Regional Collaboration for Resiliency Planning

The next phase of the Sustaining Scioto Project

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MID-OHIO REGIONAL PLANNING COMMISSION

SUSTAINING SCIOTO

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Agenda

- Project Introduction
- Climate & Watershed Model Results – What Does it all Mean
- Adaptive Management Approach
- Vulnerability Assessment
  - Sector based vulnerabilities
  - Risk and Impact Evaluation
- Development of Adaptive Management Strategies
  - Adaptive strategy evaluation metrics, costs, time frame
  - High priority strategies
- Conclusions & Next Steps of Sustaining Scioto Committee

SUSTAINING SCIOTO PARTNERS

USGS science for a changing world

Water Research Foundation℠

DEL-CO WATER COMPANY, INC. 40 YEARS 1973–2013

THE CITY OF COLUMBUS
MICHAEL B. COLEMAN, MAYOR
DEPARTMENT OF PUBLIC UTILITIES

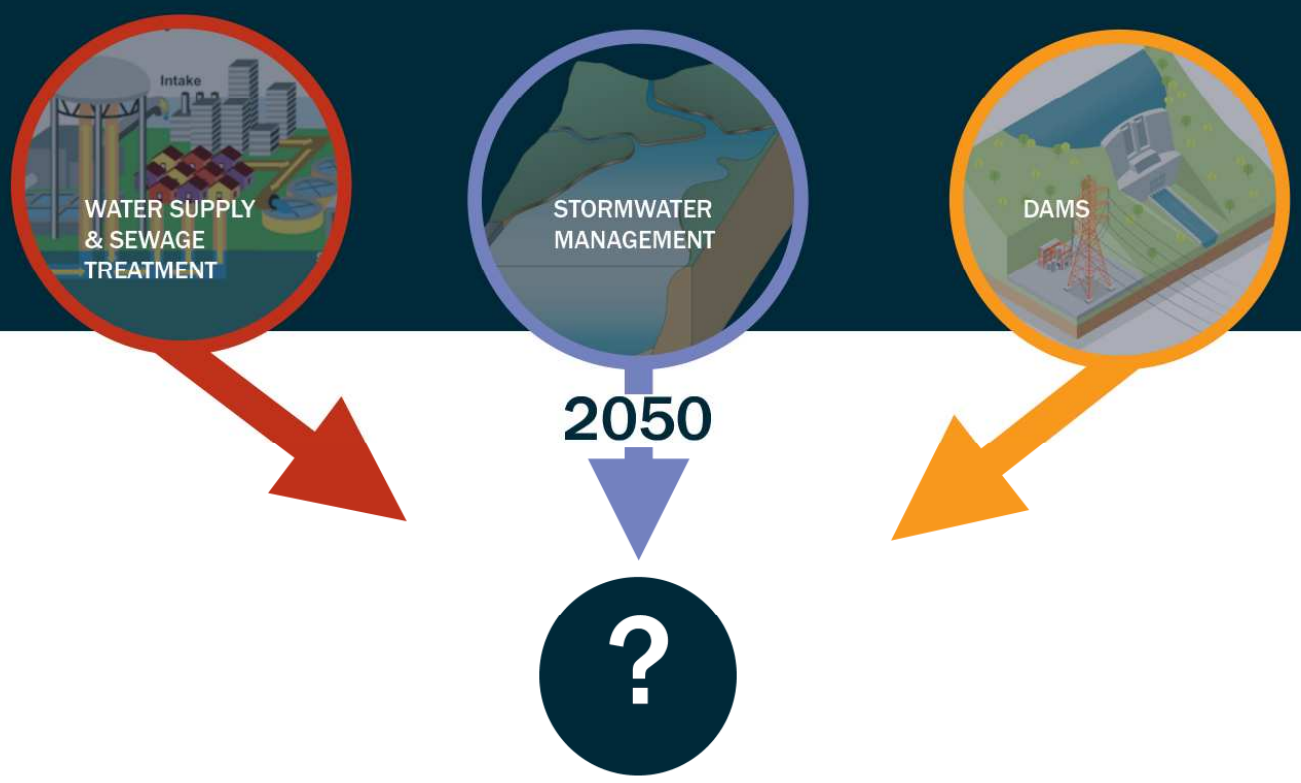
Brown AND Caldwell

OHIO WATER DEVELOPMENT AUTHORITY

morpc
Mid-Ohio Regional Planning Commission

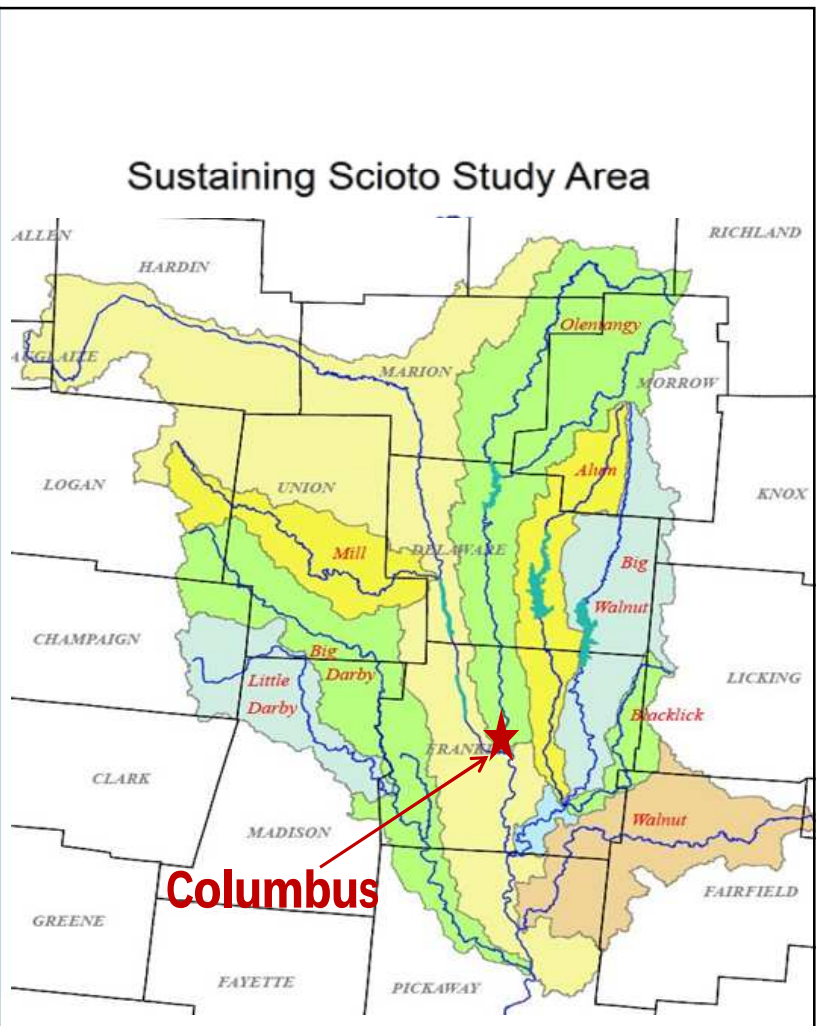
THE PAST ≠ THE FUTURE

2018



UPPER SCIOTO RIVER BASIN

- 3,200 square mile watershed
- Provides drinking water for nearly 2 million
- Provides 85% of the region's surface water supply

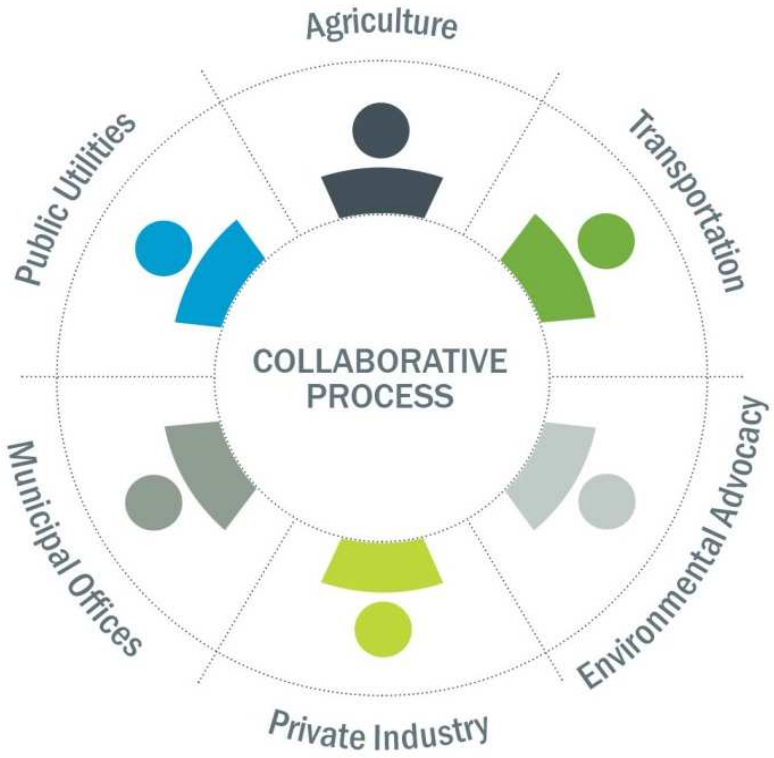


Two-Phased Project

- Phase I –
  - o USGS model development for Scioto Watershed to assess the impacts of changing weather patterns on water resources
- Phase II –
  - o Development of an adaptive management plan using the results of the model and input from a broadly based Stakeholder Advisory Committee

Stakeholder Advisory Committee

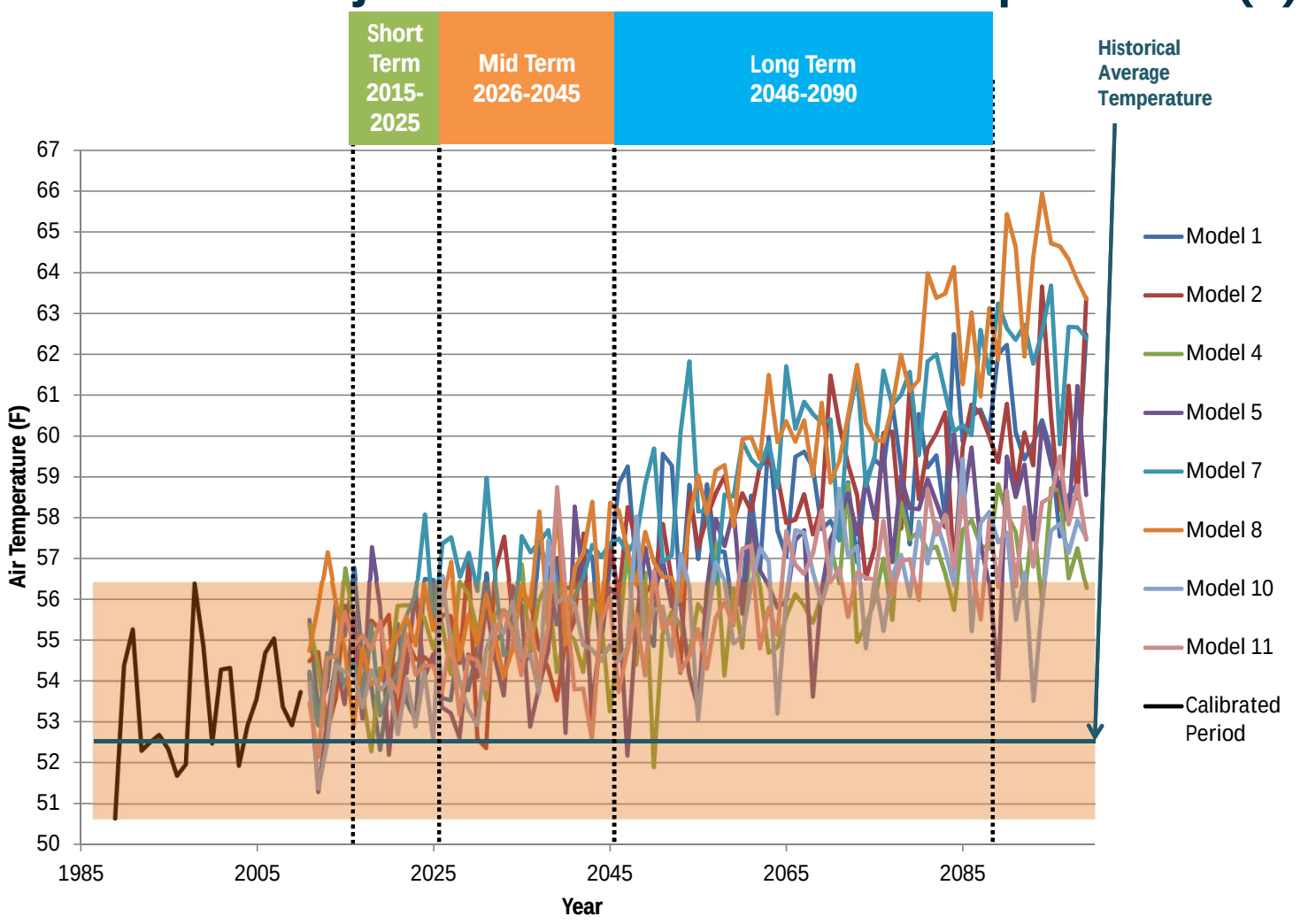
- Input on current and future water needs
- Vulnerability assessment
- Adaptive management strategy development



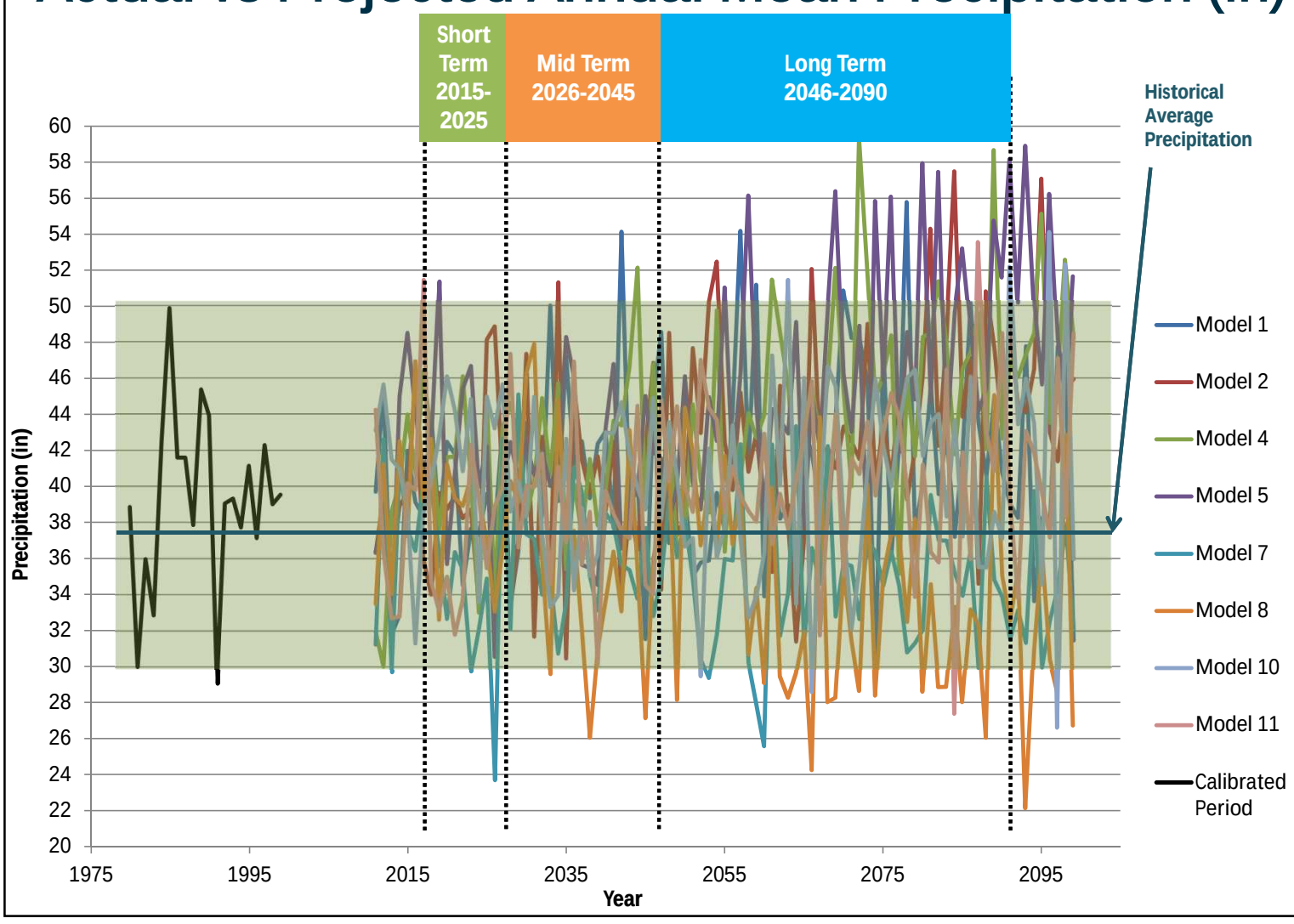
USGS Hydrologic Modeling

- Precipitation-runoff model (HSPF)
  - Calibrated based on historical observed climate and streamflow data
- Simulate runoff characteristics for climatic conditions that are projected to occur in the future
  - Temperature
  - Precipitation
  - Evapotranspiration
  - With and without anticipated population growth and development

Actual vs Projected Annual Mean Temperature (F)



Actual vs Projected Annual Mean Precipitation (in)



CLIMATE & WATERSHED MODEL RESULTS

Short Term

- 2015 to 2025
- Climate within normal range

Mid Term

- 2026 to 2045
- Increase in annual average temperature and higher seasonal temp
- Increase variability in flow and precipitation

Long Term

- 2046 to 2090
- Increased uncertainty – regional development as well as climate
- Increased temperature and variability in flow

Long-Term Model Results

Long-Term

- **With projected development, water supply may be inadequate in areas with current operational practices**
- Future water use may withdraw water from groundwater and discharge to surface water system
- Potentially significant future irrigation water needs
- Need for regional water supply study (SW & GW)

Studies of Central Ohio

- Results parallel recent Climate Change Study prepared for City of Columbus and the ACOE report on Climate Change Impacts in the Ohio River Basin

ADAPTIVE MANAGEMENT: ITERATIVE APPROACH TO PLANNING

Iterative Approach:
re-evaluate and adjust as new information becomes available

Overall Prioritization Methodology

Predicted Changes

Evaluated changing conditions & ranked based on ***LIKELIHOOD*** of occurrence

Risks

Ranked based on ***IMPACT*** on the region

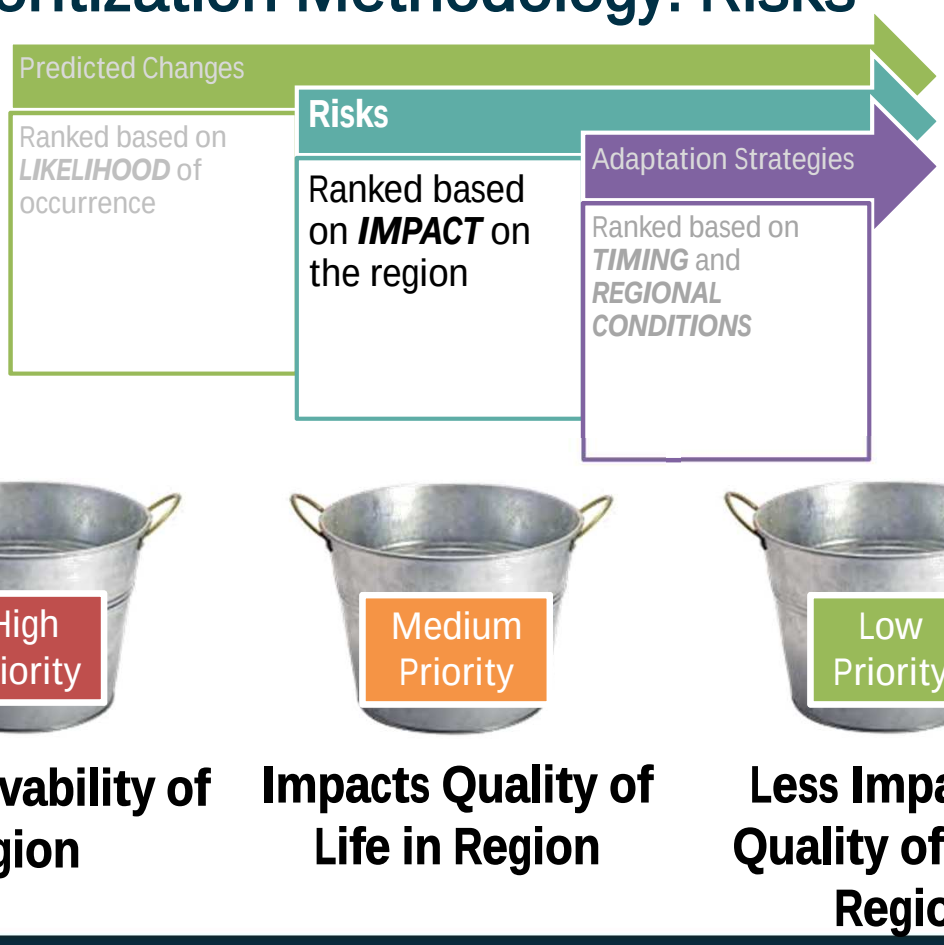
Adaptation Strategies

Ranked based on ***TIMING*** and ***REGIONAL CONDITIONS***

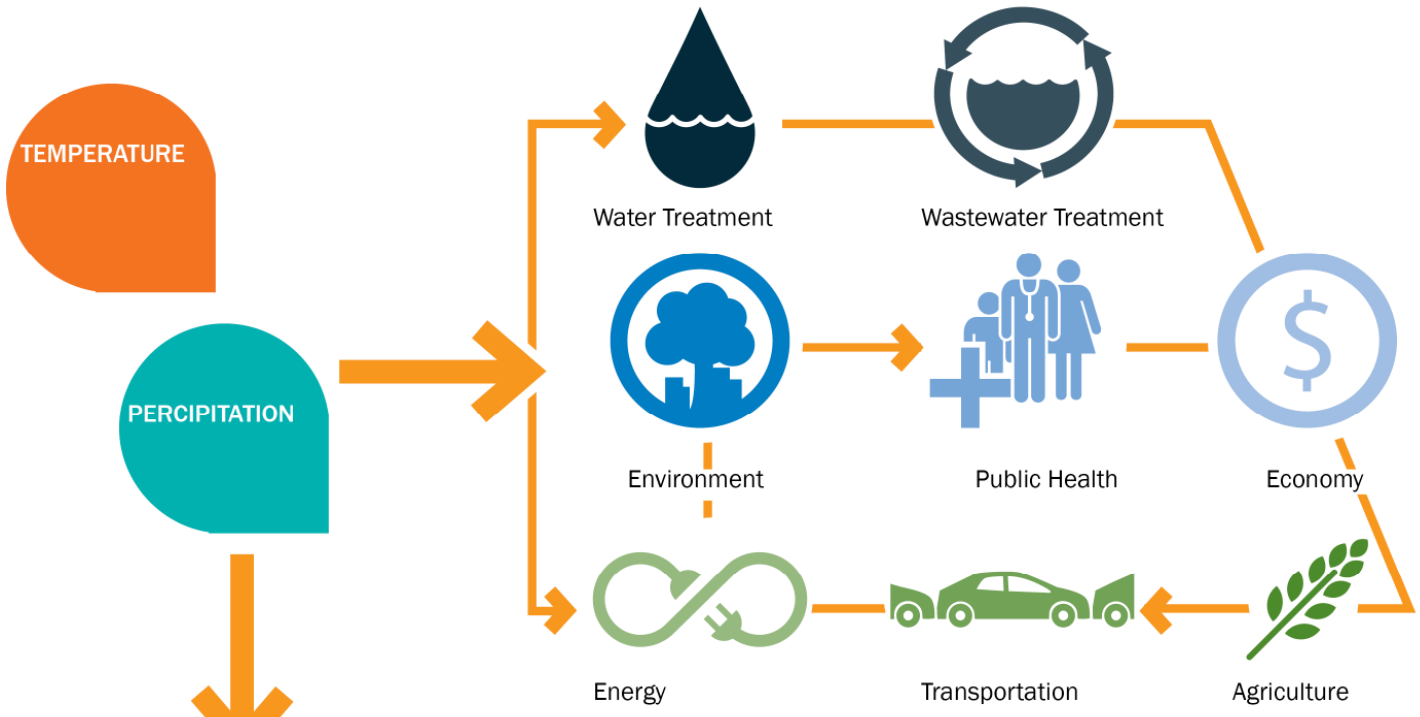
PREDICTED CHANGES AND THEIR LIKELIHOOD OF OCCURRENCE

No.	Predicted Changes	Likelihood of Occurrence
1	Increased air temperatures/increased incidence of heat waves	High
2	Increased water temperature	High
3	Warmer soil temperatures/decreased soil moisture	High
4	Higher maximum flows (30- and 7-day higher peak river flows)	Medium
5	Extended dry periods/summer drought (decreased minimum 30-day stream flow)	Medium
6	Increased intensity of rain and wind events	Medium
7	Change in vegetation/animal species composition	Low

Prioritization Methodology: Risks



RISKS & IMPACTS



Projected or Potential Future Challenges

Impacted Sectors

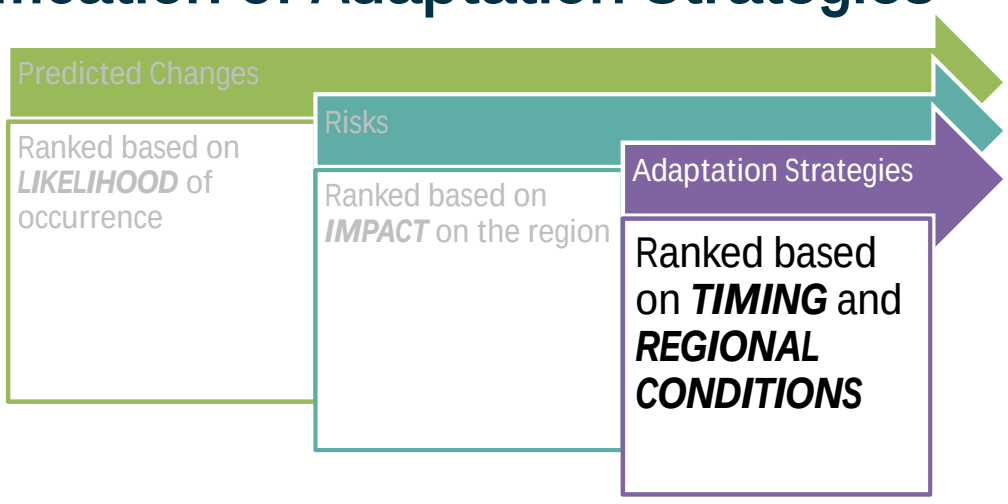
Prioritization Methodology: Risks

Vulnerability Scenarios	Affected Sector								
	Water Supply/ Water Quality	Water Treatment	Wastewater Treatment	Public Health	Agriculture	Environment	Economy	Energy	Transportation
Increased Air Temperatures / Increased incidence of heat waves	Increased evaporation, Reduced water volume	Negatively affects water quality	Impacts to infrastructure (increased corrosion)	Vector Diseases	Vegetation / Animal species shift	Vegetation / Animal species shift	Extended recreational season	Increased energy demand due to air conditioning, increased use of pumps for water / wastewater	Increase in road and bridge repairs and disruptions due to heat stress
	Increased water demand and demand due to irrigation				Livestock health / mortality				Increased use of private vehicles
	Increased in-stream TOC			Increased issues for asthma and allergies	Extended/disruptions to growing season		Increased costs for utility services (water, wastewater, and energy)		
	Increased nutrient/ pesticide / herbicide runoff due to extended growing season, increased algal blooms	Increased capital investment due to designing for peaking factors	Lower flow affects discharge permits and treatment		Increased use of herbicides/pesticides/ nutrients with longer growing season	Increased smog / Decreased air quality		Decreased efficiency throughout production as temperature rises	Change in construction materials for higher temperatures
	Increased watershed erosion	Taste and odor concerns, potential for algal toxins	Increase need for odor control	Impacts to human mortality, Increase in heat illnesses and stresses on healthcare	Increased need for irrigation and controlled drainage		Increased service cost for food	Increased power disruptions (brownouts)	Extended but less efficient construction season
		Increased chlorine demand, Increase DBPs					Decreased human productivity		
Increased water temperature	Decreased dissolved oxygen	Taste and odor concerns, potential for algal toxins	Lower DO / changes in temp require affect wastewater discharge allocation	Increase in waterborne diseases	Increased costs to control water quality from fields	Changes in pH and pollutant toxicity	Algae growth could impact recreational use	Increased cost for energy production because have to cool discharge before released	Limited applicability
	Increased release of phosphorus and other pollutants from anoxic zones/sediment	Increased treatment costs due to algae and potentially algal toxins							
	Decreased mixing	Increased treatment efficiency	Decreased organics at plant due to DBPs	Increased use of disinfectants; increased DBPs	Treatment and disinfection use increases		Increased energy cost due to power plant discharge cooling		
	Longer duration of poorer water quality				Energy use for cooling	Negative impact on aquatic life diversity and numbers			
	Increased algal blooms including blue greens (potential for increased toxin release)				Livestock management and aquaculture	Decreased dissolved oxygen			
						Increase in algal blooms			
Warmer soil temperatures / Decreased soil moisture	Decreased groundwater base flow to streams	Increased treatment demands due to lower water WQ	Increased use of effluent sludge on farm fields	Impacts to private water systems	Increased need for irrigation and controlled drainage	Vegetation / Animal species shift	Negative impact on winter recreational activities if less snow/ice	Increased albedo; greater urban heat island effect leads to increased cooling demands	Reduced salt usage in winter
	Reduction/change in vegetative cover				Vegetation / Animal species shift	Increased erosion			Embankment erosion and damage due dry soils
	Increased watershed erosion	Change of frequency in water main breaks in winter			Increased soil conservation practices				
	Increased in-stream TOC								
	Increased sediment deposition/loss of volume				Increased need for crop insurance	Increase in invasive species	Higher food prices and potential job losses if results in loss of agricultural crops		

ADAPTIVE MANAGEMENT: ITERATIVE APPROACH TO PLANNING

Iterative Approach:
re-evaluate and adjust as new information becomes available

Identification of Adaptation Strategies



- Types of Strategies:
  - Planning
  - Operational
  - Capital Improvement
- Estimate relative costs: $, $$, $$$
- No Regrets Strategies

ADAPTIVE MANAGEMENT PLANNING

Short Term (10 Years)
2015 – 2025

- Regional Collaborative Forum
- Public Education
- Improve Emergency Preparedness Capacities
- Enhance Operational Procedures (WQ Monitoring & Treatment SOPs)
- Resource Protection/Source Management

Mid Term (10-30 Years)
2026 – 2045

- Regional Water Supply Planning
- Groundwater Supply Planning
- Water Reuse Planning
- Reservoir Capacity Planning
- Nutrient/Pollutant Reduction Planning and Implementation
- Re-evaluate climatic conditions

Long Term (End of Century)
2046 – 2090

- Implement Improvements from Mid Term Plans
- Re-evaluate climatic conditions

SUSTAINING SCIOTO: ADAPTATION STRATEGIES

Recommended Adaptation Strategies for Protecting Water Quality		
Strategy	**No Regrets**	**Cost**
Planning and Policy		
Develop Water Quality Monitoring Plan	✓	$
Develop an Agricultural Nutrient Management Program	✓	$
Implement Public Education on water quality, water supply & climate change impacts	✓	$
Modify local ordinances to promote low impact development, stormwater harvesting/reuse	✓	$
Develop Regional Watershed Management Plan to reduce nutrient runoff	✓	**$**
Operational		
Implement increased fertilizer reduction programs, revegetation of riparian buffer zones, and other non-structural practices	✓	$$
Capital Improvement		
Implement reservoir capital improvement projects		$$
Implement pollutant reduction projects (BMPs) to reduce pollutants of concern		$$$

SUMMARY

Results

- Increased air & water temperature
- Increased variability in precipitation – more extreme rain events and drought periods
- Degraded water quality

Challenges to Utilities & Region

- Need for flexibility in operations and management
- Regional issues require regional collaboration

Adaptive Planning

- Prepare with “No-Regrets” strategies
- Update plan over time
- Regional collaboration & education, source resiliency; monitoring; emergency preparedness

NEXT STEPS:
Regional Collaboration is the Key!

- Consider regional impacts and adaptation strategies
- Identify partners and collaborate

Case studies from extreme weather events across U.S. indicate that weak community networks and lack of resources can significantly exacerbate the impacts of weather related disasters (flood, drought, fire and extreme heat)

NEXT STEPS:
Coordinate/Collaborate with Current Efforts

- Engage farmers – collaborate w/ SWCDs
  - Collaborate w/ "Be the Change" Campaign
- Engage public water systems – "peer to peer"
- Columbus stormwater design manual update
- Collaborate on emergency management planning throughout region
- Collaborate with Sustainable2050 efforts

NEXT STEPS:
Regional Collaboration is the Key!

- Potential regional workshop for municipal leaders, water system leaders, agricultural committee in conjunction with MORPC Summit on Sustainability

QUESTIONS?

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