Drought Checklist for Small Utilities

How to monitor and respond to drought

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Info to cover for the next component

- Providing some information for monitoring of drought conditions and response issues for public water systems.
- Basic concepts tied to overall emergency planning protocol for a given system and details that can be listed in O and M / ERP reference.

Out of the Woods For Now…

"Extreme drought strikes portions of Connecticut as dry weather stretches into fall; rainfall down 11 inches in Hartford area."

Source: By STEPHEN SINGER *HARTFORD COURANT |*
SEP 28, 2020 AT 6:00 AM

Water Supply Plans

Water Supply Plans - Each major public water supplier must prepare a water supply plan that indicates ongoing water conservation actions as well as an emergency contingency planning component. The plan includes triggers for water conservation during any water supply concern, including various stages of drought. Source - Connecticut Drought Preparedness and Response Plan - 2018.

** Major = 1000 or more customers - if less still very important ERP includes drought response info*

Situational Awareness - Environmental Conditions

- System personnel generally speaking are tuned into weather conditions and weather trends given the nature of their business.

- What are the conditions at your local level (local weather ie streamflow/groundwater table? Visual observations indicate general trends.

Changing Supply Conditions

- Another source of info are business activities and reports from local well drillers and plumbers (higher activity for servicing wells ie. hydrofracking or deeping existing wells, loss of spring sources are a clear indicator water table is stressed.
- For any citizens in your area that have their own water supply (not serviced by PWS) what is status of their spring or well?

State Internet Resources -

Information listed online on Connecticut Water Planning Council @ https://portal.ct.gov/Water/Drought/Drought-Home

Info on data / reports, press & communications, state drought plan, water conservation, other resources

Connecticut Water Planning Council

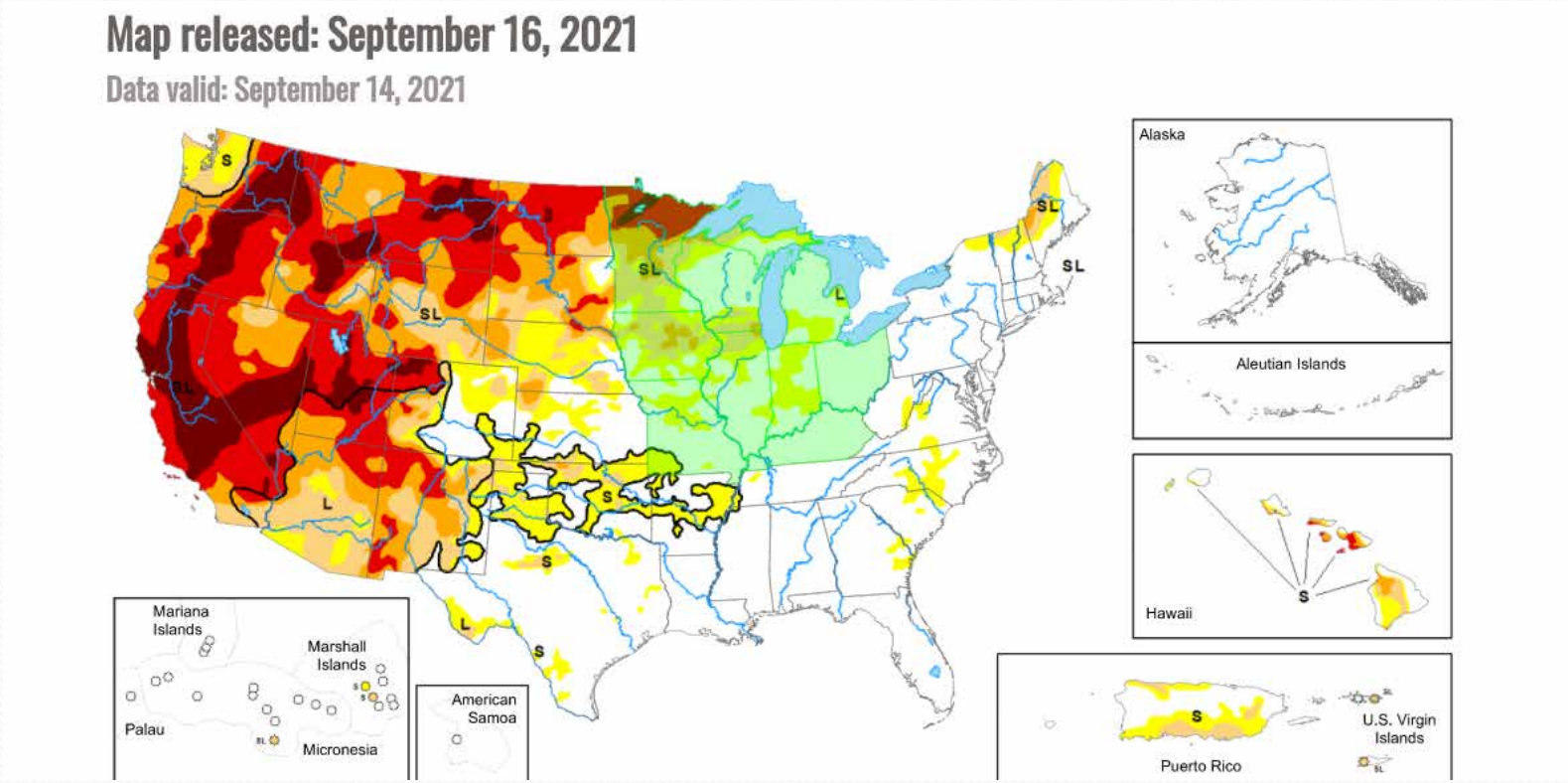
How to Monitor - Information That is Available

U.S. Drought monitor https://droughtmonitor.unl.edu/

- Current conditions plotted in map format
- Set of drop down tools to allow review of historical information
- Earlier this year (April 20, 2021) timestamp shows majority of CT in abnormally dry status.

Drought Monitor Sample

U.S. Drought monitor https://droughtmonitor.unl.edu/



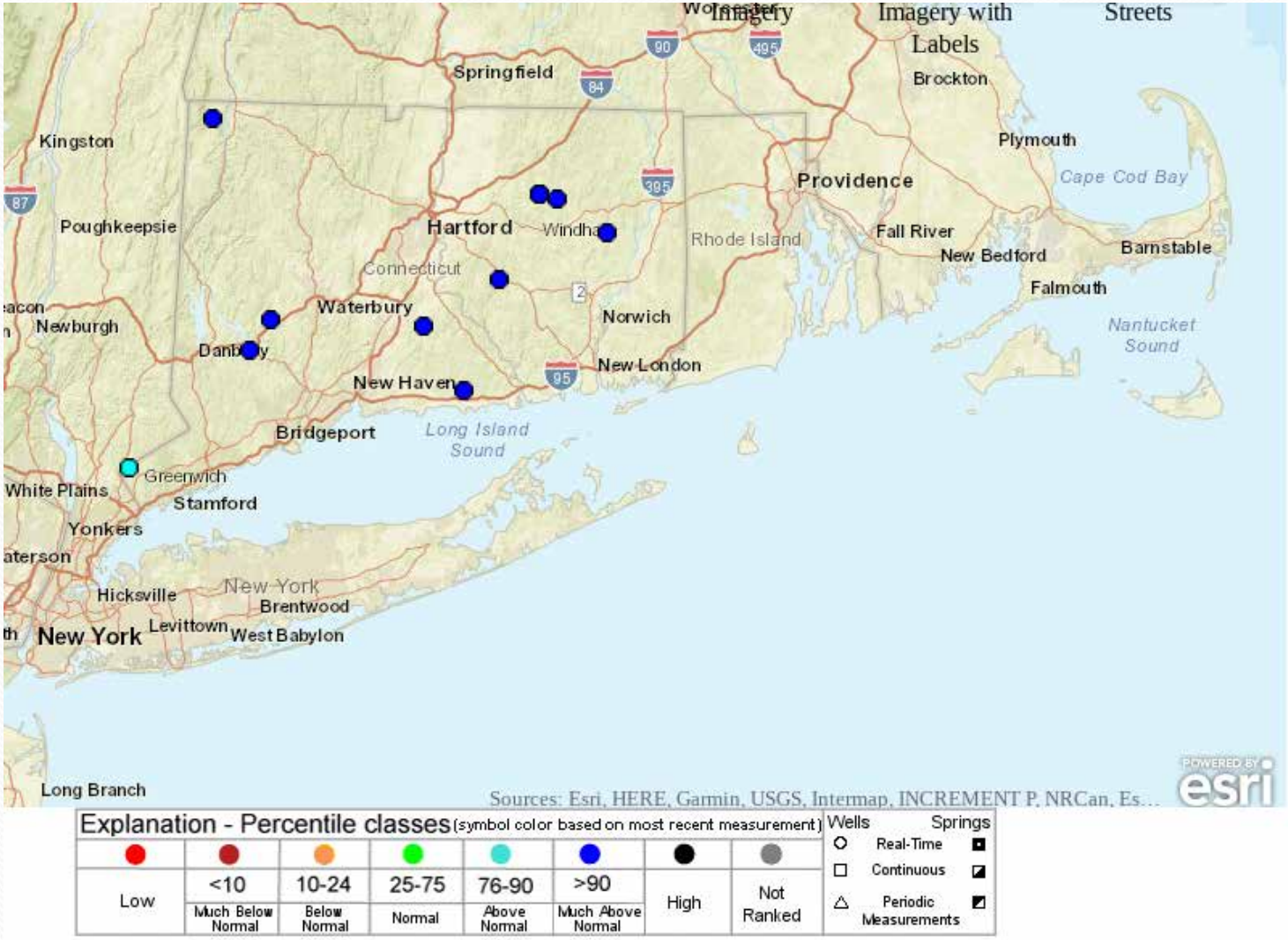
USGS - Water Condition Resources

- **Connecticut Real-Time Groundwater Level Network**
- https://groundwaterwatch.usgs.gov/NetMapT1L2.asp?ncd=rtn&sc=09

  USGS Current Water Data for Connecticut
- https://waterdata.usgs.gov/ct/nwis/rt

  Data such as levels for local water bodies (reservoir and stream levels).

USGS - Water Condition Resources



Explanation - Percentile classes (symbol color based on most recent measurement)							
Low	<10	10-24	25-75	76-90	>90	High	Not Ranked
	Much Below Normal	Below Normal	Normal	Above Normal	Much Above Normal		

Wells	Springs
Real-Time	
Continuous	
Periodic Measurements	

What is Happening at the Operations Level to Monitor Operations Impacts Caused by Drought?

- What pieces of data are available for your source(s) condition? Some info of critical importance -
- Pump times and pumping rates water use by customers

Other Data Indicators

- Electrical usage and meter data - increased KWH can be another indicator of extra pumping time to meet water system demand.

Other Data Indicators

- Water quality changes at the source may be an indicator of supply changes.
- Can be as simple as basic water chemistry changes (given parameters not often recorded for many small systems).
- The extreme situation would be dirty water at the source given drastic change in static levels.

Other Critical Planning Items

- Customer communications plans need to be mapped out in advance of emergency operations situations.
- Of particular importance are so called critical customers such as schools, hospitals, dentist, nursing homes, restaurants, food producing facilities.

With Drought Conditions Knowing Static Level Is Important - Options to Measure

- Electric water level probes.
- Do note not permanent monitoring tool and sanitary concerns.

Image source: Fischer

Airline to Measure Static Level

Ways to measure the water level

Air Line Device

Set a known length of small-diameter tubing down the well until at least 10 feet is in the water. The tubing must be straight, so most engineers strap it to the pump discharge pipe. Connect a pressure gauge to the tubing at the wellhead, and pump air into the line until you achieve maximum pressure. Use the pressure gauge reading to determine the length from the water level to the bottom of the tubing. Subtract this length from the total length of the air line to determine the distance from the wellhead to the water level. If the gauge is calibrated in feet, it will directly indicate the distance from the water level to the end of the air line. If the gauge reads in pounds per square inch (psi), convert the reading to feet by using the formula 1 psi = 2.31 feet.

Example: If the open end of an installed air tube is 300 feet below the top of the well casing and the pressure gauge reads 38 psi, the water level depth would be 213 feet below the top of the well casing.

300 feet - (38 psi x 2.31 ft/psi) = 213 feet

Air Line Device

https://www.doh.wa.gov/portals/1/Documents/pubs/331-428.pdf

Source: Washington State Department of Health

Options to monitor source conditions

- Airline device
- Advantage of permanent installation and sanitary installation situation.

ISWS has a very good 4 minute video on the airline device procedure at this link (not showing now in interest of time).

- https://www.youtube.com/watch?v=yLFUjxjYFmw

Other Options to Monitor Source Conditions

- Pressure transducers & sonic well sounders are other options to monitor static levels for your source.
- If you are considering an upgrade to your source for monitoring instrumentation seek advice from your plumbing / industry supplier for recommendations given your unique supply equipment situation.

How Are You Keeping Track of the Trends?

- For data points you are collecting be sure to record / plot the information.
- Some have SCADA systems with built in programs.
- As an option record to a spreadsheet program.
- The spreadsheet allows for graph plots of data to show trends in visual format. In addition many analysis options for peaks, lows, average, median, etc.

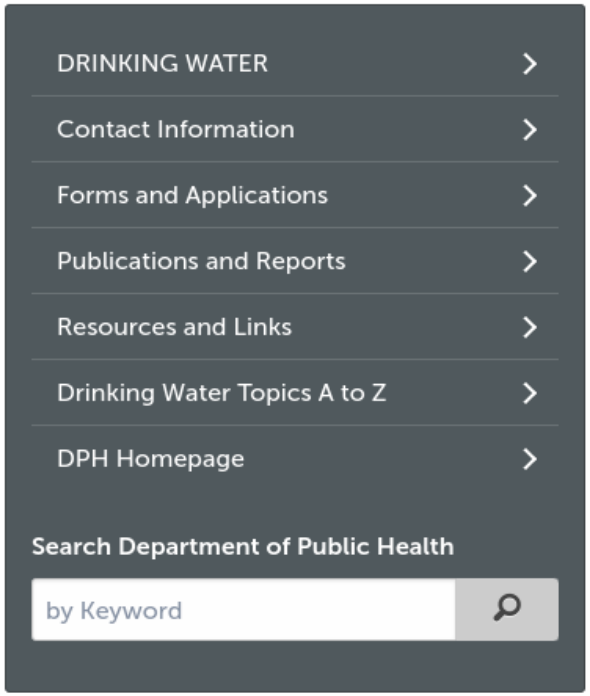
As part of ERP set parameters

- When dought conditions worsen have a parameter set that will lead to specific action. EPA refers to this as trigger or threshold value.
- Represents a shift toward some specific action as source is negatively impacted.
- Focused on implementing conservation measures and be prepared to recieve water from other sources if / as needed.

Mutual Support

- Neighboring system helping neighboring system has always been the approach of the water sector in times of crisis operations.
- This has been further developed through activities of CTWarn. More info @ https://portal.ct.gov/DPH/Drinking-Water/DWS/The-Connecticut-WaterWastewater-Agency-Response-Network-CtWARN

CTWARN as listed on CT DPH Website



The Connecticut Section of the American Water Works Association has been developing a Connecticut Water/ Wastewater Agency Response Network (CtWARN). The CtWARN is a network comprised of utilities providing assistance to one another in the form of personnel and resources during emergencies by means of a pre-drafted mutual aid agreement. As a result, the CtWARN will provide for increased planning, coordination and enhanced access to specialized resources to enable rapid, short-term deployment of emergency services to restore critical operations of the affected utility.

The Connecticut Department of Public Health has participated through its Drinking Water Section (DWS) with Connecticut's Drinking Water Industry in this initiative.

The CtWARN's mission is to support and promote statewide emergency preparedness, disaster response, and mutual assistance matters for public and private water and wastewater utilities. Through this Mutual Aid and Assistance Program, members coordinate response activities and share resources during emergency events. The Agreement sets forth the procedures and standards for the administration of the Connecticut Intrastate Mutual Aid and Assistance Program.

The CtWARN supports a major National Water Sector-Specific Plan (SSP) goal of maintaining a resilient infrastructure. The development of this water and wastewater mutual aid program will further enhance security and resiliency of the Water Sector, which has been designated as one of the national critical infrastructures and a key resource.

The CtWARN Steering Committee Members:

- American Water Works Association- CT Section
- Aquarion Water Company of CT
- Atlantic States Rural Water & Wastewater Assoc.
- Birmingham Utilities
- Capitol Region Council of Governments

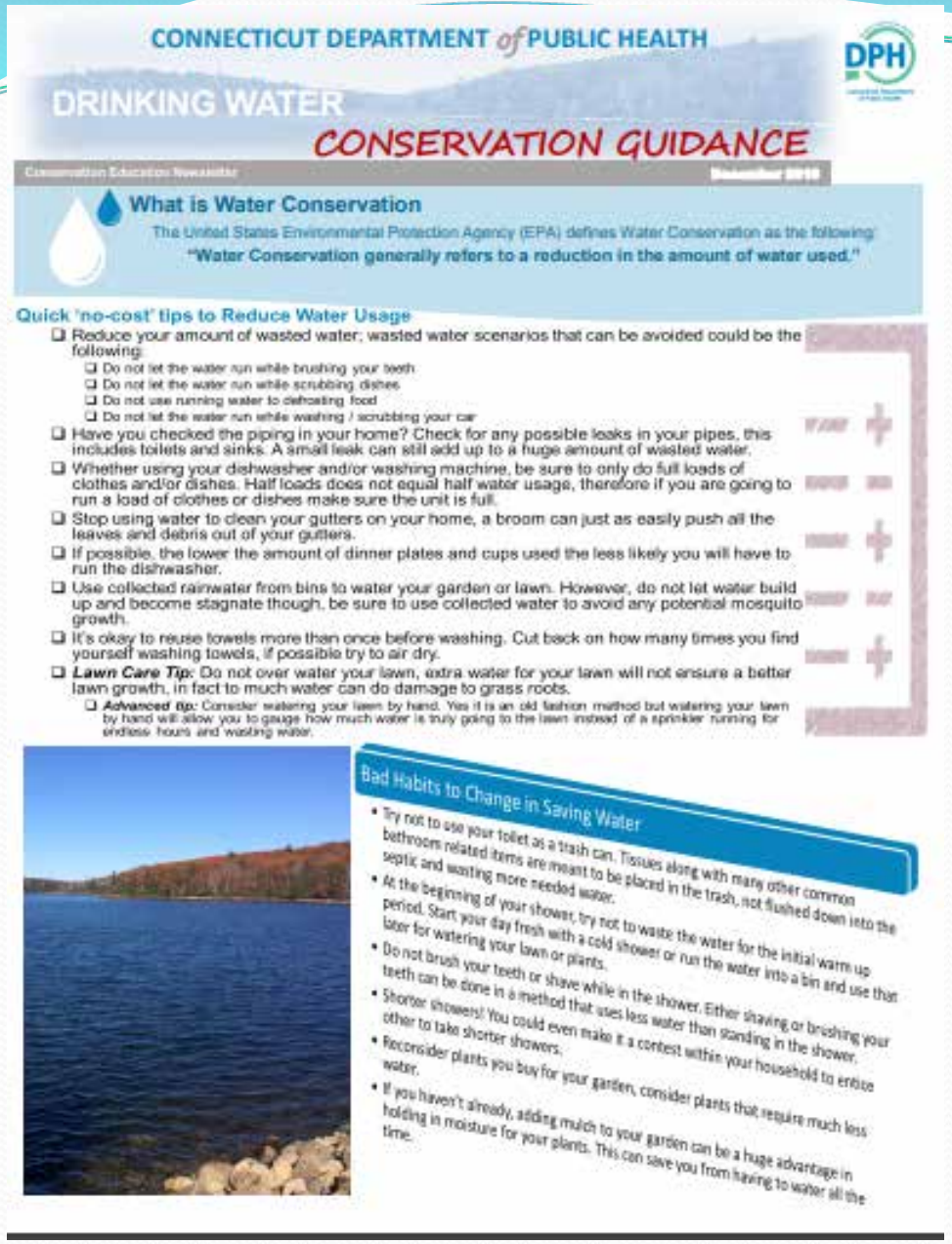
Conservation Measures

- With monitoring and a trigger hit - initiate the conservation measures plan (should be part of ERP within Operations and Maintenance Manual).
- Upto the tipping point you should already be notifying your customers you are monitoring the situation and provide them some basics to indicate the system will be considering more comprehensive conservations measures if conditions worsen.

See CT DPH Resources on Conservation

- Very good one-page that can be a bill stuffer and shared via social media feeds your system is using.
- It goes without saying you should be promoting conservation strategies on an ongoing basis.
- Very good one-pager @ https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/drinking_water/pdf/DPHQuickTipsFlyerConservationpdf.pdf

Connecticut DPH Drought Brochure



CONNECTICUT DEPARTMENT of PUBLIC HEALTH

DRINKING WATER

CONSERVATION GUIDANCE

Conservation Education Newsletter

What is Water Conservation

The United States Environmental Protection Agency (EPA) defines Water Conservation as the following:

"Water Conservation generally refers to a reduction in the amount of water used."

Quick 'no-cost' tips to Reduce Water Usage

- Reduce your amount of wasted water; wasted water scenarios that can be avoided could be the following:
  - Do not let the water run while brushing your teeth
  - Do not let the water run while scrubbing dishes
  - Do not use running water to defrosting food
  - Do not let the water run while washing / scrubbing your car
- Have you checked the piping in your home? Check for any possible leaks in your pipes, this includes toilets and sinks. A small leak can still add up to a huge amount of wasted water.
- Whether using your dishwasher and/or washing machine, be sure to only do full loads of clothes and/or dishes. Half loads does not equal half water usage, therefore if you are going to run a load of clothes or dishes make sure the unit is full.
- Stop using water to clean your gutters on your home, a broom can just as easily push all the leaves and debris out of your gutters.
- If possible, the lower the amount of dinner plates and cups used the less likely you will have to run the dishwasher.
- Use collected rainwater from bins to water your garden or lawn. However, do not let water build up and become stagnate though, be sure to use collected water to avoid any potential mosquito growth.
- It's okay to reuse towels more than once before washing. Cut back on how many times you find yourself washing towels, if possible try to air dry.
- ***Lawn Care Tip:*** Do not over water your lawn, extra water for your lawn will not ensure a better lawn growth, in fact to much water can do damage to grass roots.
  - ***Advanced tip:*** Consider watering your lawn by hand. Yes it is an old fashion method but watering your lawn by hand will allow you to gauge how much water is truly going to the lawn instead of a sprinkler running for endless hours and wasting water.

Bad Habits to Change in Saving Water

- Try not to use your toilet as a trash can. Tissues along with many other common bathroom related items are meant to be placed in the trash, not flushed down into the septic and wasting more needed water.
- At the beginning of your shower, try not to waste the water for the initial warm up period. Start your day fresh with a cold shower or run the water into a bin and use that later for watering your lawn or plants.
- Do not brush your teeth or shave while in the shower. Either shaving or brushing your teeth can be done in a method that uses less water than standing in the shower.
- Shorter showers! You could even make it a contest within your household to entice other to take shorter showers.
- Reconsider plants you buy for your garden, consider plants that require much less water.
- If you haven't already, adding mulch to your garden can be a huge advantage in holding in moisture for your plants. This can save you from having to water all the time.

Share as a bill stuffer or via social media / related.

Additional CT DPH Conservation Resource

- This 5-page resource is much more comprehensive list of conservation measures for different water users / different industries. https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/drinking_water/pdf/DPHWaterConservationTipsandFactSheetFinalpdf.pdf

CT Water Planning Council Conservation Info

- link @ https://portal.ct.gov/Water/Drought/Water-Conservation
- A number of resources on conservation to include recommendations for PWS customers.

EPA Drought Action Checklist

- https://www.epa.gov/sites/default/files/2015-06/documents/drought_0.pdf
- Compreshensive and concise checklist item that can be directly implemented to O and M / ERP, edit and modify to your unique operations situation.

More Online Resources - Thanks to Steve Harkey (CT DPH) for providing this info

- Drought Index Portal: https://droughtindexportal.colorado.edu/
- Landscape Evaporative Response Index: https://psl.noaa.gov/leri/
- Evaporative Demand Drought Index: https://psl.noaa.gov/eddi/
- Climate Engine https://app.climateengine.org/climateEngine

Plenty of Data Is Accessible

- You can determine what information you will track and reference items to take advantage of.
- Recommend listing those resources in O and M and ERP documents.
- Check links / resources occasionally as these do get updated and or change over time.

Bulk Haul Specifics

- https://portal.ct.gov/DPH/Drinking-Water/DWS/Forms-and-Applications#BulkWaterHauling
- Form to be completed by the system and provided to DPH.
- Process form accordingly and keep an open channel with CT DPH contacts.
- Advise them of your operations situation to ensure proper procedures and to demonstrate you are protect the health of your customers.

Bulk Haul Info @ CT DPH Website

Bulk Water Hauling Notification

The following notification form should be completed and submitted to the Department after a Public Water System (PWS) hauls in bulk water. Note that if bulk water hauling is required due to an emergency as defined in Section 19-13-B46 of the Regulations of Connecticut State Agencies, a *Notification Form to Confirm Compliance with Sections 19-13-B46 & 19-13-B102 of the Regulations of Connecticut State Agencies (RCSA)* must be completed and submitted.

- Bulk Water Hauling Notification Form
- Bulk Water Hauling Application

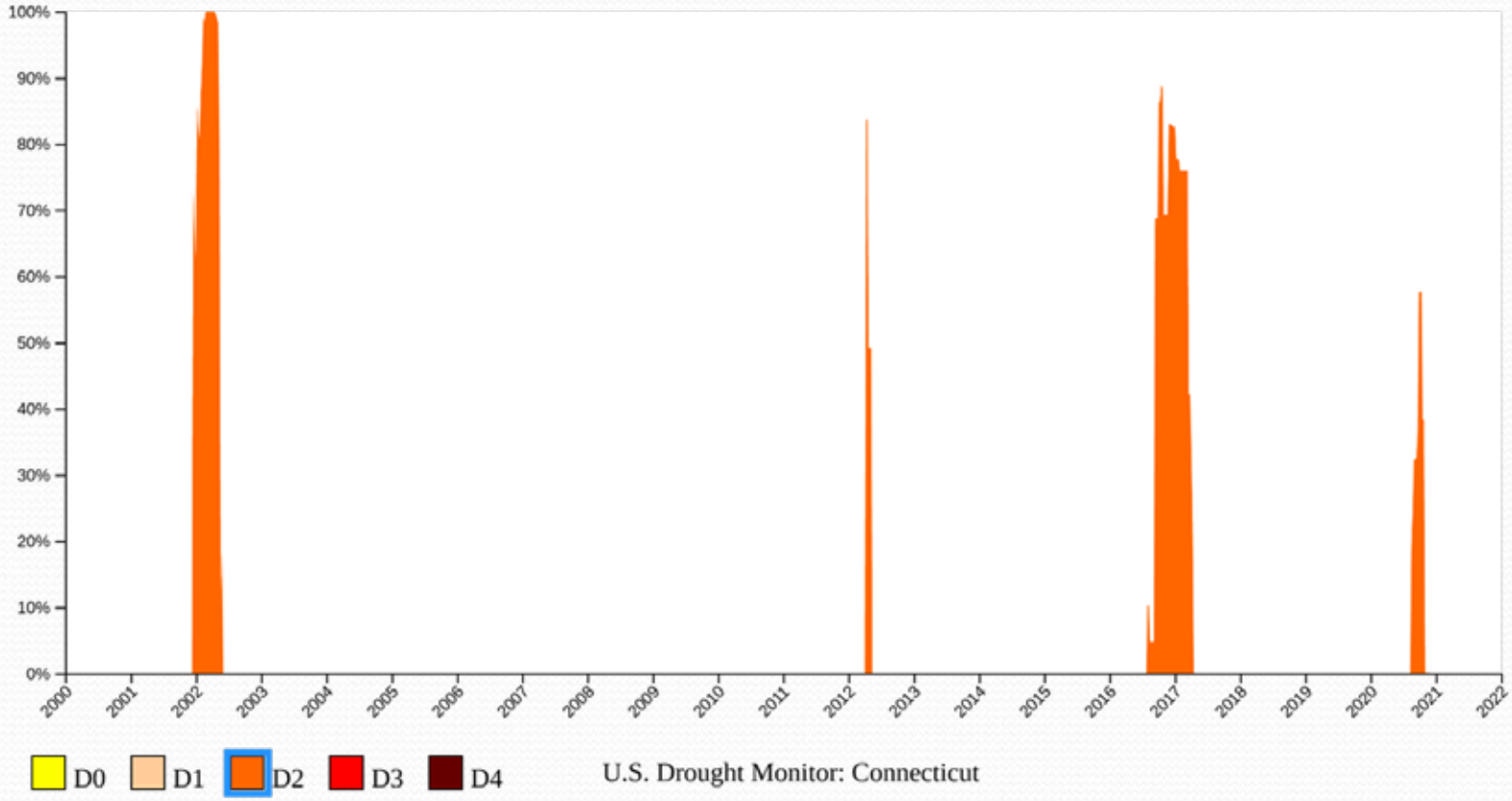
Operations Impacts - Are You Prepared to Receive Water From Another Source?

- If source levels are critical you may need water from another source.
- Be sure to work in options for alternative sources as part of your ERP.
- Be sure to follow guidance and specific CT DPH rules if you are at a point of receiving water from another source and or invovled in a bulk haul situation.

Add the information to your ERP

- For any forms or templates you download and or develop add these items to your Emergency Response Plan.
- Be sure to adjust a given form so it is specific to your system situation / service audience.
- DEBRIEF and update SOP's after a given incident. Will ensure your system is better prepared to in the future.

Be Prepared for Another Drought Phase, “Soon.”



Questions / Comments

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