

Water Resource Strategies and Information Needs in Response to Extreme Weather/Climate Events

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ACWI – May 30, 2013



This Study

- A snapshot in time of a cross section of “typical” communities that have experienced extreme events.
- Examine the state of play in American communities as they begin to cope with extreme weather and climate events.
- Study how they - planned, coped, and expect to adapt - to extremes given the new normal (growing awareness of new extreme trends).

What is an Extreme Event?

Many definitions (e.g., IPCC, NCA, etc.)

Many approaches to defining (e.g., economic, physical, social...)

Our approach:

- an 'extreme event' was one that was notable in some way (e.g., broke previous records or inflicted major damage)
- extremes are defined by impacts on the community and the extraordinary measures required to cope

The Extreme Events Team



Screen: Kenan Ozekin, **Water RF**

Back Row: Lauren Fillmore, **WERF**, Karen Metchis, **US EPA**, Erica Brown, **Noblis**

Front Row: Nancy Beller-Simms, **NOAA**, Claudio Ternieden, **CTC**

With special thanks:

Amrith Sagar, Caroline Hemenway, Miriam Heller, Nancy Tosta, Rob Greenwood

Partnerships

- Unique partnership of 2 federal agencies; 2 water-related research foundations; and 2 other applied science research organizations
- Working relationships began in 2009
- Funded initial workshop



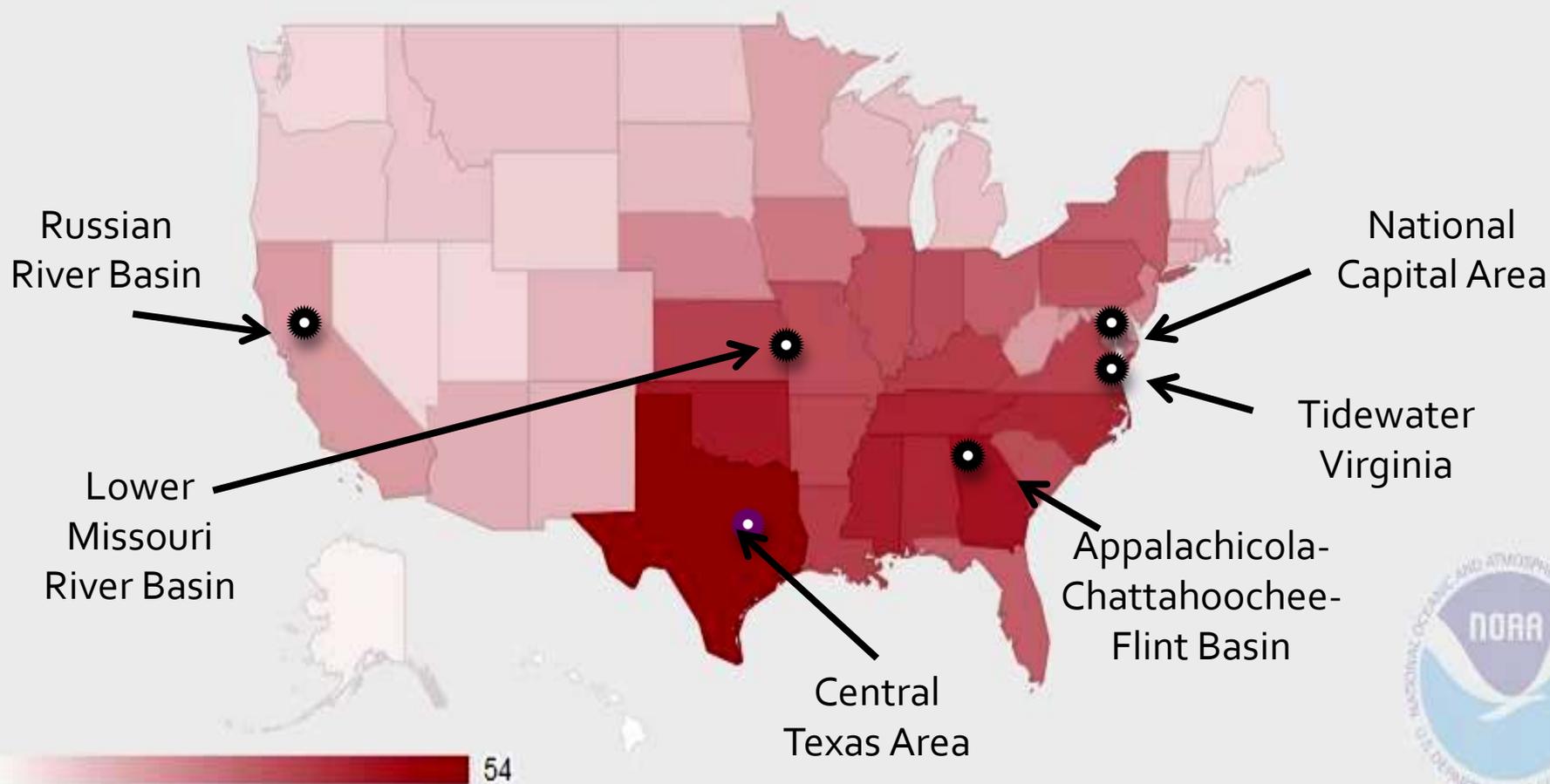
The Future of Research
on Climate Change
Impacts on Water

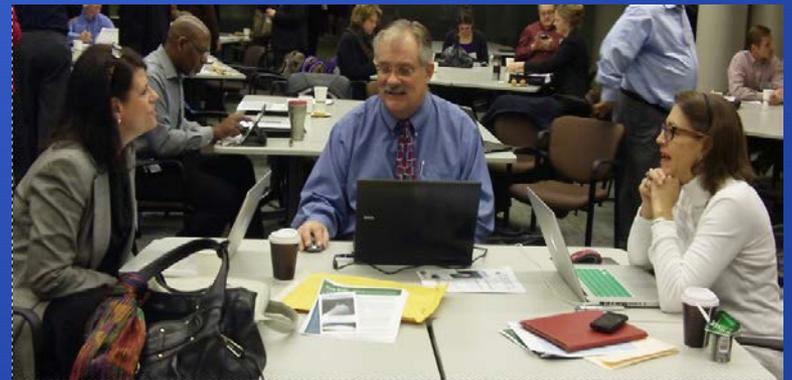
A Workshop Focusing on Adaptation Strategies
and Information Needs

Subject Area: Water Resources and Environmental Sustainability



Case Study Sites and Number of 1980 – 2012 Billion-Dollar Weather/Climate Disasters









1. Resilience = Readiness for multiple types and occurrences of extreme events

- Russian River
 - Flood '06
 - Drought + Frost '07-'09
- National Capital Region
 - Derecho June '12
 - Superstorm Sandy Oct. '12
- Apalachicola-Chattahoochee-Flint
 - Drought '07/08
 - Flood Sept. '09
 - Flood Winter '09/10
 - Drought '12
- Tidewater Virginia
 - H. Isabel '03
 - Nor'easter Ida '09
 - Hurricane Irene Aug '11
 - Tropical Storm Lee Sept '11
 - Two Nor'easters '12
- Central Texas
 - Drought '06/07,
 - Flood '07
 - Drought + Wildfires '11
 - Drought 2010-present
- Lower Missouri River
 - Record Floods '52, '93, '11
 - Drought '12/13

...Impacts, Responses, and Costs Vary



Floods/storms:

- Impacts: acute
- Response: ER, recovery
- Costs: damage, recovery
- Dynamics: cooperation

Drought

- Impacts: slow moving (ex. wildfire!)
- Response: sustained over long periods of time
- Costs: reduced revenue, repairs, new technologies
- Dynamics: divisiveness



They all require community buy-in for long-term solutions



2. Resilience = critical water services are prioritized

During/after Emergencies – first priorities

- Restoring access to potable water
- Controlling wastewater discharges

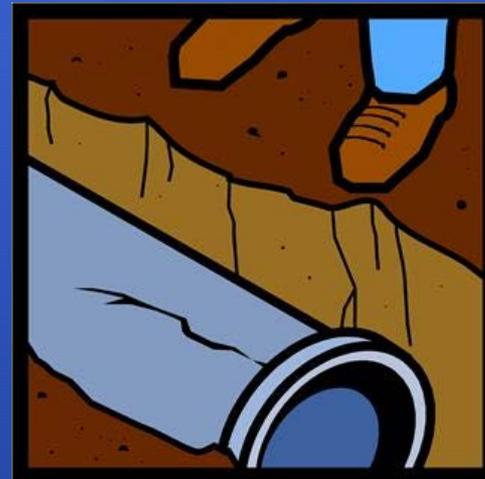
Water utilities depend on:

- Electricity
- Communication systems
- Supply Chains (fuel, chlorine)
- Transit
- Emergency response

...and re: resilience -> public expectations
are aligned with willingness to pay

Engage the public about:

- The feasibility and cost of reducing risks
- Their readiness and role in protecting their own safety and property
- (hint: view the media as a constituency)



3. Resilience = emergency response + long term preparedness



- > Utilities must actively embrace both!
- > Utilities are increasingly:
 - skilled at responding to emergencies
 - conducting vulnerability assessments
- > But implementing adaptation plans is limited



...and Resilience = formal and informal networks

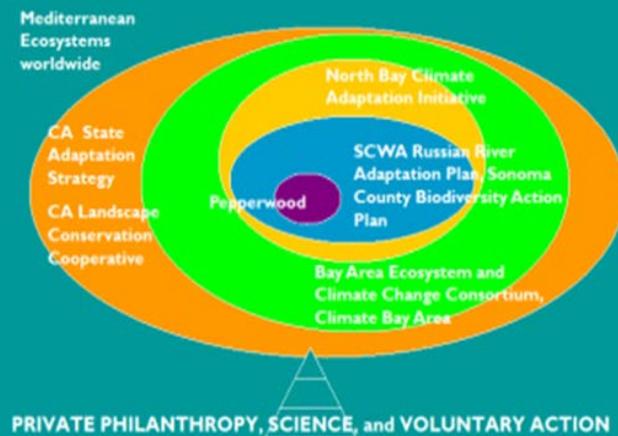
- *Formal* support and communication networks establish clear roles during emergencies
- *Informal* networks and relationships provide flexibility for problem solving

4. Resilience = coordination beyond service area or jurisdictional boundaries

- Many organizations and constituents play a role that affects watershed management and utility operations
- Failure to understand inter-dependencies can undermine success of *everyone's* actions

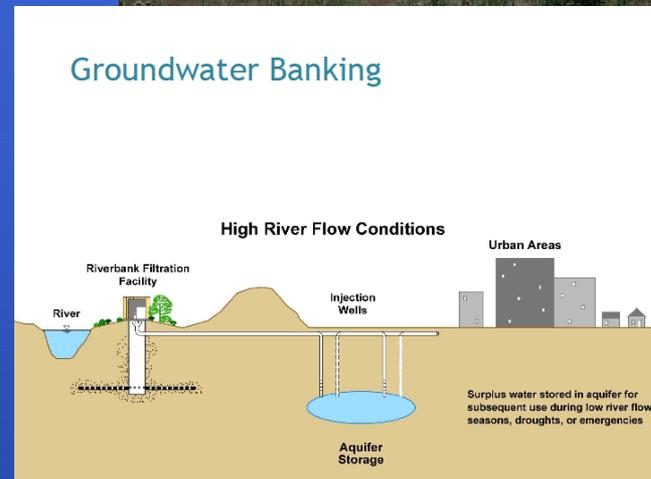
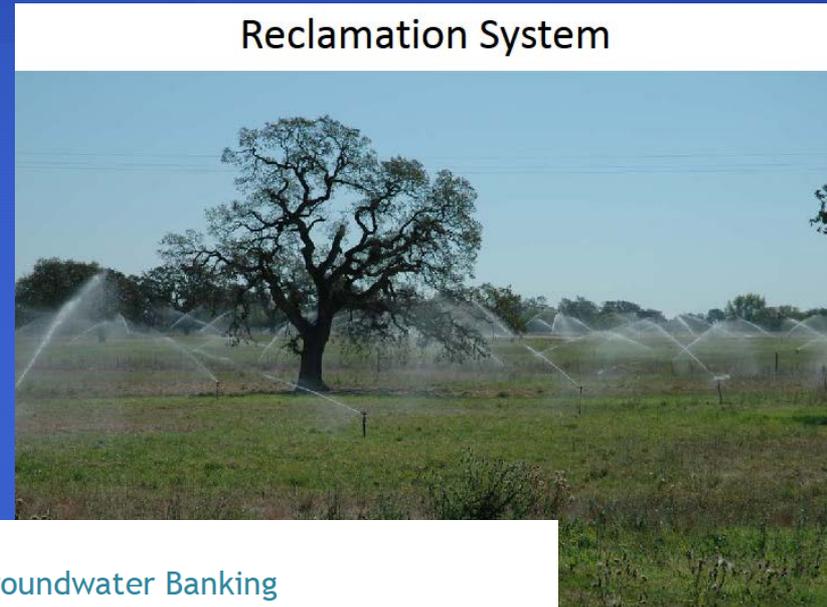


Nesting of climate adaptation efforts



5. Resilience = community leadership and innovation

- Water utility managers are competently taking action *within their span of control*
- Overcoming boundaries requires leadership to navigate a community-wide path to resilience



...and Resilience = communication and cooperation

- The unique local political, environmental, and social context can facilitate or constrain community ability to address vulnerabilities
- Having the right messenger(s) matters
- A trusted, neutral party can convene and engage sectors in problem solving for locally viable solutions



6. Resilience = active engagement in acquiring information

There is no 'silver-bullet' decision support tool

- More information at practical temporal and spatial scales is available than realized
- Decision makers need to be informed of and trained to use available tools.

All tools require effort to customize and apply to local conditions

Typical Tools

- Typical Tools – **Drought.gov**, **weather.gov**, **climate.gov**, Missouri Basin River Forecast Center, Climate Prediction Center, NRCS Snotel, HPRCC, state climatologists
- NCA Report: USGCRP



STORMWATCH

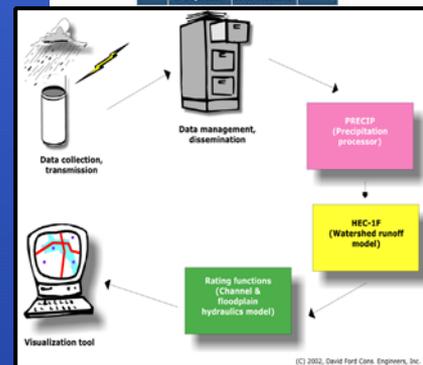
Johnson County Missouri Regional Warning

2/18/2013 10:45 AM CST
Logged in as djharley
My StormWatch Settings
Edit User Account
Logout

Home Graphs Raw Data Rainfall Data Sites Resources Forecasts Admin Users My StormWatch About

StormWatch > My StormWatch > Edit My StormWatch Settings

My StormWatch Settings



Graph Sensor Groups RWIS (Roadway Information) Site Groups

Create one or more groups of Sensors that you are interested in graphing.

Group Name	# of Sensors

Create one or more groups of RWIS Sites that you are interested in graphing.

Create New RWIS Site Group

Alerts

the system. When the sensor reading meets your specified threshold and condition, you will be alerted by you.

Condition	Rain Time Frame (mins)	Don't Repeat (Days)	Last Alert
GT	60	1	9/1/2012 3:43:25 AM Edit

Alert

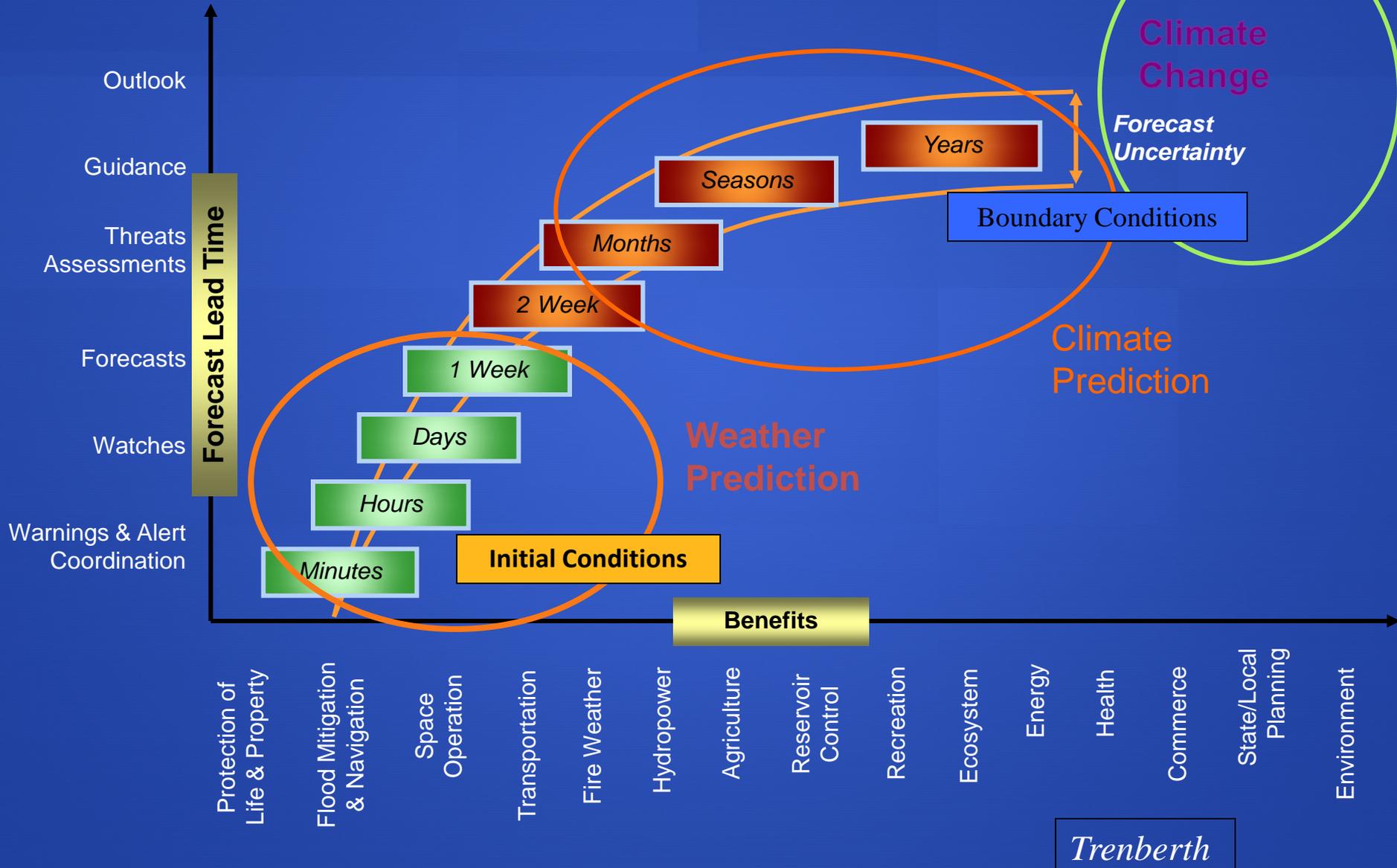
Match Page



Johnson County Stormwater Management

ADBY AND BEYOND, BY DESIGN

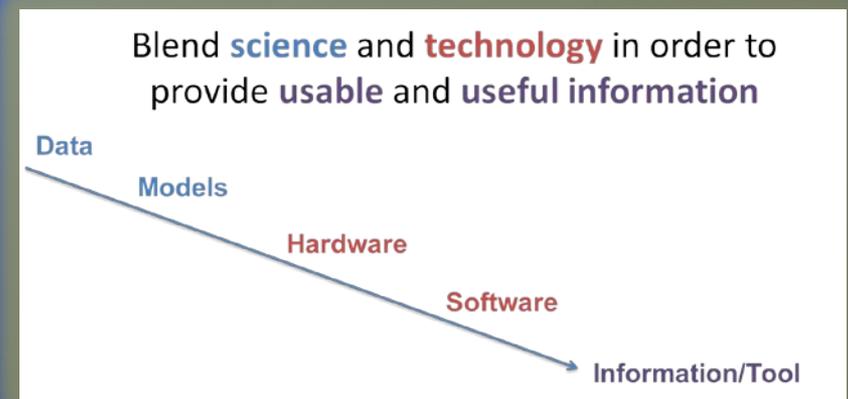
Climate Across Time Scales



7. Resilience = multi-disciplinary teams to create actionable information

Useful decision support can often be met by working with integrated teams

- *Water utilities*: articulate their needs in the context of specific decisions
- *Water managers and water users*: gain cross-sector understanding
- *Climate modelers and academics*: understand local and sectoral needs
- *Stakeholders*: buy-in to solutions



Other Resilience Lessons



Future Products

- 2-pagers summarizing impacts, response and lessons learned
- Final report – synthesis
 - More detailed case studies
 - Synthesis of lessons, tools and needs
- Peer-reviewed and trade-specific publications
- Webinars
- Conference Talks

Thank you!

Fact Sheets on Site Visits:

<http://cpo.noaa.gov/ClimatePrograms/ClimateSocietalInteractionsCSI/SARPPProgram/ExtremeEventsCaseStudies.aspx>