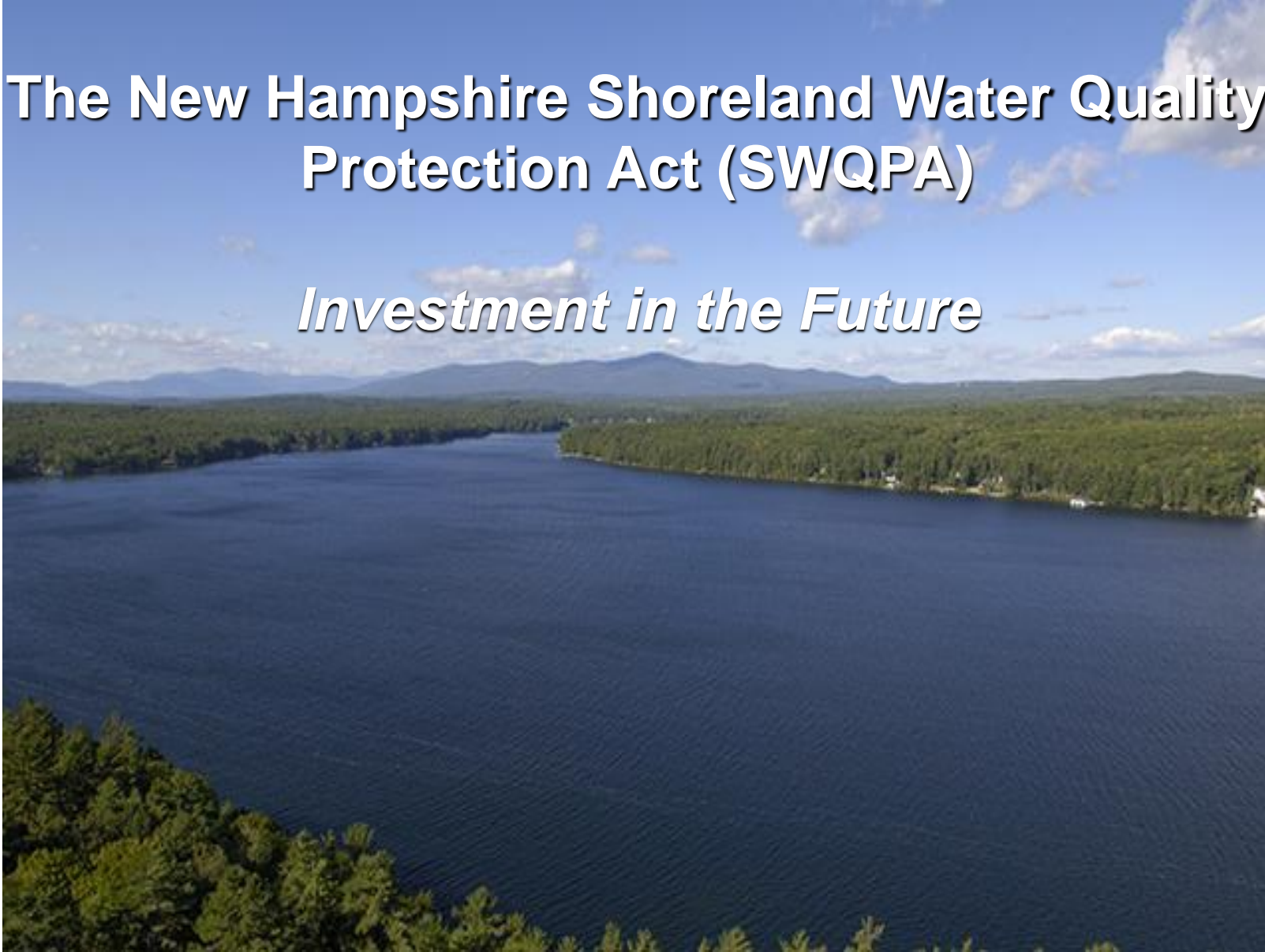
Test Data				
pH - Soil	6.40			Optimum Range
Calcium, Mehlich 3 (Ca)	695.70 (ppm)	L		800 - 1200
Magnesium, Mehlich 3 (Mg)	63.00 (ppm)	O		60 - 120
Potassium, Mehlich 3 (K)	72.00 (ppm)	L		170 - 280
Phosphorus, Mehlich 3 (P)	97.00 (ppm)	H		30 - 50
Lead, Mehlich 3 (Pb)	3.72 (ppm)	VL		
Org. Matter, LOI-360 (OM)	1.78 (%)			
<u>Optimum Range Key</u>				
VL - Very Low	L - Low	O - Optimal	H - High	VH - Very High
Fertilizer: For any single application, apply up to 0.9 lbs of total nitrogen per 1,000 sq. ft. using a fertilizer ratio of 1:0:1 (or 4:0:3) or equivalent. Refer to the maintenance schedule below to determine how many applications to make in one year.				

Poll – choose the best fertilizer based on soil test results (P and K) **AND** water quality goals (hint: >50% WIN)

Test Data				
pH - Soil	6.40			Optimum Range
Calcium, Mehlich 3 (Ca)	695.70 (ppm)	L		800 - 1200
Magnesium, Mehlich 3 (Mg)	63.00 (ppm)	O		60 - 120
Potassium, Mehlich 3 (K)	72.00 (ppm)	L		170 - 280
Phosphorus, Mehlich 3 (P)	97.00 (ppm)	H		30 - 50
Lead, Mehlich 3 (Pb)	3.72 (ppm)	VL		
Org. Matter, LOI-360 (OM)	1.78 (%)			
<u>Optimum Range Key</u>				
VL - Very Low	L - Low	O - Optimal	H - High	VH - Very High
Fertilizer: For any single application, apply up to 0.9 lbs of total nitrogen per 1,000 sq. ft. using a fertilizer ratio of 1:0:1 (or 4:0:3) or equivalent. Refer to the maintenance schedule below to determine how many applications to make in one year.				

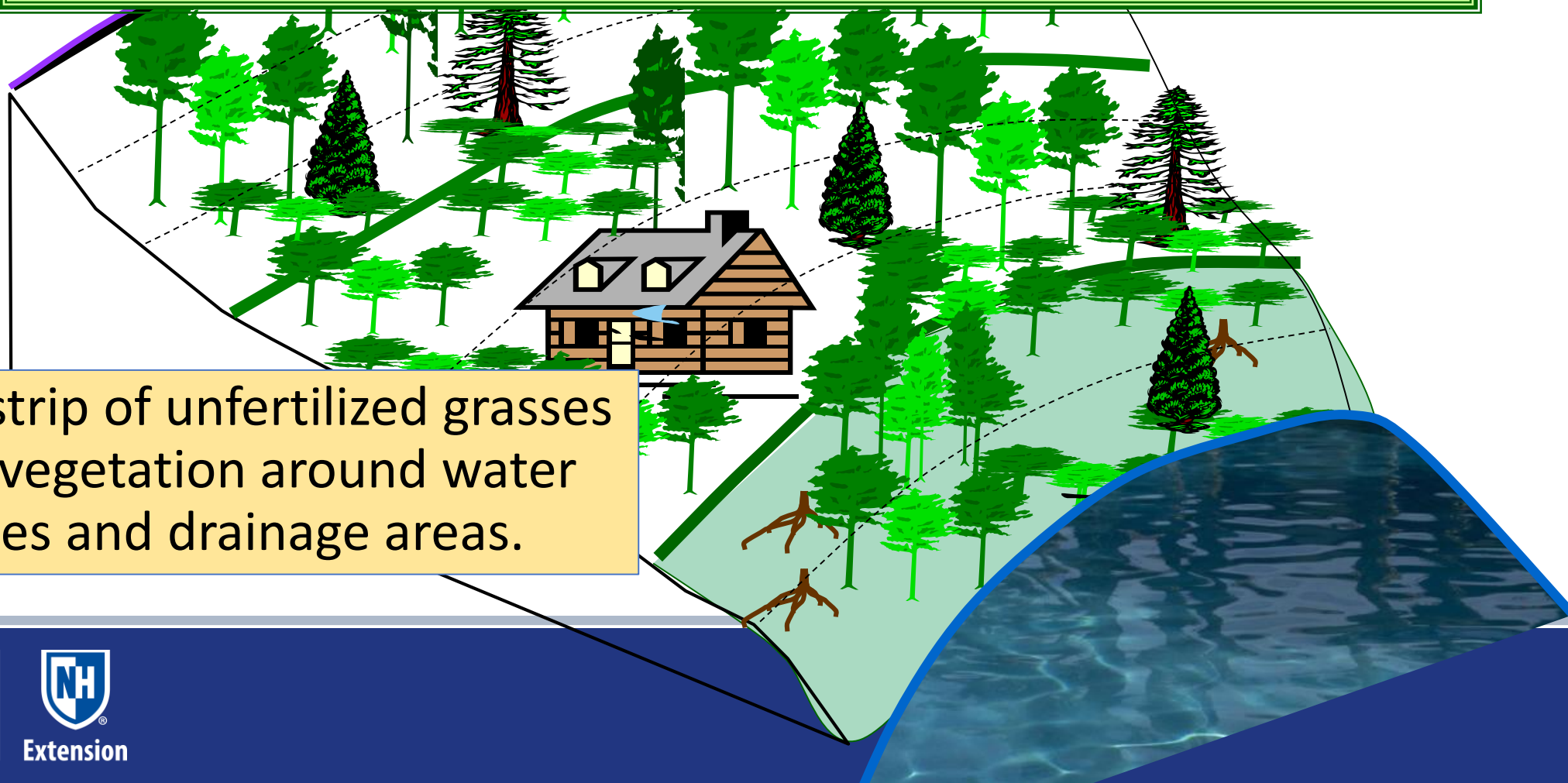
The New Hampshire Shoreland Water Quality Protection Act (SWQPA)

Investment in the Future



Fertilizers within Waterfront Buffer:

- Lime may be used within 25'
- Slow release nitrogen and low phosphorus fertilizer may be used beyond 25' from the reference line



Leave a strip of unfertilized grasses and vegetation around water bodies and drainage areas.

Additional Information:

- <https://extension.unh.edu/tags/landscaping-water-quality> - includes video clips, manuals, fact sheets
- <https://extension.unh.edu/resource> - search by any lawn or gardening topic –
 - Videos, blogs, fact sheets, manual, etc.

Green Grass & Clear Water

Water-quality friendly lawn care and fertilizer recommendations for northern New England

According to a recent survey, it's likely that you and your neighbors believe having a lawn that is safe for the environment is very important.¹ However, some lawn care practices can create water quality problems. Plants need nutrients to grow, but excess nutrients (including nitrogen and phosphorus found in fertilizers) that run off our properties into local waterbodies can trigger algal blooms that cloud water and rob it of oxygen.

Many of us enjoy the time we spend working on our lawns and are willing to try new practices as long as our lawns continue to look good.¹ Here are some easy practices for creating and maintaining a truly healthy lawn that is both attractive and safer for the environment.



For additional fact sheets and videos, please visit:

www.extension.unh.edu/tags/home-lawn-care

Simple Recommendations for Every Lawn

1. Choose the Right Grass Seed

Consider limiting lawn area to locations where grass will grow easily and will actually be used for outdoor activities.

Choose grass varieties that require less maintenance. For northern New England, choose seed mixes with higher percentages of turf-type tall fescues, compact-type tall fescues and/or fine fescues. Choose mixes with smaller percentages of Kentucky bluegrass and/or perennial ryegrass. Overseed bare spots.

In shaded areas, select shade-tolerant turf grasses like fine-leaf and tall fescues.

Up to 10% of total seed mix can be white clover to help fix nitrogen in soil naturally. Avoid clover if anyone in the household is allergic to bee stings.

2. Don't Overwater

1" of water per week (from rain or irrigation) is usually enough. Overwatering can cause excess nutrients to move out of the root zone and into waterbodies or groundwater.

3. Test Your Soil

To have your soil tested, please visit this site: extension.unh.edu/programs/soil-testing-services. Sometimes adjusting the soil pH or organic matter are the only treatments needed to improve a lawn. If your soil test results are acceptable but your lawn is not, check for other problems like pests, grass variety, or sun/shade conditions.

4. Mow Smart



Mow grass no shorter than 3" high. Cut no more than one-third (1/3) of the blade each time you mow to encourage longer, stronger roots. Leave the clippings after mowing so they can return nutrients to the soil. NEVER dispose of clippings in drainage areas, storm drains, or waterbodies!



Protecting Water Resources and Managing Stormwater




A BIRD'S EYE VIEW FOR NEW HAMPSHIRE COMMUNITIES

Landscaping for Water Quality

2021 [Online]
Centered on Derry, NH




November 3 & 4 2021

UNIVERSITY of NEW HAMPSHIRE
COMPARATIVE EXTENSION

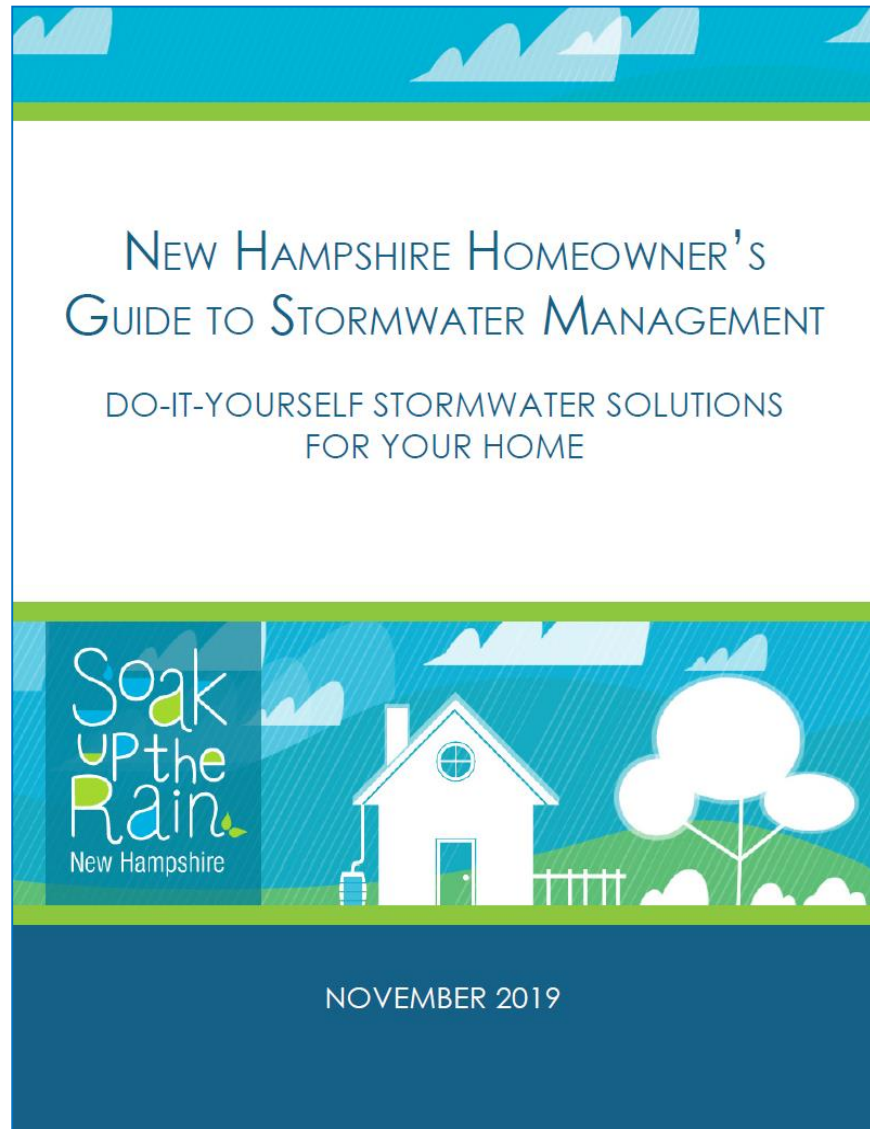
LANDSCAPING at the Water's Edge

AN ECOLOGICAL APPROACH



A MANUAL FOR NEW HAMPSHIRE LANDOWNERS AND LANDSCAPERS

<https://extension.unh.edu/tags/landscaping-water-quality>



Soak
UP the
Rain.
New Hampshire

<http://soaknh.org/>
603-419-0322

CHAT: Any final Questions or Comments?

Thank you!

