ICPRB WATER MARKETS DISCUSSION SERIES

1. Scope & Background

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Interstate Commission on the Potomac River Basin (ICPRB)

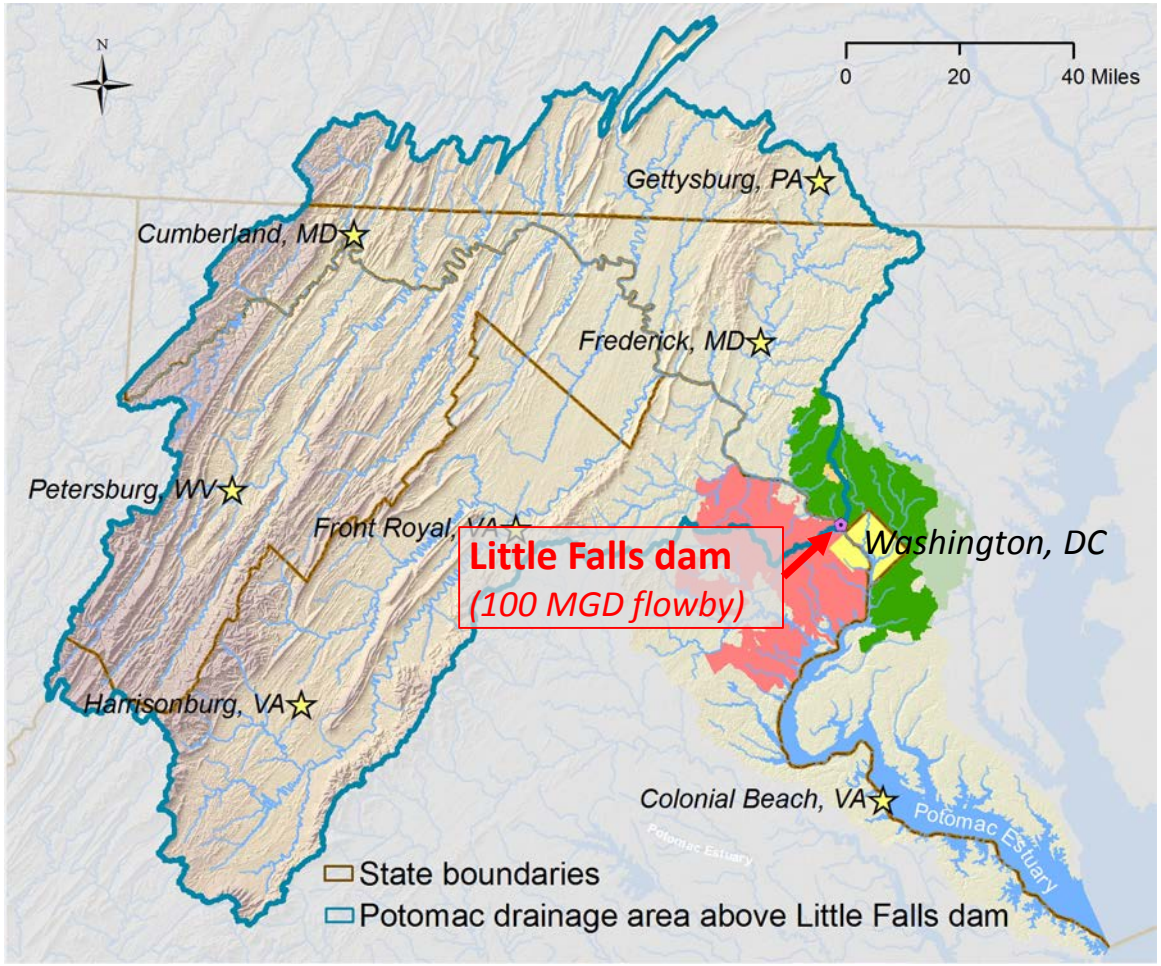
ICPRB Water Markets Discussion Series

<u>Caution</u>: ICPRB staff are not economists, and are not experts in water markets!

- What do we mean by "water markets"?
  - sellers: owners of "excess" water storage
  - buyers:
    - water users in need of additional raw water sources?
    - water users seeking to "mitigate" consumptive use via low flow augmentation?
    - others?
- Focus is on water quantity
  - water supply
  - recreational users
  - ecological systems
  - other?

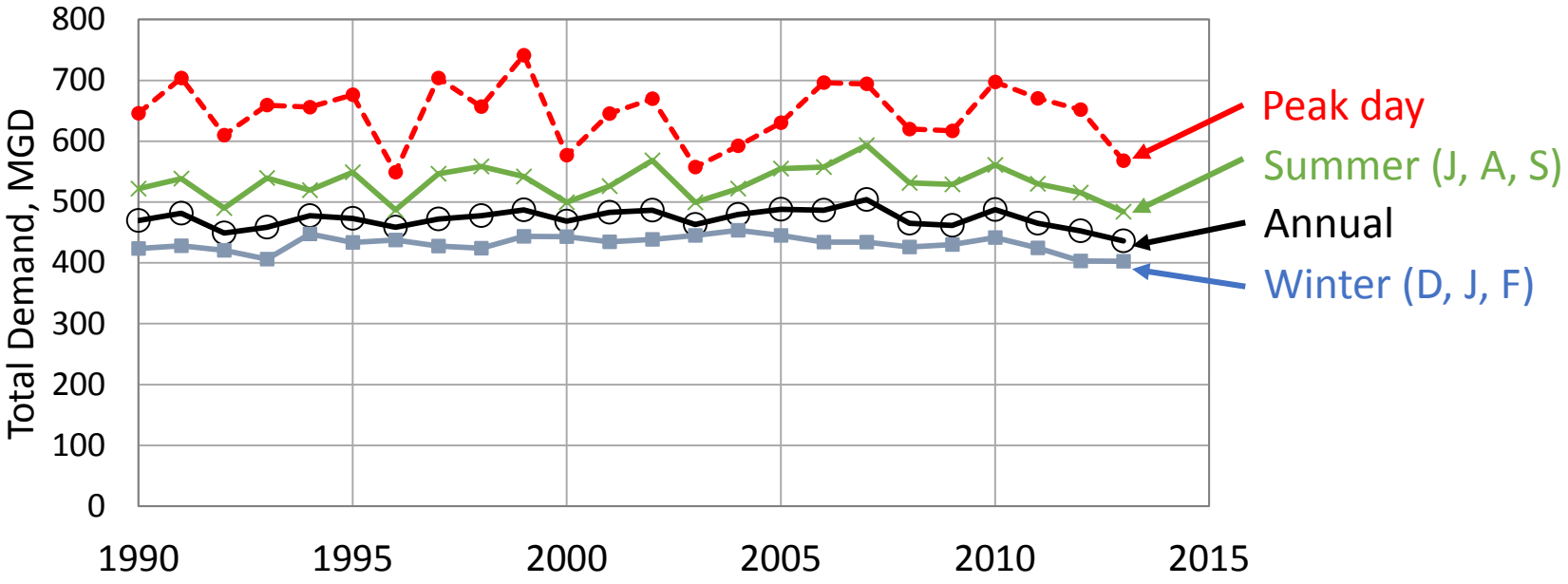
Geographic Scope

- Look at examples from around the world
  - regulatory drivers
  - institutional support
  - technical support
- Apply to ”upper” Potomac basin
  - potential benefits
  - potential role of ICPRB, states



Washington metropolitan area (WMA) water use

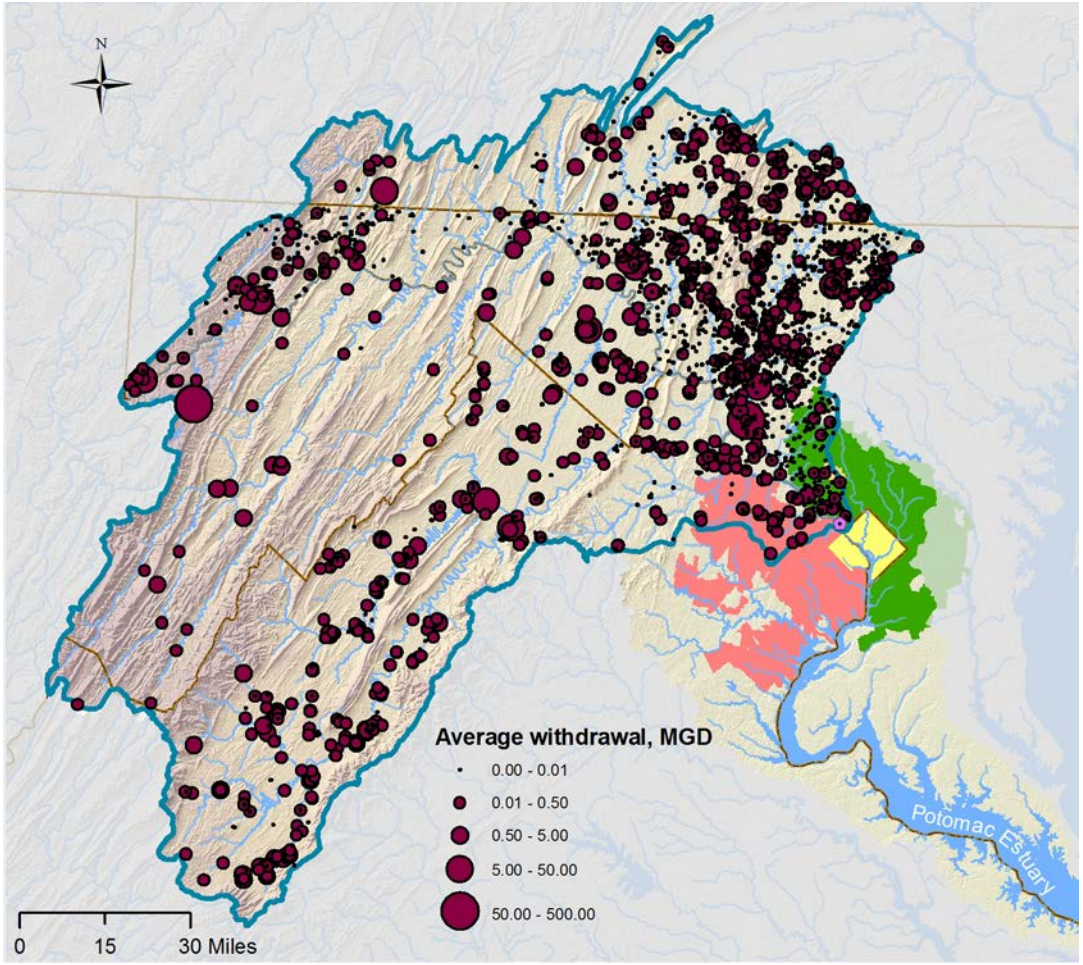
- Current annual demand ~ 475 MGD* - steady since 1990
- 2040 annual demand forecast: 545 MGD*
- Water sources: ~ 75% from Potomac River, ~ 25% from off-Potomac reservoirs



*includes City of Rockville

Upstream water withdrawals

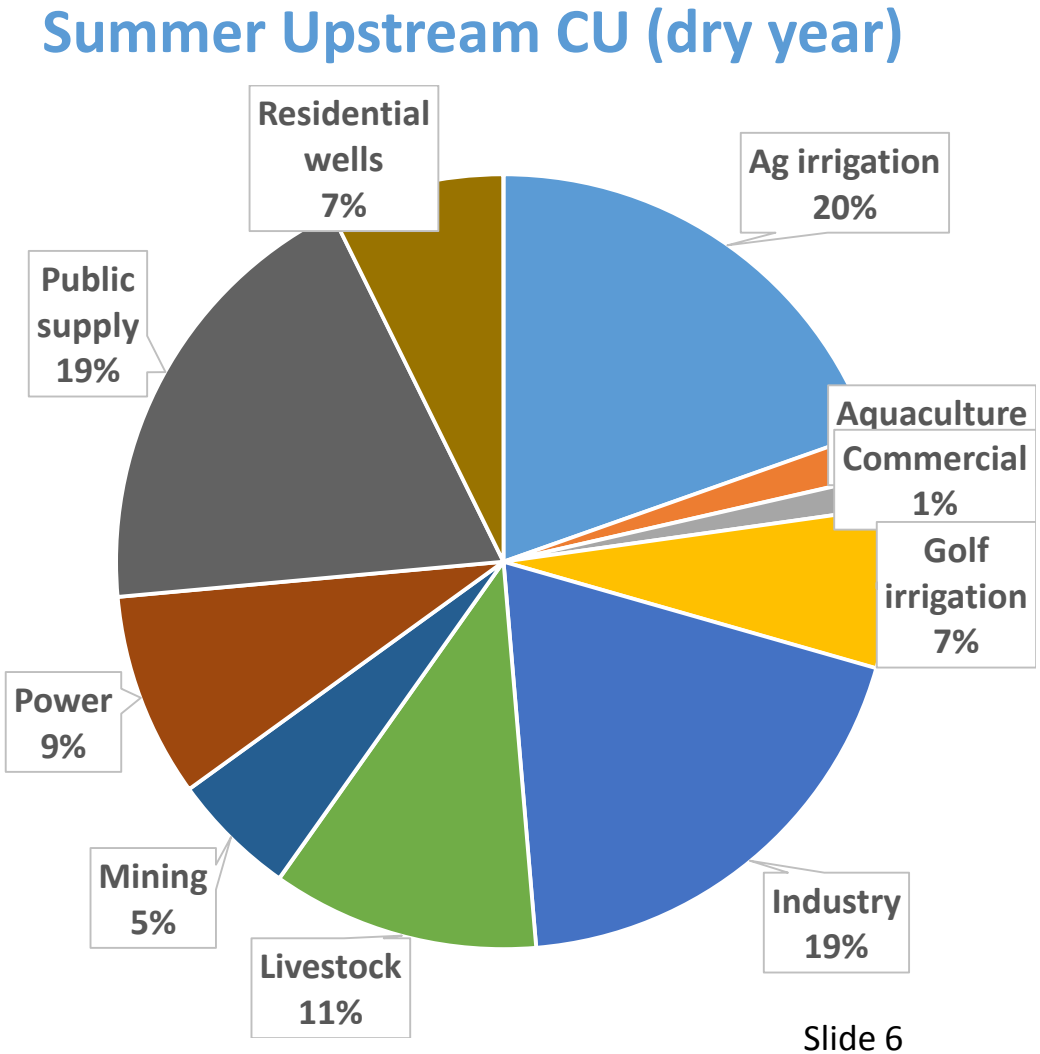
- ICPRB has developed database of state monthly withdrawals
- Average annual upstream withdrawals totaled 740 MGD in 2010*



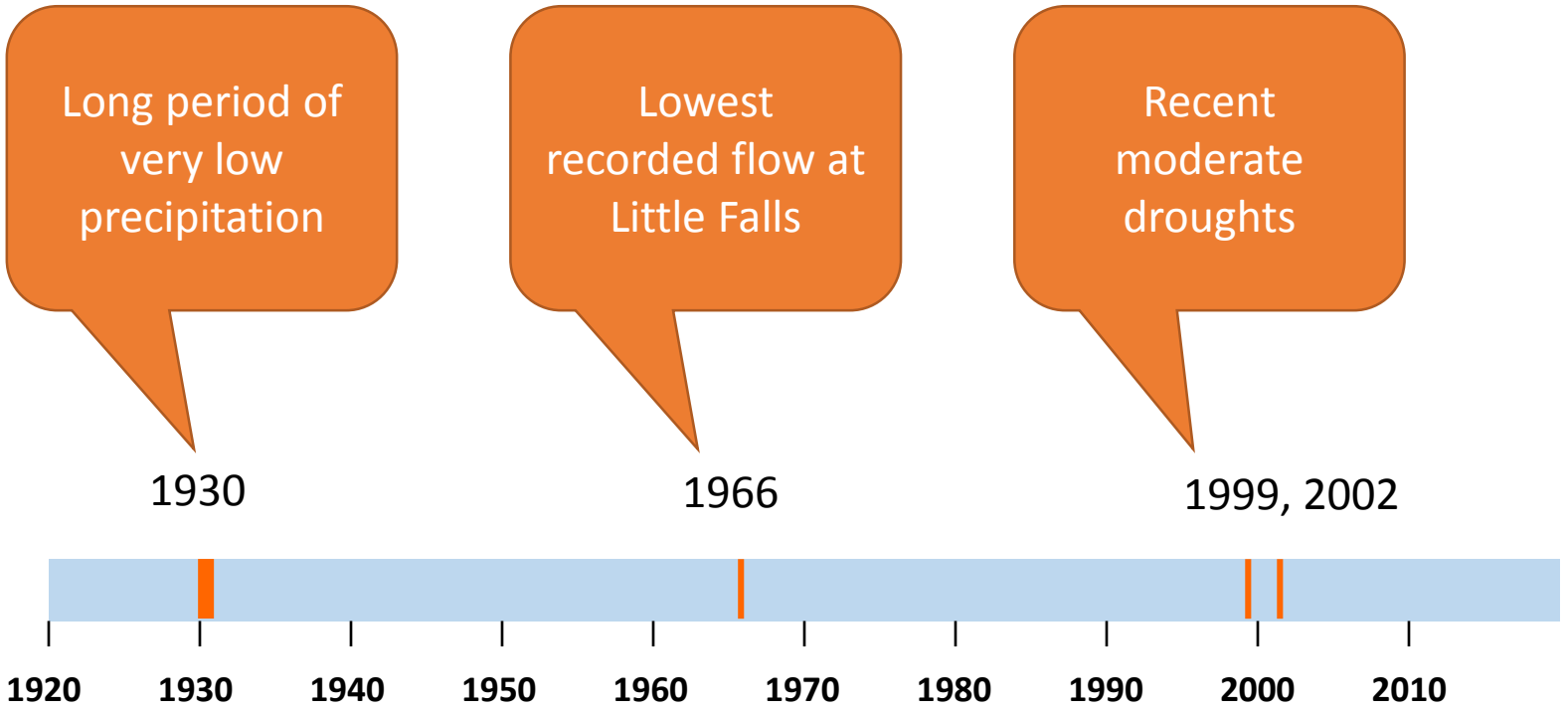
*Excluding Mt. Storm Power Station in West Virginia

Upstream consumptive use (CU)

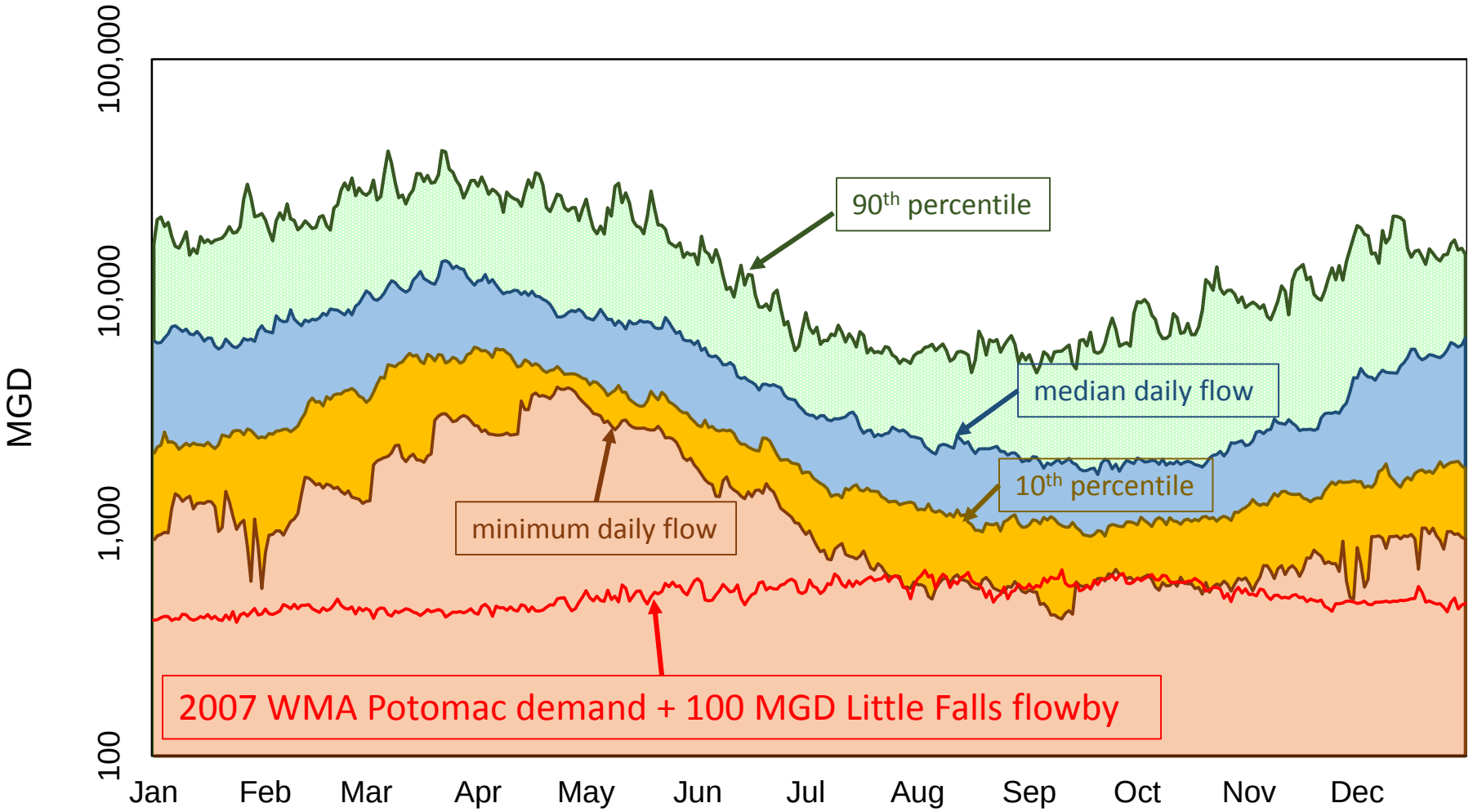
- CU is net withdrawal (withdrawal – discharge)
- CU is highest in the summer months (June, July, August)
- Total upstream summertime CU (dry year) is estimated to be
  - 111 MGD in 2010
  - 141 MGD in 2040
- Large forecast uncertainties
  - agricultural use
  - power sector use



Water availability – historical



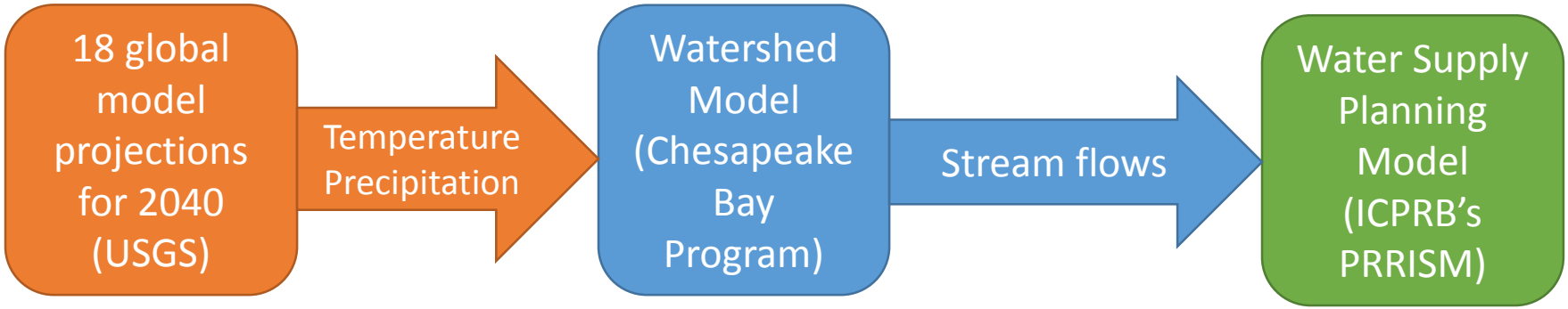
Water availability – daily Potomac River flow* statistics (from 1930-2013 data)



*"Adjusted" flow at Little Falls – observed flow plus WMA withdrawals

Water availability – Climate Change
(CO-OP 2013 Study)

Modeling the potential impact of climate change



- Climate change adds uncertainty to water availability forecasts
- Temperatures are projected to rise
- Precipitation is projected to increase … or decrease

Water availability – climate response function *(CO-OP 2015 study)*

Change in stream flow, ΔQ_{summer} , (%) from 2013 Watershed Model results:

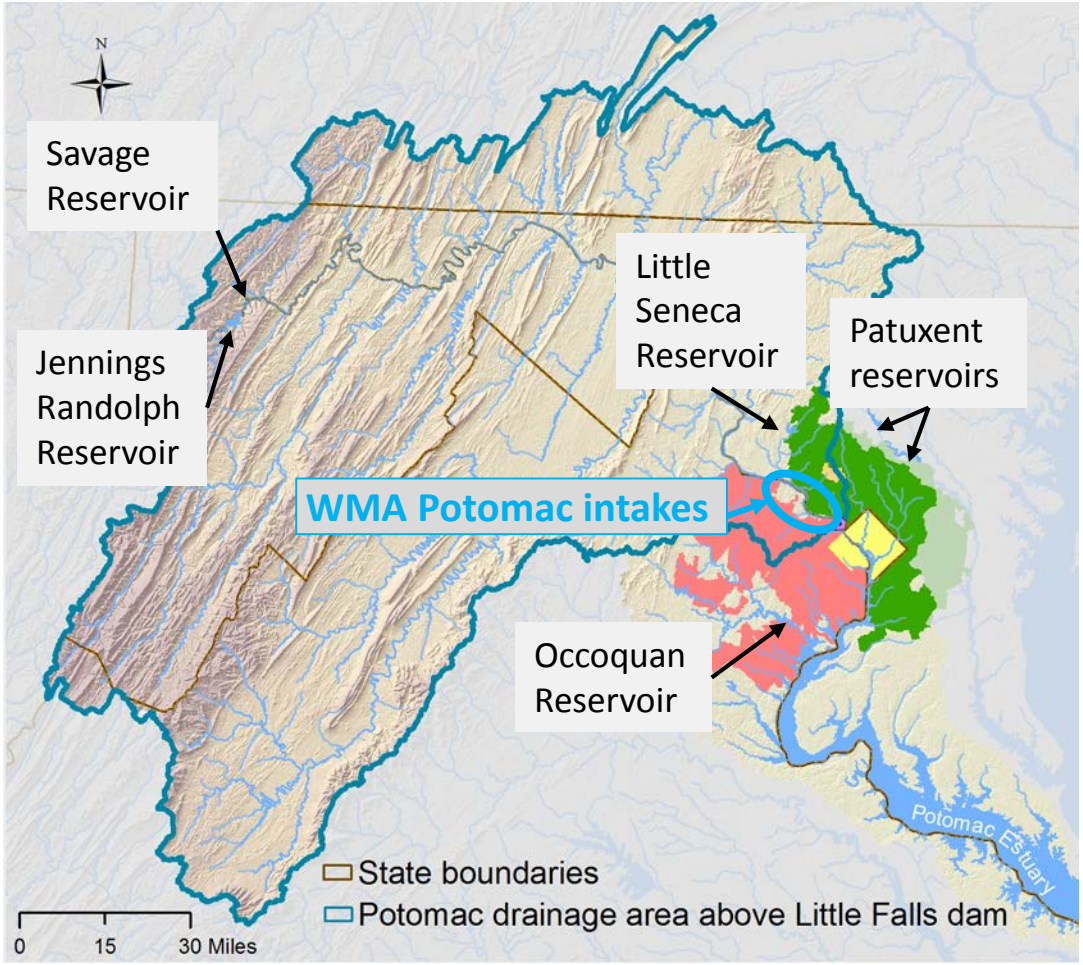
$$\Delta Q_{summer} = 2.254 * \Delta P - 0.038 * \Delta T$$

Change in average precipitation (P)

Change in average temp, °F (T)	-10.0%	-7.5%	-5.0%	-2.5%	0.0%	2.5%	5.0%	7.5%	10.0%
0.0	-23	-17	-11	-6	0	6	11	17	23
0.5	-24	-19	-13	-8	-2	4	9	15	21
1.0	-26	-21	-15	-9	-4	2	7	13	19
1.5	-28	-23	-17	-11	-6	0	6	11	17
2.0	-30	-24	-19	-13	-8	-2	4	9	15
2.5	-32	-26	-21	-15	-9	-4	2	7	13
3.0	-34	-28	-23	-17	-11	-6	0	6	11
3.5	-36	-30	-24	-19	-13	-8	-2	4	9
4.0	-38	-32	-26	-21	-15	-9	-4	2	7

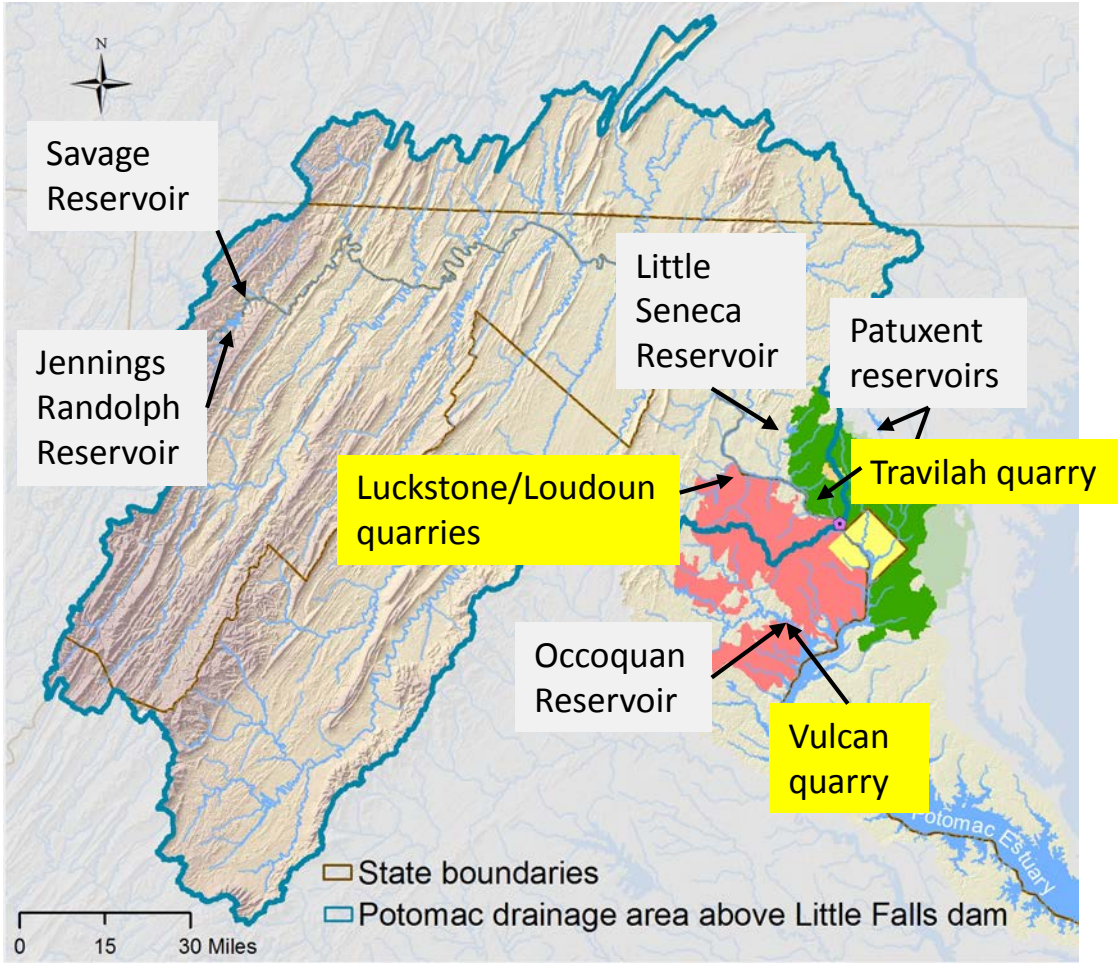
WMA's Cooperative System

- *Low Flow Allocation Agreement* (1978)
  - DC, MD, VA, US, Fairfax Water, WSSC
  - emergency water allocation formula based on winter use
- *Water Supply Coordination Agreement* (1982)
  - DC, US, Fairfax Water, WSSC, ICPRB
  - establishment of cooperative system
    - coordination during droughts
    - regular planning studies
    - ICPRB CO-OP as support
  - cost-share formula for <u>future storage</u>
- Storage cost-sharing agreements (1982)



Future reliability of the WMA system

- 2015 water supply study conclusions
  - current system would have difficulty meeting 2040 demands during a severe drought
  - climate change adds considerable uncertainty
- ICPRB's upcoming water supply alternatives study
  - will evaluate ability of new resources and operational changes to meet future challenges



Regulatory drivers in upper Potomac basin

- There are caps on consumptive use in the upper Potomac basin for non-municipal surface water withdrawals
  - Maryland[1]: for CU > 1 MGD
  - Virginia[2]: for CU > 0.5 MGD
- Users whose use exceeds these caps have two choices during low flow periods
  - Secure adequate storage for low flow augmentation to mitigate CU
  - Reduce withdrawals
- Reduction in surface water withdrawals by municipal users required when "Restriction Stage" of the LFAA is declared
  - Maryland[1]: requires reductions to wintertime levels (Jan, Feb, Mar)
  - Virginia[3]: requires reductions in consultation with CO-OP

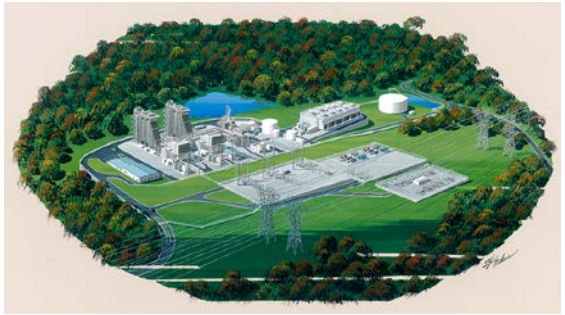
[1]See Code of Maryland Regulations, Title 26 DEPARTMENT OF THE ENVIRONMENT, Subtitle 17 WATER MANAGEMENT, Chapter 07 Consumptive Use of Surface Water in the Potomac River Basin: 26.17.07.01, 26.17.07.02, 26.17.07.03, 26.17.07.04

[2]See Code of Virginia § 62.1-44.15:5.02. Low-flow protections in Potomac River

[3]See 9VAC25-210-110. Establishing applicable standards, limitations or other VWP permit conditions.

Examples of permitting processes involving storage

- Proposed expansion of Mirant Dickerson power facility
  - lead agency: Maryland Public Service Commission (PSC)/envir. review by MD DNR Power Plant Research Program (PPRP)
  - required storage: on-site tanks coupled with reduced production
- Proposed Catoctin Power facility
  - lead agency: Maryland PSC/envir. review by PPRP
  - required storage: WV quarries were candidates
- Proposed modifications of Mirant Dickerson facility for air quality
  - lead agency: Maryland PSC/envir. review by PPRP
  - required storage: 4.5 MG onsite pond & potential reductions in production
- Loudoun Water Potomac River intake
  - lead agency: VA DEQ – Water Supply Program
  - required storage: 1.02 BG (onsite retired quarry)
- Town of Leesburg water reuse by Stonewall Generating Station (current)
  - lead agency: VA DEQ – Northern Regional Office/envir. review by DEQ Water Supply Program
  - *will Stonewall seek mitigating storage to avoid water use reductions required by NPDES permit?*



Questions for discussion

- Are there enough drivers currently in place for a water market to develop in the upper Potomac basin?
- Could a water storage market help your organization meet its water management goals?
- Are there potential new storage resources you are aware of that are not mentioned above?
- Other questions for discussion?

ICPRB Water Markets Discussion Series - *Logistics*

- Next meetings tentatively scheduled
  - Dec 9, 2015: Overview of water markets in California (Karin Bencala)
  - Jan 7, 2016: Nutrient trading in the Chesapeake Bay watershed (Carlton Haywood)
- Are there specific topics/issues/examples you'd like this discussion series to address?
- Are there people on your staff or in other organizations you'd like to have lead one of these meetings?
- Future directions: end series with a formal workshop?

Email suggestions to Karin Bencala at kbencala@icprb.org