SUSTAINING SCIOTO

Ohio Water Environment Association
Watershed Workshop
November 12, 2015

SUSTAINING SCIOTO PARTNERS

USGS
science for a changing world

Water Research Foundation℠

DEL-CO WATER COMPANY

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

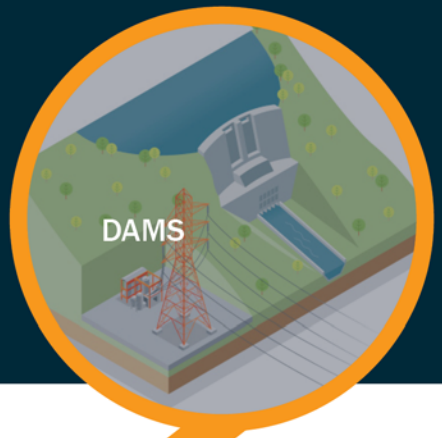
Brown AND Caldwell

OHIO WATER DEVELOPMENT AUTHORITY

morpc
Mid-Ohio Regional Planning Commission

THE PAST ≠ THE FUTURE

2014



2050

?

WHAT IS SUSTAINING SCIOTO?

- *Models the effects of climate change on the Upper Scioto River Basin*
- *Uses technical data, climate modeling, and stakeholder input*
- *Develops an adaptive management plan for the region*

MID-OHIO REGIONAL PLANNING COMMISSION

SUSTAINING SCIOTO

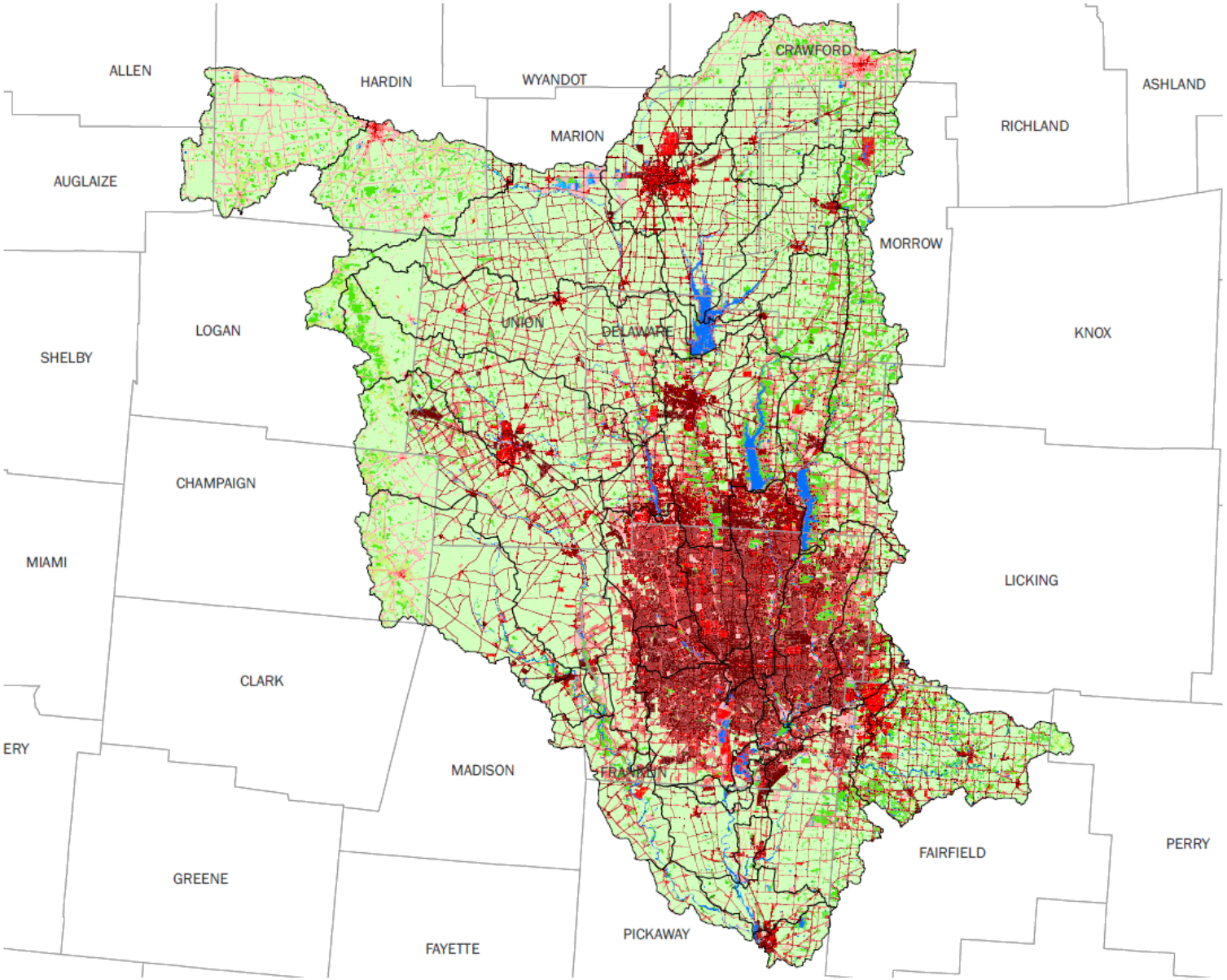
INVESTING TODAY. PRESERVING TOMORROW.

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

USGS MODELING

- Model developed for the Upper Scioto River basin
- Calibrated and validated the model
- Simulated runoff characteristics for climatic conditions that are projected to occur in the future (with and without anticipated population growth and build-out)



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

N

0 5 10
Miles

Source:
MORPC, USGS, ODOT
Franklin County Auditor

Ohio Location Map

morpc

The information shown on this map is compiled from various sources available to us which we believe to be reliable.
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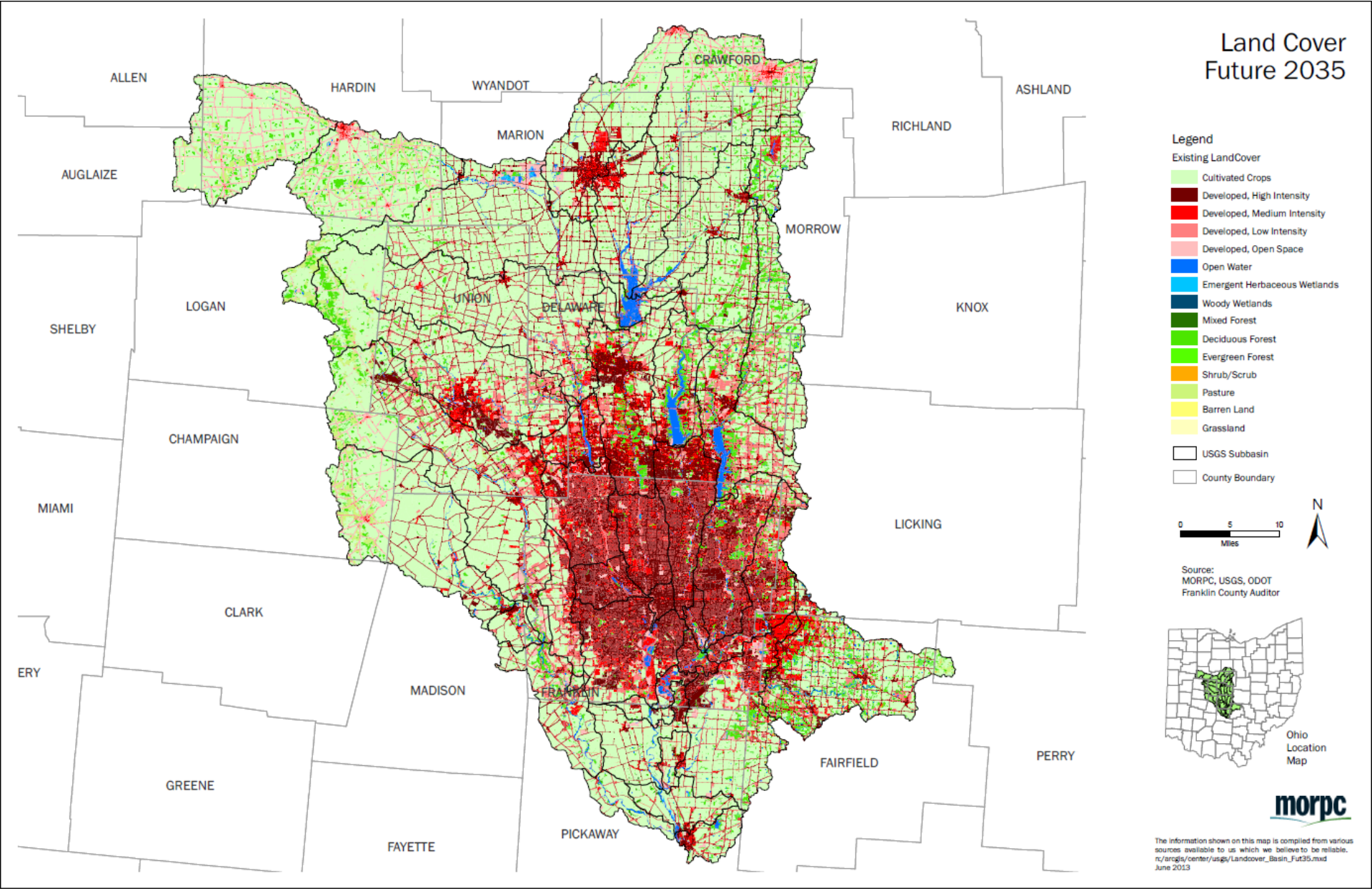
June 2013


Land Cover
Future 2035
ALLEN
HARDIN
WYANDOT
CRAWFORD
ASHLAND
MARION
RICHLAND
AUGLAIZE
MORROW
LOGAN
UNION
DELAWARE
KNOX
SHELBY
CHAMPAIGN
MIAMI
LICKING
CLARK
ERY
MADISON
FRANKLIN
FAIRFIELD
PERRY
GREENE
FAYETTE
PICKAWAY
Legend
Existing LandCover
Cultivated Crops
Developed, High Intensity
Developed, Medium Intensity
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Pasture
Barren Land
Grassland
USGS Subbasin
County Boundary
0 5 10
Miles
N
Source:
MORPC, USGS, ODOT
Franklin County Auditor
Ohio
Location
Map
morpc
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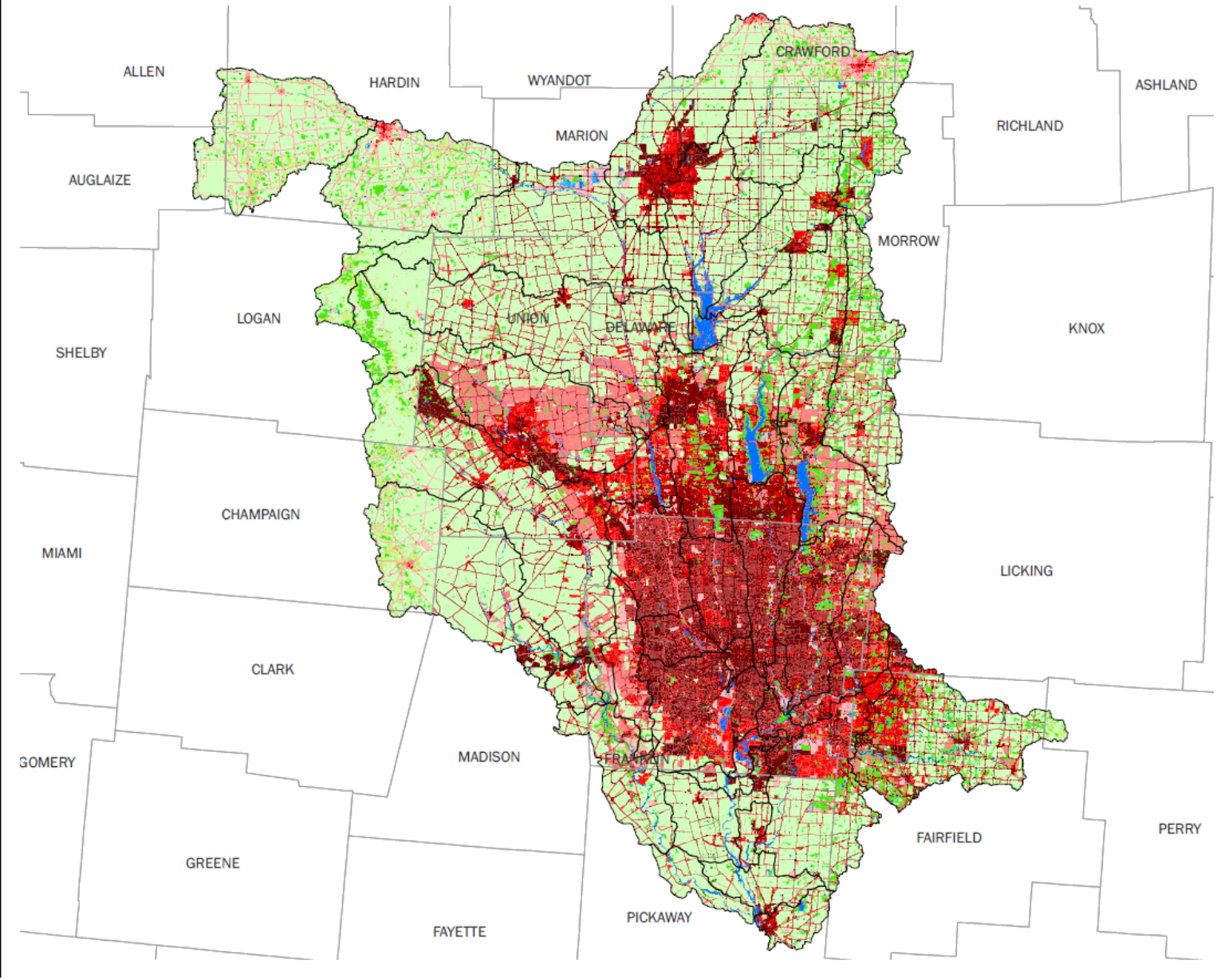
June 2013



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.

0 5 10
Miles

N

Source:
MORPC, USGS, ODOT
Franklin County Auditor

Ohio Location Map

morpc

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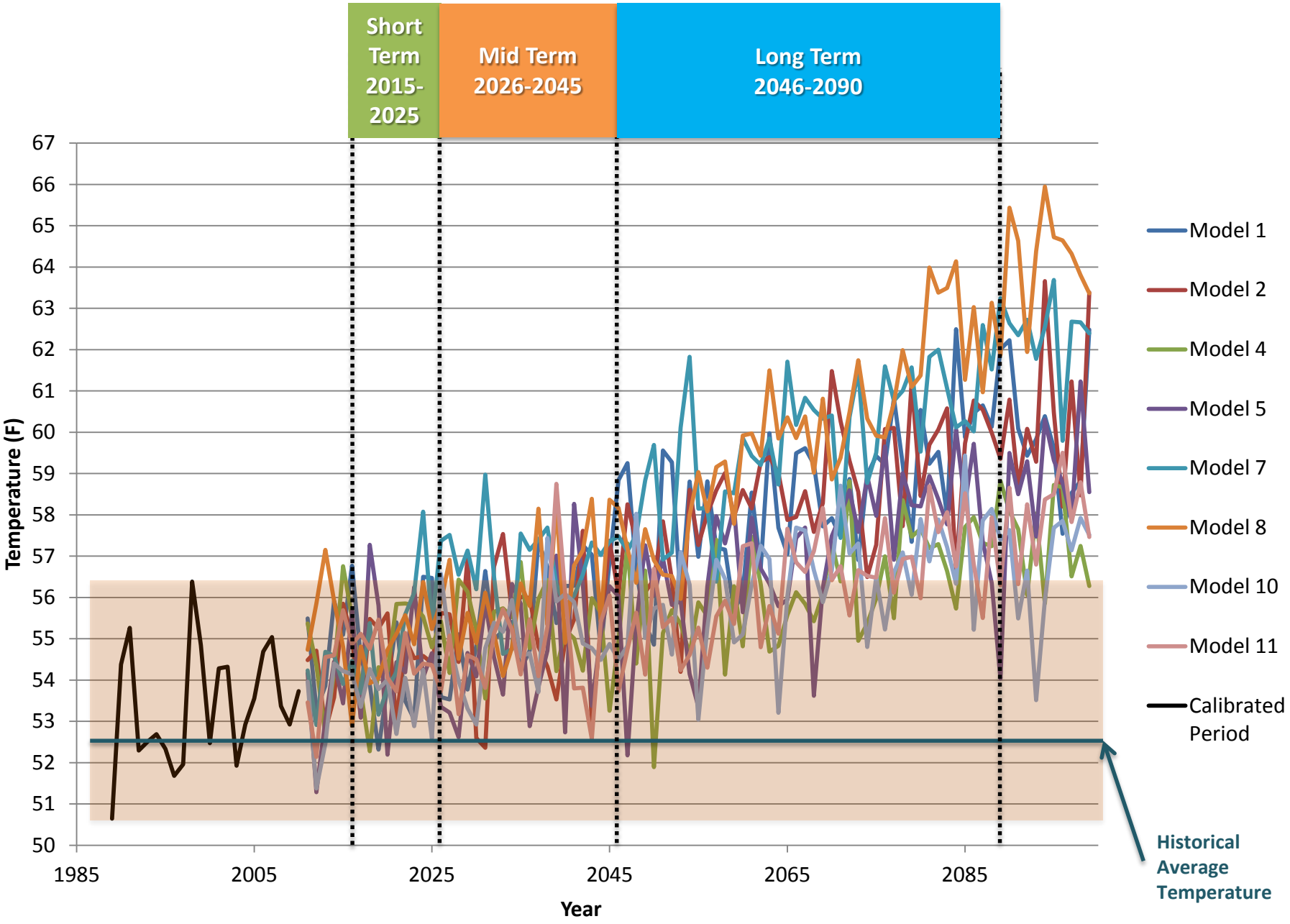
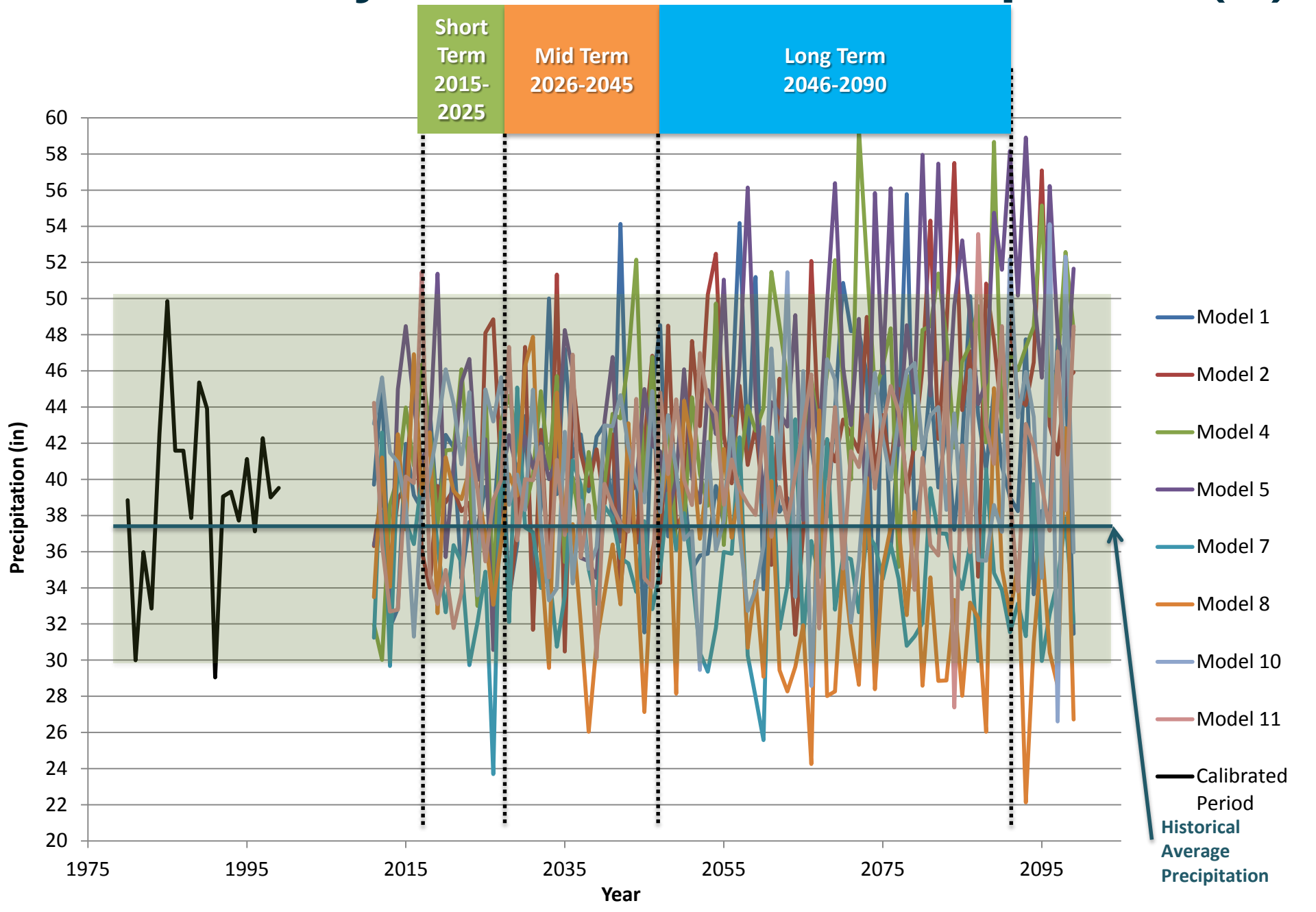
June 2013

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

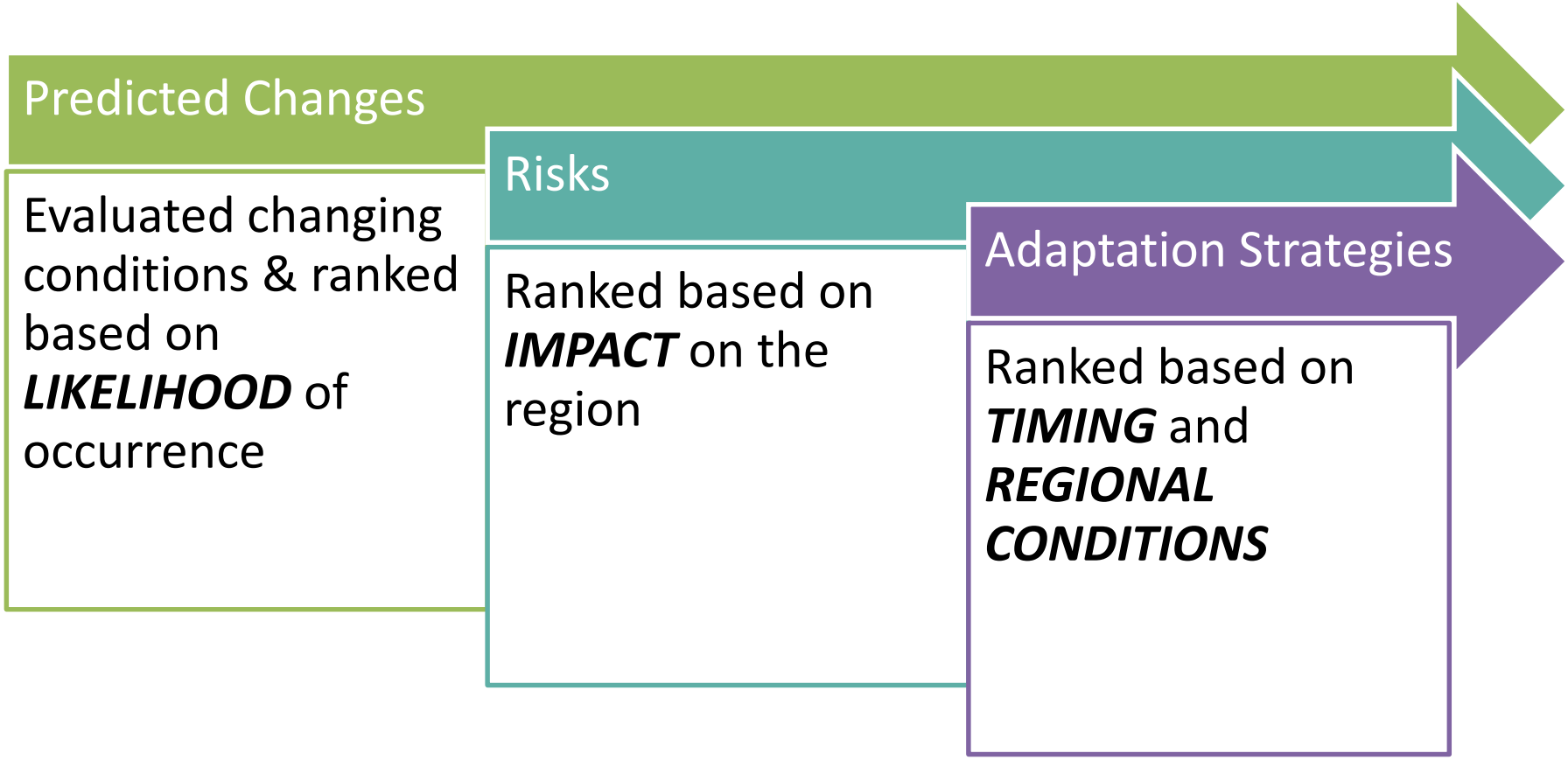
Mid-Term

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

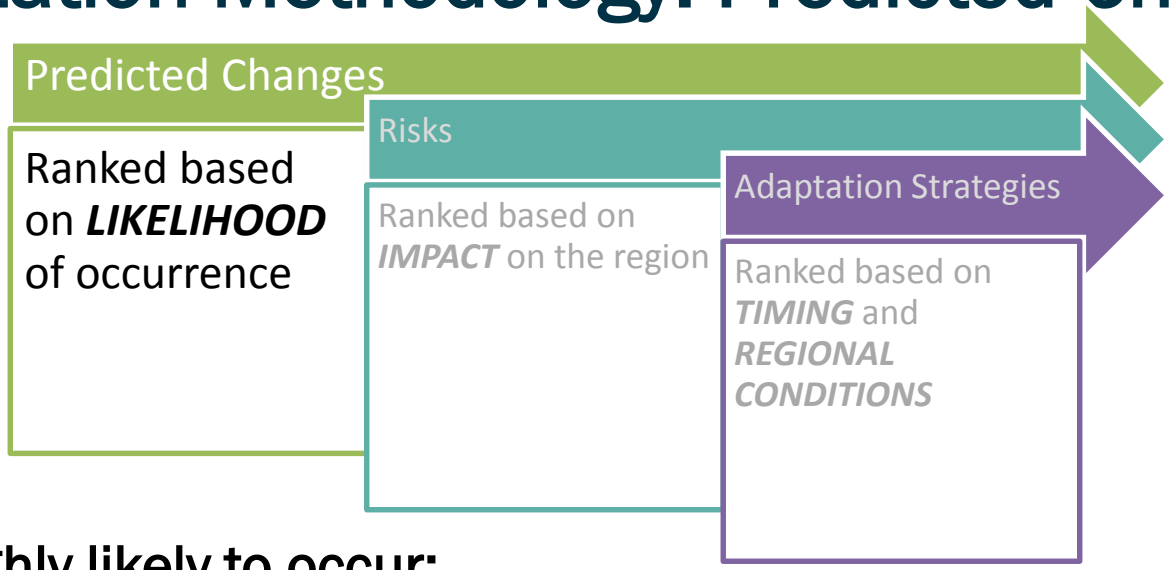
Long-Term

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

Overall Prioritization Methodology



Prioritization Methodology: Predicted Changes



- Highly likely to occur:
  - Linked to defined trends from the model results and climate data
- Medium probability of occurrence:
  - Results shown in the models
  - Less distinct trends
  - Associated with build-out or trends in precipitation
- Low probability of occurrence:
  - Not directly predicted by the model results
  - Considered less likely to occur based on the analysis

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

Predicted Changes

Ranked based on ***LIKELIHOOD*** of occurrence

Risks

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

Adaptation Strategies

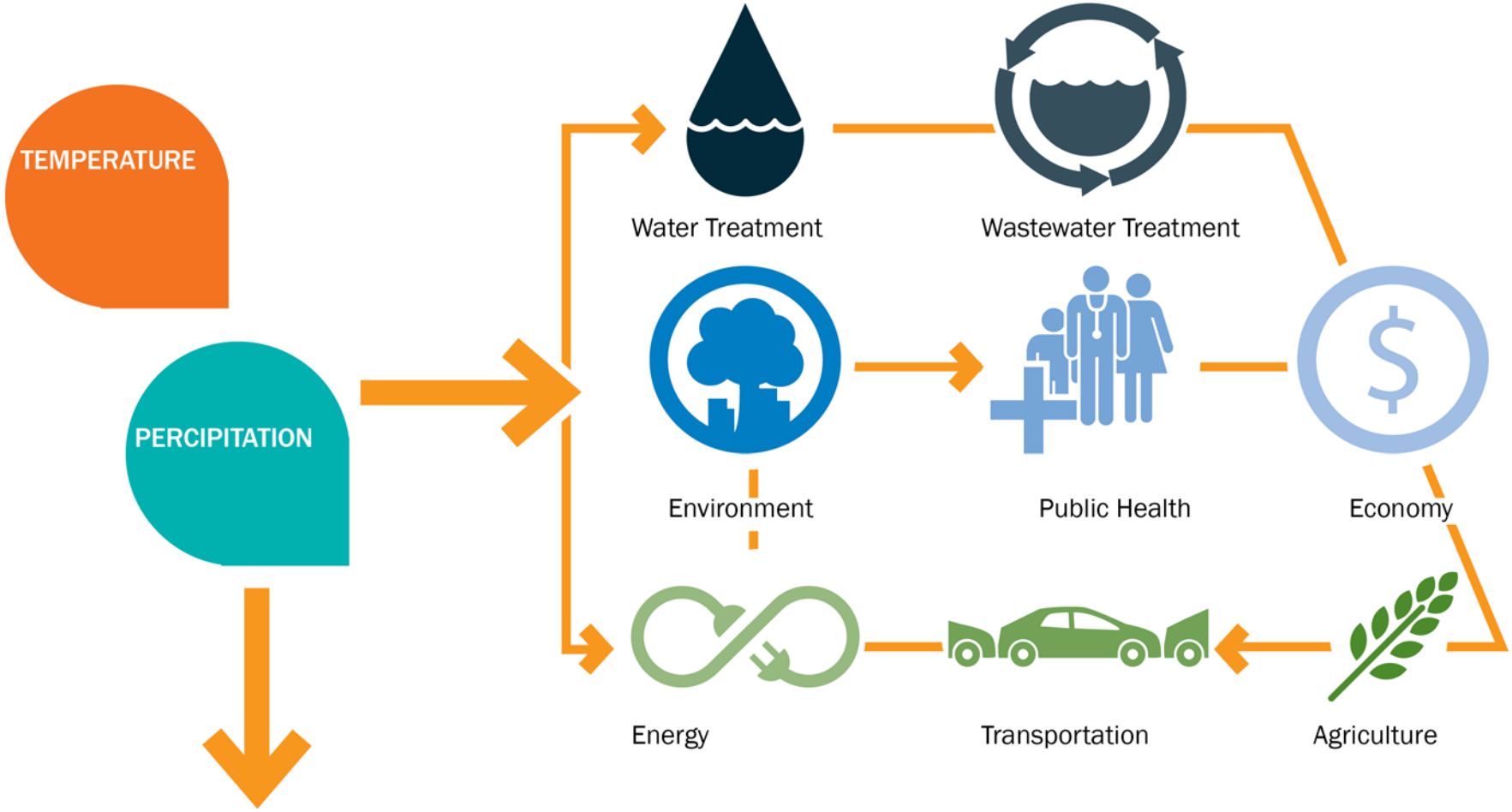
Ranked based on ***TIMING*** and ***REGIONAL CONDITIONS***

Affects Livability of Region

Impacts Quality of Life in Region

Less Impact on Quality of Life in Region

RISKS & IMPACTS



Projected or Potential Future Challenges

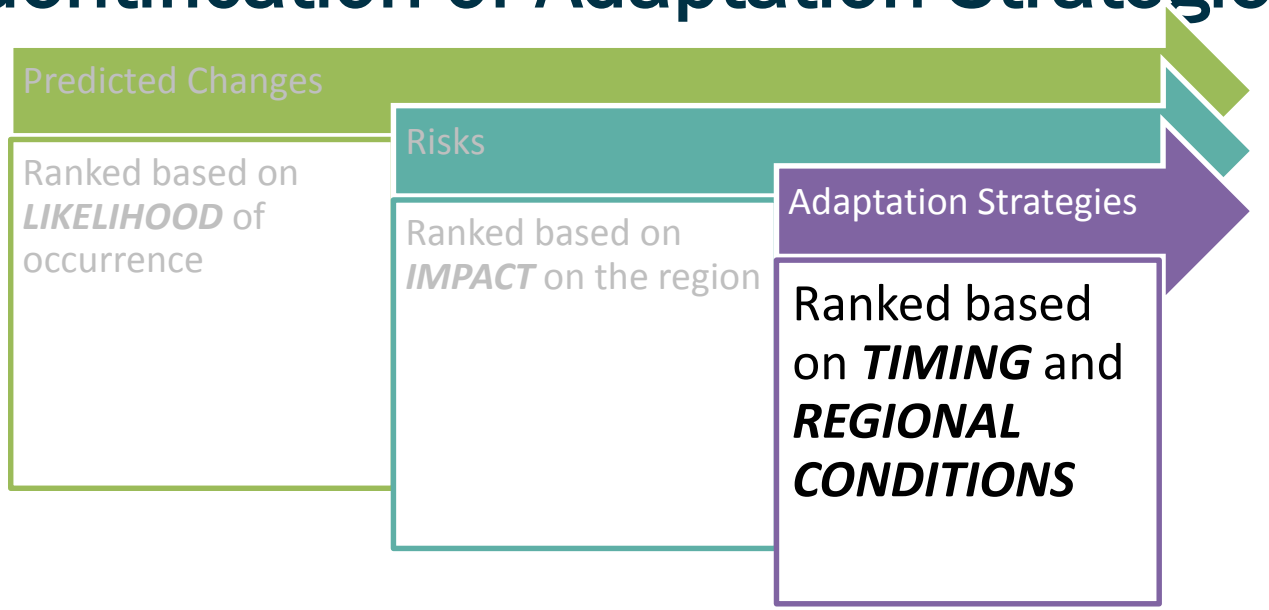
Impacted Sectors

THREATS & VULNERABILITIES

ADAPTIVE MANAGEMENT APPROACH

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
2015 – 2025

- Expand monitoring
- Increase emergency preparedness
- Source Management (Demand)
- Regional collaboration & public education

Mid-Range Term
2026 – 2045

- Regional Water Supply Plan
- Groundwater Supply Study
- Water reuse
- Enhance reservoir capacity
- Watershed Management Plan (Nutrient/ Pollutant Reduction)
- Re-evaluate climatic conditions

Long-Range Term
2046 – 2090

- Implement improvements from mid-range 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		$$$

SUSTAINING SCIOTO: ADAPTATION STRATEGIES

Agriculture: Mitigating Impacts from Increased Heat and Changes in Flow		
Strategy	**No Regrets**	**Cost**
Planning and Policy		
Implement public outreach and education on water quality issues	✓	$
Establish partnerships among key stakeholders	✓	$
Modify local ordinances to require LID, reduce impervious areas, and reuse stormwater		$
Develop Regional Water Supply Management Plan for extended drought conditions	✓	$
Determine future water agricultural needs and recycled water for irrigation potential		$
Develop guide for and promote rainwater and stormwater harvesting/reuse		$
Operational		
Implement agricultural conservation practices		$
Adjust crop mix and/or planting schedules, as needed		$
Develop crop insurance programs to reduce chemicals used		$$
Alter livestock feeding schedules and nutritional balance		$
Capital Improvement		
Work with farmers to install advance irrigation systems to reduce water use		$$
Install controlled drainage in agricultural fields		$$
Develop local agricultural water sources such as irrigation, ponds, cisterns		$–$$
Build wastewater reclamation systems for industrial and agricultural water use		$$$
Install heat abatement equipment such as fans, shade tarps, sprinklers		$–$$

SUSTAINING SCIOTO: ADAPTATION STRATEGIES

Mitigating Impact of Damage to Infrastructure / Failure Related to Increased Intensity of Rain and Wind Events

Strategy	No Regrets	Cost
Planning and Policy		
Evaluate increased wastewater and stormwater storage options for extreme events	✓	$
Update Regional Emergency Preparedness and Response Plans for extreme weather	✓	$
Evaluate wastewater system infrastructure vulnerabilities and needs	✓	$$
Determine appropriate LOS during extreme weather events	✓	$
Develop Emergency Power Plan including backup power supplies	✓	$
Operational		
Establish SOPs for modified treatment plant operation during extreme events		$
Modify local ordinances to require LID, reduce impervious areas, and reuse rainwater	✓	$
Implement backup power supplies at pump stations and treatment facilities		$$
Capital Improvement		
Rehabilitate or replace most vulnerable infrastructure		$$
Set aside land to support future flood-proofing needs (berms, dikes etc.)		$$$
Implement flood control strategies at the WWTP and protect vulnerable infrastructure		$$$
Increase capacity for wastewater and stormwater collection, treatment, and discharge		$$$

SUMMARY

Results

- Increased air & water temperature
- Degraded water quality
- Increased potential for both floods & droughts
- More extreme storm events

Challenges to Utilities & Region

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

Adaptive Planning

- Prepare with No-Regrets strategies
- Update plan over time
- Source resiliency; Monitoring; Emergency Preparedness; Regional Collaboration & Education

CONCLUSION:
WHAT CAN YOU DO?

- Consider impacts and adaptation strategies
- Identify partners and collaborate
- Develop a timeframe and benchmarks
- Consider how this will impact your community

QUESTIONS?

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