DPH Drinking Water Vulnerability Assessment: UConn CIRCA and CEE

Central WUCC Meeting
March 13, 2017

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UCONN

CIRCA
Connecticut Institute for Resilience and Climate Adaptation

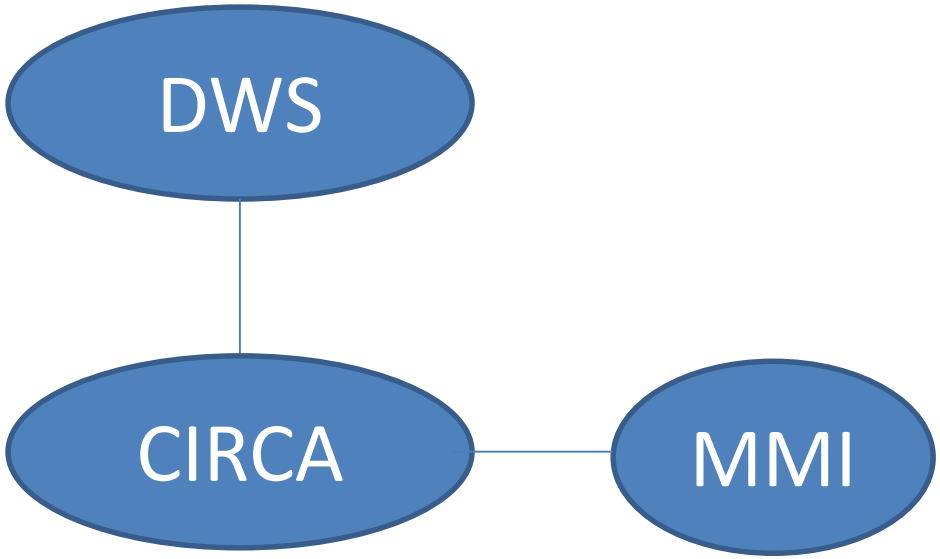
PROJECT OVERVIEW

Drinking Water Vulnerability Assessment and Resilience Plan (DWVAR Plan)

Project Organization

DWVAR Plan Drinking Water Section (DWS) Committee Members:

Lori Mathieu
Michael Hage
Eric McPhee
Rachel Nowek
Steven Wallett



CIRCA

James O'Donnell
Christine Kirchhoff
Rebecca French

MMI

David Murphy

Drinking Water Vulnerability Assessment and Resilience Plan (DWVAR Plan)

Project Objective

- To be better prepared and resilient before, during and after future storms and hazards by assessing, identifying and addressing vulnerabilities for community water systems in Fairfield, New Haven, New London, and Middlesex counties

Drinking Water Vulnerability Assessment and Resilience Plan (DWVAR Plan)

- **Task 1**- Community Water System (CWS) Vulnerability Assessment
- **Task 2**- Review and Assessment of DPH's Emergency Response plans
- **Task 3**- Private Well (PW) Assessment and Recommendations
- **Task 4**- Implementation Plan

Project end date – September 30, 2017

VULNERABILITIES

Drinking Water System Vulnerabilities

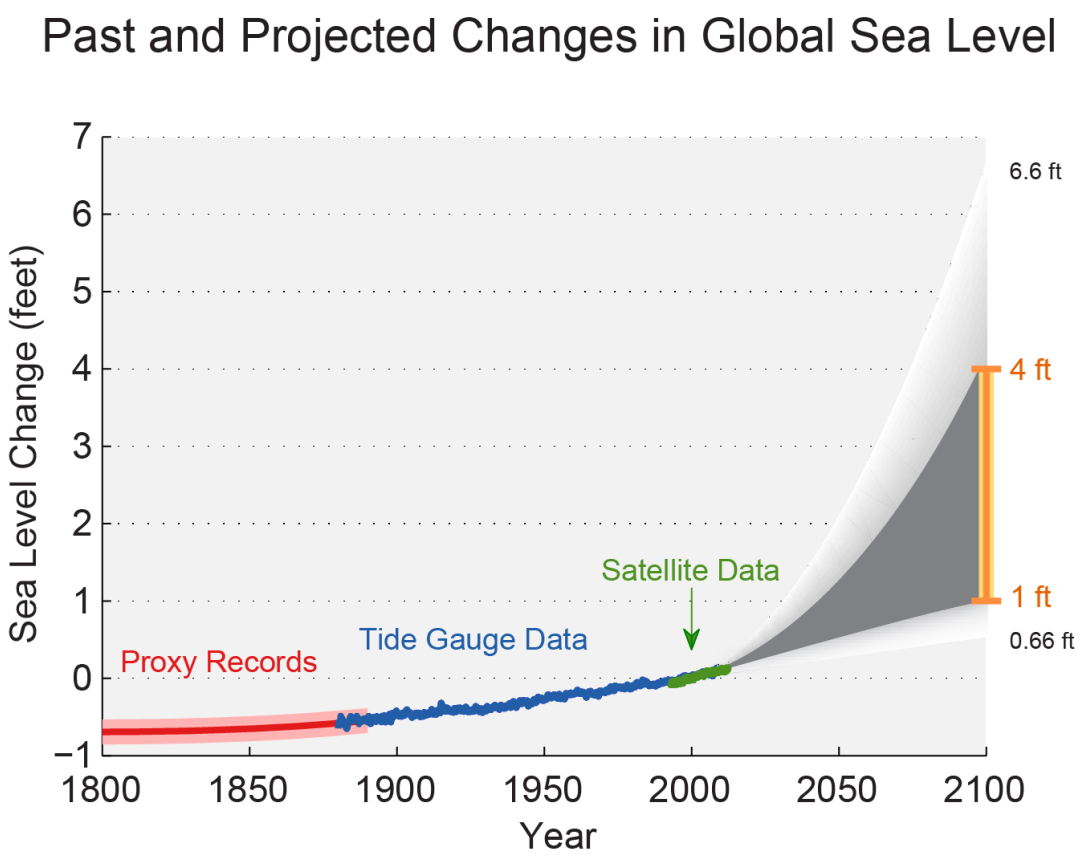
Main Concerns

- Coastal and Inland Flooding
- Climate change
- Sea Level Rise
- Drought

Possible Consequences

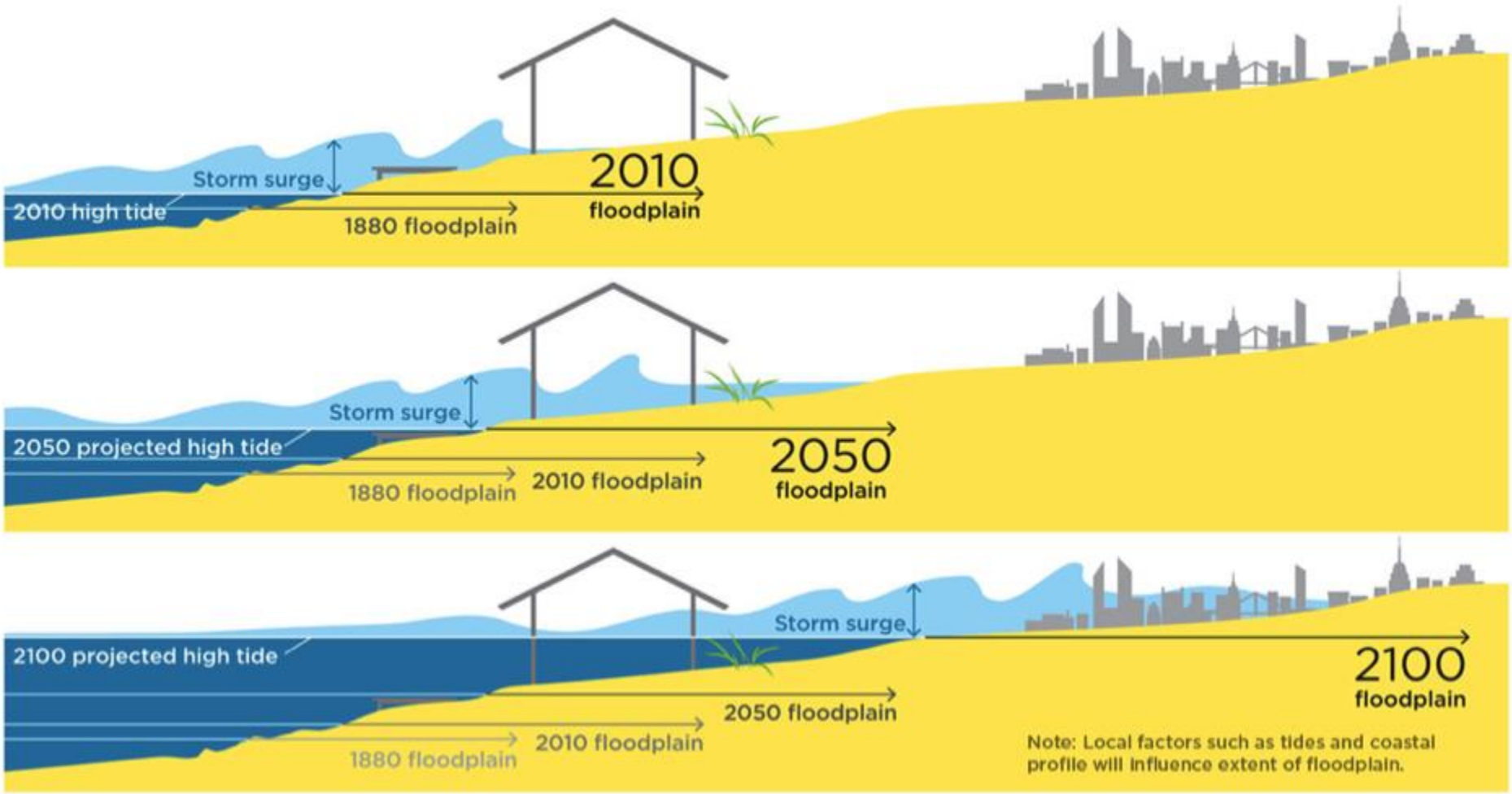
- Disruption of service
- Degradation of water
- Reduced groundwater recharge
- Damage to infrastructure
- Financial burden to get back in operation
- Salt water intrusion

Impacts of Climate Change



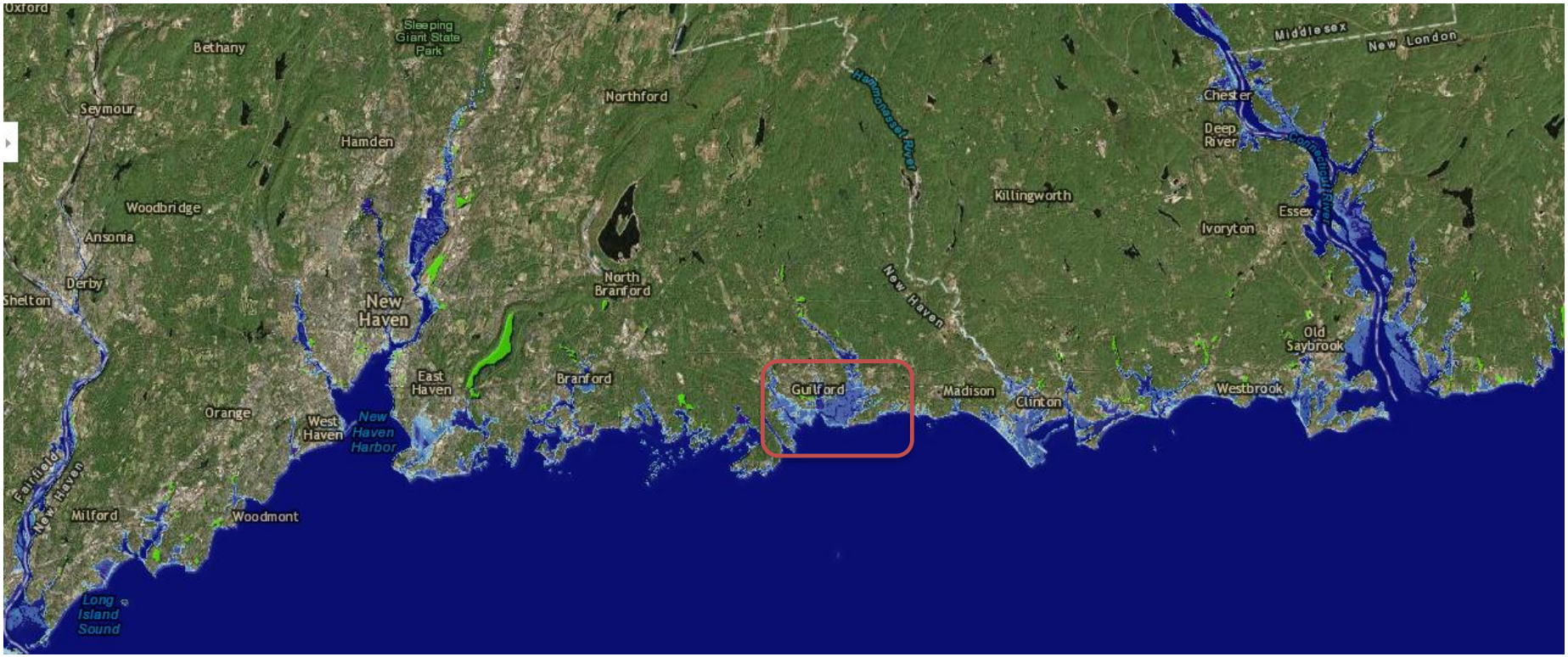
NCA, 2014

Sea Level Rise Increases Frequency of Flooding



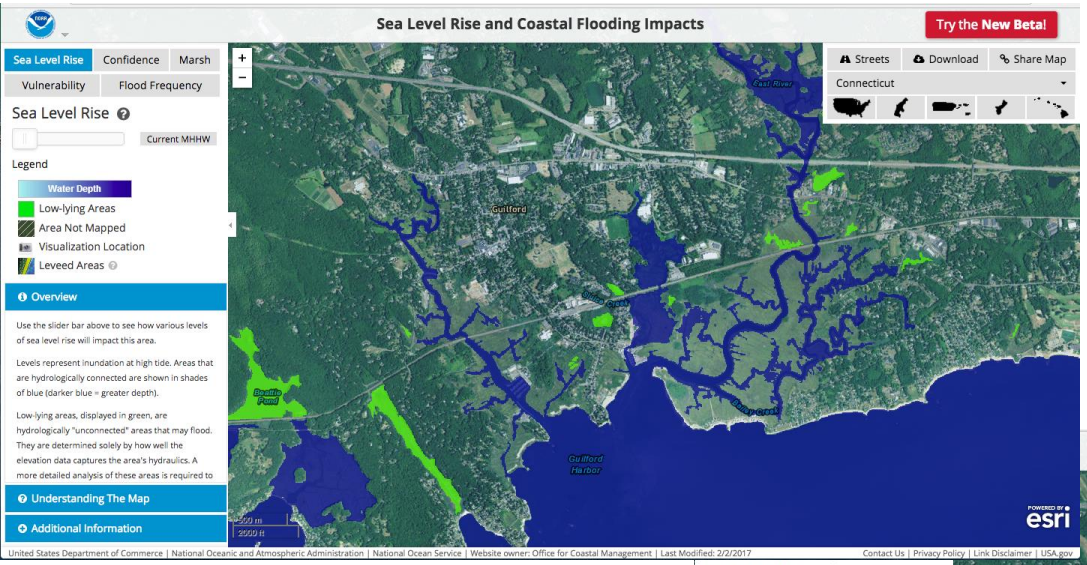
Union of Concerned Scientists, 2015

Central WUCC – Sea Level Rise



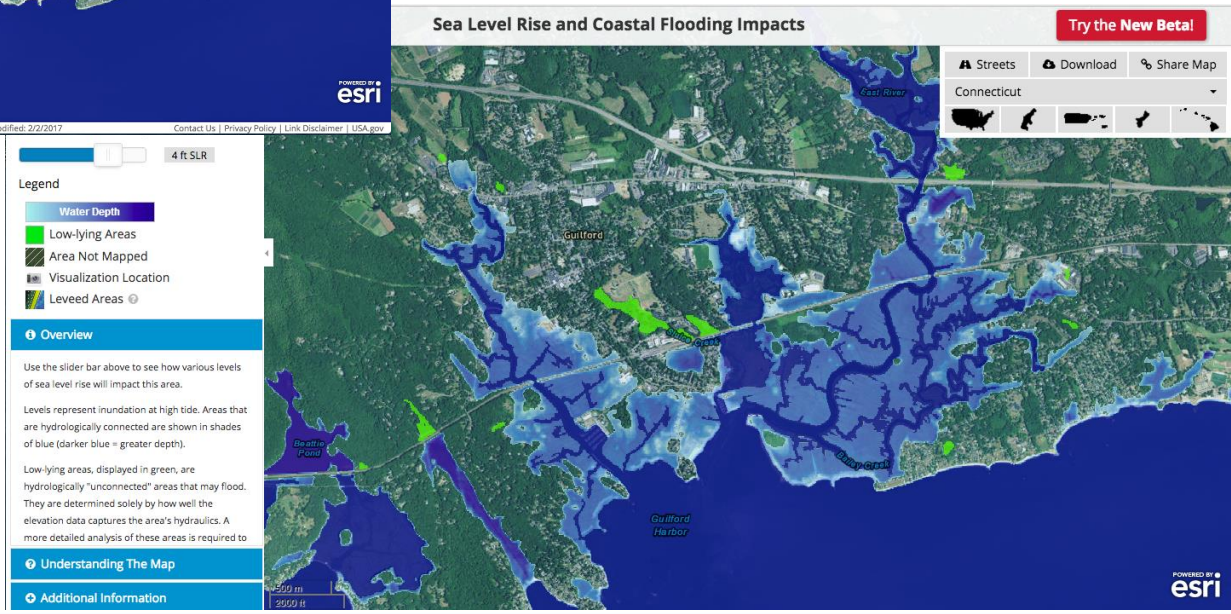
Central WUCC, Milford to Old Lyme, coastal area displayed with a 4 foot SLR projection using NOAA Sea Level Rise Viewer

Guilford CT – Sea Level Rise



Today - MHHW

4 ft of Sea Level Rise



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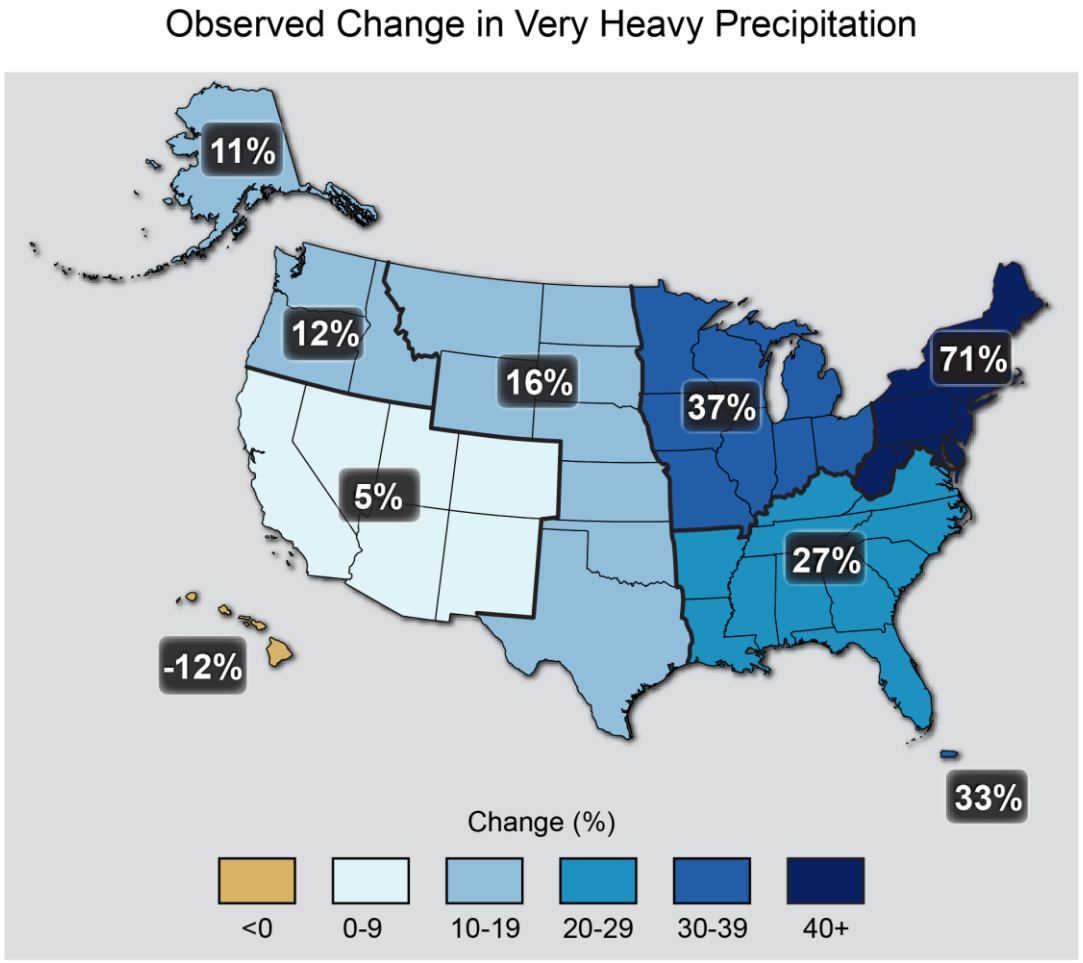
Impacts of Climate Change in Northeast



NCA, 2014

Small System Vulnerabilities

Main Concerns for Connecticut Systems

- Potential for lack of emergency power and supply
- Lack of interconnections
- Some systems may rely solely on one source
- Potential for inadequate pumping or storage capacity
- Lack of adequate resources (financial or technical)

CASE STUDIES

Waynesboro, TN
Adaptation decreased shutdowns from days to hours

- 2003 plant flooded with a **three day** shut down to repair equipment, clean and dry pumps
- 2004 flooded with extensive damage and caused a **four day** shutdown
- 2005 received a $148,000 USDA flood mitigation grant
  - Removed first level windows & installed water tight doors
  - Relocated office and lab space to second floor
  - Raised raw water intake motors and equipment by four feet
- 2010 flooded with only an **eighteen hour** shutdown

Resilience

3 Components of Drinking Water Systems

Physical	Cyber	Human
• Water source • Conveyance • Raw Water storage • Treatment • Finished water storage • Distribution system • Monitoring system	• Enterprise system • Process system & operational controls • Supervisory Control & Acquisition Data (SCADA) system	• Employees • Contractors

NEXT STEPS

Community Water Systems: Interviews and Surveys

- Subtask 1.1:
  - Interviews with a subset of CWS managers
  - Survey of all CWS
- Timing: Interviews before surveys
  - Enables interview results to inform survey design
- Goal of interviews and survey
  - Understand past storm and drought impacts (if any) and responses
  - Assess adaptive capacity and resilience of CWS to storms and droughts and to long-term changes
  - Understand factors that influence adaptive capacity and resilience
  - Gather CWS perspectives on how to support increasing resilience

Acknowledgments

- **Dr. James O'Donnell** – CIRCA Executive Director and Professor Marine Science
  - Victoria Brudz, M.S. GIS and Project Coordinator
- **Dr. Rebecca A. French** – CIRCA Director of Community Engagement
- **Dr. Christine Kirchhoff** – Assistant Professor CEE
  - Dr. Julia Flagg, postdoctoral fellow
- **Dr. Guiling Wang** – Professor CEE
- **Dr. Amy Burnicki** – Assistant Professor in Residence CEE
- **Dave Murphy, P.E., CFM** – Milone & MacBroom

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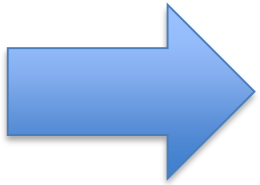
Portsmouth, NH

- Serves ~8,300 customers
- Daily production ranges from 3.5 to 6.5 MGD
- Main threats: flooding from storm surge, SLR & drought

Pumping stations within flood zones

Access roads become flooded during king tides

Water supply source 60% surface water – susceptible to long-term drought



Implemented: Green infrastructure program

- Customer rebate program

Potential: Raise pump station elevation

- Temporary flood barriers
- Develop new groundwater sources
- Watershed management
- Develop flood risk management plan, update drought plans

Spartanburg Water, SC

- Experienced droughts in 2002, 2003 & 2005-2009
- Raised dam height which increased storage from 2.6 to 5.5 billion gallons
- Joined EPA's WaterSense Program
- Implemented technology to reduce water loss
- Modified procedures to reduce loss