

Jun 24th, 4:15 PM - 4:30 PM

Session A9: Green Infrastructure and Blue Habitat: Impacts of Watershed Conditions and Stormwater Management on River Health and Fish Passage

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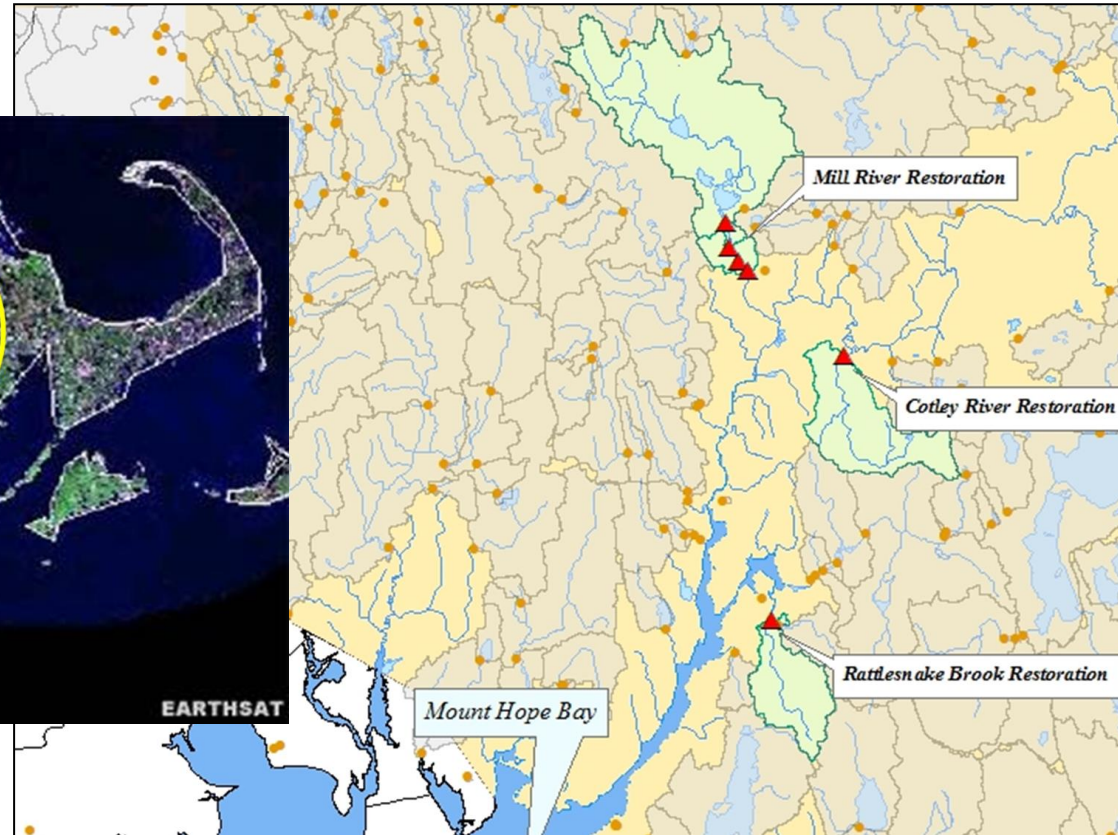
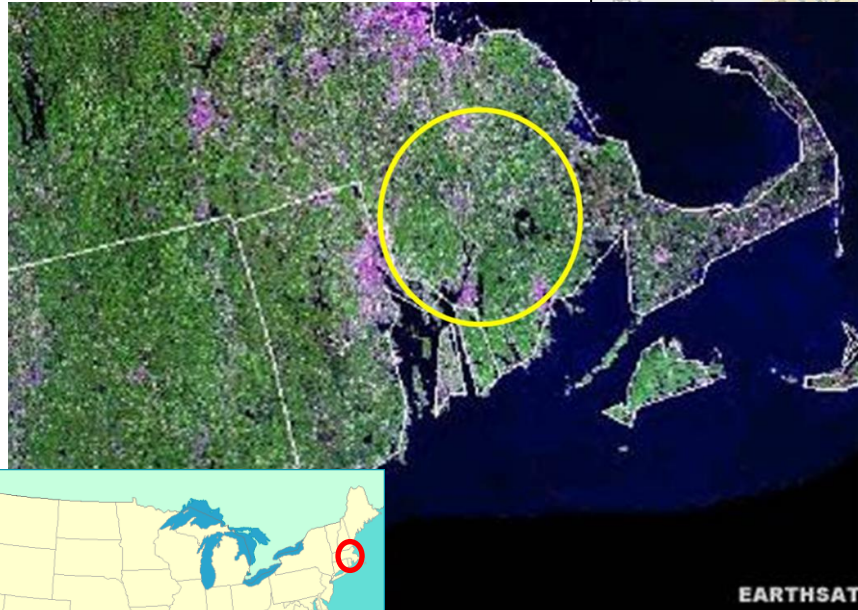


Green Infrastructure and Blue Habitat:

Impacts of watershed conditions and stormwater management on river health and fish passage

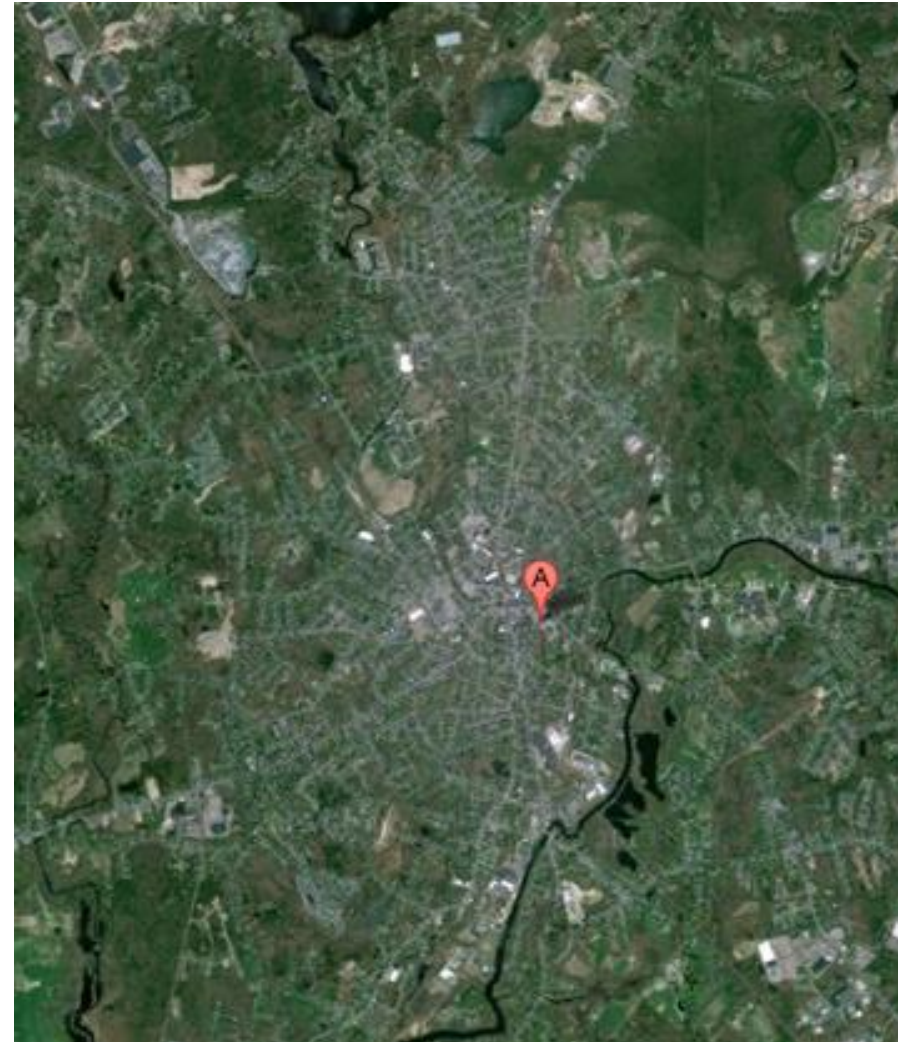
CATHY BOZEK, AQUATIC ECOLOGIST,
THE NATURE CONSERVANCY, MASSACHUSETTS, USA

DAM REMOVAL IN MASSACHUSETTS

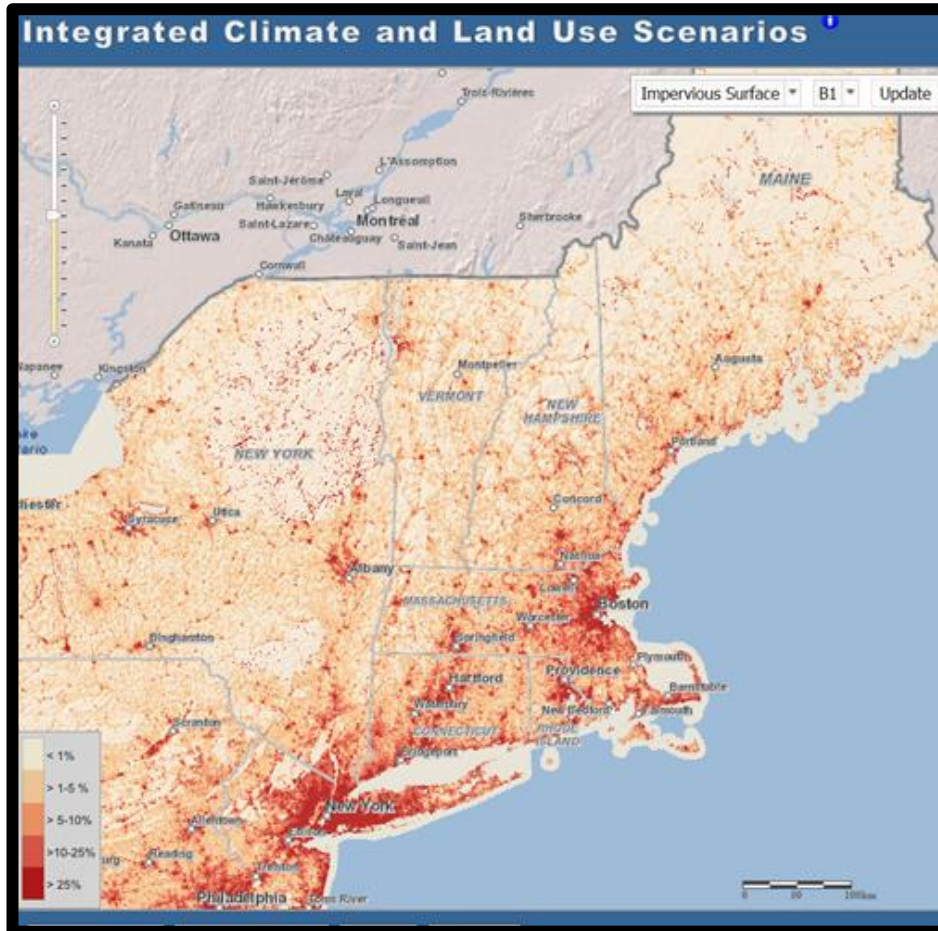


HOWEVER...

Some areas have high percentages of **Impervious Cover** in the watershed



IMPERVIOUS COVER IN THE NORTHEAST US

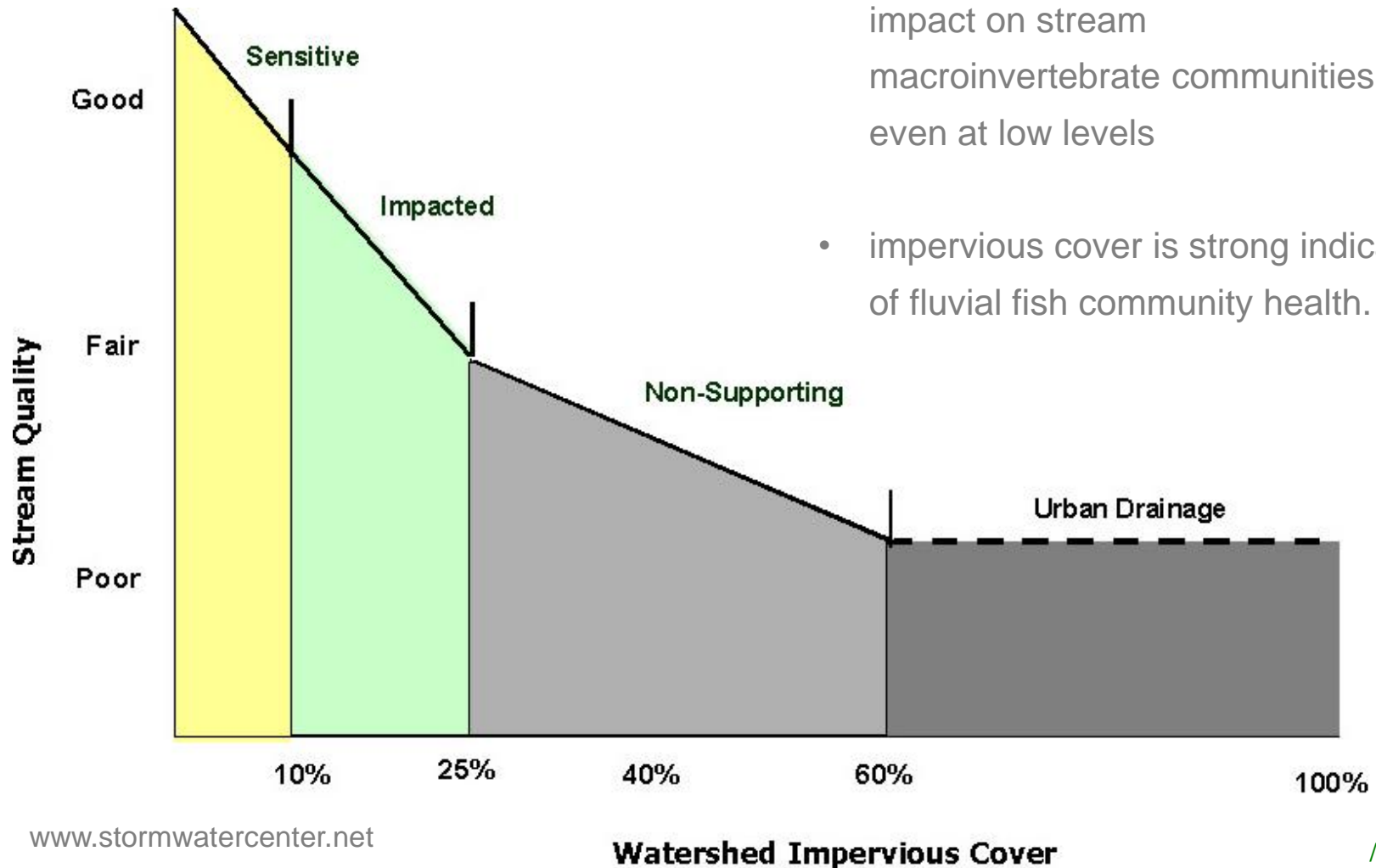


From EPA: Impervious surface, B1 population scenario, 2010

IMPERVIOUS COVER IMPACTS ON AQUATIC SYSTEMS

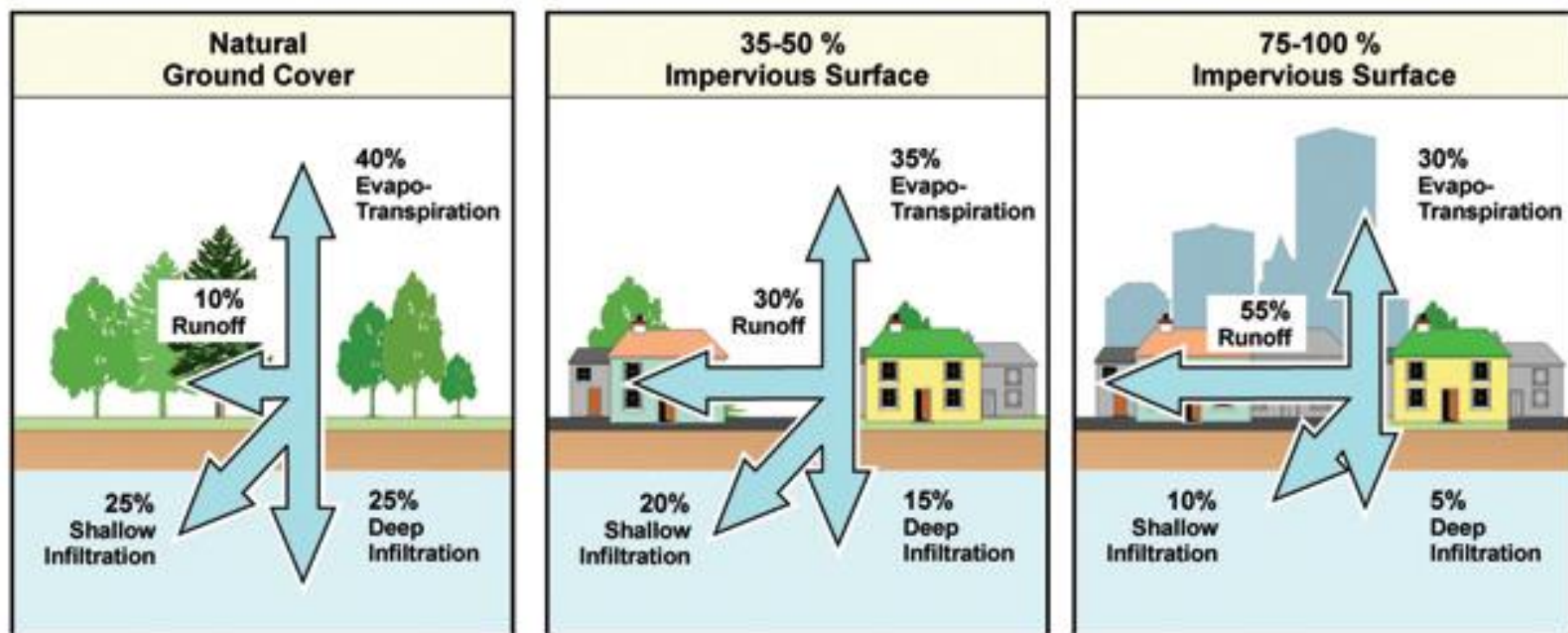
RECENT RESEARCH=
LOWER THRESHOLDS

- 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



Photo: Millers River Watershed Council

WHAT CAN WE DO?

GREEN INFRASTRUCTURE

- **Site-based:**
Constructed systems mimic natural hydrology

OR

- **Landscape level:** Conservation and restoration of natural lands



WHAT CAN WE DO?

Gray Infrastructure

- Goal is to get water off site as quickly as possible
- Minimal water quality treatment

Vs.

Green Infrastructure

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



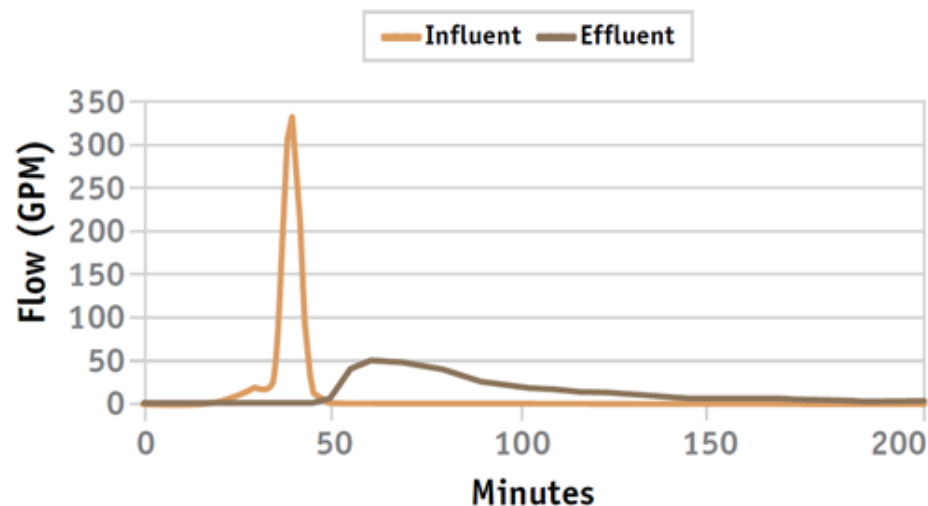
Photo:erdmananthony.com



GREEN INFRASTRUCTURE

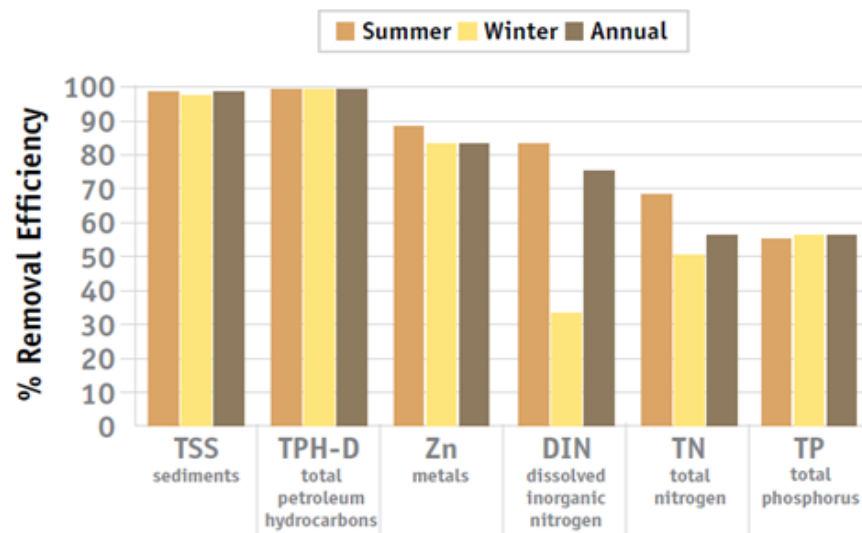
MANAGING FLOW AND POLLUTION

HYDRAULIC PERFORMANCE



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

POLLUTANT REMOVAL: 2004–2010



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

MORE GREEN INFRASTRUCTURE



Outreach/Education

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

Prioritization

- Study hydrology and land use
- Model and prioritize projects
- Guide city/ regional plans

Policy

- Regulations and permits
- Incentives
 - Funding
 - Technical assistance
- Stormwater utilities
- Many levels

TAKE HOME MESSAGES

1. Can't just open passage, need to improve habitat
2. Habitat is impacted from actions on land
3. Use green infrastructure
4. Empower municipalities and landowners to do more green infrastructure projects