



Drought Preparedness in Virginia

**Or, Whatcha Gonna Do When the
Well, Creek, River, or Reservoir
(Might) Run Dry?**

Rappahannock-Rapidan Regional
Commission Living Lands Workshop
November 18, 2014



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- ❖ Overview of Virginia's **Drought Assessment & Response Plan**
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VA DARP: Key Concepts

VA Drought Assessment & Response Plan

- Meant to be **proactive**
- Recognizes the complexity of Hydrologic Drought and its interactions with water supply
- Recognizes the relative sparseness of monitoring points
- Relies on objective triggers, as well as the professional judgment of members of the Drought Monitoring Task Force and the Commonwealth Drought Coordinator
- No predetermined exemptions



VA DARP: Key Features

Drought Monitoring Task Force (DMTF)

- Composed of staff from state and federal agencies
 - ◆ VDEQ, VDH, VDEM, VDOF, VDACS, VCES, VDGIF
 - ◆ NOAA-NWS, USDA-FSA, USGS, USACE, UVA
- Monitors **hydrologic indicators**, supplemented by meteorological, agricultural and public supply drought indicators
- Meets regularly and advises/makes recommendations to Virginia Drought Coordinator regarding drought stage declarations
- Governor, (or Drought Coordinator as designee) makes final decisions

Drought Assessment Tools

Thirteen Drought Evaluation Regions

Four Drought Severity Indicators:

- Precipitation Deficits
- Stream Flows
- Ground Water Levels
- Reservoir Storage

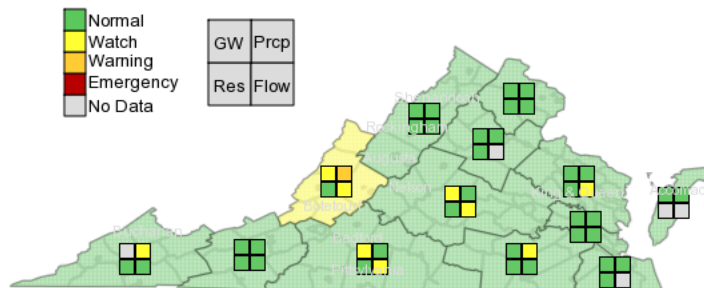
} monitored daily and automatically updated on Drought website

DMTF recommends **Drought Stage Declarations** based on the above & other indicators, for example:

- U. S. Drought Monitor
- NOAA Climate Prediction Center & NWS forecasts

On-Line Drought Indicator Map

Drought Indicators Updated on 2013-04-02



A Drought Watch was in effect for the Upper James Drought Evaluation Region

Drought Assessment Tools

Maximum Likelihood Least-Squares Regression (MLLR): relates gaged winter stream flows to summer low flows

Year	Mean Measured Streamflow: November - February (cfs)	Predicted Probability of September Daily Flow < 25th Percentile	Actual # of Days September Flow < 25th Percentile
2013	559	26%	0
2014	927	19%	1

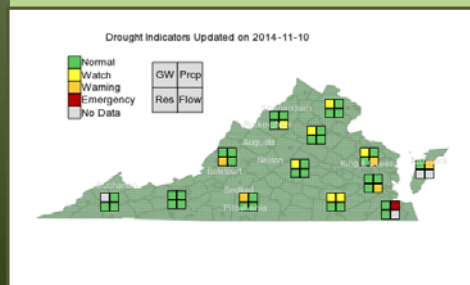
Station 01667500-Rapidan River nr Culpeper

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Drought Stage Declaration

A recommendation may be made when 2 of 4 indicators exceed the threshold for a stage determination; however, other information is considered:



U. S. Drought Monitor
NWS Forecasts
Water Demand Outlook
U.S. Seasonal Outlook
PDSI Map

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Drought Stages & Responses

Drought Watch: responses are intended to increase awareness (notification level)

Drought Warning: responses beyond those conducted during Watch stage when a significant drought event is imminent: voluntary conservation encouraged

Drought Emergency: responses are required during the height of a significant drought:

- Declared by Governor by executive order
- Mandatory restrictions on non-essential uses



VA Drought Response Actions

Watch:

- DEQ: Press release, **notifications** to all local govts & appropriate State agencies, encourage users of >10,000 gpd to review existing drought plans
- DMTF: monitor situation & make **monthly reports**
- VDH: **inform & monitor** all affected public waterworks, encourage leak detection & repair programs
- State agencies: **encourage** water conservation & review drought plans





VA Drought Response Actions

Warning:

- DEQ: same steps as Watch, plus **advise** Gov & Cabinet re: **necessity of authorizing temporary overweight vehicle exemptions, update Gov bi-weekly, encourage** local govts to review/adopt drought ordinances with **mandatory non-essential water use restrictions, encourage** users to voluntarily reduce/eliminate non-essential uses
- Governor's Press Office & DMTF: bi-weekly updates
- VDACS: **notify** stakeholders regarding federal drought disaster designations
- Users >10,000 gpd: initiate **voluntary** conservation per plans



VA Drought Response Actions

Emergency:

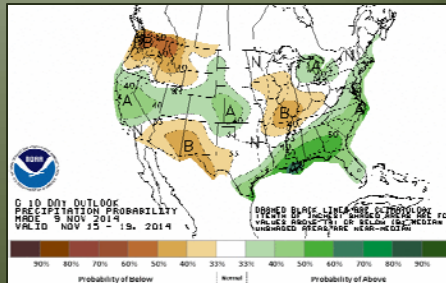
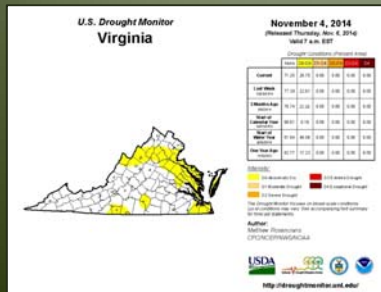
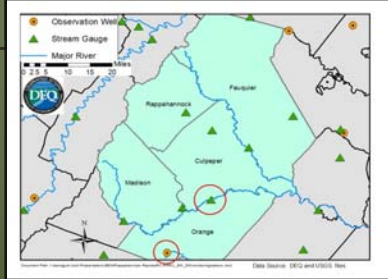
- Governor's declaration by Exec Order
- DEQ: same as Warning plus **weekly updates** see **VDARP pp 14-16 for additional tasks**
- Governor's Press Office: **weekly press releases**
- DMTF: same steps as Warning, plus **report changes weekly**
- VDH: same steps as Watch & Warning
- **Additional State Agency duties:** see VDARP, pp 14-16
- **All Water Users:** initiate **mandatory** non-essential water use restrictions





- Local governments and public waterworks may impose use restrictions consistent with local conditions
- Follow the **Drought Preparedness Plans** in local/regional Water Supply Plans – revise/update where appropriate
- Maximize storage** if at all possible
- Educate** constituents & customers about water conservation & drought
- Arrange** for alternate/emergency water sources
- Monitor** available local drought indicators
 - During **Normal** times--Don't wait until **Drought** starts

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Drought Monitoring/Planning Resources

- [Virginia DEQ Drought Monitor](#)
- [U. S. Drought Monitor for VA](#)
- [NWS Climate Prediction Center](#)
- [U. S. Drought Portal](#)
- [USGS Virginia Climate Response Network](#)
- [USGS WaterWatch](#)
- [USGS VA: Streamflow Duration Plots](#)
- [Drought Risk Atlas](#)
- [AWWA Drought Resource Community](#)
- [Drought-Ready Communities Guide](#)

Think "Tornado"

Normal: Monitor conditions

◇ **Watch:** "It's very dry and could get drier. Let's pay close attention, conserve water and take some proactive steps"

Warning: "We're in a Drought that could get worse. Immediate action is needed"

Emergency: "We don't ever want to go there, but if we do, we want to minimize the damage"





Summary

VA DARP:

- Proactive, focuses on hydrologic drought
- 13 Drought Regions across Virginia
- DMTF meets regularly & makes assessments during normal conditions
- Drought Stage Responses increase in # and severity



Drought Preparation

- Learn, review & update WSP plans & ordinances
- Monitor, don't wait until the drought has begun
- Increase storage if possible before drought onset
- Educate and Coordinate
- Think "Tornado"



Questions?



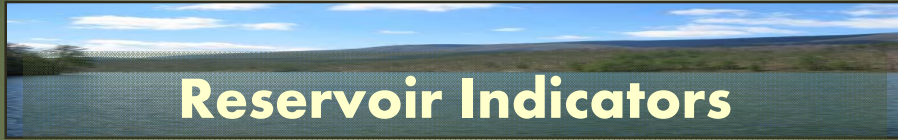


Precipitation Deficits

Months Analyzed	Normal	Watch	Warning	Emergency
	(% Of Normal Precipitation)	(% Of Normal Precipitation)	(% Of Normal Precipitation)	(% Of Normal Precipitation)
October-December	>75.0	<75.0	<65.0	<55.0
October-January	>80.0	<80.0	<70.0	<60.0
October-February	>80.0	<80.0	<70.0	<60.0
October-March	>80.0	<80.0	<70.0	<60.0
October-April	>81.5	<81.5	<71.5	<61.5
October-May	>82.5	<82.5	<72.5	<62.5
October-June	>83.5	<83.5	<73.5	<63.5
October-July	>85.0	<85.0	<75.0	<65.0
October-August	>85.0	<85.0	<75.0	<65.0
October-September (and previous 12 months)	>85.0	<85.0	<75.0	<65.0

Stream Flow & Ground Water Level Indicators

- ◆ 7-Day average stream flow at a key station within each evaluation region is compared to historic flow statistics:
 - **Normal** condition: >25th percentile
 - **Watch** condition: between 10th and 25th percentiles
 - **Warning** condition: between 5th and 10th percentiles
 - **Emergency** condition: <5th percentile
- ◆ 7-Day average ground water levels at key shallow monitoring wells are compared in the same manner



Reservoir Indicators

- ◆ **Drought Conditions** are based upon the estimated days of available storage:
 - **Normal** condition: >120 days
 - **Watch** condition: 90 to 120 days
 - **Warning** condition: 60 to 90 days
 - **Emergency** condition: <60 days



Additional Drought Indicators

- ◆ U. S. Drought Monitor
- ◆ Drought Indexes: Palmer, SPI, CMI, Keetch-Byrum
- ◆ NWS monthly and seasonal outlooks
- ◆ USGS map of drought conditions for stream basins based on streamflow statistics
- ◆ Additional stream flow or ground water level data within an evaluation region during drought conditions