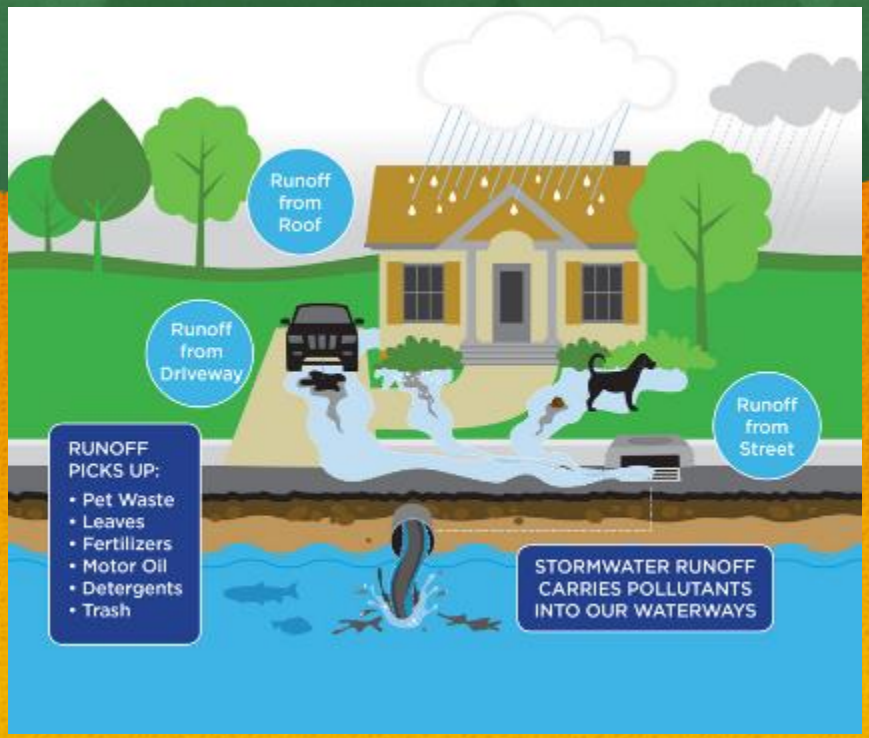
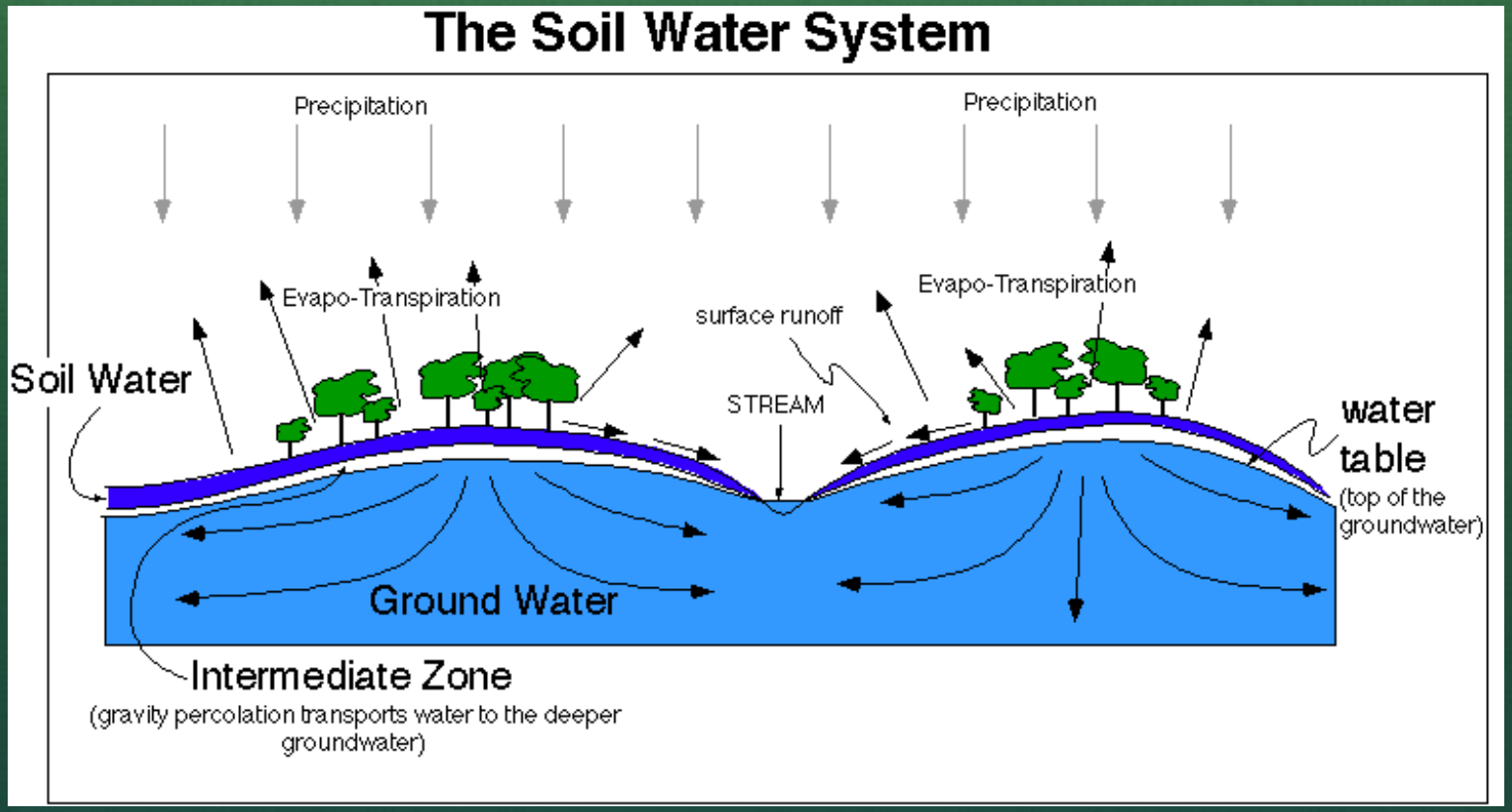
Stormwater Management for Homeowners



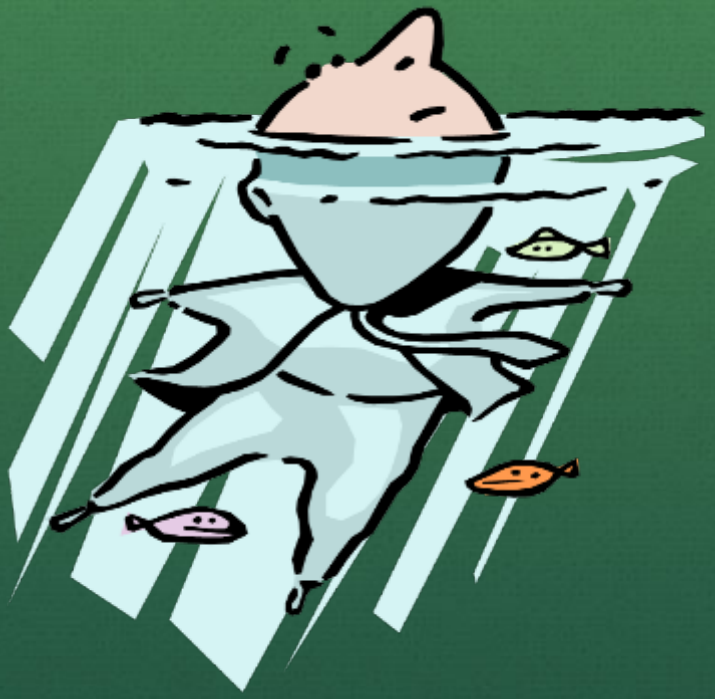
Presented by Jeannie Toher, AP Deal Lake Commissioner and
Dr Stephen Souza, DLC Water Quality and Environmental Consultant

What is Stormwater Runoff?

Rainfall that doesn't percolate into the ground and naturally filters through the soil.



What's The Fuss About a Little Runoff?



Name Some Problems You Know Are Created By Run Off?

Did You Know?

- Stormwater is the biggest source of pollution in our waterways.
- A majority of NJ's waterways do not meet the minimum standard for drinking water, aquatic life, recreation, or fish consumption.
- Flooding has increased throughout NJ as a result of more frequent and intense storms and more hard surfaces, such as pavement.

Impaired Water Quality

Over 70% of water quality problems in US due to non-point source pollution (run off other than industrial waste or sewage) fertilizer, goose poop. Also impacts drinking water quality.

Hydraulic Impacts

Erosion

Stream Sloughing

Run Off Impacts

Flooding

Less Base Flow

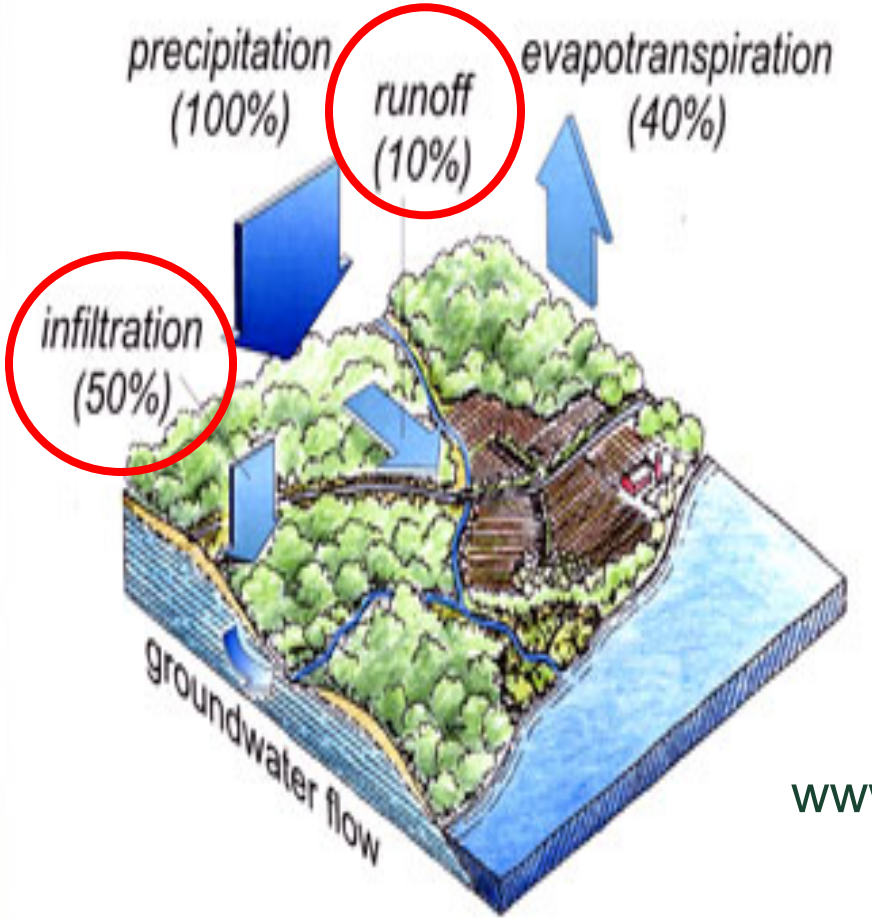
Excessive Nutrients

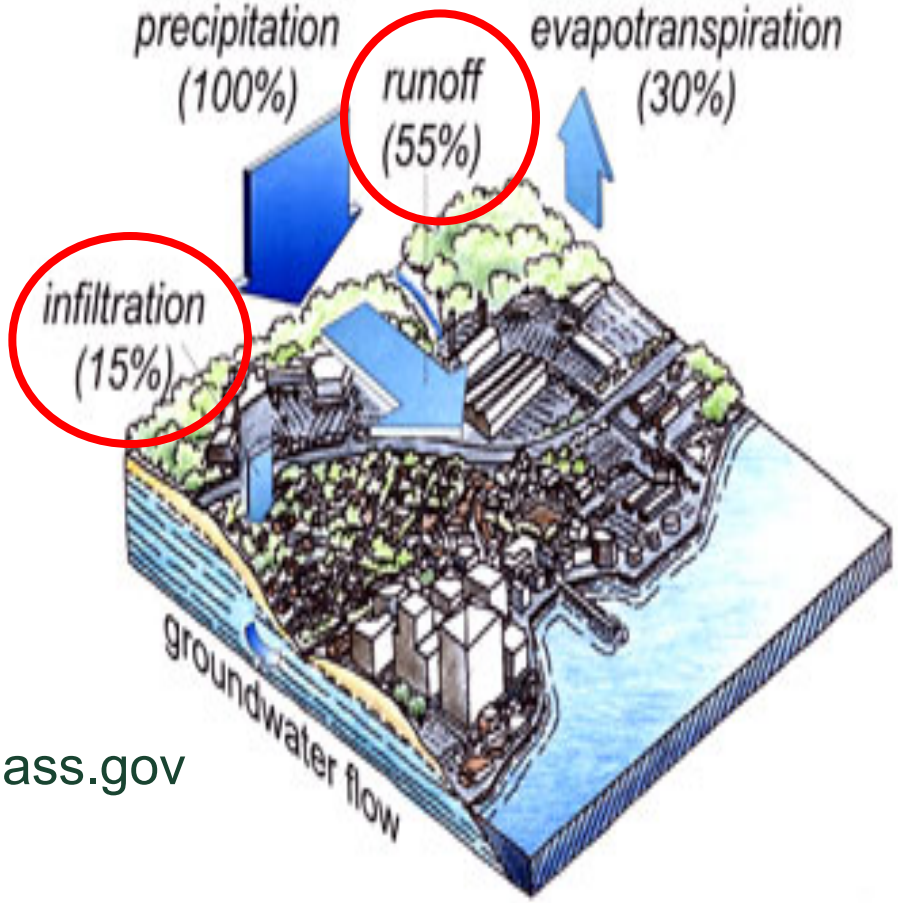
Eutrophication – Algae Blooms

Fish Kills

A Little Storm Water Run Off Leads To A Lot Of Problems!

How Development Alters Run Off



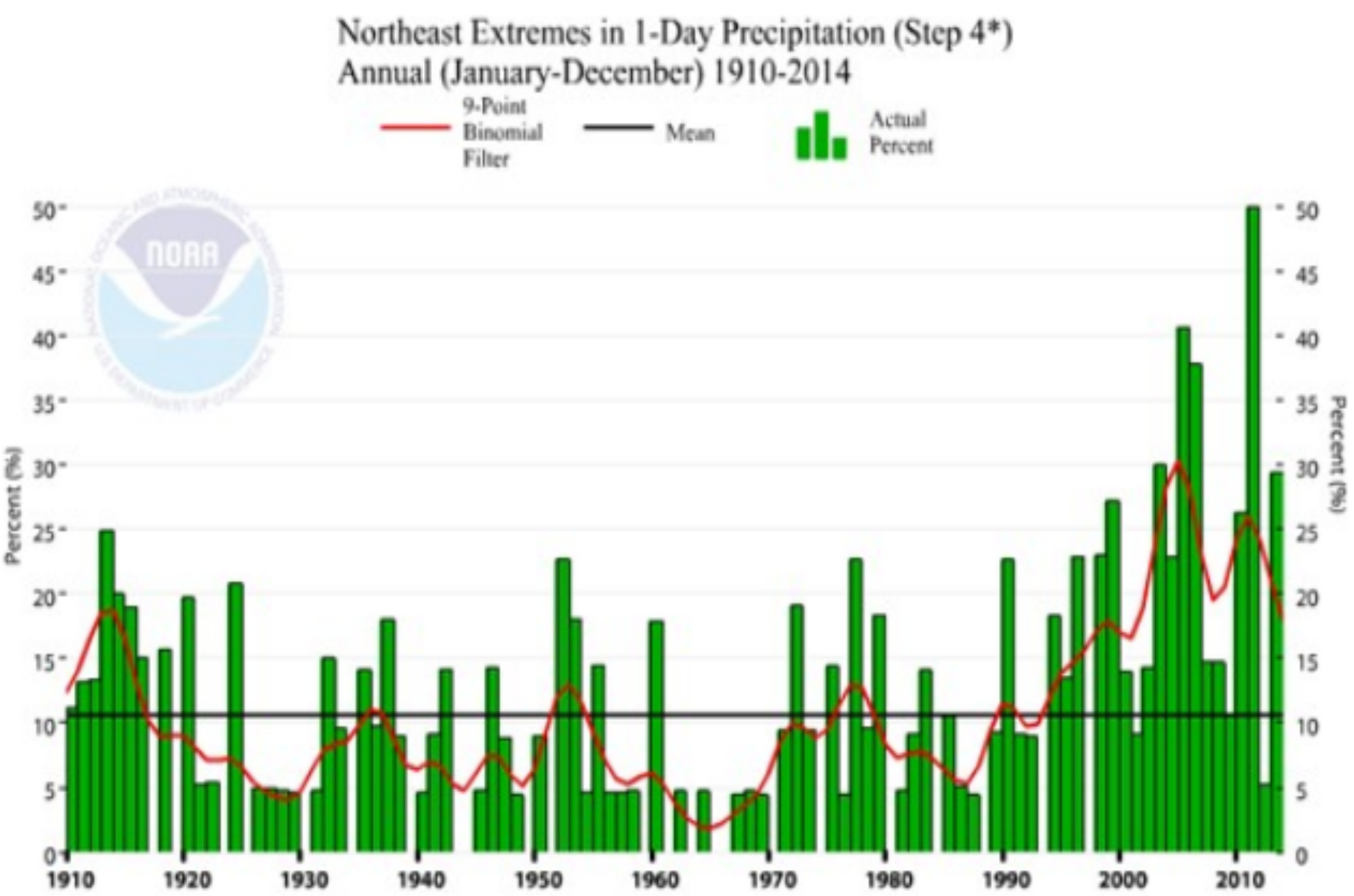


www.mass.gov

Did You Know?

We are experiencing more rainstorms and rainstorms that are more severe than ever before .

Communities face an increasingly urgent need to upgrade the systems that handle the resulting runoff.



Source - Dr. Anthony Broccoli

IMPERVIOUS SURFACES =MAJOR IMPACT

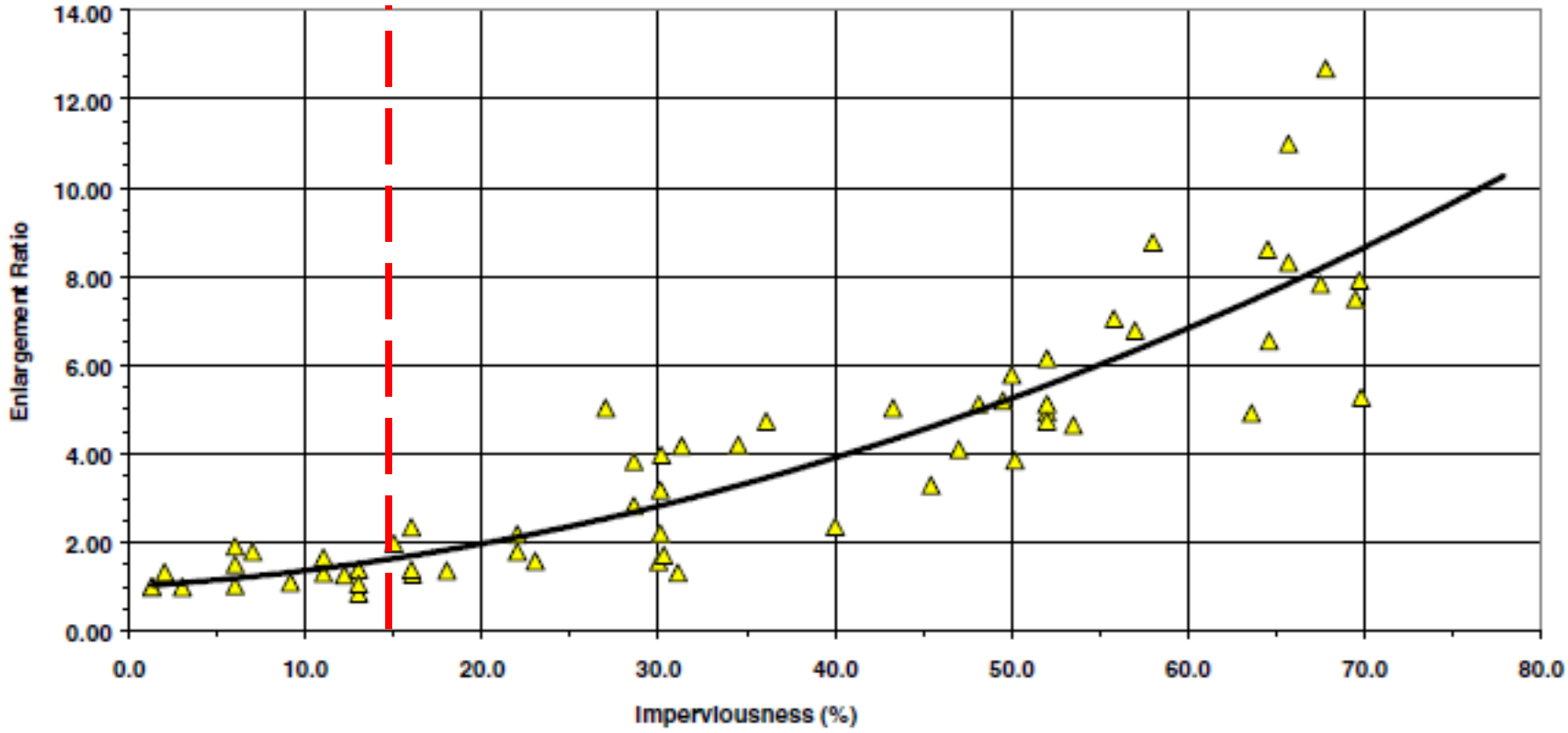
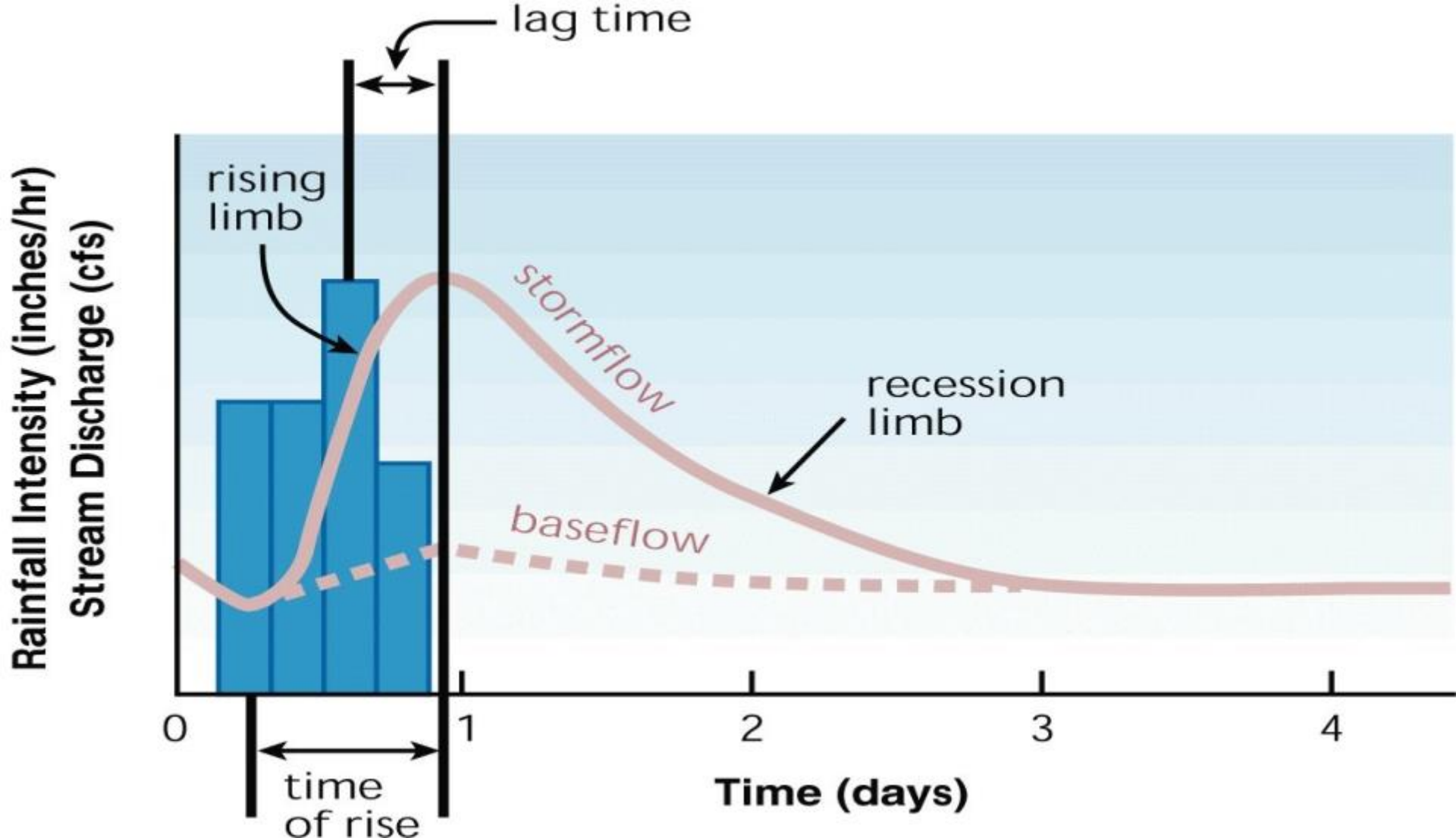


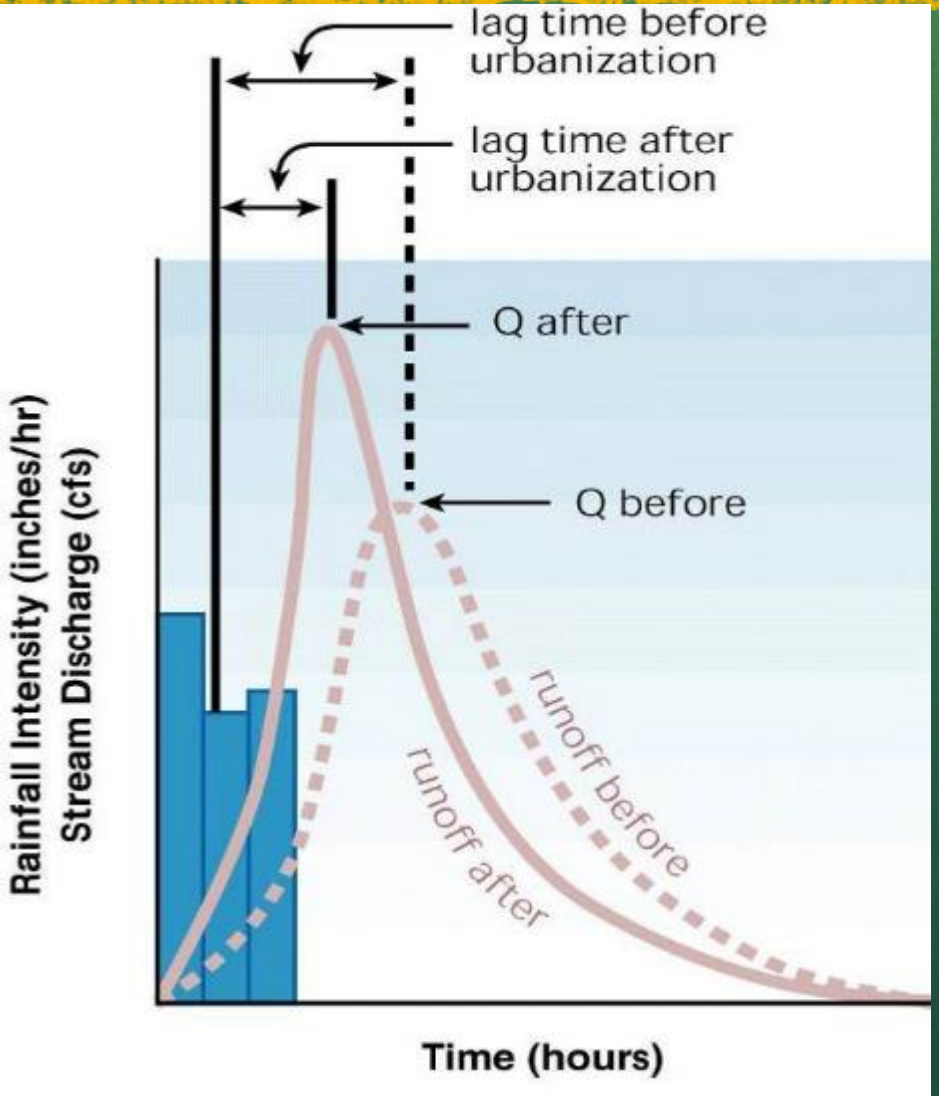
Figure 22: Ultimate Channel Enlargement in MD, UT and TX Alluvial Streams (MacRae and DeAndrea, 1999 and CWP, 2001b)

Impacts of Impervious Cover on Aquatic Systems, Center for Watershed Protection, 2003

Rainfall Stream Flow Discharge Re Charge



Detention Basins Alone Can't Properly Mitigate Stromwater Impacts



Collectively need to:

- Reduce runoff volume
- Recharge groundwater and maintain baseflow
- Remove and reduce pollutant loads

Before Regulations

- SW problems more common in older developed areas because they were constructed before NJ stormwater regs were adopted (1985).
- Many homes around Deal Lake were built in the flood zone (area flooded during 100 year storm). Lower than lake surface.
- Prior to 2002 SW regs, no need to reduce pollutants or recharge groundwater

What We Have Been Doing in "Modern Days"?

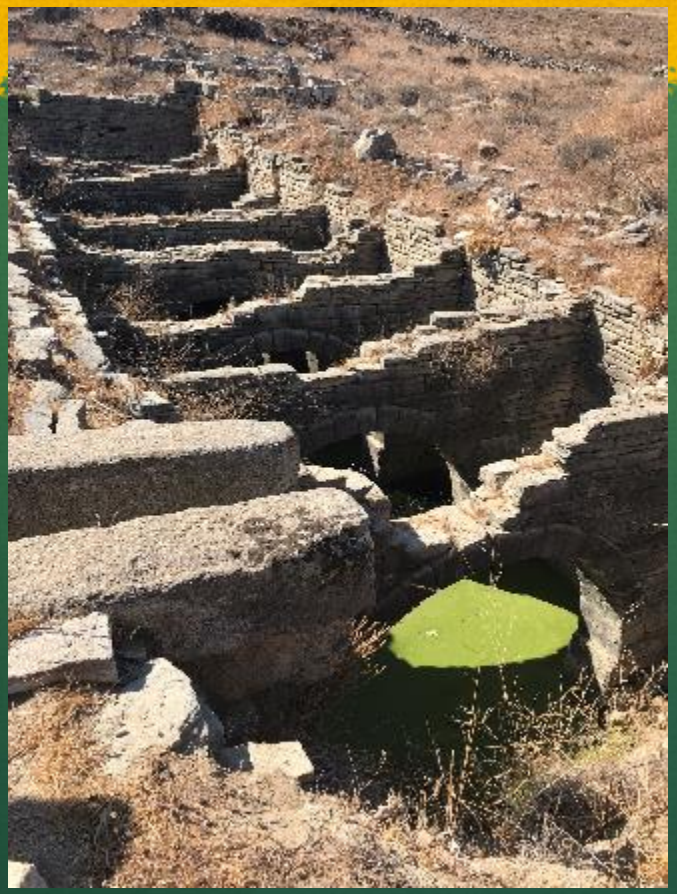
- We quickly moved SW away from structures...into the gutter...into a storm sewer...into the lake!
- No attempt made to recharge runoff, remove pollutants or reduce the volume of runoff.

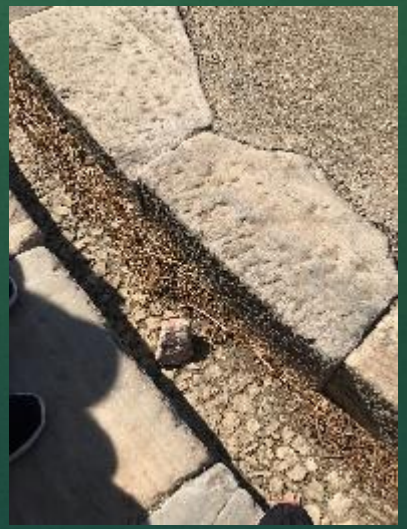
Not the right way to "manage" runoff...need to keep it on-site as much as possible!

We Must Change Our Thinking

Rather than "getting rid" of stormwater as quickly as possible we must begin to think of stormwater as a resource. Then we can start to fix the problem.

Ancient Peoples Knew





DELOS, 2nd Century BC

Aquaducts, collection basins, drains to direct and save water. They kept the water ON SITE

To Fix the Problems We Need To

- Reduce volume of runoff leaving our properties
- Maintain or replicate existing hydrology
- Maintain baseflow (infiltrate rainfall, don't let it run off)
- Reduce pollutants conveyed by runoff

Takes more than only managing peak flows

Fixing The Problems Created By The "Old" Ways Is Very Expensive.

What Can Homeowners Do ?

Small Steps Main Ideas

1. Treat stormwater as a resource
2. Don't make stormwater management an afterthought
3. Think small to achieve big results
4. Use nature as your model
5. Inexpensive solutions abound
6. Keep the water close to the source.

Impervious/Pervious

Reduce impervious surfaces through the addition of features such as rain gardens, rain barrels, permeable pavement, and green roofs that manage the rainfall on the property, so that it never enters the municipal stormwater system.

Maintain Healthy Soil

- Avoid compacting soils : mowing and driving on lawns makes them more "solid".
- Impacts ability to infiltrate, results in more runoff.
- Regularly aerate lawns; breaks down compaction and promotes recharge.

Which Is The Better Aerator?

Make Healthy Soil Without Fertilizer

- Minimize pesticide and fertilizer use, add LIME.
- NJ soils tend to be too acidic.
- Adding lime helps grass absorb natural phosphorus…less fertilizer needed.

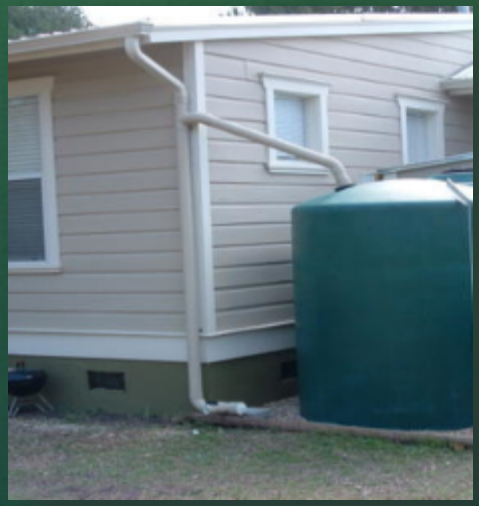
Retain Runoff On Site… Wildflower Meadow: The Lazy Lawn

Retain Runoff On Site... Get Really Lazy

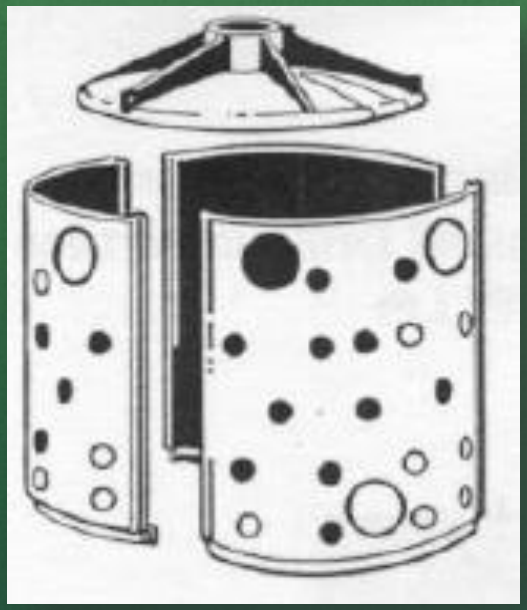
- Reduce the square footage of your lawn area by planting low-maintenance ground-covers, trees, flowers, and shrubs to help water infiltrate into the ground and prevent soil erosion.
- Leave mulched grass clippings on your lawn to naturally fertilize and prevent evaporation to reduce the amount you need to water.

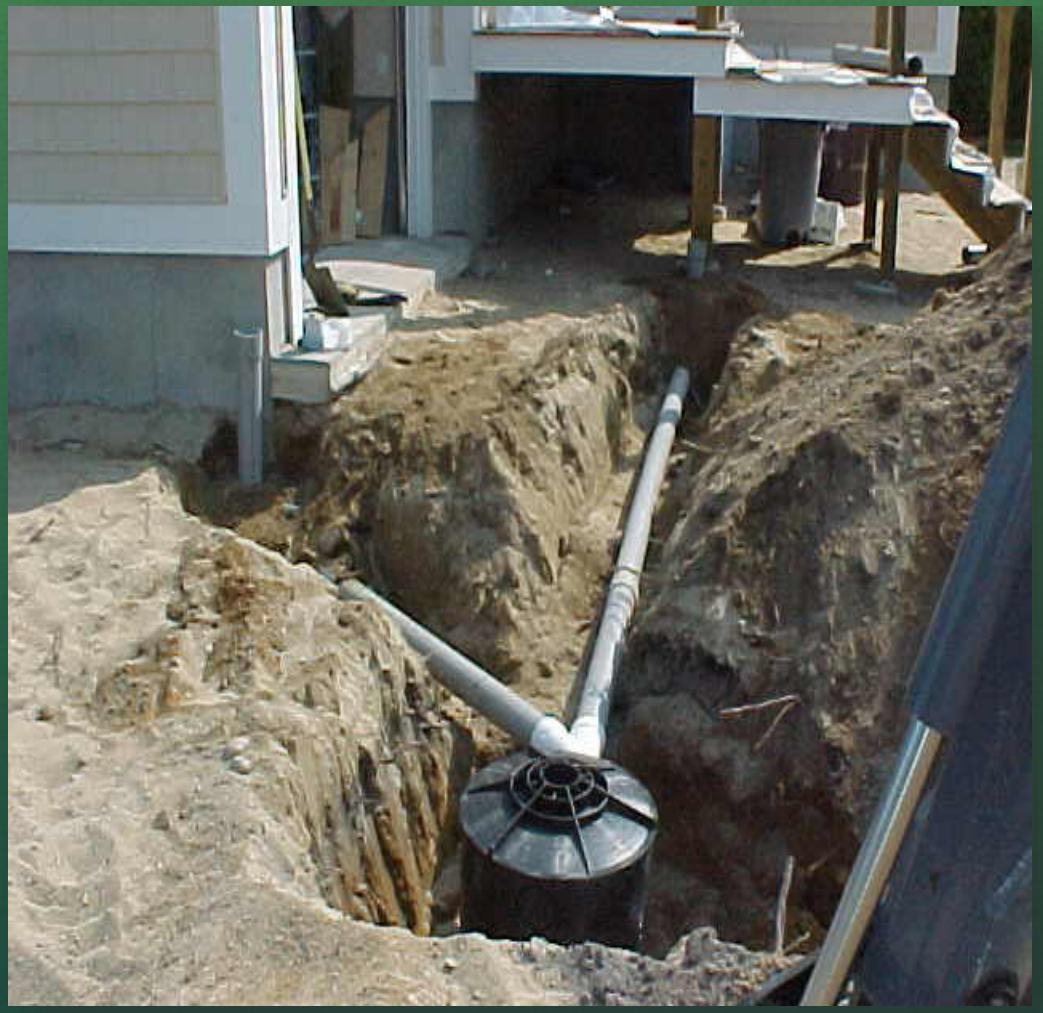
Retain Runoff On Site... Rain Barrels

- Reuse captured rainfall
- Use to water your plants, garden, flowers, wash your tools.

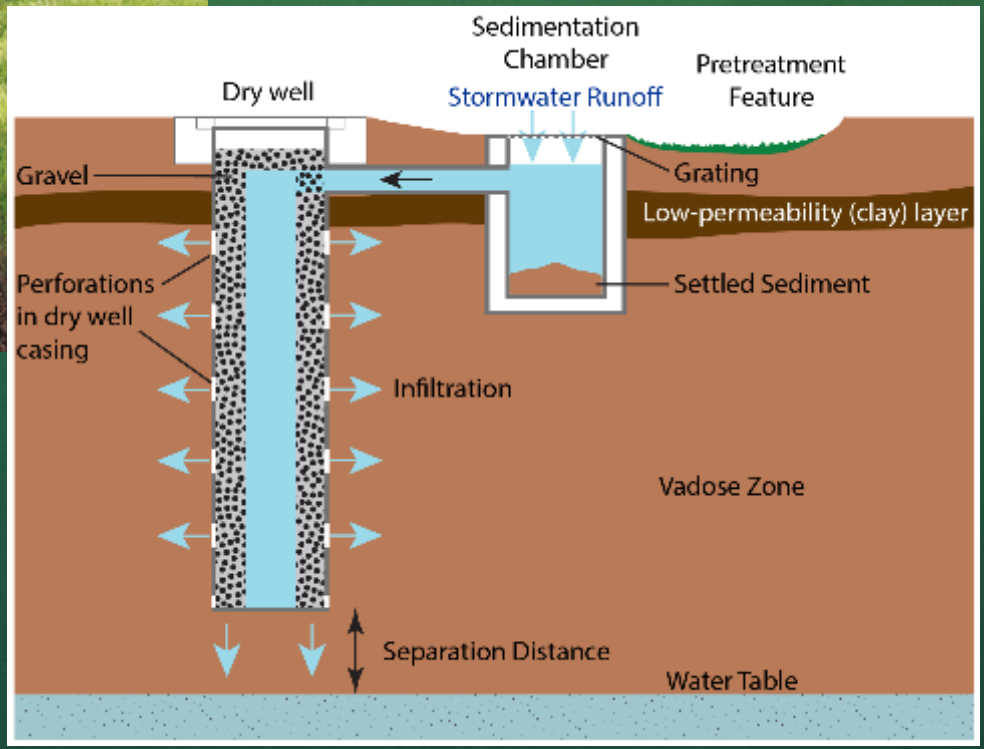


Retain Runoff On Site... Drywells





Retain Runoff On Site... Drywells

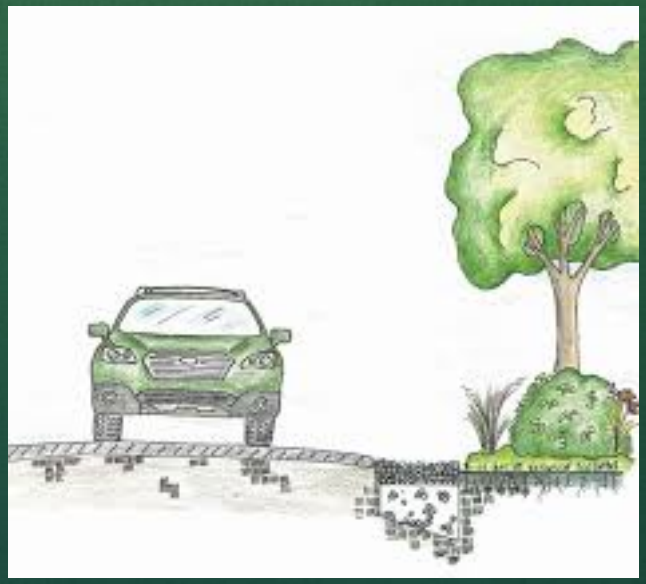


Retain Runoff On Site... Rain Gardens

- The first residential rain gardens used in 1990 in Prince George's County, Maryland.
- Mimics the water retention areas that naturally existed before development.

Retain Runoff On Site… Driveway Infiltration Trench

- A driveway infiltration trench collects and infiltrates stormwater from your driveway allowing it to soak into the ground. It helps reduce stormwater runoff.



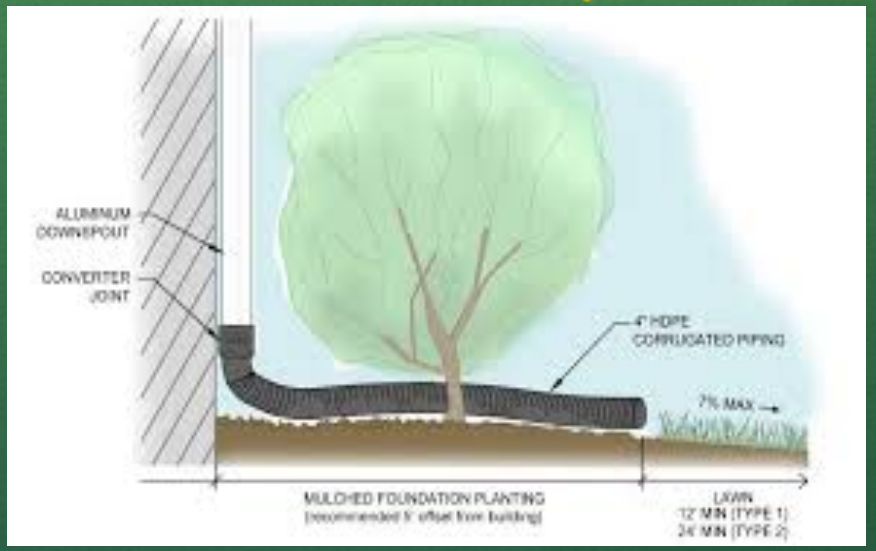
Retain Runoff On Site... ... Use Pervious Walkways and Patios

- Pervious pavers look like traditional pavers, but are able to absorb and store rain.

Work With Nature... Keep Runoff Near Its Source

- Replace impervious surfaces with natural, native ground cover or materials that allow rain water to seep into the ground such as gravel, brick, stepping stones, wood chips, or other porous surfaces.
- Direct runoff from impervious areas to pervious ones. For example, direct the downspout from your roof gutter away from your driveway and instead into a vegetated area such as a swale or garden area.

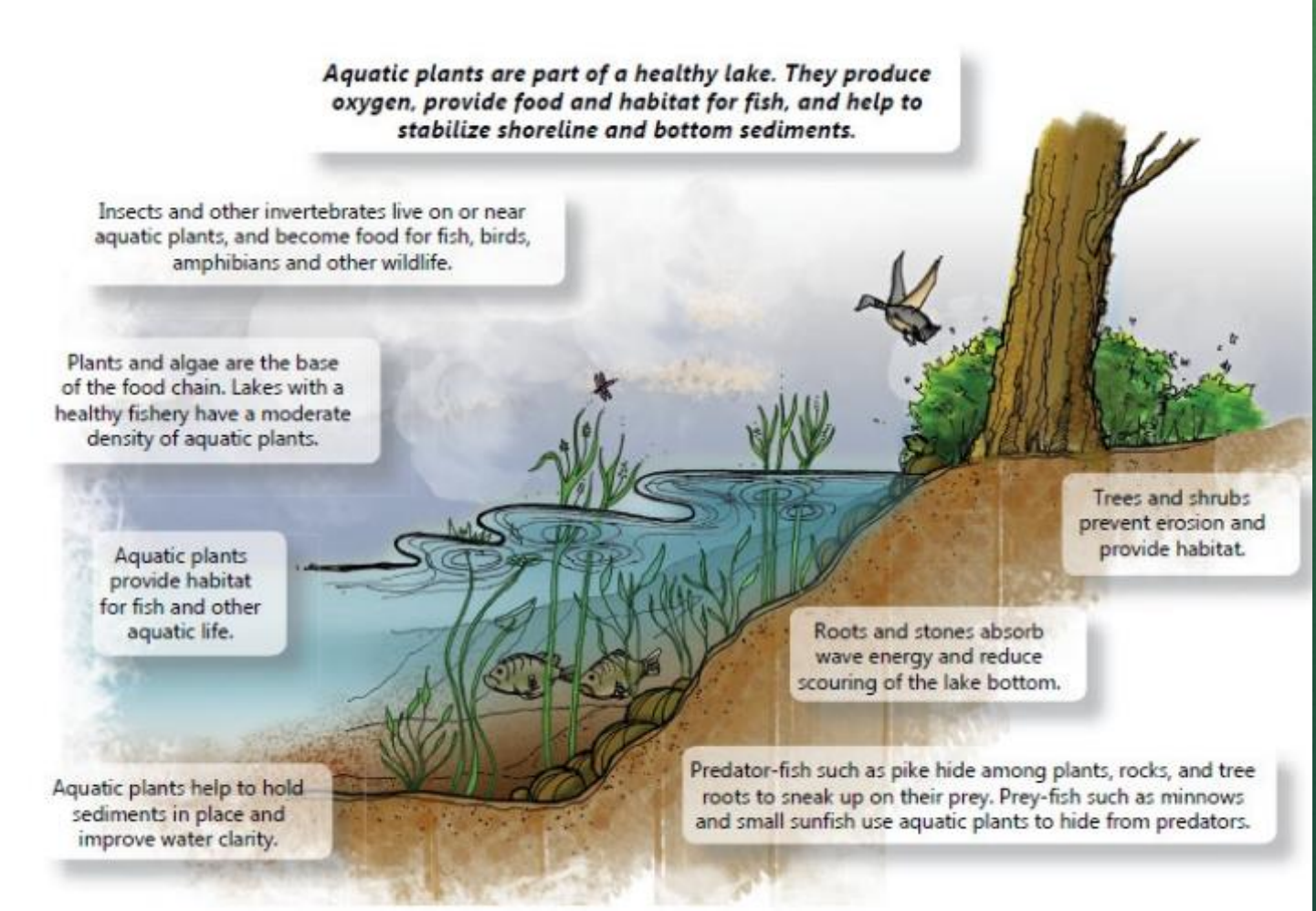
Work With Nature...
Keep Runoff Near Its Source



Natural Shoreline Buffers .

- **For lakefront homes: create/maintain natural shoreline BUFFERS.**
- **Remember: MIMIC NATURE. Let trees, native plants and bushes grow .**

You Cannot Improve On Nature.



Lake Shore Line is Especially Fragile

Early *life* stages of most fish , turtles, frogs etc. depend on this shore line habitat to survive.

Lake Shore Line is Especially Fragile

Disturbing the shore line; removing trees, native plants, digging soil along the shore etc. can expedite erosion which increases turbidity in lake water that effects aquatic life.

These are a few reasons why the DEP has special regulations in place to protect the lake shore line.

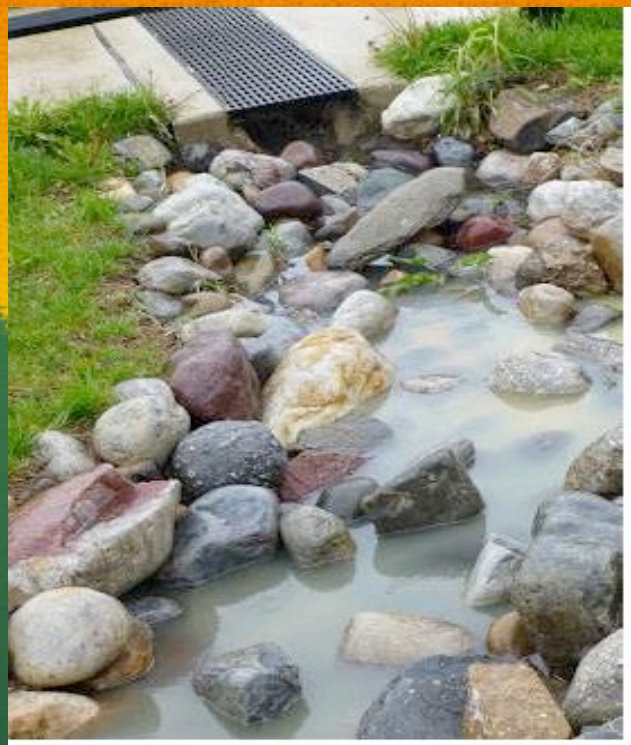
Resources

Water Resources Program/Rutgers

http://water.rutgers.edu/

Our mission is to identify and address community water resources issues using sustainable and practical science-based solutions.

This site has numerous links to additional resources on SWM, green infrastructure project help, etc.



GREEN INFRASTRUCTURE GUIDANCE MANUAL

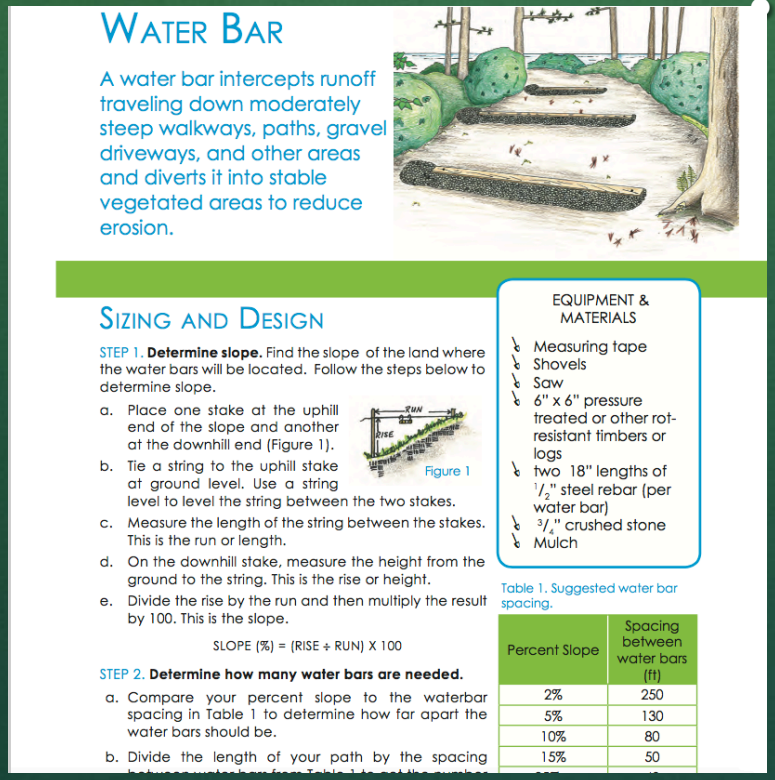
FOR NEW JERSEY

RUTGERS New Jersey Agricultural Experiment Station

http://water.rutgers.edu/Green_Infrastructure_Guidance_Manual/2015-03-31_Manual.compressed.pdf

Resources

- This NH site has a good guidance document with green infrastructure project drawings written in lay person language:
  - https://www.des.nh.gov/organization/divisions/water/stormwater/stormwater-mgmt-homeowners.htm



Water Bar

A water bar intercepts runoff traveling down moderately steep walkways, paths, gravel driveways, and other areas and diverts it into stable vegetated areas to reduce erosion.

Sizing and Design

EQUIPMENT & MATERIALS

- Measuring tape
- Shovels
- Saw
- 6" x 6" pressure treated or other rot-resistant timbers or logs
- two 18" lengths of $^1/_2$" steel rebar (per water bar)
- $^3/_4$" crushed stone
- Mulch

STEP 1. **Determine slope.** Find the slope of the land where the water bars will be located. Follow the steps below to determine slope.

a. Place one stake at the uphill end of the slope and another at the downhill end (Figure 1).
b. Tie a string to the uphill stake at ground level. Use a string level to level the string between the two stakes.
c. Measure the length of the string between the stakes. This is the run or length.
d. On the downhill stake, measure the height from the ground to the string. This is the rise or height.
e. Divide the rise by the run and then multiply the result by 100. This is the slope.

Figure 1

SLOPE (%) = (RISE ÷ RUN) X 100

Table 1. Suggested water bar spacing.

Percent Slope	Spacing between water bars (ft)
2%	250
5%	130
10%	80
15%	50

STEP 2. **Determine how many water bars are needed.**

a. Compare your percent slope to the waterbar spacing in Table 1 to determine how far apart the water bars should be.
b. Divide the length of your path by the spacing

Before You Disturb The Shoreline

https://www.nj.gov/dep/landuse/lawsregs.html

- NJDEP through NJAC 7:7A (Freshwater Wetlands Act) and 7:13 (Flood Hazard Act) regulates activities conducted within flood plain, riparian areas, wetlands and open waters of the state.
- Make sure that you review the rules and have proper permits...this includes removal of trees and vegetation along the shoreline and any type of regrading or development at the water's edge.

In Summary

- Improperly managed storm water leads to numerous environmental and ecological impacts.
- Treat stormwater as a resource.
- Try to keep as much rainfall and runoff on site as possible.
- Less runoff = less flooding, less erosion and less pollutants

In Summary

There are a lot of “easy fixes”:

- Maintain soil health
- Be LAZY about your lawn.
- Use rain barrels, dry wells, simple infiltration trenches, rain gardens to keep runoff on site.
- Reduce impervious cover where you can.
- Check with the DEP before you dig along the shore.

- You can’t improve on nature. Leave natural shoreline buffers natural.

In Summary…

- Divide and conquer…green infrastructure works best when managing small “chunks” of runoff
- Incorporate SW management into your property.

Allow Your Piece of Earth the Freedom to Be Itself.