MassDEP Wetlands Program -- Adaptation Project --

Thomas Maguire, MassDEP Wetlands Program

Mass. Water Resources Commission Meeting

April 12, 2012

Project Purpose

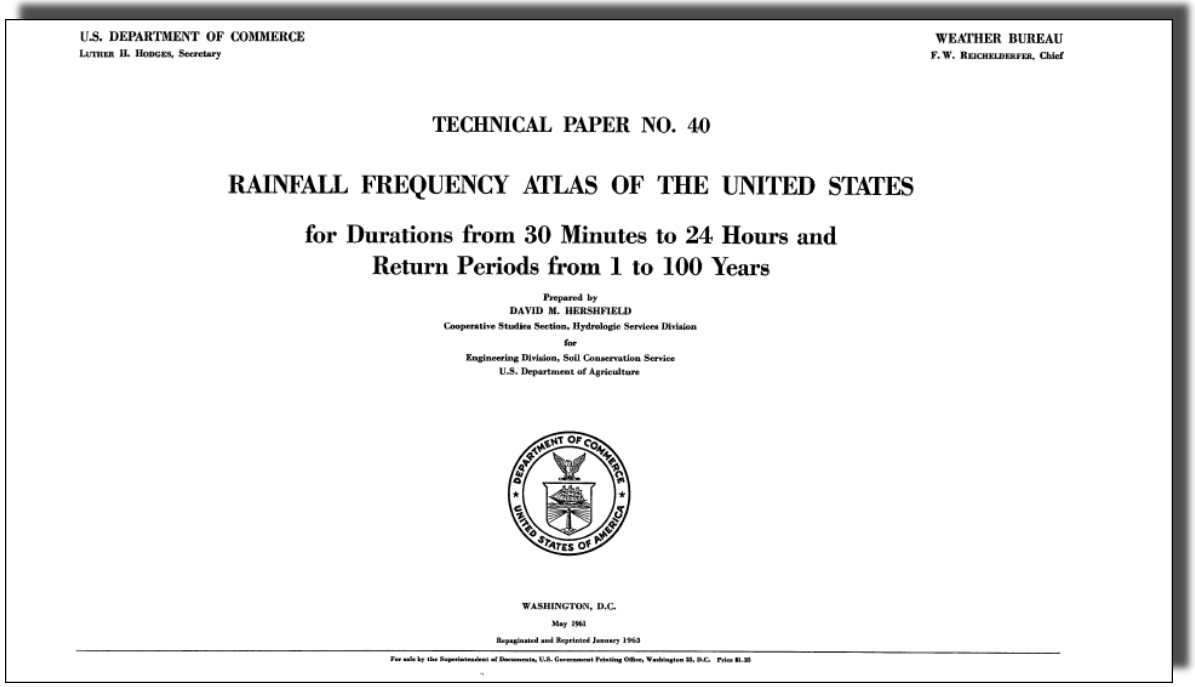
- **Determine which Mass. Wetland regulations at 310 CMR 10.00 may interface with climate change**
- **Seek USGS recommendations how best to address**
- **Evaluation funded by EPA grant**
- **Current scope is limited to inland resources due to available funds**

How Climate Change May Interface with Inland Wetland Regulations?

- **Technical Paper 40 (TP40) – precipitation atlas specified in Wetland regulations and Hydrology Handbook policy**
- **Peak stormwater runoff rate**
- **Stream crossings (bridges and culverts)**
- **Maximum lateral extent of certain wetland boundaries (e.g. flood prone areas)**

What is TP40?

- Technical Paper 40 is a rainfall frequency atlas
- Published in 1961 by U.S. Weather Bureau
- Used to control peak stormwater runoff rate
- Used to determine maximum lateral extent of area regulated as flood prone in absence of FEMA profile



U.S. DEPARTMENT OF COMMERCE
LUTHER H. HODGES, Secretary

WEATHER BUREAU
F. W. REICHELDERFER, Chief

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

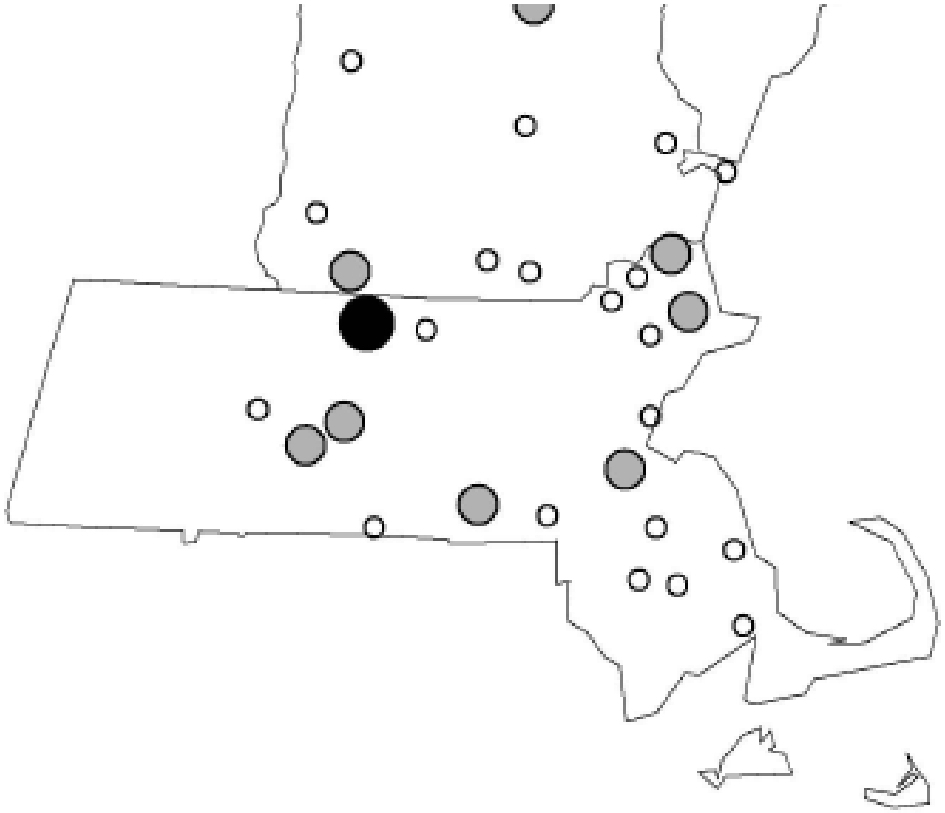
for Durations from 30 Minutes to 24 Hours and
Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture

WASHINGTON, D.C.
May 1961
Repaginated and Reprinted January 1963

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price $1.25

Is Maximum Precipitation Increasing?

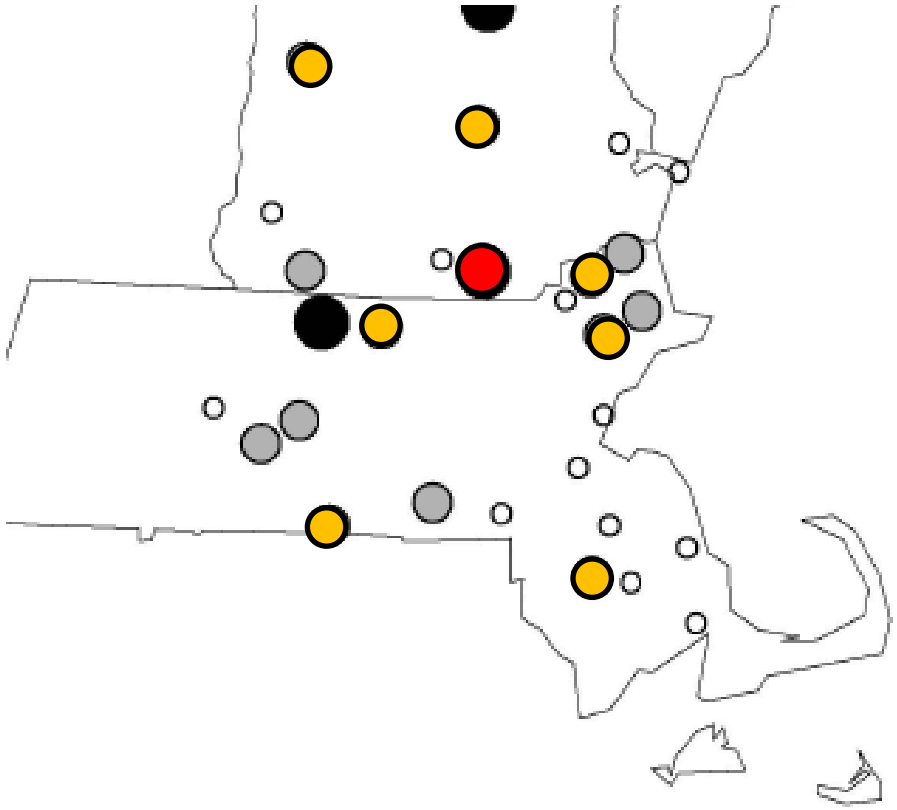


1970-2005 linear slope p-values

- < 0.01
- 0.01 to 0.05
- > 0.05

0 30 60 120 Km

Ellen Douglas and Chelsea Fairbanks, 2011, Is Precipitation in Northern New England Becoming More Extreme?, Journal Hydrologic Engineering, Vol. 16, No. 3, pp. 203-217



1970-2008 linear slope p-values

< 0.01

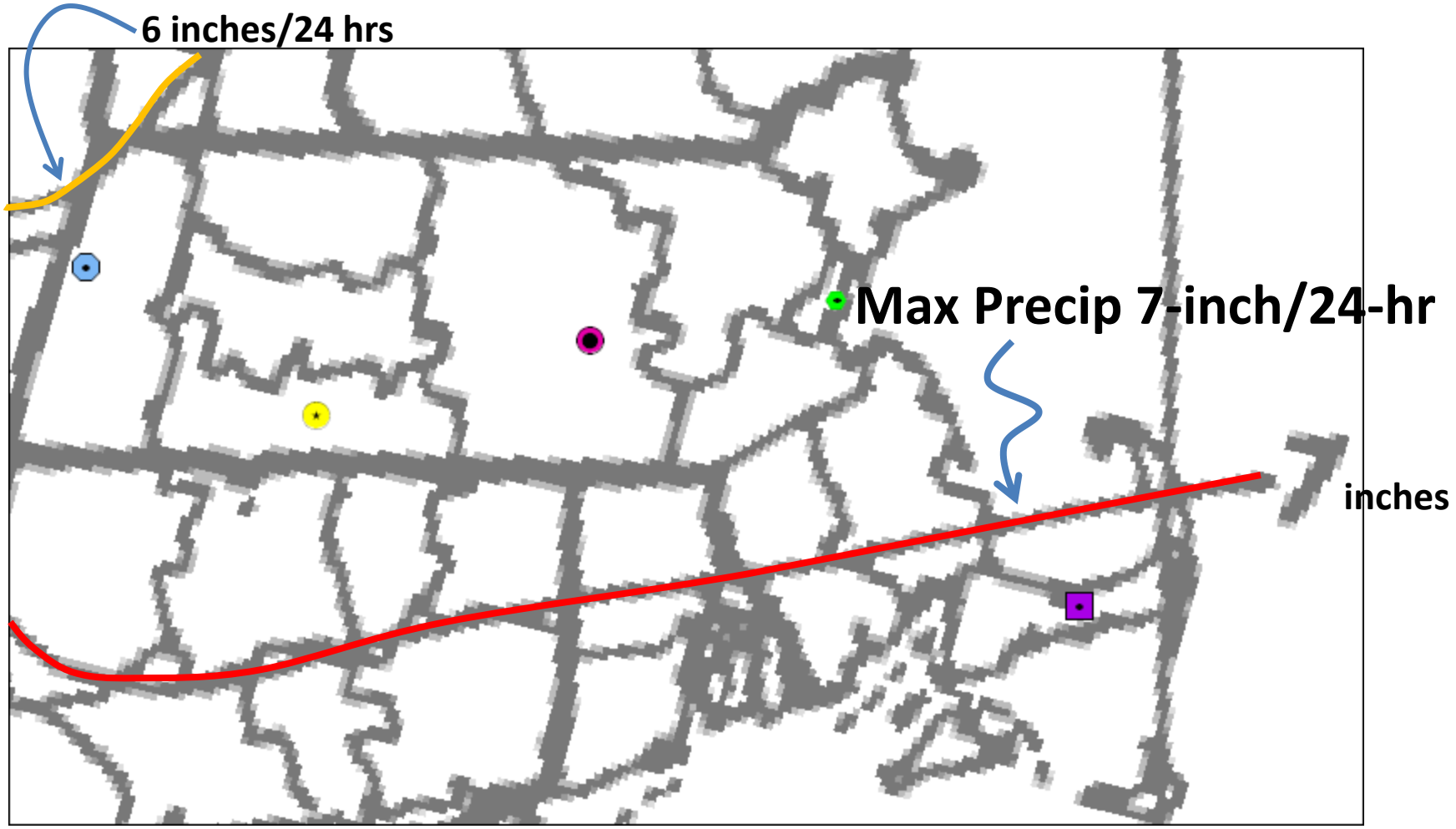
0.01 to 0.05

> 0.05

0 30 60 120 Km

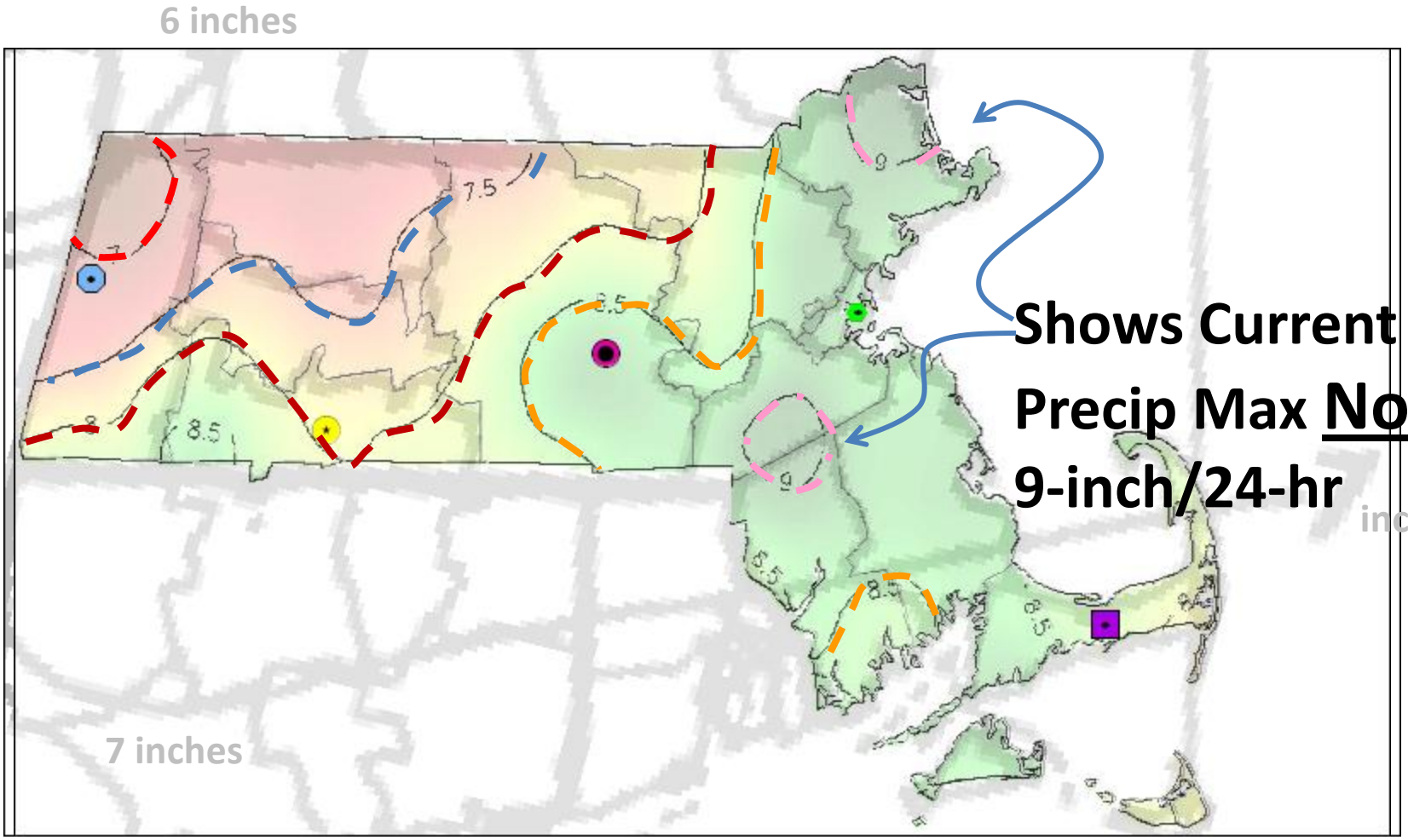
Ellen Douglas and Chelsea Fairbanks, 2011

Does TP40 reflect this trend?



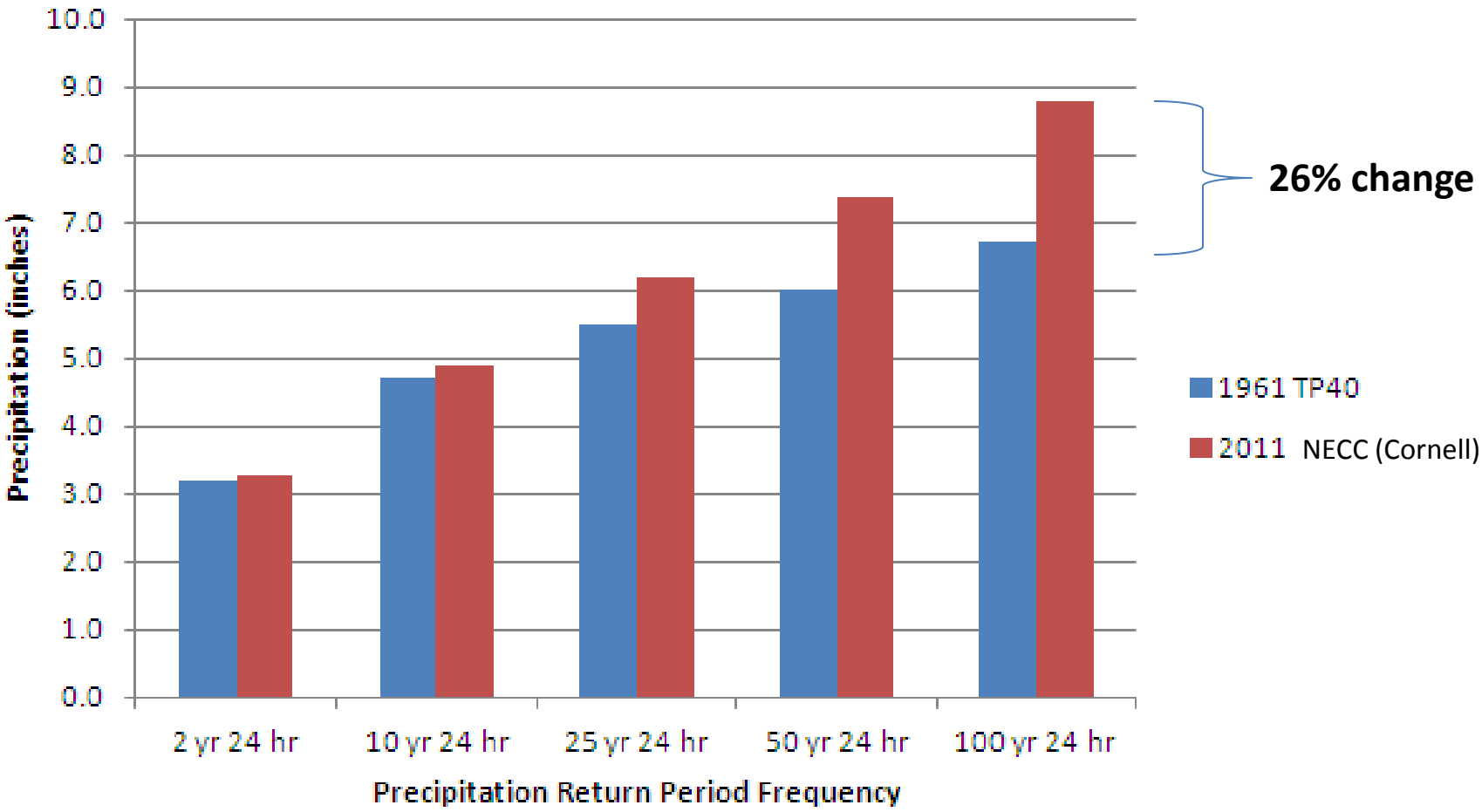
TP40, U.S. Weather Bureau, 1961

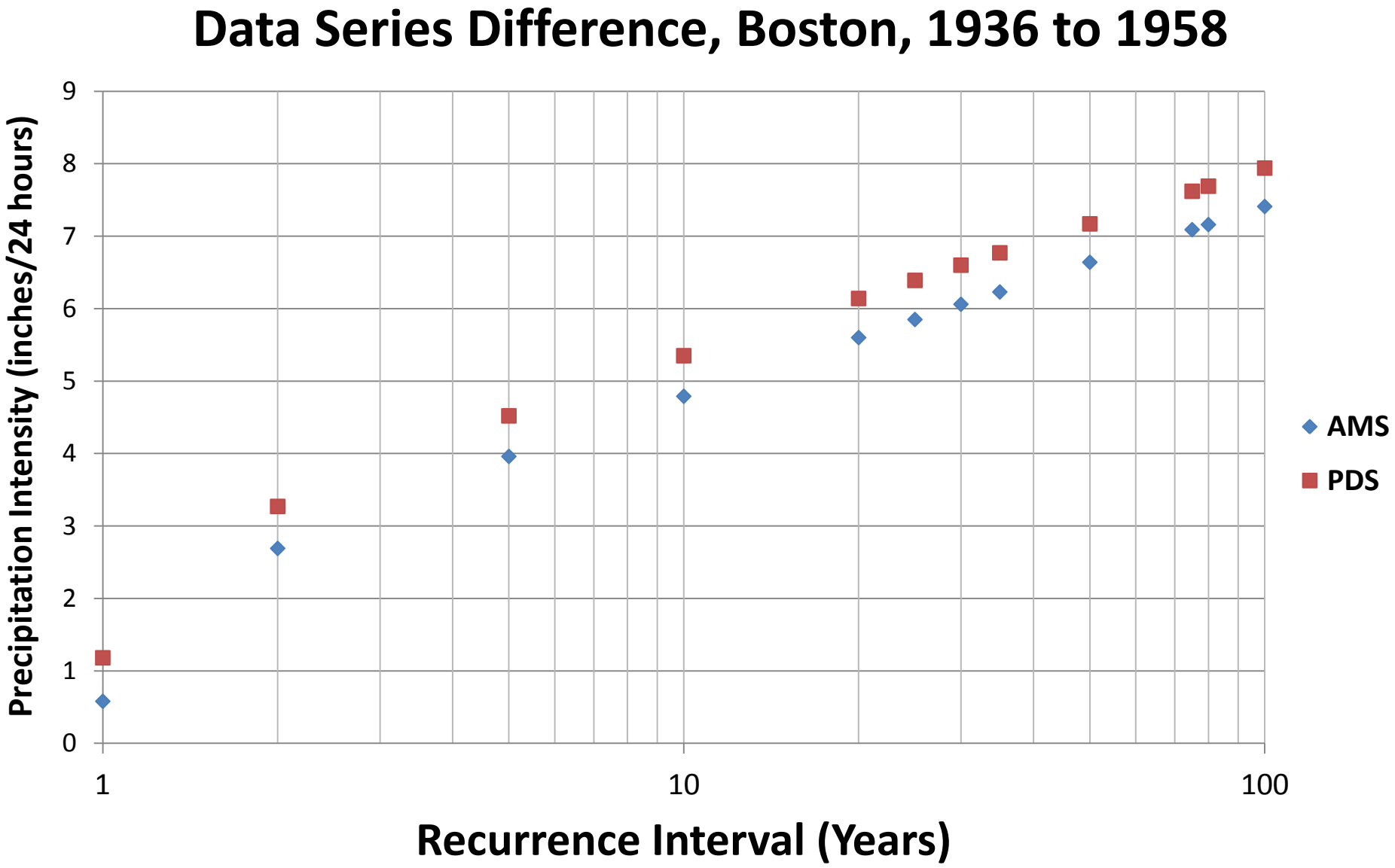
Current Information



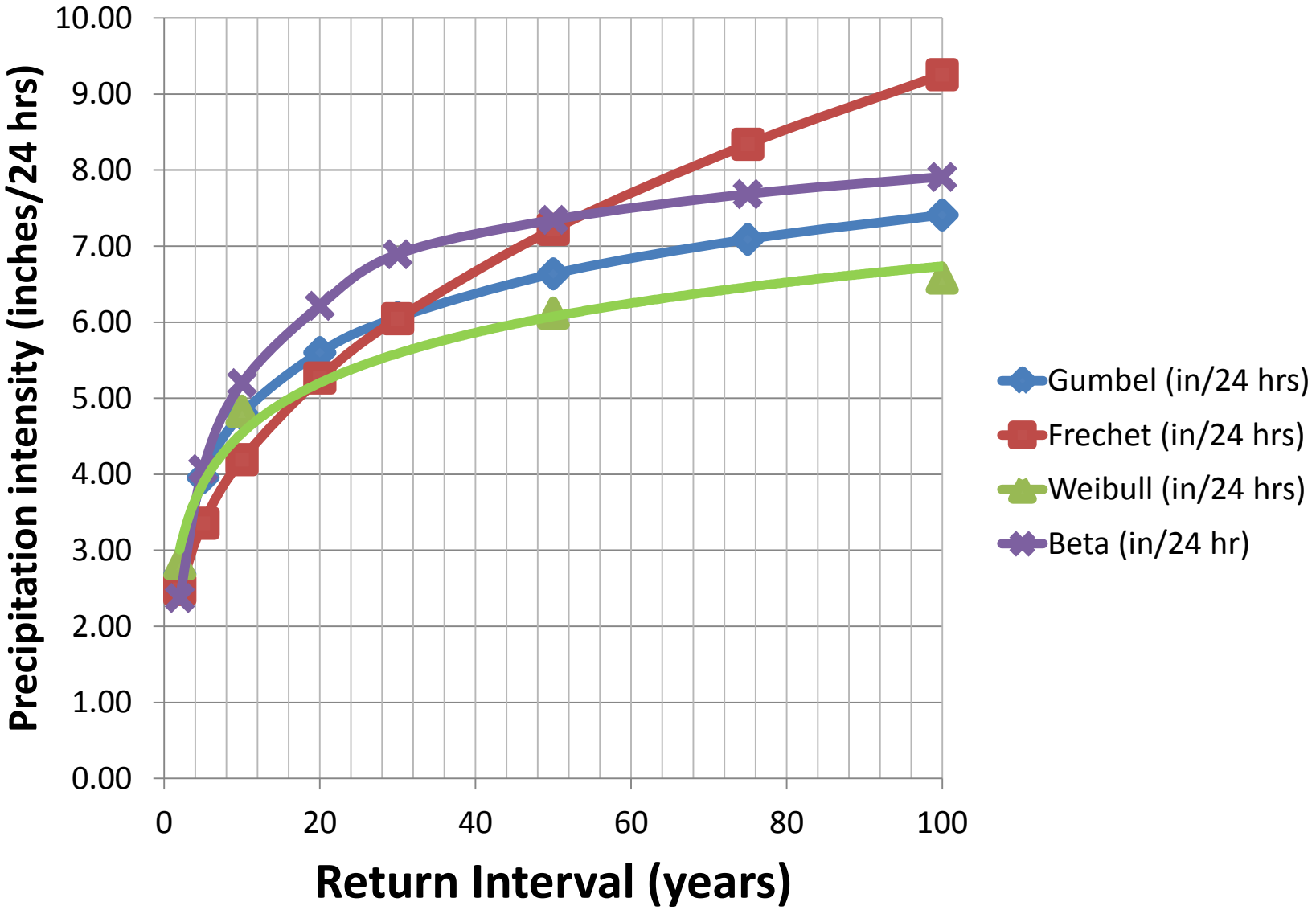
Northeast Climate Center (NECC), Cornell University, 2011

Precipitation Return Period Frequency - Boston

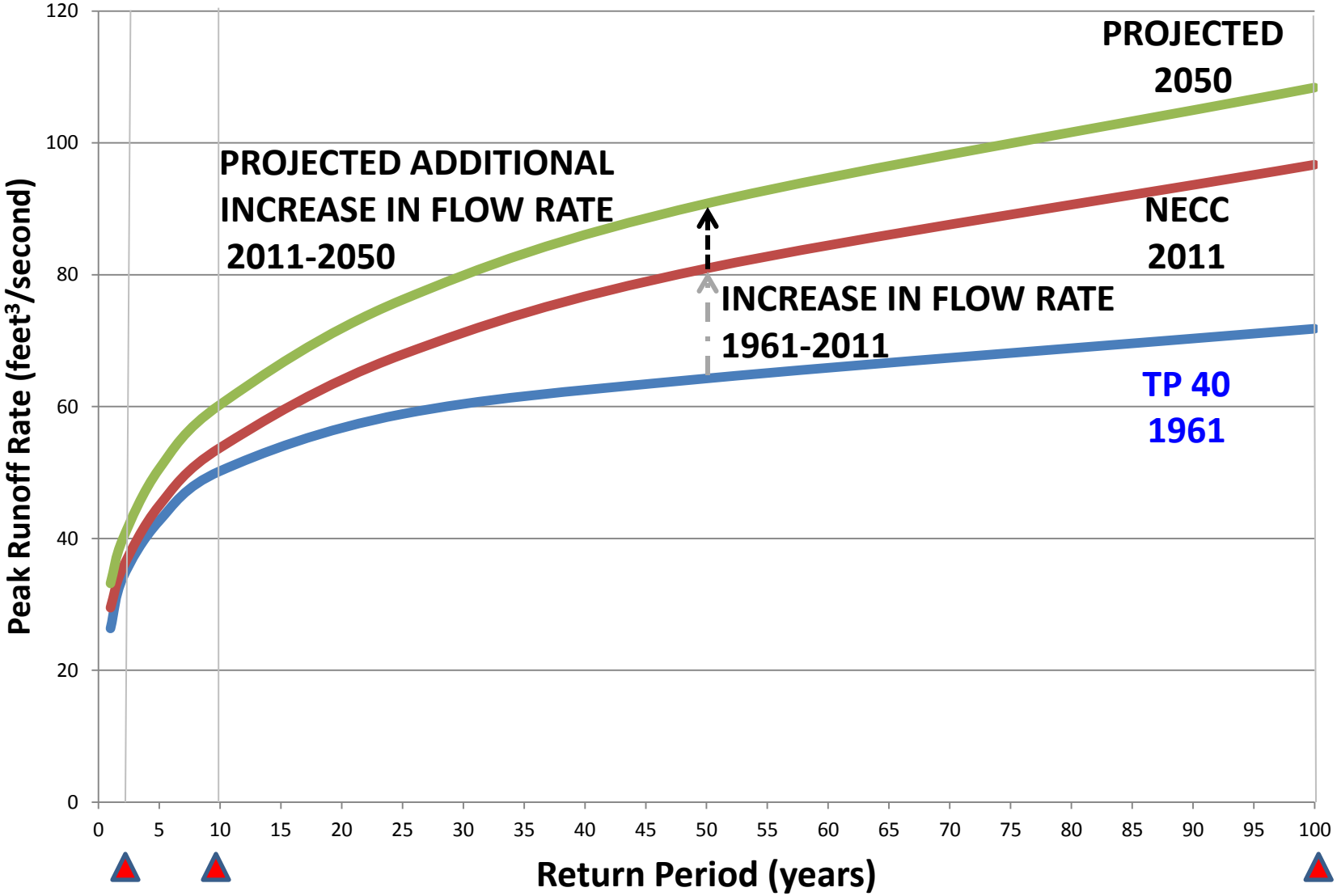



Data Series Difference, Boston, 1936 to 1958
Precipitation Intensity (inches/24 hours)
0
1
2
3
4
5
6
7
8
9
1
10
100
Recurrence Interval (Years)
AMS
PDS

Statistical Distribution Difference, Boston, 1936 to 1958




Stormwater Runoff Rate/Volume



WinTR55 analysis, hypothetical 10-acre parking lot in East Boston location, with CLIMB projection of 0.31% precipitation increase each year

Stream Crossings

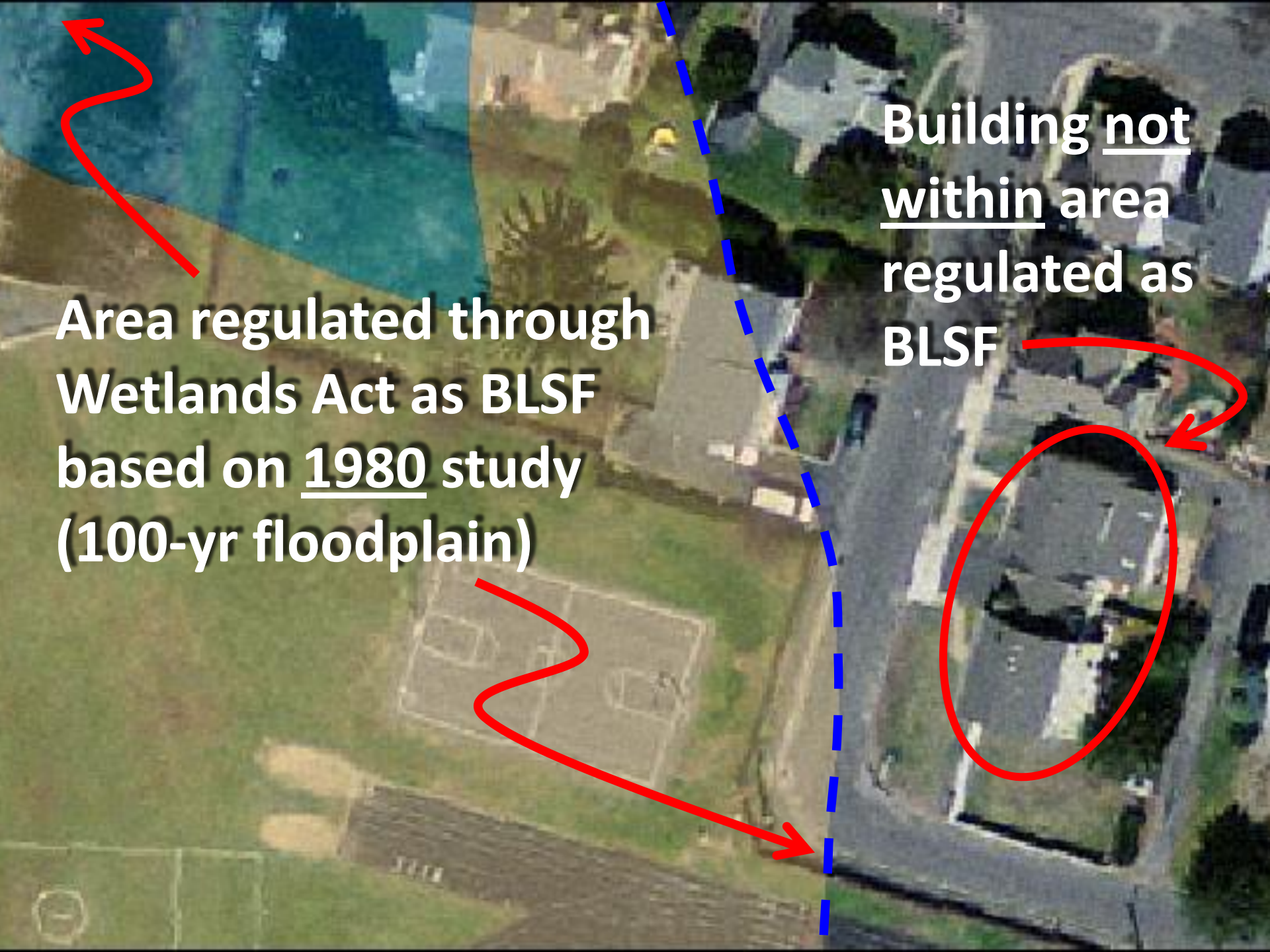
Roadway Classification	MassDOT Culvert/Bridge Hydraulic Opening Using 1961 TP40	2011 NECC Equivalent
Rural Principal Arterial	50-year	**25-year**
Rural Minor Arterial	50-year	**25-year**
Rural Collector, Major	50-year	**25-year**
Rural Collector, Minor	10-year	10-year
Rural Local Road	10-year	10-year
Urban Principal Arterial	50-year	**25-year**
Urban Minor Arterial	10-year	10-year
Urban Collector Street	10-year	10-year
Urban Local Street	10-year	10-year

Based on MassDOT 2009, Load and Resistance Design Factor (LRFD) Bridge Manual, Part 1, Table 1.1

Palmer River - Before March 2010 Flood

Palmer River - After March 2010 Flood


Wetland Boundaries – BLSF
(100-yr floodplain)


Area regulated through Wetlands Act as BLSF based on 1980 study (100-yr floodplain)
Building not within area regulated as BLSF


Same building, March 2010 flood (~40-year flood)


11
Bedford
V.A.
Hospital
via
Arlington
Heights &
Lexington
Center

Questions?