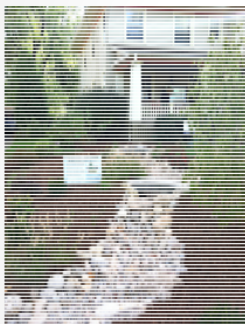


# Residential Rain Gardens and Healthy Lawn Care Practices



Michael Dietz, Ph.D.

CT Nonpoint Education for Municipal Officials (NEMO)  
Center for Land Use Education and Research

May 4, 2013

Vernon Earth Day Celebration



## Center for Land Use Education and Research



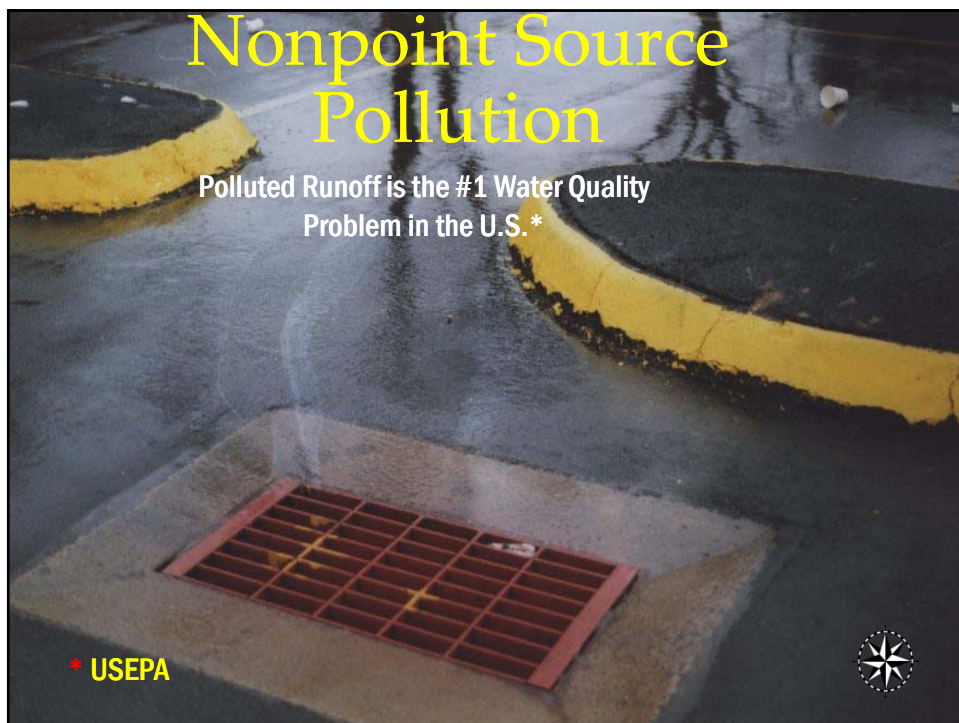
**CLEAR's Mission:**  
To provide information,  
education and assistance  
to land use decision  
makers in support of  
balancing growth and  
natural resource  
protection.



University of Connecticut

- College of Agriculture, Dept. of Extension
- College of Agriculture, Dept. of Natural Resources & the Environment
- Connecticut Sea Grant

- Connecticut NEMO
- National NEMO Network
- Geospatial Training Program
- Land Use Academy
- Extension Forestry Program



## Structural Features: Drainage Systems

- Roof runoff onto impervious surface

**NO!**



- Gutters draining to lawns or gardens

**YES!**



## Rainwater Harvesting

- Rain barrels
- Cisterns

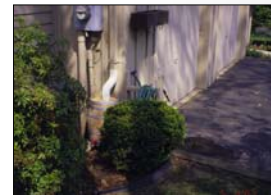






## Can I do it?

- Cheapest/simplest method is the use of rain barrels
  - Limitation: volume of water, distribution



## Where to buy rain barrels

- [www.amazon.com](http://www.amazon.com)
- [www.realgoods.com](http://www.realgoods.com)
  - Barrel+diverter- \$149
  - Diverter- \$30



- Gardeners Supply Company [www.gardeners.com](http://www.gardeners.com)
  - 50 gallons \$120
  - 65 gallons, \$179



## Lawn management



Keeping the lawn at 3" high reduces weeds, keeps the soil moist, and grows deep roots

## Recycle grass clippings right back to the lawn



Cuts N needs in half!



## Test the Soil



<http://www.urbanorganicgardener.com/2009/09/testing-soil-ph-the-old-fashioned-way/>

Bring to your local Extension office or UConn  
Home & Garden Center



# Soil Test Results



## University of Connecticut Department of Plant Science

Soil Nutrient Analysis Laboratory, 6 Sherman Place, Box U-102, Storrs, CT 06269-5102,  
Phone : 860-486-4274, Fax : 860-486-4562.

<b>GROWER'S ADDRESS</b>		<b>SAMPLE ID</b>	
TOM BARRY		SECRETION SOIL	
18 ASH ST		<b>LAB ID</b>	<b>RECEIVED/REPORTED</b>
MILFORD, CT 06460		8730	10/12/12 10/18/12
		<b>SALES AGENT</b>	
<b>NUTRIENTS EXTRACTED FROM YOUR SOIL (MODIFIED MORGAN EXTRACTABLE)</b>			
<b>pH</b>	5.8	<b>BELOW OPTIMUM</b>	<b>OPTIMUM</b>
Calcium	1264 lbs/acre	*****	
Magnesium	209 lbs/acre	*****	
Phosphorus	10 lbs/acre	*****	
Potassium	179 lbs/acre	*****	

Element	ppm	Soil Range
Boron (B)	0.50	0.1-2.0
Copper (Cu)	0.20	0.3-8.0
Iron (Fe)	11.50	1.0-40.0
Manganese (Mn)	5.50	3.0-20.0
Zinc (Zn)	0.80	0.1-70.0
Aluminum (Al)	52	10-300

Estimated Total Lead: Low, typical background levels

### LIME AND FERTILIZER RECOMMENDATIONS

**CROP OR PLANT: NEW LAWN, SEEDING OR SODDING**  
**LIMESTONE (GROUND, GRANULAR, PULVERIZED OR PELLETTED):**  
 Apply 20 lbs. per 1000 sq. ft. to raise the pH level. Have your soil re-tested in 3-4 years.  
**FERTILIZER:**  
 After final grading, if seeding, apply 20 lbs of 5-10-5 or 10 lbs of 10-20-10 per 1000 sq ft. Scratch into the soil surface with the seed. If sodding, apply to the soil surface 10 lbs of 10-10-10 per 1000 sq ft after final grading before sod placement. Once the lawn begins to grow, follow the recommendations for maintenance fertilizers shown on the enclosed sheet.  
**COMMENTS:**  
 Soil texture classification: Loamy sand  
 Organic content classification: Low

# Fertilizer Calculator

Home | College | Cooperative Extension System | UConn

University of Connecticut Cooperative Extension System

**Water Quality and the Home Landscape**

SUSTAINABLE LANDSCAPING | LANDSCAPE CONSTRUCTION | HOME WATER SYSTEMS | MANAGEMENT PRACTICES

**Residential Water Quality**

- > Community Outreach
- > Connecticut's Changing Landscape
- > Fertilization Calculator
- > FAQ - Frequently Asked Questions
- > Tip of the Week
- > Publications

**STEP 1**

Enter the total area of the yard or choose the shape of the yard.

Area:  square feet

**CONTINUE**

or

Yard Shapes:

☐ ☐ ☐ ☐

**FERTILIZATION CALCULATOR**

**Fertilization Calculator**

Find out how much fertilizer you will need for your lawn.

- > Step 1: Find the area of your yard
- > Step 2: Rate of nitrogen
- > Step 3: Percent of nitrogen
- > Fertilizer Survey

CONTACT US | SITE MAP | RELATED LINKS

UConn

[www.sustainability.uconn.edu/fertcalc.html](http://www.sustainability.uconn.edu/fertcalc.html)





## Fertilize with Care



- Apply only if needed
- Don't apply when heavy rain expected
- Don't overspread on impervious surfaces



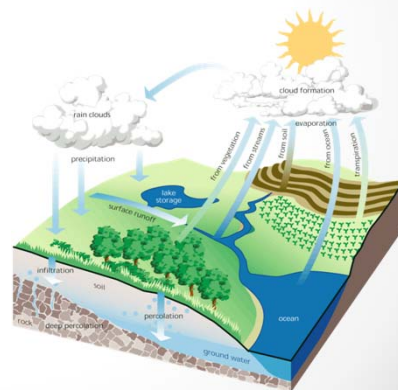


## Recent legislation in CT regarding lawn fertilizer

- Prohibits application of fertilizer with P
  - Except when soil is deficient or new establishment
- Prohibits all application of fertilizer with P between December 1 and March 15
- No fertilizer with P shall be applied to a lawn within 20 ft of any body of water
- No application of fertilizer with P to impervious surface

## Low Impact Development (LID) Site Planning Concepts

- The Goal: To preserve pre-development hydrology
  - Runoff volume and rate
  - Groundwater recharge
  - Stream baseflow
  - Runoff water quality

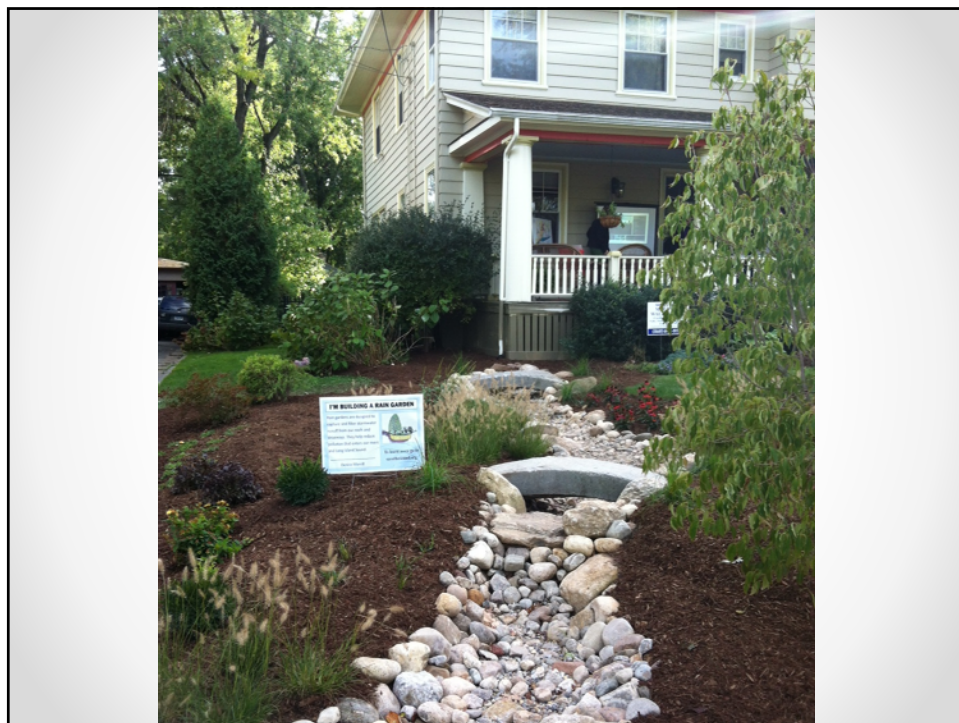


## Rain gardens

- Depression in the landscape designed to collect and infiltrate stormwater
- Besides performing this function, they also look really nice!

## What's going on in there?

- Reduction in stormwater volume
  - Infiltration
  - Evapotranspiration
- Filtration of coarse particles
  - Sediment
  - Bacteria
- Pollutants retained
  - Taken up by plants (nitrogen, phosphorus)
  - Adsorbed to mulch, soils, or organic matter (metals)
  - Broken down by microorganisms and sunlight (hydrocarbons, bacteria)





## Ponding area

- Ponding is OK, but should be gone within 3-4 hours



## Rain Gardens



Norwich Extension Office

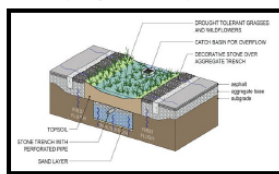




## Lake Street School Bioretention Area

### What is Stormwater Runoff?

Stormwater is runoff which occurs when precipitation flows over the ground. Impervious surfaces like sidewalks, driveways, and streets prevent stormwater runoff from soaking into the ground. Stormwater from parking lots and roads carries debris, chemicals, dirt, and other pollutants. These pollutants then discharge into surface water, including rivers and streams either directly or through a stormwater collection system.



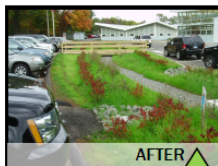
**Bioretention areas** provide on-site treatment of stormwater runoff. During storms, bioretention areas pond runoff above ground and allow the water to slowly filter into the soil. This bioretention area consists of composted topsoil and plants. These plants and soil filter and treat stormwater through biological processes. The filtered stormwater then either becomes groundwater or is transported to a stormwater system or waterway.



BEFORE



AFTER



AFTER



BEFORE

### What is stormwater?

**Flotables**  
Flotables are pieces of litter in the water. They may be contaminated with chemicals and bacteria. Commonly observed flotables include cigarettes, plastic containers, weapons, and cans.

**Sediment**  
Sediment is usually the result of soil erosion, and can be harmful to aquatic life. Sediments can carry chemicals and cover the bottoms of streams, harming the habitat needed by aquatic insects and plants.

**Nutrients**  
Nutrients such as nitrogen and phosphorus, commonly from residential fertilizers, result in excessive plant growth that clogs waterways, blocks sunlight, and reduces oxygen available to fish and other aquatic life.

**Bacteria and Viruses**  
Bacteria is washed with animal excrement and leakage from sewers and septic systems into waterways.

**Oil and Grease**  
Petroleum products (gasoline, oil, and grease) may be toxic to aquatic life. Oil and grease in stormwater can generally be traced to automotive leaks and spills or improper disposal of used oil.

**Pesticides and Herbicides**  
Excess amounts of pesticides and herbicides applied to yards, lawns and greenways are washed into streams during rainfall events. These chemicals can be toxic to organisms.

**Metals**  
Metals such as lead, zinc, mercury, copper, and cadmium in water, can be toxic aquatic life. Metals come from vehicle exhaust, weathered pipes, metal plating, tires and motor oil.

**Why put a project here?**  
This project location was identified by the Friends of the Hickman River as a Tacklingtoons River Watershed Management Plan. This location was ideal for the installation of a bioretention area to prevent stormwater before it enters the nearby stream.

**Questions?**  
If you have questions about this project, please feel free to contact the North Central Conservation District at (860) 875-3881.



## Crash course in rain garden design/installation

### Siting your rain garden

- Locate at least 10-15 feet away from foundation with a basement, well, or septic system

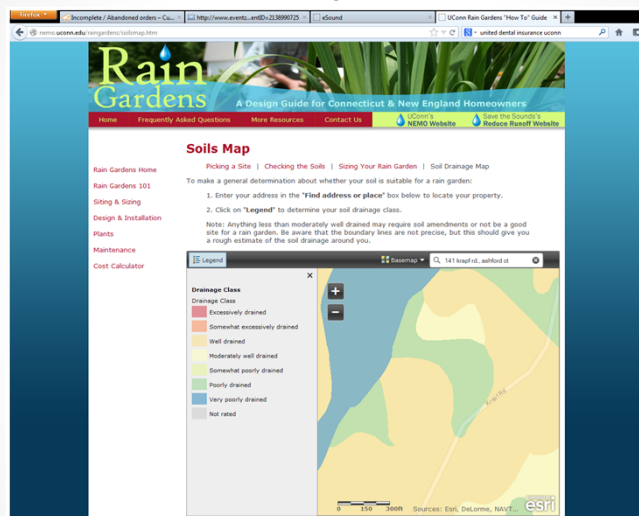


## Siting your rain garden

- Seasonal high water table: don't put in wet area of yard
- Avoid very clayey or compacted soils



## Evaluate your soils



- Check soils map at NEMO rain garden site
  - <http://nemo.uconn.edu/raingardens/soilsmap.htm>

## Soils

- Simple percolation test
  - Dig hole 6 inches deep, and fill with water
  - If there is still water in the hole after 24 hours, the site is **not suitable** for a rain garden



## Soils

### Better percolation test:

#### Steps:

1. Dig a hole 12 inches deep by 6 inches in diameter.
2. Fill hole with water and let stand until all the water has drained into the ground.
3. Refill the hole with water again. Measure the depth to water with a ruler.
4. Check the depth to water with a ruler every hour for 4 hours.
5. Calculate how many inches of water drained per hour.

*~1.5 inches of water draining per hour is ideal*

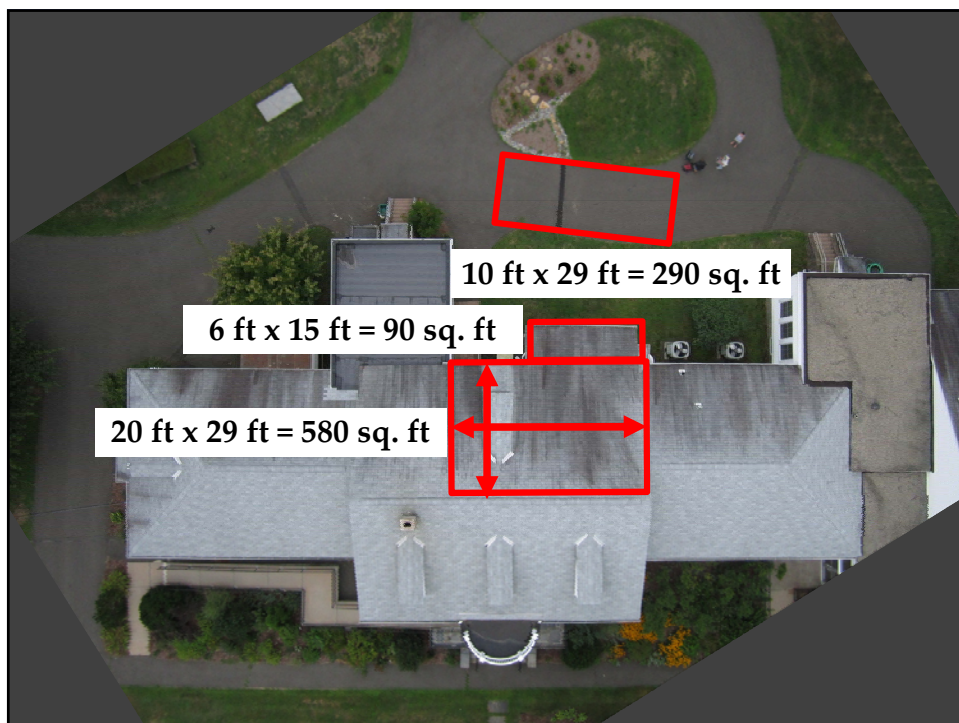


## Soil Amendments

- For compaction, loosen up and remove some of the compacted soil, and replace with sand/compost mixture
- For clay soils:
  - Make garden larger and shallower, and amend with compost
- For very sandy soils:
  - Amend with compost to slow down the infiltration
- For urban fill soils, other adjustments may be needed

## Simple sizing method





## 2. Add up the area:

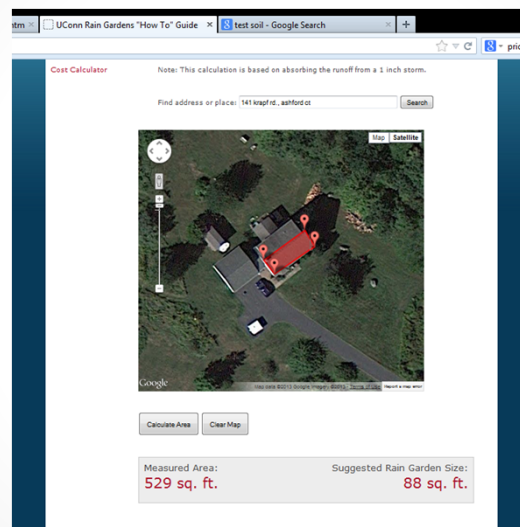
$$290 + 90 + 580 = 960 \text{ square feet}$$

Rain gardens typically sized to contain 1 inch of rainfall in a depression 6 inches deep

## 3. Calculate best rain garden size:

$$960/6 = 160 \text{ square feet}$$

## Online sizing tool



<http://nemo.uconn.edu/raingardens>

## Installation

- Mark area to be dug
- Call hotline to locate underground utilities (at least 3 days in advance) **1 – 800 – DIG – SAFE**
- Plan for labor
  - Smaller gardens can be dug by hand or equipment can be rented for larger gardens

## Mark out & plan for flow





## Remove turf



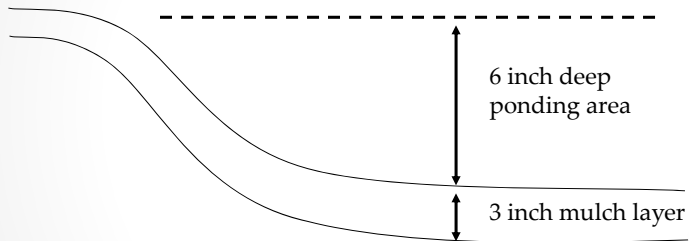
- Can be saved for berm

## Remove soil



- Foot traffic only – this is really important!

## Depth



## Berm if necessary



## Install plants and mulch



Plants should be natives or well-adapted non-natives  
\*\*\*May need to add compost if soils aren't great\*\*\*

## Construct flow entrance



Use finely shredded bark mulch



## Maintenance

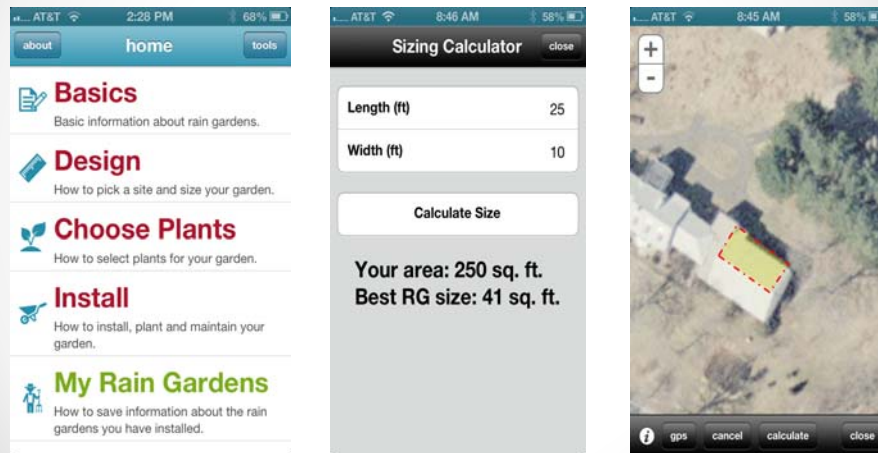
- Short term
  - Water plants until they get established
  - Remove any invasives
- Long term
  - Trim plants as desired
  - Remove invasives
  - Remulch as needed
  - **\*\*Maintain flow paths and storage\*\***



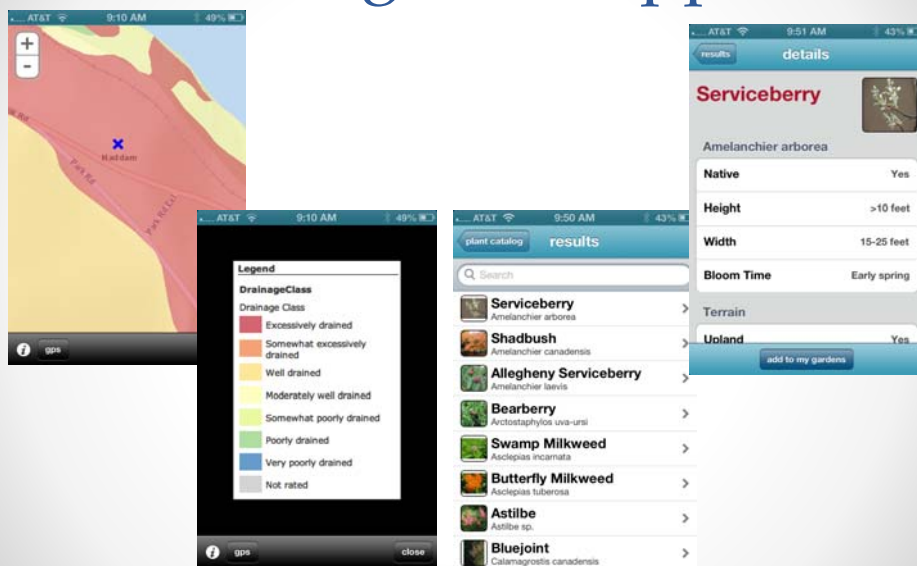
**BREAKING  
NEWS!!!!**



# Smartphone app!



# Rain garden app



## Resources

- NEMO/CFE Rain Garden page  
<http://nemo.uconn.edu/raingardens>
- Webinars  
<http://clear.uconn.edu/webinars/CLEARseries>
- LID Inventory  
<http://nemonet.uconn.edu>

Questions??

michael.dietz@uconn.edu