



CONNECTICUT DEPARTMENT *of* PUBLIC HEALTH
DRINKING WATER SECTION

Yale University
School of Architecture

October 16, 2018

Public Health and Drinking Water

By Lori J. Mathieu, Public Health Section Chief, Drinking Water Section

Public Water System Sustainability

Drinking
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- Connecticut Department of Public Health's Drinking Water Section
- Drought 2016/2017 – State Drought Plan
- Connecticut's First State Water Plan
- CT DPH Water Utility Coordinated Committee Water Supply Plan
- Connecticut Institute for Resilience & Climate Adaptation (CIRCA) – Public Water System Vulnerability Assessment & Resilience Plan
- Water Quality and Human Health
- The Future of Public Drinking Water - Challenges



CT DPH Drinking Water Section Responsibilities

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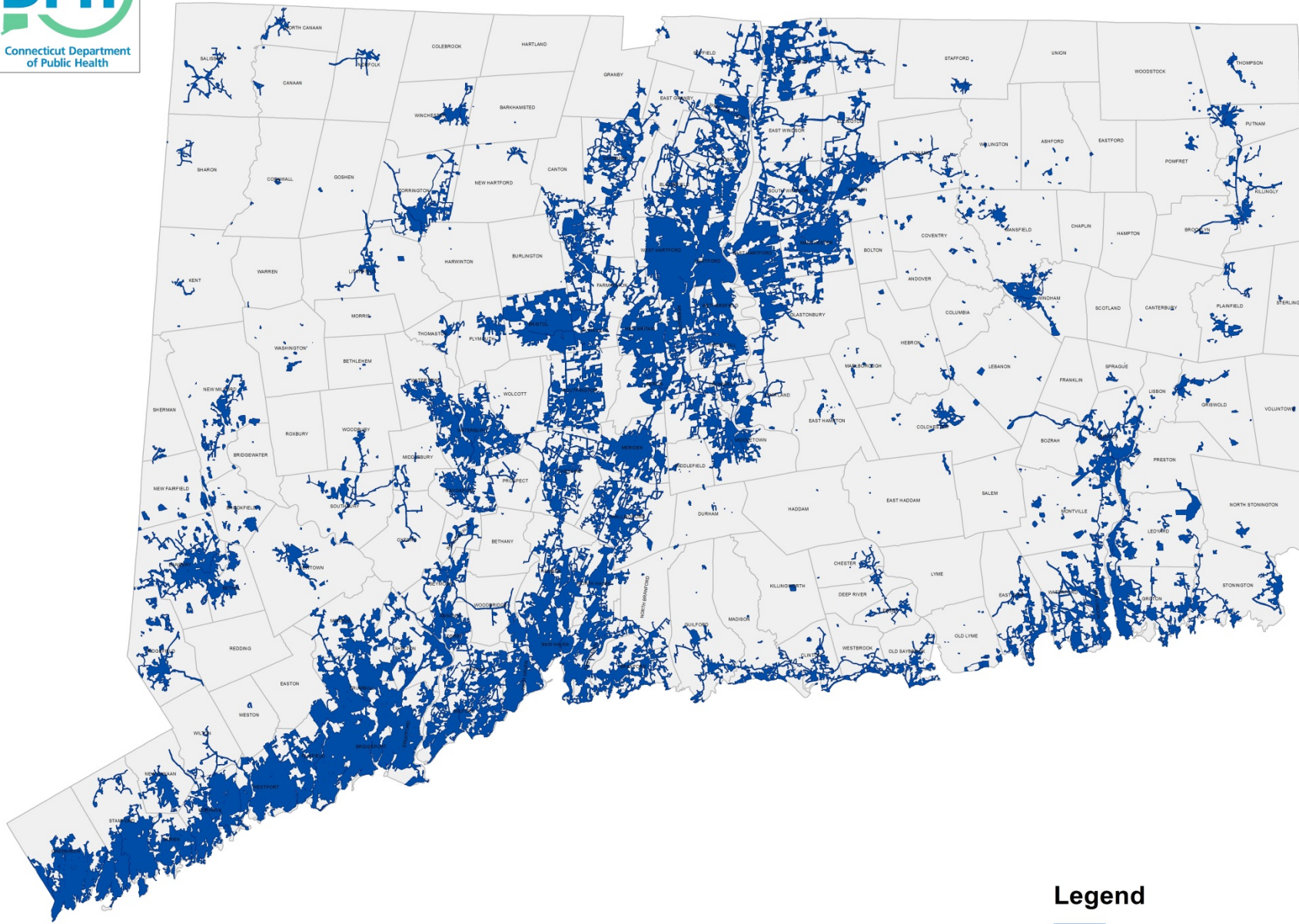
- Regulate 2,550 Public Water Systems
- 2.8 million CT Residents Served
 - 3.5 million Total Population
- 550 Community Systems
- 2,000 Non-Community Systems
- 150 Reservoir Systems
- Over 4,000 Groundwater Sources
- Over 350,000 private wells

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Public Water Supply Service Area



Legend

 PWS Service Areas

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Primacy of Safe Drinking Water Act – EPA

- System engineering reviews
- Treatment/source review & approval
- Drinking Water State Revolving Loan Fund
- Drinking water quality
- Oversight of monitoring and reporting
- Ground water rule
- Revised total coliform rule

State Statutory Oversight

- Water supply planning and regional planning (WUCC)
- Purity and adequacy of public drinking water
- Water company land regulation
- Recreation permitting, sale of excess water, certified operators, enforcement



Responsibilities – 50 Staff

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- Administer Drinking Water Protection Laws
- SDWA, Primacy Since 1976
- Water Quantity Oversight – Margin of Safety
- Water Quality Review, over 500,000 Samples per Year
- Review and Approve all Significant Improvements to Public Water Systems
- Review and Approve New Treatment Plants and Systems
- Conduct Sanitary Engineering Surveys, Every 3 or 5 Years
- Review and Approve Water Supply Plans and Regional Plans
- Responsive to all Hazards, Emergency Preparedness
- Review of Sale/Use of 100,000 Acres of Water Company Land



DWS Responsibilities

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- Drinking Water State Revolving Loan Fund \$150 million Since 1999, with Another \$200 million Moving Forward, Infrastructure Projects, Repair, Replace Upgrade, Extend to Pollution
- Proactively Protect Public Drinking Water Sources
- Proactive Enforcement of Violations, Follow-up with System Owner, Issue NOVs and Orders to Assure System Compliance
- System Takeover if Failure, System Review, Violations, etc.
- Tracking of SDWA Compliance and Reporting to EPA
- Sources of Bottled Water in CT and Bulk Water Hauling
- 24/7 Coverage and Response Concerning Public Water System Emergencies
- Track and Report Program Measures
- Administer EPA Grants Since 1980s
- Assure Compliance for all 2500 Public Water Systems



Drought Experience 2016 - 2017

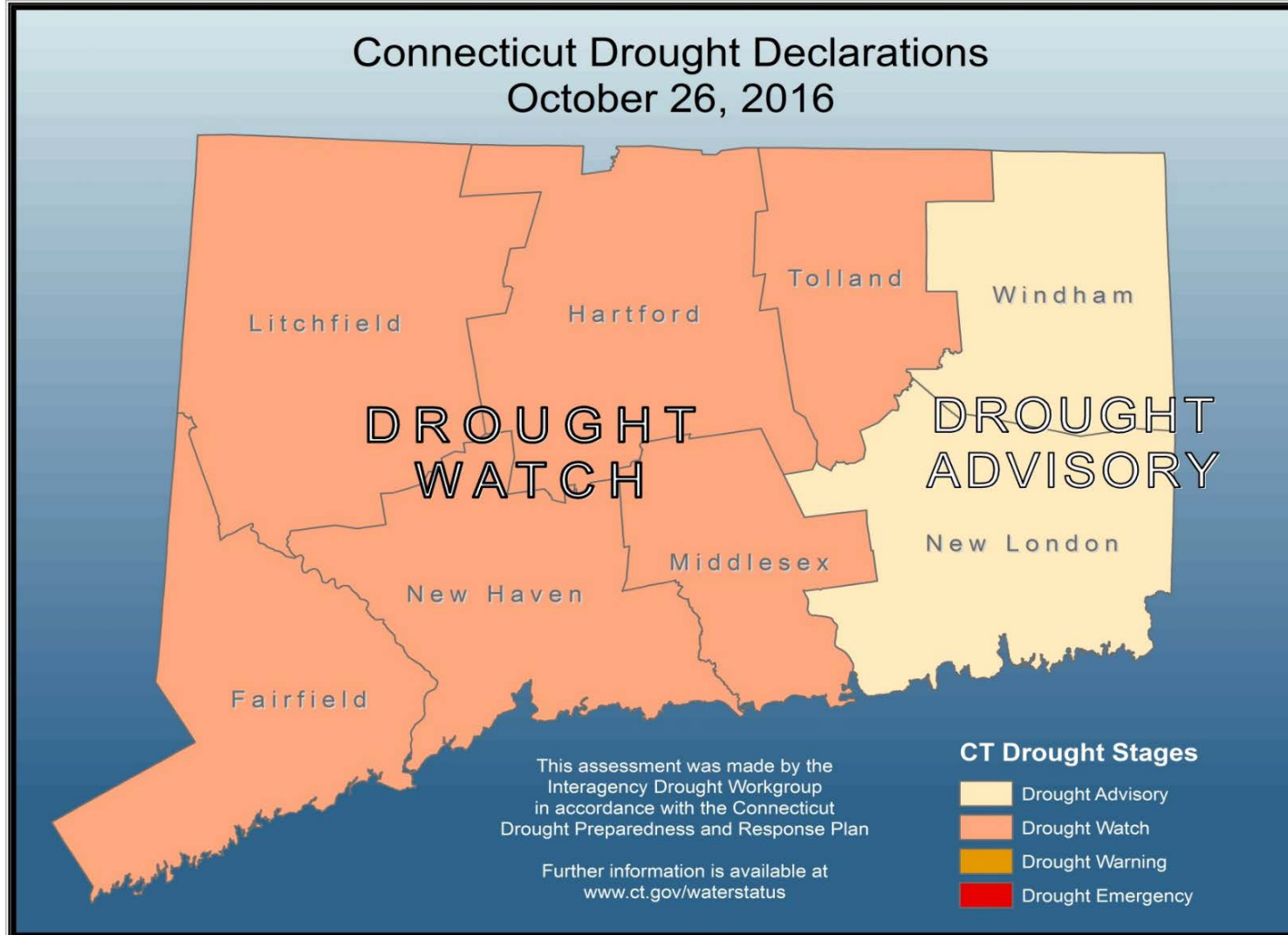




Drought Stages

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The Reality of
Drought is here

Drought Watch is in
effect for 6 counties

Drought Advisory is in
effect for 2 counties

Drought Data is
available

2016

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Utility Name	Current Month	Monthly Average	% of Normal	Monthly Low on Record	Period of Record	Status or Comments
Aquarion Water Co of CT-Greenwich System	37.2**	77	48	24	1962 - 2016	Water Supply Emergency
Aquarion Water Co of CT-Main System*	65.1**	88	74	61	1966 - 2016	Water Supply Emergency
Aquarion Water Co of CT-Mystic*	100	98	102	77.25	1984 - 2016	Voluntary Water Restrictions
Aquarion Water Co of CT-Norfolk System	100	100	100	92	1983 - 2016	Voluntary Water Restrictions
Aquarion Water Co of CT-Salisbury Sys*	100	97	103	51	1983 - 2016	Voluntary Water Restrictions
Aquarion Water Co of CT-Stamford	39.3**	73	54	0	1967 - 2016	Water Supply Emergency
Bethel Water Dept	84.88**	96	88	82	1984 - 2016	No Restrictions
Bristol Water Department*	42.94**	90	48	42.94	1968 - 2016	PHASE 3 Drought Alert
Connecticut Valley Hospital	98.67	97	102	79	1999 - 2016	No Restrictions
CTWC - Naugatuck Region-Central System*	60.74**	92	66	60.74	1983 - 2016	Water Supply Advisory
CTWC - Northern Reg-Stafford System	95.51**	100	96	95.51	1983 - 2016	Water Supply Advisory
CTWC - Northern Reg-Western System	62.08**	87	71	48	1983 - 2016	Water Supply Advisory
CTWC - Shoreline Region-Chester System*	91.49**	97	94	80	1983 - 2016	Water Supply Advisory
CTWC - Shoreline Region-Guilford System*	51.4**	87	59	20	1983 - 2016	No Water Supply Watch
Danbury Water Department*	73.21**	85	86	55	1977 - 2016	Water Emergency
Groton Utilities	90.98	89	102	45	1984 - 2016	Drought Advisory
Jewett City Water Company*	86.14**	91	95	62	1983 - 2016	No Restrictions
Manchester Water Department	70.44**	96	73	70.44	1981 - 2016	Water Supply Alert
Meriden Water Division	59.75**	90	67	59.75	1987 - 2016	Voluntary Water Restrictions
Metropolitan District Commission	75.31**	86	87	42	1951 - 2016	Drought Advisory
Middletown Water Department*	68.45**	81	84	24	1951 - 2016	No Restrictions
New Britain Water Department	37.31**	69	54	37.31	1971 - 2016	Water Supply Warning
New London Dept. of Public Utilities	38.45**	67	58	30	1971 - 2016	No Restrictions
Norwalk First Taxing District	58.25**	91	64	44	1979 - 2016	Drought Emergency
Norwich Public Utilities	58.72**	89	66	58	1983 - 2016	Water Supply Warning
Regional Water Authority	53.7**	79	68	53.7	1960 - 2016	Voluntary Water Restriction
Sharon Water & Sewer Commission	100	97	103	69	1999 - 2016	No Restrictions
South Norwalk Electric & Water	33**	78	42	23	1968 - 2016	Water Emergency
Southington Water Department*	34.88**	82	43	32	1951 - 2016	Treatment Plant off-line
Torrington Water Company	70.2**	79	88	9	1964 - 2016	No Restrictions
Wallingford Water Department*	72.8**	83	88	63	1982 - 2016	No Restrictions
Waterbury Water Department	52.98**	93	57	52.98	1966 - 2016	Drought Watch
Windham Water Works	100	100	100	100	1984 - 2016	No Restrictions
Winsted Water Works	79.51**	99	81	79.51	1984 - 2016	No Restrictions

Statewide Average: 68.9 88.3 76.8

* System uses both groundwater and reservoir supplies.

** Level Below Historical Monthly Average



2018

MARCH 2018 - MONTHLY RESERVOIR STATUS SUMMARY

(Percent Usable Storage)

Utility Name	Current Month	Monthly Average	% of Normal	Monthly Low on Record	Period of Record	Status or Comments
Aquarion Water Co of CT-Greenwich System	94.2	94	100	44	1962 - 2018	No Restrictions
Aquarion Water Co of CT-Main System*	100	98	103	71	1966 - 2018	No Restrictions
Aquarion Water Co of CT-Mystic*	100	99	101	87	1984 - 2018	No Restrictions
Aquarion Water Co of CT-Norfolk System	100	100	100	95	1983 - 2018	No Restrictions
Aquarion Water Co of CT-Salisbury Sys*	100	100	100	90	1983 - 2018	No Restrictions
Aquarion Water Co of CT-Stamford	92.6	91	102	51	1967 - 2018	No Restrictions
Bethel Water Dept	100	98	102	86	1984 - 2018	No Restrictions
Bristol Water Department*	99.01	97	102	67	1968 - 2018	No Restrictions
Connecticut Valley Hospital	100	94	106	0	1999 - 2018	No Restrictions
CTWC - Naugatuck Region-Central System*	100	99	101	75	1983 - 2018	No Restrictions
CTWC - Northern Reg-Stafford System	100	100	100	100	1983 - 2018	No Restrictions
CTWC - Northern Reg-Western System	100	96	104	45	1983 - 2018	No Restrictions
CTWC - Shoreline Region-Chester System*	100	100	100	96	1983 - 2018	No Restrictions
CTWC - Shoreline Region-Guilford System*	100	98	102	74	1983 - 2018	No Restrictions
Danbury Water Department*	96.1	95	101	60	1977 - 2018	No Restrictions
Groton Utilities	100	99	101	93	1984 - 2018	No Restrictions
Jewett City Water Company*	100	100	100	88	1983 - 2018	No Restrictions
Manchester Water Department	104.66	100	104	91	1981 - 2018	No Restrictions
Meriden Water Division	98	96	102	74	1987 - 2018	No Restrictions
Metropolitan District Commission	99.97	92	109	44	1951 - 2018	No Restrictions
Middletown Water Department*	96.15	95	101	48	1951 - 2018	No Restrictions
New Britain Water Department	89.92	85	106	46	1971 - 2018	No Restrictions
New London Dept. of Public Utilities	93.77	85	110	54	1971 - 2018	No Restrictions
Norwalk First Taxing District	100	97	103	66	1979 - 2018	No Restrictions
Norwich Public Utilities	100	99	101	77	1983 - 2018	No Restrictions
Regional Water Authority	97.75	94	104	62	1960 - 2018	No Restrictions
Sharon Water & Sewer Commission	100	94	107	0	1999 - 2018	No Restrictions
South Norwalk Electric & Water	99.8	97	103	45	1968 - 2018	No Restrictions
Southington Water Department	100	95	105	66	1951 - 2018	No Restrictions
Torrington Water Company	100	91	110	38	1964 - 2018	No Restrictions
Wallingford Water Department*	89.59**	90	99	73	1982 - 2018	No Restrictions
Waterbury Water Department	97.52**	98	100	86	1966 - 2018	No Restrictions
Windham Water Works	100	100	100	100	1984 - 2018	No Restrictions
Winsted Water Works	100	100	100	94	1984 - 2018	No Restrictions
Statewide Average:	98.5	96.0	102.6			

* System uses both groundwater and reservoir supplies.

** Level Below Historical Monthly Average

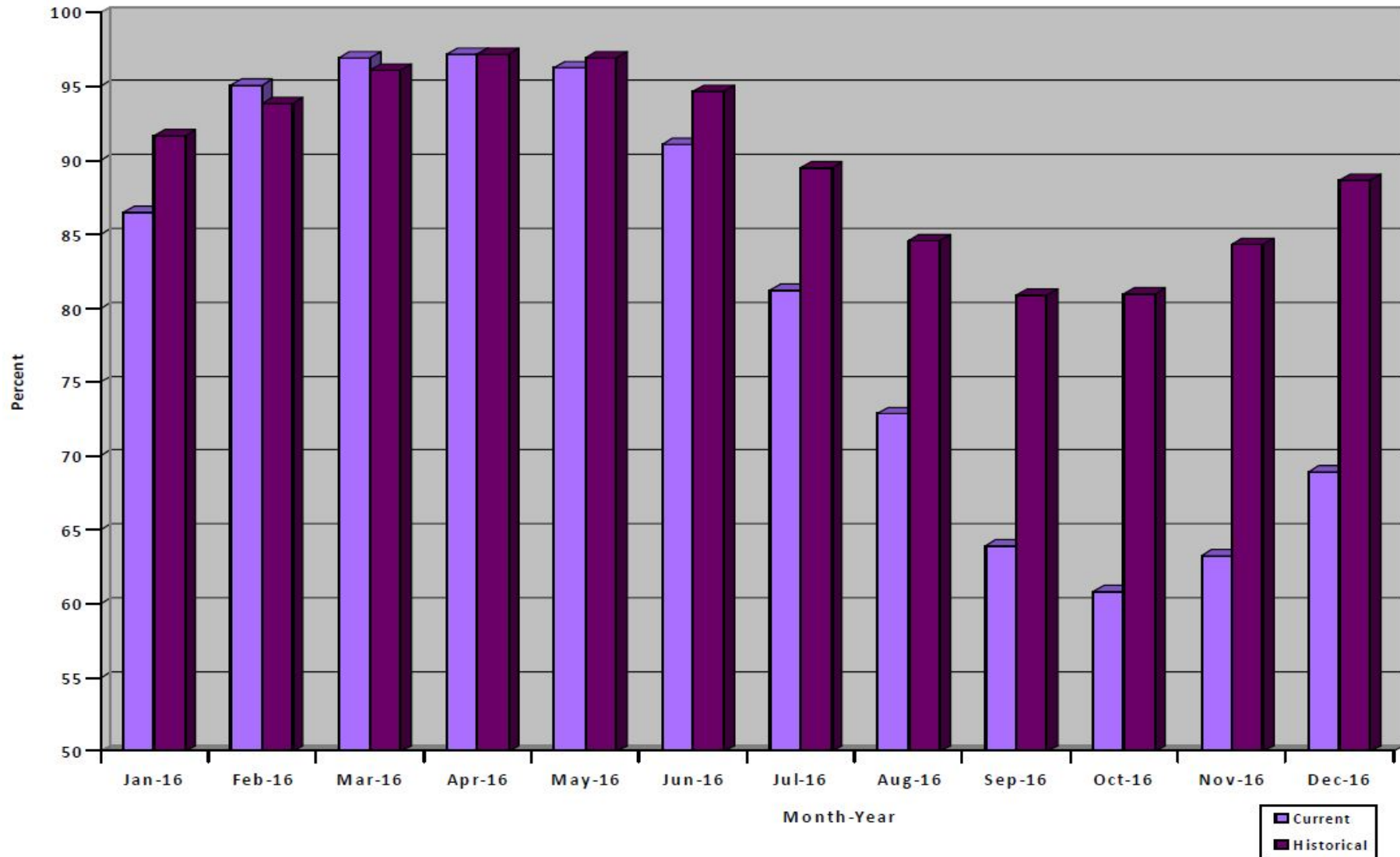
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Reservoir Capacity - December of 2016

State of Connecticut
Reservoir Capacity Levels - Statewide



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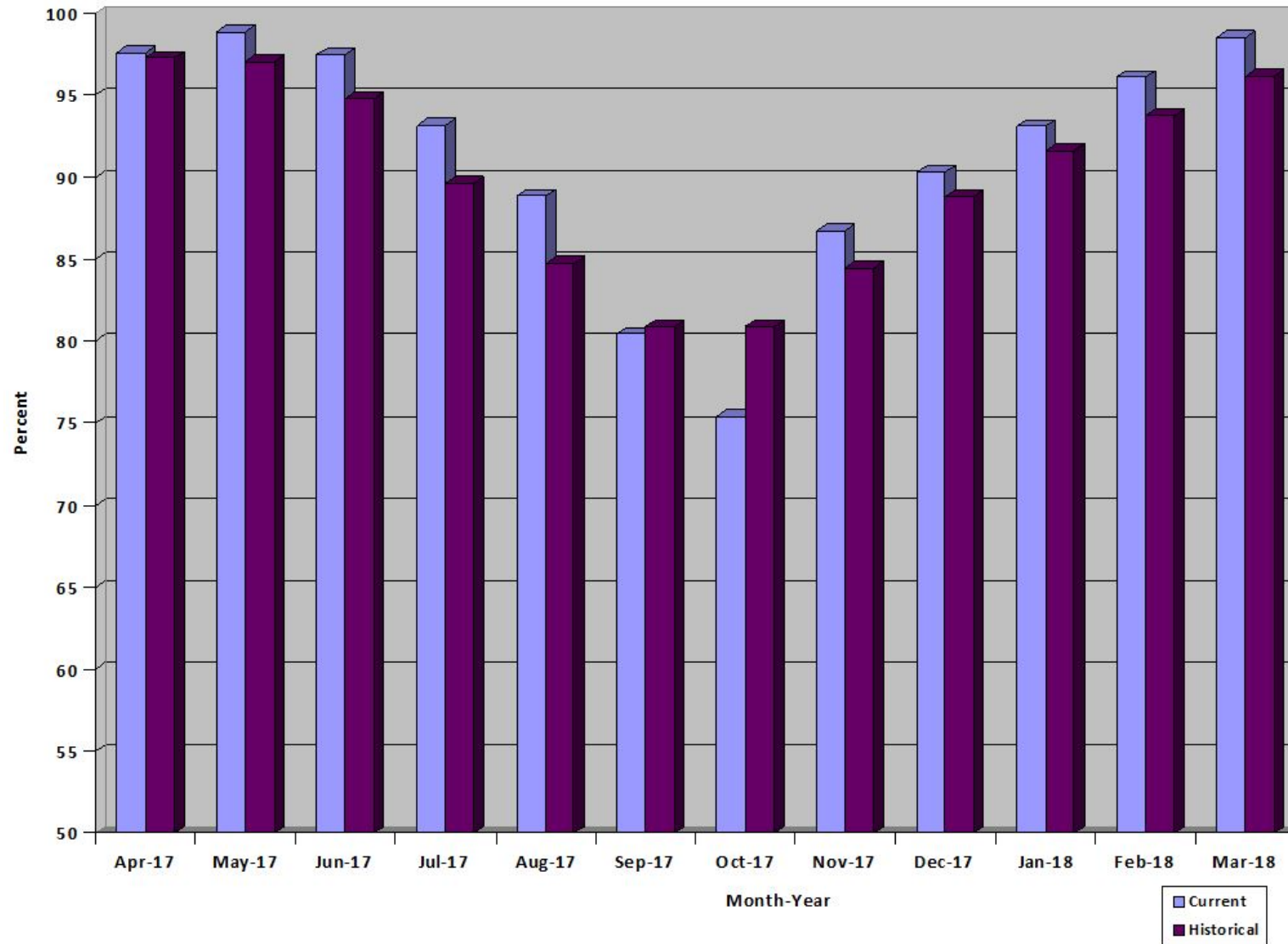


Reservoir Capacity - Presently

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State of Connecticut
Reservoir Capacity Levels - Statewide

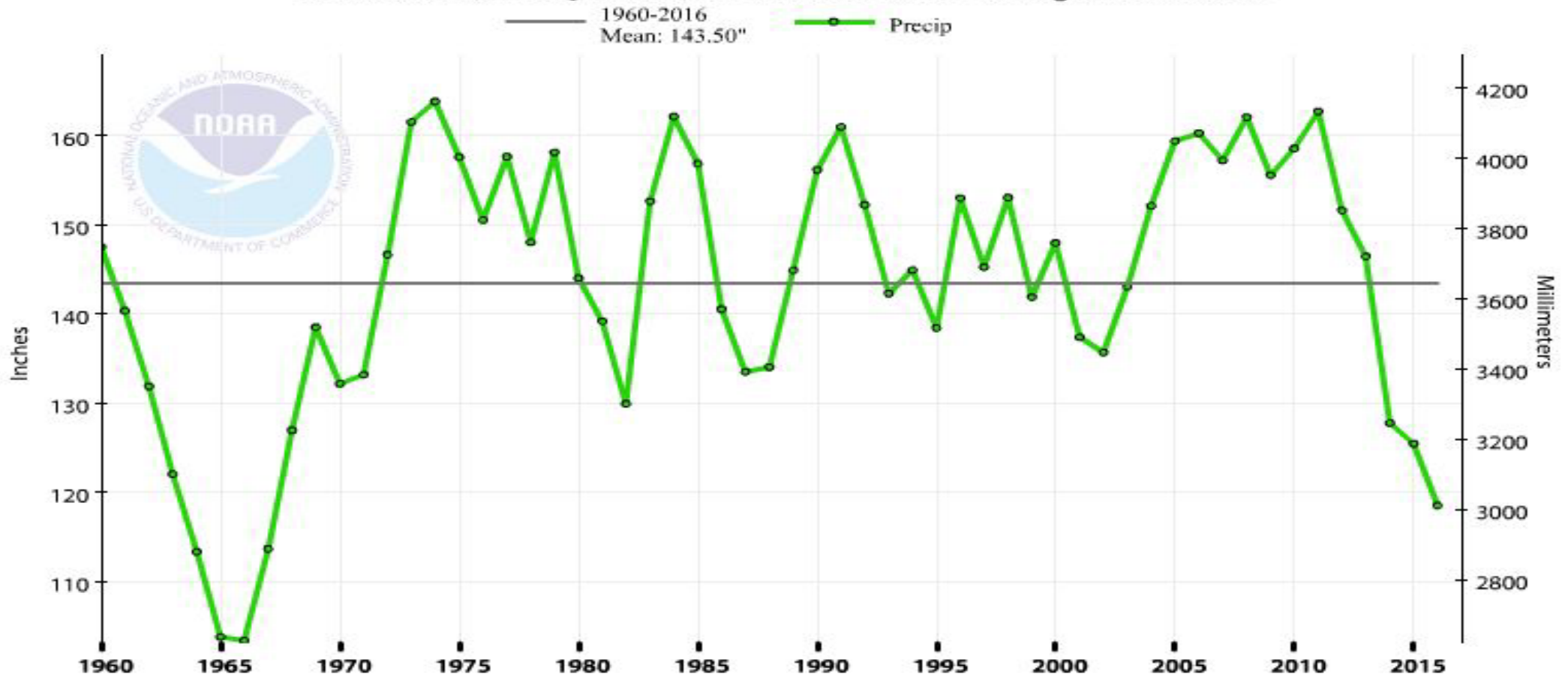


1960s Drought vs. 2016 Drought

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Connecticut, Precipitation, 36-Month Period Ending in December



Jan 2014 to Dec 2016 - 5th Greatest Precipitation Deficit – *Based on NOAA Data*

Water Supply Plans

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The water utility water supply plans prepared by the major water utilities include a water conservation component and an emergency contingency planning component

(RCSA 25-32d-3).

Changes needed to emergency drought triggers based on new water usages to start conservation measures and emergency sources earlier. Add triggers that begin emergency source water testing to aid in decision making for water companies and DPH to determine withdrawal rates and treatment before the source is used.

Included are triggers for implementing stricter water conservation at various stages during a drought.

In addition, Water Utility Coordinating Committees in the preparation of their area-wide water supply plans are required to evaluate water conservation as one of their charges. This drought plan incorporates and supplements these efforts.

DPH Drinking Water Section Drought Response

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- DPH Press Release 6/27/16
- Circular Letter #2016-20 on 6/29/16
- Gov. Malloy Press Release on 10/28/16
 - Reduce Consumption by 15%
- Circular Letter #2016-27 on 11/1/16
- Circular Letter #2016-30 on 11/21/16
- Emergency Orders to Aquarion, Waterbury and Danbury issued in October & November
- [Drought Preparedness & Response Plan](#)
 - Existing Plan Dated 08/04/2003
 - Proposed Plan Dated 09/02/2016
 - [http://www.dpuc.state.ct.us/dockcurr.nsf/8e6fc37a54110e3e852576190052b64d/e4f2ff5f748b44018525804a0064b45f/\\$FILE/CT%20Drought%20Plan%20-%202016-10-12.pdf](http://www.dpuc.state.ct.us/dockcurr.nsf/8e6fc37a54110e3e852576190052b64d/e4f2ff5f748b44018525804a0064b45f/$FILE/CT%20Drought%20Plan%20-%202016-10-12.pdf)
 - [Review & provide written comments to PURA by 12/16/16 in Docket #16-10-12](#)

Drought Response

- **Drought Preparedness and Response Plan (2003)**

- Response to 2002 drought and reflects the desire of state agencies to develop more formalized operating procedures in order to improve the effectiveness and predictability of future state drought response activities
- Provides statewide guidance to assess and minimize the impacts of a drought
- Plan is currently under revision | Public comment period closed on December 16th, 2016.
- Plan to be revised by end of 2018

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Drought Response

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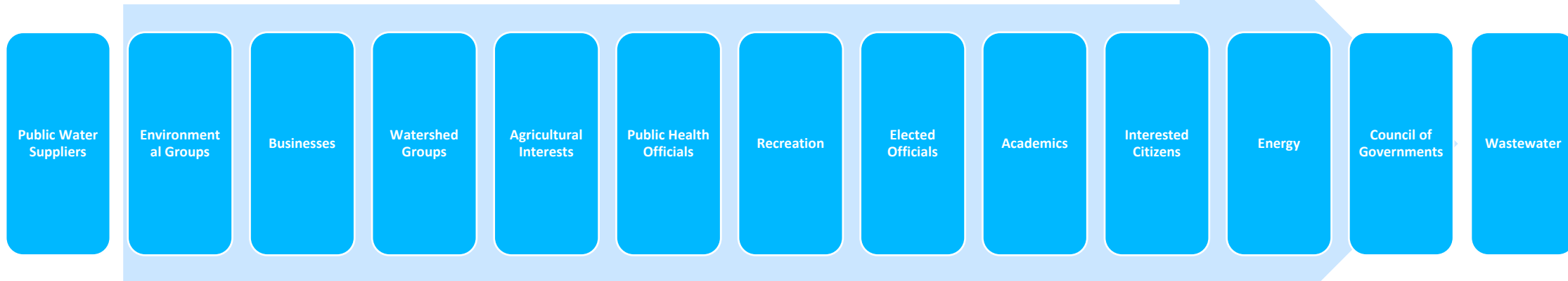
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- Changing the current mindset of water companies, home owners and landscaping industry
- Better information, knowledge, training, and tools
- Availability of better systems and components
- Collaboration with businesses in what they tell and sell to the consumer
- Possible Legislation/Policy: Conservation Rates and Local Emergency Ordinance
- Restart of Residential retrofit board, establish new oversight, leak detection requirements, focus on water sense standards
- Initiate water audits of top water users to determine water usage and investigate large amounts of unaccounted for water of these users

The Connecticut State Water Plan



- Brought to you by: **The Water Planning Council**
 - Steering Committee, Policy and Science & Technical Subcommittees, and Water Planning Council Advisory Group
 - Numerous Stakeholders, including:



- Consulting provided through NEIWPC by CDM Smith and Milone & MacBroom, Inc.

www.ct.gov/water

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Why Do We Need a State Water Plan?



Water is our most important natural resource



Balancing all water needs



Preserving and protecting the state's public drinking water supply



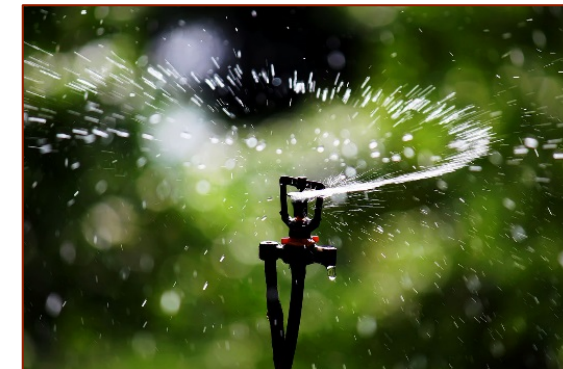
Increasing frequency of drought



Climate change impacts



Environmental impairments caused by registered diversions



Increasing peak day demands for lawn irrigation

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Requirements of the State Water Plan

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Science

- Quantities / Qualities of Water
- Present / Projected Demands
- Appropriate Regions
- Data-Driven Decisions

Considerations

- Public Health & Safety
- Ecological & Environmental Needs
- Economic Impacts
- Balance

Public Act 14-163

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Engagement

- Inform State Residents
- Communication & Implementation of Plan
- Incorporate Regional & Local Plans
- Businesses, Towns, Local Health Departments and Regional Governments

Policy

- Climate Resiliency
- Infrastructure & Land Use Measures
- Recommendations on Laws / Regulations
- Conservation / Water Reuse
- Inter-Regional Solutions & Sharing

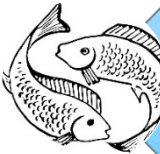
Key Highlights of the State Water Plan



Platform for consistent, informed decision making



Maintain highest quality drinking water



Balance in-stream and out-of-stream needs



Water conservation



Maintain scientific data

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What We Have Learned:



CT has ample high quality water for our needs

The water is not always where we need it when we need it

We need wise and efficient use of our water

Climate change will add stress to our natural systems and management systems

Now is the time to implement this Plan's priority action items

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What is in the Final Plan?

Background (White Papers)

- Current Policies
- Future Options

Technical Information

- Water Needs
- Climate Change
- Water Conservation

Recommendations

Policies

Pathways Forward

Implementation of Near Term

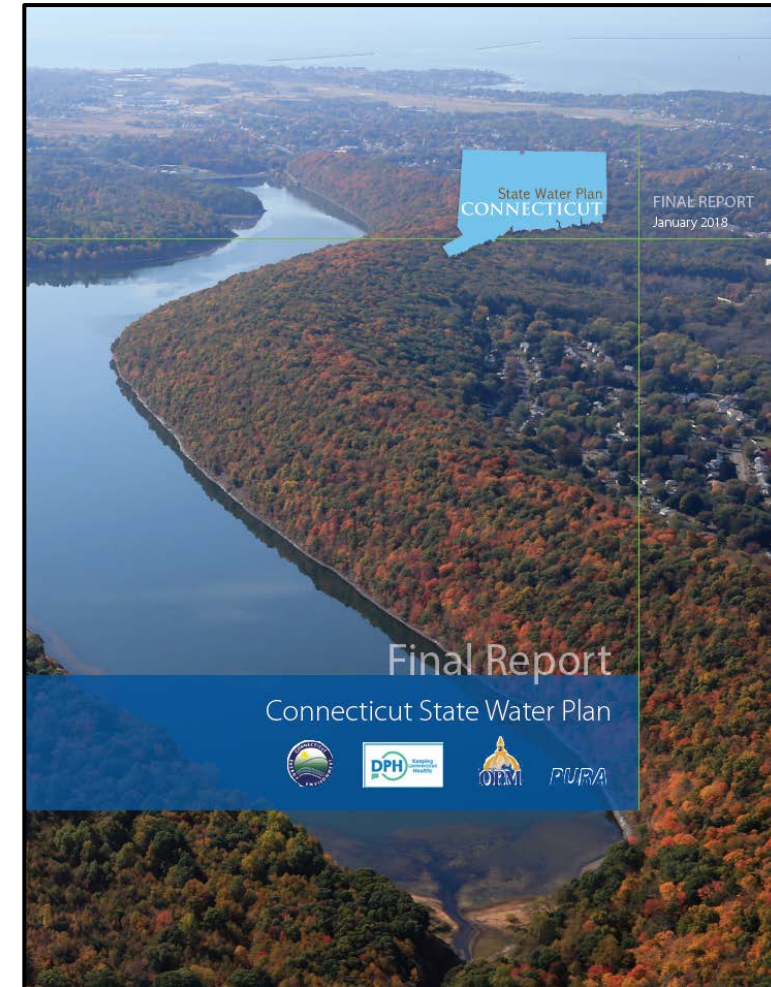
Goals

Topics for Future Discussion

Not a Solution to all CT Water Issues, but a consensus-based plan to frame future water decisions

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Top Consensus-Based Policy Priorities



- Be Scientifically Based
- Remove Obsolete Registered Diversions
- Encourage Innovative Agricultural Practices
- Increase Access to a Centralized Data
- When appropriate, consider Non-Potable Uses of Class B Water
- Review for Consistency with Other State Plans
- Encourage Regional Water Solutions
- Protect Watershed Lands
- Promote Data-based Water Education Program
- Develop Water Conservation Outreach Strategies

Not a Solution to all CT Water Issues, but a consensus-based plan to frame future water decisions

Topics for Further Consideration

- Water Conservation
- Regionalization/Interconnections
- Registered Water Diversions
- Aging Infrastructure
- Economic Impacts
- Technology Issues
- Private Wells
- Funding for Implementation
- Future Class B Water for Non-Potable Uses
- Statewide Drought Planning
- Wastewater and Water Reuse
- Water Use Accounting
- Instream Flow



Comments Received & Responses



~200 comment letters submitted from various stakeholders

- Business Communities
- Citizen-Led Coalitions
- Environmental Advocacy Organizations
- Members of the Public
- Municipal Officials
- Specialty Groups
- State Agencies
- Legislators
- Water Suppliers



Response Considerations:

- Stakeholder consensus was vital during development of the State Water Plan
- Substance of the Plan was heavily reliant on issues that all stakeholders could agree upon during development

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Additional Topics Included in the Plan as a Result of Public Comment Period



- Health Equity
- Drought Planning/Town Involvement
- Environmental Equity
- Harmonizing Energy Priorities
- Transparency / Local Involvement in Water Decisions
- Water as a Public Trust
- Large Water Uses, incl. Bottled Water
- Emerging & Re-emerging Contaminants
- Stormwater Management
- Green Infrastructure / Low-Impact Development
- Dam Removal
- Bio-solids & Other Wastewater Topics
- Climate Change, esp. Inland Flooding Potential & Future Drought Risks
- Agricultural and Industrial Water Needs, Uses & Practices.



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Water Utility Coordinating Committees

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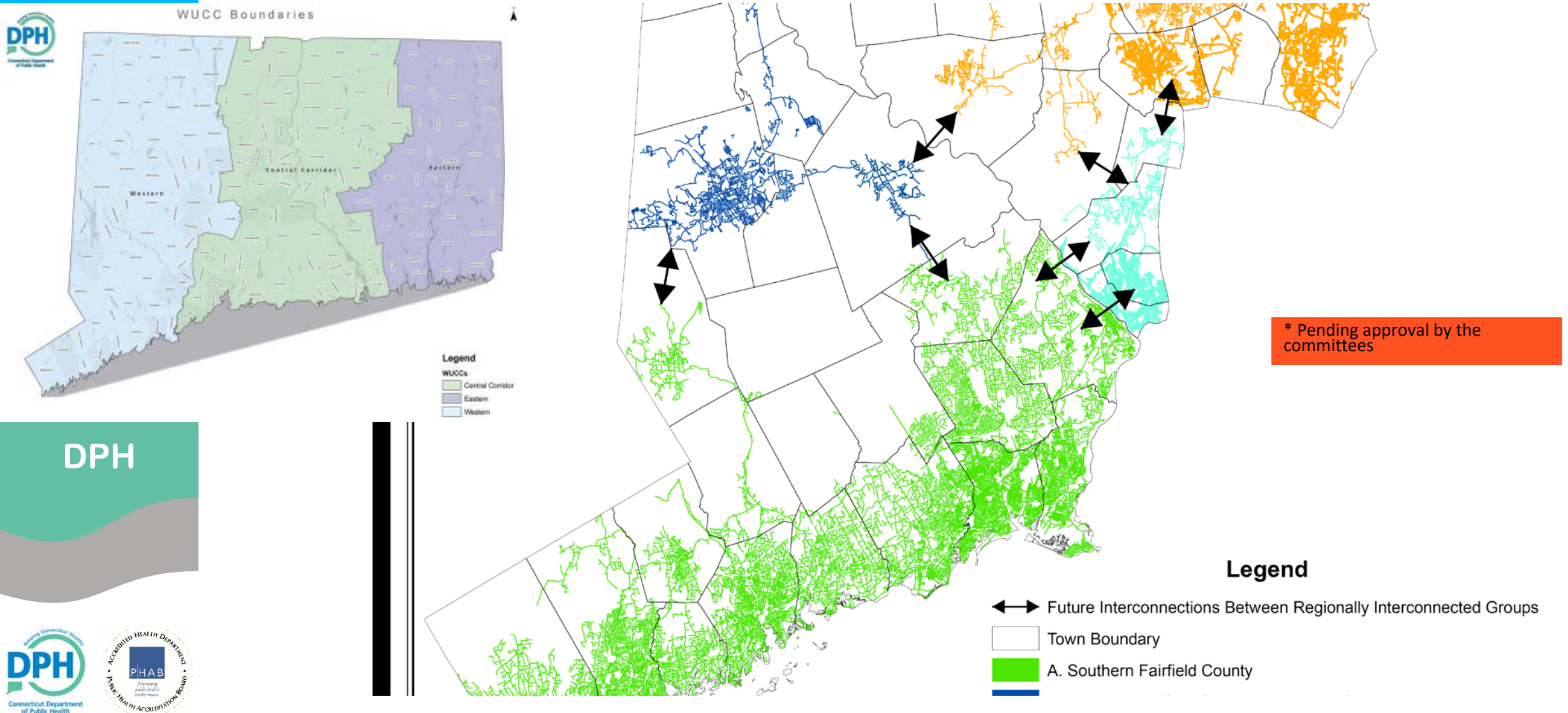
WUCC Process
Finalization

Statewide WUCC Plan

Priorities of Public
Drinking Water
Statewide

- Reports are posted on our website

- Water Utility Coordinated Committee (WUCC) Integrated Report drafts will be published for public review and comment in March.*



CIRCA Plan

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DWS has received a HUD Grant to develop a Drinking Water Vulnerability Assessment and Resiliency Plan.

December 21, 2016 DPH entered an agreement with UConn's Connecticut Institute of Resilience and Climate Adaptation (CIRCA) to help prepare the Plan.

A stakeholder workshop was held on April 6th, 2018.



CIRCA Plan

- Purpose
 - Following Storm Sandy in 2012,
 - DPH wished to assess and identify public water system vulnerabilities along the four southern counties
 - Improve resiliency of public water systems
 - Identify work items to improve resiliency
 - Recommend action items for water companies to initiate
 - Prepare an internal DPH DWS Emergency Response for DWS Staff preparation and training

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Recommendations

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Water Quality Challenges

- Unregulated contaminants
- Lead
- Manganese
- PFAS
- Legionella
- Etc, etc



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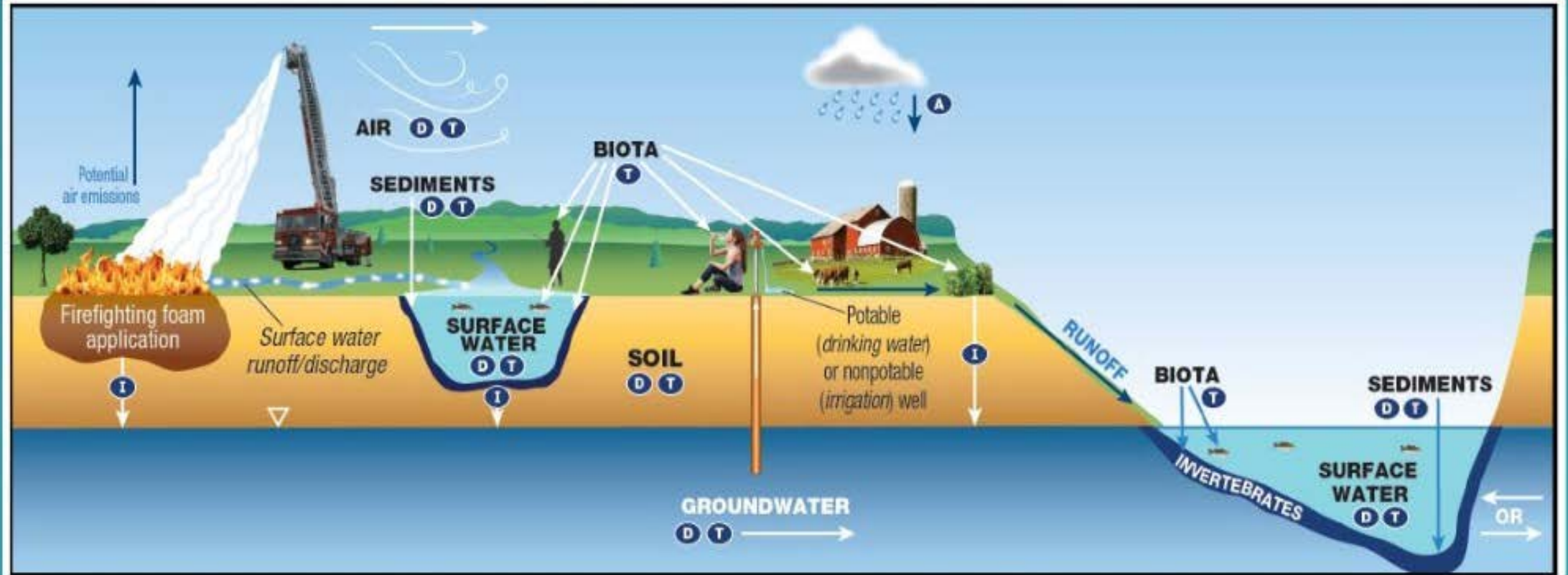
PFAS (Per- and polyfluoroalkyl substances)

- Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that includes PFOA, PFOS, GenX, and many other chemicals.
- PFAS have been manufactured and used in a variety of industries around the globe, including in the United States since the 1940s.
- PFOA and PFOS have been the most extensively produced and studied of these chemicals. Both chemicals are very persistent in the environment and in the human body – meaning they don't break down and they can accumulate over time.
- There is evidence that exposure to PFAS can lead to adverse human health effects.

PFAS – Fire Foam

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KEY **A** Atmospheric Deposition **D** Diffusion/Dispersion/Advection **I** Infiltration **T** Transformation of precursors (abiotic/biotic)

Figure 1. Conceptual site model for fire training areas.



PFAS – Waste Release & Disposal

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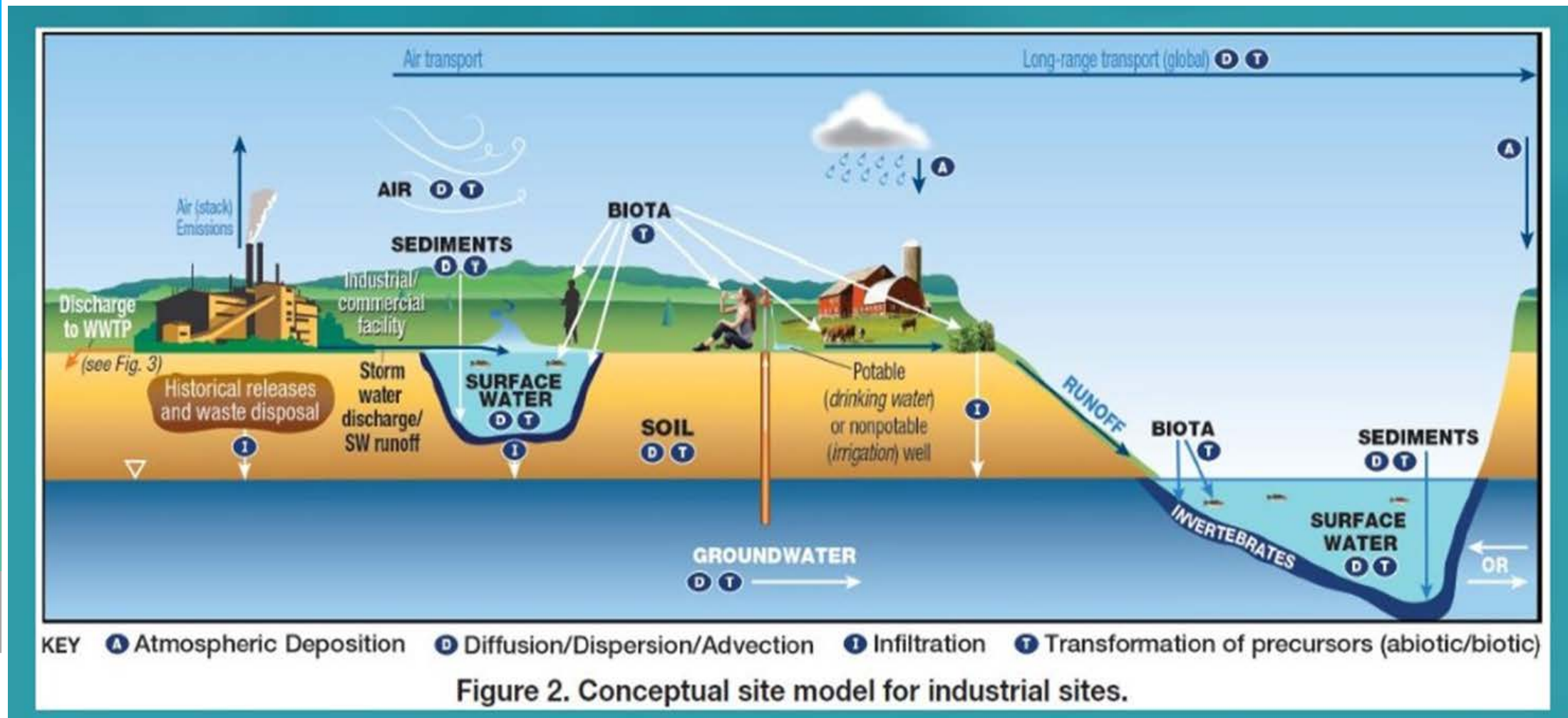


Figure 2. Conceptual site model for industrial sites.



PFAS - Landfill

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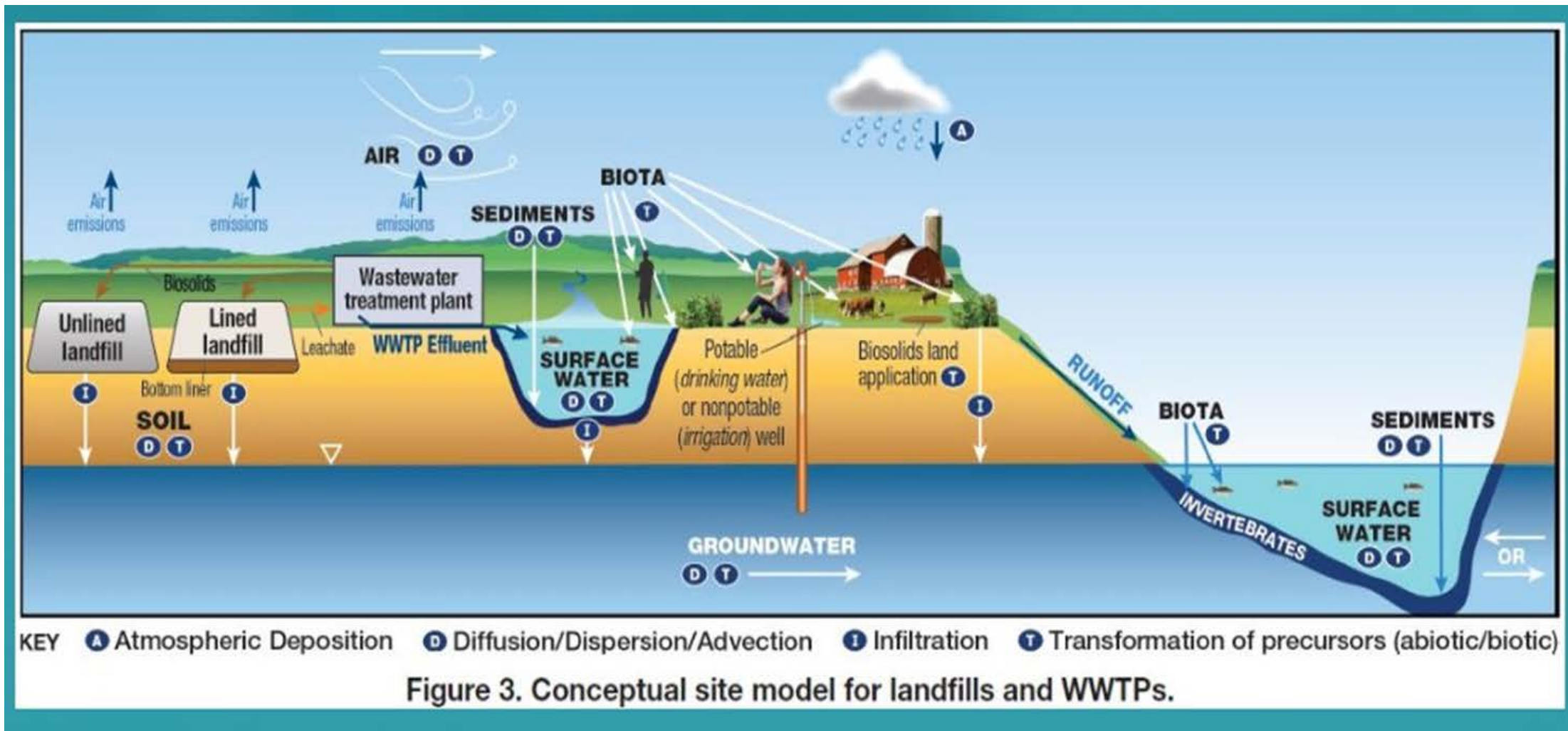


Figure 3. Conceptual site model for landfills and WWTPs.



Public Water System Resiliency

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- Climate change and extreme storms will represent an ongoing challenge and threat to public health protection
- Drinking water quality will continue to be challenged
- Aging system infrastructure, needed investment
- Number of sustainability challenged public water systems
- State Policy
- Focus on interconnection need and investment
- Protecting the existing and future sources of public drinking water



Thank you!

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