Green Infrastructure as a Climate Adaptation Measure

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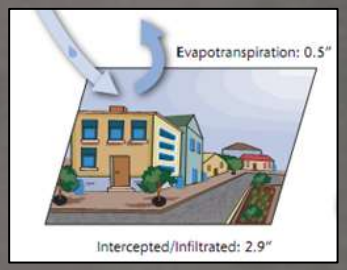
Northeast Climate Preparedness Conference
May 20, 2014

Newmarket, NH April 2007










The New Orleans Hurricane Protection System: What Went Wrong and Why-- 1**0 Lessons Learned from Katrina** by the ASCE Hurricane Katrina External Review Panel and the USACE Interagency Performance Evaluation Task Force

1. Failure to think globally and act locally-We must account for climate change
2. Failure to absorb new knowledge
3. Failure to understand, manage, and communicate risk-Need to take rigorous risk based approach,
4. Failure to build quality in
5. Failure to build in resilience
6. Failure to provide redundancy
7. Failure to see that the sum of many parts does not equal a system
8. The buck couldn't find a place to stop--Poor organization, lack of accountability
9. Beware of interfaces: materials and jurisdiction
10. Follow the money-People responsible for design and construction had no control of the monies.

Changing Trends

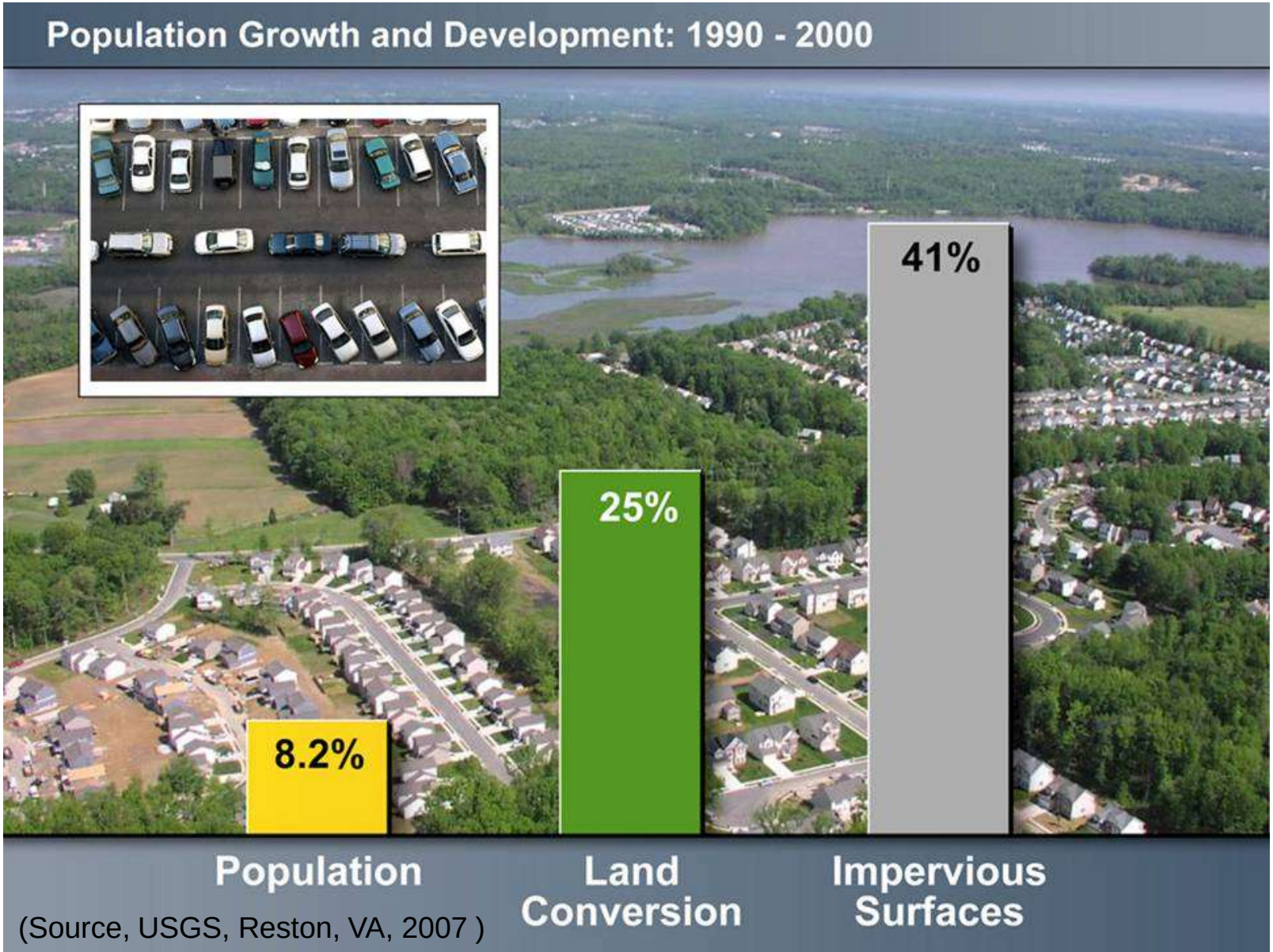
County	Historic 100-Yr	NRCC 100-Yr	% Increase
Rockingham	6.4	8.8	27%
Strafford	6.3	8.2	23%

Powered by ACIS Northeast Regional Climate Center

http://precip.eas.cornell.edu/

Changing Trends

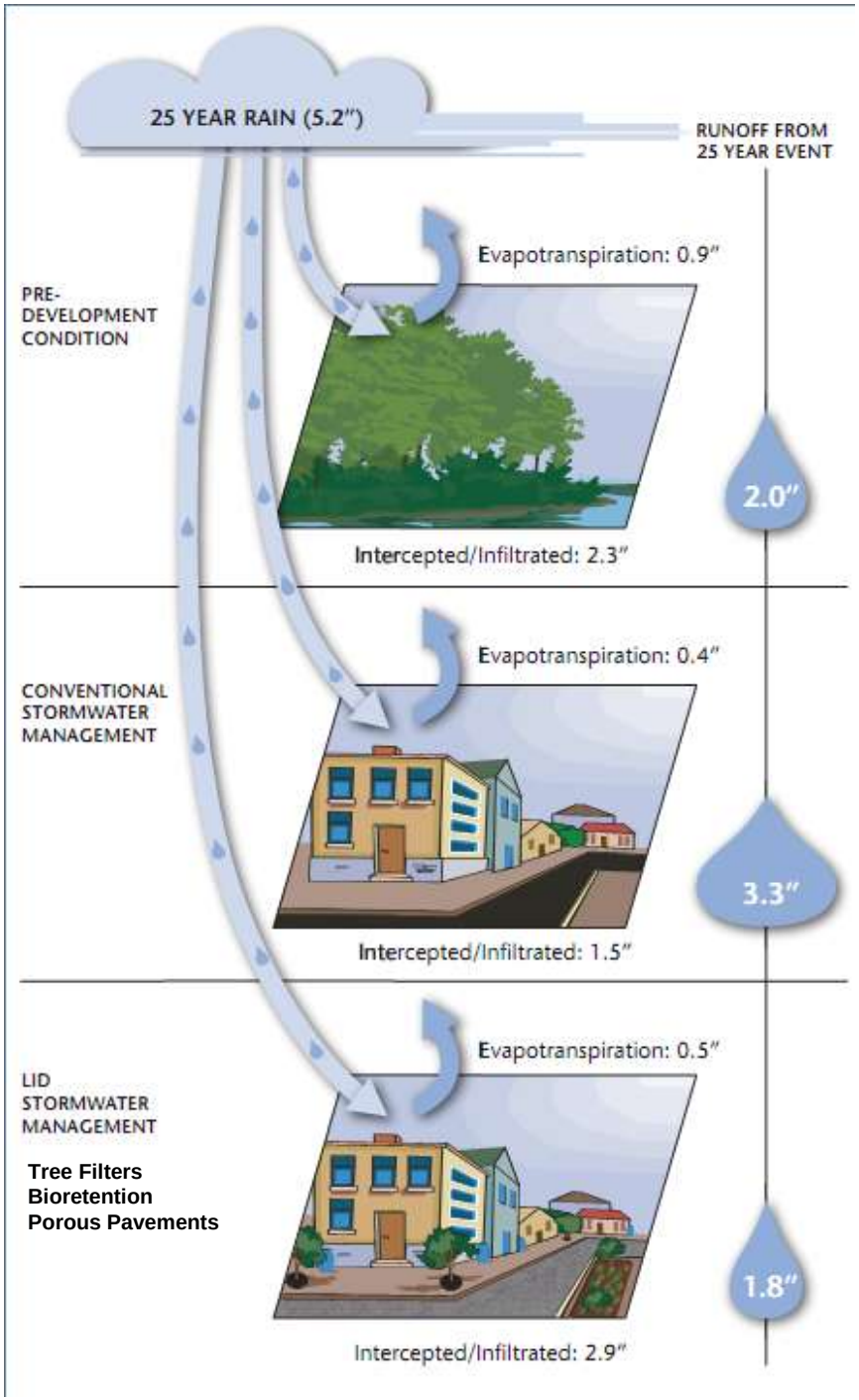
Increasing Impervious Surfaces



(Source, USGS, Reston, VA, 2007)

Hydrology Overview

- **Conventional**
- **Low Impact Development**
- **Manufactured Treatment Devices**



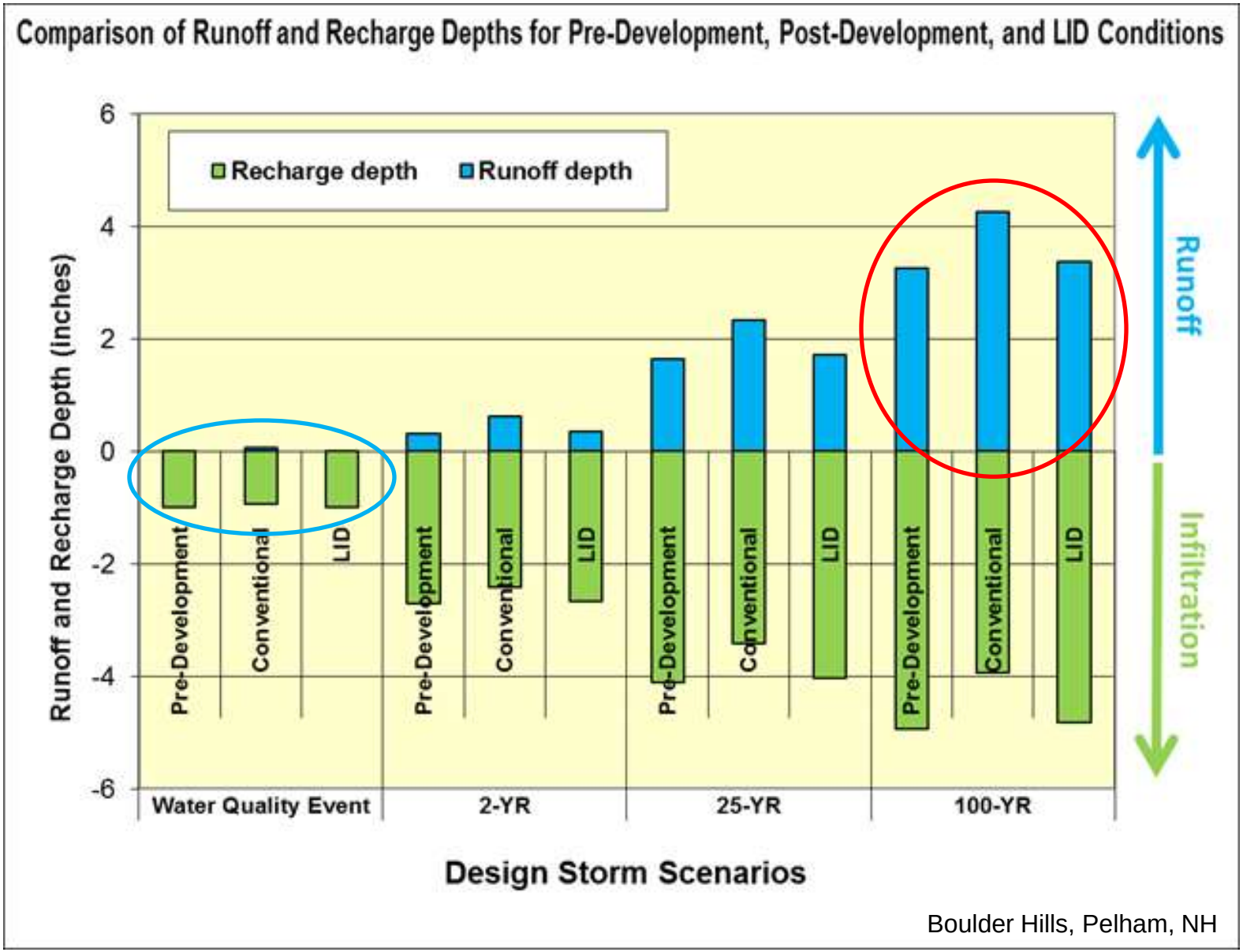
Low Impact Development

Low Impact Development as a Climate Adaptation Tool and Community Resiliency

Mill Pond Rd after dam failure at Nottingham Lake, 4/18/2007

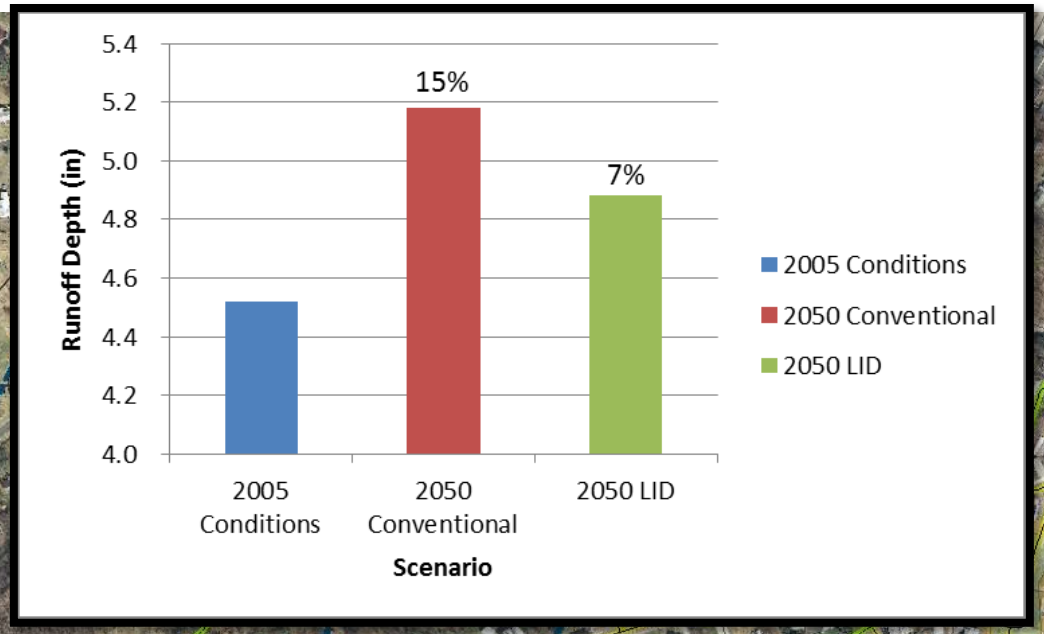
Boulder Hills, Pelham, NH

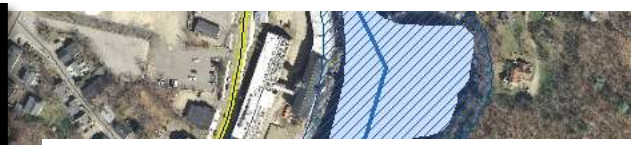
Boulder Hills, Pelham, NH



Boulder Hills, Pelham, NH

Newmarket, NH Moonlight Brook





LID zoning achieved a 53% reduction of build-out impacts from current zoning

Does Impervious Cover Reduction Really Work?

Urban Watershed Renewal in Berry Brook

Robert Roseen, Viktor Hlas, Tom Schueler, Tom Ballestero, Mark Voorhees, Melinda Bubier, Joel Ballestero, James Houle, Dean Peschel, Bill Boulanger, David Burdick, Lorie Chase, Ann Scholz, Sally Soule, John Magee, Ben Nugent, Matt Carpenter, University of New Hampshire Stormwater Center, City of Dover, University of New Hampshire, Cocheco River Watershed Coalition, New Hampshire Fish and Game, New Hampshire Department of Environmental Services

Funding Sources: NHDES 319 Watershed Assistance

NHDES Aquatic Resource Mitigation Funds

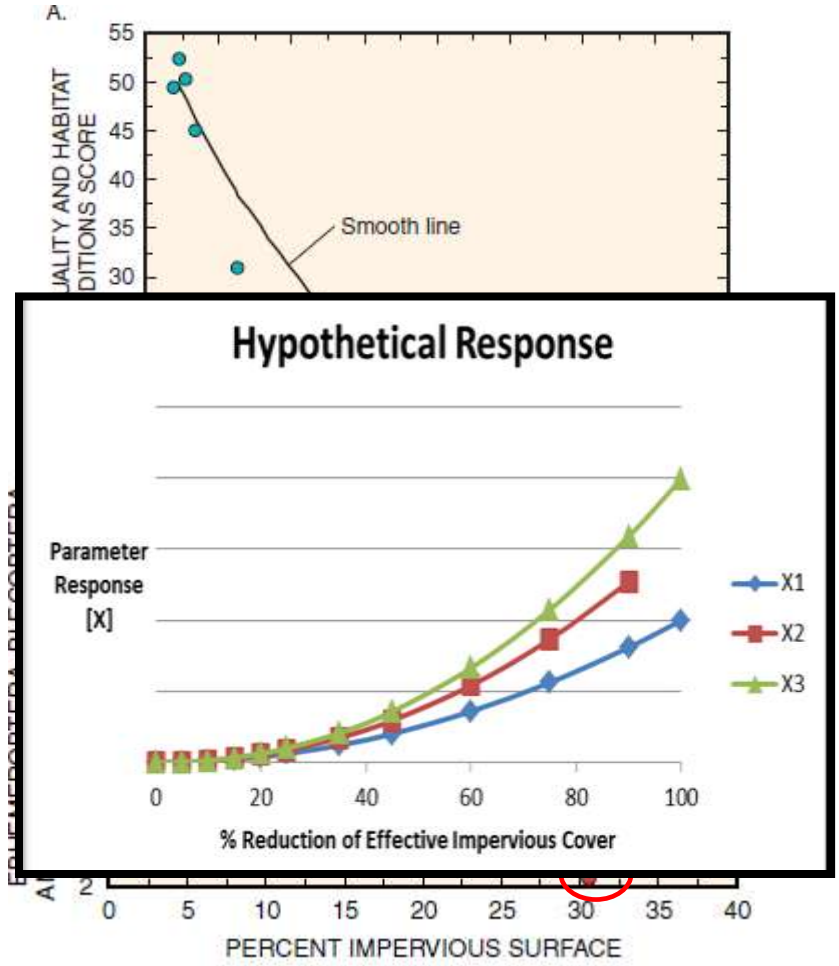
Stream Restoration Objective

Recreate a stream last seen in the 1800's

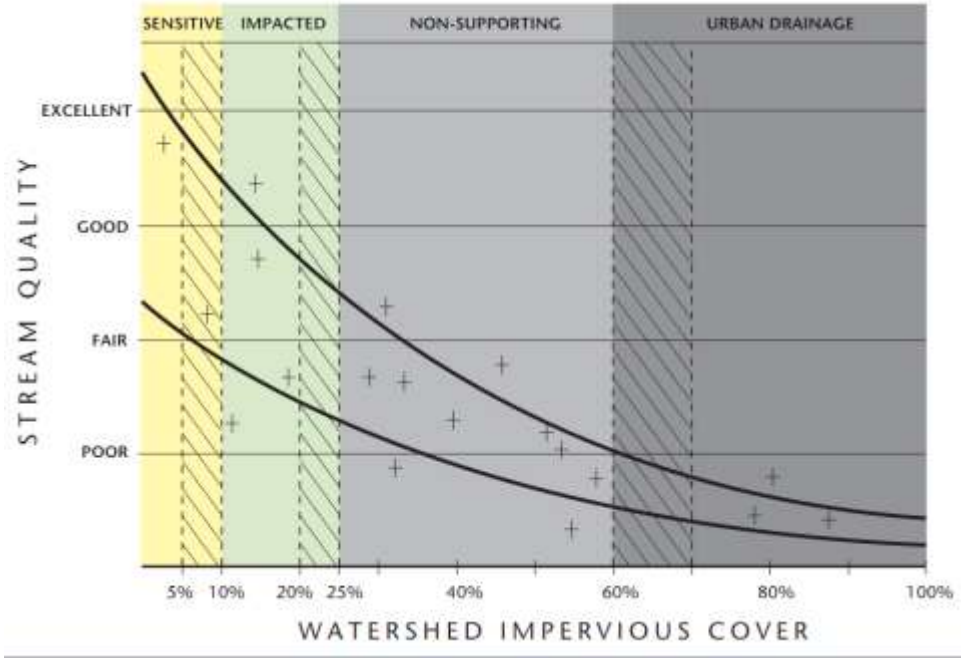
LID Retrofit Objective

Recreate predevelopment hydrology and restore biological integrity

Watershed Urbanization and IC



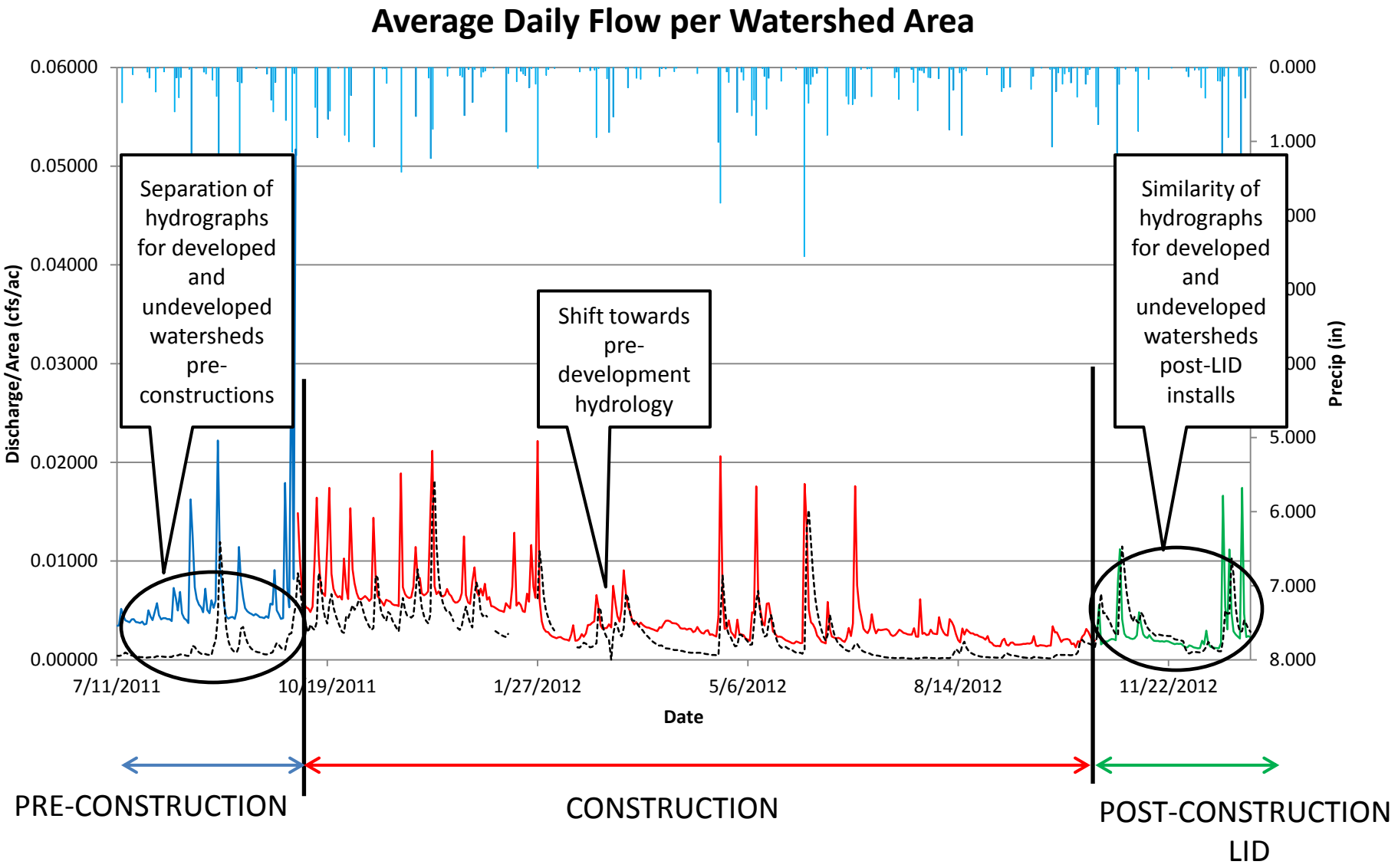
Source: Effects of Urbanization on Stream Quality at Selected Sites in the Seacoast Region in New Hampshire, 2001-03, USGS 2005



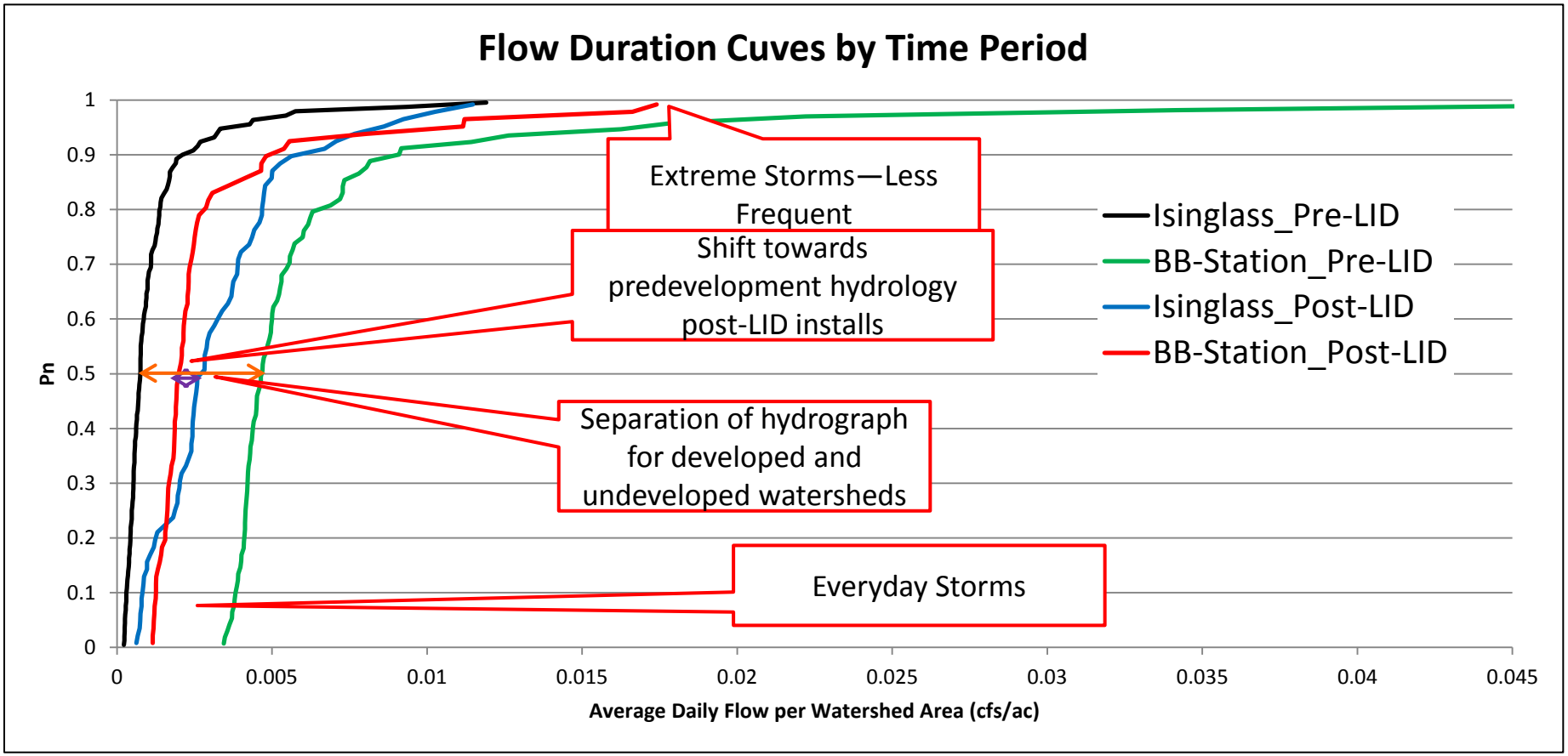
Source: Impacts of Impervious cover on Aquatic Systems, CWP March 2010.


Central Ave
Crescent Ave
DA = 2.97 ac
Treated IC = 1.5 ac (28.5%)
Gravel Wetland
DA=11.0 ac, Treated IC = 9.55 ac (86.8%)
Page Ave
DA = 5.23 ac,
Treated IC = 1.88 ac (36.0%)
Wetland Expansion
~0.6 acres
Glencrest Ave
DA = 6.8ac
Treated IC = 2.3 ac (33%)
Lowell Ave
DA = 2.6 ac
Treated IC = ac (43%)
Stream Restoration
~800 ft, including C, A and Aa - channel
Upper Horne Street
DA = 12.2 ac
Treated IC = 3.7 ac (31%)
Roosevelt Ave

Hydrology---Benefits of LID Retrofits



Low Impact Development Hydrology



Average daily area weighted flow duration curves for Berry Brook-Lower Watershed (Station, DA = 184.8 acres) and Isinglass River (DA = 73.6 sq.miles)

Acknowledgements

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Questions?

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United States Environmental Protection Agency

University of New Hampshire