



HISTORY and BACKGROUND DROUGHT MONITORING IN THE METROPOLITAN WASHINGTON REGION

Presentation to
DCTC - Drought Monitoring Workshop
April 4, 2013



by STUART FREUDBERG AND STEVE BIEBER, COG STAFF

Overview

- Goals of the workshop
- Brief history of the 1999 drought
- Regional response and the need for a common message
- Creation of the Metropolitan Washington Water Supply and Drought Response Plan

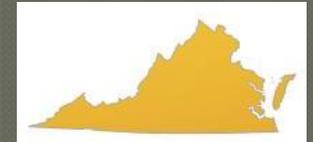
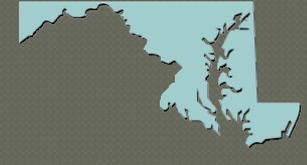


Great Falls on August 5, 1999



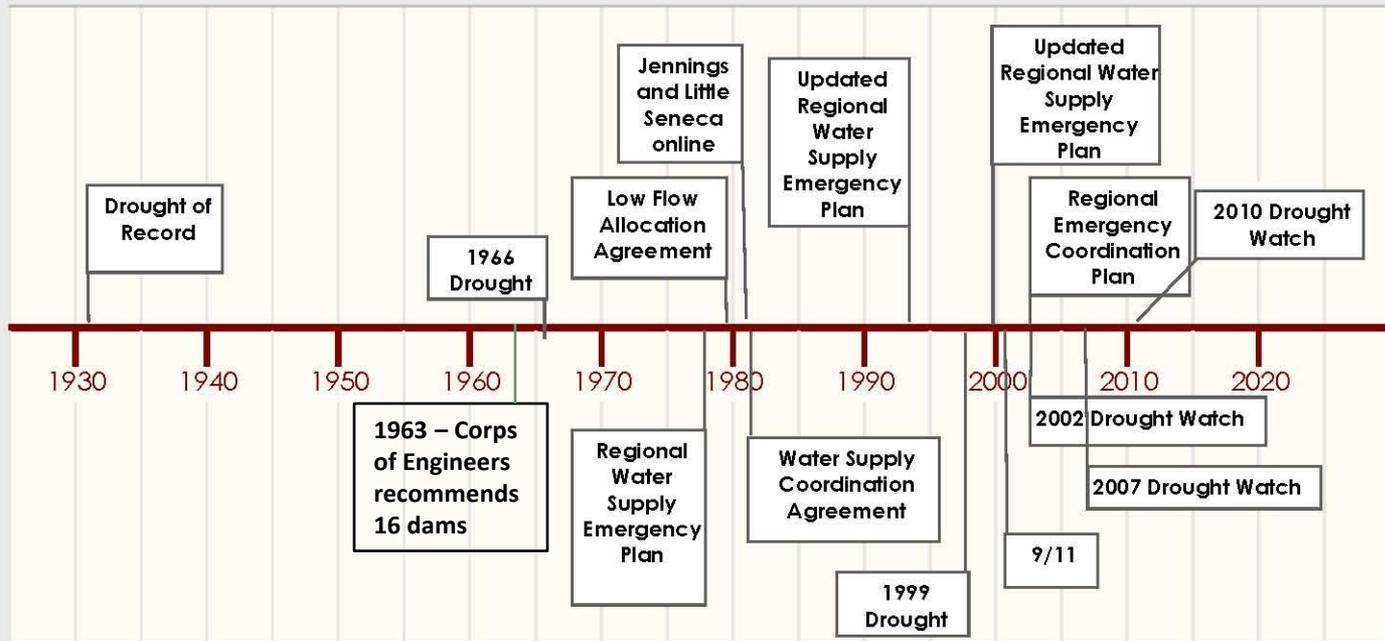
Goals for Today

- Common understanding of the Regional Water Supply and Drought Plan
 - June 2000 COG Board Plan
 - ICPRB CO-OP Roles and agreements
 - State drought plans
- Common understanding of supporting technical tools
 - Focusing on the Potomac Drought Monitor
- Brainstorming discussion on improving Drought Watch trigger

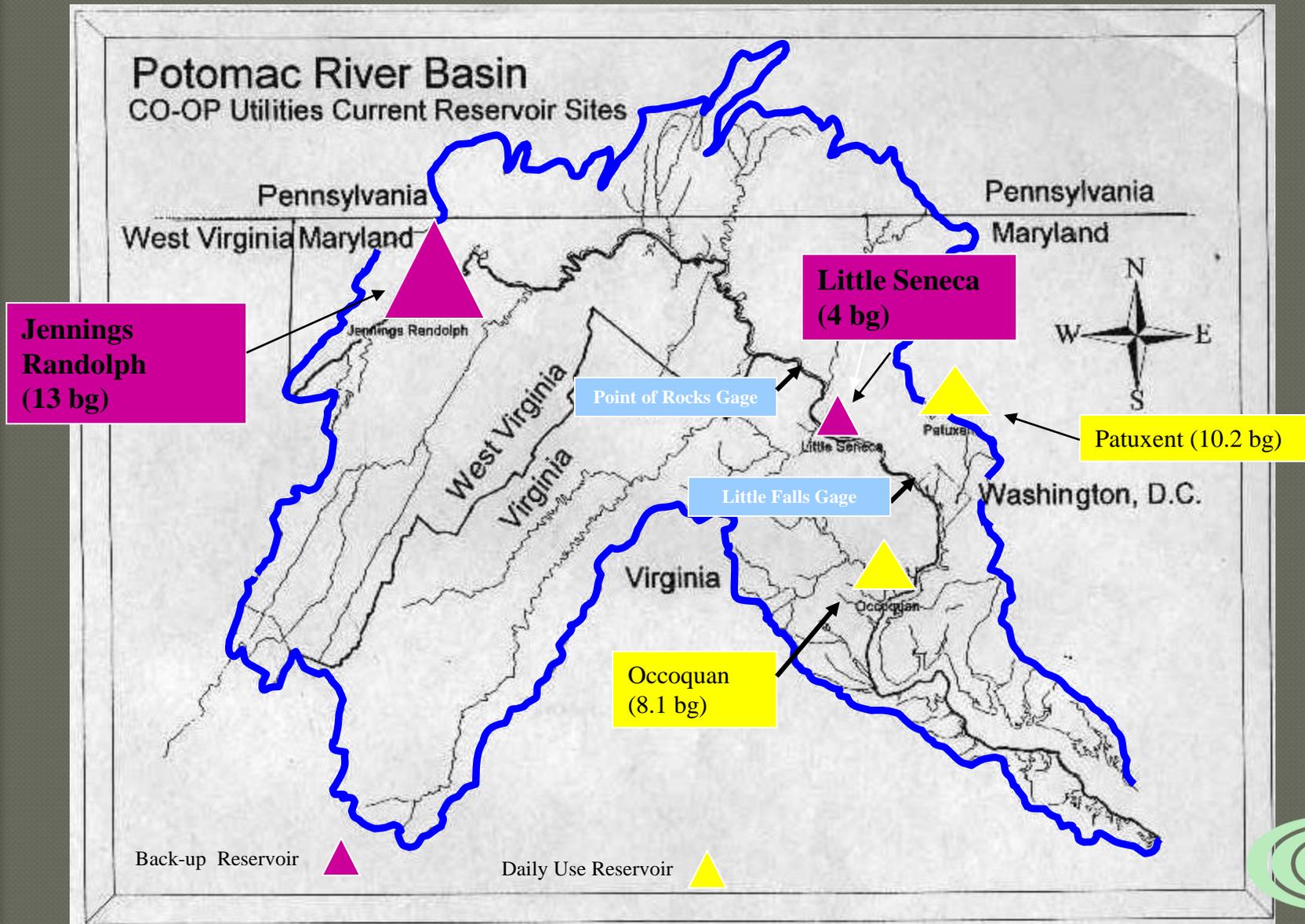


Regional Drought Timeline

Regional Drought Timeline



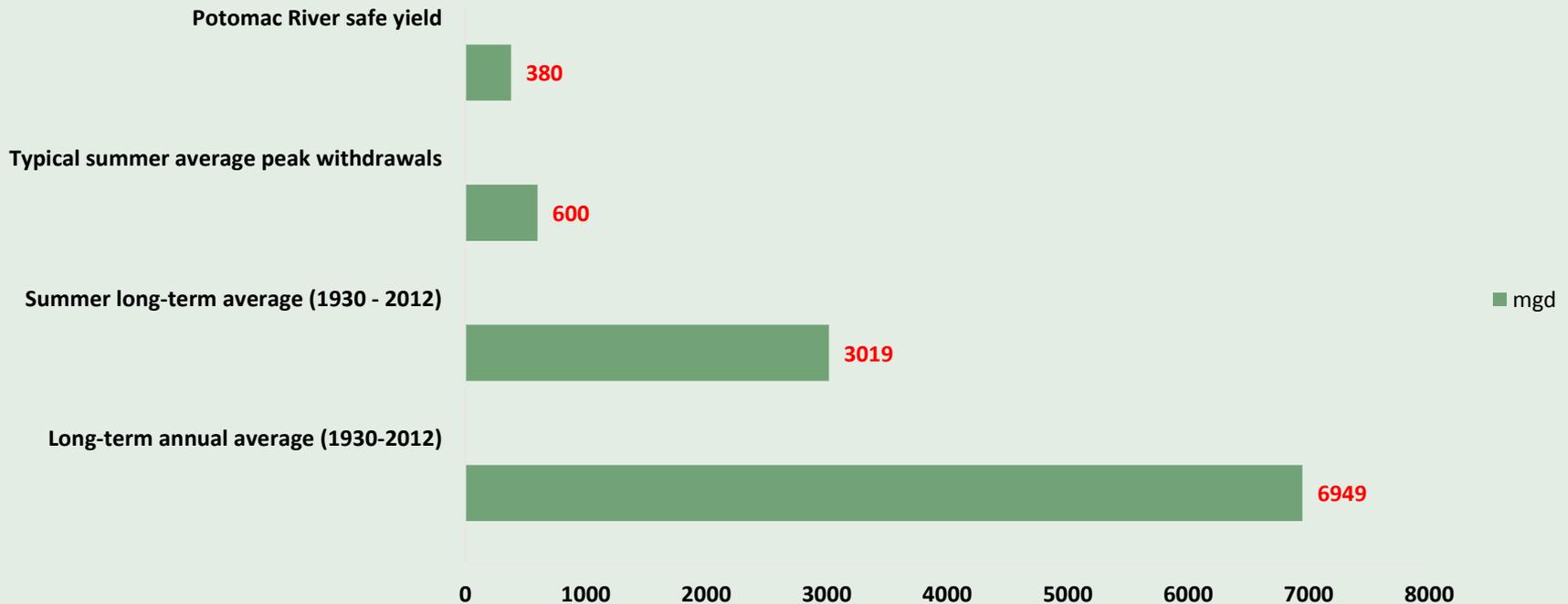
Major Water Supply Storage Reservoirs



Little Falls Streamflow

Streamflow at Little Falls

*Estimated Summer and Annual Average,
Summer withdrawals, Potomac Safe Yield*





Drought of 1999

- Among the top 3 droughts of the century (1930-31, 1966, 1999)
- Record low flows in Potomac River
 - Average “natural” flow in Potomac in July dropped to 900 mgd, only 30% of normal
- First ever water supply releases from Jennings Randolph and Little Seneca
- Region was responding with numerous conflicting messages

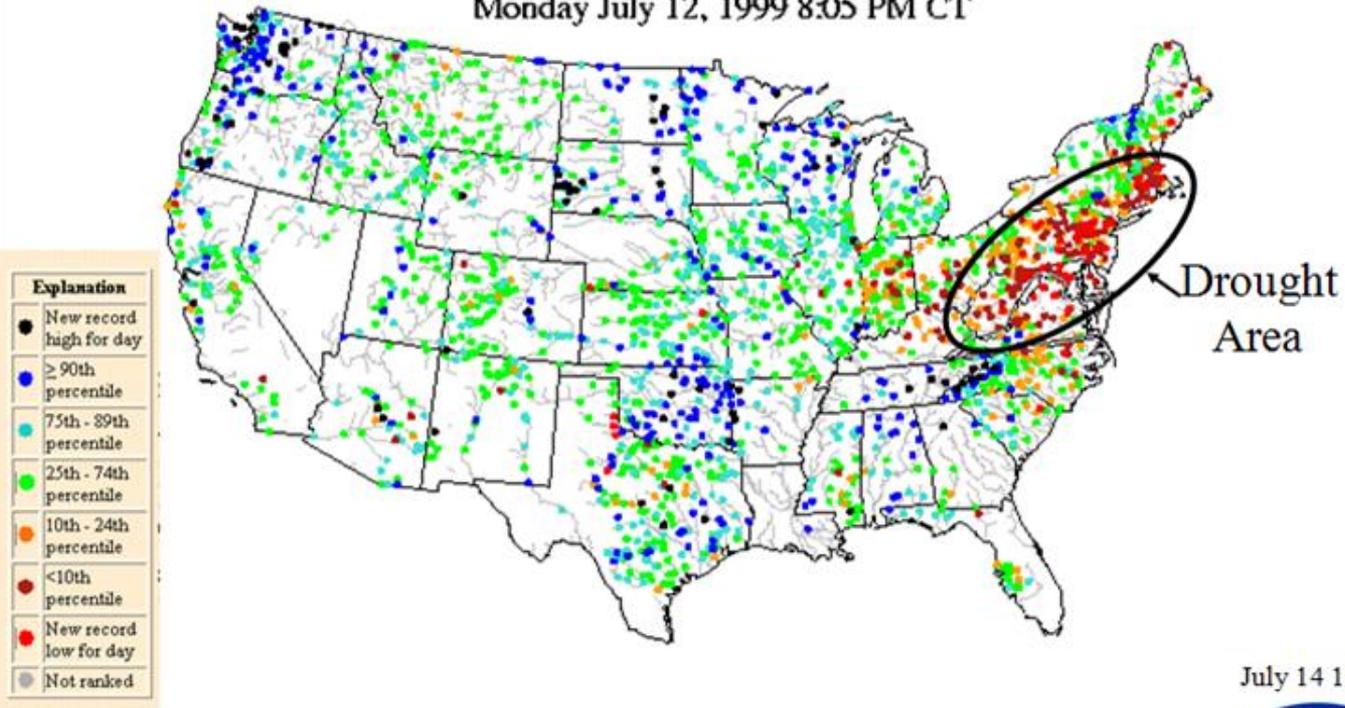


Drought in 1999 – U.S. Streamflow

River Gaging Stations on 7/12/99 Showing Extent of Drought

4

Monday July 12, 1999 8:05 PM CT



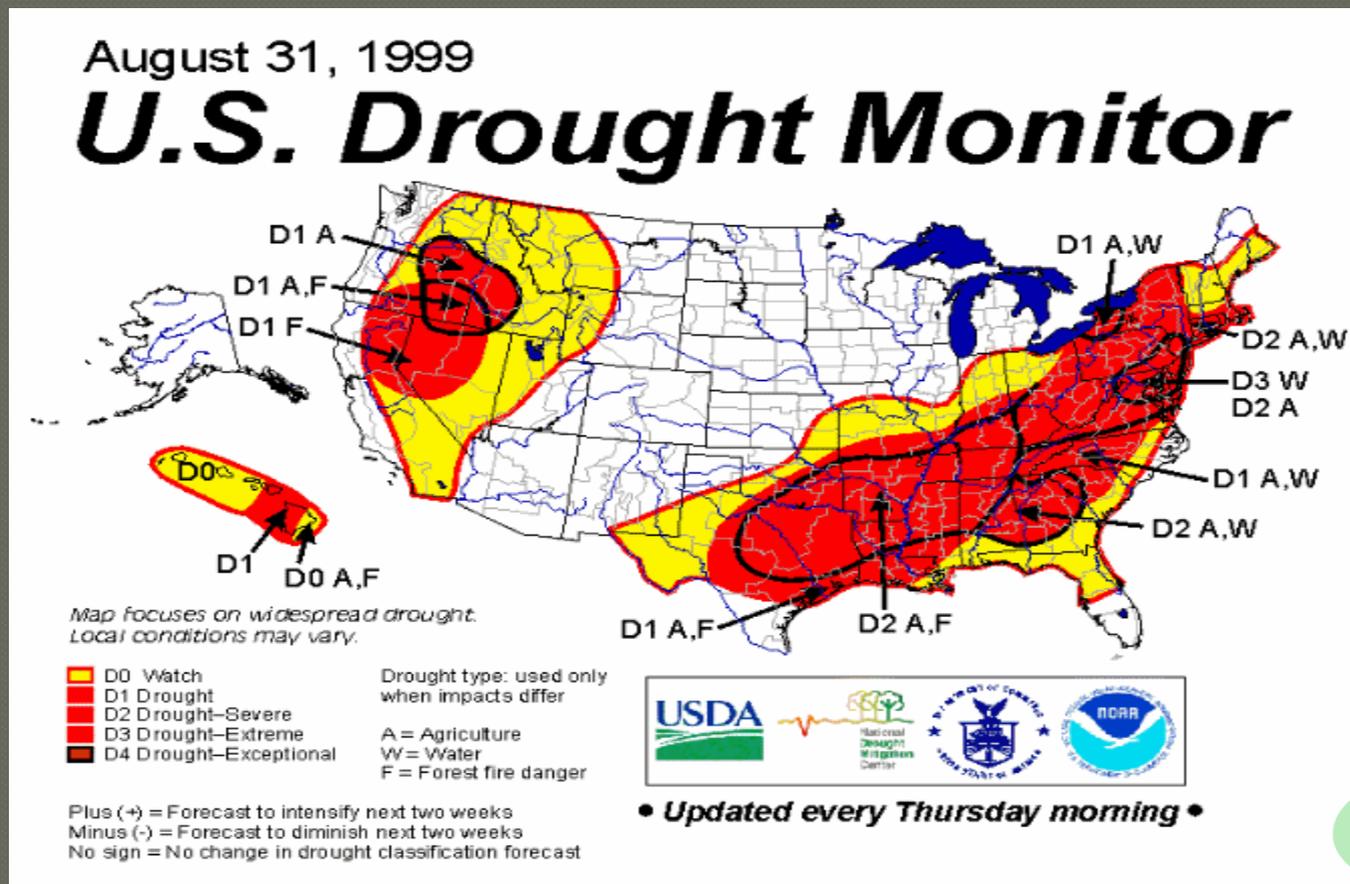
Source: U.S.G.S.

July 14 1999



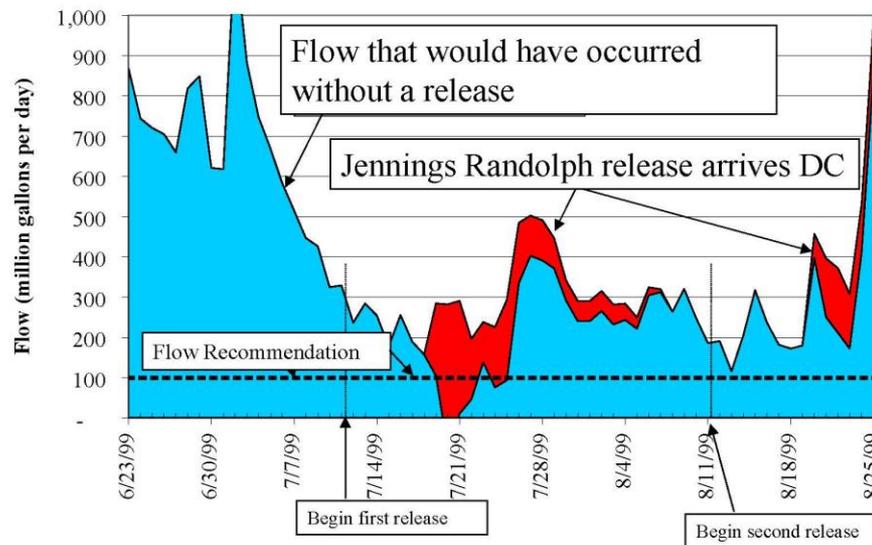
Drought in 1999 – Drought Monitor

- US Drought Monitor: D2-D3 Severe and Extreme



Drought in 1999 – Reservoir Releases

Washington 1999 flows



6

Figure 4: Jennings Randolph release, flow target, and flow below Little Falls dam.

SOURCE:
WASHINGTON
AREA 1999
DROUGHT
OPERATIONS
REPORT

Interstate Commission
on the Potomac River
Basin

NOTE:
ADDITIONAL
RELEASES IN 2002
AND 2010





Headlines: *Washington Post*

- Fish kill may be worst in decade; drought said to claim more than 200,000 in Maryland in 5 days” (7/2/99)
- “Poolesville restricts water use; Md. Calls drought a serious threat” (7/8/99)
- “Thirsty region, fragile river; as drought drains Potomac water, officials debate need for conservation” (7/16/99)
- “Drought changes Potomac; water levels stay low, forcing people and fish to adjust” (7/18/99)



Headlines: *Washington Post*

- “Dry Md. Community tries divining rods when science fails” (7/19/99)
- “Supervisors mandate water restrictions; limits start Aug. 1 in Eastern Loudoun” (7/22/99)
- “Md. Governor imposes broad water limits; washing cars, filling pools could bring sanctions” (8/5/99)
- “Md. Counties disagree on need to enforce water limits; Montgomery cracks down, Prince George’s won’t fine” (8/7/99)
- “Water use is off 18% in Maryland; Glendening was aiming for a 10% reduction” (8/10/99)



Headlines: *Washington Post*

- The cure that lacks a disease: politicians posture on water restrictions in the absence of any need” (8/13/99)
- “Brown with envy; at Md. Line, grass is greener than on other side of the street” (8/15/99)
- “Big damage, little relief from storm; high winds rip up area; drought still unquenched” (8/19/99)
- “Prayers for rain; in drought, Hindus look to goddess” (8/21/99)
- “Region can take another dry year; in worst case, planners say, water will last” (8/24/99)
- “Rainfall brings more hope than help; Maryland officials won’t ease limits” (8/25/99)



COG and Regional Response 1999 – Water Supply Task Force & Workshop

- COG Board created the Water Supply Task Force (WSTF) in the summer of 1999
 - Review existing water supply and drought conditions
 - Review existing arrangements for drought response
 - Collect information on future conditions
- Public Workshop October 5, 1999



COG Board Direction January 2000

- January 2000 the Board asked the WSTF to develop 'common language' for the region in the event of another serious drought
 - Directive: A year-round communications program with primary focus on water conservation
 - Directive: simple language/plan for the public and media
- WSTF conclusions:
 - Create a regional response plan
 - The COG plan and State of Maryland's plan should be consistent
 - Develop plan for the Potomac system; possibly expand to entire regional water supply system.



June, 2000: New Water Supply and Drought Awareness Response Plan

- COG Board unanimously adopted the Plan on June 7, 2000.



2000 Board Chairman Gerry Connolly

- Two components:
 - Year-round Wise Water Use Program
 - Drought Triggers & Actions
- Delegated authority to Drought Coordination Committee
 - COG CAOs, Utility GMs, states, ICPRB



Normal

Watch

Warning

Emergency



Wise Water Use Program

- A Public Outreach Campaign with Indoor and Outdoor Conservation Messages – year-round focus
- Now 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



Wayne the Water Drop



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

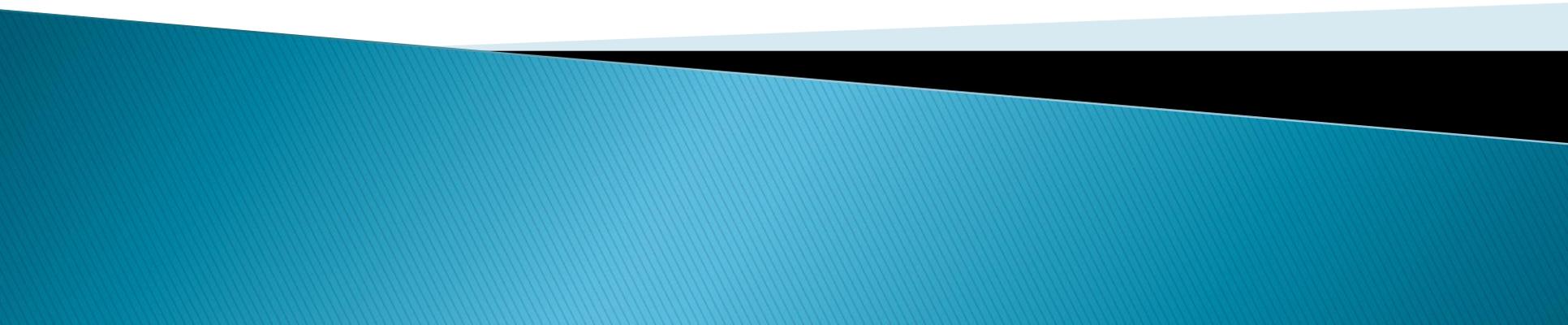
Mandatory Water Restrictions announced

Regional Press Conference on daily basis



Discussion of regional drought plan triggers

April 4, 2013



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

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The NOAA Drought Index

- ▶ A synthesis of multiple indices and impacts that represents a consensus of federal and academic scientists.
- ▶ The drought index assimilates data on rainfall, snowpack, soil moisture, and other indicators into a comprehensible big picture.
- ▶ **Dryness Categories** D0 ... Abnormally Dry ... used for areas showing dryness but not yet in drought, or for areas recovering from drought.
- ▶ **Drought Intensity Categories**
 - D1 ... Moderate Drought
 - D2 ... Severe Drought
 - D3 ... Extreme Drought
 - D4 ... Exceptional Drought
- ▶ The NOAA index is the official index used in the regional drought plan to issue a “Watch”.

History of Use – Drought Declarations

- ▶ COG's DCC issued the last Drought WATCH – **Sept. 9, 2010**
 - Press Release urged residents and businesses to conserve water – use water wisely
 - Emphasized – water supply reservoirs that were constructed in the early 1980s to provide water during droughts 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



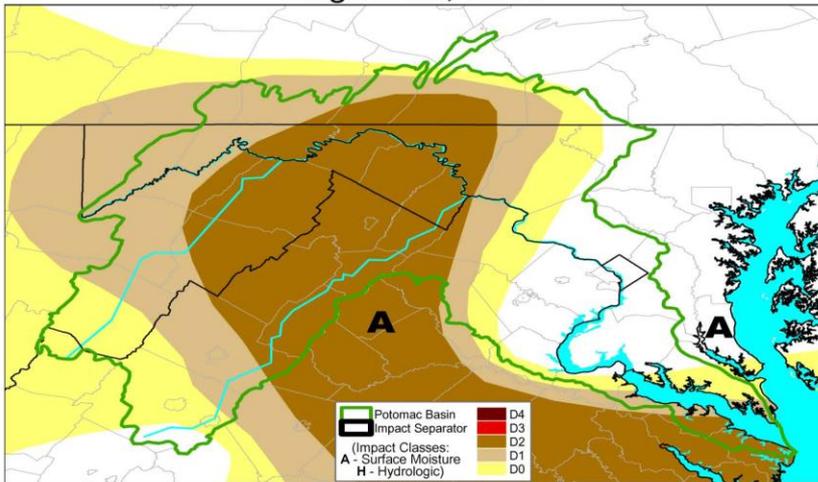
Great Falls – Sept.
2010

2010 Drought WATCH

September 9, 2010 – October 7, 2010 –
Ended with Tropical Storm Nicole

Potomac Basin Drought Monitor

August 31, 2010

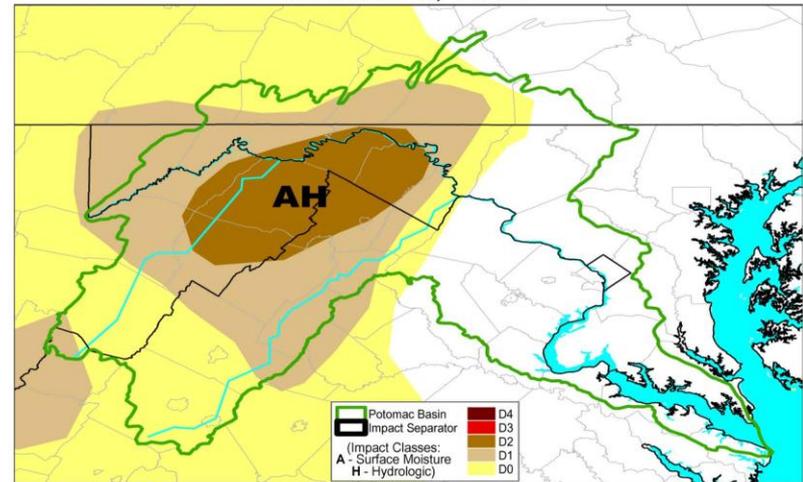


Selected Basin-Average Indices on August 29, 2010

	<i>Raw Value</i>	<i>Anomaly</i>	<i>Percentile</i>
Palmer Drought	-3.01	-3.05	8.4 [D2]
Palmer Hydrologic	-2.87	-3.12	10.3 [D1]
Palmer Z	-1.66	-1.83	22.9 [D0]
CPC Soil Moisture	n/a	n/a	26.1 [D0]
1-Month Precipitation	3.18"	-0.47"	38.5 [--]
3-Month Precipitation	8.98"	-3.04"	18.8 [D1]
6-Month Precipitation	19.04"	-3.48"	31.9 [--]
12-Month Precipitation	40.96"	-0.81"	56.9 [--]
24-Month Precipitation	80.64"	-2.95"	49.4 [--]
Basin Coverage:	17.7% not dry; 18.7% D0; 27.0% D1; 36.6% D2		Basin Average: D'0.83'

Potomac Basin Drought Monitor

October 5, 2010



Selected Basin-Average Indices on October 3, 2010

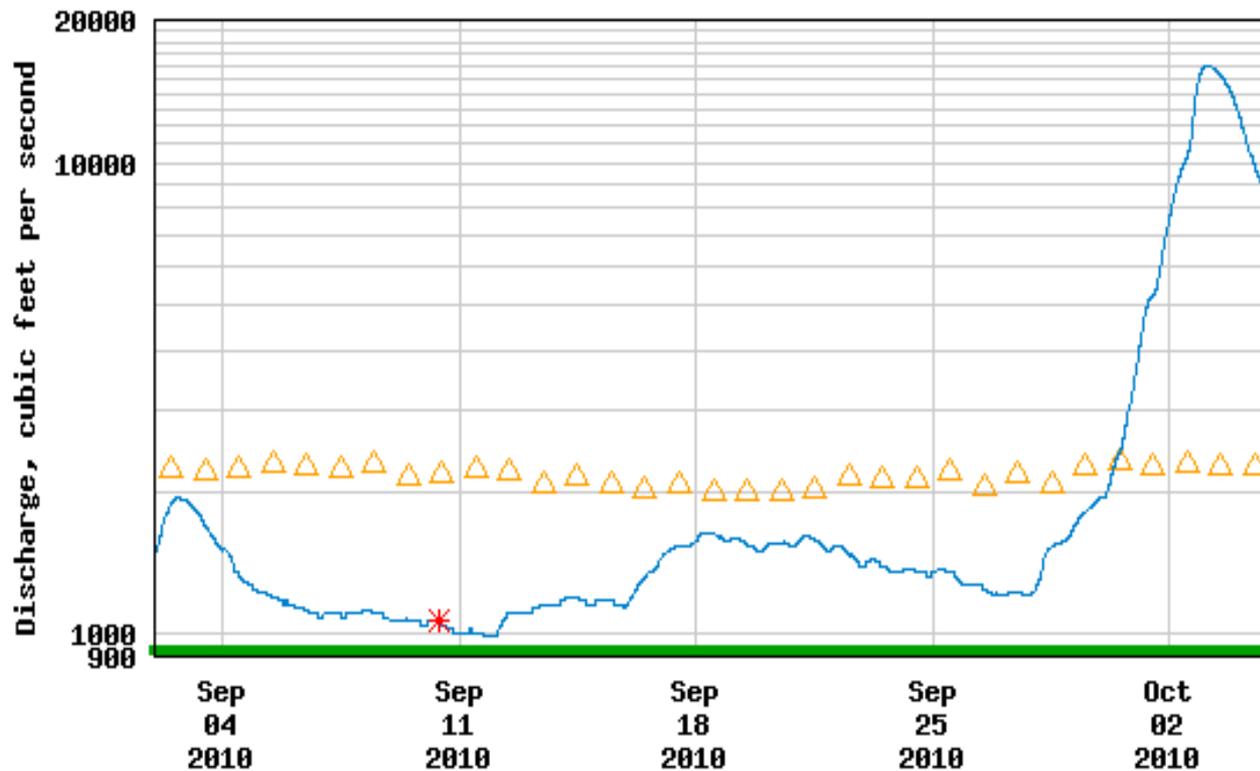
	<i>Raw Value</i>	<i>Anomaly</i>	<i>Percentile</i>
Palmer Drought	-0.15	-0.41	48.0 [--]
Palmer Hydrologic	-1.92	-2.34	23.0 [D0]
Palmer Z	+2.56	+2.39	88.3 [--]
CPC Soil Moisture	n/a	n/a	58.6 [--]
1-Month Precipitation	3.35"	-0.45"	55.9 [--]
3-Month Precipitation	9.72"	-1.73"	31.6 [--]
6-Month Precipitation	18.54"	-4.24"	19.1 [D1]
12-Month Precipitation	41.85"	+0.08"	63.2 [--]
24-Month Precipitation	79.86"	-3.73"	46.6 [--]
Basin Coverage:	35.1% not dry 21.6% D0 28.6% D1 14.7% D2		Basin Average: D'0.23'

2010 Drought WATCH

September 9, 2010 – October 7, 2010



USGS 01638500 POTOMAC RIVER AT POINT OF ROCKS, MD

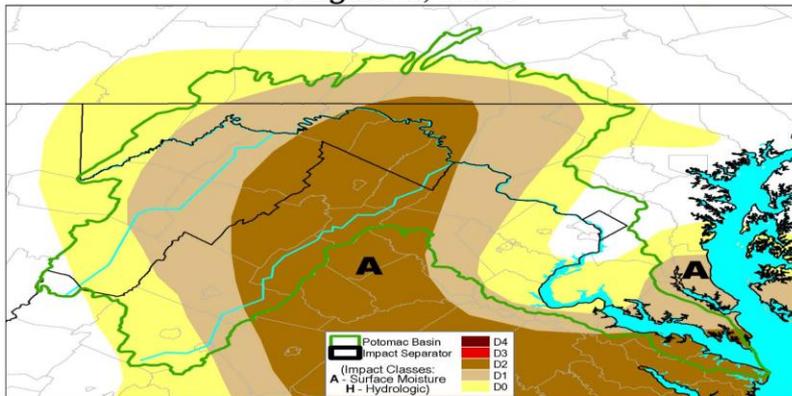


- △ Median daily statistic (117 years)
- ★ Measured discharge
- Discharge
- Period of approved data

Near Watch Declaration Summer 2010

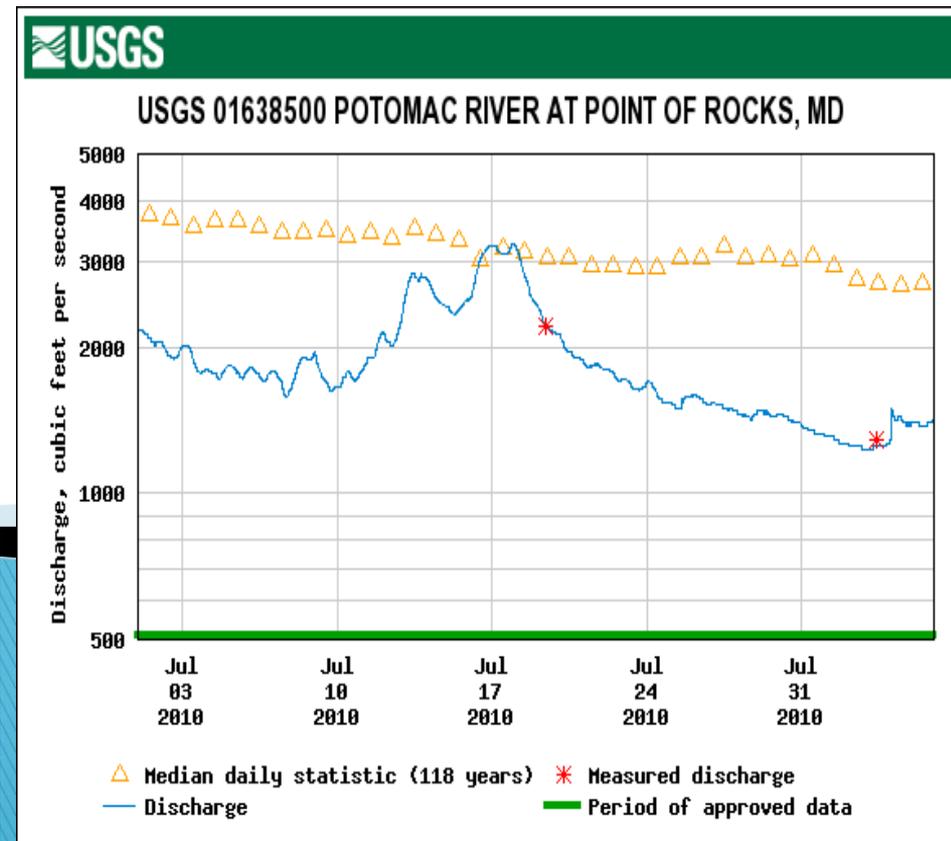
Waited to declared a Watch in September 2010 – conditions did not improve even though cooler temperatures were predicted

Potomac Basin Drought Monitor August 3, 2010



Selected Basin-Average Indices on August 1, 2010

	<i>Raw Value</i>	<i>Anomaly</i>	<i>Percentile</i>		
Palmer Drought	-2.74	-3.10	8.2 [D2]		
Palmer Hydrologic	-2.57	-3.14	11.1 [D1]		
Palmer Z	-2.01	-2.19	16.0 [D1]		
CPC Soil Moisture	n/a	n/a	27.6 [D0]		
1-Month Precipitation	3.41"	-0.45"	37.1 [--]		
3-Month Precipitation	9.93"	-1.46"	35.5 [--]		
6-Month Precipitation	19.16"	-1.51"	44.7 [--]		
12-Month Precipitation	41.58"	-0.19"	60.2 [--]		
24-Month Precipitation	80.64"	-2.95"	50.5 [--]		
Basin Coverage:	5.5% not dry	28.1% D0	38.6% D1	27.8% D2	Basin Average: D'0.89'

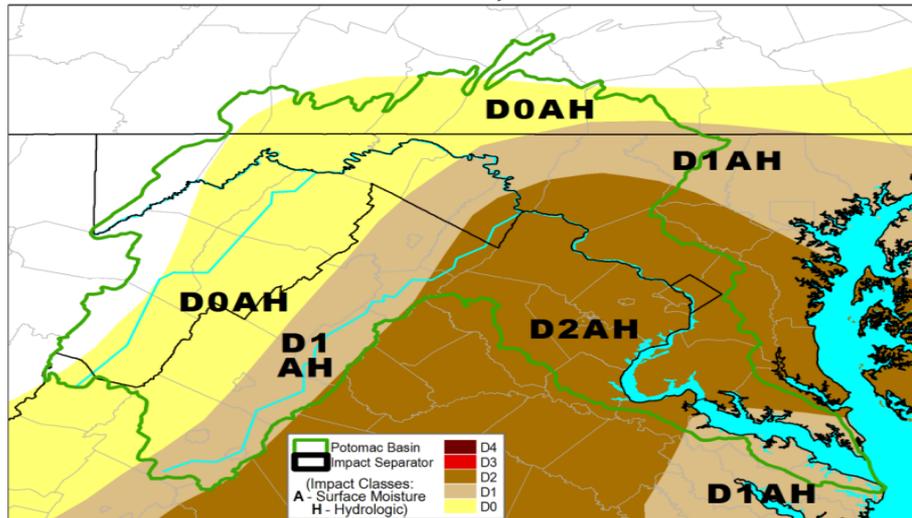


2007 Drought WATCH

October 2, 2007 - April 2, 2008

Potomac Basin Drought Monitor

October 2, 2007

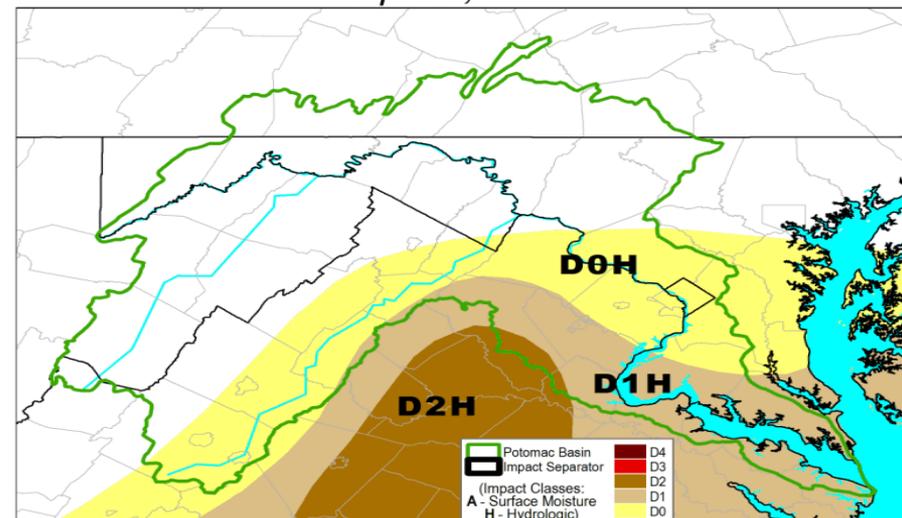


Selected Basin-Average Indices on October 1, 2007

	<u>Raw Value</u>	<u>Anomaly</u>	<u>Percentile</u>
Palmer Drought	-2.35	-2.60	15.8 [D1]
Palmer Hydrologic	-2.59	-3.01	14.5 [D1]
Palmer Z	-1.72	-1.89	19.1 [D1]
CPC Soil Moisture	n/a	n/a	15.4 [D1]
1-Month Precipitation	1.60"	-2.20"	14.8 [D1]
3-Month Precipitation	8.22"	-3.16"	21.5 [D0]
6-Month Precipitation	17.02"	-5.76"	12.7 [D1]
12-Month Precipitation	36.84"	-4.93"	28.9 [D0]
24-Month Precipitation	79.23"	-4.35"	44.9 [D1]
Basin Coverage:	7.6% not dry	36.8% D0	26.4% D1
		29.2% D2	Basin Average: D'0.77'

Potomac Basin Drought Monitor

April 8, 2008



Selected Basin-Average Indices on April 6, 2008

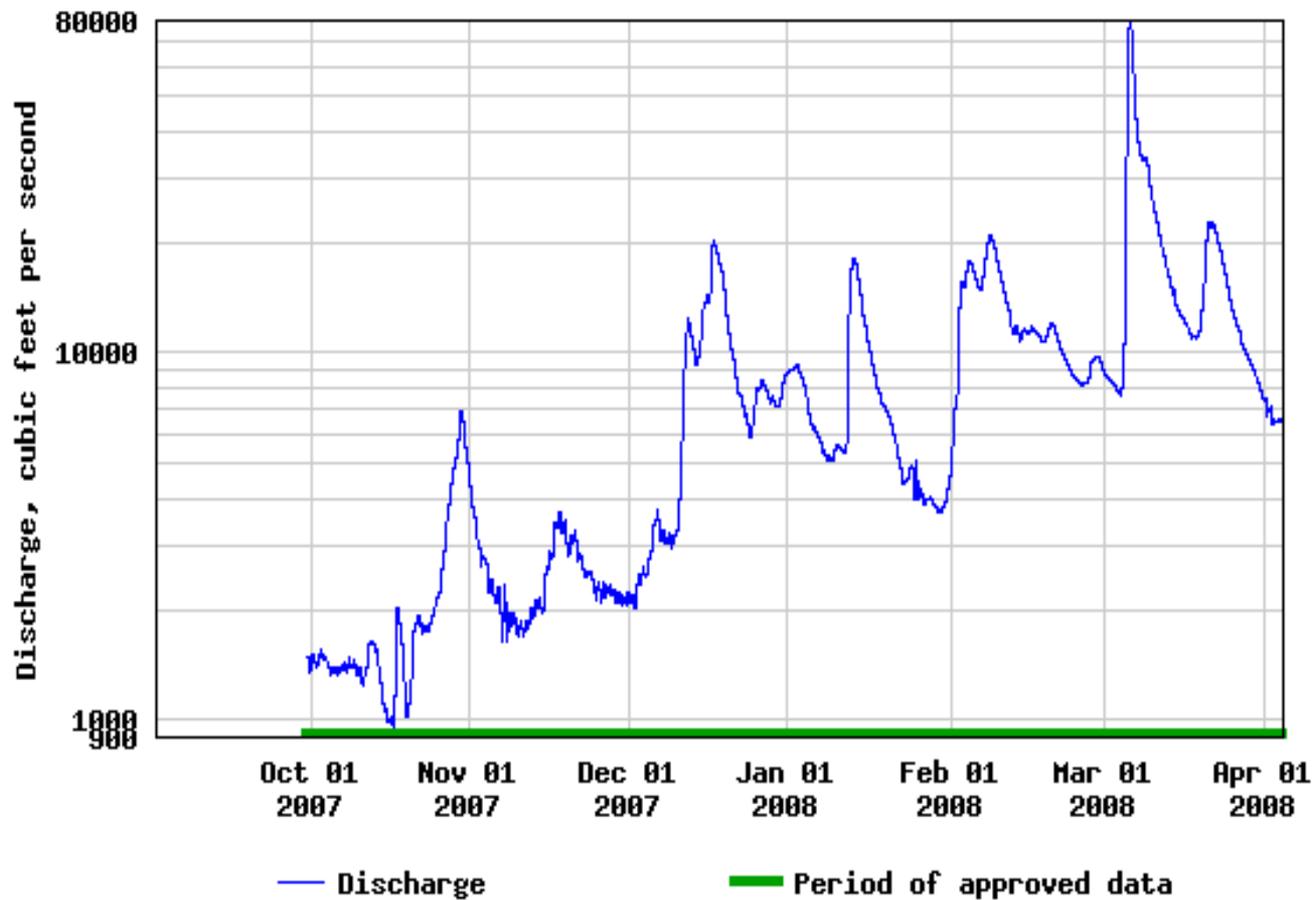
	<u>Raw Value</u>	<u>Anomaly</u>	<u>Percentile</u>
Palmer Drought	+0.42	+0.02	58.0 [D0]
Palmer Hydrologic	+0.33	-0.22	55.3 [D0]
Palmer Z	-1.10	-1.28	30.6 [D1]
CPC Soil Moisture	n/a	n/a	48.1 [D0]
1-Month Precipitation	3.79"	+0.24"	57.0 [D0]
3-Month Precipitation	9.06"	-0.21"	55.0 [D0]
6-Month Precipitation	18.58"	-0.52"	58.5 [D0]
12-Month Precipitation	36.71"	-5.09"	34.1 [D1]
24-Month Precipitation	80.96"	-2.62"	52.9 [D0]
Basin Coverage:	58.2% not dry	25.5% D0	15.5% D1
		0.8% D2	Basin Average: D'-0.41'

2007 Drought WATCH

October 2, 2007 - April 2, 2008



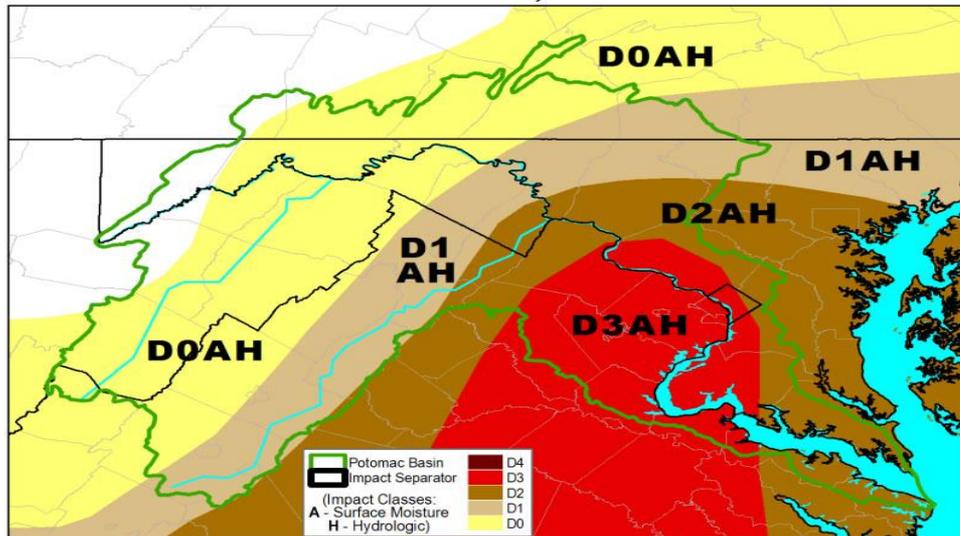
USGS 01638500 POTOMAC RIVER AT POINT OF ROCKS, MD



Near Warning Declaration October 2007

Saved by heavy precipitation the last week of October 2007

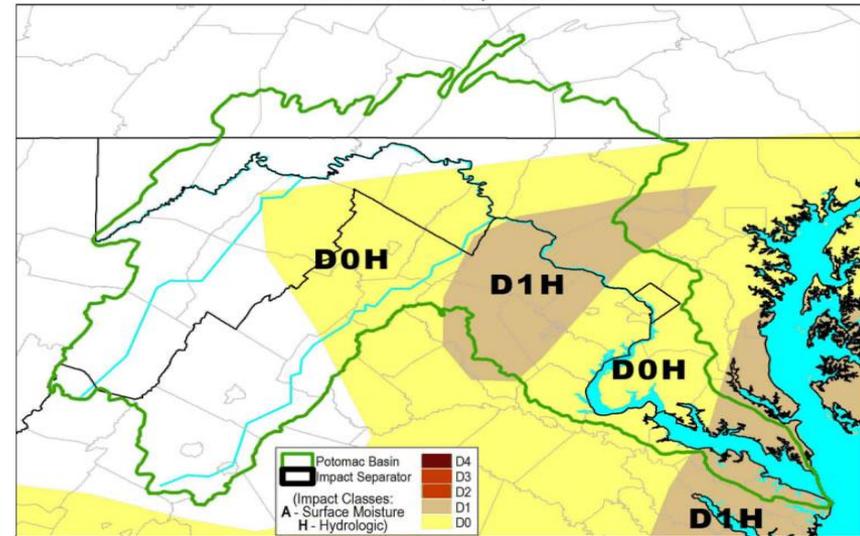
Potomac Basin Drought Monitor
October 23, 2007



Selected Basin-Average Indices on October 21, 2007

	<u>Raw Value</u>	<u>Anomaly</u>	<u>Percentile</u>
Palmer Drought	-3.18	-3.43	7.2 [D2]
Palmer Hydrologic	-3.25	-3.61	7.7 [D2]
Palmer Z	-2.02	-2.19	14.3 [D1]
CPC Soil Moisture	n/a	n/a	5.9 [D2]
1-Month Precipitation	1.28"	-2.26"	12.7 [D1]
3-Month Precipitation	7.28"	-3.78"	16.6 [D1]
6-Month Precipitation	15.27"	-7.50"	7.0 [D2]
12-Month Precipitation	34.45"	-7.32"	16.3 [D1]
24-Month Precipitation	75.82"	-7.76"	29.4 [D0]
Basin Coverage:	4.5% not dry	38.2% D0	23.1% D1
	16.8% D2	17.4% D3	Basin Average: D'1.04'

Potomac Basin Drought Monitor
October 30, 2007



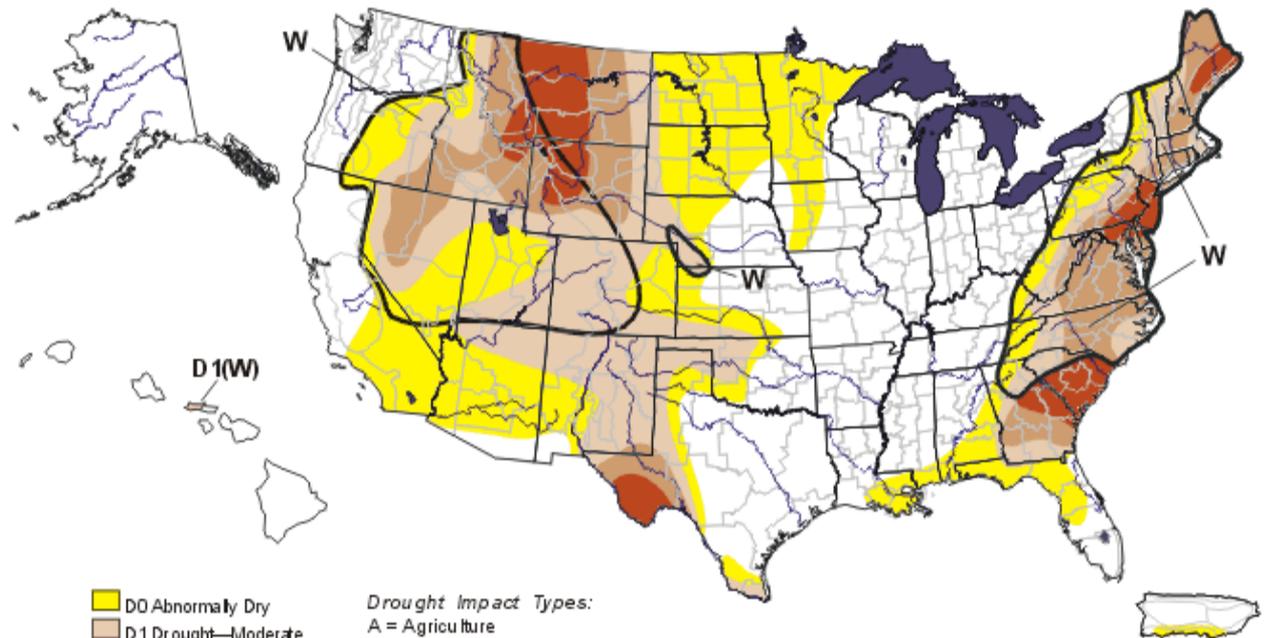
Selected Basin-Average Indices on October 28, 2007

	<u>Raw Value</u>	<u>Anomaly</u>	<u>Percentile</u>
Palmer Drought	-1.33	-1.57	29.9 [D0]
Palmer Hydrologic	-2.37	-2.67	17.3 [D1]
Palmer Z	+0.70	+0.53	67.5 [--]
CPC Soil Moisture	n/a	n/a	25.1 [D0]
1-Month Precipitation	4.06"	+0.77"	74.2 [--]
3-Month Precipitation	9.84"	-0.89"	46.4 [--]
6-Month Precipitation	17.54"	-5.22"	19.0 [D1]
12-Month Precipitation	36.49"	-5.28"	26.8 [D0]
24-Month Precipitation	77.51"	-6.07"	37.2 [--]
Basin Coverage:	49.7% not dry	34.5% D0	15.9% D1
			Basin Average: D'-0.34'

2002 Drought WATCH

February 20, 2002 – November 22, 2002

U.S. Drought Monitor February 19, 2002 Valid 8 a.m. EST



- D0 Abnormally Dry
- D1 Drought—Moderate
- D2 Drought—Severe
- D3 Drought—Extreme
- D4 Drought—Exceptional

Drought Impact Types:
A = Agriculture
W = Water (Hydrological)
F = Fire danger (Wildfires)
/ Delineates dominant impacts
(No type = All 3 impacts)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See a accompanying text summary for forecast statements.

<http://drought.unl.edu/monitor/monitor.html>



Released Thursday, February 21, 2002

Author: Michael Hayes, NDMC

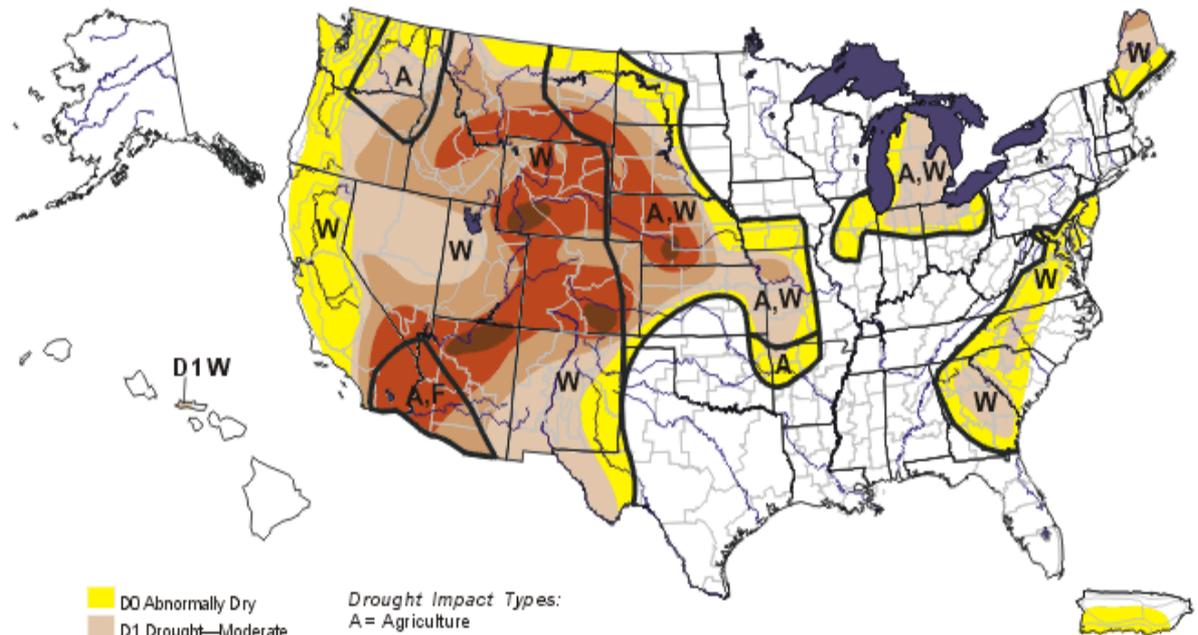
2002 Drought WATCH

February 20, 2002 – November 22, 2002

U.S. Drought Monitor

November 19, 2002

Valid 7 a.m. EST



- D0 Abnormally Dry
- D1 Drought—Moderate
- D2 Drought—Severe
- D3 Drought—Extreme
- D4 Drought—Exceptional

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<http://drought.unl.edu/dm>

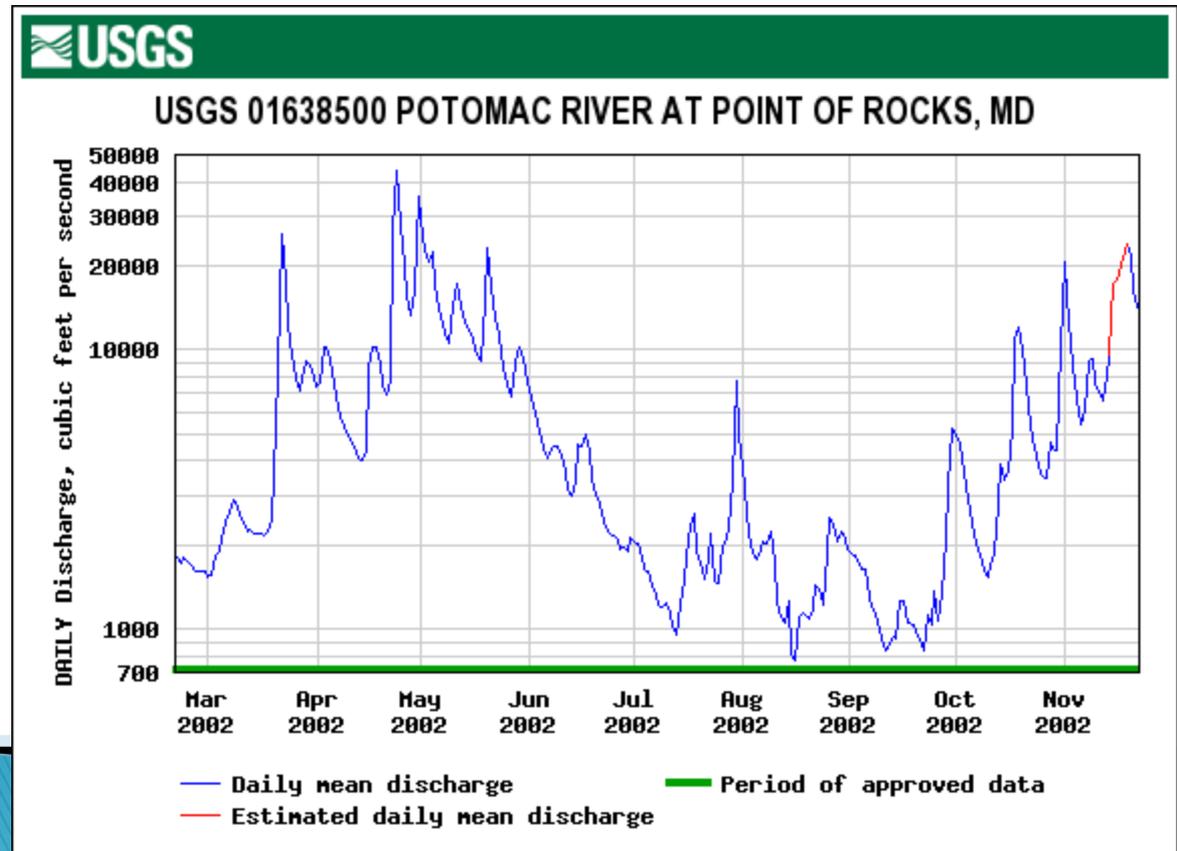


Released Thursday, November 21, 2002

Author: Richard Heim/Karin Gleason, NCDC

2002 Drought WATCH

February 20, 2002 – November 22, 2002



Questions to consider

- ▶ Is the present drought “Watch” trigger okay?
 - ▶ Do we need to establish a specific percentage of the Potomac Basin that is in D1 status to declare a watch?
 - ▶ Should we consider changing the Potomac Basin area it is calculated on?
 - ▶ Should we consider adding a Potomac River flow component, such as flow at Point of Rocks?
 - ▶ Do we need criteria or a trigger for ending a drought “Watch”?
- 