



Water Conservation to Address Future Water Supply Needs

Derek Bennett

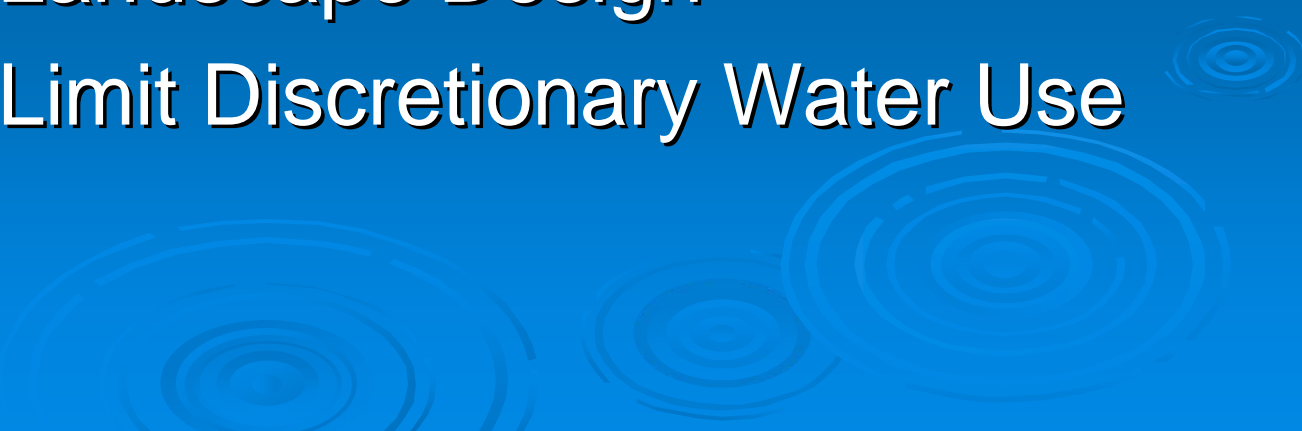
Water Use & Conservation

NHDES – Drinking Water and Groundwater Bureau

October 8, 2010

NNECAPA

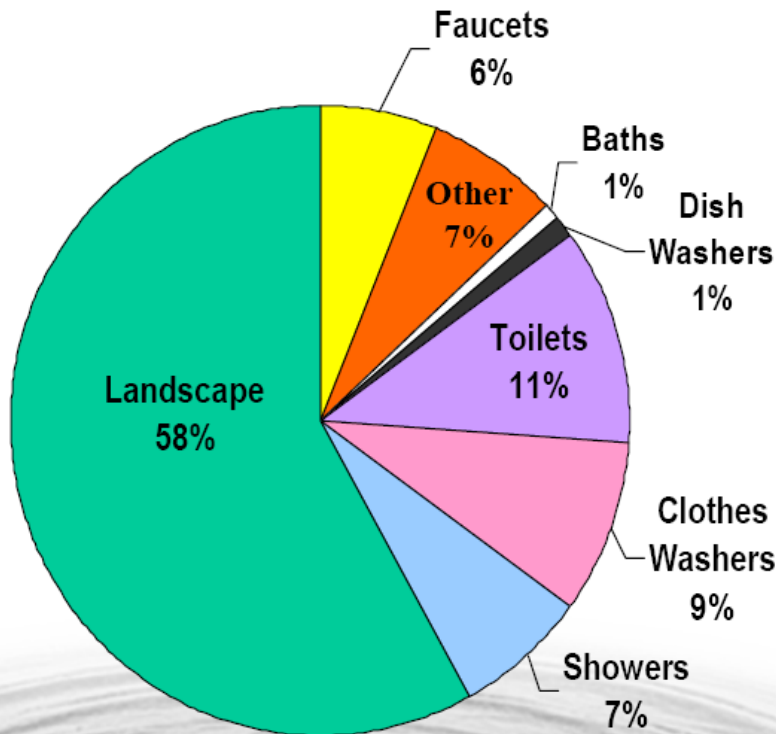
Overview

- The challenges facing NH
 - Water conservation to address challenges
 - DES requirements
 - Beyond the rules
 - Efficient Landscape Design
 - Tools to Limit Discretionary Water Use
- 

The Challenges

1. Discretionary Use

Residential Water Usage

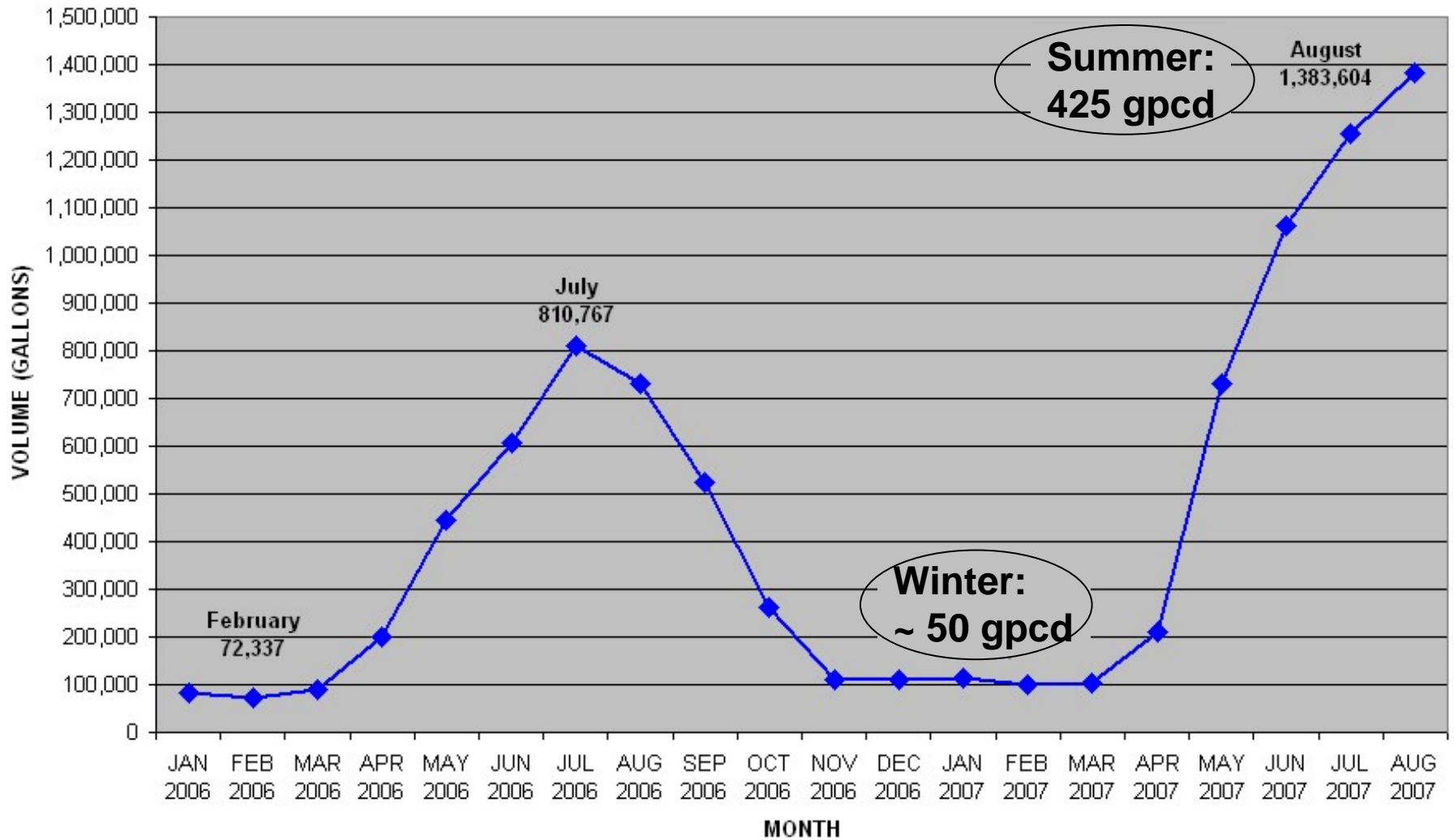


Source: AWWRF Residential End Uses of Water, 1999

- Average Winter (Indoor) Daily
 - 50 gpcd (Sandown)
 - 78 gpcd (Newcastle)
 - 63 gpcd (Seacoast avg)
- Average Summer Daily
 - 75 gpcd (Sandown)
 - 152 gpcd (Newcastle)
 - 92 gpcd (Seacoast avg)

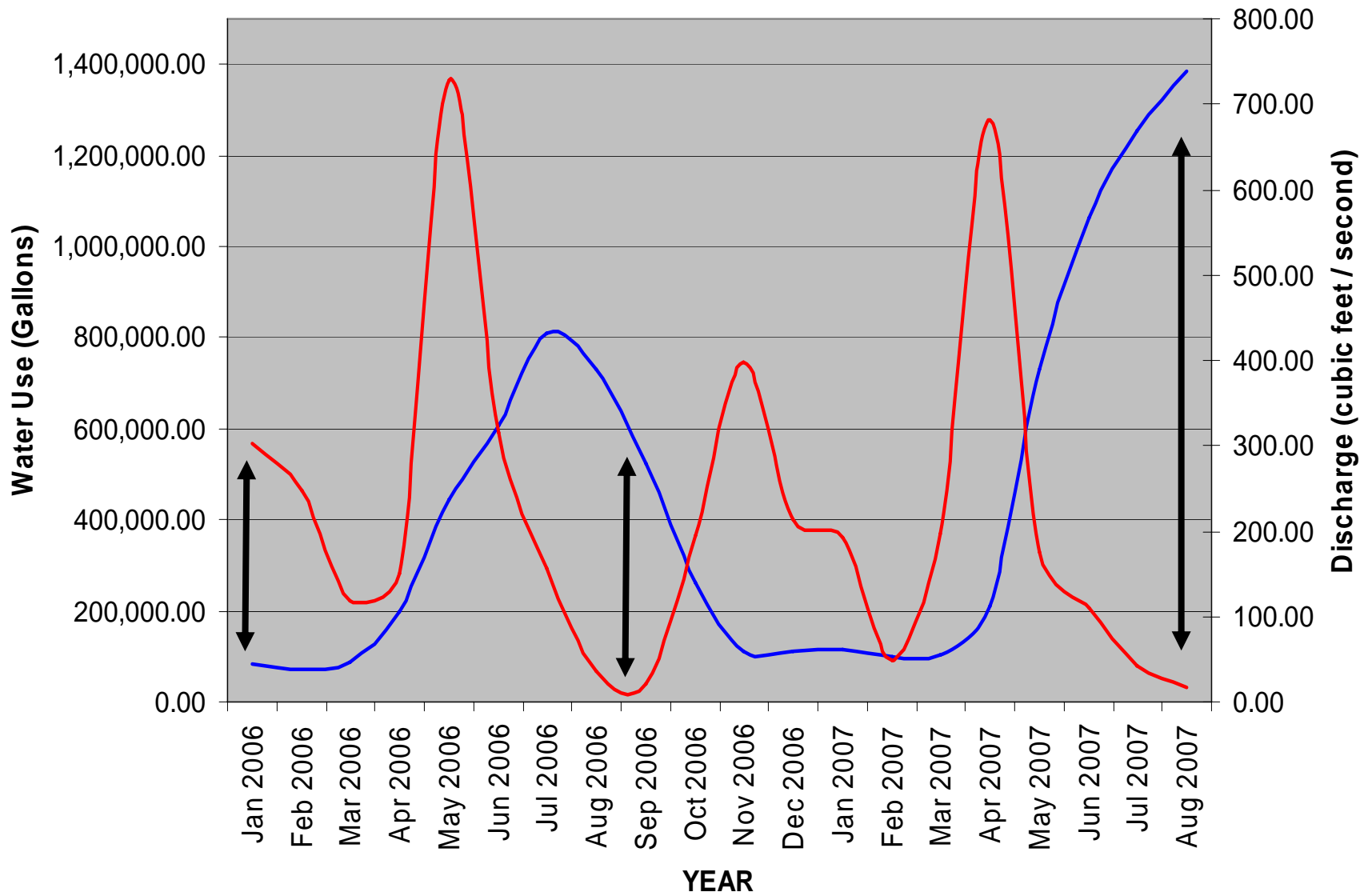
Source: <http://pubs.usgs.gov/sir/2007/5157>

MONTHLY WATER USE



“Are water managers becoming lawn irrigation managers”? – Amy Vickers

Water Use Vs. Stream Hydrograph

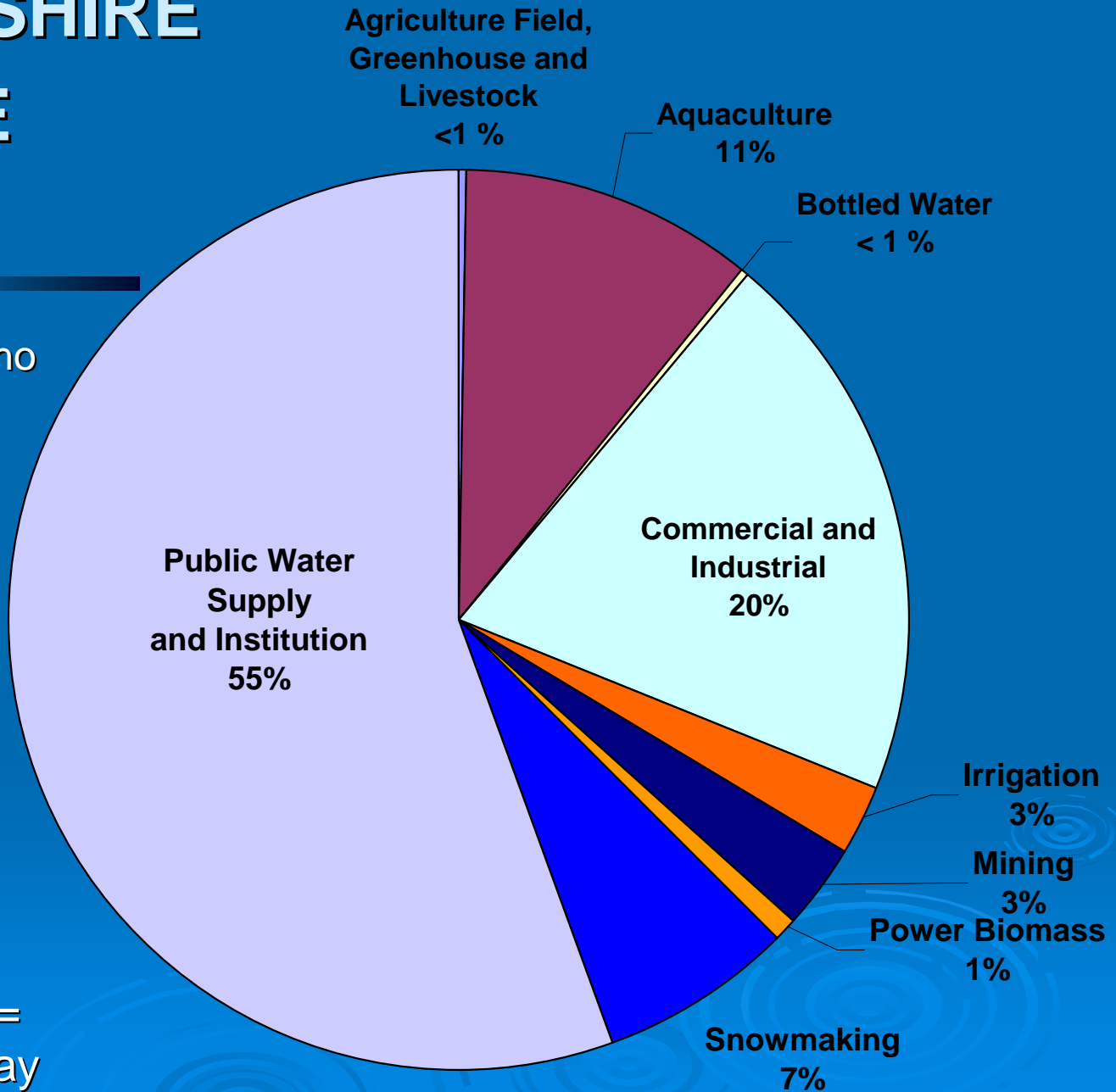


NEW HAMPSHIRE WATER USE (2005)

Based on water users who use more than 20,000 gallons per day

Adjusted Daily Avg. = 183,126,012 gallons

USGS estimate 2000 = 447 million gallons / day

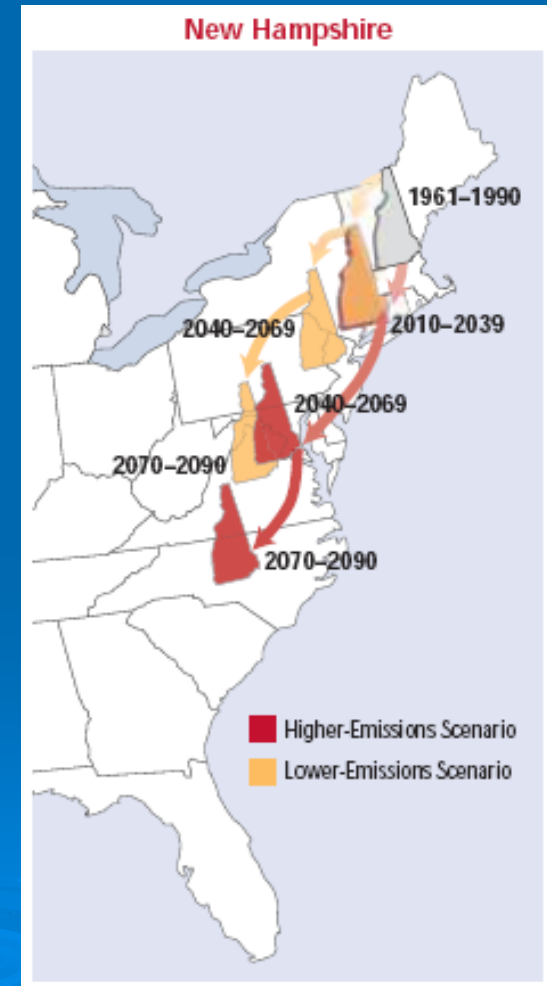


The Challenges

2. Climate Change

- More frequent extreme precipitation
- Winter warming
- Decreased snowfall
- Fewer days with snow on ground
- Lake ice out dates earlier
- Earlier spring runoff
- Extended growing season
- Sea-level rise

Hodgkins et al., 2002; 2003;
Wolfe et al., 2005;
Wake and Markham, 2005;
Wake et al., 2006



The Challenges

3. Aging Infrastructure

- Rate of pipe replacement not keeping up
- Leaks / Losses
 - Inflated production costs
 - Stressed water supplies
 - Never reaches the beneficial use
 - No revenue



LARGE LEAKS

Flow Rate

Awareness

Location

Repair



Time

SMALL LEAKS

Flow Rate

Awareness

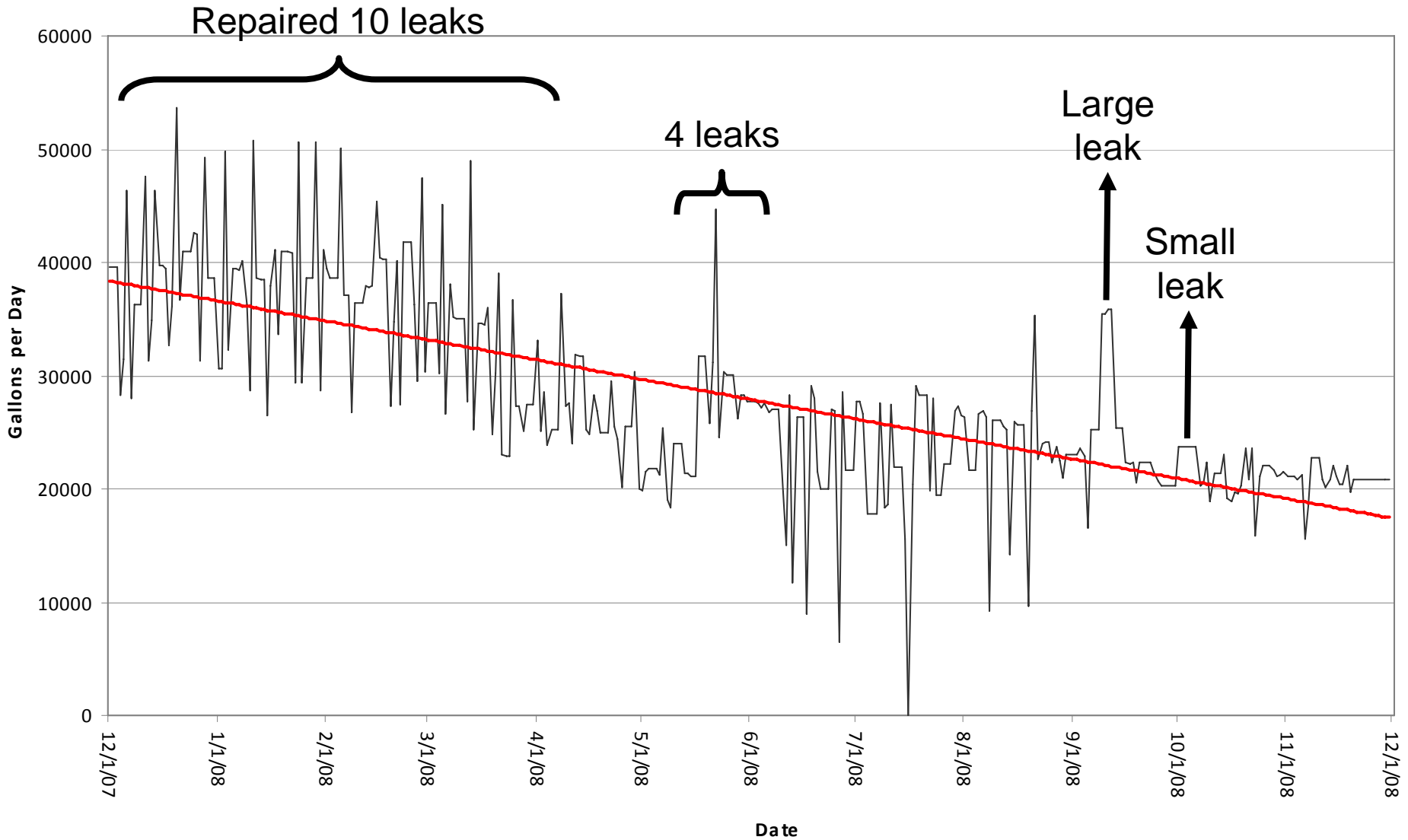
Location

Repair



Time

DAILY WATER USE - NH WATER SYSTEM 2007 - 2008



NHDES Leak Detection Contracts

➤ 2009

- 29 water systems
- 44 leaks identified
- 251 gallons per minute
- 131,925,600 gpy

➤ 2010

- 14 water systems
- 61 leaks
- 351 gallons per minute
- 184,485,600 gpy
(\$0.00023 / gallon)

➤ 2011

- 13 systems scheduled

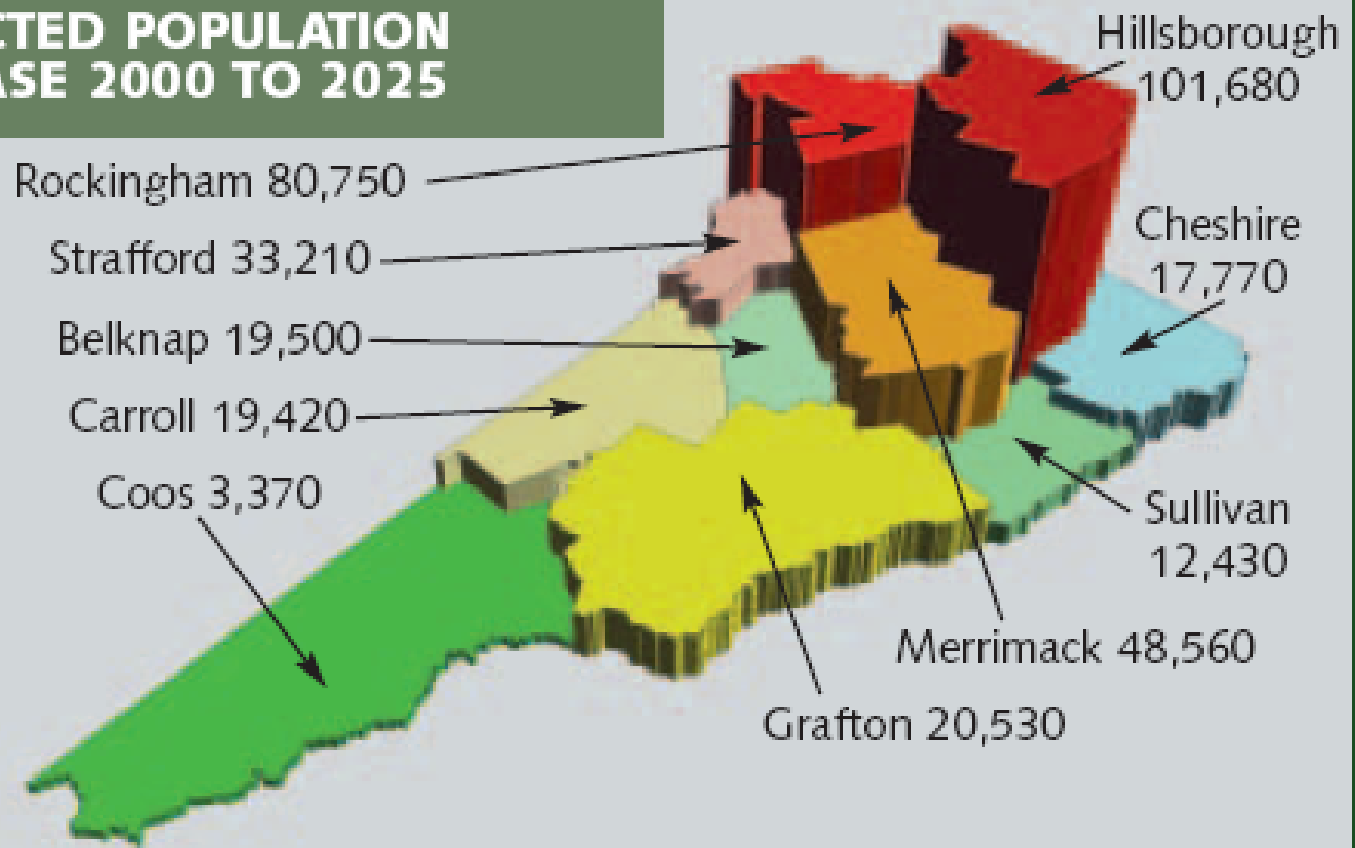


The Challenges

4: Population Growth

WHERE IS NH GROWING?

PROJECTED POPULATION INCREASE 2000 TO 2025



The Challenges

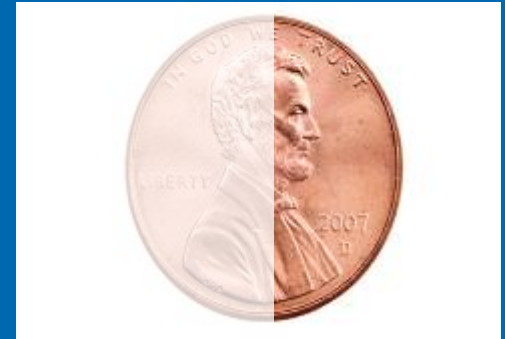
5. Public Understanding

Financial

- Water is inexpensive
 - Avg NH family pays \$487.82 / year
 - \$1.33 / day / family or \$.005 / gallon
- Cost not tied to supply & demand
- Needs to reflect FULL COST
- Pay more and use less – difficult case

Hydrologic

- Appears to be abundant
- Relative lack of storage
- Minor droughts greater impact



17,000 miles of
rivers and streams

1,000 ponds > 10
acres

3,000 smaller lakes
and ponds

Water Conservation - definition

New Hampshire Safe Drinking water Act 485:1-a XIX

“Any beneficial reduction in water losses,
waste, or use”

The background of the slide features several faint, light blue concentric circles that resemble ripples on water, scattered across the lower half of the page.

Water Conservation

Water System Side

Loss Control

- Meter Installation & Maintenance
- Water Accounting and Water Audits
- Leak Detection and Repair
- Pressure Reduction

Conservation rates

Outreach

Customer audits

Rebate programs

Efficiency ordinances

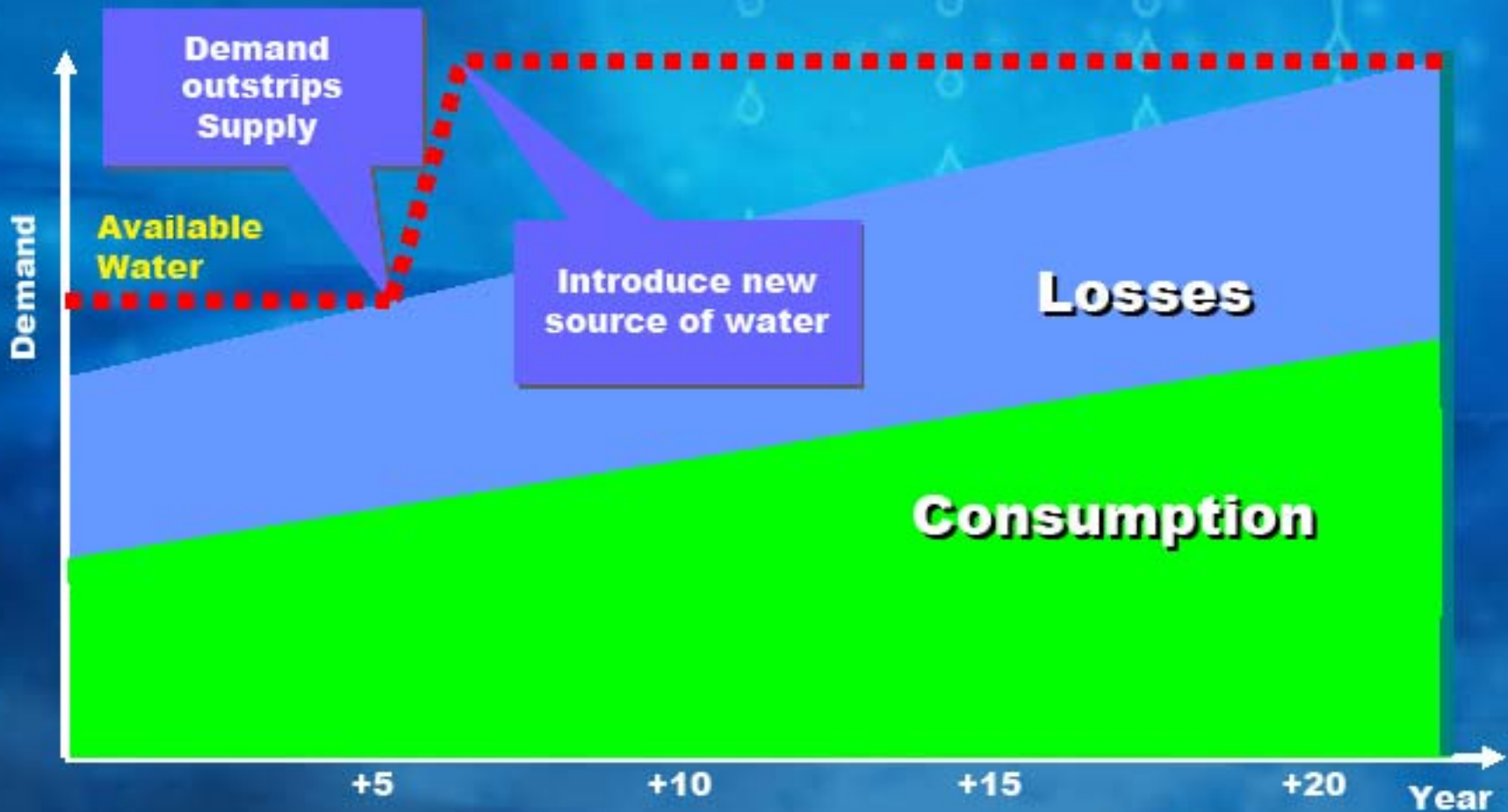
Consumer Side

Consumption

- Engineering changes inside the home
- Engineering changes outside the home
- Changes in behavior

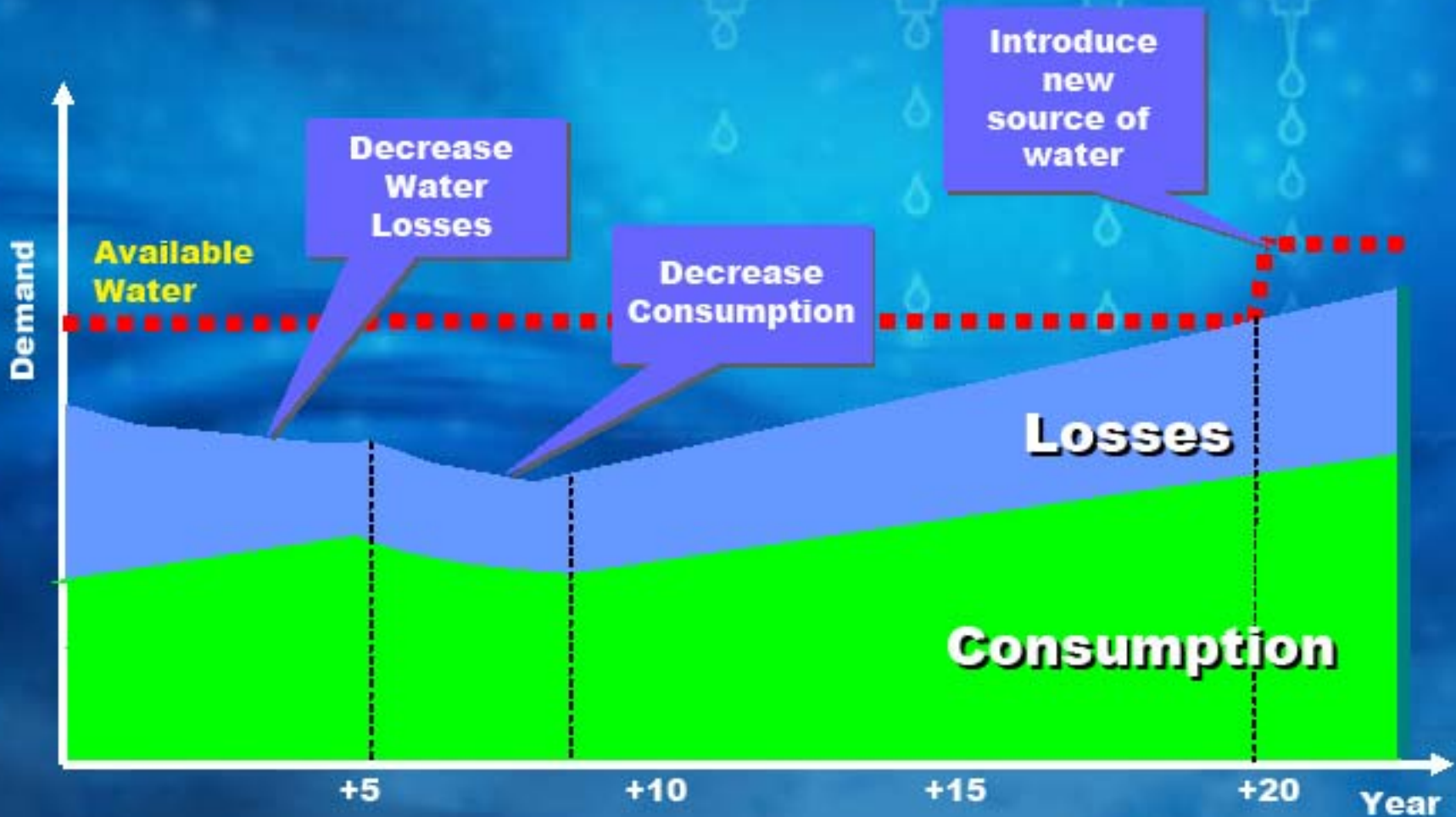
How do we Balance Supply against Demand?

Option 1: Increase Water Availability



How do we Balance Supply against Demand?

Option 4: All of the Above (most practiced)





**“Water conservation is the only source of water that doesn’t require a permit”
-NH Consultant**

Water Conservation (IN RULE)

Water System Side

Loss Control

- Meter Installation, Reading & Maintenance
- Water Accounting and Water Audits
- Leak Detection and Repair
- Pressure Reduction

Conservation rates

Outreach

Customer audits

Rebate programs

Efficiency ordinances

Consumer Side

Consumption

- Engineering changes inside the home
- Engineering changes outside the home
- Changes in behavior

Public Notification

- Applicant Contacts
 - Municipality where source is located
 - All municipalities receiving water from the system
 - Wholesale customers
 - Regional Planning Commission
- Applicant Provides
 - A copy of plan
 - Summary of requirements
- Applicant Requests
 - Amend site planning requirements to reflect 2101
 - Promote water efficient landscaping

Limiting Discretionary Water Use



General Site Requirements

- Minimize site disturbance
- Retain and redistribute topsoil following disturbance
- Preserve existing non-invasive vegetation
- Preserve small stands of trees rather than individual tree


Artificially Watered Lawn Areas

- Artificially watered lawn areas no more than 40% of total
- No less than 6 inches of loam at least 10% organic matter
- Water efficient grass mixes



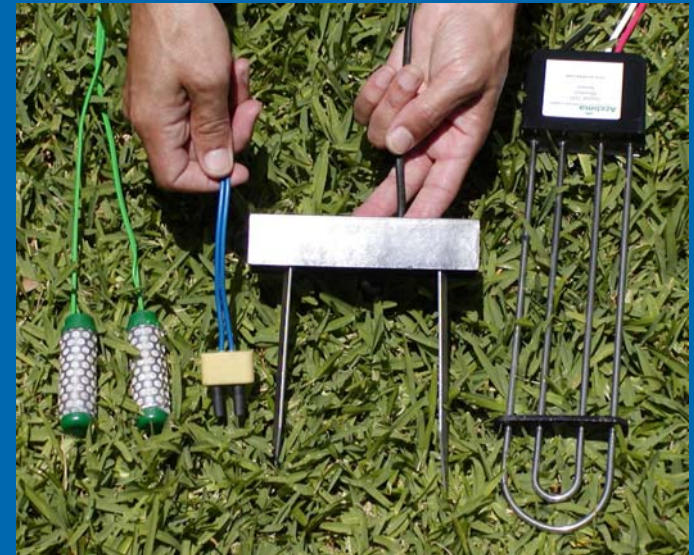
Windham, NH

Tree & Plant Areas

- Selected based on site condition
 - Native species encouraged
 - Non-native non-invasive permitted if supplemental irrigation is not necessary
 - Exposed soils shall be mulched
- 

Irrigation Systems

- Prohibited unless:
 - Designed and installed by WaterSense professional
 - No runoff or overspray
 - Distribution uniformity
 - Sensors and controllers
 - Audited once every three years for performance and leaks



When Efficient Landscapes Are Not Enough



**CONSERVE WATER
NO OUTSIDE
WATERING**

Grantham, NH – August 2010



WATER BAN
OUTSIDE WATER
USE LIMITED TO
ODD/EVEN
6 PM - 8 PM

Contoocook, NH – September 2010

Water Use Restrictions

38:26 Bylaws and Ordinances. –

I. In municipalities with public water systems the governing body, or the board of water commissioners, if any, may adopt such ordinances and bylaws relating to the system or structures as required for proper maintenance and operation.

II. Any person who violates any ordinance or bylaw adopted pursuant to paragraph I of this section shall be subject to a civil penalty not to exceed \$10,000 per day of such violation.

Known Water Use Restrictions






Last Update: September 16, 2010

Legend

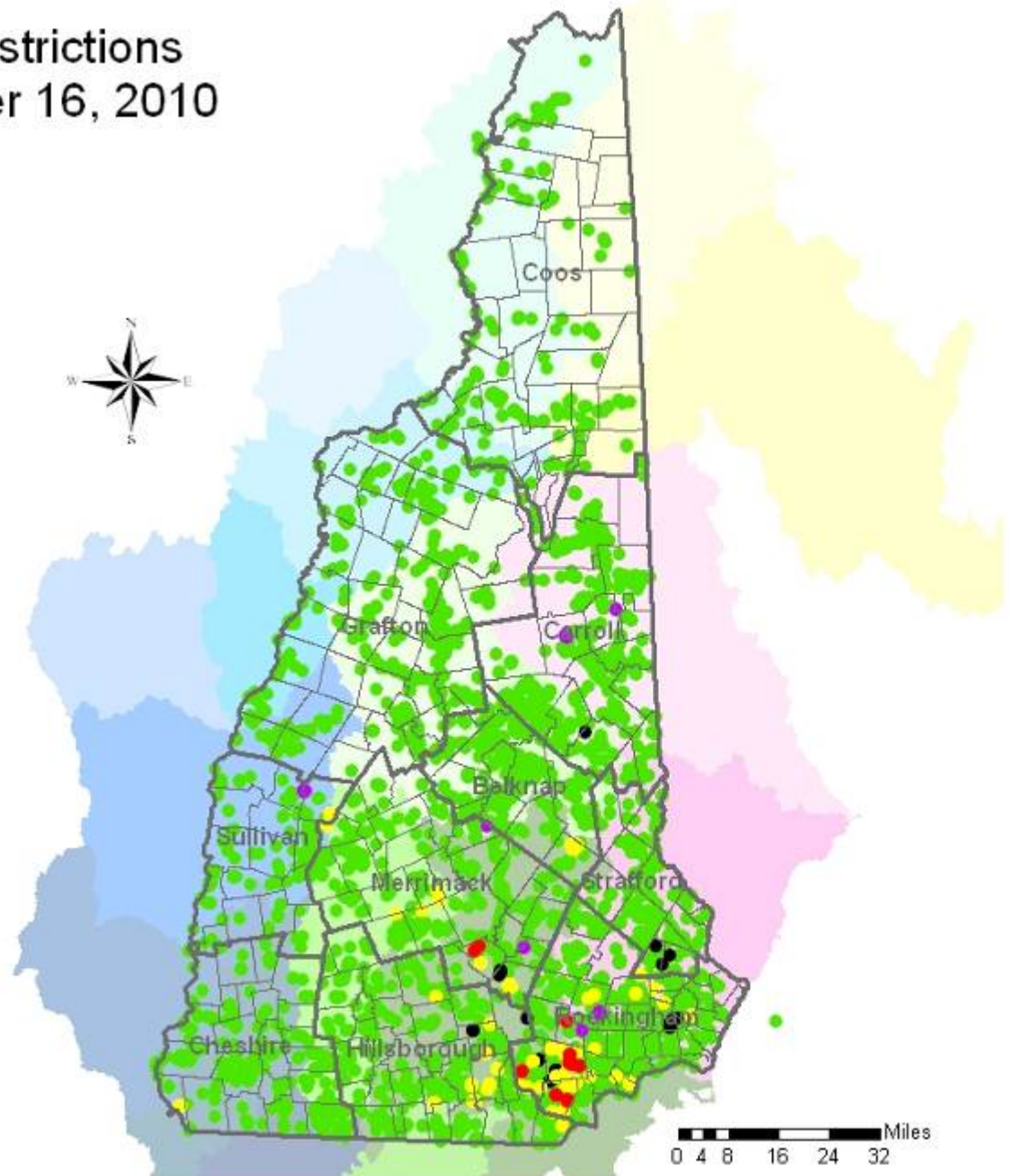
-  Town Line
-  County Line

Community Sources

RESTRICTION TYPE

-  OUTDOOR WATER BAN
-  LAWN IRRIGATION BAN
-  RESTRICTION
-  ALERT (VOLUNTARY)
-  NO KNOWN RESTRICTIONS

79 WATER SYSTEMS
IN 39 TOWNS



0 4 8 16 24 32 Miles

A New Drought Mitigation Option

Effective August 24, 2007

41:11d

Restricting the Watering of Lawns. –

I. The local governing body may establish regulations restricting the use of water from private wells or public water systems for residential outdoor lawn watering when administrative agencies of the state or federal government have designated the region as being under a declared state or condition of drought.

Year

01

02

03

04

05

06

07

08

09

1890

1900

1910

1920

1930

Decade

1940

1950

1960

1970

1980

1990

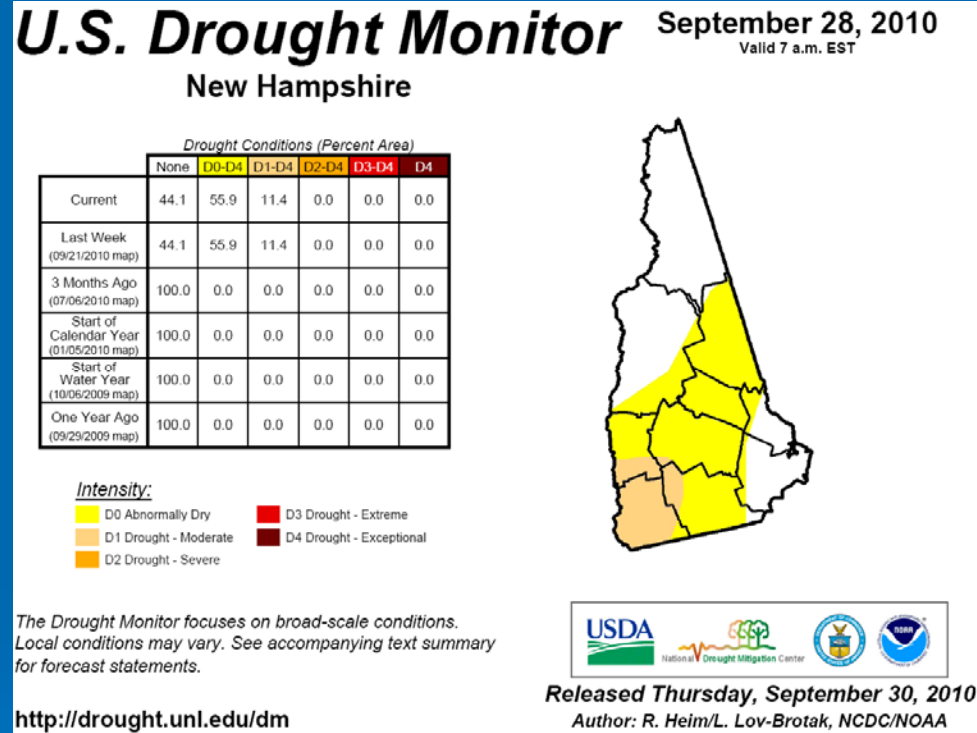
2000

 Mild Drought Moderate Drought Severe Drought Extreme Drought


Drought designation based on the Palmer Hydrological Drought Index calculated by NOAA by averaging data from all New Hampshire observation stations.

Implementing 41:11-d

- Three day notification
 - paper of general circulation
 - two public places
- Restriction Levels
 - 1 (odd / even)
 - 2 (two days per week)
 - 3 (ban)
- Enforcement (sworn officers)
 - First offense: Warning
 - Second Offense: Fine
 - Each Additional Offense: Up to \$1,000 fine



Wrap Up & Next Steps

- Water conservation may be an effective tool to address many water supply related challenges
 - Water conservation may be the least cost alternative
 - Discretionary water use poses a significant challenge, Per capita water use has to improve
 - Meeting with Department?
- 



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http://des.nh.gov/organization/divisions/water/dwgb/water_conservation/index.htm