

Jun 9th, 2:10 PM - 2:30 PM

Green Infrastructure and Blue Habitat- making the connection in Massachusetts

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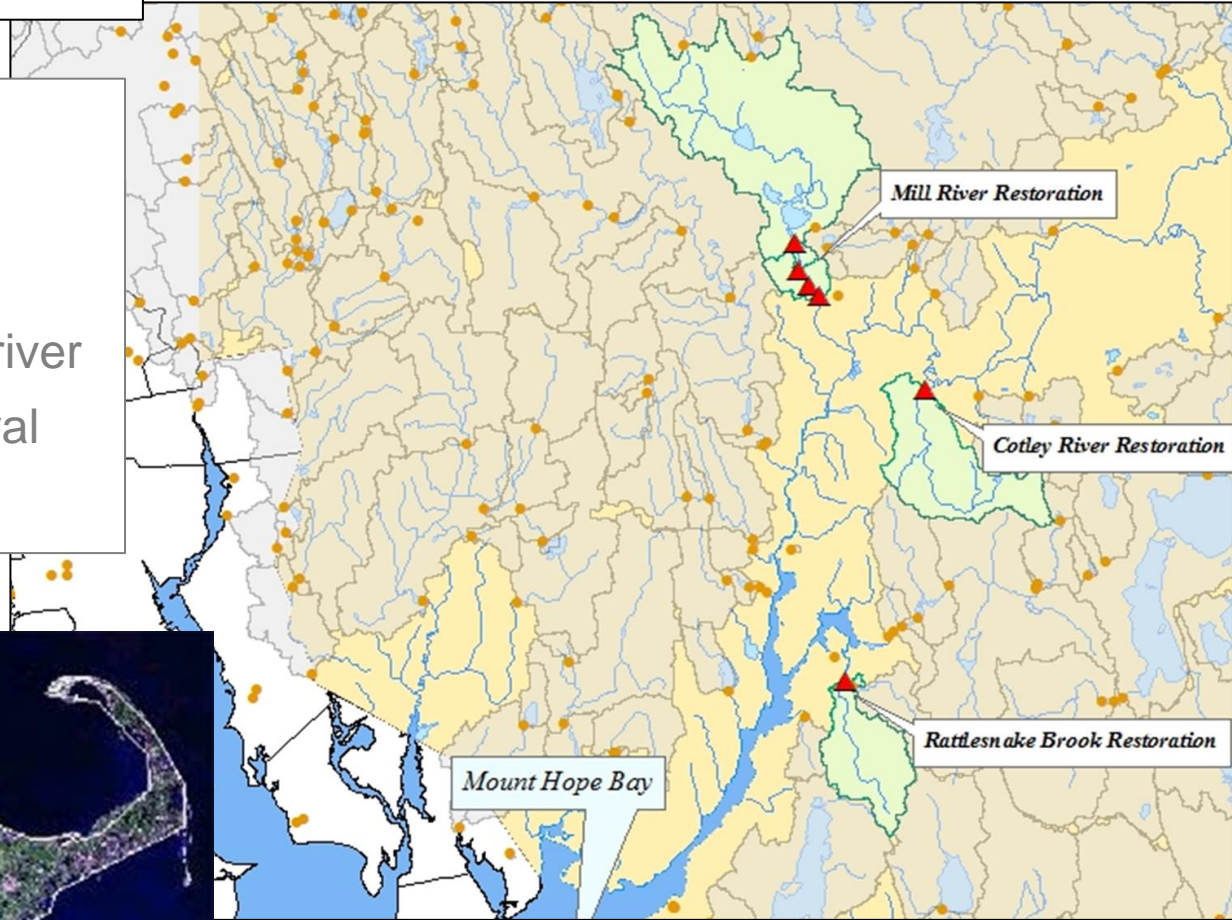


Green Infrastructure and Blue Habitat: Making the Connection in Massachusetts

CATHY BOZEK, AQUATIC ECOLOGIST, THE NATURE CONSERVANCY

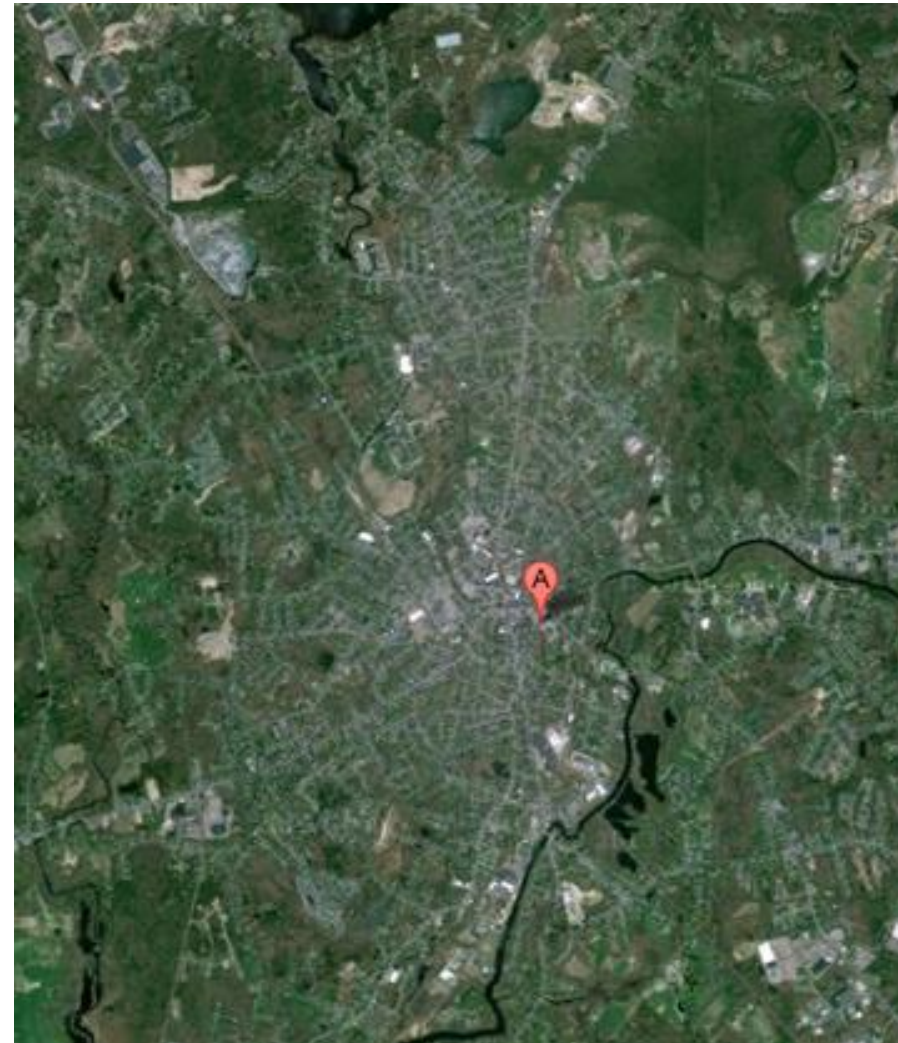
AQUATIC SYSTEM GOALS

- Improve in-stream habitat conditions
- Restore fish passage and river processes with dam removal and culvert replacement



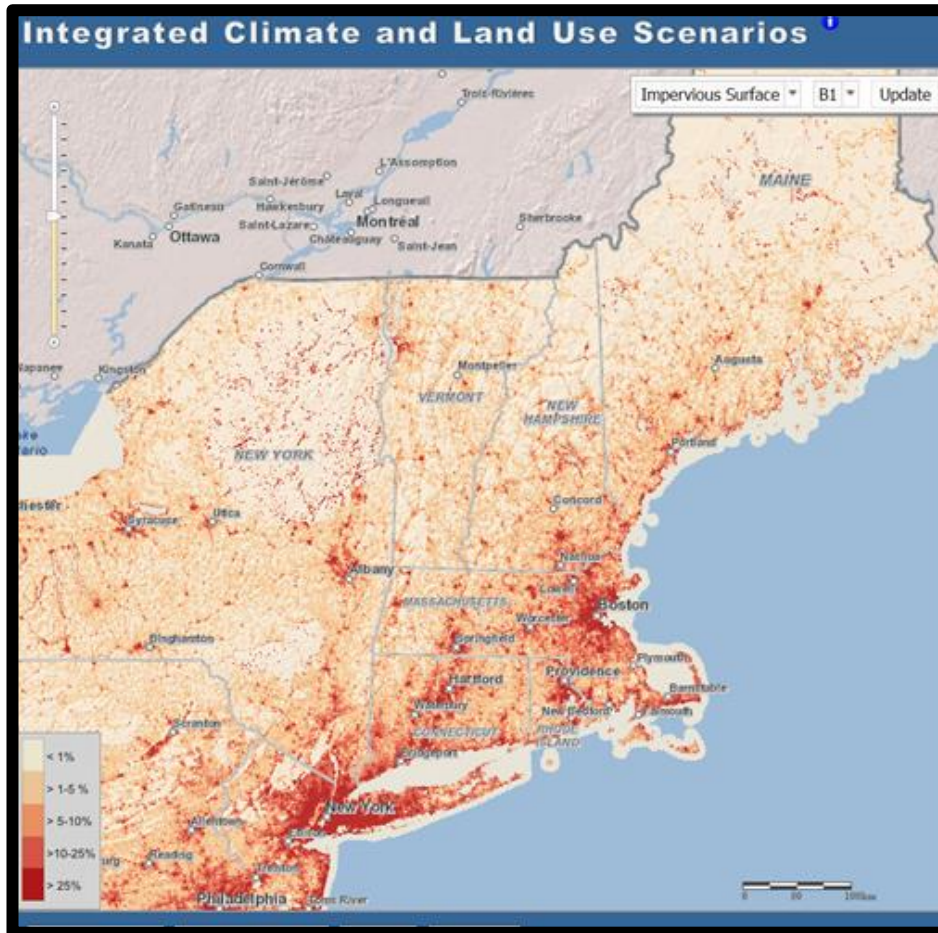
HOWEVER...

- Some of the areas where we work have high percentages of Impervious Cover in the watershed



IMPERVIOUS COVER IN THE NORTHEAST

EPA INTEGRATED CLIMATE AND LAND USE TOOL

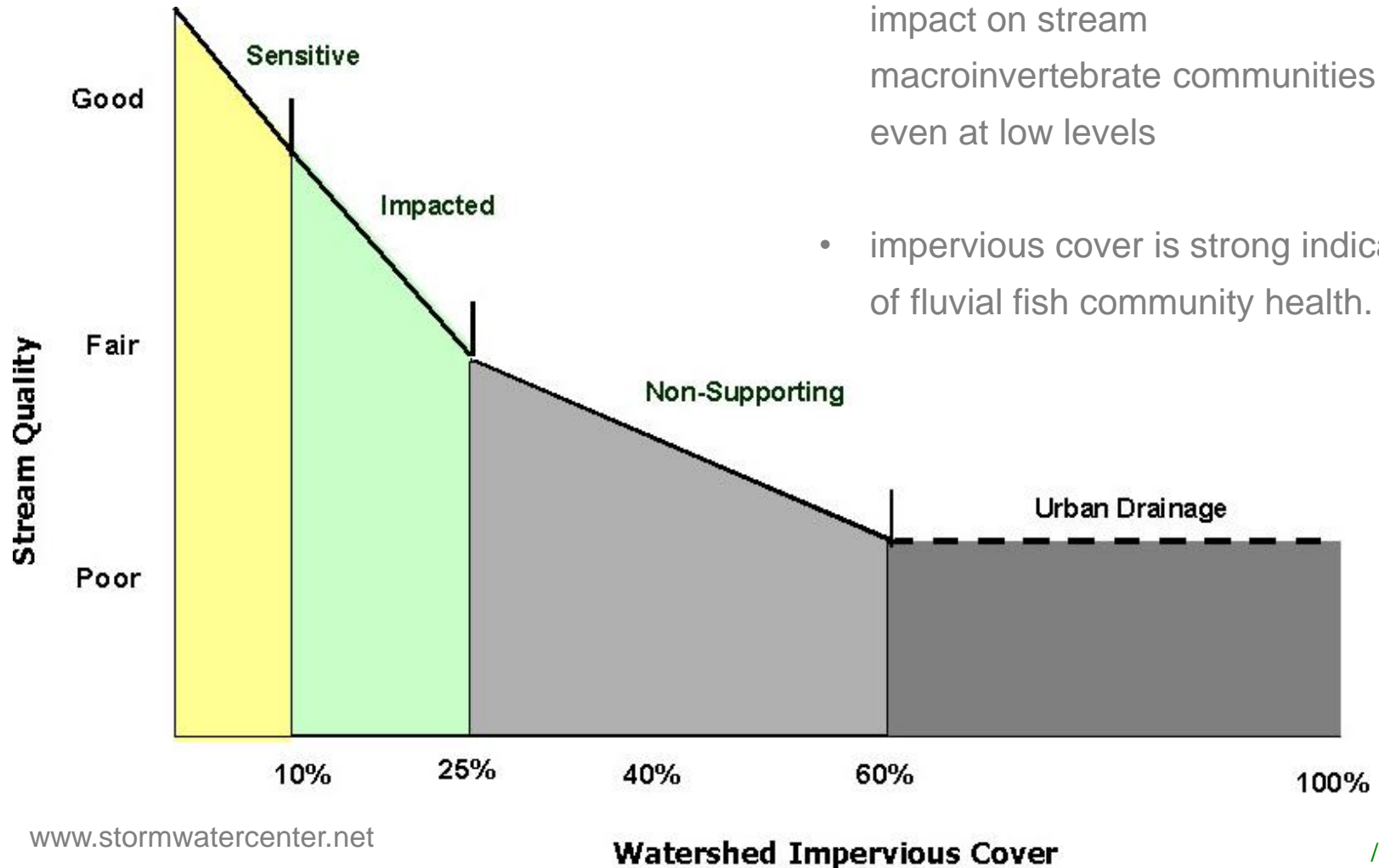


Impervious surface, B1 population scenario, 2010

IMPERVIOUS COVER IMPACTS ON AQUATIC SYSTEMS

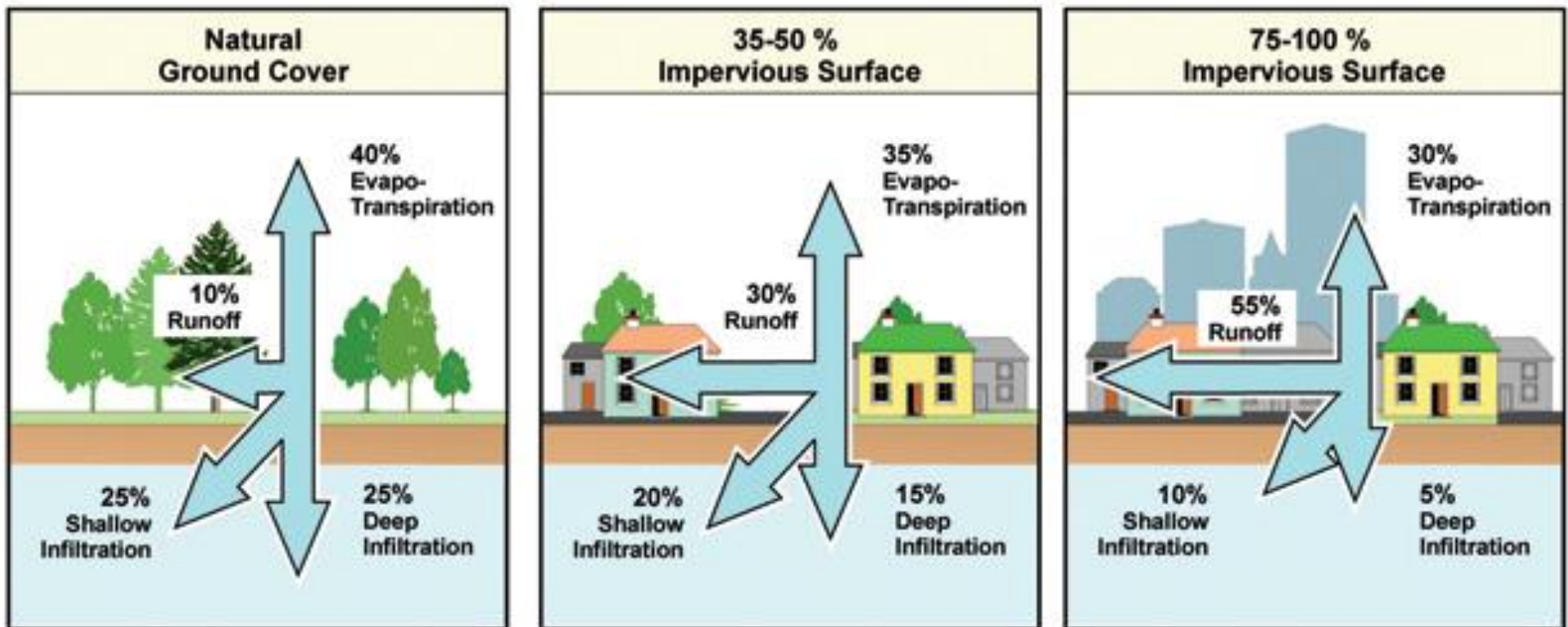
RECENT RESEARCH=
LOWER THRESHOLDS

- watershed impervious cover has an impact on stream macroinvertebrate communities even at low levels
- impervious cover is strong indicator of fluvial fish community health.



WHAT DO IMPERVIOUS SURFACES DO?

ALTERED HYDROLOGY



Graphic: Horsley-Witten Group 2008

WHAT ARE THE LINKS?

FLOW

More Water:

- Increased **volume** of runoff
- Greater stream/runoff **velocity** during storms
- Increased **peak** discharge
 - Erosion
 - Impacts fish movement

Less Water:

- **Reduced base flow**
 - Reduce habitat amount and quality
 - Stresses fish, migration problems



Photo: StormwaterPartners.org

WHAT ARE THE LINKS?

SEDIMENT

- Fine sediment fills interstitial spaces
 - makes streambed uniform, reduces habitat diversity
 - reduces habitat for inverts
- Sediment also:
 - clogs gills
 - reduces feeding success
 - affects migration
 - smothers vegetation
 - carries metals and nutrients



WHAT ARE THE LINKS?

POLLUTION

- **Nutrients:**
 - algal blooms → low DO
 - affects migration, fish kills
- **Metals:**
 - behavioral/ reproductive abnormalities
- **Organics:**
 - reduced immune response, fin erosion, egg mortality
- **Salts:**
 - impact prey, vegetation
- **Temperature:**
 - Impacts to movement, spawning

WHAT CAN WE DO?

GRAY VS. GREEN INFRASTRUCTURE

Gray Infrastructure

- Goal is to get water off site as quickly as possible
- Water quality treatment is usually minimal

Green Infrastructure

- Range of systems
- Infiltrates water on site
- Water quality treatment
- Can convey water
- Can be used in coordination with gray infrastructure



Photo:erdmananthony.com



GREEN INFRASTRUCTURE

WHAT IS IT?

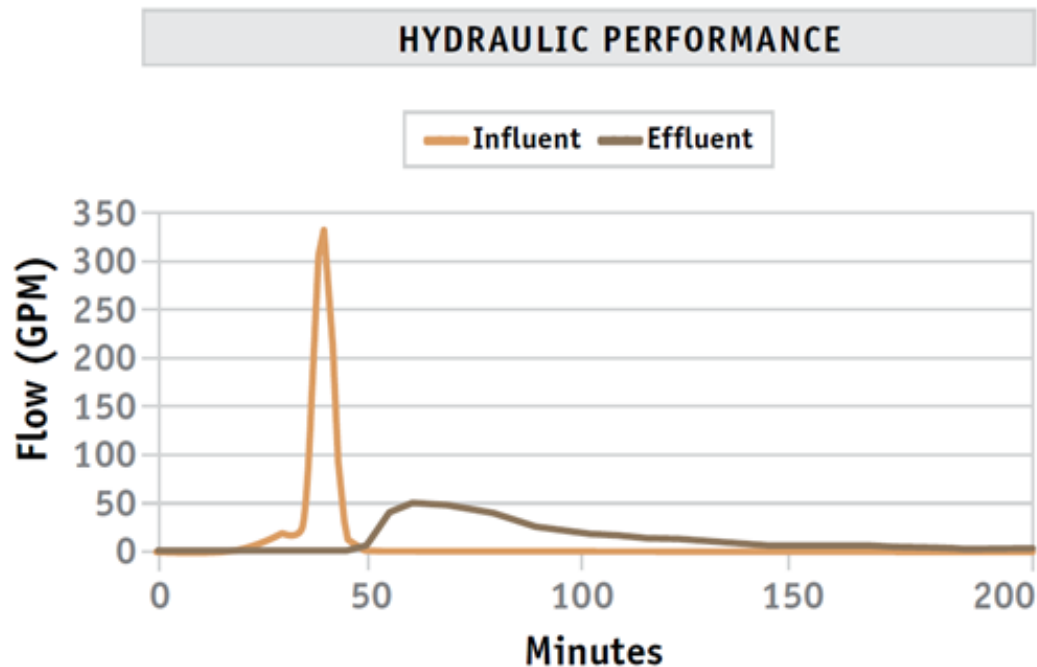
- Site-based:
Best Management Practice (BMP)
mimics natural hydrology
- OR
- Landscape level:
Conservation/restoration of natural
land
-
- Infiltrates water
 - Filters and cleans water using
natural processes
 - Other benefits



GREEN INFRASTRUCTURE

MANAGING FLOW

- Green infrastructure can:
 - ✓ Reduce peak flow, delay peak flow, reduce overall runoff
 - ✓ Reduce erosion
 - ✓ Reduce load on sewer system (storm sewer and combined systems)

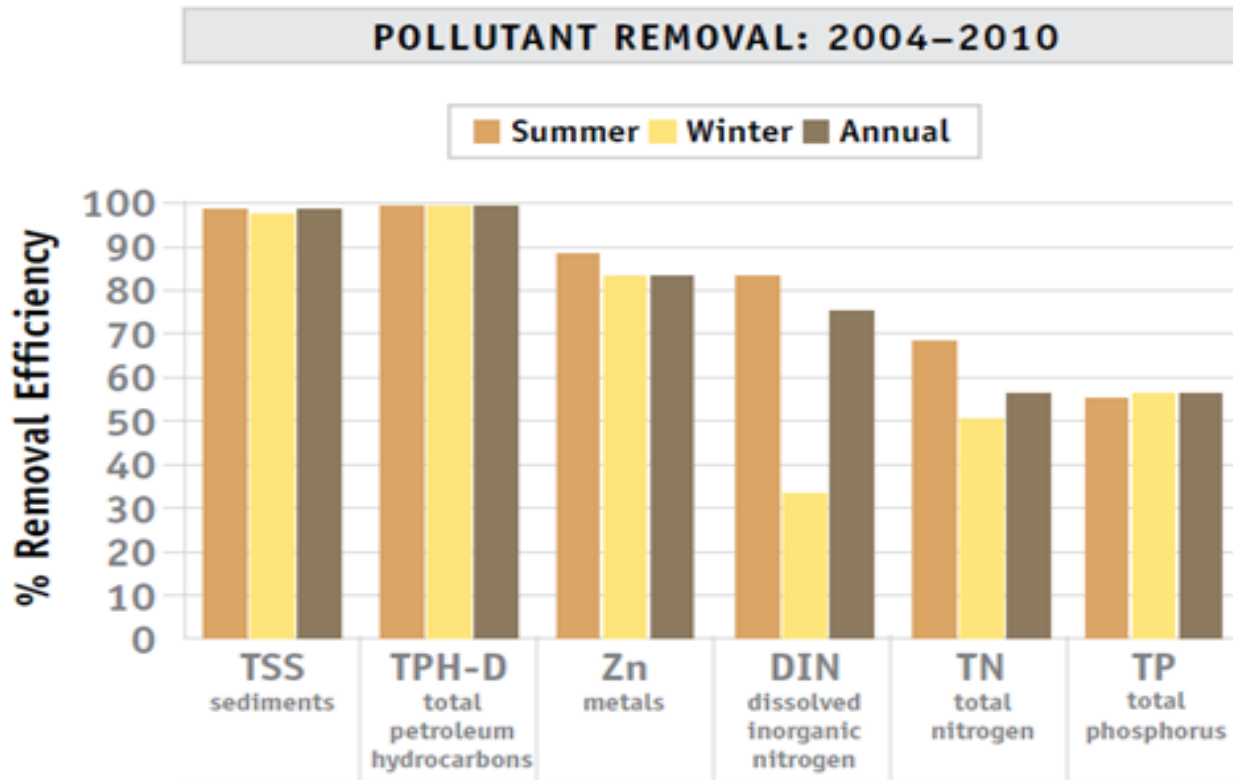


	Winter	Summer	Annual Average
Average Peak Flow Reduction	91%	93%	92%
Average Lag Time (minutes)	419	367	391

From: UNH Stormwater Center 2012 Biennial Report
Data for subsurface gravel wetland.

GREEN INFRASTRUCTURE

MANAGING POLLUTION



From: UNH Stormwater Center 2012 Biennial Report
Data for subsurface gravel wetland. .

GREEN INFRASTRUCTURE

BENEFITS

- ✓ Be economical
- ✓ Reduces need for and stress on gray infrastructure, used in combination
- ✓ Avoided waste water treatment and drinking water costs
- ✓ Help comply with regulations
 - MS4
 - TMDL
 - MA Sustainable Water Management Initiative
- ✓ Improve home values
- ✓ Reduce energy costs
- ✓ Benefit communities (resilience, air quality, traffic calming, aesthetics, access to nature)



GREEN INFRASTRUCTURE



COMMON ISSUES

- “New” idea- not understood
- Concerns about how well it works
- Concerns about costs
- Concerns about maintenance
- Old policies and codes
- Funding

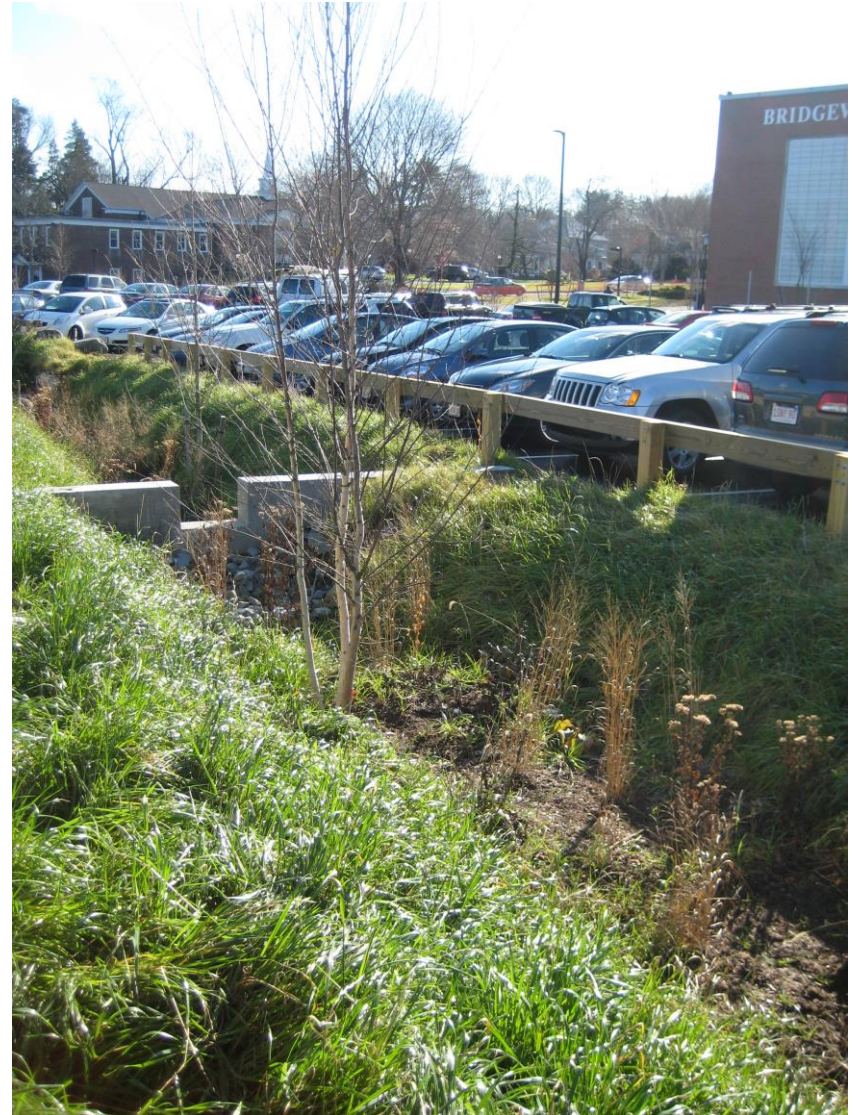
WHAT CAN WE DO?

- Enabling conditions
- Future opportunities

ENABLING GREEN INFRASTRUCTURE

OUTREACH/EDUCATION

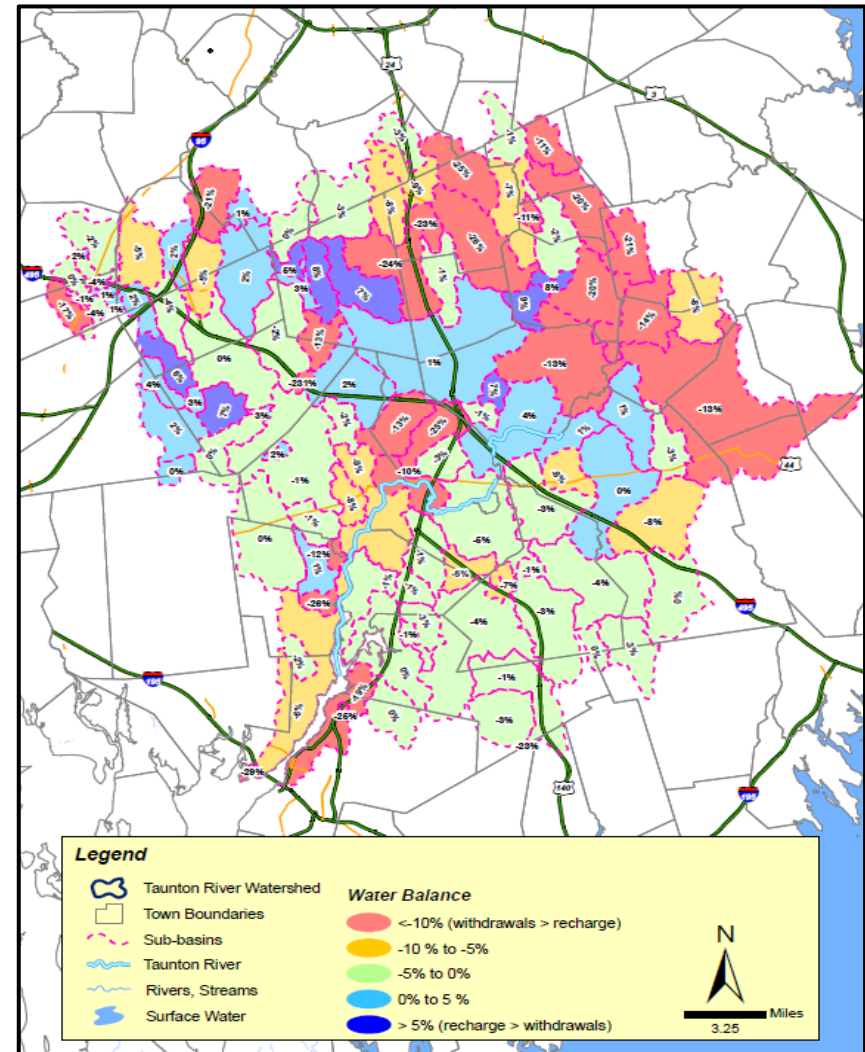
- Working with engineers
- Educating legislators
- Workshops
- Demonstration projects



ENABLING GREEN INFRASTRUCTURE

PRIORITIZE

- Study hydrology and land use
- Modeling to guide municipal/
regional plans
- EPA Healthy Watersheds
Initiative project



Taunton Watershed Water Budget,
Horsley Witten Group 2008

ENABLING GREEN INFRASTRUCTURE

SUPPORT POLICY

- Regulations and permits
- Incentives
 - Grants: TIGER, 319, SRF
 - Technical assistance
- Stormwater utilities
- Many levels





TAKE HOME MESSAGES

- Can't just open passage, need to improve habitat
- Habitat is impacted from actions on land
- Impacts of impervious cover can be reduced with green infrastructure
- Work on enabling conditions