



August 2, 2013

Mission Statement

To provide the water sector (drinking water, wastewater, and stormwater utilities) with the practical tools, training, and technical assistance needed to adapt to climate change by promoting a clear understanding of climate science and adaptation options.



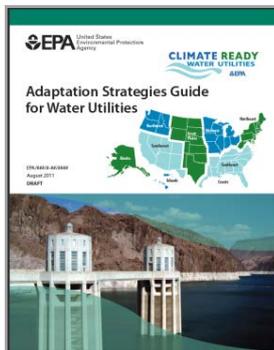
Climate Ready Process

Adaptive Response Framework



Explore Elements of Climate Readiness

Adaptation Strategies Guide



Learn Climate and Adaptation Basics

Toolbox

-  **Featured Resource**
-  **Region Map**
-  **Activities**
-  **Funding**
-  **Publications and Reports**
-  **Tools and Models**
-  **Training, Workshops and Seminars**

Research and Gather Information

Extreme Events Workshop Planner



Collaborate with Partners

Climate Resilience Evaluation and Awareness Tool



Assess Risks and Evaluate Opportunities



Climate Resilience Evaluation & Awareness Tool (CREAT)



Process



- Software tool for conducting **risk assessment** of potential climate change impacts at your utility
- Multiple climate scenarios provided to help **capture uncertainty**
- Assessments will help inform **adaptation planning**
- Results from CREAT help utilities compare potential **costs, risk reduction and energy implications** of different options



What Can You Do In CREAT?



Build Awareness

- Explore local climate data
- View links to publications, models and other tools



Assess Risk

- Catalog data and assumptions
- Understand and assess climate impacts



Plan Adaptation

- Compare adaptation options
- Generate reports to support decisions

CREAT Process

Setup



CREAT captures a variety of information about your utility, including size and ownership structure. You also specify other options used during analysis.

Threats



CREAT provides a set of descriptive narratives regarding climate change impact and potential threats associated with them. You can select the threats applicable to your utility and define custom ones.

Assets



CREAT provides a standardized list of assets. You can modify the asset inventory to reflect your specific facility.

Baseline Analysis



After establishing your initial facility setup, you can determine your current risk level associated with asset/threat combinations over the specified time periods.

Resilience Analysis



After conducting a baseline analysis, you can move forward and consider potential adaptations to your facility to lower the risk associated with specific asset/threat combinations.

Adaptation Planning



Use Adaptation Planning to review your existing and potential adaptive measures, and to develop packages of adaptive measures that you may consider for implementation over future time periods.

Results & Reports



Generate reports of the analysis results developed around your inventories of assets, threats, time periods, or various sorting of any analysis you have conducted.



Building Awareness: Using Climate Data

Quantify projected changes and
potential threats

- Many sites provide access to climate projection data online
- Users may be uncertain about
 - Which data to use: Model? Time period?
 - How to access data?
 - How to apply data?
- CREAT provides data for utilities within a risk assessment framework
- If available, users can enter and use their own data as well



Climate Browser
X

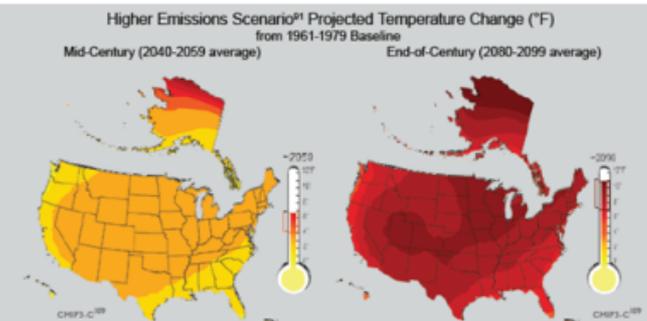
Climate Information
X



Projected U.S. Temperature Changes

Higher Emissions Scenario¹ Projected Temperature Change (°F)
from 1961-1979 Baseline

Mid-Century (2040-2059 average) End-of-Century (2080-2099 average)



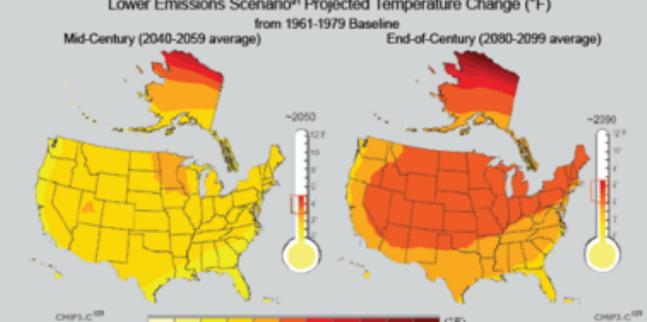
CHIPS-CTM

These maps are based on projections of temperature under lower and higher emissions scenarios [IPCC Special Report on Emissions Scenarios (SRES) B1 and A2, respectively]. The brackets on the thermometers represent the likely range of model projections. These maps show projections at national, regional, and sub-regional scales, using well-established techniques.

Source:
WCRP. 2008. Coupled Model Intercomparison Project phase 3 (CMIP3) multi-model dataset. (http://gdcdcp.ucllnl.org/downscaled_cmip3_projections/)
Accessed September 8, 2009.

Lower Emissions Scenario¹ Projected Temperature Change (°F)
from 1961-1979 Baseline

Mid-Century (2040-2059 average) End-of-Century (2080-2099 average)



CHIPS-CTM

(°F)

1 2 3 4 5 6 7 8 9 10 >10

✔ Done

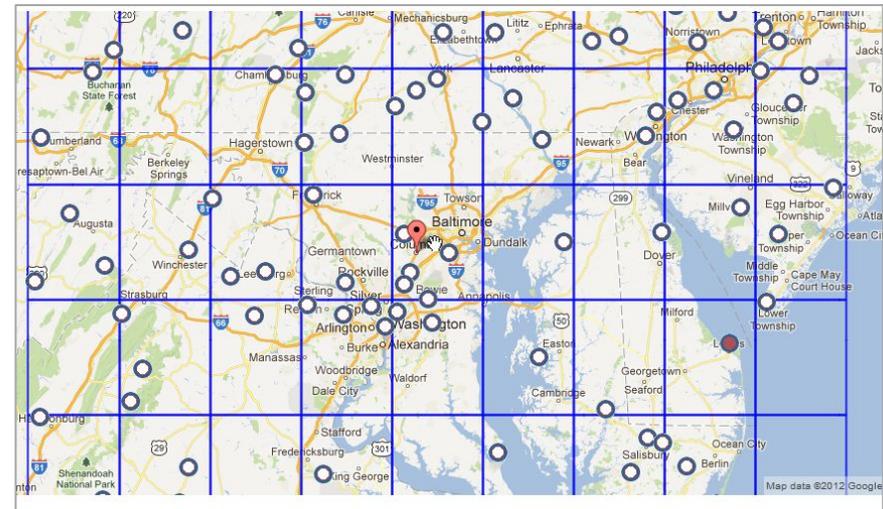
Threat Tabs

↓ Threat Types

- Reduced Groundwater Recharge
- Lower Lakes and Reservoir Levels
- Reduced Snowpack
- Other Drought Impacts
- Saline Intrusion Into Aquifers
- Altered Surface Quality
- High Flow Events
- Coastal Storm Surges
- Loss of Coastal Landforms and Wetlands
- Altered Vegetation/Wildlife Risk
- Volume & Temperature Challenges
- Agricultural Practice Changes
- Changes in Energy Sector Water Needs

Historical Data

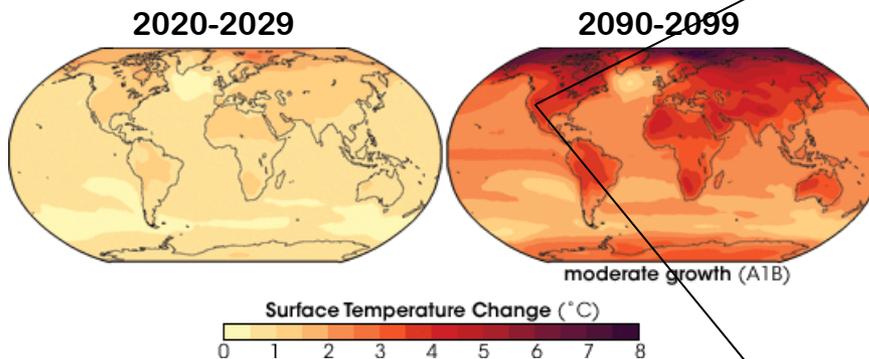
- 30-year (1971-2000) annual and monthly averages of temperature and precipitation
- Data provided at ½ degree by ½ degree resolution (32x32 mi.)
- Intense precipitation data sourced from NOAA climate stations
- Select the station that best matches your historical data OR enter your own



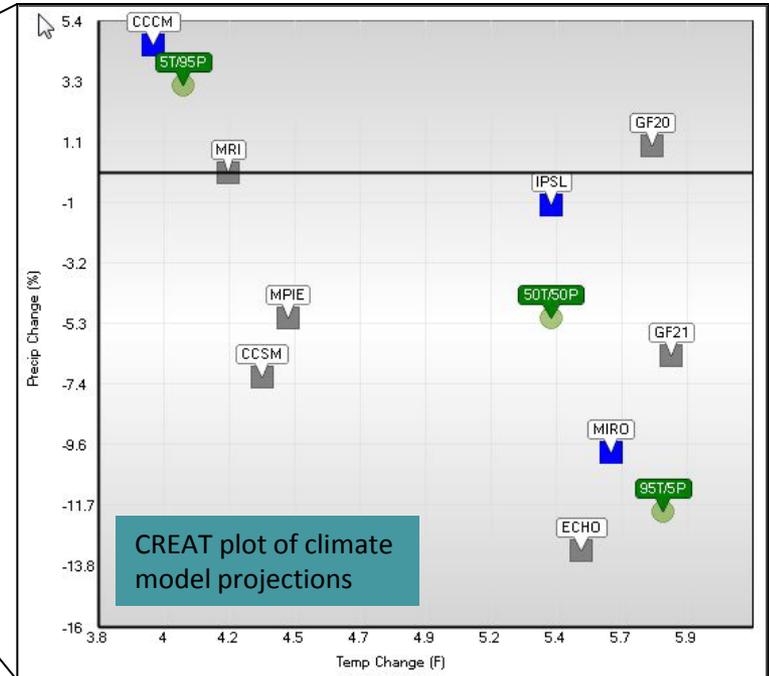
Location (📍) with available climate stations (🕒) in CREAT

What Information and Data are Available?

- Models as basis for climate projections
- Down-scaling efforts to extend to local scales
- Challenge: connect changing climate to more direct consequences to water resources



Source: IPCC AR4 Projected Temperature Changes for SRES A1B

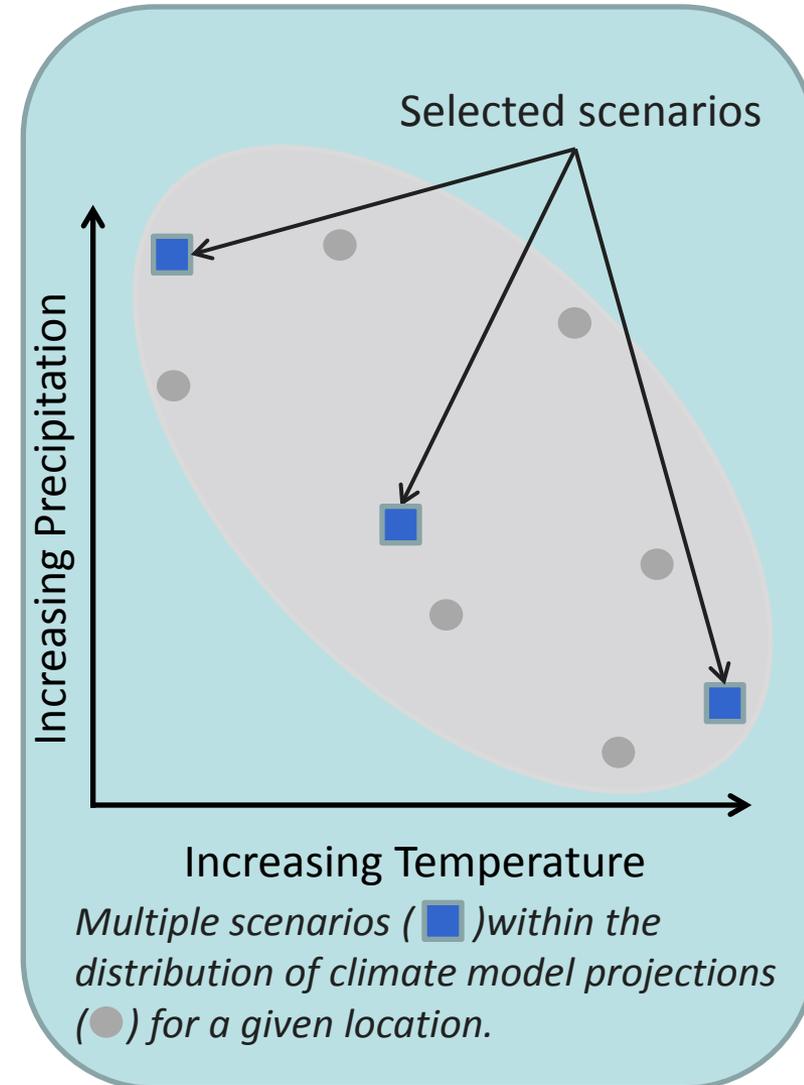


- CREAT provides projected changes in
 - Temperature
 - Precipitation
 - Intense precipitation
 - Sea level
- Rather than rely on a single projection, three scenarios are provided to support assessments over a range of possible future conditions

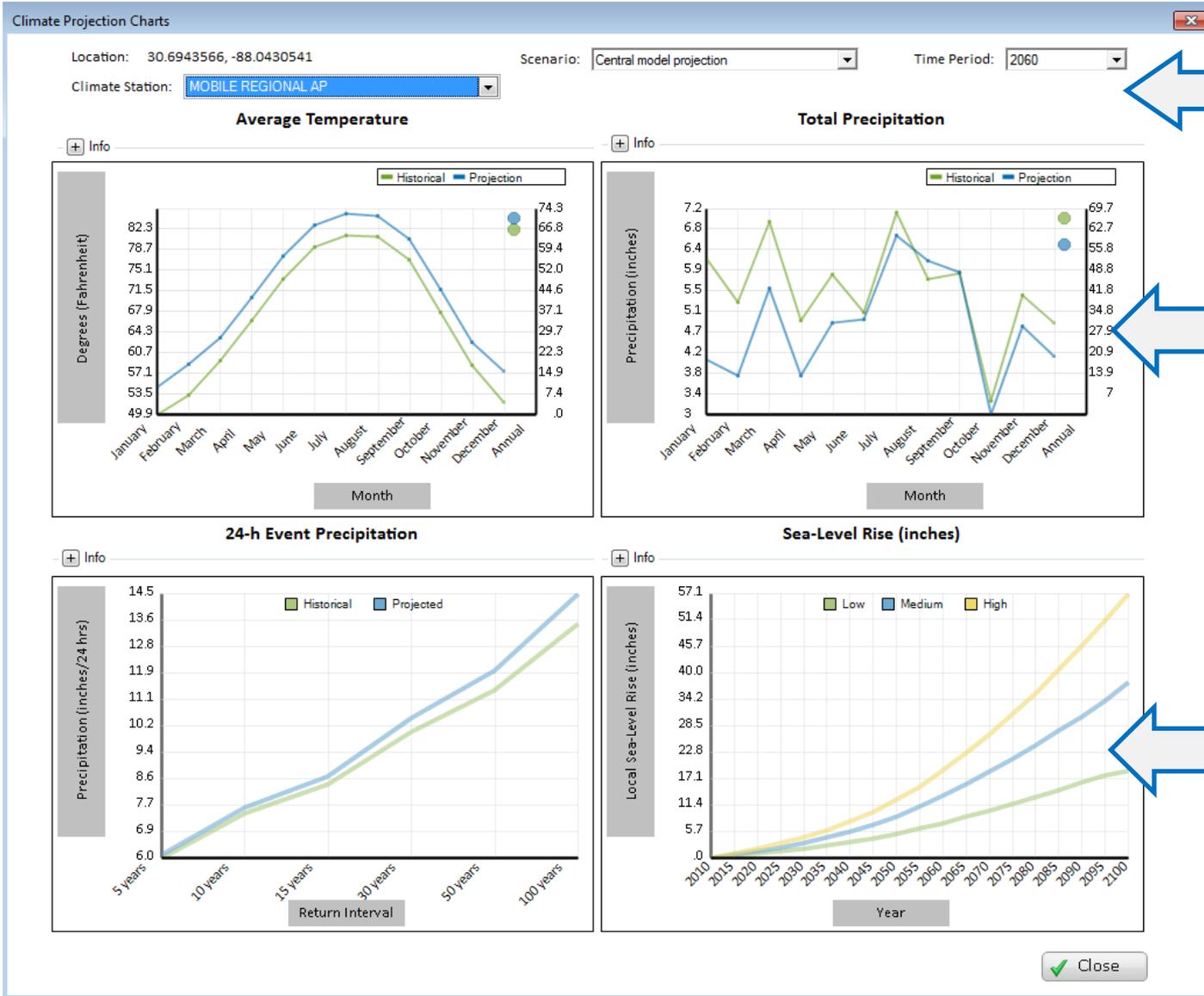


Climate Scenarios

- Scenarios, based on a single model projection, selected for each grid cell
 - Hot and Dry model
 - Central model
 - Warm and wet model
- Data provided for two time periods (2020-2050 and 2045-2075)



Climate Data in CREAT



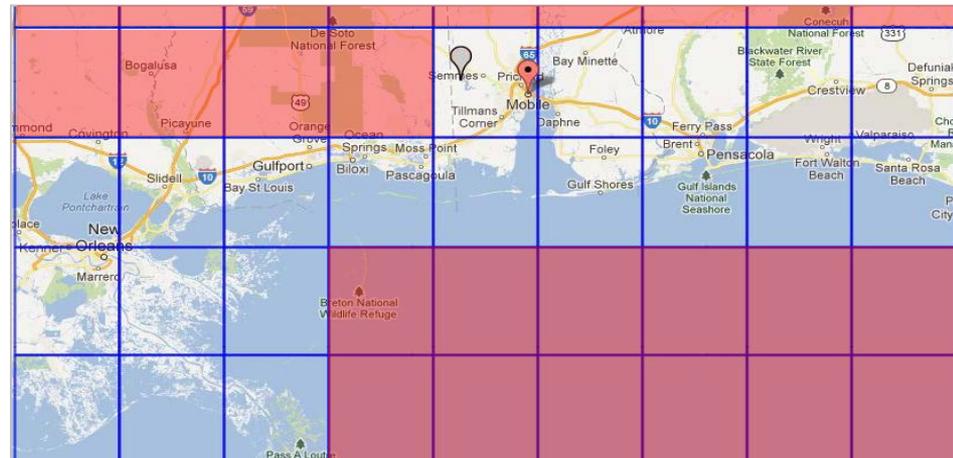
View data from multiple climate stations, scenarios, and time periods

Annual and monthly temperature and precipitation

Intense precipitation events and sea-level rise

Sea-Level Rise Factors

- Two components of global sea-level rise (SLR)
 - Thermal expansion: varies regionally due to ocean currents, salinity and other factors
 - Ice melt: from glaciers and ice sheets over land (Antarctica, Greenland)
- Latest scientific literature suggests global SLR of up to 1.5 m by 2100 for planning purposes
- CREAT provides regional SLR data for coastal grid cells



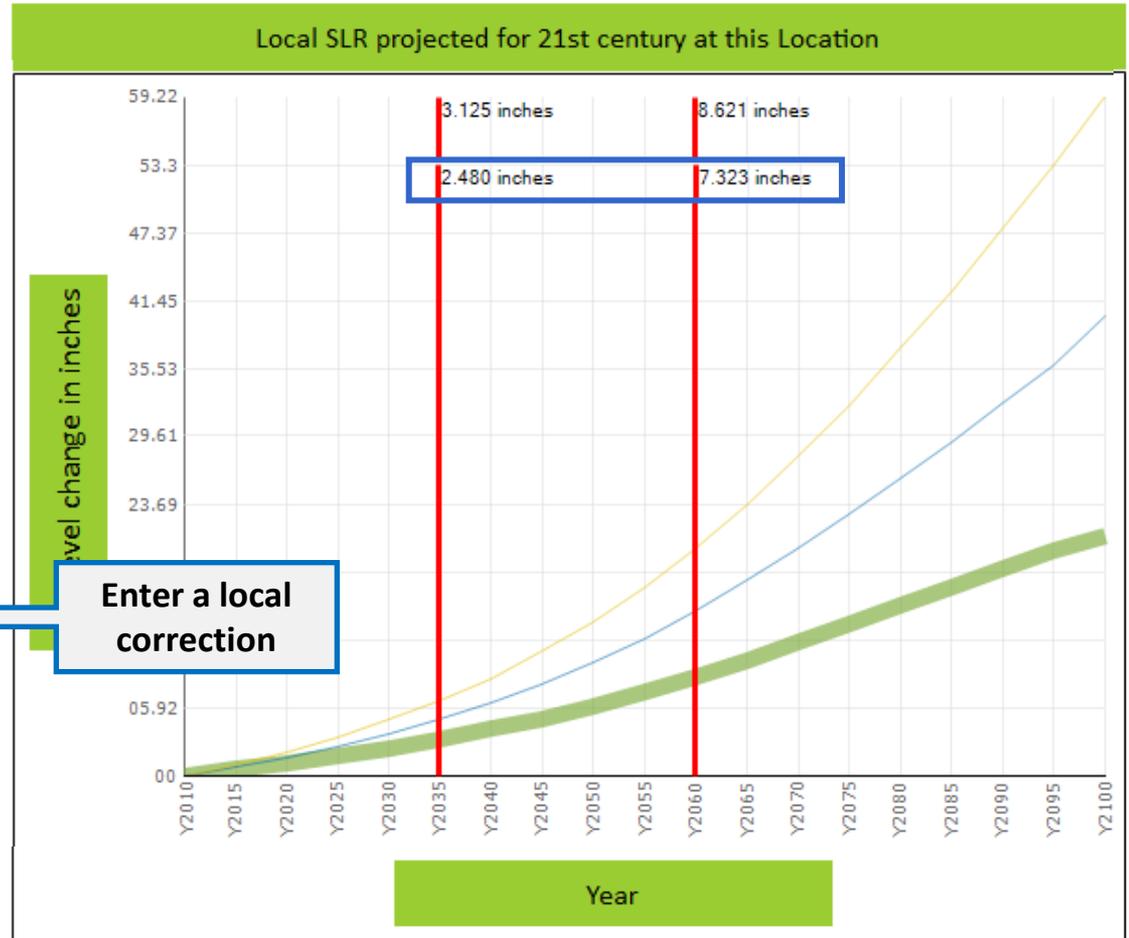
Select the Global (2100) SLR value you would like to consider for your location

- 4.92 feet by 2100 (1.5 m) (High) ■
- 3.28 feet by 2100 (1.0 m) (Med) ■
- 1.62 feet by 2100 (0.5 m) (Low) ■

Scalar for this location:

Local Corrections to Global SLR Values

- None
- Tide Gauge inches/y
- Subsidence inches/y





Information

- CRWU website and to download CREAT:
 - www.epa.gov/climateredyutilities
- Contact:
 - Curt Baranowski
 - 202-564-0636
 - baranowski.curt@epa.gov