



**SUSTAINING  
SCIOTO**

INVESTING TODAY. PRESERVING TOMORROW.

# **Stakeholder Advisory Committee June 19, 2014**

**David Rutter, Watershed Coordinator  
MORPC**

**Lisa Jeffrey, PE**

**Kristin Knight, PE**

**Catherine Eichel, LEED AP**

**Brown and Caldwell**

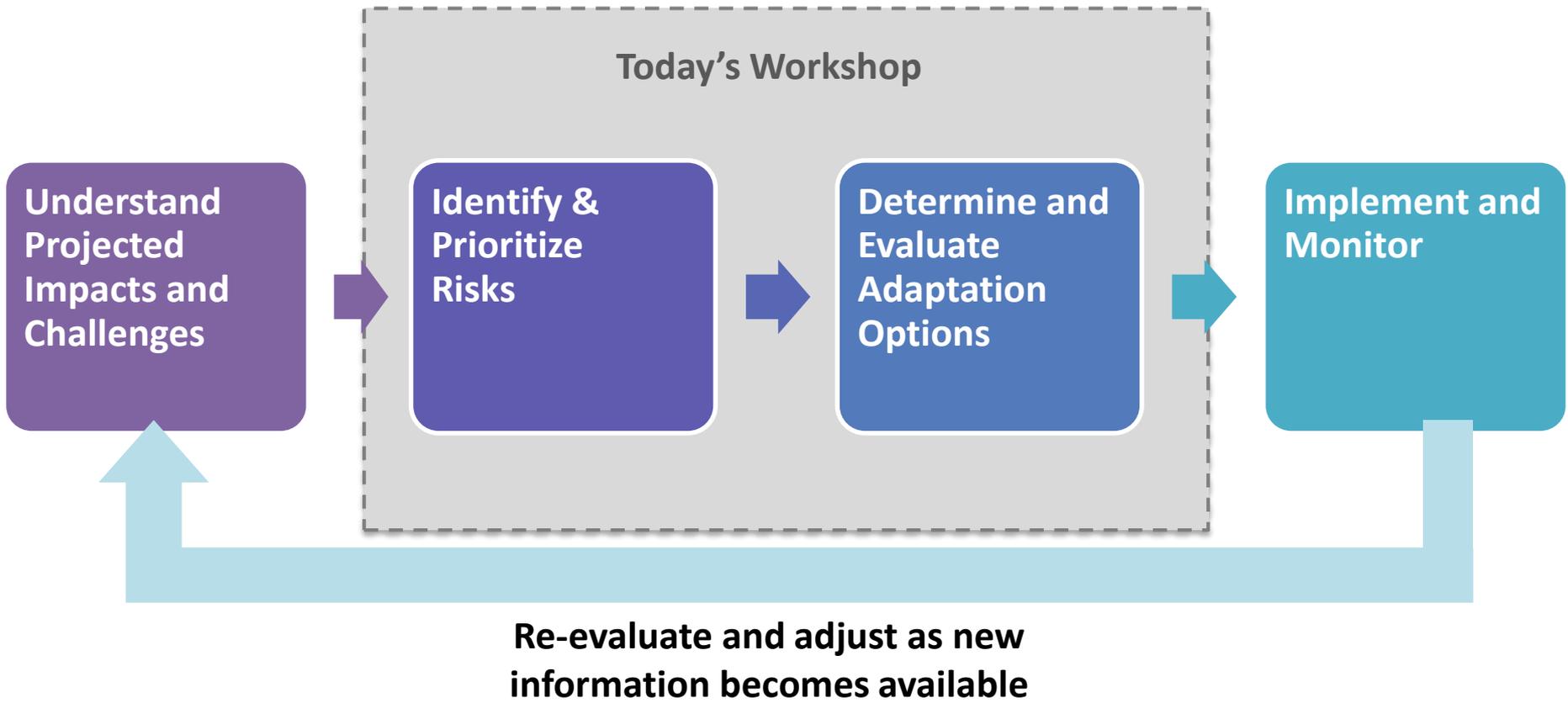


# Agenda

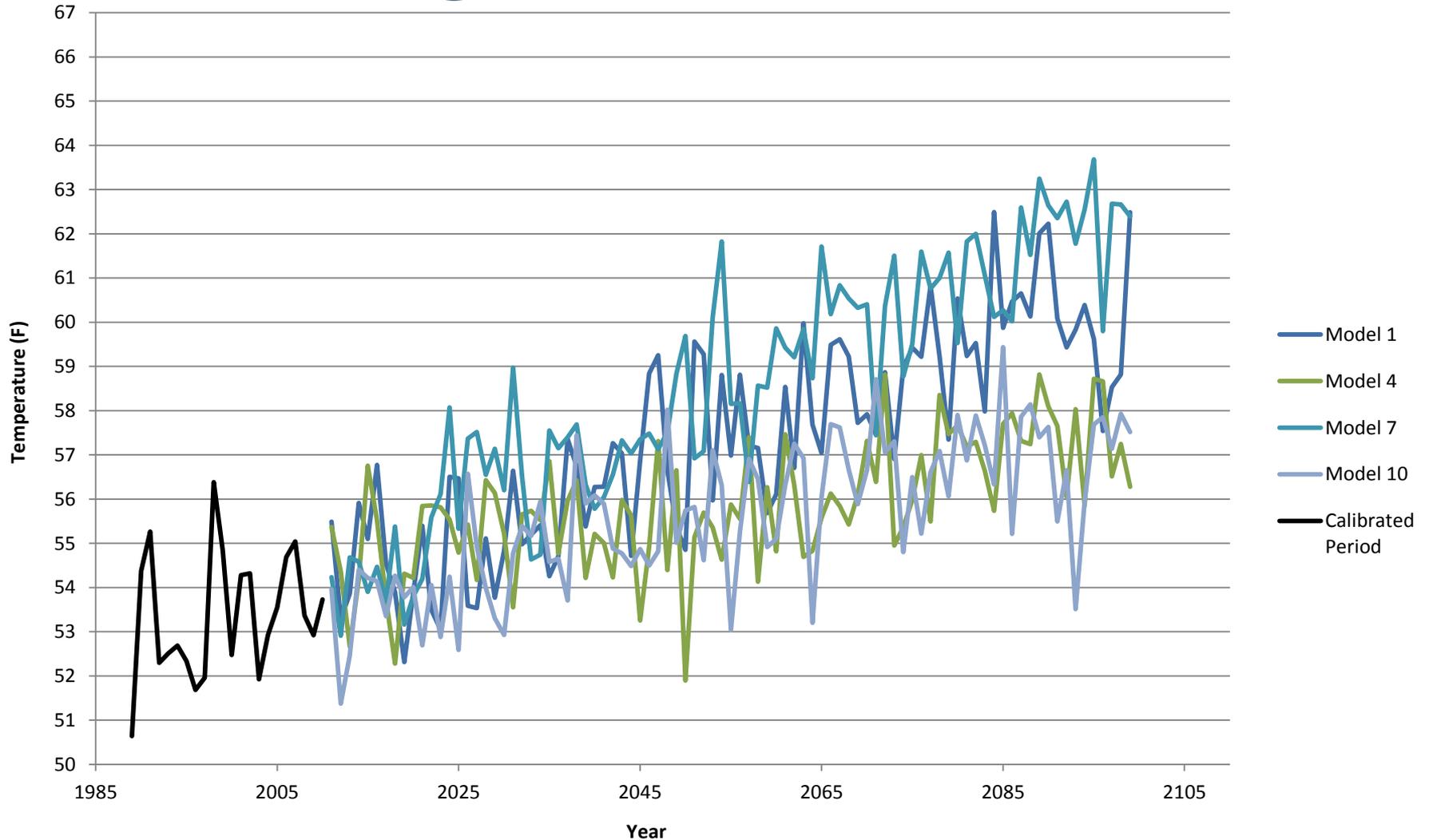
- Welcome and Introduction
- Current project status
- Presentation of Model Results
- Review of Impact Assessment Discussions
  - Impacts related to model results
  - Small group discussion
- Introduction to Adaptive Management Planning for Climate Change
  - Small group discussion
- Next Meeting: August 21, 2014



# Adaptive Management Strategies

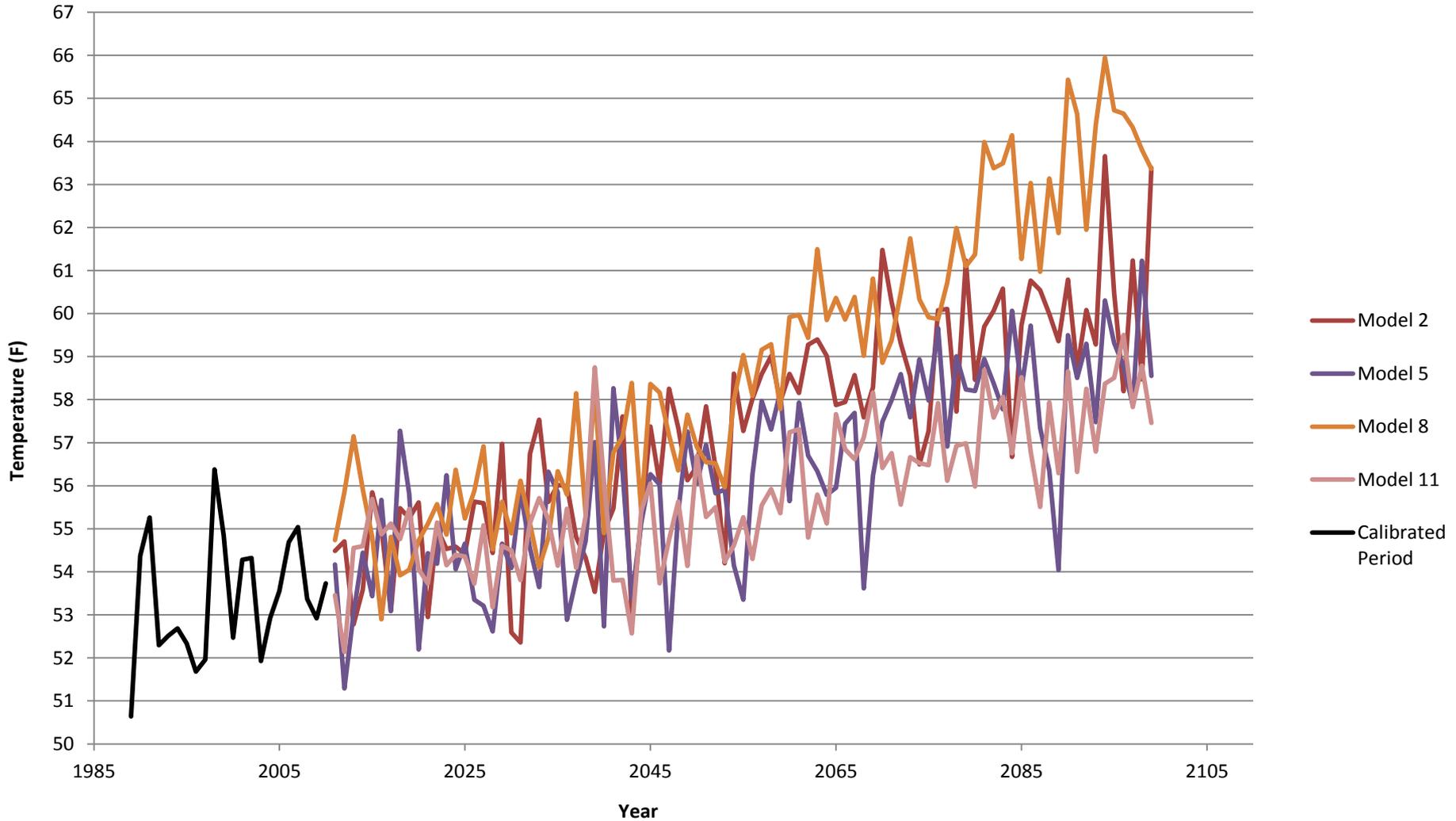


# Actual vs. Projected Annual Mean Temperature (F) High Emission Scenarios

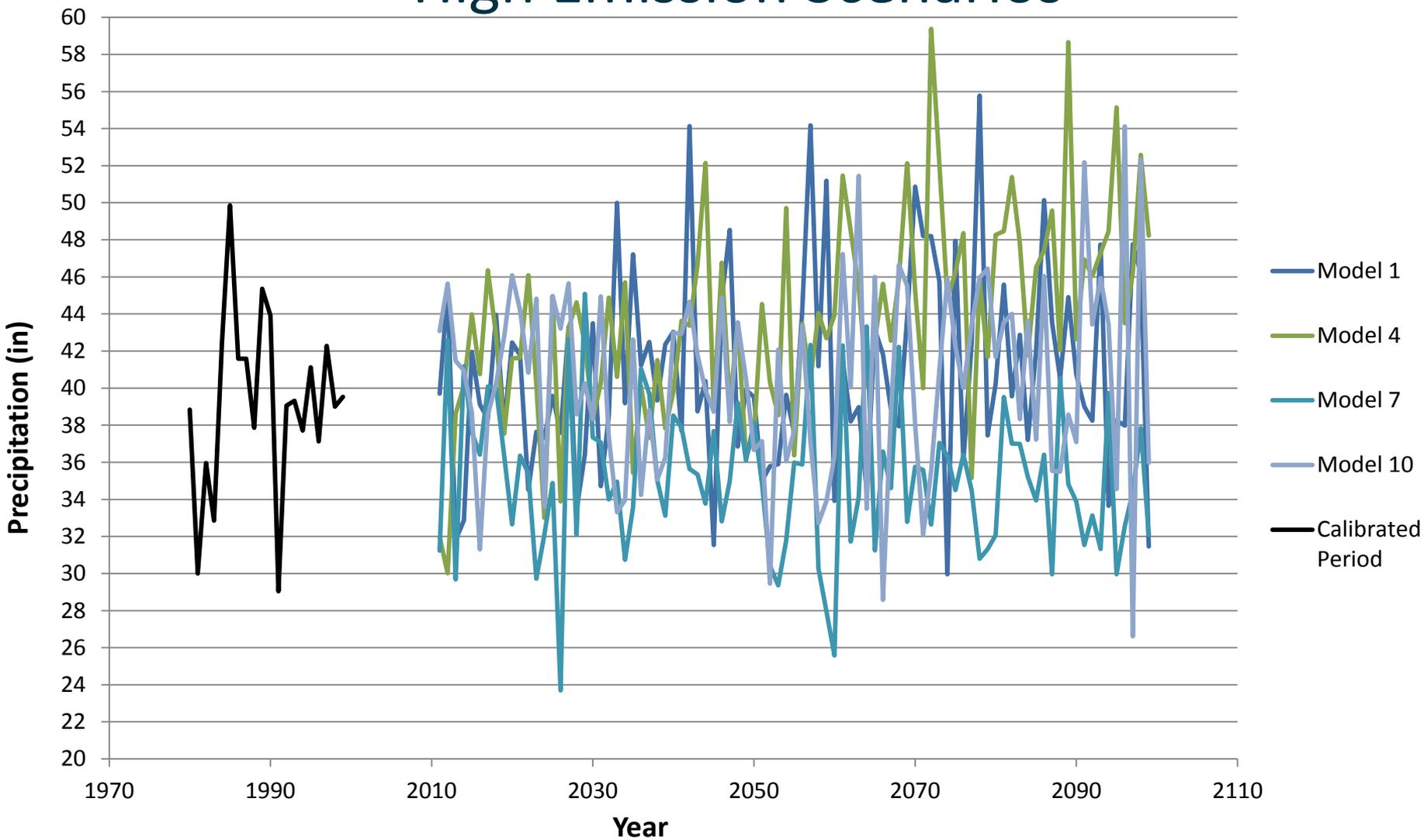


# Actual vs. Projected Annual Mean Temperature (F)

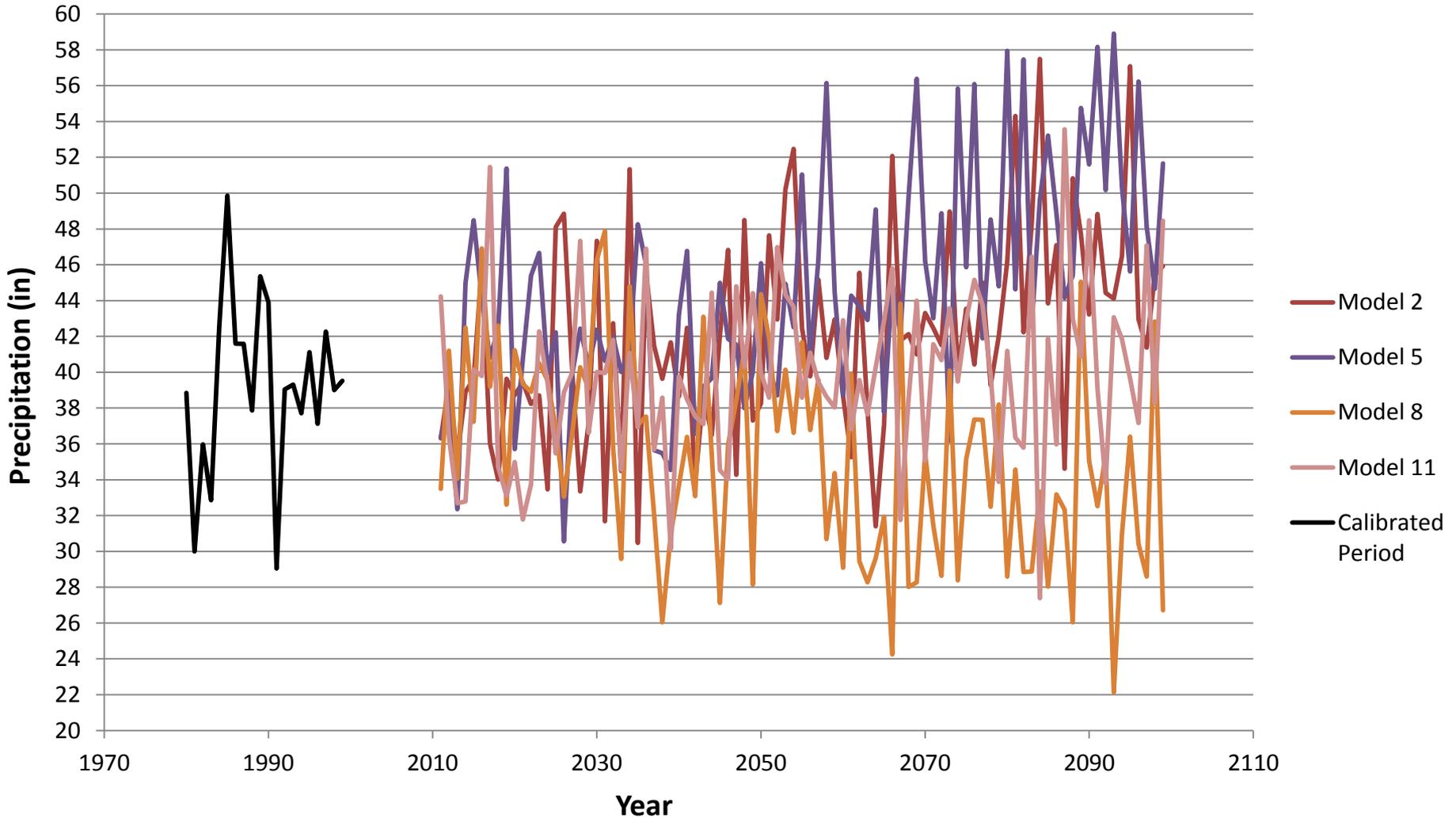
## Medium Emission Scenarios



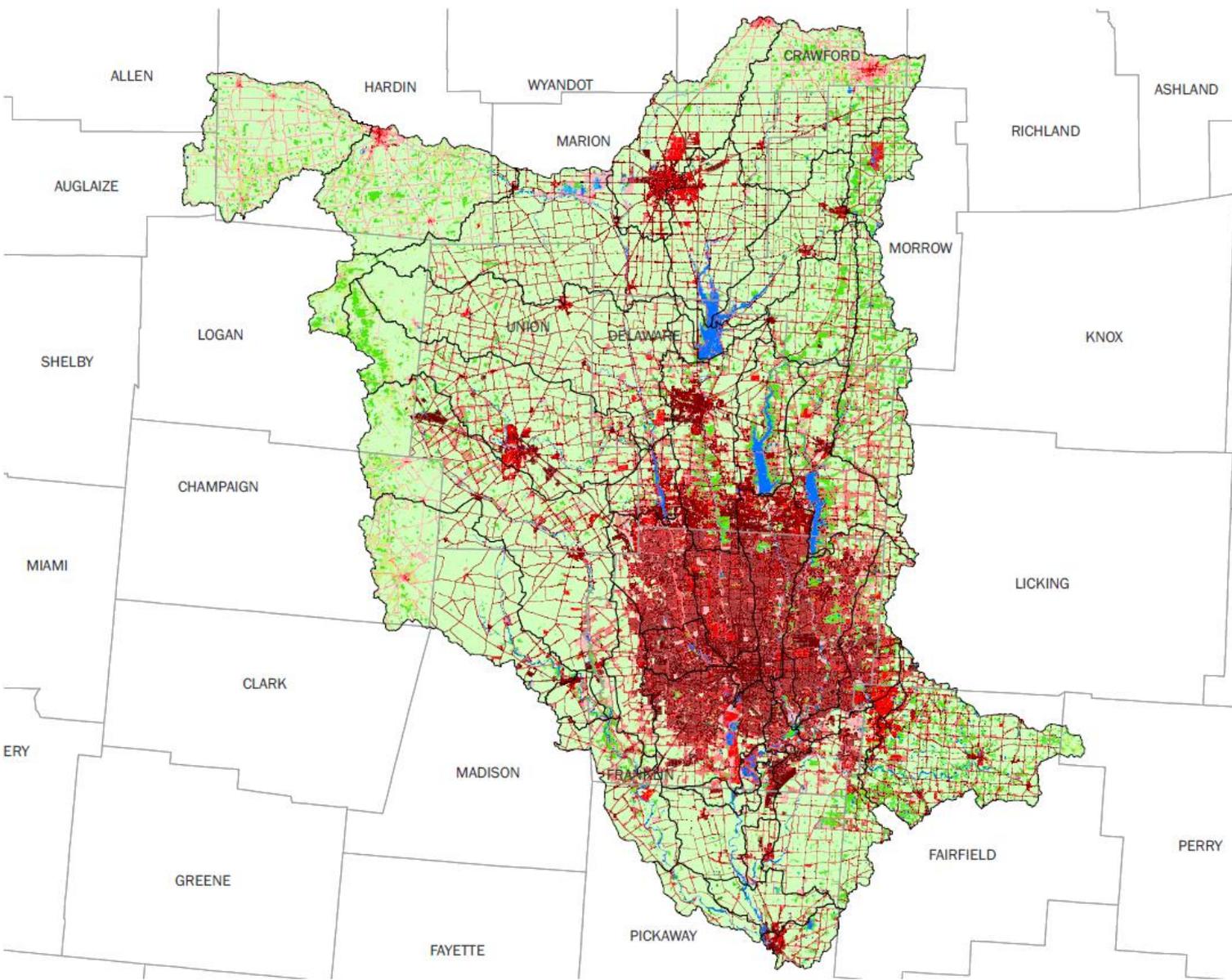
# Actual vs. Projected Annual Mean Precipitation (in) High Emission Scenarios



# Actual vs. Projected Annual Mean Precipitation (in) Medium Emission Scenarios



# Land Cover Existing 2010



- Legend**
- Existing LandCover
- Cultivated Crops
  - Developed, High Intensity
  - Developed, Medium Intensity
  - Developed, Low Intensity
  - Developed, Open Space
  - Open Water
  - Emergent Herbaceous Wetlands
  - Woody Wetlands
  - Mixed Forest
  - Deciduous Forest
  - Evergreen Forest
  - Shrub/Scrub
  - Pasture
  - Barren Land
  - Grassland
  - Project Area
  - County Boundary



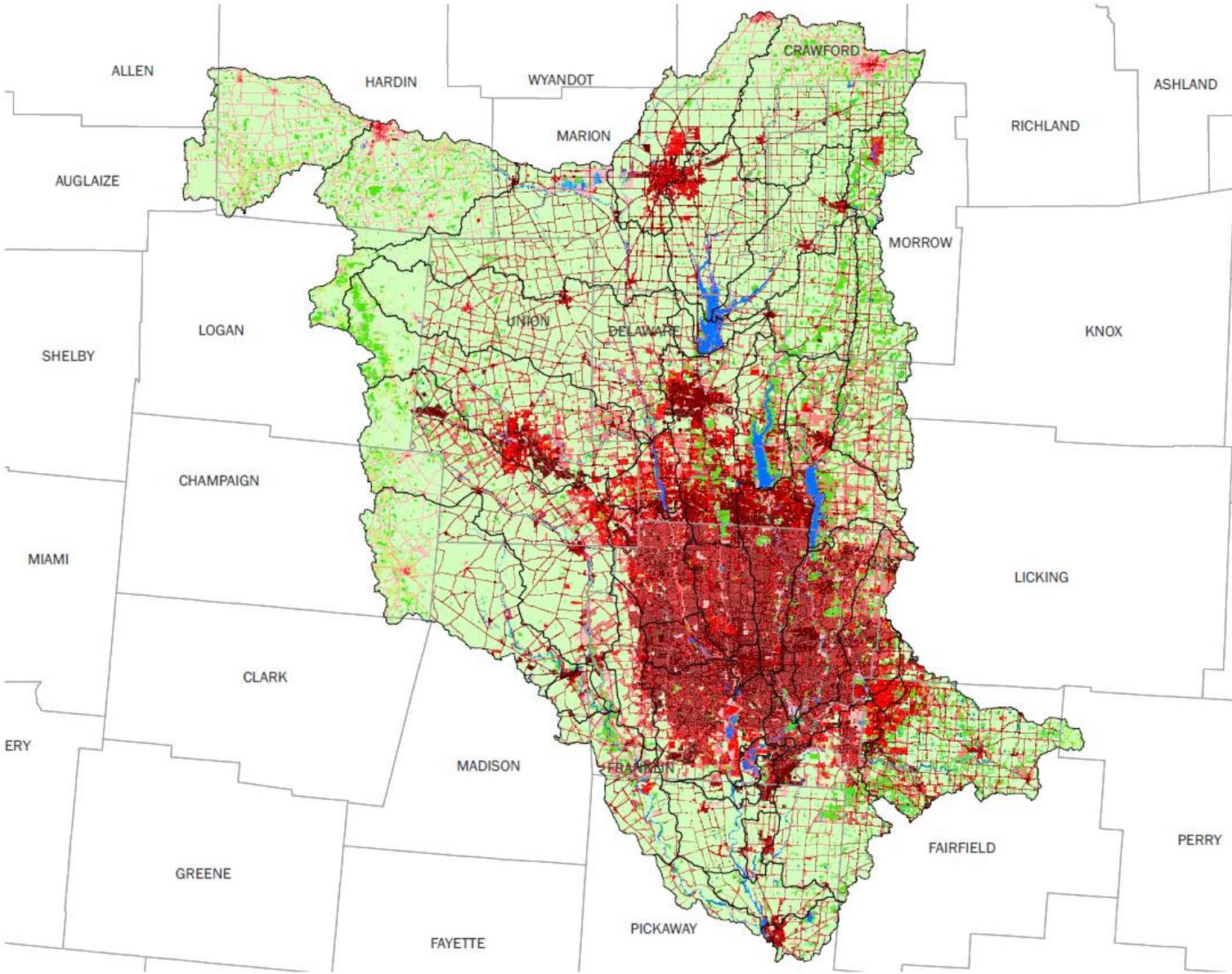
Source:  
MORPC, USGS, ODOT  
Franklin County Auditor



The information shown on this map is compiled from various sources available to us which we believe to be reliable.  
n:\arcgis\center\usgs\Landcover\_Cnty\_Ea.mxd  
June 2013



# Land Cover Future 2035



- Legend**
- Existing LandCover
- Cultivated Crops
  - Developed, High Intensity
  - Developed, Medium Intensity
  - Developed, Low Intensity
  - Developed, Open Space
  - Open Water
  - Emergent Herbaceous Wetlands
  - Woody Wetlands
  - Mixed Forest
  - Deciduous Forest
  - Evergreen Forest
  - Shrub/Scrub
  - Pasture
  - Barren Land
  - Grassland
- USGS Subbasin
- County Boundary



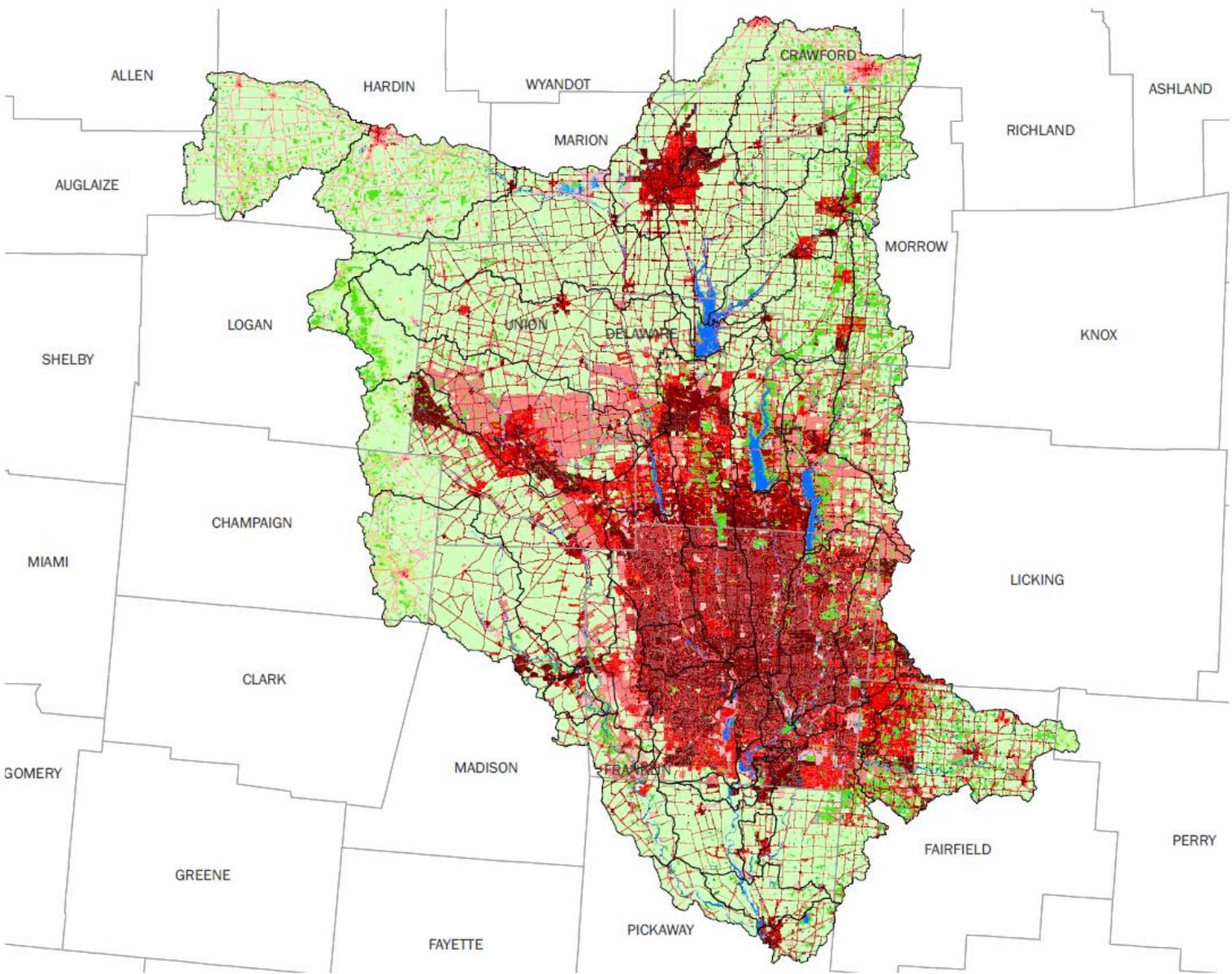
Source:  
MORPC, USGS, ODOT  
Franklin County Auditor



The information shown on this map is compiled from various sources available to us which we believe to be reliable.  
r:/sreg/pls/cenr/usgs/Landcover\_Basin\_Fut35.mxd  
June 2013



# Land Cover Future 2090



- Legend**
- Future LandCover
- Cultivated Crops
  - Developed, High Intensity
  - Developed, Medium Intensity
  - Developed, Low Intensity
  - Developed, Open Space
  - Open Water
  - Emergent Herbaceous Wetlands
  - Woody Wetlands
  - Mixed Forest
  - Deciduous Forest
  - Evergreen Forest
  - Shrub/Scrub
  - Pasture
  - Barren Land
  - Grassland
  - USGS Subbasin
  - County Boundary

Note:  
Future landcover based on local plans,  
where available.



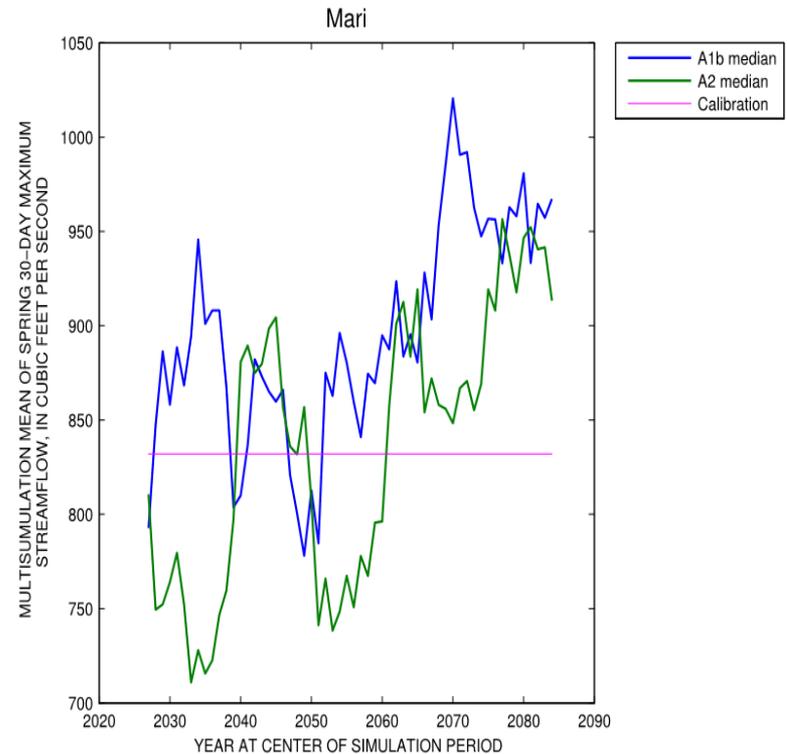
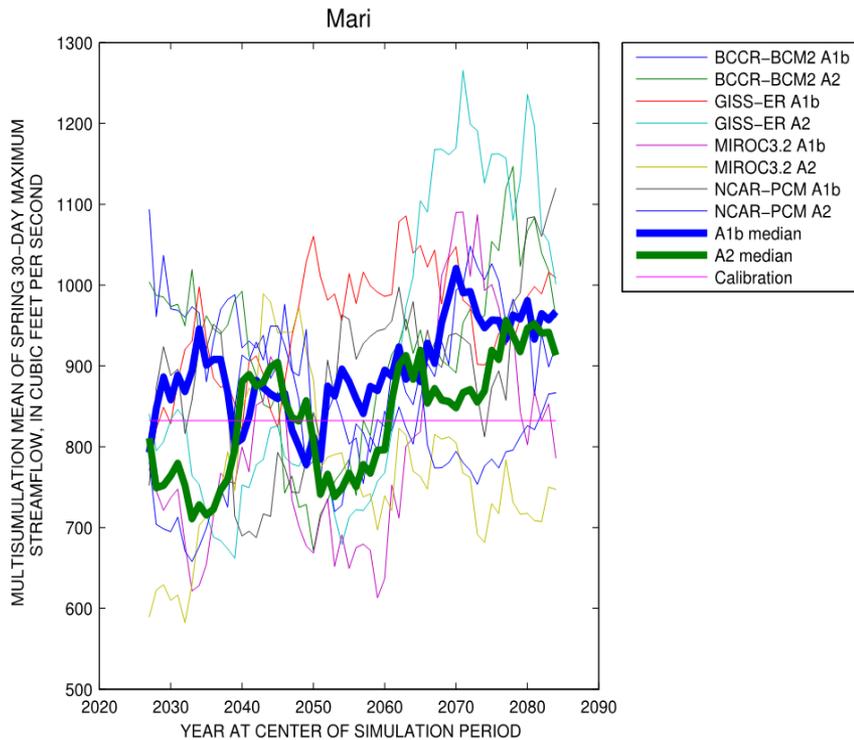
Source:  
MORPC, USGS, ODOT  
Franklin County Auditor



The information shown on this map is compiled from various sources available to us which we believe to be reliable.  
nc:\org\center\usgs\Landcover\_Basin\_Fut.mxd  
June 2013



# Little Scioto Reach with Marion Public Water Supply Climate-Only Seasonal Stream Flows

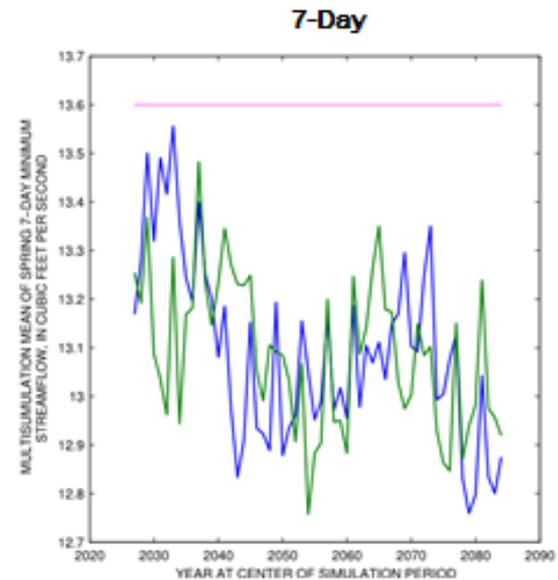
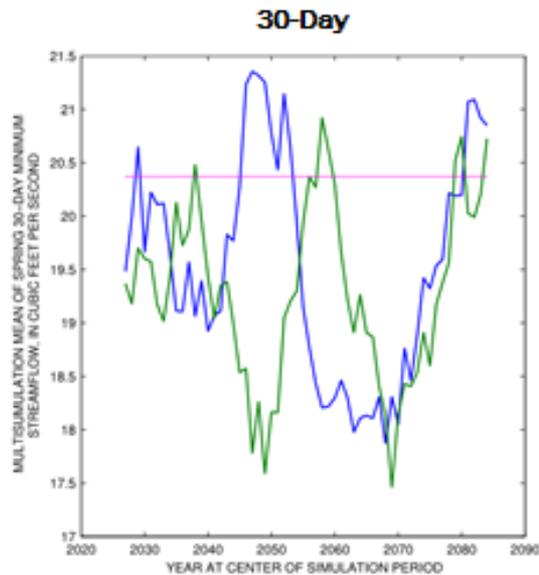
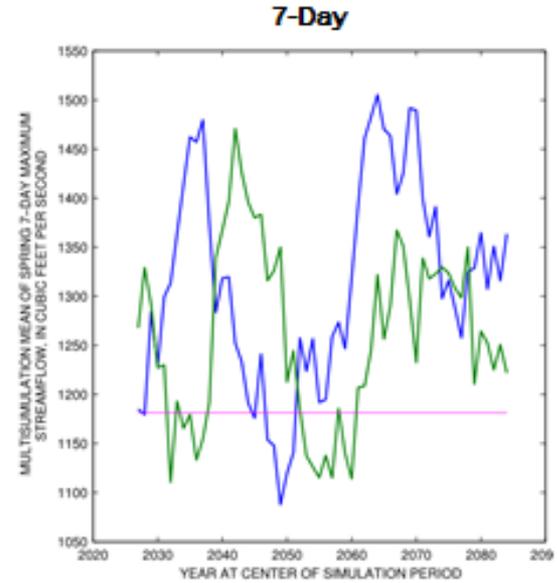
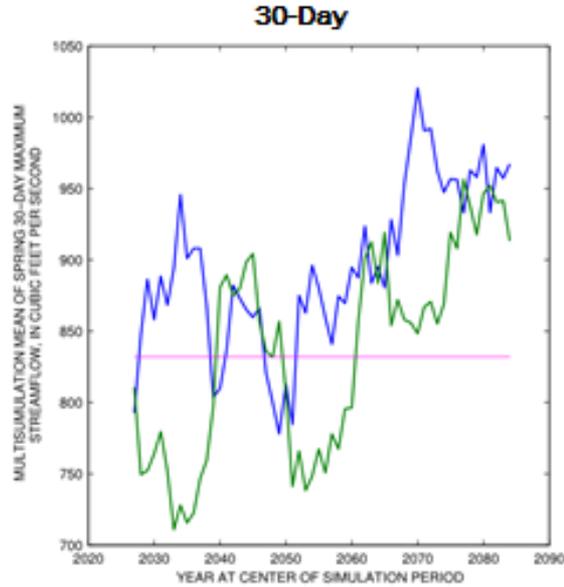


# Little Scioto Reach with Marion Public Water Supply

Spring  
Maximum  
Stream Flow

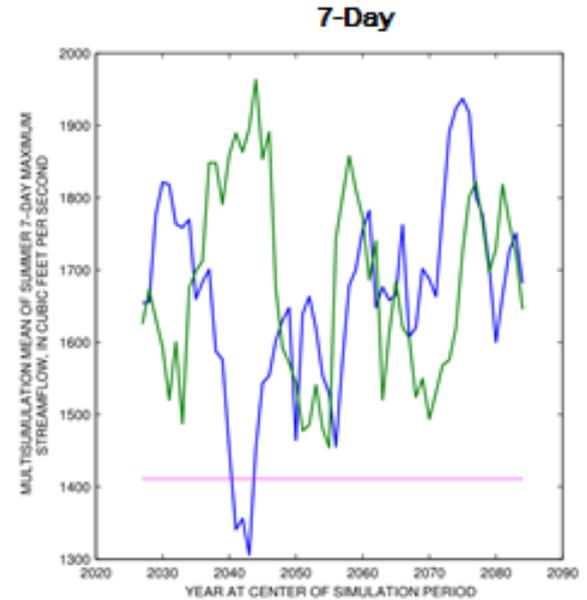
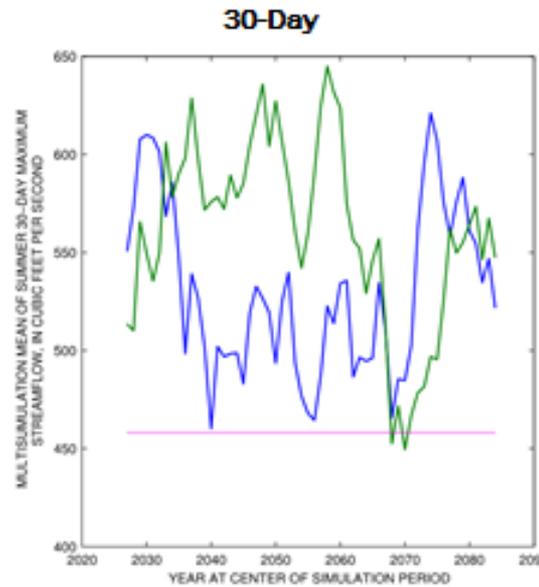
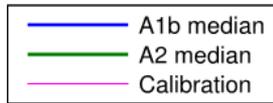
- A1b median
- A2 median
- Calibration

Spring  
Minimum  
Stream Flow

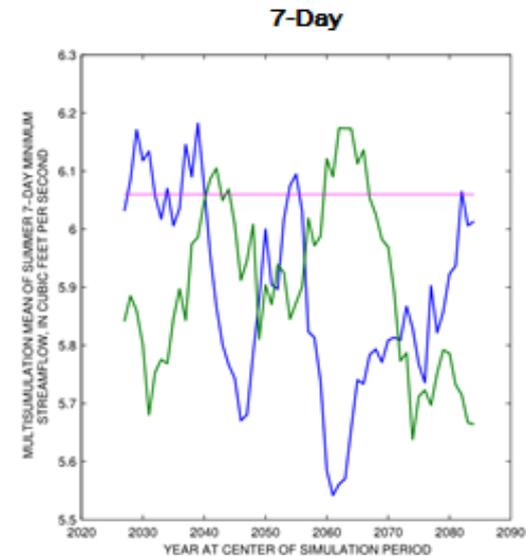
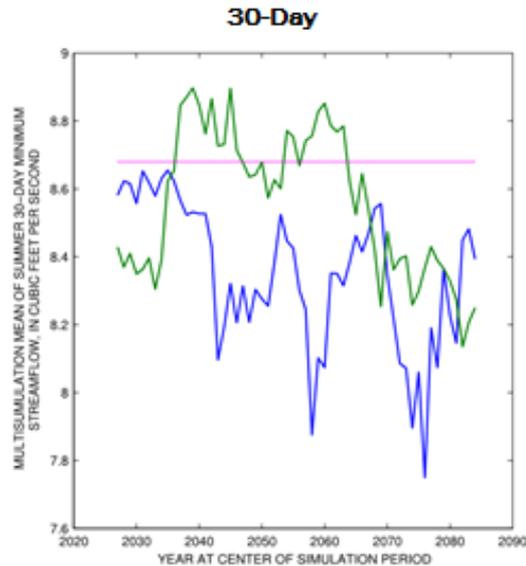


# Little Scioto Reach with Marion Public Water Supply

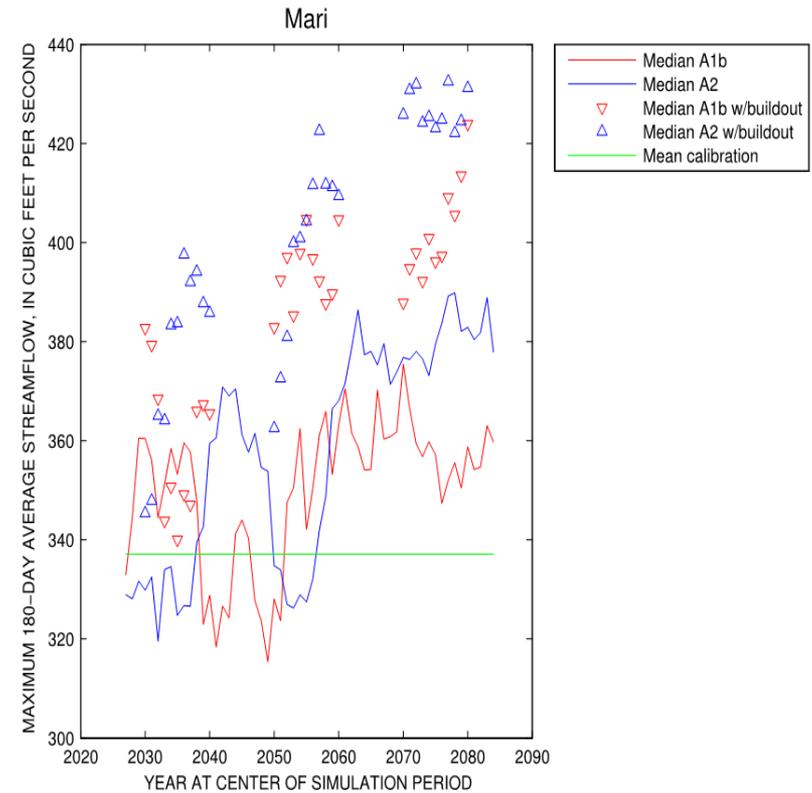
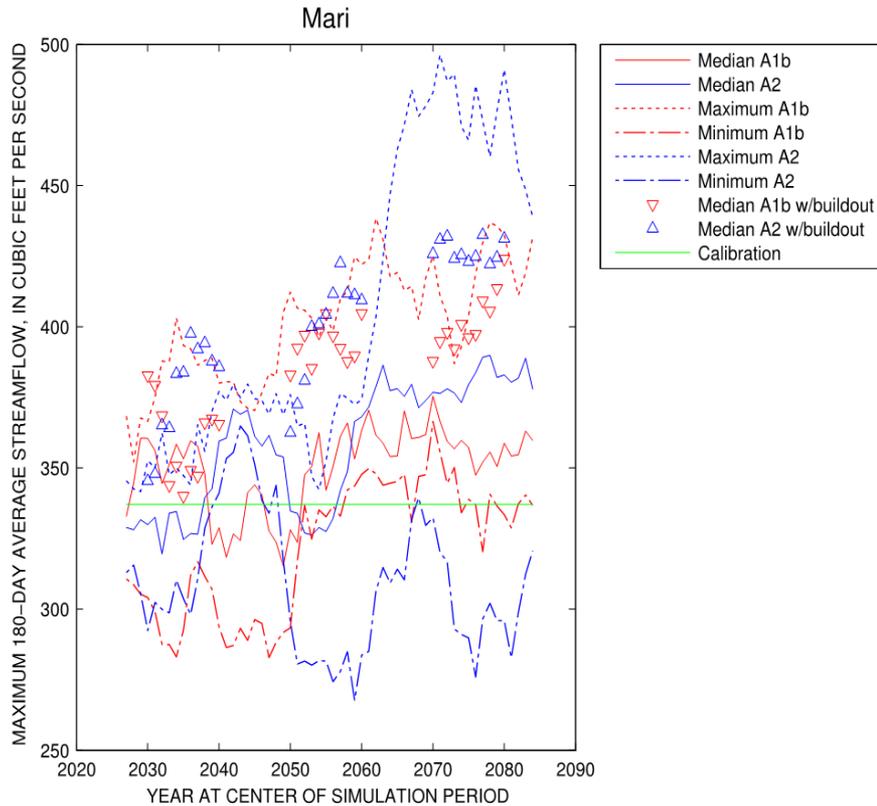
## Summer Maximum Stream Flow



## Summer Minimum Stream Flow



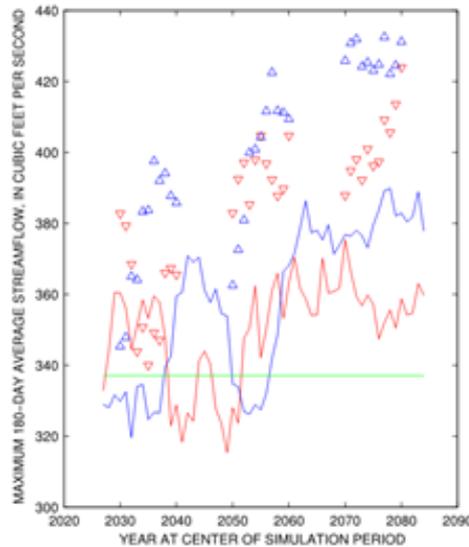
# Little Scioto Reach with Marion Public Water Supply Average Stream Flows with Development



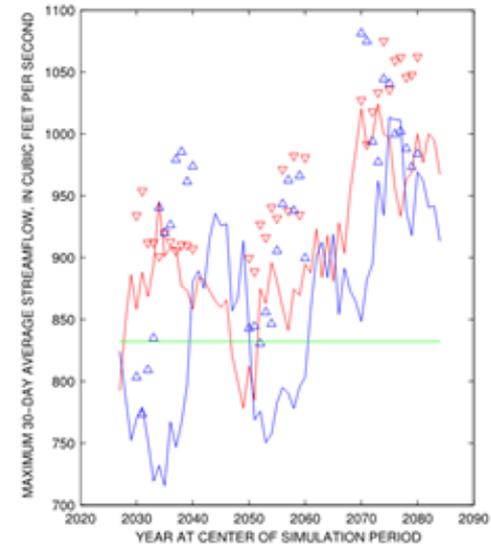
# Little Scioto Reach with Marion Public Water Supply

Maximum  
Average Stream  
Flows with  
Development

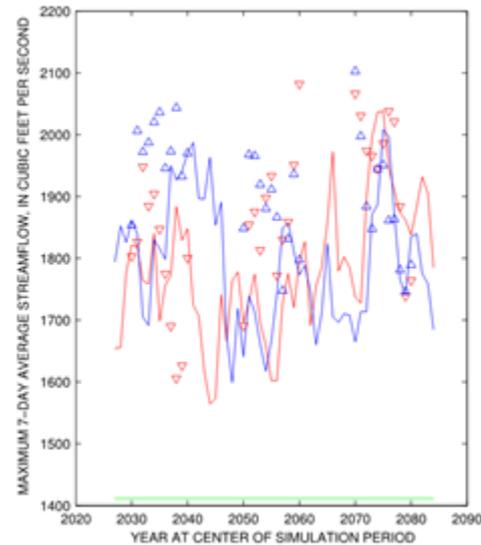
180-Day



30-Day



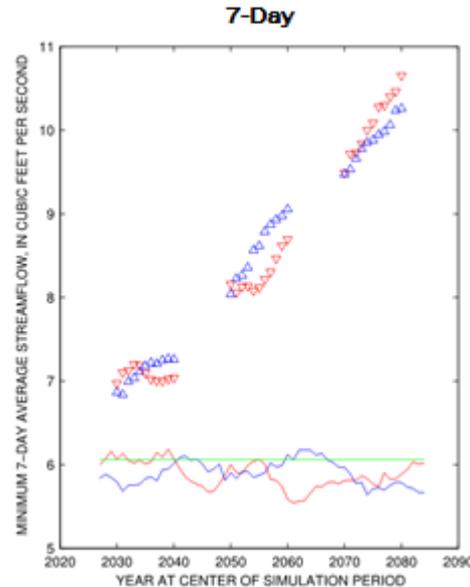
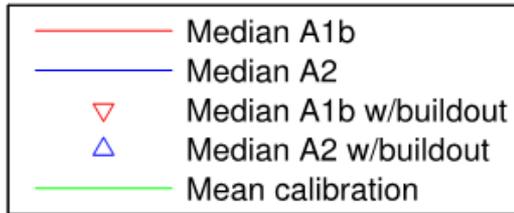
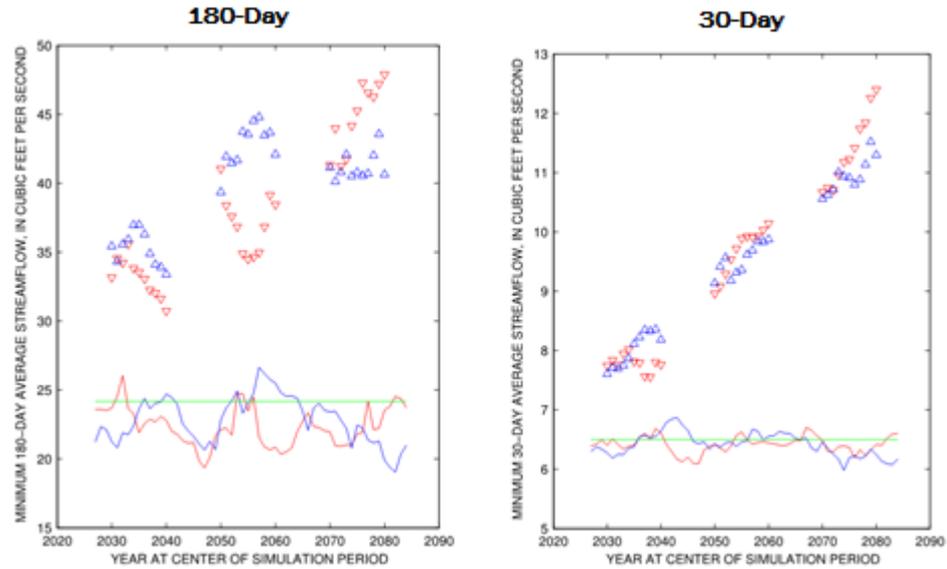
7-Day



- Median A1b
- Median A2
- Median A1b w/buildout
- Median A2 w/buildout
- Mean calibration

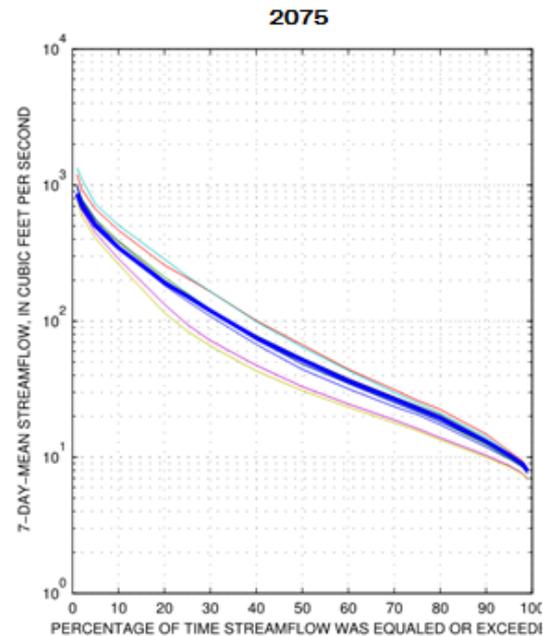
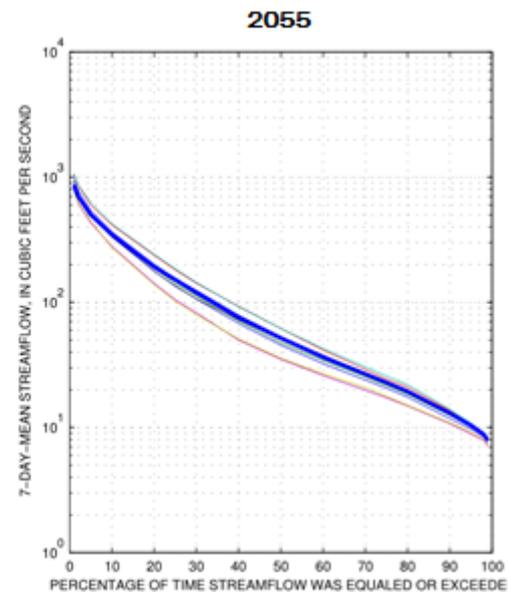
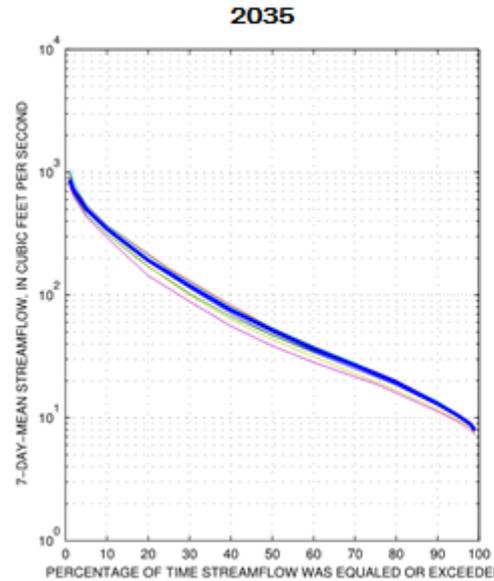
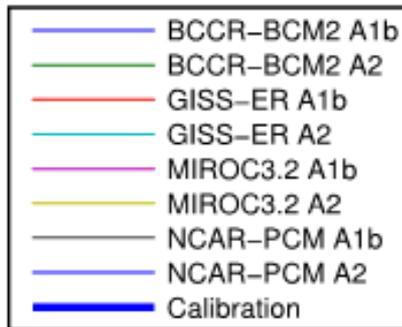
# Little Scioto Reach with Marion Public Water Supply

## Minimum Average Stream Flows with Development



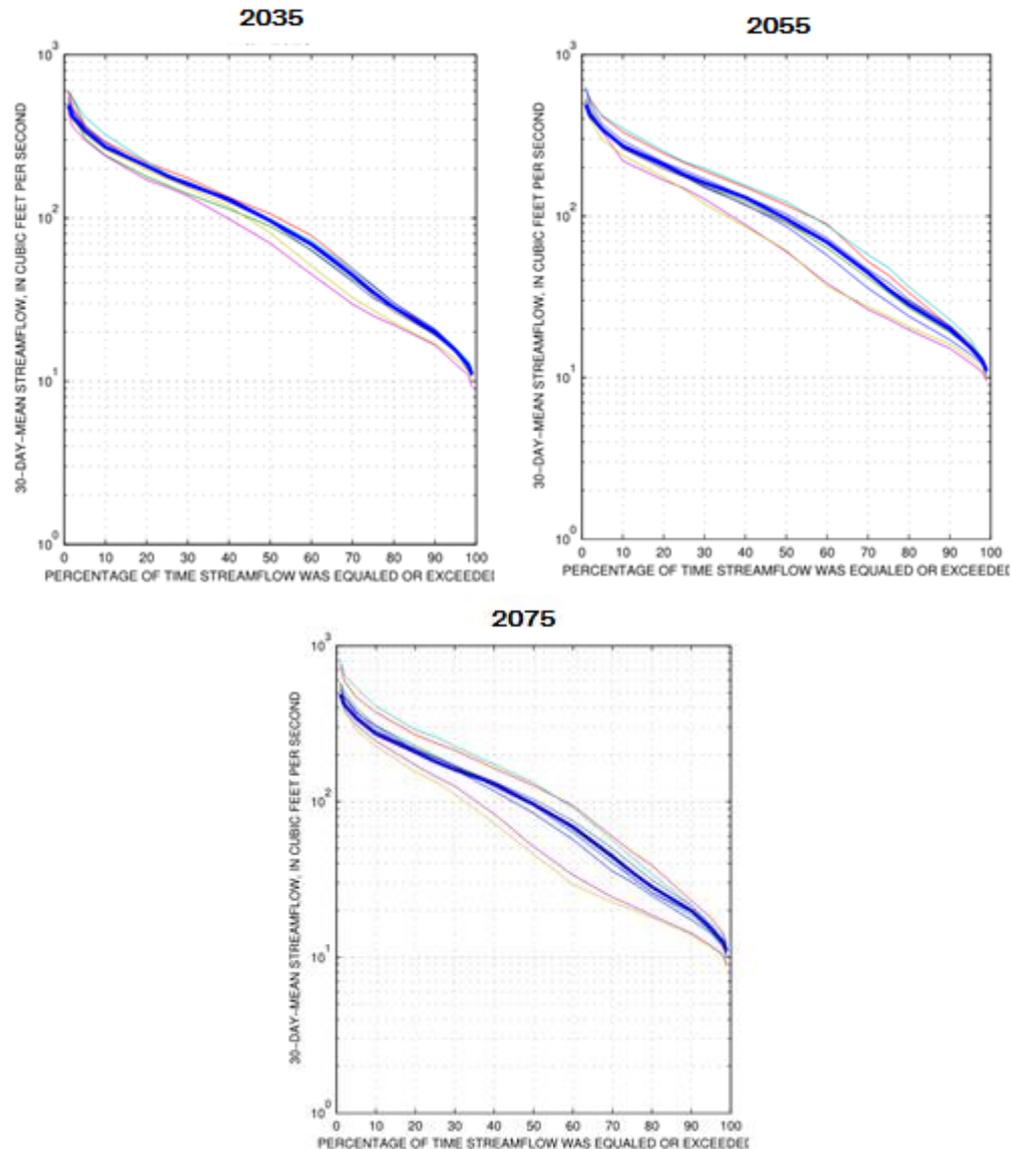
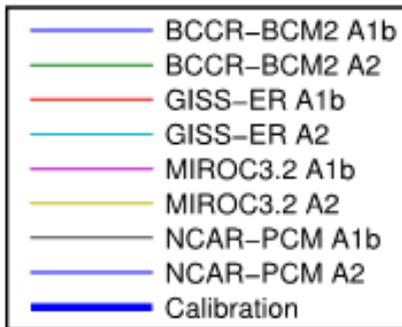
# Little Scioto Reach with Marion Public Water Supply

## 7- Day Flow Durations without Development

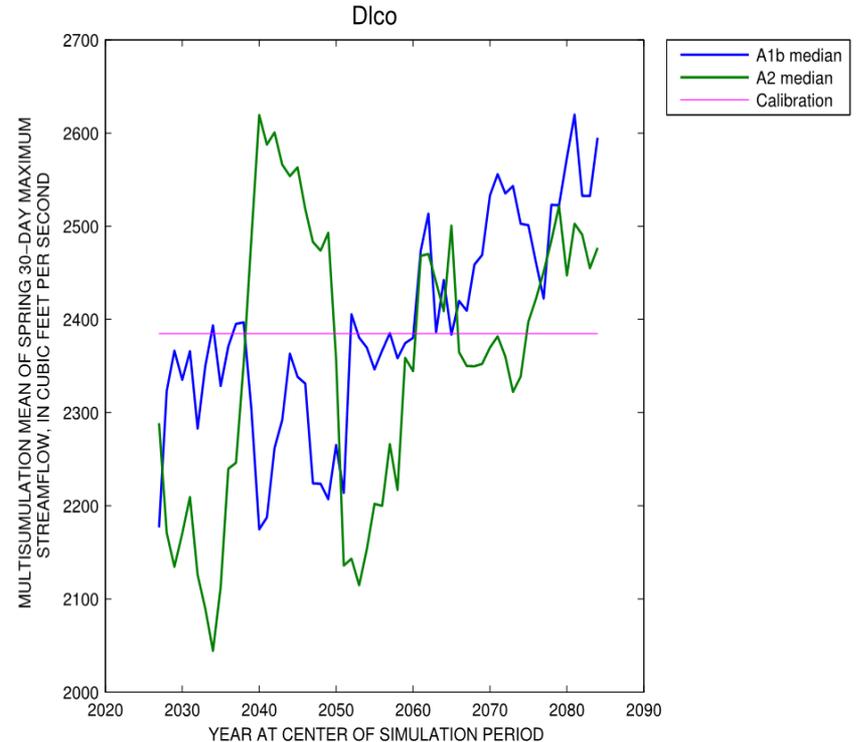
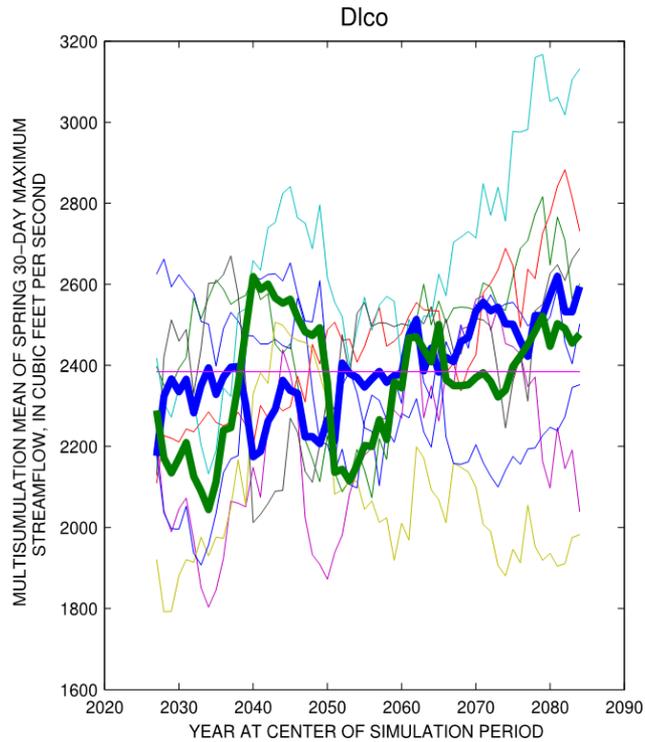


# Little Scioto Reach with Marion Public Water Supply

## 30- Day Flow Durations without Development

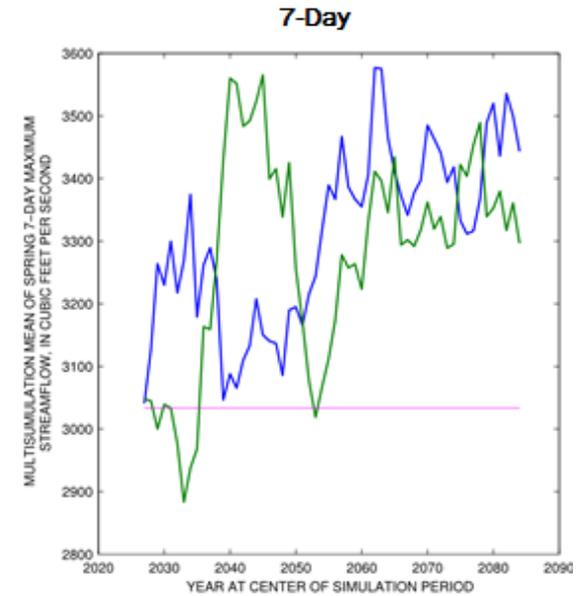
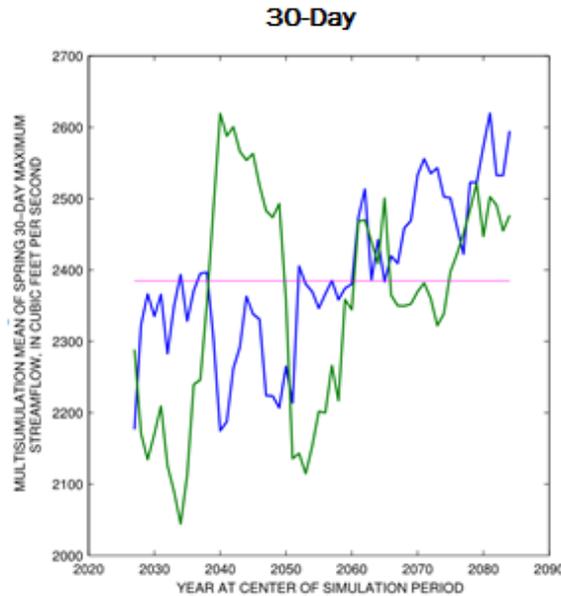
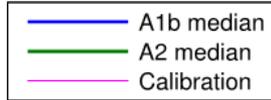


# Olentangy River at Del-Co Climate-Only Seasonal Stream Flows

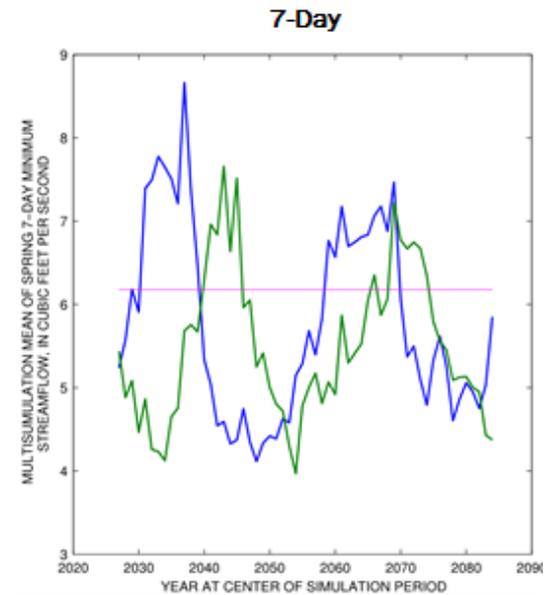
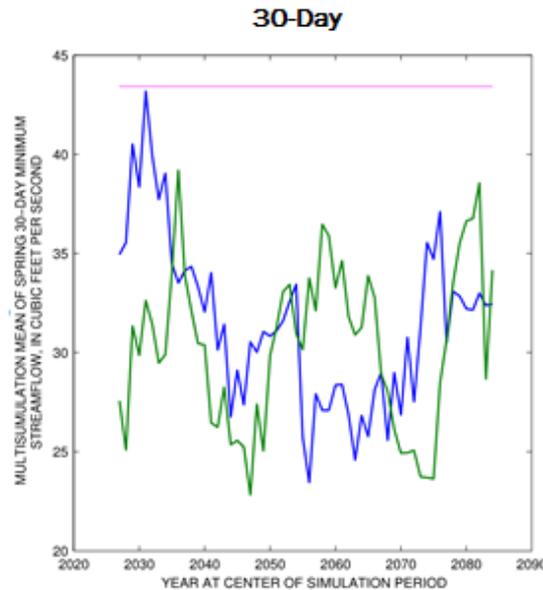


# Olentangy River at Del-Co

## Spring Maximum Stream Flow

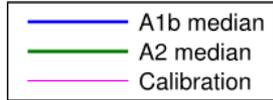


## Spring Minimum Stream Flow

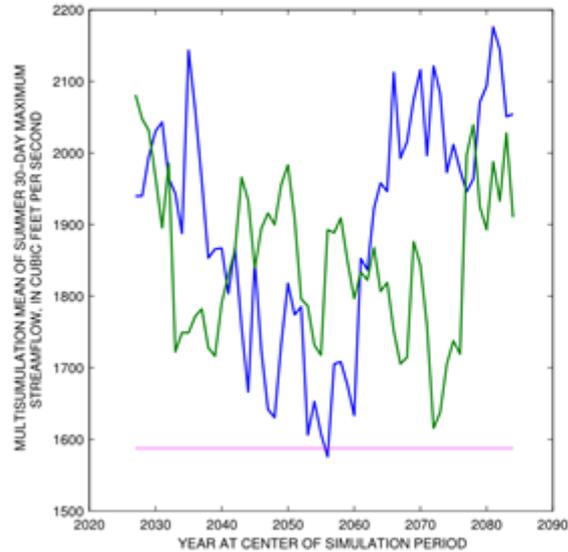


# Olentangy River at Del-Co

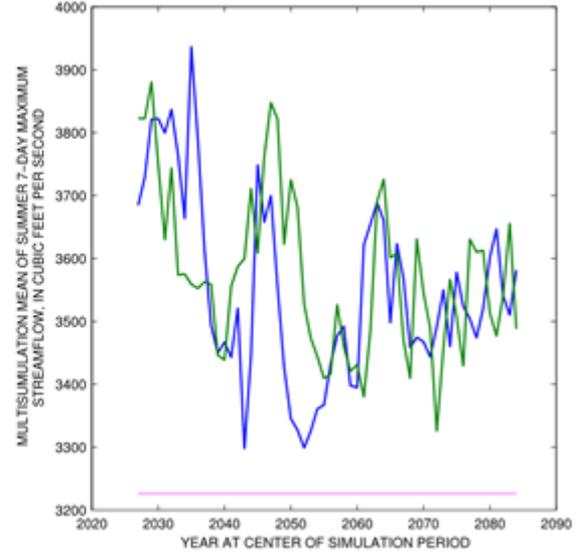
Summer  
Maximum  
Stream Flow



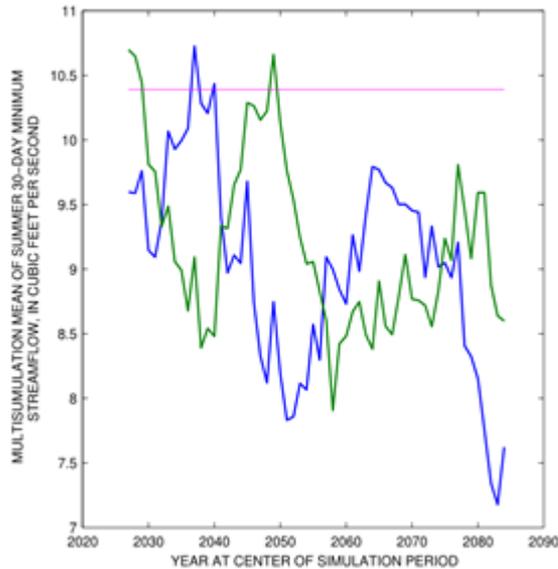
30-Day



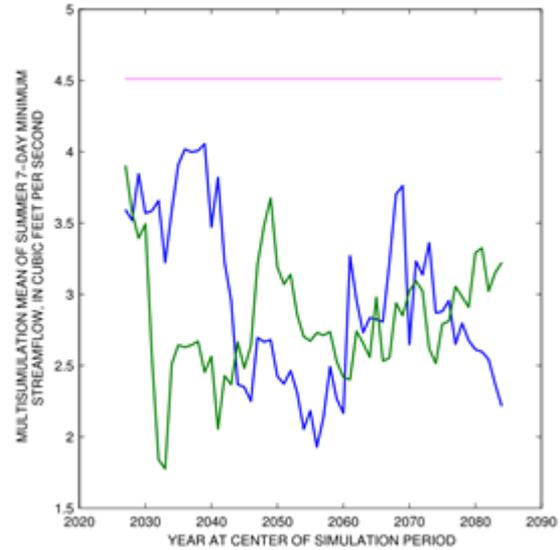
7-Day



30-Day



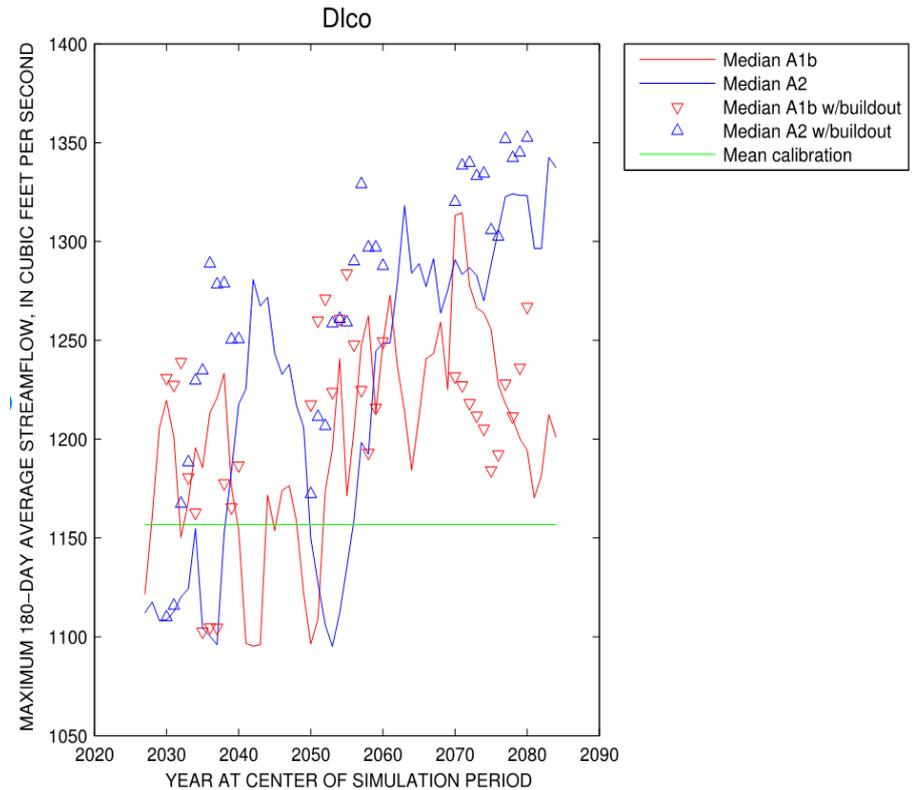
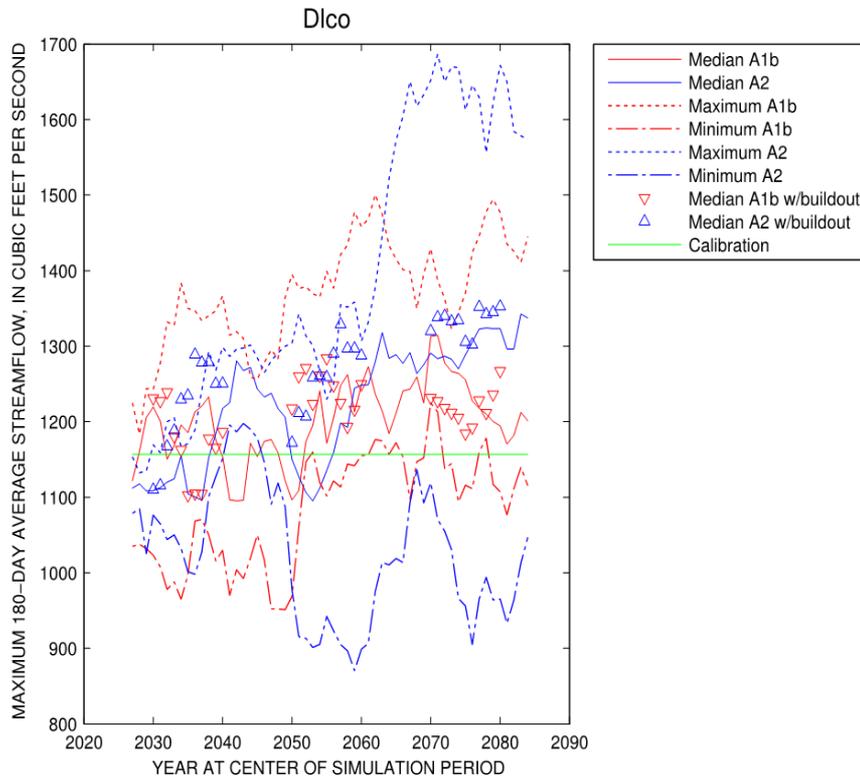
7-Day



Summer  
Minimum  
Stream Flow

# Olentangy River at Del-Co

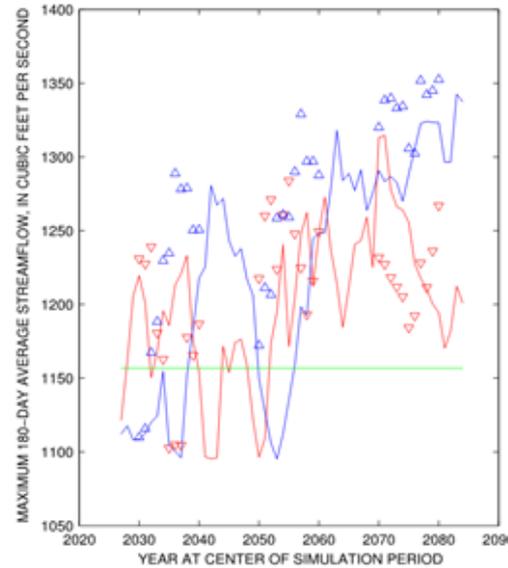
## Average Stream Flows with Development



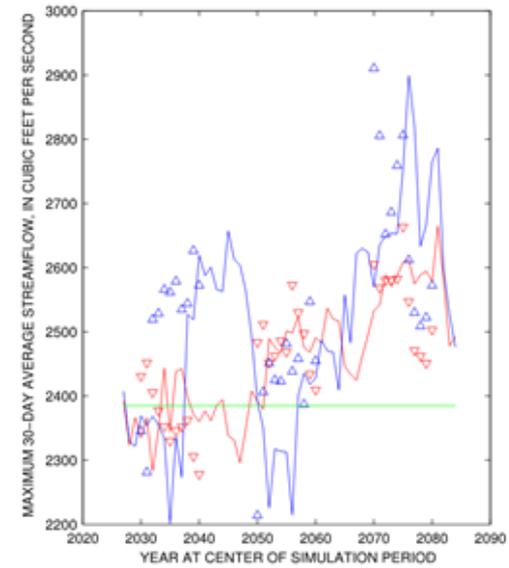
# Olentangy River at Del-Co

## Maximum Average Stream Flows with Development

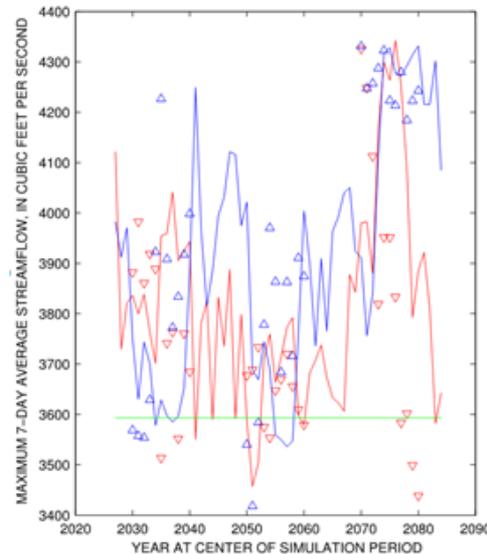
180-Day



30-Day



7-Day

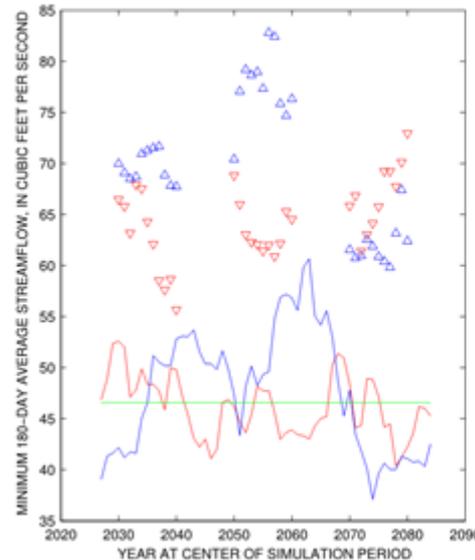


- Median A1b
- Median A2
- ▽ Median A1b w/buildout
- △ Median A2 w/buildout
- Mean calibration

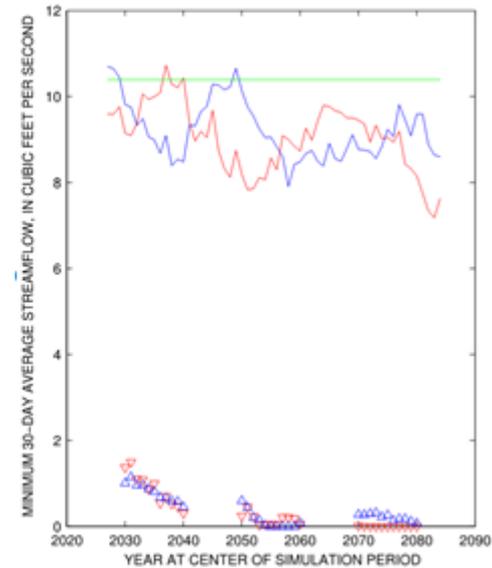
# Olentangy River at Del-Co

## Minimum Average Stream Flows with Development

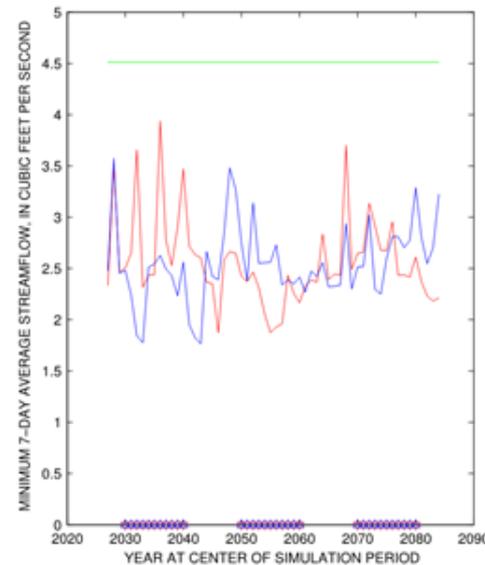
180-Day



30-Day



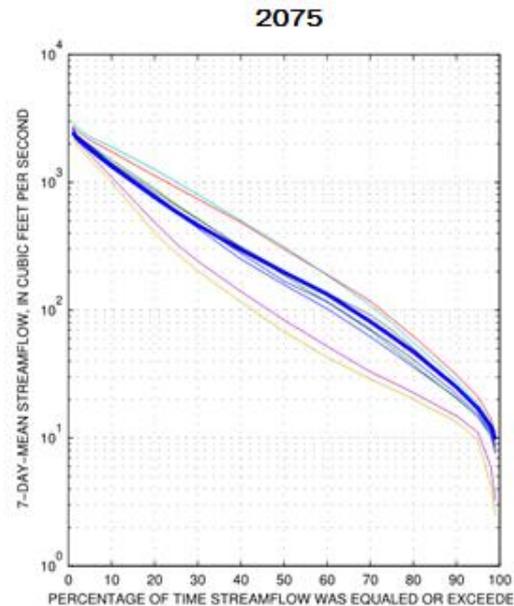
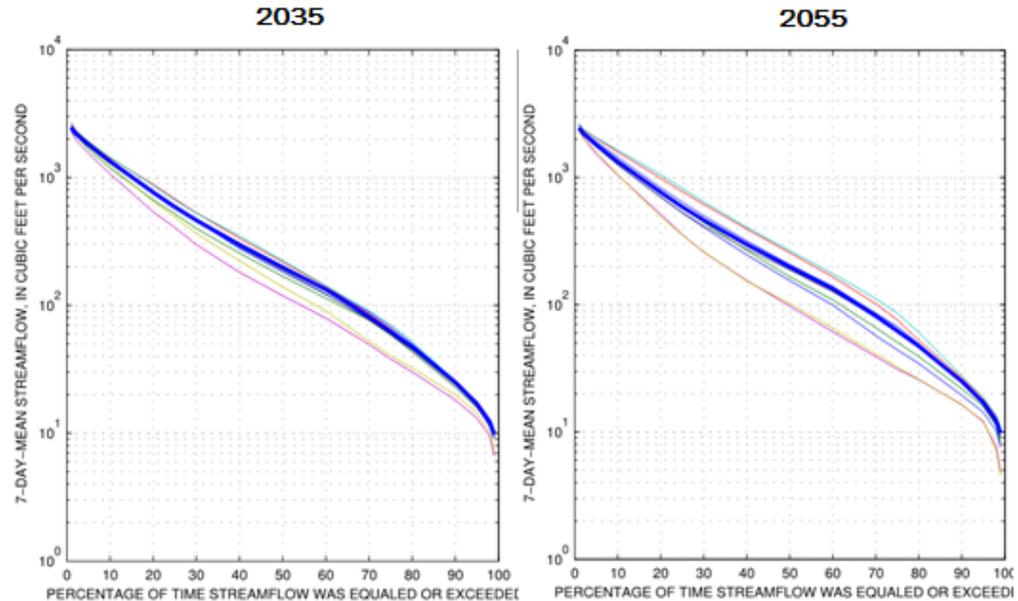
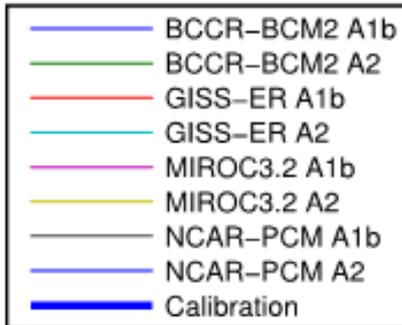
7-Day



- Median A1b
- Median A2
- ▽ Median A1b w/buildout
- △ Median A2 w/buildout
- Mean calibration

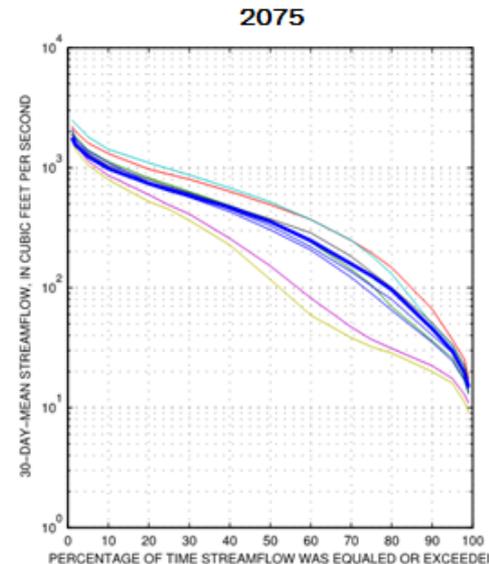
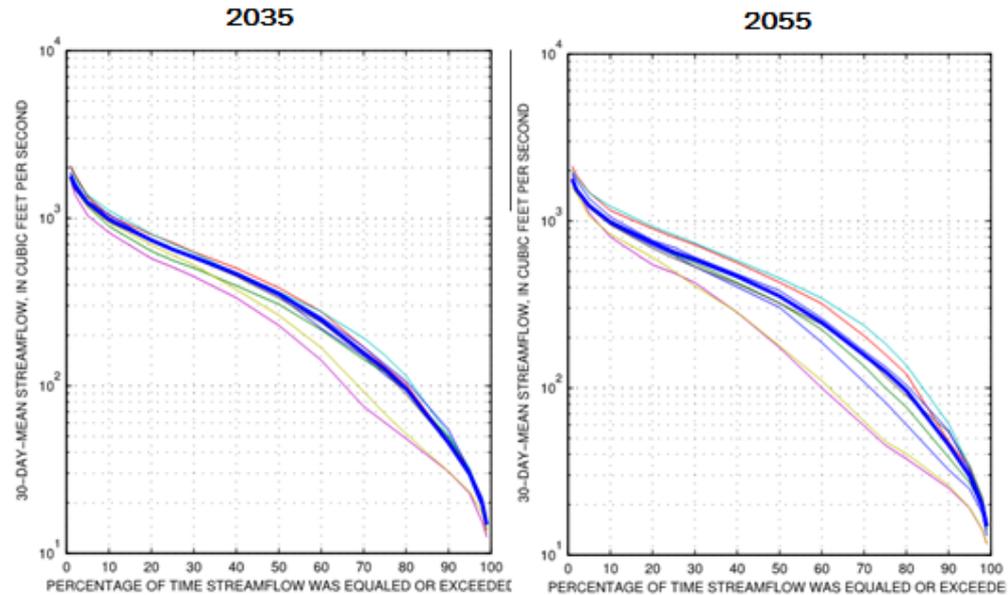
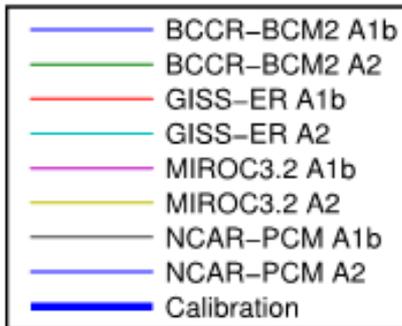
# Olentangy River at Del-Co

## 7- Day Flow Durations without Development

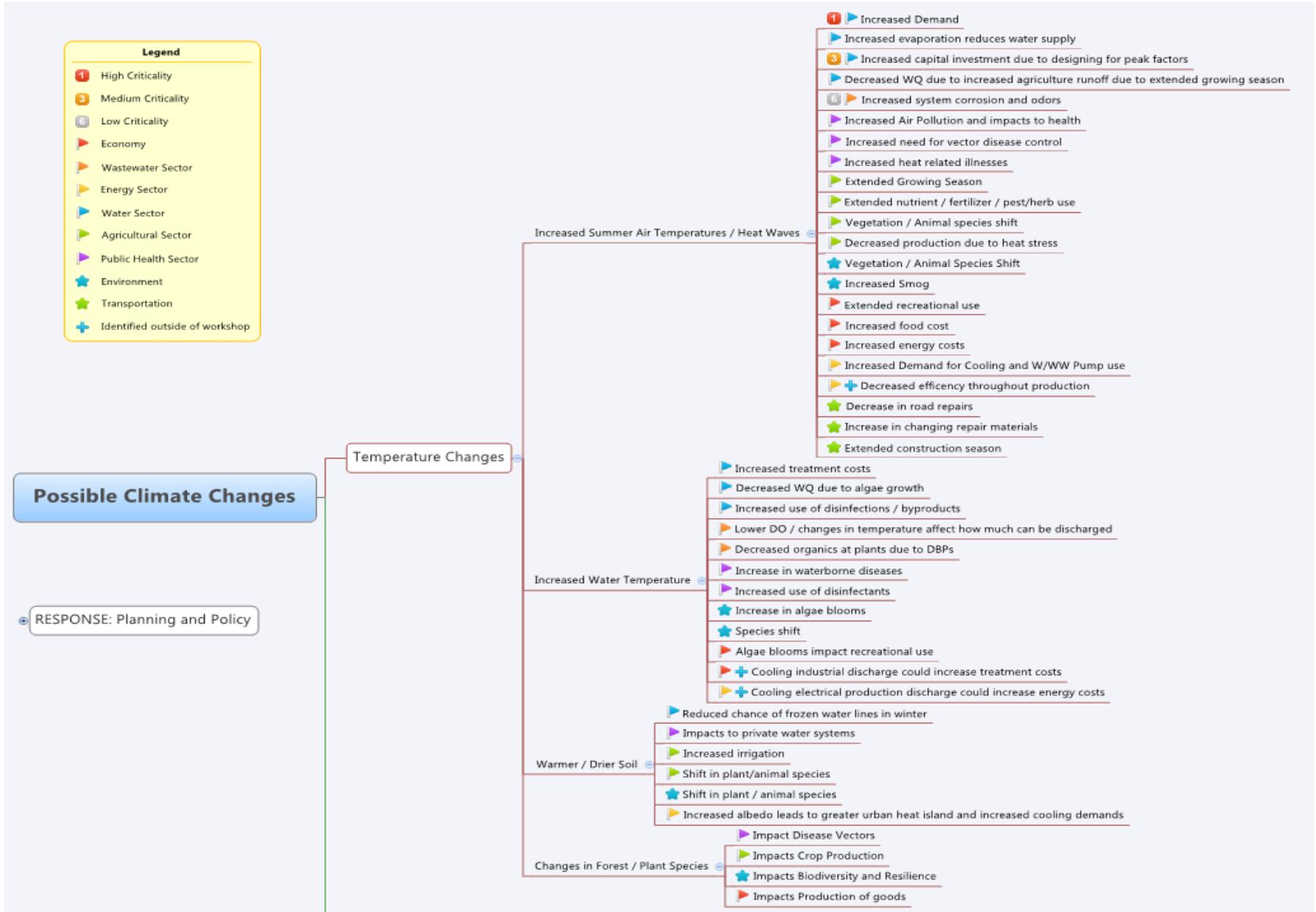


# Olentangy River at Del-Co

## 30- Day Flow Durations without Development

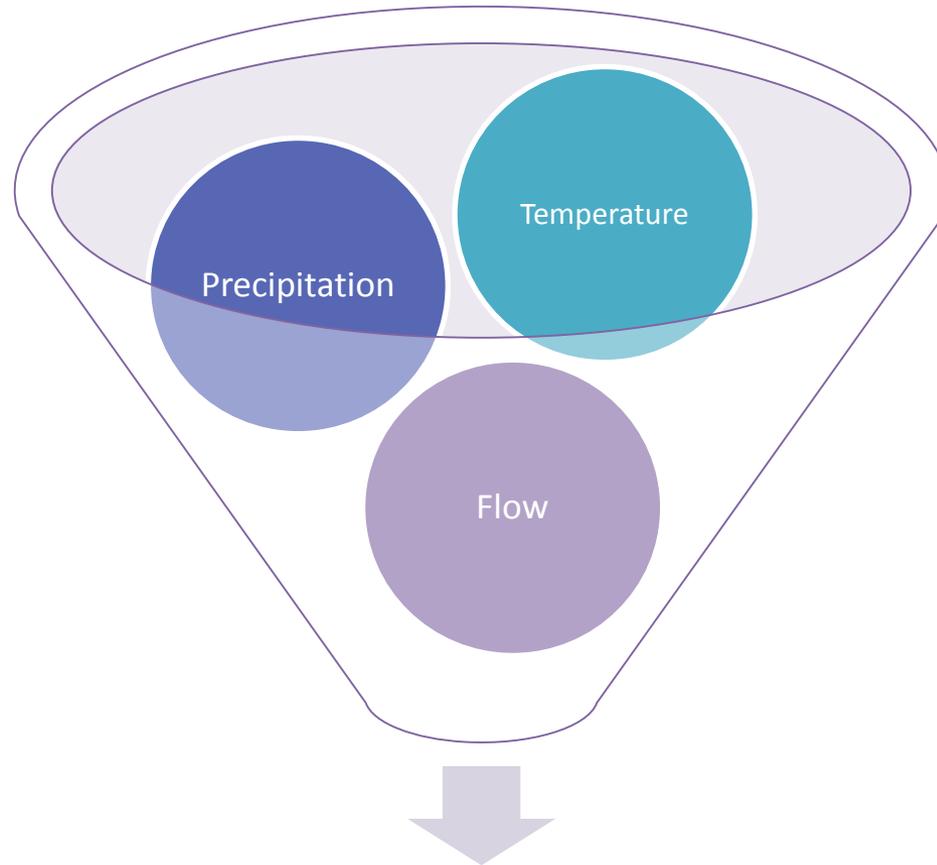


# Review of Impact Assessment Results: Temperature Changes



# Understand Projected Impacts and Challenges

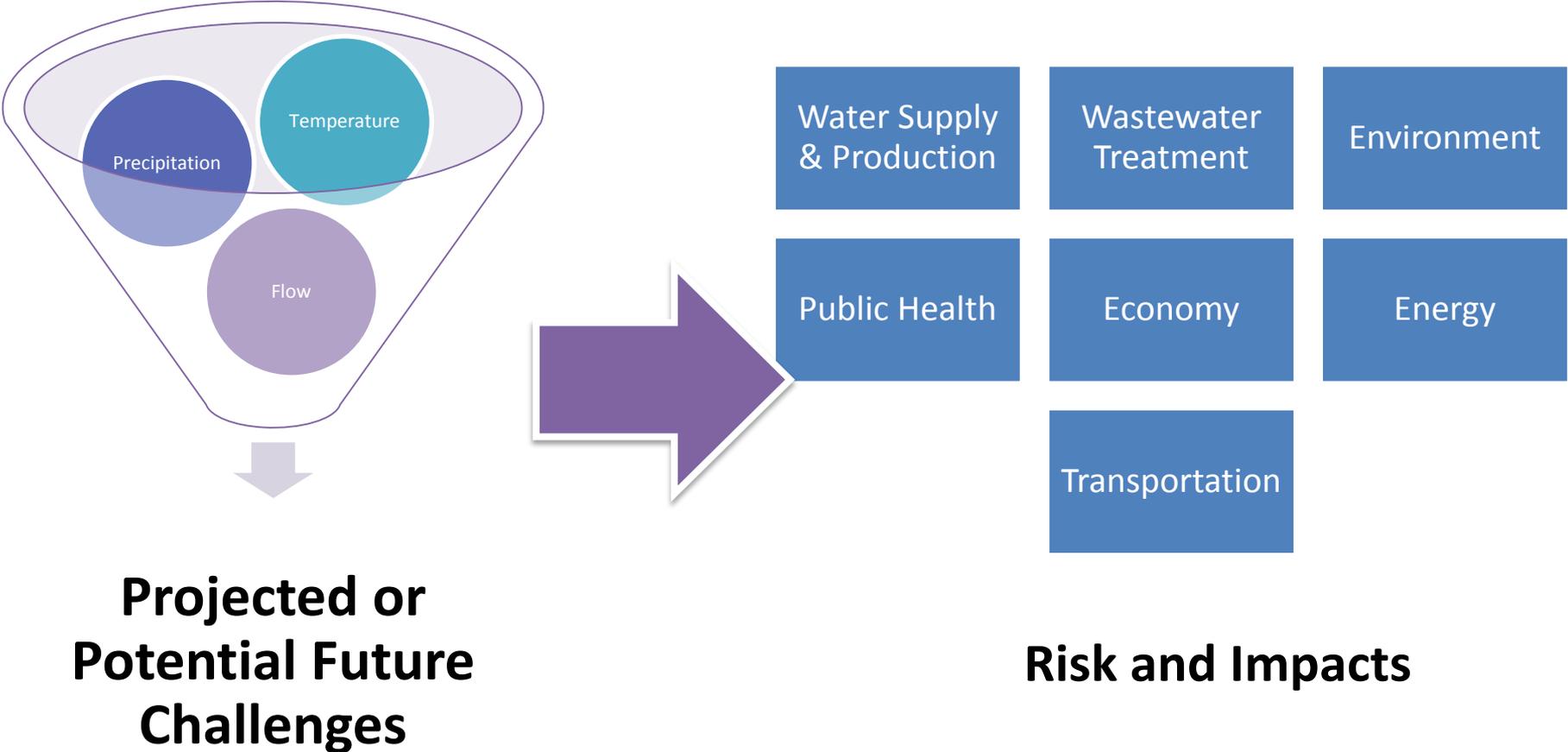
**Projected or Potential Changes in these factors**



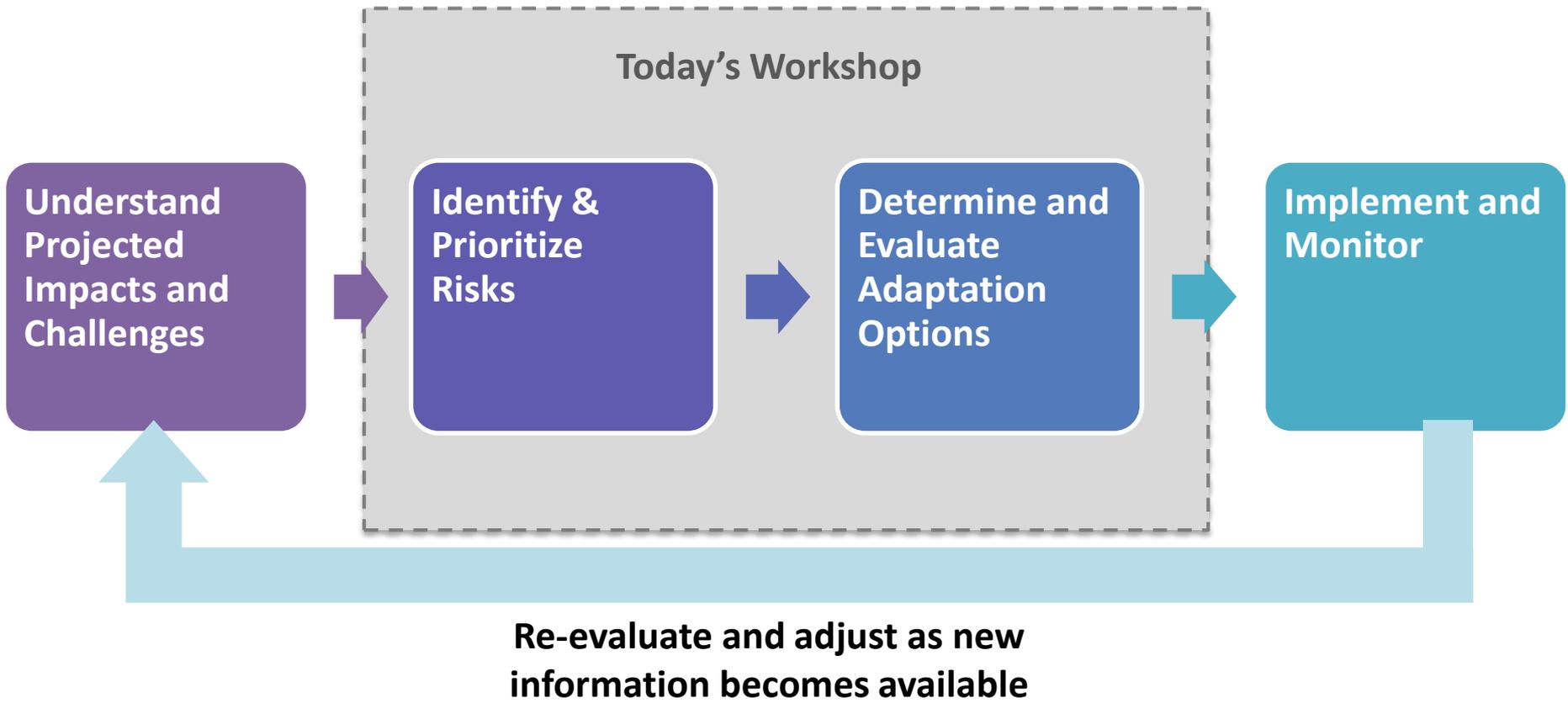
**Projected or Potential Future Challenges**



# Identify Risks Caused by Predicted Impacts

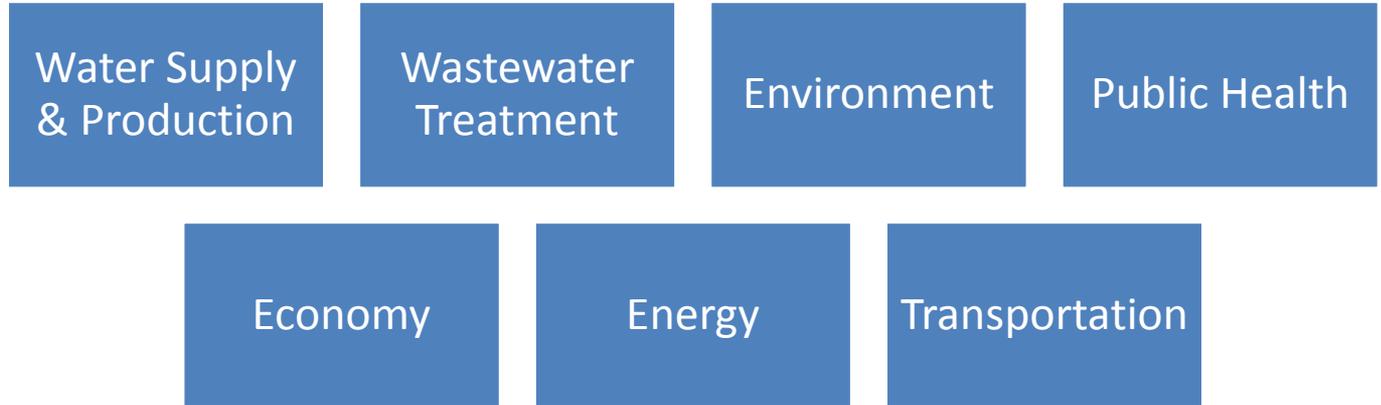


# Adaptive Management Strategies



# Prioritize Impacts

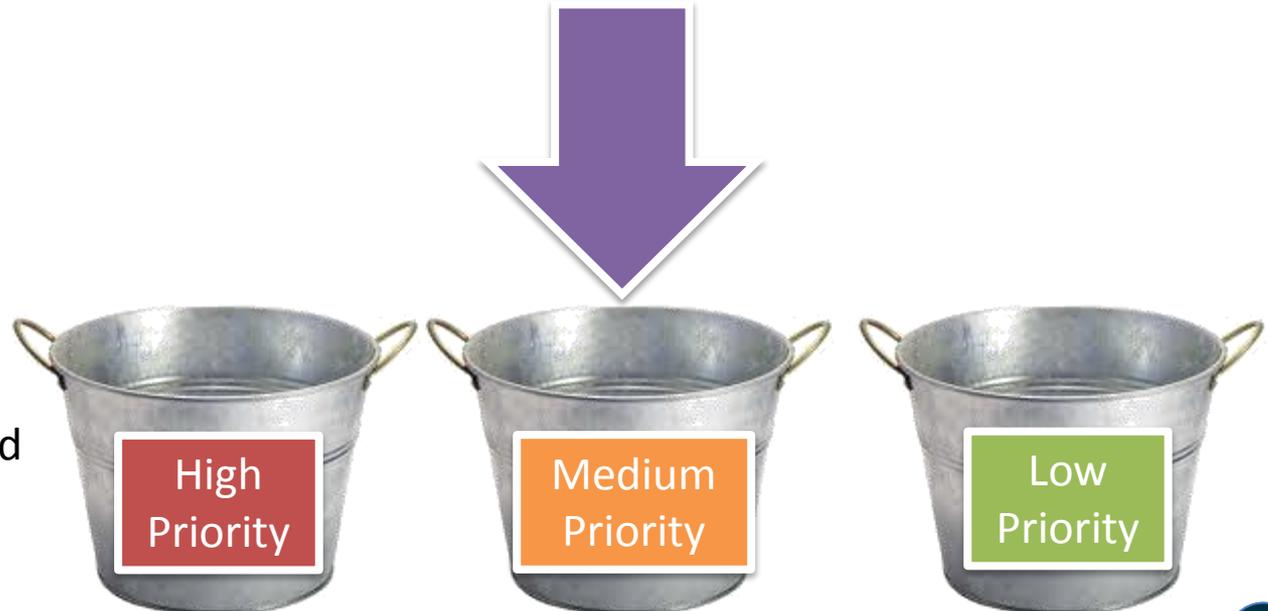
## Risk and Impacts



## Prioritize Impacts

Based on:

- Risk likelihood and consequence
- Current plans and priorities
- Current and projected resources



# Prioritize Impacts



**Affects Livability of  
Region**



**Impacts Quality of  
Life in Region**



**Little / No Impact  
on Quality of Life in  
Region**

- Further Define these Priority Categories in your own terms



# Prioritize Impacts: Define Top 10 High Priorities

- Identify your top 10 high priorities
- Define why it is important regionally
- Identify and describe impacts

**Critical Impacts Prioritization Worksheet**

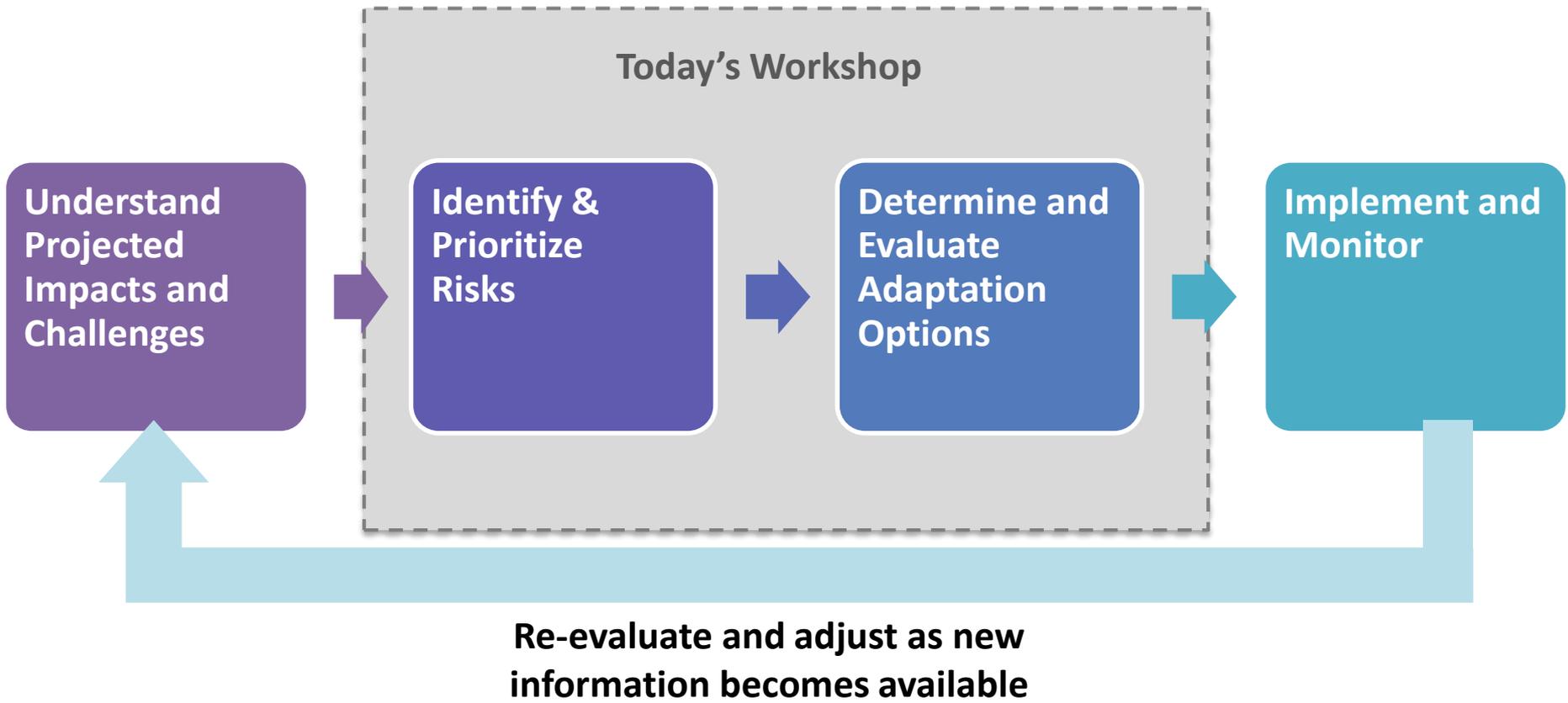


Group Members: \_\_\_\_\_



Potential Impact	Why is this Impact Important?	Sectors Significantly Impacted:
		<input type="checkbox"/> Water <input type="checkbox"/> Environment <input type="checkbox"/> Wastewater <input type="checkbox"/> Economy <input type="checkbox"/> Health <input type="checkbox"/> Energy <input type="checkbox"/> Agriculture <input type="checkbox"/> Transportation
		<input type="checkbox"/> Water <input type="checkbox"/> Environment <input type="checkbox"/> Wastewater <input type="checkbox"/> Economy <input type="checkbox"/> Health <input type="checkbox"/> Energy <input type="checkbox"/> Agriculture <input type="checkbox"/> Transportation
		<input type="checkbox"/> Water <input type="checkbox"/> Environment <input type="checkbox"/> Wastewater <input type="checkbox"/> Economy <input type="checkbox"/> Health <input type="checkbox"/> Energy <input type="checkbox"/> Agriculture <input type="checkbox"/> Transportation
		<input type="checkbox"/> Water <input type="checkbox"/> Environment <input type="checkbox"/> Wastewater <input type="checkbox"/> Economy <input type="checkbox"/> Health <input type="checkbox"/> Energy <input type="checkbox"/> Agriculture <input type="checkbox"/> Transportation
		<input type="checkbox"/> Water <input type="checkbox"/> Environment <input type="checkbox"/> Wastewater <input type="checkbox"/> Economy <input type="checkbox"/> Health <input type="checkbox"/> Energy <input type="checkbox"/> Agriculture <input type="checkbox"/> Transportation
		<input type="checkbox"/> Water <input type="checkbox"/> Environment <input type="checkbox"/> Wastewater <input type="checkbox"/> Economy <input type="checkbox"/> Health <input type="checkbox"/> Energy <input type="checkbox"/> Agriculture <input type="checkbox"/> Transportation
		<input type="checkbox"/> Water <input type="checkbox"/> Environment <input type="checkbox"/> Wastewater <input type="checkbox"/> Economy <input type="checkbox"/> Health <input type="checkbox"/> Energy <input type="checkbox"/> Agriculture <input type="checkbox"/> Transportation
		<input type="checkbox"/> Water <input type="checkbox"/> Environment <input type="checkbox"/> Wastewater <input type="checkbox"/> Economy <input type="checkbox"/> Health <input type="checkbox"/> Energy <input type="checkbox"/> Agriculture <input type="checkbox"/> Transportation
		<input type="checkbox"/> Water <input type="checkbox"/> Environment <input type="checkbox"/> Wastewater <input type="checkbox"/> Economy <input type="checkbox"/> Health <input type="checkbox"/> Energy <input type="checkbox"/> Agriculture <input type="checkbox"/> Transportation
		<input type="checkbox"/> Water <input type="checkbox"/> Environment <input type="checkbox"/> Wastewater <input type="checkbox"/> Economy <input type="checkbox"/> Health <input type="checkbox"/> Energy <input type="checkbox"/> Agriculture <input type="checkbox"/> Transportation

# Adaptive Management Strategies



# Identify Options to Reduce Regional Vulnerabilities



## **Adaptive Planning can help support and inform:**

- Emergency Response Planning
- Capacity Development
- Capital Investment Planning
- Water Supply and Demand
- Conservation Practices
- Level of Service Planning
- Infrastructure Maintenance Planning
- Appropriate Policy and Zoning Planning



# Identify Options to Reduce Regional Vulnerabilities



## Develop Options

- Consider Current plans and priorities
- Consider Future projections and resources



## Monitor

- As more information becomes available
- As systems and processes change



## Document

- Document and monitor



# Brainstorm Options for High Priority Impacts

- Identify critical thresholds that will impact your system or the region
- Identify Strategies:
  - Planning
  - Operational
  - Capital Improvement Strategies
- Estimate general, relative costs:  
\$, \$\$, \$\$\$

**Adaptation Options Planning Worksheet**

MID-OHIO REGIONAL PLANNING COMMISSION



**Critical Impact Title and Description**

List the Critical Threshold conditions that may result in damage or failure of your assets, change in your operational strategy or may negatively impact the region. Some examples might be a minimum flow or a flood level and associated peak flows that impact your current operating capacity.

**Adaptation Options:**

Planning Strategies		Cost*

Operational Strategies		Cost*

Capital Improvement Strategies		Cost*

\*General relative estimates expressed in terms of: \$, \$\$, \$\$\$

# Adaption Options Planning Example

## Adaptation Options Planning Worksheet - EXAMPLE



### Critical Impact Title and Description

Increased flooding from severe storm events

List the Critical Threshold conditions that may result in damage or failure of your assets, change in your operational strategy or may negatively impact the region. Some examples might be a minimum flow or a flood level and associated peak flows that impact your current operating capacity.

Flooding in excess of 100 year storm; Increased frequency of flooding events

### Adaptation Options:

#### Planning Strategies

	Cost*
<b>Identify and protect vulnerable facilities</b>	\$- \$\$
Integrate flood management and modeling into land use planning by elevating flood impacts associated with more extreme floods (ie 500 years)	\$
Consider potential water quality changes and costs of resultant changes in treatment	\$
Integrate climate-related risks into capital improvement plans	\$

#### Operational Strategies

	Cost*
<b>Monitor and inspect existing infrastructure</b>	
Monitor flood events	\$\$
Monitor surface water quality and modify treatment process	\$

#### Capital Improvement Strategies

	Cost*
<b>Monitor weather conditions and establish flood warning system based on rain / flow gauge network</b>	\$\$-\$\$\$
Acquire and manage ecosystems, such as forested watersheds, vegetation strips, and wetlands, to buffer against floods and sediment and nutrient inflows.	\$\$\$
Implement green infrastructure on site and in municipalities to reduce runoff and associated pollutants	\$\$\$
Implement or retrofit source control measures that address altered flow and quality at treatment plants	\$\$-\$\$\$
Increase water storage capacity, including silt removal to expand capacity at existing reservoirs and construction of new reservoirs.	\$\$\$
Relocate or protect critical infrastructure and facilities	\$\$-\$\$\$

\*General relative estimates expressed in terms of: \$, \$\$, \$\$\$

# Questions?

David Rutter  
Watershed Coordinator  
[drutter@morpc.org](mailto:drutter@morpc.org)  
614-233-4186

Lisa Jeffrey, PE  
[ljeffrey@brwncald.com](mailto:ljeffrey@brwncald.com)  
757-518-2423

Next Meeting:  
August 21, 2014 1-4 PM

MID-OHIO REGIONAL PLANNING COMMISSION

