Impact of climate change on Washington metropolitan area water supply

Metropolitan Washington Council of Governments

Air and Climate Public Advisory Committee

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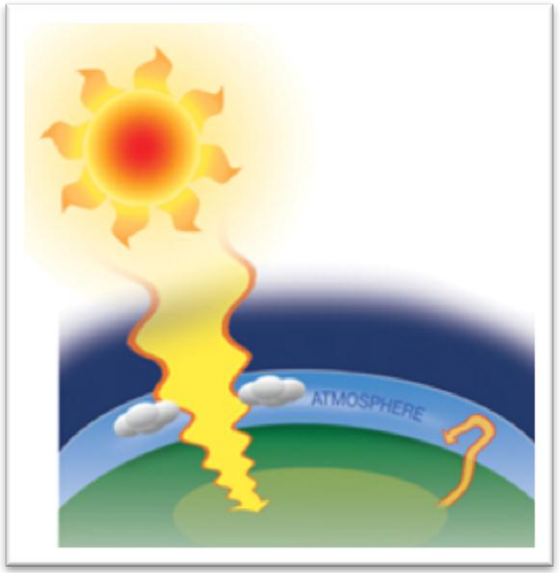
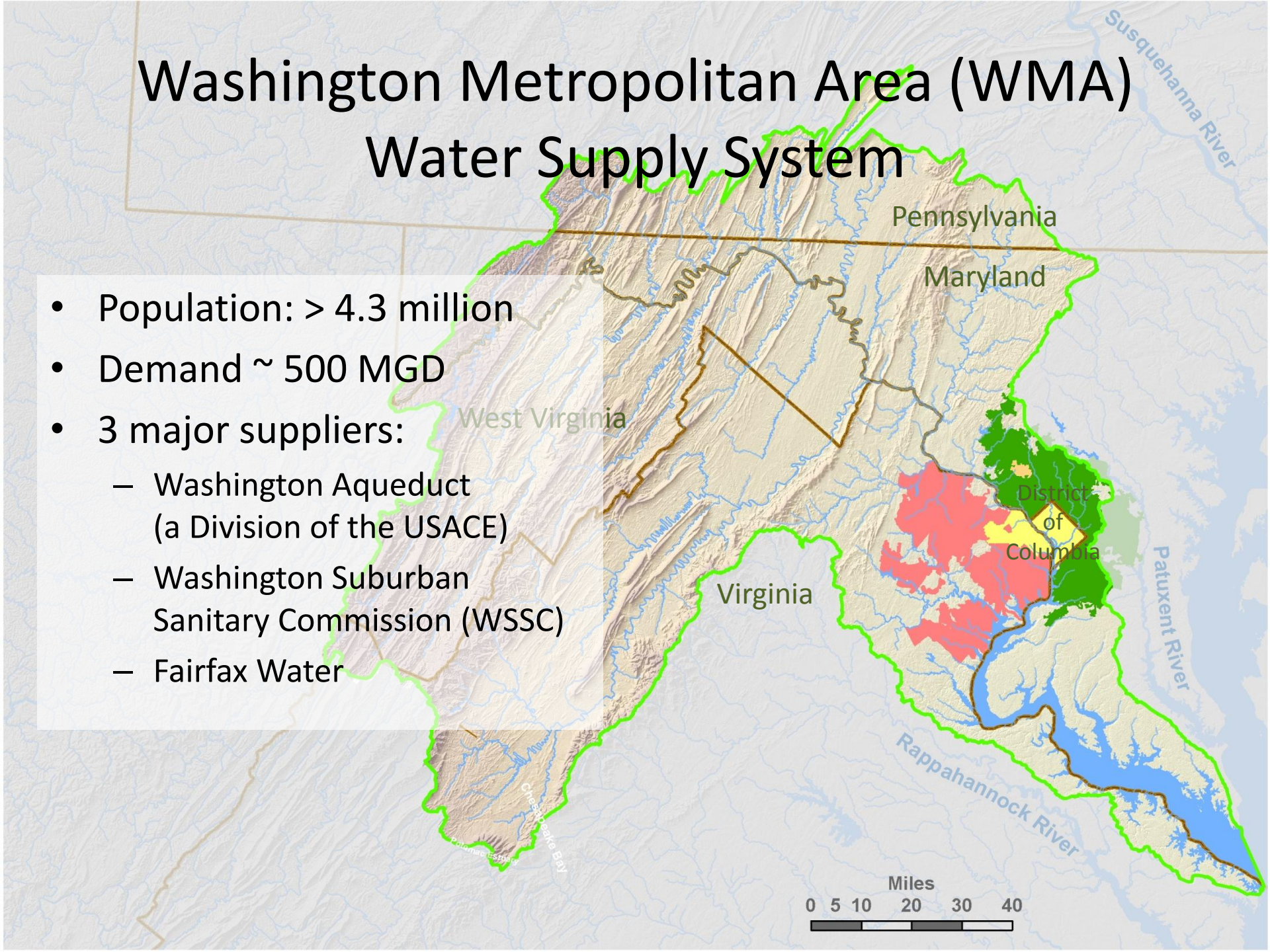
Overview

- Washington metro area's cooperative water supply system
- Impacts of climate change
  - On Potomac basin stream flows
  - On annual water budget
  - On reliability of current Washington metro area water supply system



Washington Metropolitan Area (WMA) Water Supply System

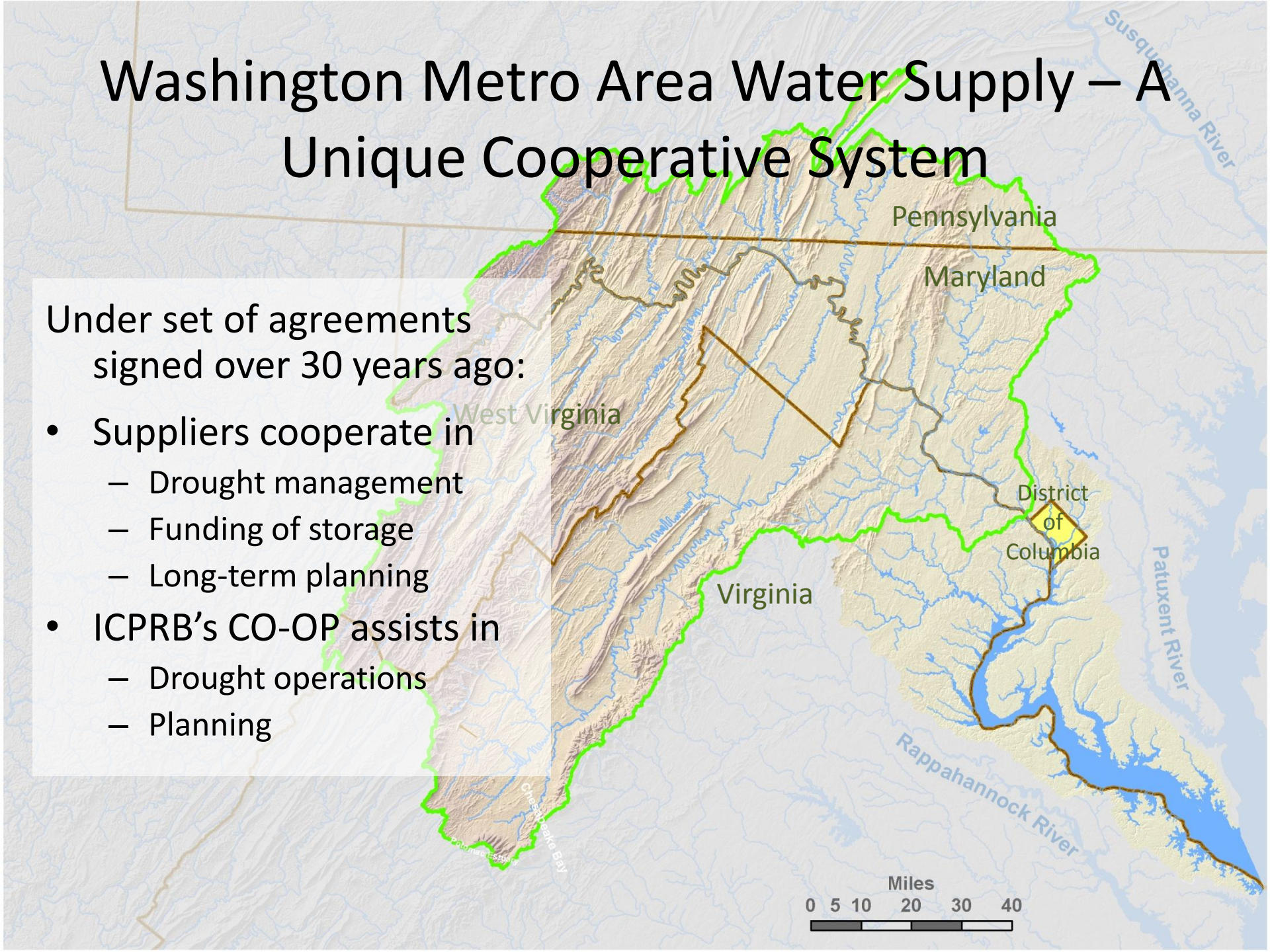
- Population: > 4.3 million
- Demand ~ 500 MGD
- 3 major suppliers:
  - Washington Aqueduct (a Division of the USACE)
  - Washington Suburban Sanitary Commission (WSSC)
  - Fairfax Water



Washington Metro Area Water Supply – A Unique Cooperative System

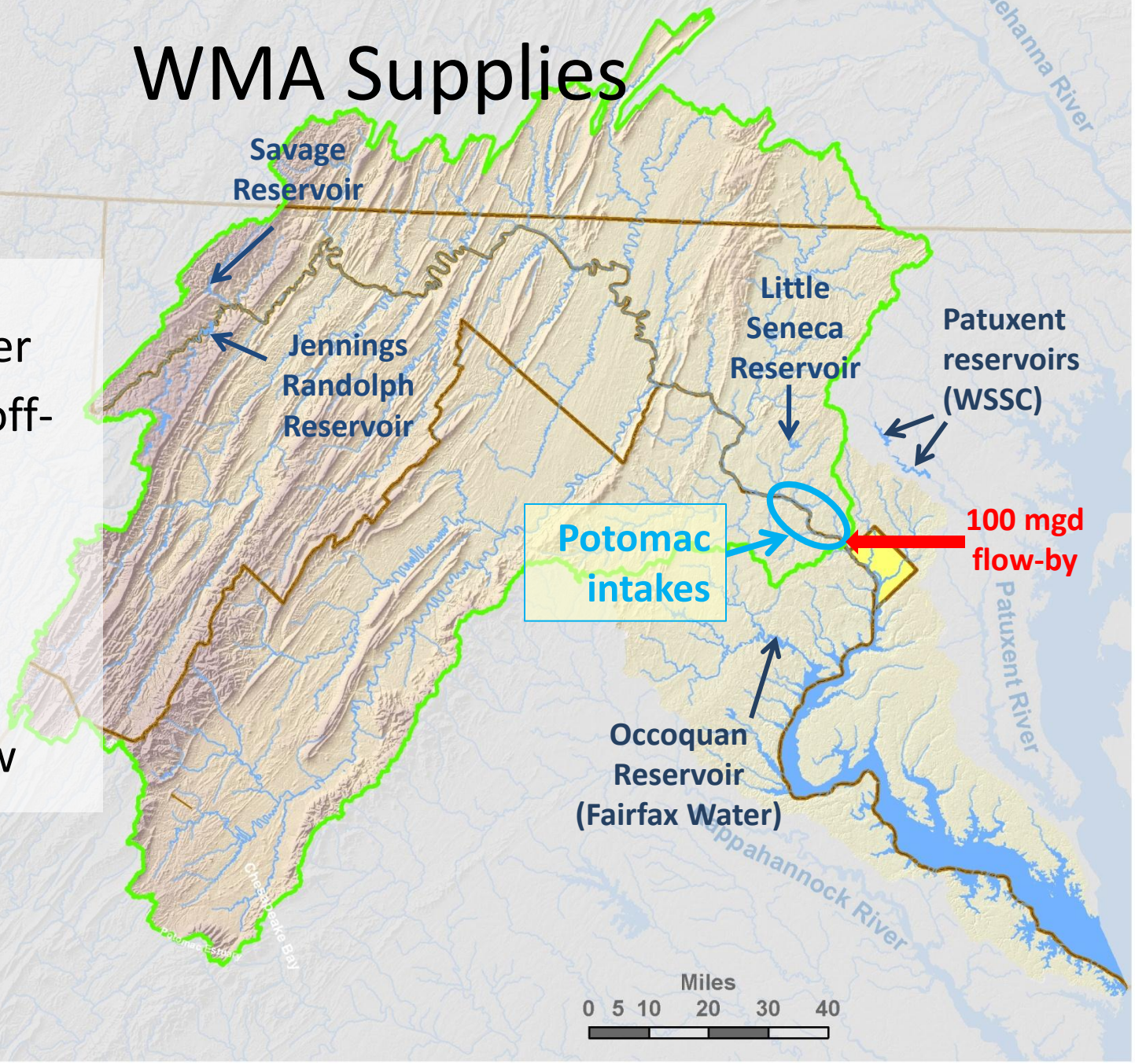
Under set of agreements signed over 30 years ago:

- Suppliers cooperate in
  - Drought management
  - Funding of storage
  - Long-term planning
- ICPRB's CO-OP assists in
  - Drought operations
  - Planning



WMA Supplies

- ~ 75% from Potomac River
- ~ 25% from off-Potomac reservoirs
- 3 upstream reservoirs to augment Potomac flow



2010 Washington Metropolitan Area Water Supply Reliability Study

- Findings of *Part 1 – Demand and Resource Availability for the year 2040* (based on historical climate)
  - The current system will likely meet demands through 2030
  - By 2040 the current system may have difficulty meeting demands in event of severe drought
  - Summertime outdoor water use may be increasing
- Objective of Part 2: Determine potential impacts of climate change, assuming no management changes.

Partners and Tools

U.S. Geological Survey
Climate Scenarios

USGS

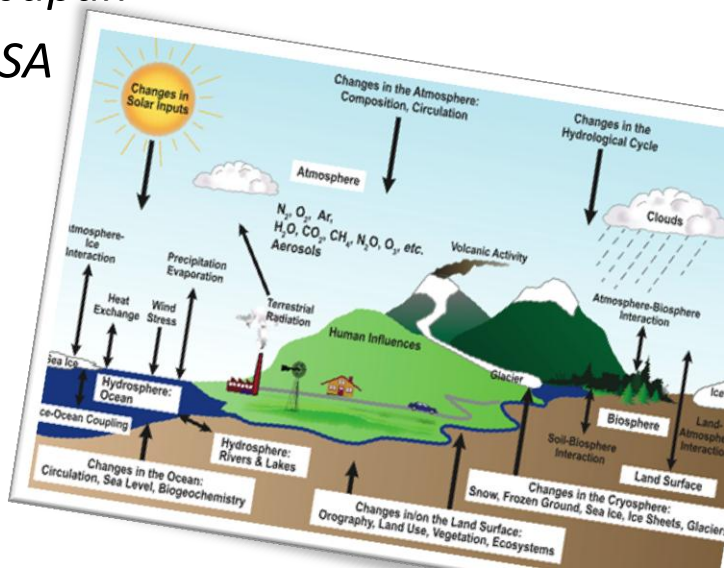
Chesapeake Bay Program
Phase 5 Watershed Model

ICPRB's Potomac River and Reservoir Simulation Model

Global Climate Models

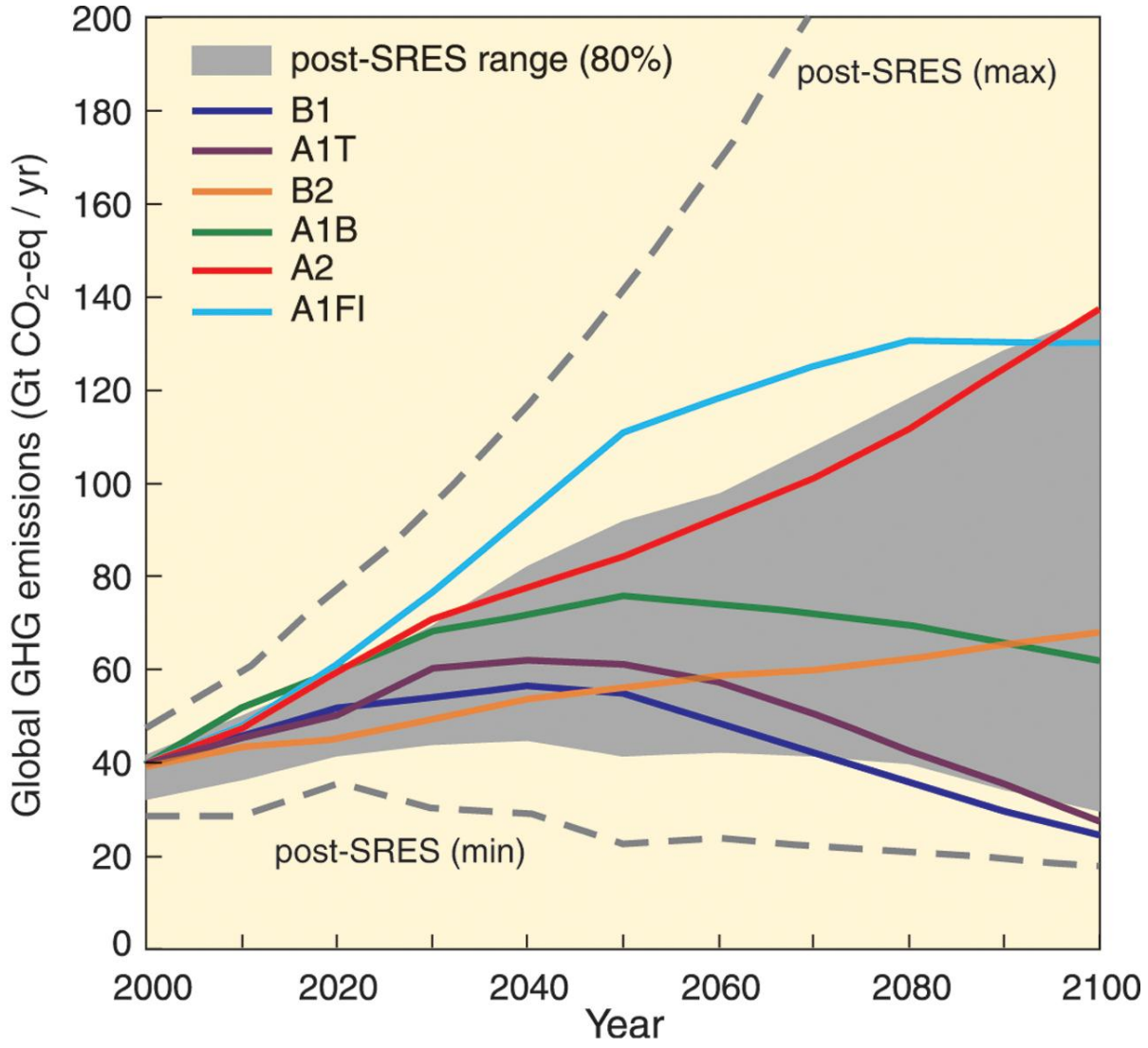
This study used projections from 6 global models:

1. Bjerknes Centre for Climate Research, *Norway*
2. Commonwealth Scientific and Industrial Research Organisation, *Australia (Mk3.0)*
3. Commonwealth Scientific and Industrial Research Organisation, *Australia (Mk3.5)*
4. National Institute for Environmental Studies, *Japan*
5. National Center for Atmospheric Research, *USA*
6. Institute for Numerical Mathematics, *Russia*

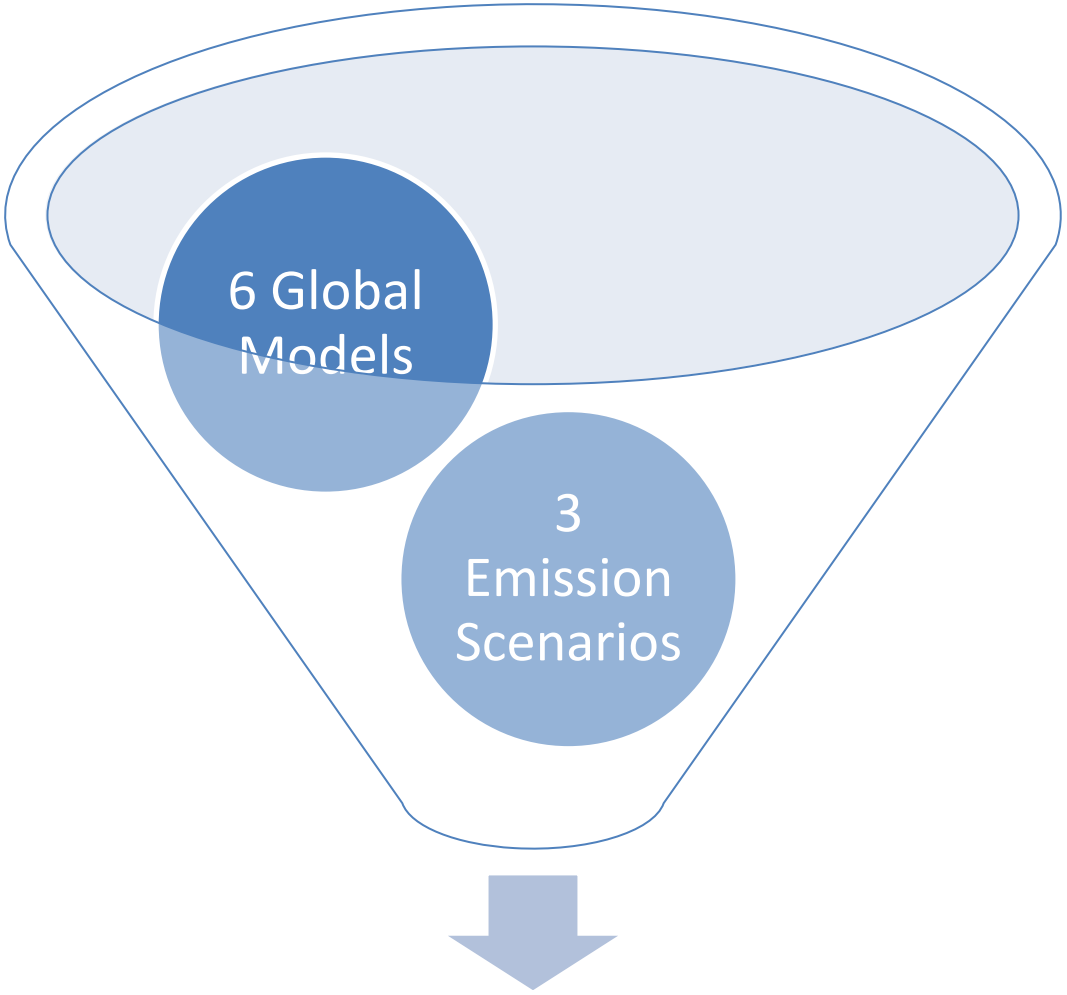


Greenhouse Gas Emission Scenarios

- A2: high population growth & slow technological change
- A1B: rapid growth & and technological change; population peak mid-century
- B1: similar to A1B, but change toward service & information economy

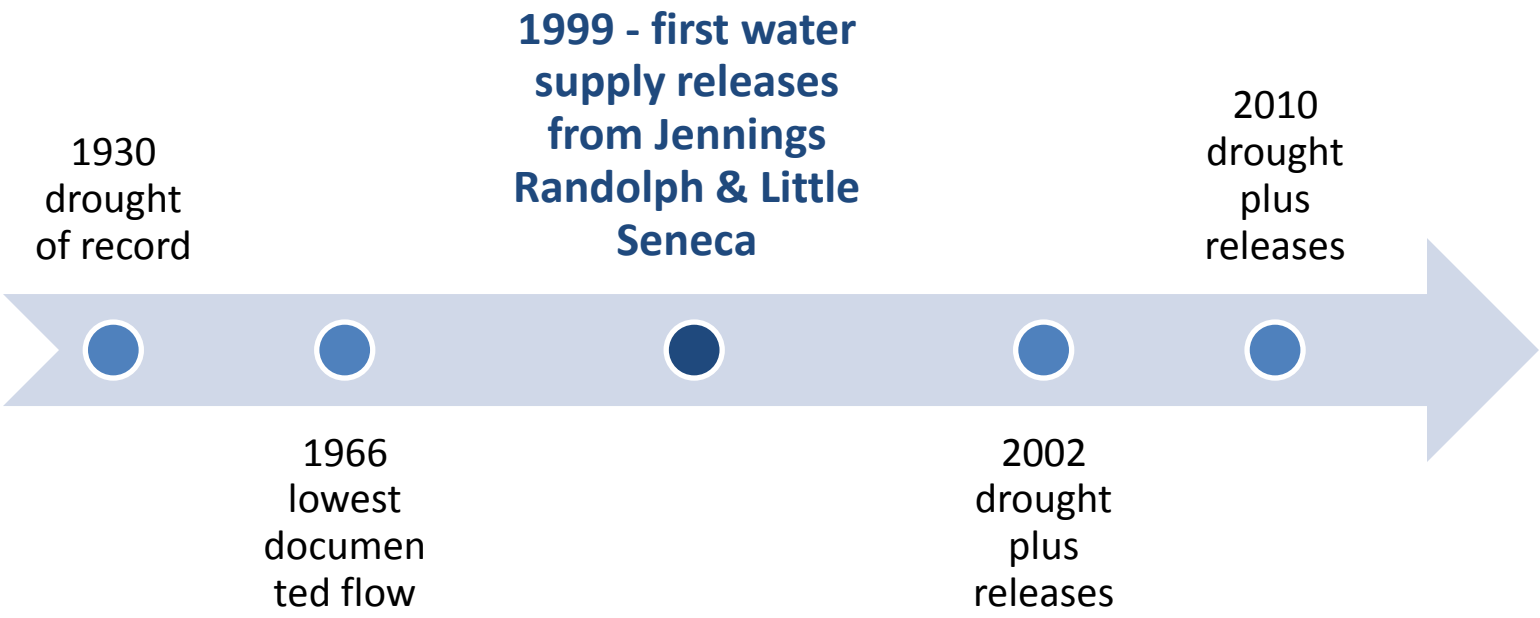


SRES: Special Report on Emissions Scenarios (2000)



18 Climate Projections

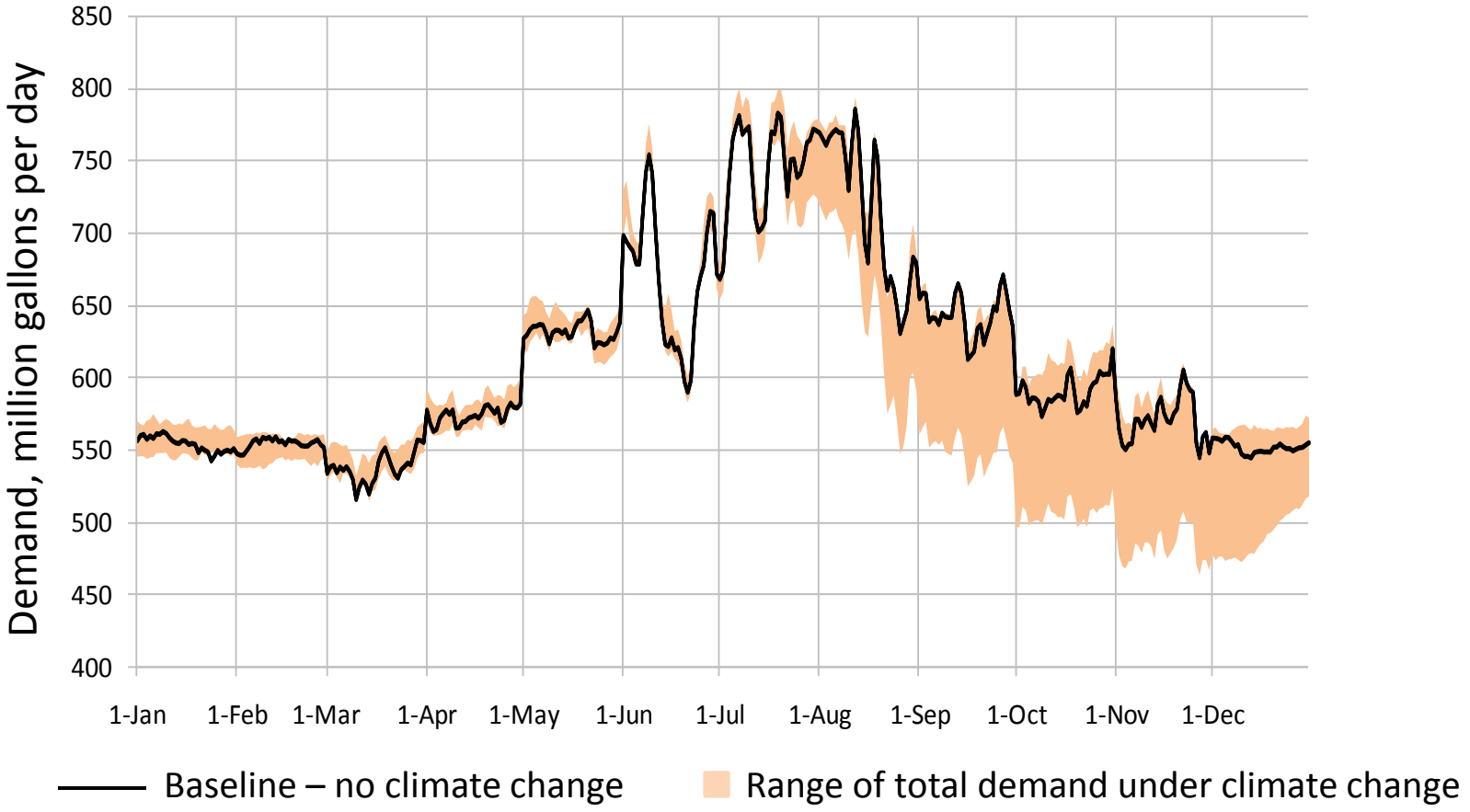
Historical Potomac Low Flow Periods



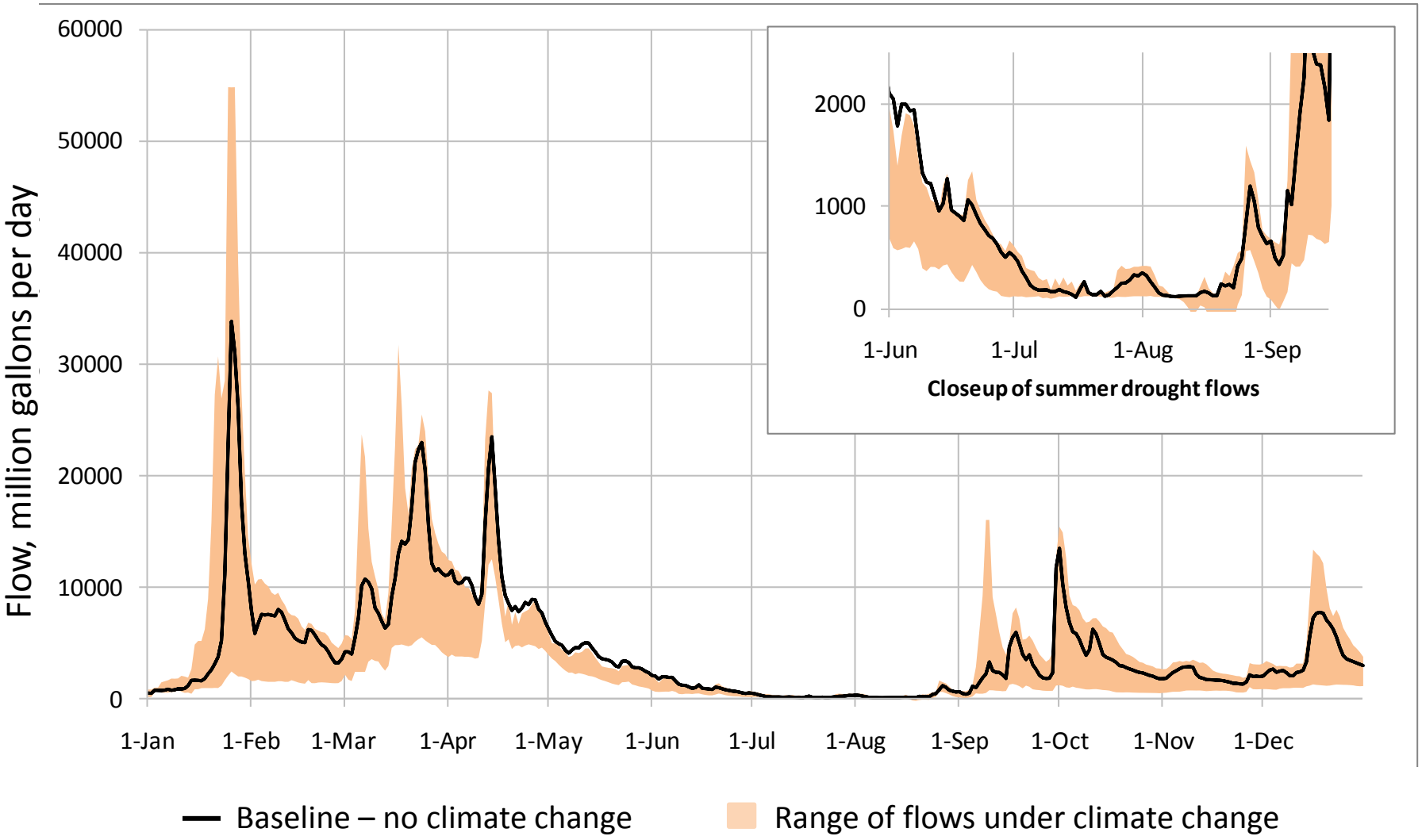
- Most severe droughts were in 1930, 1966, 1999, & 2002
- This study's primary focus: a "moderate" drought, with likelihood comparable with drought of 1999

Daily Water Demands

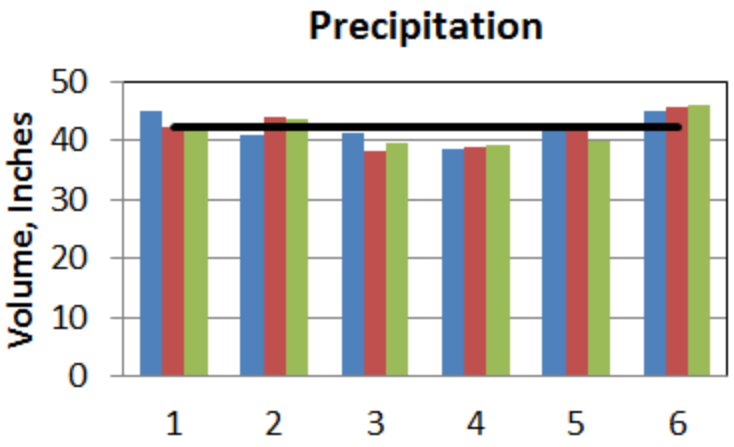
- Daily demand forecasts are responsive to higher temperatures and lower precipitation
- Low reservoir levels trigger water use restrictions, causing demands to drop

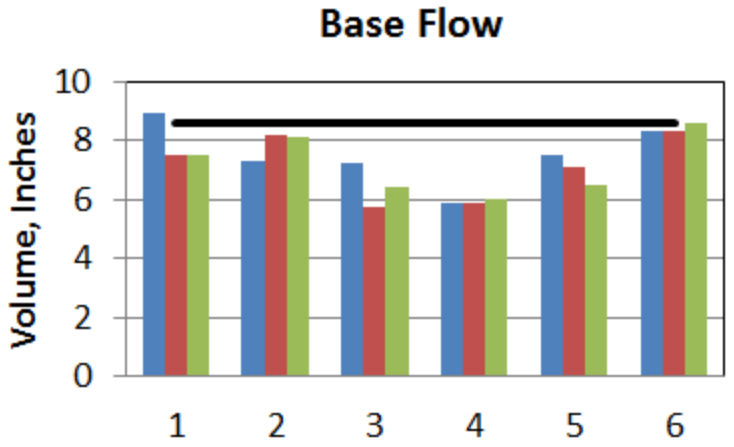


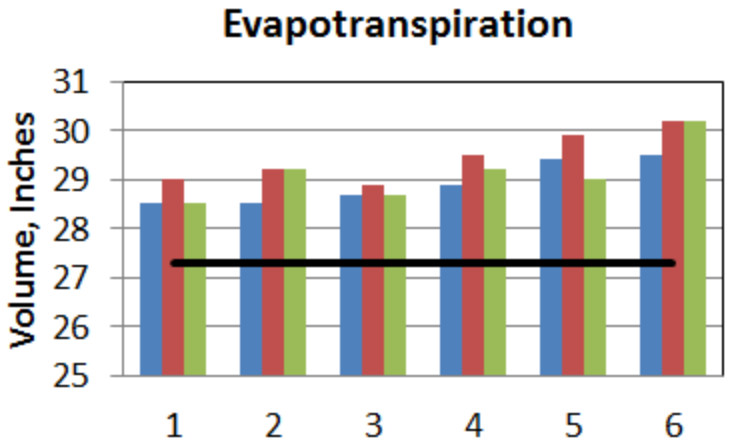
Potomac River Flows

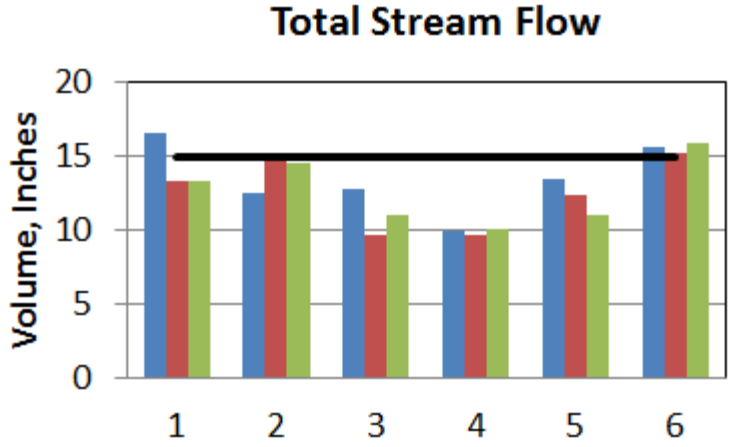


Basin-wide Average Annual Water Budget









Study Summary

Uncertainties/Limitations

- Range of projections from global models
- Less confidence in regional predictions
- Variability based on short time period (1988-1999)
- Uncertainty added by watershed modeling

2040 Water Supply Reliability
(moderate drought conditions)

- Best scenarios: little impact
- Medium-impact scenarios: mandatory water use restrictions likely
- Worst-case scenarios: significant management/system changes required

Potential Management/System Changes

(To be evaluated in 2015 water supply reliability study)

- More operational efficiency
- Increased system flexibility
- Earlier and increased water use restrictions
- Additional water supply storage

For More Information

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