ICPRB's Potential Impact of Climate Change on Drinking Water Supply and COG's Water Supply and Drought Response Plan

Presentation to WRTC

November 7, 203

by Christine Howard

COG staff

Overview

- COG staff provided an overview of wastewater projections at our last WRTC meeting – will focus on water quantity and drinking water projections

- Key Features and Next Steps
  - ICPRB CO-OP's Study on the Potential Impact of Climate Change on Washington Metropolitan Water Supply
  - COG's Water Supply and Drought Plan

- Identify clarifications needed for CBPC meeting next Friday

Great Falls on April 29, 2012

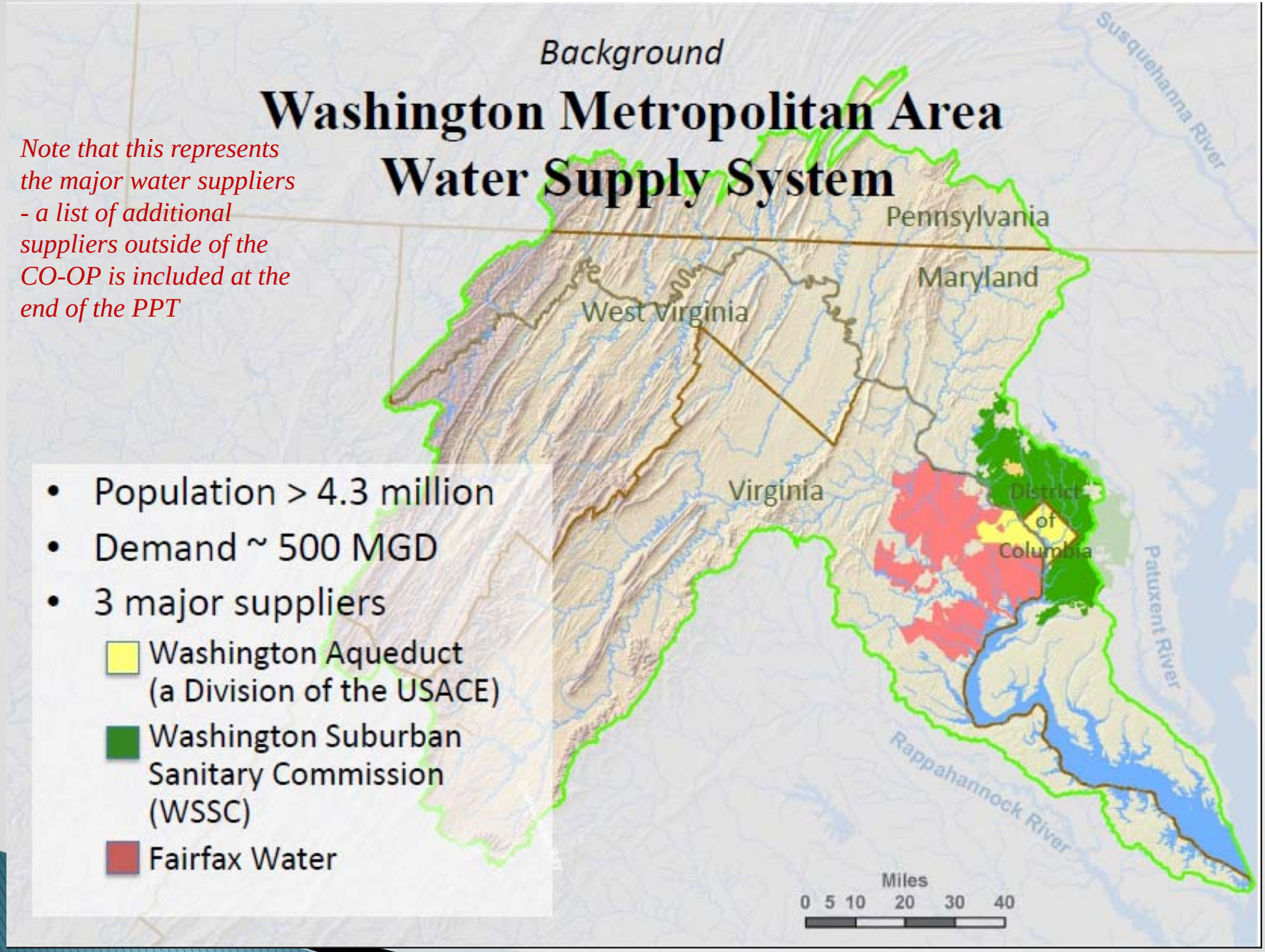
Background – ICPRB and the CO-OP

- ICPRB's Section for Cooperative Water Supply Operations on the Potomac (CO-OP)
  - Created in 1979 as a cooperative technical center
    - Regional reservoir and water supply operations during droughts
  - Conducts water supply reliability studies every five years, to ensure that the Washington metropolitan area's future water needs can be met.
  - Publishes a Water Supply and Drought Outlook report from April – October
    - Note that COG publishes a regional drought report as well

Background

Washington Metropolitan Area Water Supply System

Note that this represents the major water suppliers - a list of additional suppliers outside of the CO-OP is included at the end of the PPT

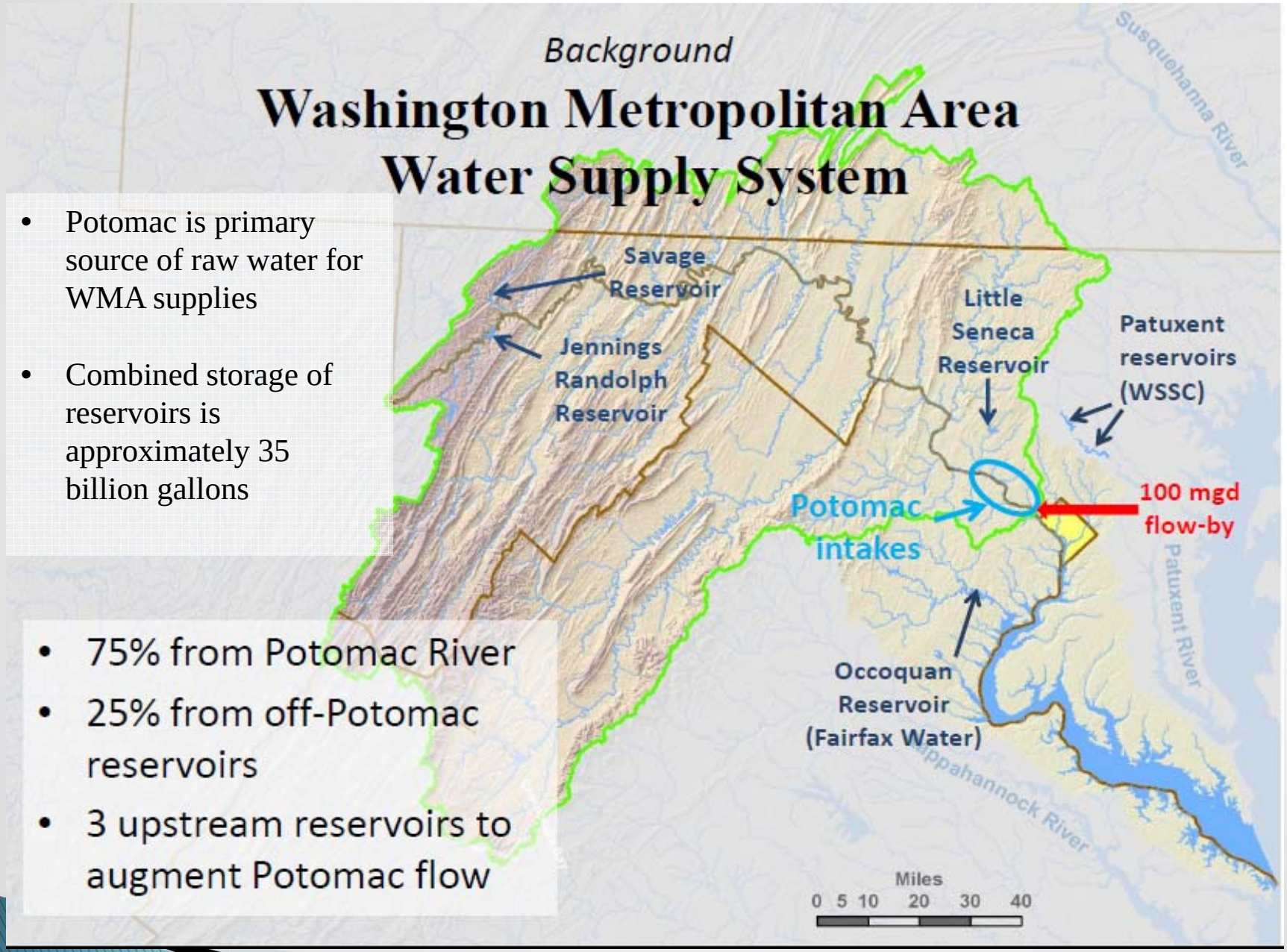


- Population > 4.3 million
- Demand ~ 500 MGD
- 3 major suppliers
  - Washington Aqueduct (a Division of the USACE)
  - Washington Suburban Sanitary Commission (WSSC)
  - Fairfax Water

Background

Washington Metropolitan Area Water Supply System

- Potomac is primary source of raw water for WMA supplies
- Combined storage of reservoirs is approximately 35 billion gallons



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

2010 Reliability Study- Two parts

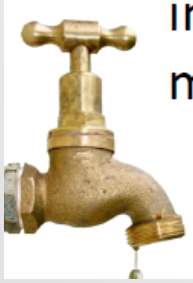
Background

2010 Reliability Study

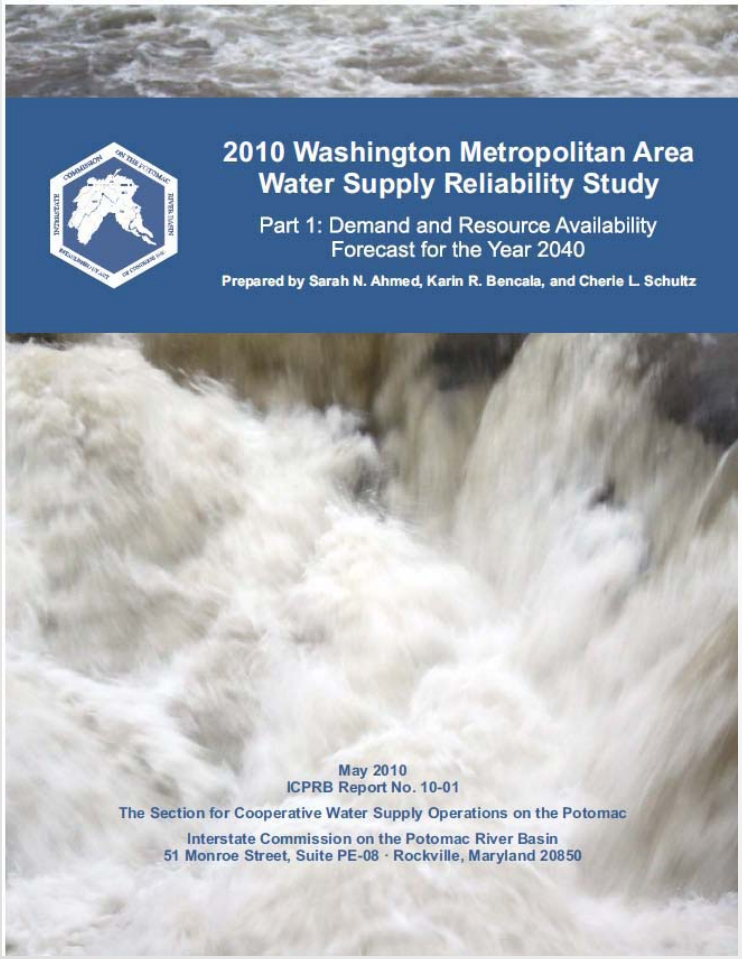
Findings of *Part 1* – *Demand and Resource Availability for the year 2040* (based on historical climate)

- 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.

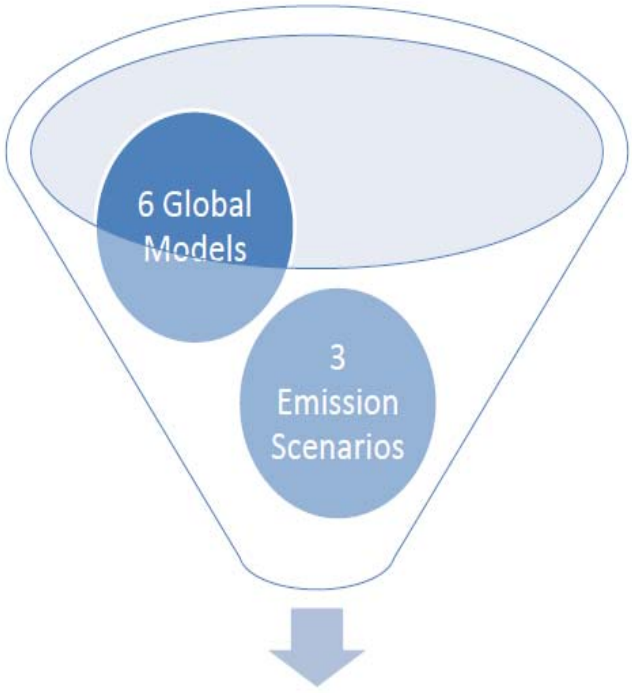


2010 Reliability Study- Part 1 Results



- Water demand in the area served by the WMA suppliers
  - will rise from 500 MGD to 610-665 MGD by year 2040 (23 – 30%)
- Used COG's Round 7.2 Cooperative Forecast for annual water demand
  - Note that the region just adopted 8.2 - study used 2010 data
- Based on a range of hydrologic conditions similar to those during the 78 year period of historical record
- Overall message – fine through 2030 – we might have shortages in 2040
- Next Step – how could climate change affect this projection in 2040?

Part 2 of Study - Climate Scenarios



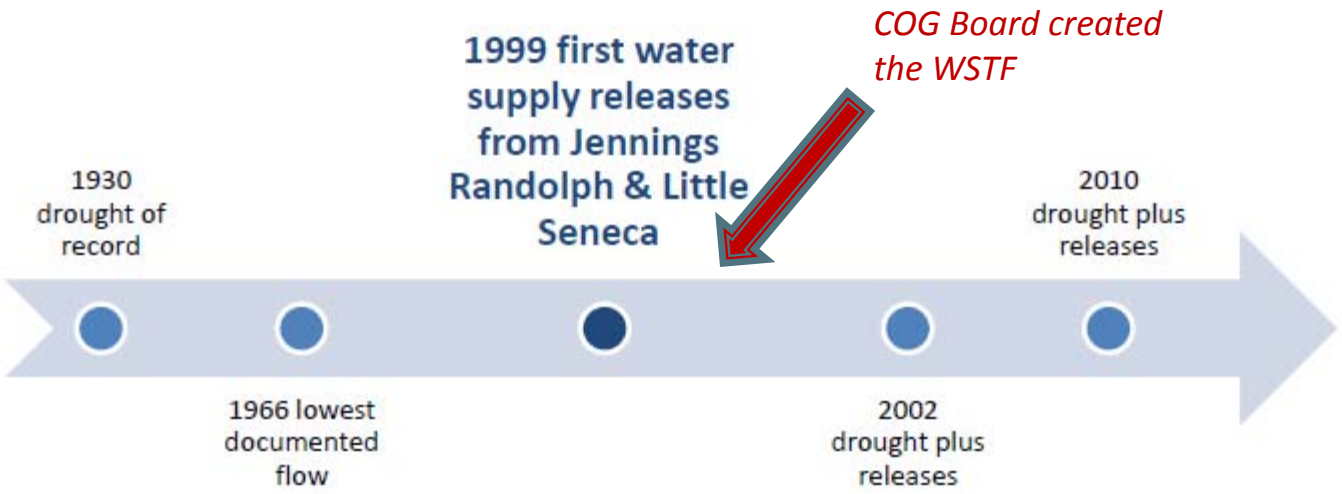
18 Climate Scenarios

Each climate scenario provides a unique interpretation of what the future might hold in terms of temperature, precipitation, evapotranspiration, stream flows and water supply demands.

- This study is based on results from six different global models under three emission scenarios
- The Bay Program's Phase 5 Watershed Model was used to estimate the impact on stream flows
- ICPRB's Potomac Reservoir and River Simulation Model (PRISM)was used to evaluate the impact on the area's water supply system
- Used reference period of 1988 – 1999

Background

Historical Potomac Low Flow Periods



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

Potential Climate Change Impacts to Potomac River Basin (in 2040)

- Average temperature increases of 1.4 to 4.1 degree F
- Precipitation increases or decreases (split)
- Higher evapotranspiration rates (evaporation from the ground and other surfaces and transpiration by plants) causing stream flows to decrease as much as 35 percent
- A rise in summertime water demand due to increases in outdoor uses

Projected Water Quantity Impacts

- Ranged from minor to major – a moderate drought in 2040 would cause
  - Best case scenarios – little impact
  - Medium case – mandatory restrictions
  - Worst case (with NO changes to the current water supply system)
    - Mandatory restrictions on water use
    - Depleted reservoirs
    - Inability to maintain environmental flow-bys in the Potomac River (100 mgd at Little Falls)

Limitations

- Predicted that precipitation will increase on a global scale, models differ on whether precipitation will increase or decrease (for the Potomac River Basin)
- Less confidence in regional models
- Based on a relatively short time period (1988-1999)

Potential Management/System Changes

- To be evaluated during their 2015 study
- Area's water suppliers are committed to funding structures/engineering changes if needed
- Fairfax Water and Loudoun Water are exploring the use of using retired quarries to store water*
- Looking at improvements in system efficiency and operational flexibility
- Earlier and increased water restrictions

* Loudoun County Luck Stone's quarry located north of the W&OD Trail and east of Goose Creek for Water Banking. It is anticipated that approximately 1 billion gallons of water will be able to be stored in this quarry alone once mining operations are complete in the 2017-2020 timeframe. Fairfax Water is developing a plan to create a water supply reservoir at Lorton's Vulcan Quarry.

Questions?

Contact

- **Sarah Ahmed, sahmed@icprb.org**
- **Cherie Schultz, PhD, cschultz@icprb.org**

Acknowledgements

- **Cherie Schultz, Karin Bencala and Ross Mandel**, Interstate Commission on the Potomac River Basin, Rockville, Maryland
- **Lauren Hay**, USGS National Research Program, Central Region, Denver, Colorado
- **Mark Bennett**, USGS Virginia Water Science Center, Richmond, Virginia
- **Gary Shenk and Jing Wu**, Chesapeake Bay Program Office, Annapolis, Maryland

COG's Water Supply and Drought Plan

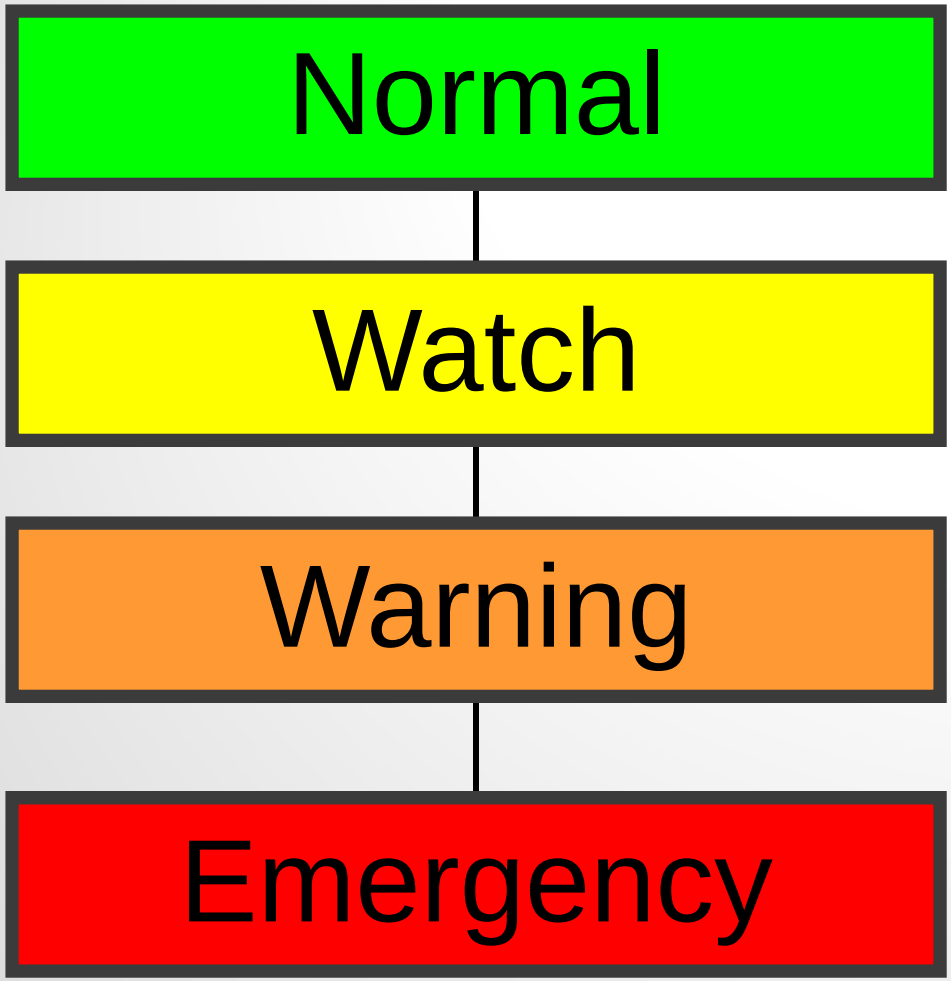
- COG Board created the Water Supply Task Force (WSTF) in the summer of 1999
  - region did not have a common voice about drought conditions – conflicting messages to the public
- Primary Focus of the WSTF
  - Initial Focus – water supply and current drought conditions
  - Long-Term Goals –develop "common language" for region in the event of another serious drought
- ***The Metropolitan Washington Water Supply and Drought Awareness Response Plan*** adopted on June 7, 2000 – two main components
  - A year-round plan emphasizing wise water use and conservation; and a water supply and drought awareness and response plan

Components of the Plan – Two Parts

- 1st Part - Wise Water Use Campaign
  - A Public Outreach Campaign with Indoor and Outdoor Conservation Messages – year-round focus
  - Part of a Regional Outreach Effort – Community Engagement Campaign
    - Regional water conservation advertising and outreach at public events
    - Web site developed with useful tools
      - Landscape guide, seasonal water conservation tips
      - Note that the CEC also focuses on other issues like fats, oils and grease and do not flush

Wayne the Water Drop

2nd Part - Drought Stages and Triggers



- Four stages with corresponding triggers and actions
- Designed for customers who use the Potomac River for water supply

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Normal

Water supply adequate to meet demands

Year-round **wise water use program** conducted

Routine reporting
Monthly water supply and drought outlooks
-May-October

Email and Web Site Updates

Watch

Trigger: NOAA "D1" drought level for Potomac River Basin (Drought Monitor)
Drought coordination committee meets
Note: CAO Chair is on this committee

Regional media briefing

Voluntary Water Conservation recommendations issued

Additional media notification at first reservoir release - 75% full reservoirs

Warning

Trigger: Jennings Randolph and Little Seneca combined storage below 60% for 5 consecutive days OR

5% probability of not meeting unrestricted water supply demands over next 1-2 months

Drought Coordination Committee meets

Voluntary water restrictions announced

Regional media briefings begun on weekly basis

Emergency

Trigger: 50% probability of not being able to meet demands over next month

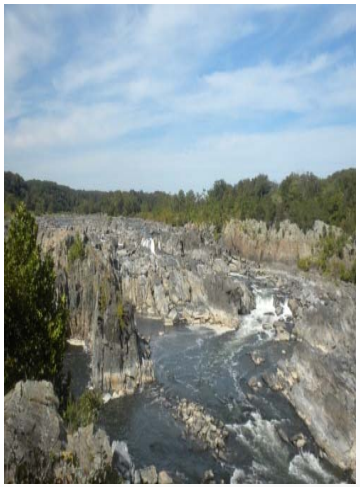
Drought Coordination Committee meets

Mandatory Water Restrictions announced

Regional Press Conference on daily basis

History of Use – Drought Declarations

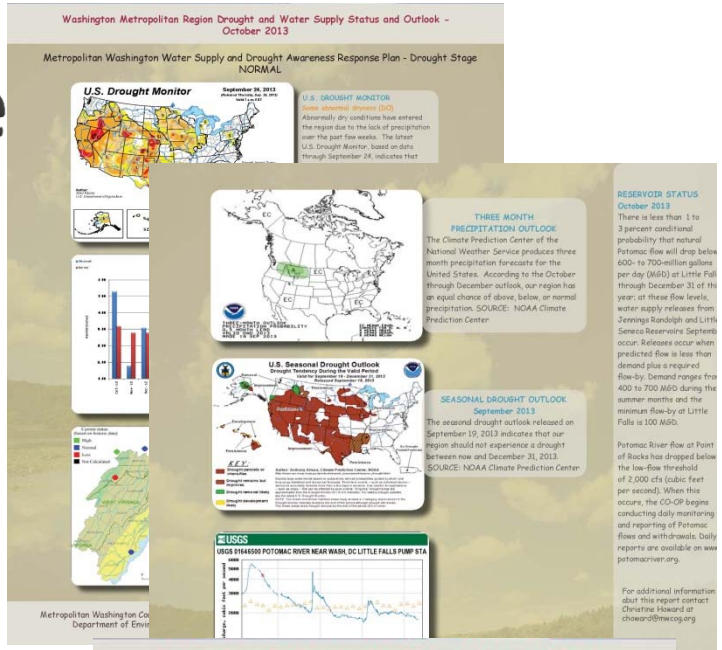
- COG the last Drought WATCH - Sept. 9, 2010
  - Press Release urged residents and businesses to conserve water – use water wisely
  - Emphasized - water supply reservoirs were full but would be utilized if needed
  - Ended with Tropical Storm Lee
- Since the Drought Awareness Response Plan was adopted in 2000
  - Declared a drought WATCH in 2002, 2007, 2010
  - Never issued a WARNING or EMERGENCY for the Potomac system

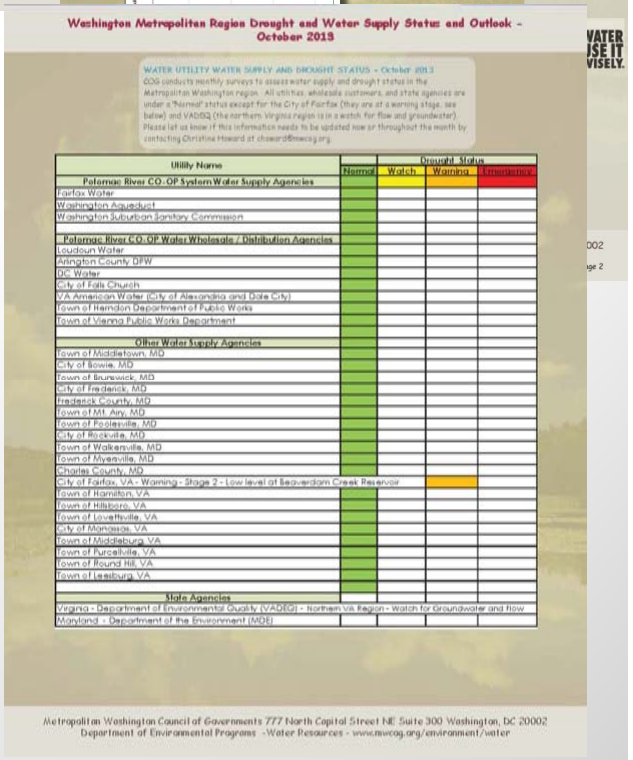


Great Falls – Sept. 2010

COG's Monthly Drought Re

- Issue Monthly from April - October
  - Reports and Summarizes
    - The U.S. Drought Monitor produced by NOAA
  - Precipitation Data for the Potomac River Basin
  - Groundwater levels
  - Seasonal Drought Outlooks
  - Streamflow levels at Point of Rocks and Little Falls
  - Probability of Reservoir Releases
  - Status of Regional Water Supply





Drought Workshop and Next Steps for Plan

- Held a successful Drought Monitoring Workshop this past spring
  - Attendees included:
    - water utility general managers and staff
    - representatives from USGS, NOAA, and ICPRB
    - local and state drought planners
  - Developed common understanding of the Plan
  - Reviewed ICPRB roles and the CO-OP, state plans
  - Discussed the drought **Watch** trigger
- Outcome – Next Steps
  - Revisit Drought Watch Trigger of **NOAA 'D1'**
  - Revisit communication aspects of the Plan
  - Review water conservation messages
  - Time frame for updates – spring 2014

Resources for Additional Information

- Christine Howard, COG Staff: choward@mwcog.org , 202.962.3366
- COG's Drought and Water Supply: http://www.mwcog.org/environment/water/watersupply/current_conditions.asp
- ICPRB's Drinking Water and CO-OP: http://www.potomacriver.org/drinking-water/water-supply?id=180

Questions or Comments

- The Chesapeake Bay Water Resources and Policy Committee will meet next Friday (November 15th)
  - ICPRB - Cherie Schultz will provide a detailed overview/presentation of their study on the Potential Impacts of Climate Change on Drinking Water Supply
  - COG Staff will provide a brief summary of the Drought Plan
  - Any questions or clarifications needed – comments? Advice?

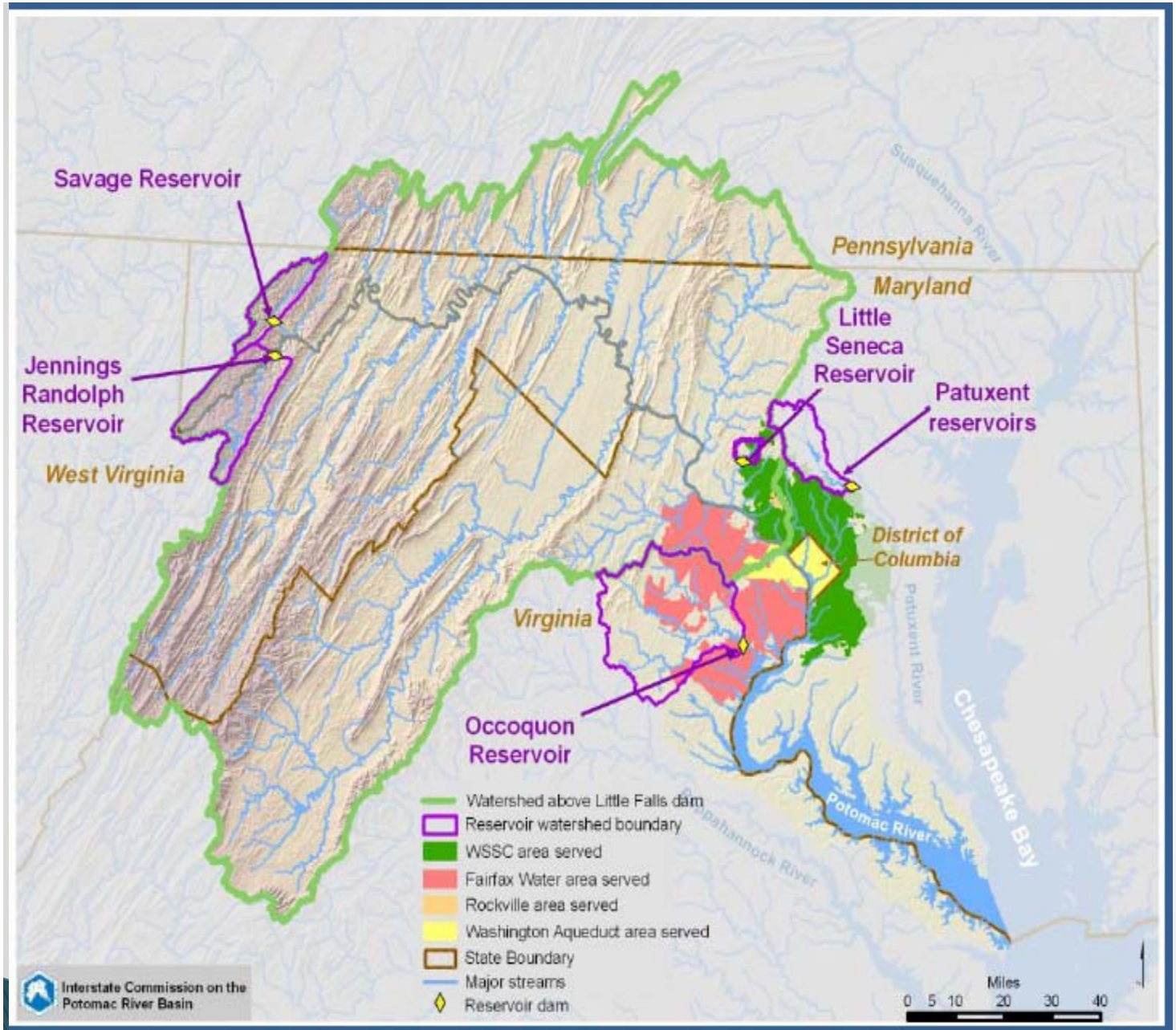


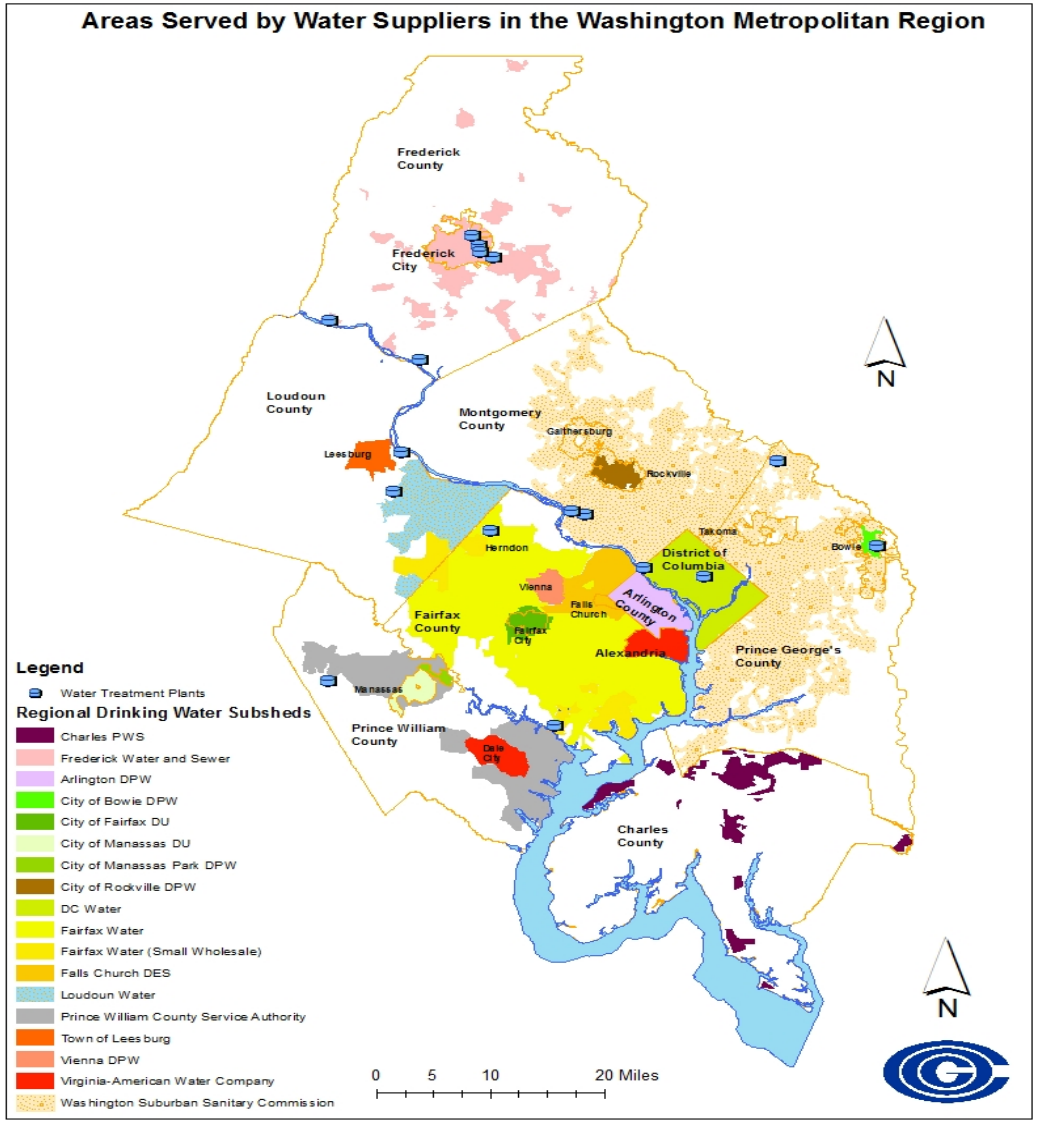
Figure 2: Map of the Potomac River basin, showing WMA water supply system resources and areas served by the WMA water suppliers.

Washington Aqueduct, serving the District of Columbia via the D.C. Water and Sewer Authority (DC Water), as well as portions of northern Virginia - Arlington County, the City of Falls Church, and the Town of Vienna.

Washington Suburban Sanitary Commission (WSSC), serving Montgomery and Prince George's counties in Maryland, and provides a limited amount of water to Howard and Charles counties, and water on an emergency basis to the City of Rockville and DC Water.

Fairfax Water, serving most of Fairfax County, Virginia, and the following wholesale customers in Virginia: Dulles International Airport, Fort Belvoir, Town of Herndon, Loudoun Water, Prince William County Service Authority, and the Virginia American Water Company (serving the City of Alexandria and Dale City).

Water Supply in the Region



Water Supply in the Region

- **Potomac [1]CO-OP System**
  Three major water suppliers in the CO-OP provide 90%+ of region's treated water
  - [2]Fairfax Water - provides water to Fairfax County, Loudoun Water, Prince William County Service Authority, Vienna DPW, Virginia-American Water Company
  - Washington Aqueduct Division - provides water to Arlington Department of Public Works, DC Water, Falls Church Department of Environmental Services
  - Washington Suburban Sanitary Commission- provides water to most of Prince George's and Montgomery County
  - Additional water supply sources in Potomac River System
    - Patuxent Reservoir, Occoquan Reservoir
    - Backup storage – Jennings Randolph Reservoir, Little Seneca Reservoir

Jurisdictions with their own water supply sources

- Bowie- groundwater
- [2]Fairfax City
- Loudoun County Towns
  - Leesburg, Purcellville, Hamilton, Hillsboro, Lovettsville, Middleburg, Round Hill
- Manassas
  - Also supplies water to part of Prince William County
- Poolesville – groundwater
- Rockville – Potomac
- Charles County – groundwater, Potomac

[1] The CO-OP System is coordinated by the Interstate Commission on the Potomac River Basin under 1982 Agreement
Loudoun Water is in the process of constructing its own water treatment plant and coordinating with the CO-OP
[2] Fairfax Water is expected to incorporate the City of Falls Church and City of Fairfax service areas in 2014