# SHiP

## Soil Health improvement Project


**www.soildistrict.org**

# SHIP PARTNERS






# Jakes Branch County Park

http://www.youtube.com/watch?v=D_I4yGqHcp8

# SHIP at Jakes Branch County Park

This project seeks to develop simple, low cost and practical soil restoration techniques and procedures that are transferrable at the homeowner scale, one yard at a time. Including:

• the improvement of soil function through de-compaction and organic matter addition to turf managed landscapes,

• identification of characteristic microbial community profiles of healthy soil systems,

•the demonstration of best management practices for soil restoration and native plantings, and a comprehensive education and outreach effort.

•Partners: *OCSCD, Rutgers Turf Management, Montclair Biology, American Littoral Society, Jacques Cousteau NERRS, NRCS*

*Funded by Barnegat Bay Partnership*

# Managing for Healthy Soil

- Soil Health is a specific soil's ability to:
  - function within natural or managed ecosystem boundaries
  - sustain plant and animal productivity
  - maintain or enhance water and air quality
  - support human health and habitation


**HEALTHY SOIL IS ALIVE!**

# SHIP Goals


Research
Demonstration
Education
SOIL HEALTH IMPROVEMENT PROJECT
SHiP
BARNEGAT BAY

# Research #1 – "*Improvement of Soil Function through De- Compaction and Organic Matter Addition to Turf Managed Landscapes in the Barnegat Bay Watershed*"

James A. Murphy, Ph.D.
Dept. of Plant Biology and Pathology, NJAES, Rutgers University

**…the Latest News….**

". . . and more exciting, was the observation that the OM amended plots were retaining much more water in the soil. This "extra" soil water was keeping the turf from experiencing the severe wilt stress that I observed in the non improved plots."

# A. Compaction Trial – Treatment Methods

Table 1. Fertility and organic matter amendment levels of six soil improvement treatments applied to a loamy sand at Jakes Branch County Park in Beachwood NJ on 25 September 2012.

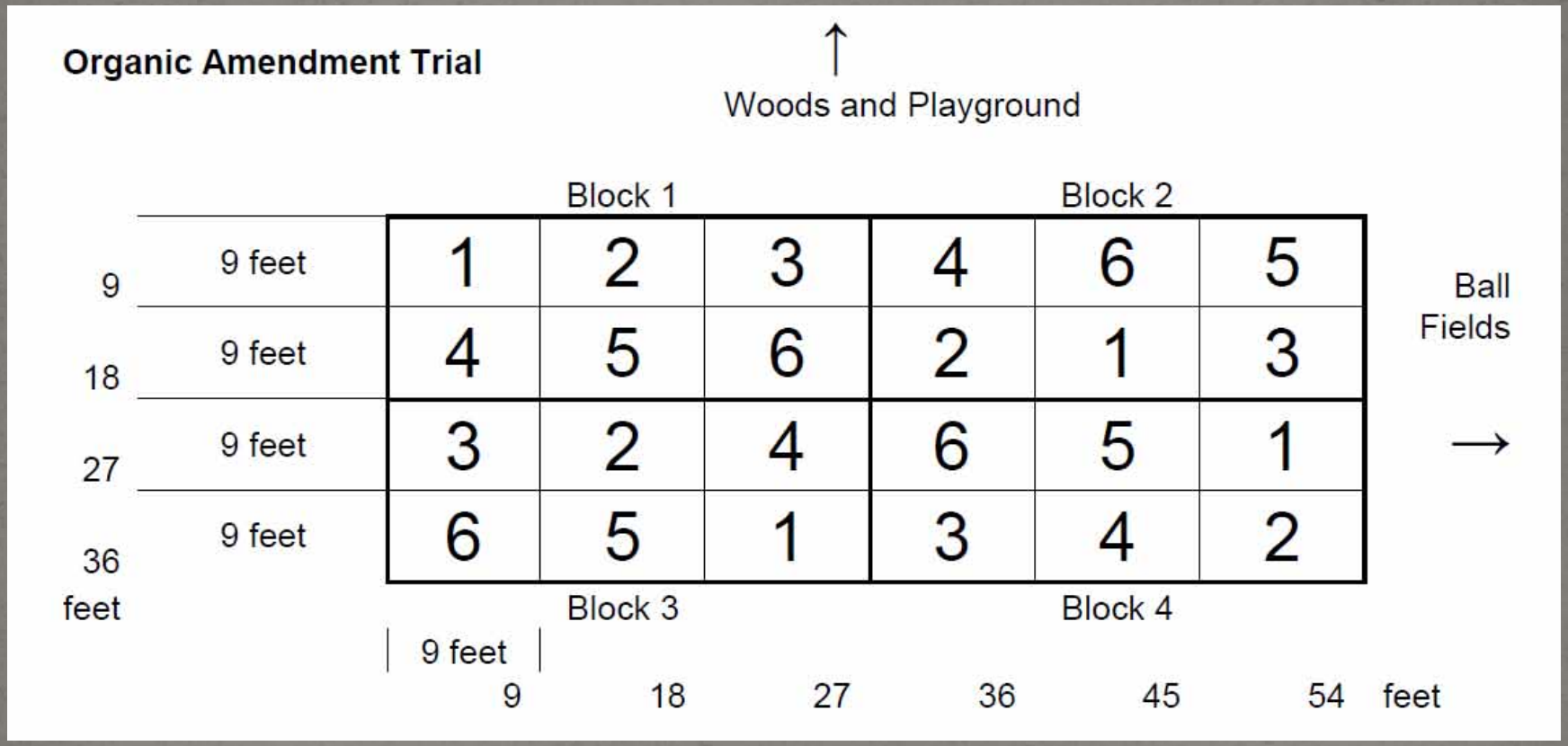
| Trmt # | Fertilizer | Organic Matter Amendment | Tillage |
|---|---|---|---|
| 1 | OceanGro only | None | None |
| 2 | OceanGro, 0-0-50, lime | None | None |
| 3 | OceanGro, 0-0-50, lime | None | Rotodairon |
| 4 | OceanGro, 0-0-50, lime | 357 cu yd per acre of leaf compost | Rotodairon |
| 5 | OceanGro, 0-0-50 | 485 cu yd per acre of Scotts Topsoil | Rotodairon |
| 6 | OceanGro, 0-0-50, lime | 258 cu yd per acre of sphagnum peat | Rotodairon |

**Organic Amendment Trial**

↑

Woods and Playground

# Trial Plot Design



# •1. Plot Amendment Trials


•**Chas Schmid, PhD Candidate, Preparing Plots**

Sustaining Infiltration Rates

**Physical conditions of the soil underneath the turf are created by grading and other site preparations. In order to achieve high infiltration rates the soil underneath the turf must be revived.**

# B. Cultivation and Leaf Compost Topdressing Effects on a Soccer Field

***Arranged in a 5 x 2 factorial with 4 replications***

- Five cultivation treatments :

1. a non-cultivated control;
2. a Toro Greens Aerator equipped with 5/8-inch diam. hollow tines that penetrated to the 2.5-inch depth in 2.25-inch hole spacing;
3. a Verti-Drain 7521 equipped with 1-inch diam. side-eject coring tines that penetrated to the 8-inch depth;
4. a Verti-Quake 2521 equipped with 10-inch blades that penetrated to the 6-inch deep (add spacing);
5. a combination of the Verti-Quake plus the Verti-Drain treatments.

# Research #2 - *"Soil Micro Food Web Analysis - Microbial Community Evaluation"*

Dr. Jennifer Adams Krumins, Montclair University

- *Soil Microfauna Evaluation*
- Microbial Community
- Nematode Community to family level
  - highly diverse and represented at all trophic levels in a soil food web (Colema et al. 2004).
  - Soil maturity index (Bongers 1990)

# The Difference between the Plots is Clear

•***Amoozemeter***

•Saturated Hydraulic Conductivity (KSAT) Measurement and Site Preparation Using a Compact Constant Head Permeameter

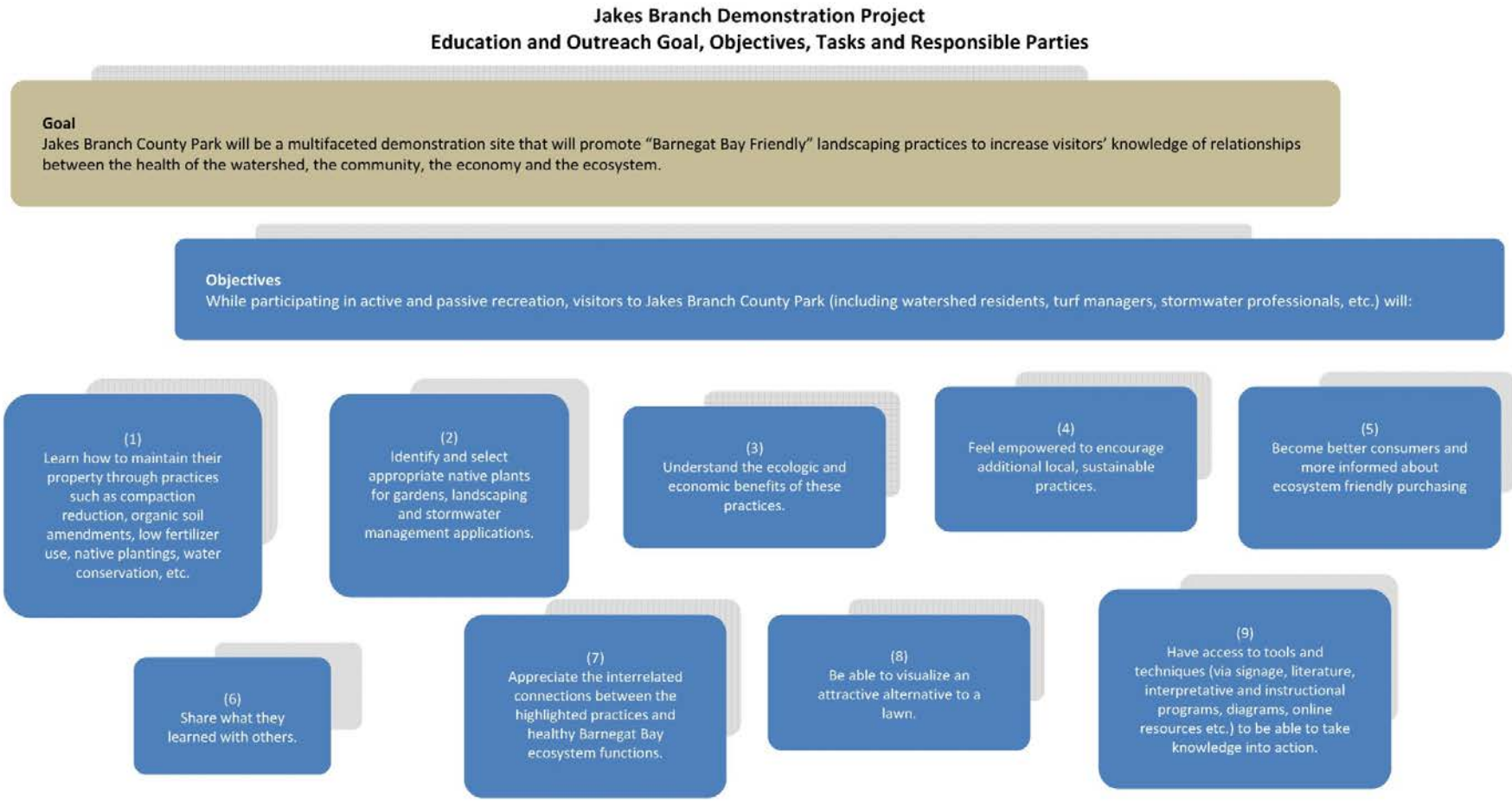
# What is Saturated Hydraulic Conductivity (Ksat)?

- *"The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy's Law..." (National Soil Survey Handbook, Section 618.50)*

# Basic Steps

1.the soil (textures, depths, Munsell colors)
2.Auger into the middle of the desired horizon (plane and brush)
3.Set up the Amoozemeter to run a constant height in the auger hole using constant head tubes
4.Take readings of water drop over time after achieving constant head – 3 readings will suffice!
5.Calculate the Saturated Hydraulic Conductivity based on measurements
6.Repeat this process 5-6 times to ensure a statistically-sound Ksat measurement

# EDUCATION


Jakes Branch Demonstration Project
Education and Outreach Goal, Objectives, Tasks and Responsible Parties
Goal
Jakes Branch County Park will be a multifaceted demonstration site that will promote "Barnegat Bay Friendly" landscaping practices to increase visitors' knowledge of relationships between the health of the watershed, the community, the economy and the ecosystem.
Objectives
While participating in active and passive recreation, visitors to Jakes Branch County Park (including watershed residents, turf managers, stormwater professionals, etc.) will:
(1) Learn how to maintain their property through practices such as compaction reduction, organic soil amendments, low fertilizer use, native plantings, water conservation, etc.
(2) Identify and select appropriate native plants for gardens, landscaping and stormwater management applications.
(3) Understand the ecologic and economic benefits of these practices.
(4) Feel empowered to encourage additional local, sustainable practices.
(5) Become better consumers and more informed about ecosystem friendly purchasing
(6) Share what they learned with others.
(7) Appreciate the interrelated connections between the highlighted practices and healthy Barnegat Bay ecosystem functions.
(8) Be able to visualize an attractive alternative to a lawn.
(9) Have access to tools and techniques (via signage, literature, interpretative and instructional programs, diagrams, online resources etc.) to be able to take knowledge into action.

# SHiP Logo


*JCNERRS initiated the creation of the project logo and development of a template/ branding for use by all partners for educational initiatives.*

# Education & Outreach Display


For use at Jakes Branch, OCSCD Office foyer, festivals, events, etc.

# IMPROVE

## A Healthy Soil:

- Controls Flooding
- Reduces Stormwater Runoff
- Filters Pollutants
- Helps Nutrient Cycling
- Supports Healthy Landscapes
- Grows Healthy Food
- Captures Carbon

# YOUR

## Use Your Senses

- **SEE** water drainage, rich and dark color, living things in the soil
- **FEEL** soft, crumbly ground underfoot, not compacted
- **SMELL** earthy scent, no rotten egg smell

Learn more with the NJ Soil Health Assessment Guide

**Get to the Root of the Matter:**

# SOIL

## Steps to Soil Improvement

1. Get your soil tested
2. Add organic material, such as compost
3. Mulch regularly
4. Avoid applying chemicals
5. Reduce/Minimize Watering
6. **GO NATIVE!**

Native plants need less from you and give more to your landscape

**LOW MAINTENANCE LANDSCAPING**
**Saves money, time, and effort!**

**www.soildistrict.org**

# HEALTH

Funding for SHIP provided by:

Other project partners:

*A nation that destroys its soil destroys itself.*
–Franklin D. Roosevelt

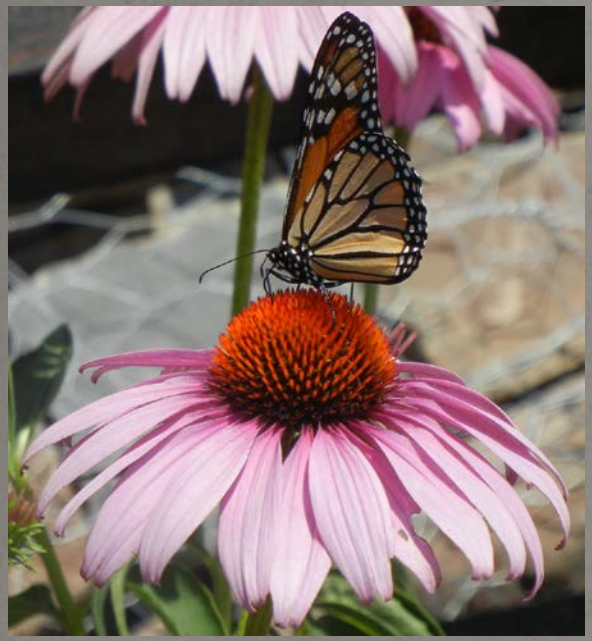
# Research and Demonstration Map

# Demonstration Gardens along Trail

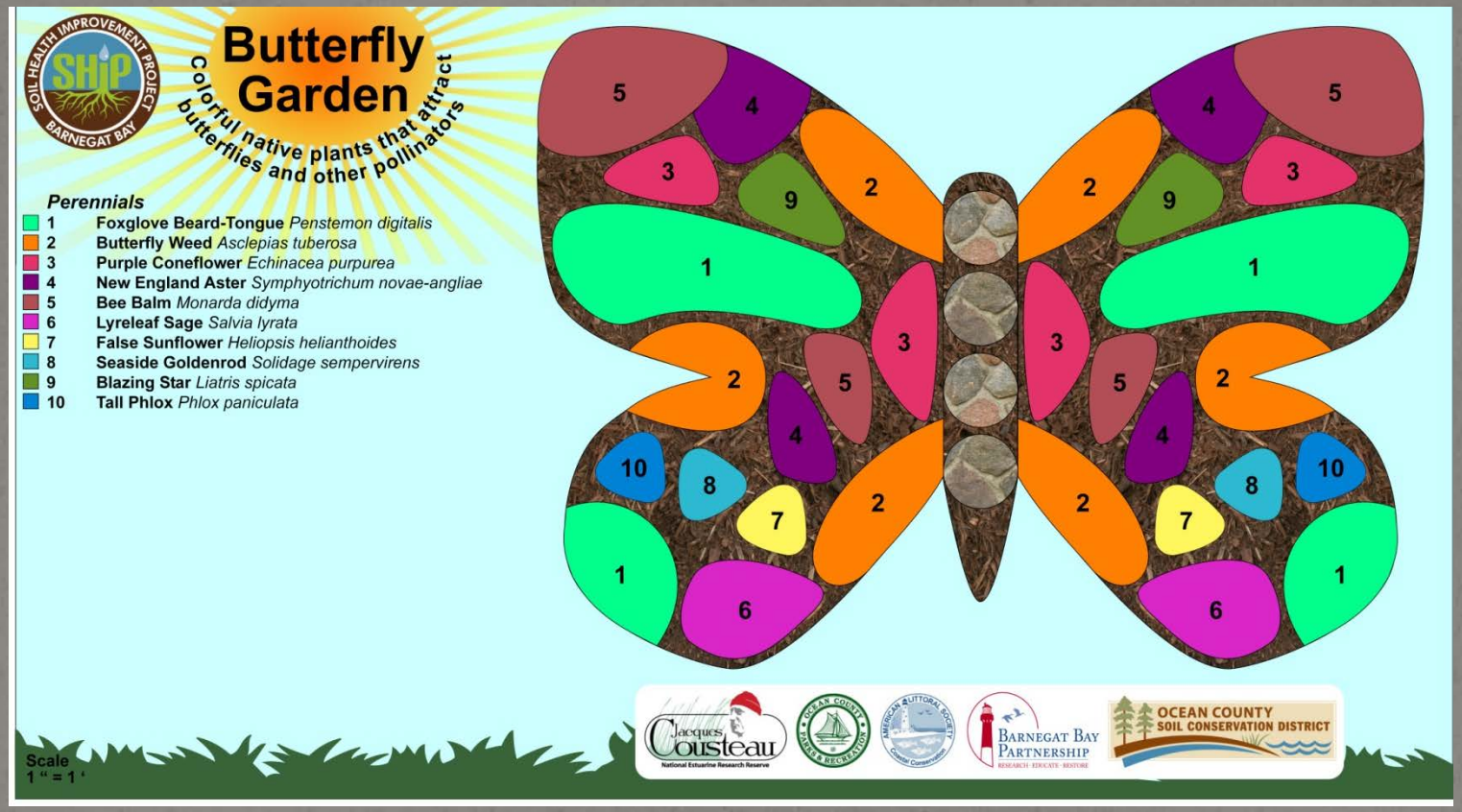
- *American Littoral Society subcontracted to Judy DiFiglio, Garden Guidance, to design 5 distinct demonstration/native gardens which include:*
  - Children's Butterfly Garden
  - Part Shade Pocket Garden
  - Sun Garden
  - Wet site Garden
  - Rain Garden

# Planting the Gardens

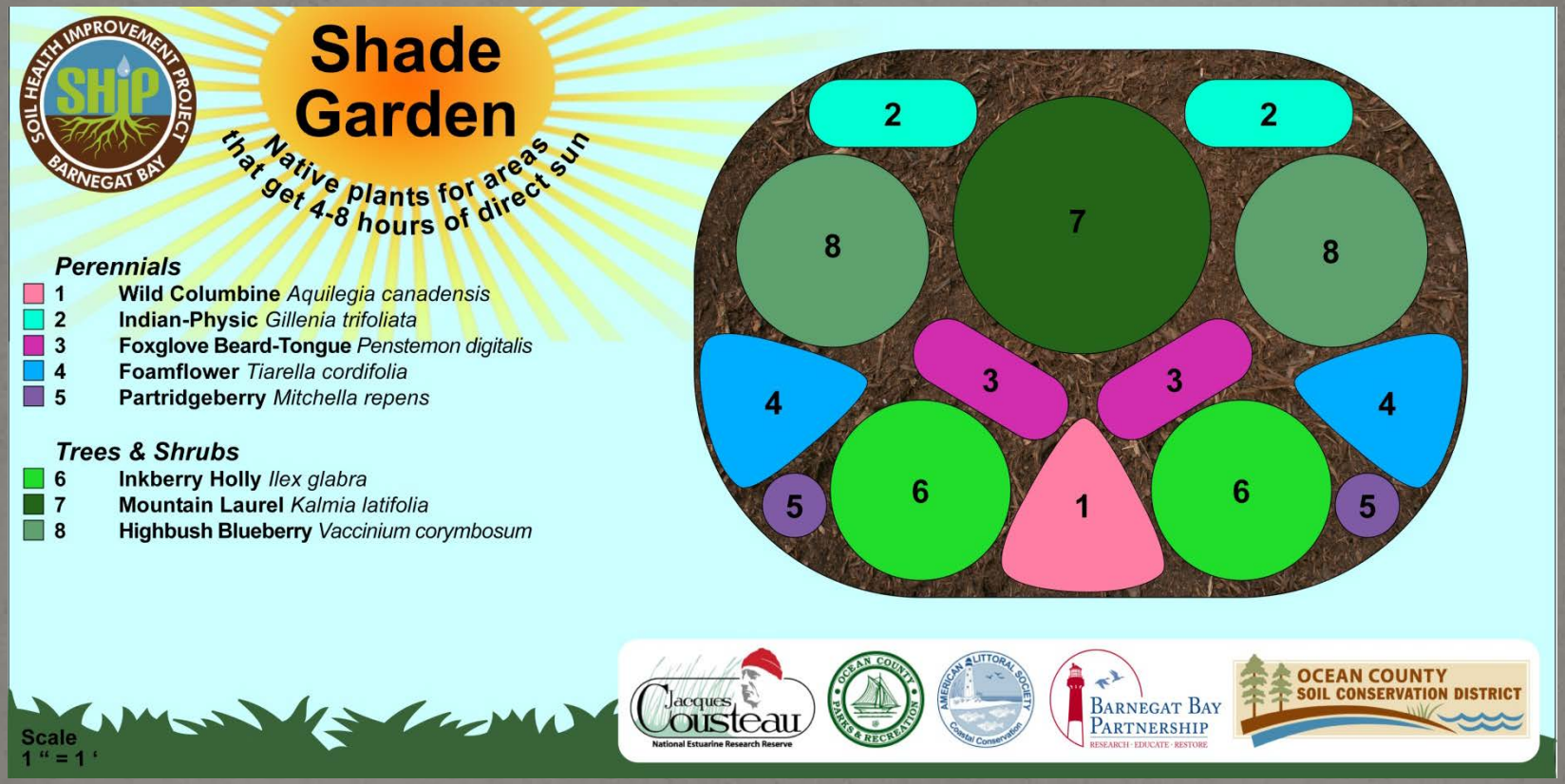

# LARGER THAN LIFE BUTTERFLY – SHAPED GARDEN



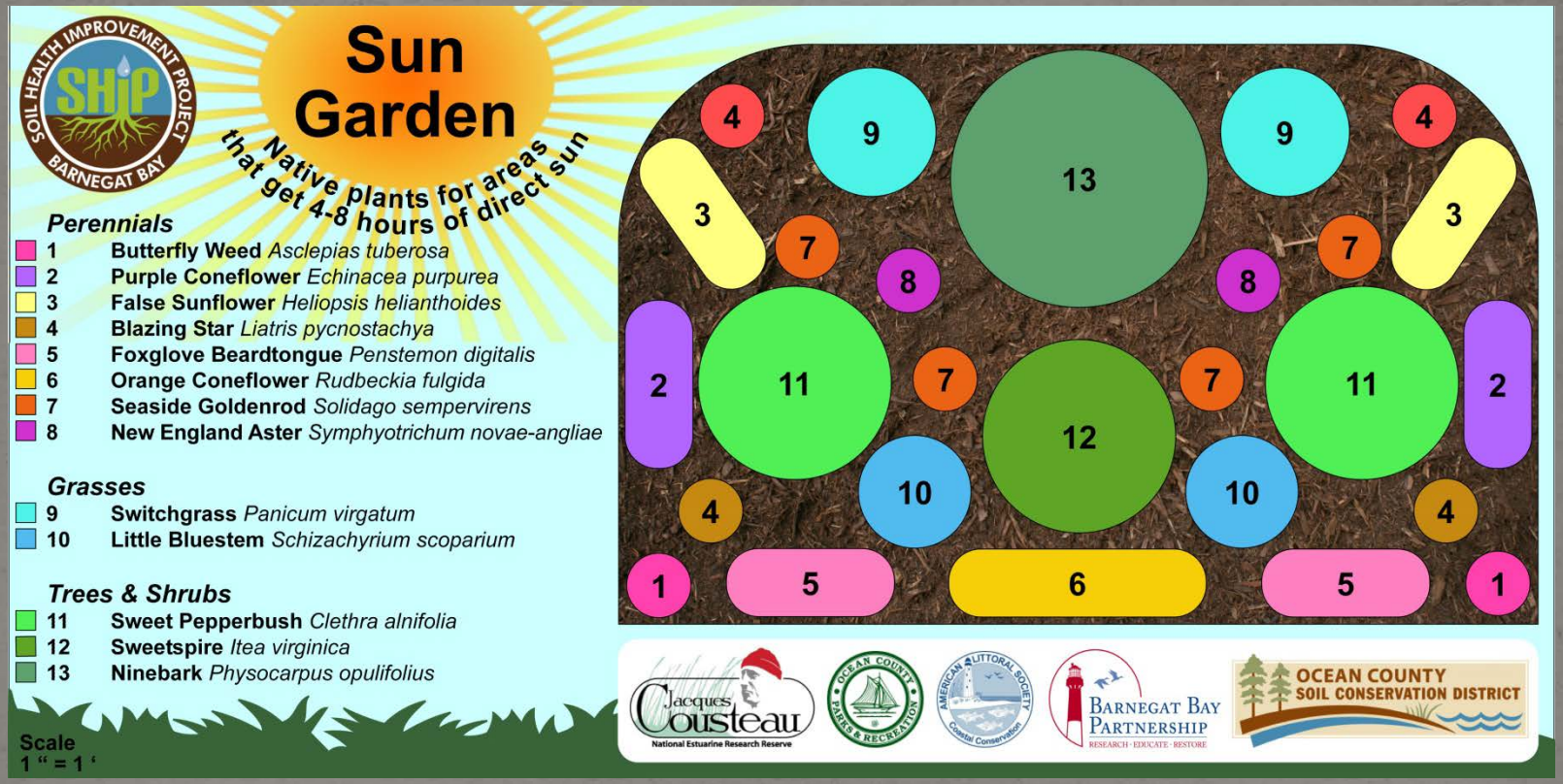
# Butterfly Garden



# Part Shade Pocket Garden



# Sun Garden


Sun Garden
Native plants for areas that get 4-8 hours of direct sun
SOIL HEALTH IMPROVEMENT PROJECT
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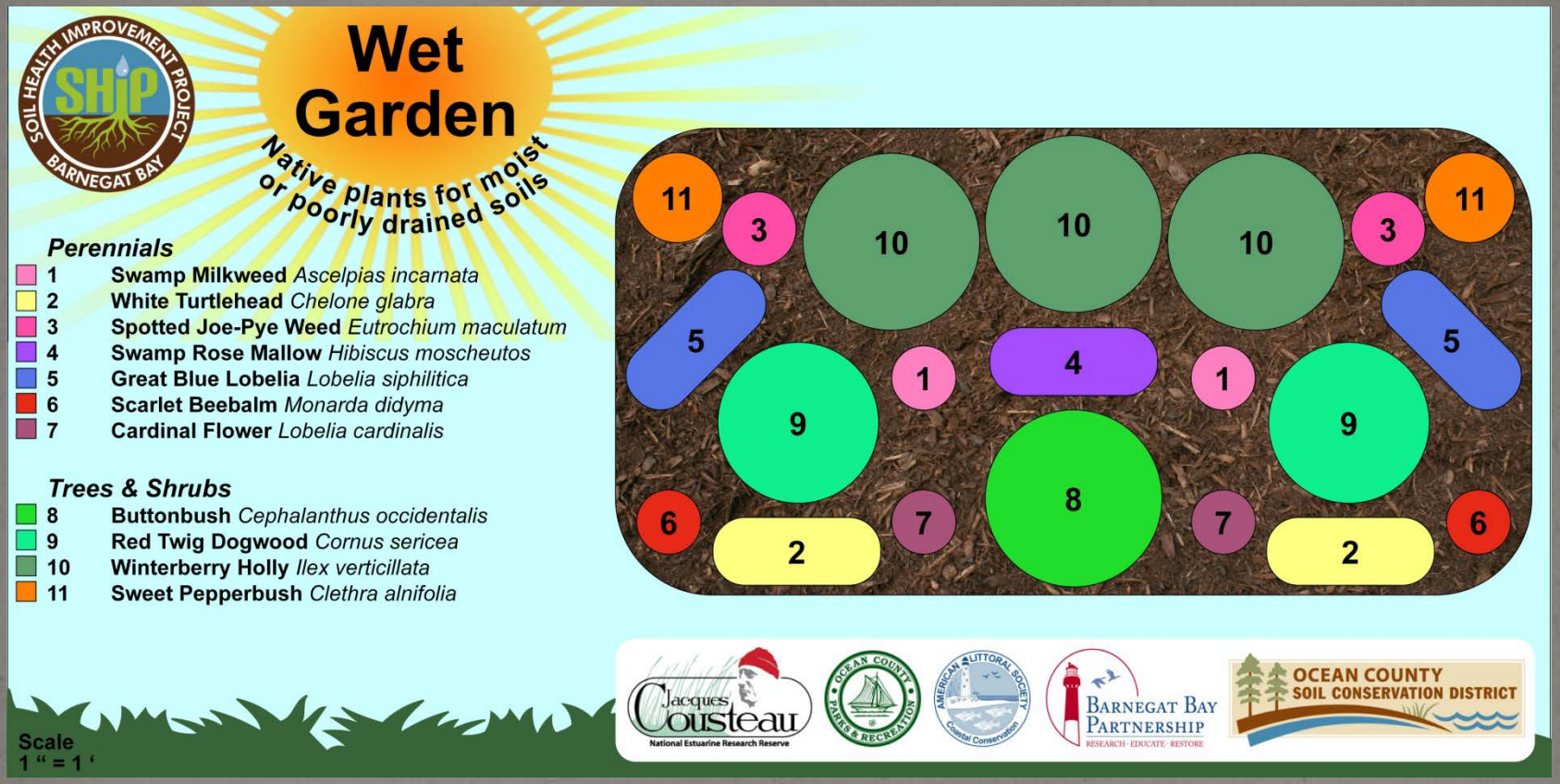
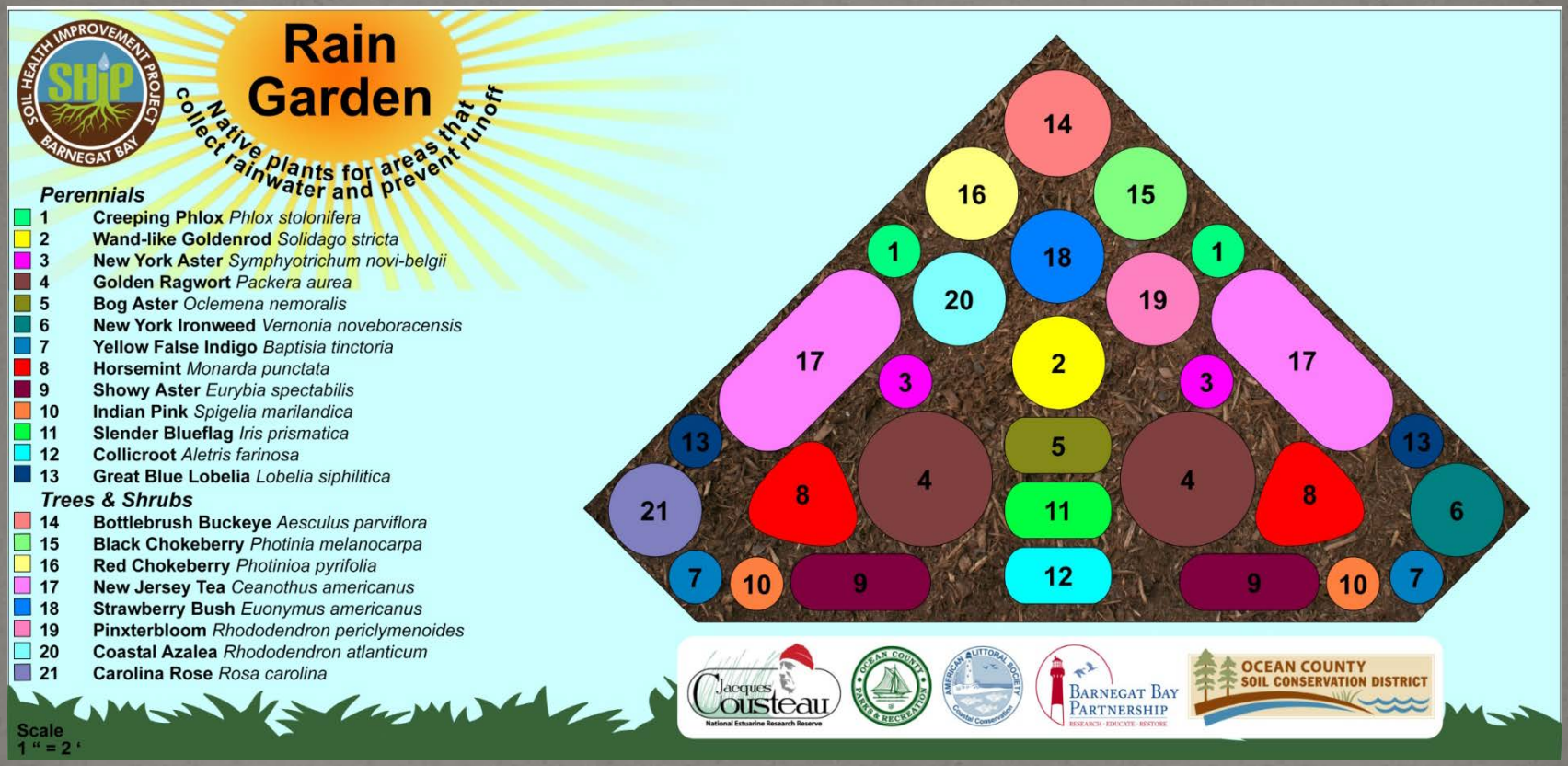
BARNEGAT BAY
Perennials
1 Butterfly Weed Asclepias tuberosa
2 Purple Coneflower Echinacea purpurea
3 False Sunflower Heliopsis helianthoides
4 Blazing Star Liatris pycnostachya
5 Foxglove Beardtongue Penstemon digitalis
6 Orange Coneflower Rudbeckia fulgida
7 Seaside Goldenrod Solidago sempervirens
8 New England Aster Symphyotrichum novae-angliae
Grasses
9 Switchgrass Panicum virgatum
10 Little Bluestem Schizachyrium scoparium
Trees & Shrubs
11 Sweet Pepperbush Clethra alnifolia
12 Sweetspire Itea virginica
13 Ninebark Physocarpus opulifolius
Scale
1 " = 1 '
Jacques Cousteau
National Estuarine Research Reserve
OCEAN COUNTY PARKS & RECREATION
AMERICAN LITTORAL SOCIETY
Coastal Conservation
BARNEGAT BAY PARTNERSHIP
RESEARCH · EDUCATE · RESTORE
OCEAN COUNTY
SOIL CONSERVATION DISTRICT

# Wet Site Garden



# Rain Garden


SOIL HEALTH IMPROVEMENT PROJECT
SHIP
BARNEGAT BAY
Rain Garden
Native plants for areas that collect rainwater and prevent runoff
Perennials
1 Creeping Phlox Phlox stolonifera
2 Wand-like Goldenrod Solidago stricta
3 New York Aster Symphyotrichum novi-belgii
4 Golden Ragwort Packera aurea
5 Bog Aster Oclemena nemoralis
6 New York Ironweed Vernonia noveboracensis
7 Yellow False Indigo Baptisia tinctoria
8 Horsemint Monarda punctata
9 Showy Aster Eurybia spectabilis
10 Indian Pink Spigelia marilandica
11 Slender Blueflag Iris prismatica
12 Collicroot Aletris farinosa
13 Great Blue Lobelia Lobelia siphilitica
Trees & Shrubs
14 Bottlebrush Buckeye Aesculus parviflora
15 Black Chokeberry Photinia melanocarpa
16 Red Chokeberry Photinioa pyrifolia
17 New Jersey Tea Ceanothus americanus
18 Strawberry Bush Euonymus americanus
19 Pinxterbloom Rhododendron periclymenoides
20 Coastal Azalea Rhododendron atlanticum
21 Carolina Rose Rosa carolina
Scale
1 " = 2 '
Jacques Cousteau
National Estuarine Research Reserve
OCEAN COUNTY PARKS & RECREATION
AMERICAN LITTORAL SOCIETY
Coastal Conservation
NJ
BARNEGAT BAY PARTNERSHIP
RESEARCH · EDUCATE · RESTORE
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SOIL CONSERVATION DISTRICT

Preparing the Site for the Rain Garden – Sod Removal & Adding Organic Material

# Build Your Own Rain Barrel Workshops

Cara Muscio, Consultant

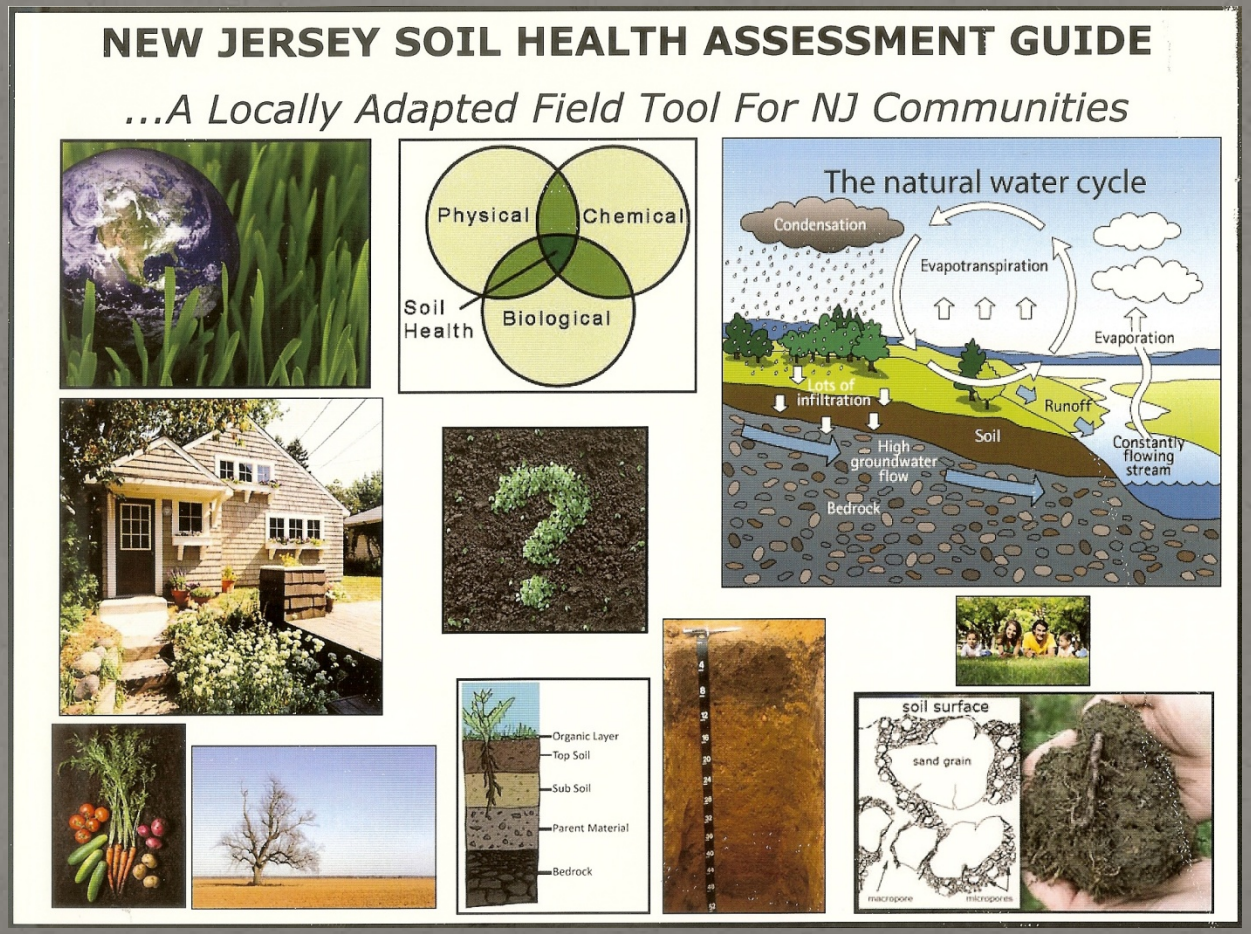

•A new meaning for

BYOB!

- ***2 workshops:***
  - *April 2013*
  - *August 2013*
- ***Participants left knowing how to:***
  - *Prevent stormwater runoff*
  - *Promote infiltration*
  - *Build a DIY Rainbarrel*

ASSESS Your SOIL:

# www.soildistrict.org - Healthy Soil Resources Page



# BUILD HEALTHY SOIL- Best Management Practices

•Add organic material to provide energy and food for the soil food web & build soil structure.

•Aerate soil to increase infiltration and add structure. Make your Yard a sponge!

•Increase plant diversity /decrease lawn/turf area, Use native plants.

•Build a Rain Garden.

•Avoid working when wet. Minimize disturbance.

•Minimize use of pesticides – kills the “good” organisms too!

# JAKES BRANCH COUNTY PARK

Jakes Branch County Park, located in Berkeley Township, is a demonstration site that promotes "Barnegat Bay Friendly" landscaping practices. Visitors can learn about the relationships between the watershed, the community, and the economy as well as how to improve the health of the Bay's ecosystem using better landscaping practices.

You can see a *Bayscape* garden in the park and learn how to maintain your property using techniques that build healthy soil, minimize use of fertilizer, and conserve water.

## HEALTHY SOIL: BUILDING A HEALTHY WATERSHED FROM THE GROUND UP!

***Healthy soil*** includes not only the physical particles making up the soil, but also adequate pore space between the particles for the movement and storage of air and water. This is necessary for plant growth and for a favorable environment for soil organisms to live. Compaction occurs when soil particles are pressed together, thereby reducing the amount of pore space. Compaction alters the movement of air and water in the soil and may decrease root growth, the biological diversity and activity in the soil. For proper plant growth, void space must be available for air and water movement. Compaction also inhibits soil's critical role in removing pollutants from stormwater runoff before it enters local groundwater or the nearest stream, river or bay.

**TO LEARN MORE ABOUT HOW YOU CAN PROTECT AND RESTORE BARNEGAT BAY, VISIT WWW.LITTORALSOCIETY.ORG**

AMERICAN LITTORAL SOCIETY
Coastal Conservation

The Jakes Branch County Park Demonstration site was created in partnership with the Barnegat Bay Partnership, Ocean County Parks and Recreation, Ocean County Soil Conservation District, Jacques Cousteau National Estuarine Research Reserve and Rutgers Cooperative Extension.

**TO LEARN MORE ABOUT NATIVE PLANTS VISIT THE AMERICAN LITTORAL SOCIETY NATIVE PLANT BLOG WWW.NATIVESHORE.BLOGSPOT.COM**

THIS BROCHURE WAS CREATED WITH FUNDING FROM THE BARNEGAT BAY PARTNERSHIP.

# BAYSCAPE *for* BARNEGAT BAY

## USING NATIVE PLANTS TO PROTECT BARNEGAT BAY

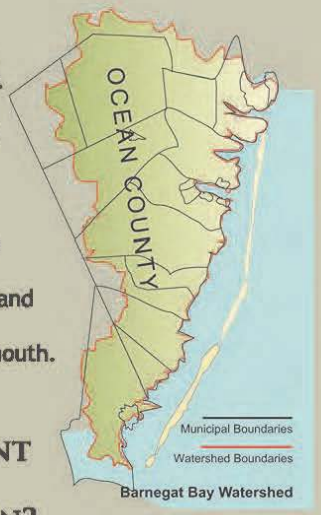
# Barnegat Bay and You...

## What is an Estuary?

Barnegat Bay is a 75-square-mile estuary—a body of water where fresh water from rivers and streams mixes with salt water from the ocean. Estuaries provide human enjoyment, economic benefits, and breeding grounds and habitat for many marine species.

## What is a Watershed?

All bodies of water have a land area that drains to them. The Barnegat Bay watershed is 660 square miles and encompasses all 33 of Ocean County's municipalities and slivers of 4 in southern Monmouth.




## What is Non-Point Source Pollution?

Polluted stormwater runoff from developed land is harming Barnegat Bay. A large source of this pollution is fertilizers and pesticides used on lawns.

## Help Heal the Bay - Use Native Plants

Unlike lawns and high maintenance exotic plants, native plants require little or no fertilizer, pesticides or watering. You can *Bayscape* for a beautiful, bay-friendly landscape that reduces stormwater pollution, conserves water and creates habitat. Here are some *Bayscape* ideas using beautiful native plants:

### Butterfly Garden

**Create habitat for butterflies & pollinators**

Arrowwood *(Viburnum dentatum)*
Bee Balm *(Monarda didyma)*
Black-eyed Susan *(Rudbeckia hirta)*
Butterfly Weed *(Asclepias tuberosa)*
Buttonbush *(Cephalanthus occidentalis)*
Foxglove Beardtongue *(Penstemon digitalis)*
Great Blue Lobelia *(Lobelia siphilitica)*

### Sun Garden

**Natives that like it hot with 4-8 hours of sun**

Black-eyed Susan *(Rudbeckia hirta)*
Blazing Star *(Liatris spicata)*
Eastern Ninebark *(Physocarpus opulifolius)*
False Sunflower *(Heliopsis helianthoides)*
Inkberry Holly *(Ilex glabra)*
Little Bluestem *(Schizachyrium scoparium)*
Purple Coneflower *(Echinacea purpurea)*
Switchgrass *(Panicum virgatum)*

### Coastal Garden

**Hardy native plants for sandy soils**

Adam's Needle *(Yucca filamentosa)*
Beach Plum *(Prunus maritima)*
Coastal Panicgrass *(Panicum amarum)*
Indian Grass *(Sorghastrum nutans)*
Northern Bayberry *(Morella pensylvanica)*
Seaside Goldenrod *(Solidago sempervirens)*
Winged Sumac *(Rhus copallinum)*

### Wetland Garden

**Moisture-loving plants can solve a drainage problem**

Cardinal Flower *(Lobelia cardinalis)*
Joe-Pye Weed *(Eupatoriadelphus fistulosum)*
Red Twig Dogwood *(Cornus sericea)*
River Birch *(Betula nigra)*
Rose Mallow *(Hibiscus moscheutos)*
Salt Meadow Cordgrass *(Spartina patens)*
Swamp Milkweed *(Asclepias incarnata)*
Winterberry Holly *(Ilex verticillata)*

### Woodland Garden

**Natives that are made for the shade**

Eastern Redbud *(Cercis canadensis)*
Columbine *(Aquilegia canadensis)*
Foam Flower *(Tiarella cordifolia)*
High Bush Blueberry *(Vaccinium corymbosum)*
Mountain Laurel *(Kalmia latifolia)*
White Turtlehead *(Chelone glabra)*

You can also download Bayscape garden layouts with plant lists at www.littoralsociety.org.

**About NRCS – *Natural Resources Conservation Service***

*A Legacy of Conservation*
*More Than 75 Years of Helping People Help The Land*

**Originally established by Congress in 1935 as the Soil Conservation Service (SCS), NRCS has expanded to become a conservation leader for all natural resources, ensuring private lands are conserved, restored, and more resilient to environmental challenges, like climate change.**


http://www.whmi.nrcs.usda.gov/wps/portal/nrcs/main/national/soils/health

**SHIP – Soil Health Improvement Project**

***Digging Deeper - Practical Demonstrations to Improve Soil Health***
***Friday, October 31, 2014 – 9:00 am – 2:00 pm, Jakes Branch County Park***

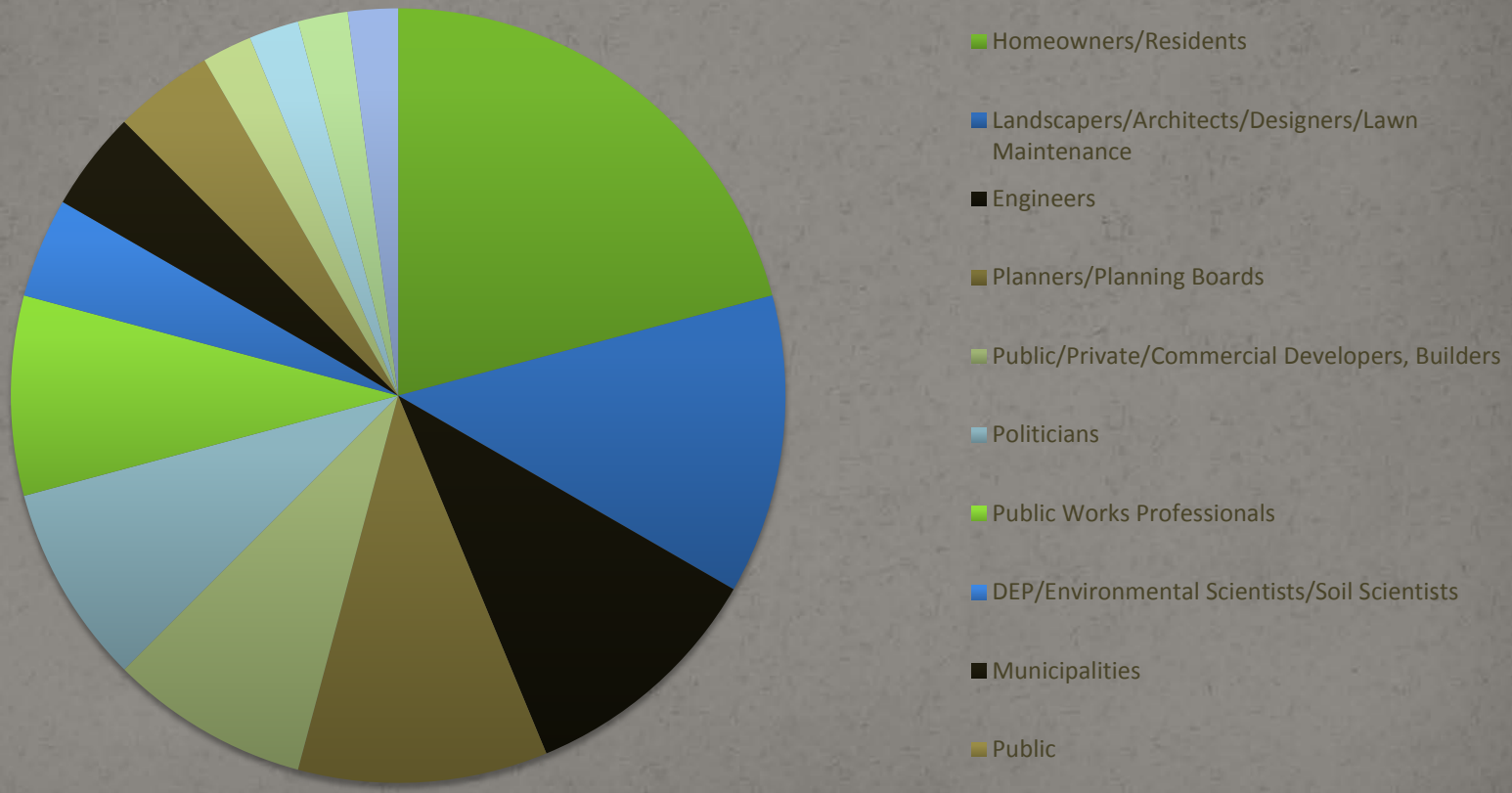
*Ocean County Soil Conservation District, through funding from the Barnegat Bay Partnership, embarked on a journey to* identify the optimal physical, chemical and biological properties of Ocean County's sandy soils. The main goal was to implement practices that create fully functioning soils that support healthy turf that are both practical and easily duplicated. A series of demonstration gardens were also created to showcase the native landscape options that are low cost, low impact and low maintenance. Join us at this FREE workshop (Lunch included) where we showcase this project and the findings. SHIP Registration Form

For more information, please visit the SHIP webpage at www.soildistrict.org or call the District at 609-971-7002.

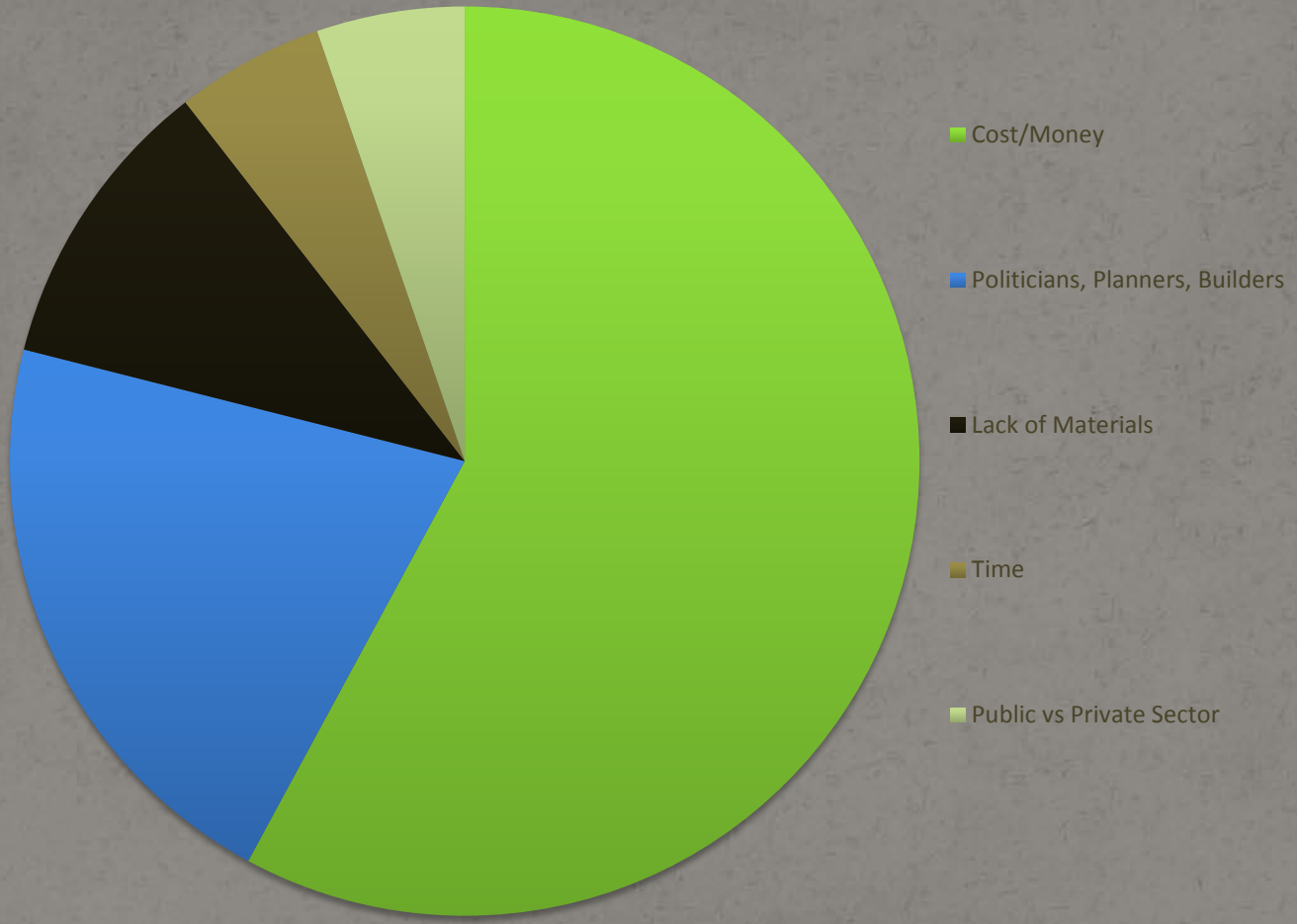
"Each soil has its own history. Like a river, a mountain, a forest, or any natural thing, its present condition is due to the influences of many things and events of the past." – Charles Kellogg, The Soils That Support Us, 1956

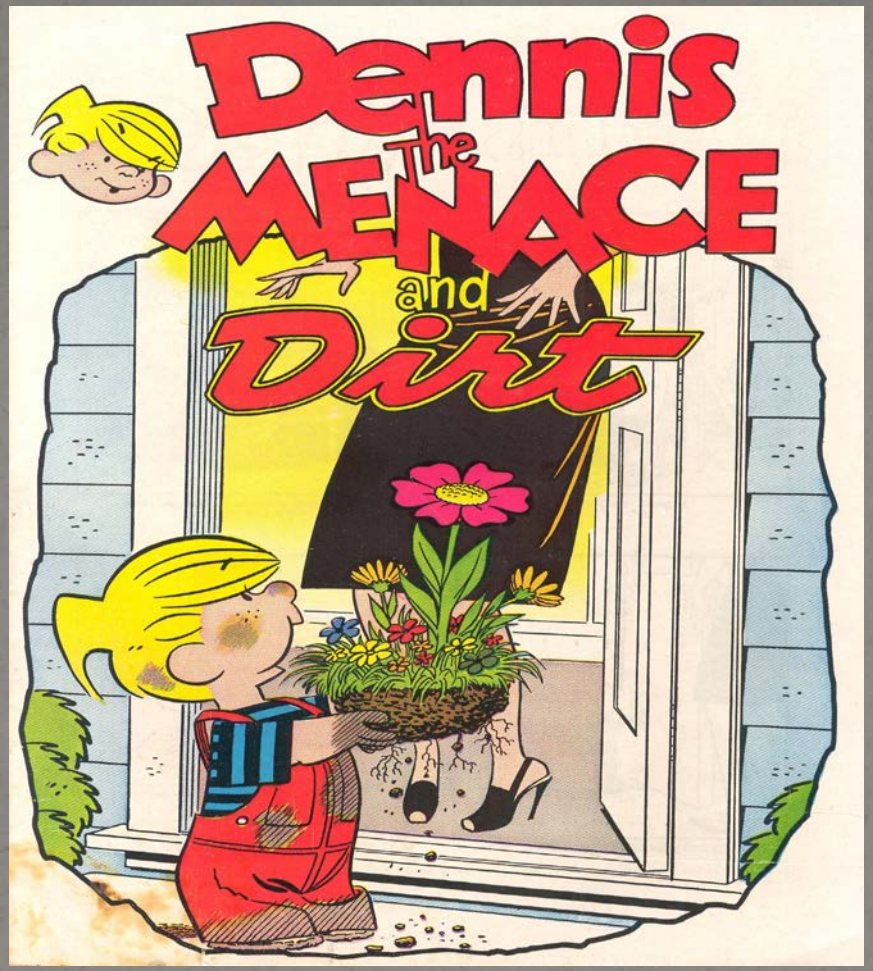
Workshop Evaluation Results

## What group of people/profession do you think needs to know more about soil health?



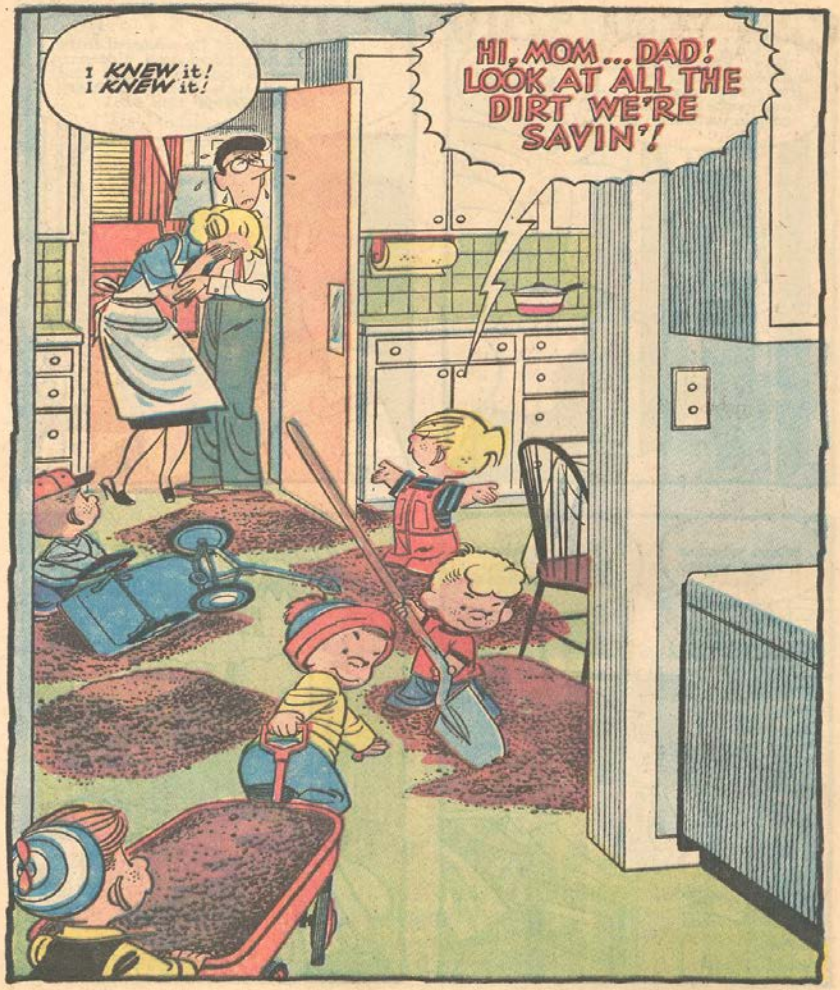
## What do you think will be the impediments to implementing soil health?






HANK KETCHAM, creator of Dennis The Menace, offered the services of his staff in preparing this book because of his own keen interest in soil conservation.

When he acquired a rolling, 61 acre ranch in Carmel Valley, California, he began immediately practicing approved conservation methods.


I KNEW it!
I KNEW it!
HI, MOM... DAD! LOOK AT ALL THE DIRT WE'RE SAVIN'!

# A “Dirty” Joke for the Soil Scientists. . . . Black Towels – GREAT Idea Dennis!

# HEALTHY SOIL. . . . IS IN YOUR HANDS!

Christine R. Raabe
District Director
craabe@soildistrict.org

OCEAN COUNTY
SOIL CONSERVATION DISTRICT
www.SoilDistrict.org