

A scenic view of a river flowing through a forest with autumn foliage. The river is the central focus, with water flowing over rocks and creating small rapids. The surrounding trees are in various shades of green and yellow, suggesting a late autumn setting. The overall atmosphere is peaceful and natural.

The Real Wild West:

How Riparianism Challenges Successful Flow and Water Level Development in the Eastern United States

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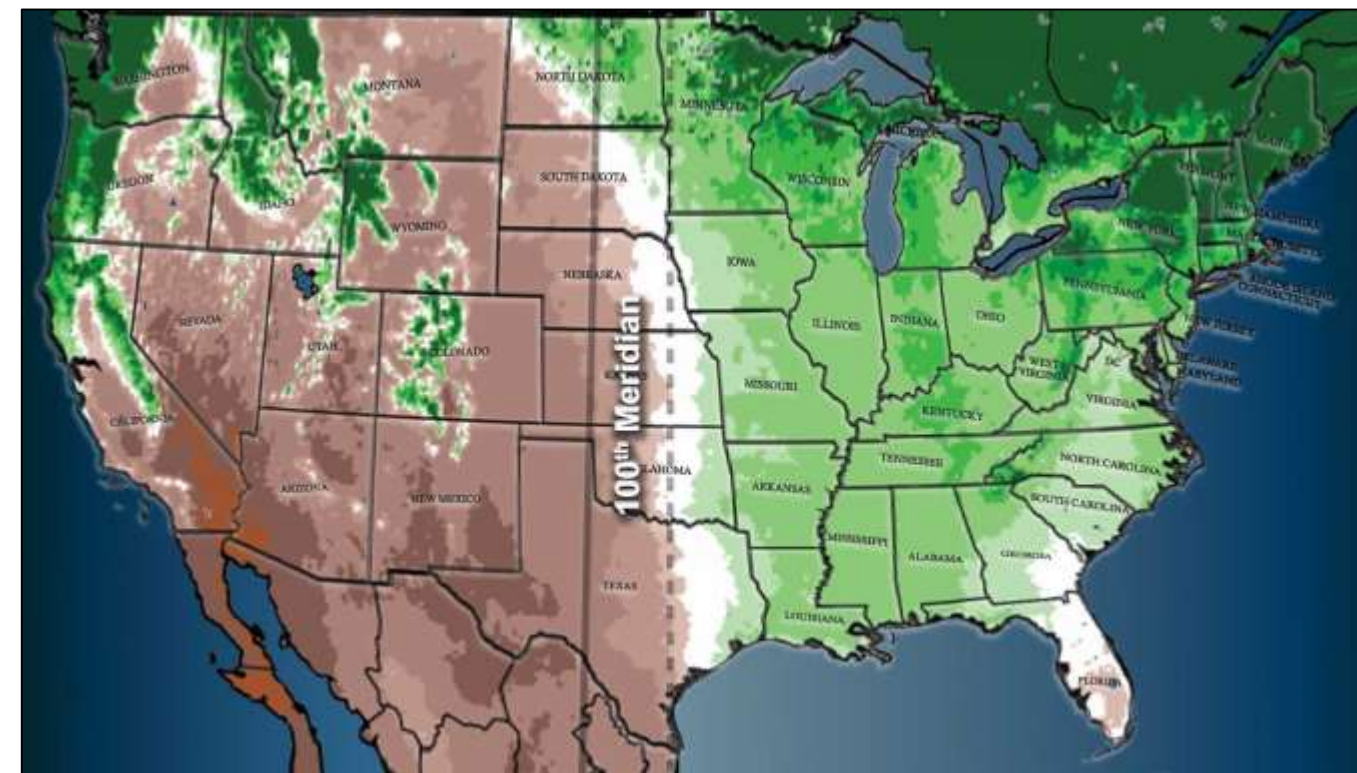
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Historically, riparian law is based on the premise of readily accessible water, yet conditions on the ground are changing

“A North American Climate Boundary Has Shifted 140 Miles East Due to Global Warming”



<https://e360.yale.edu/digest/a-north-american-climate-boundary-has-shifted-140-miles-east-due-to-global-warming>



Irrigation along the eastern shore of Maryland & Delaware

<http://www.delmarvanow.com/story/news/local/delaware/2014/07/02/drip-irrigation/12105845/>

Riparian law uses principles of unquantified “reasonable use” and natural flow for landowners next to a waterbody



Basics:

- Adjoining landowners have the right to make “reasonable use”
- Share and share alike (including in times of shortage)
- No export from basin

For groundwater law in the East, principles of “reasonable use” lead to regulation similar to the “law of capture”

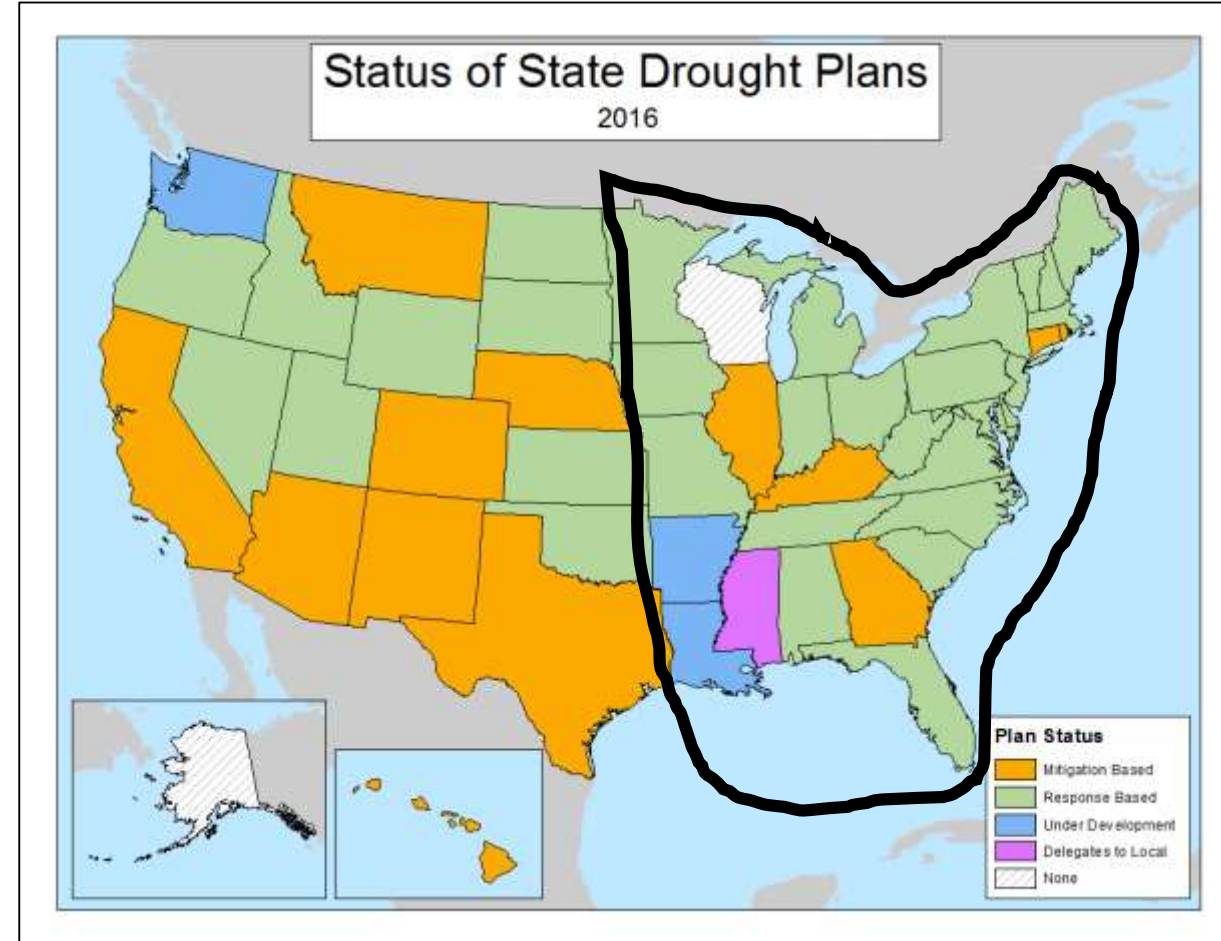


Source: Penn State Mont Alto

Consequently, most drought management in the eastern United States tends to be reactive, instead of proactive

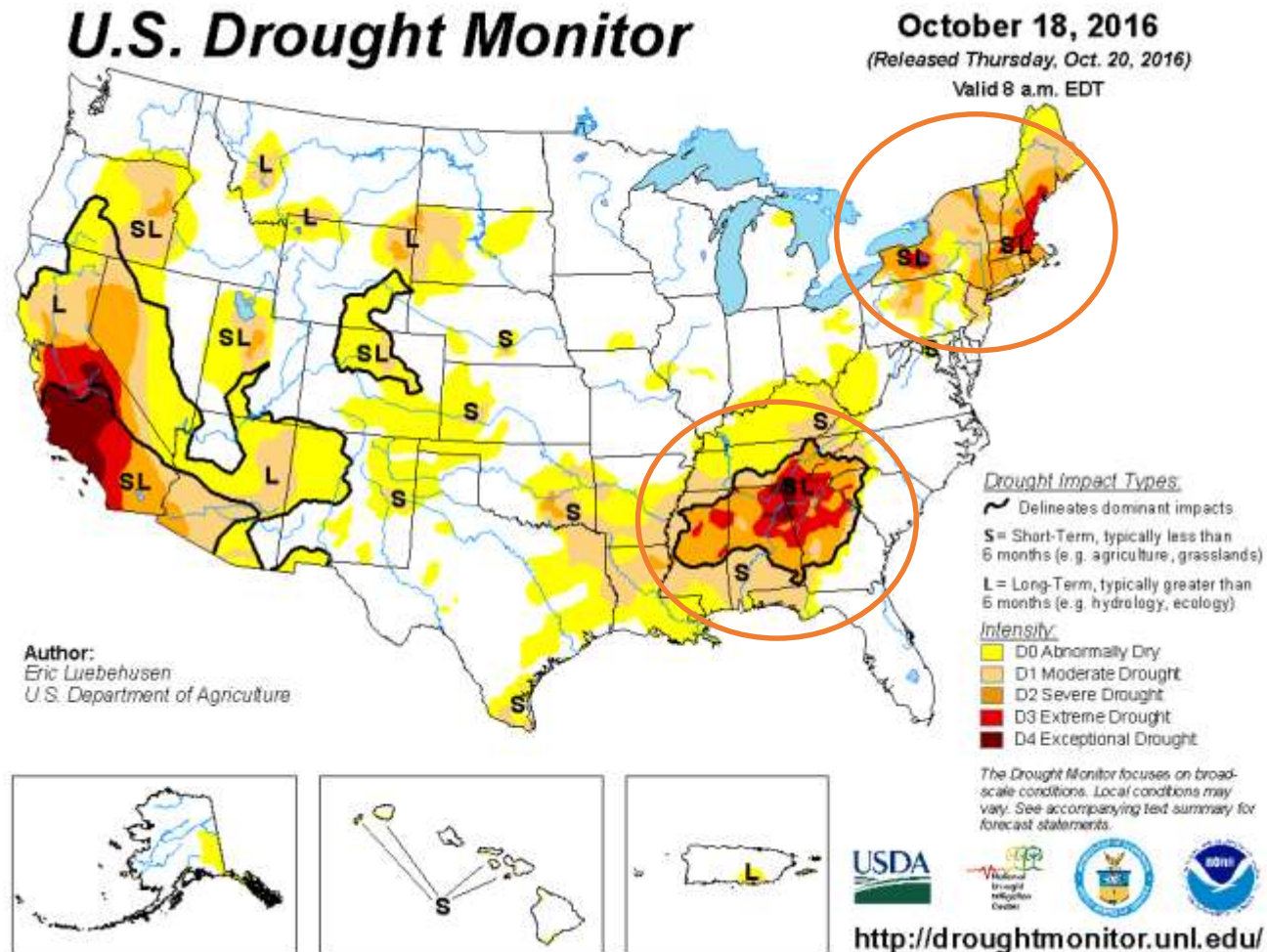


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<http://drought.unl.edu/archive/StateDroughtPlans/StatusMaps/2016.png>

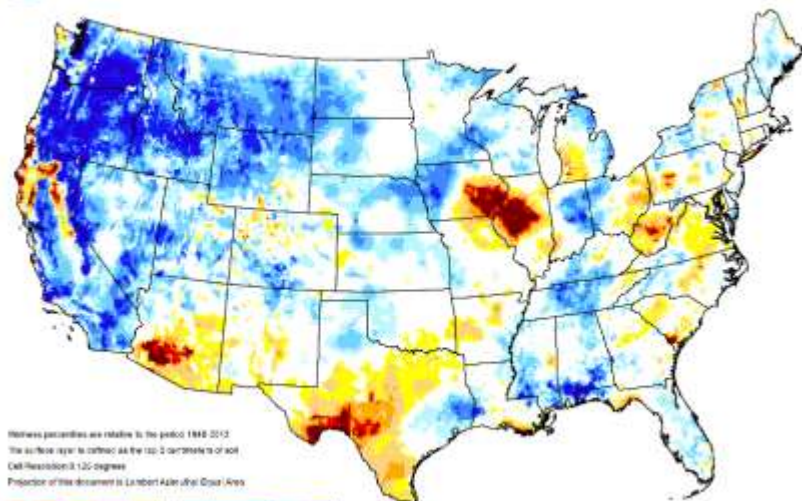
In particular, drought (both short and long term) challenges riparian frameworks to manage water flows and levels in an array of waterbodies





GRACE-Based Surface Soil Moisture Drought Indicator

September 18, 2017



Wetness percentiles are relative to the period 1992-2012.
The surface layer is defined as the top 2 centimeters of soil.
Cell Resolution is 1/2 degree.
Projection of this document is Lambert Azimuthal Equal Area.

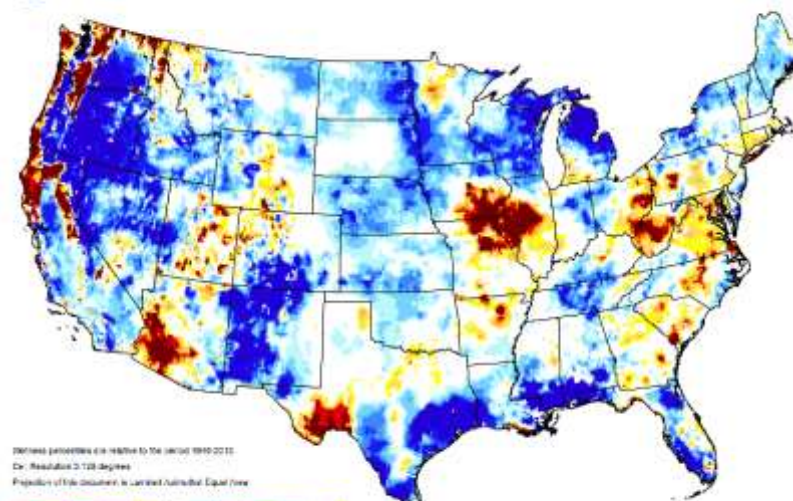


<http://nasagrace.unl.edu>



GRACE-Based Shallow Groundwater Drought Indicator

September 18, 2017



Wetness percentiles are relative to the period 1992-2012.
Cell Resolution is 1/2 degree.
Projection of this document is Lambert Azimuthal Equal Area.

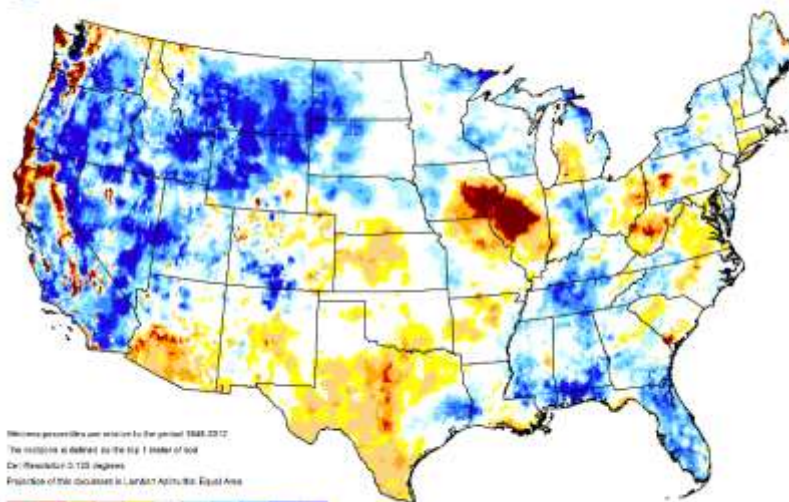


<http://nasagrace.unl.edu>



GRACE-Based Root Zone Soil Moisture Drought Indicator

September 18, 2017

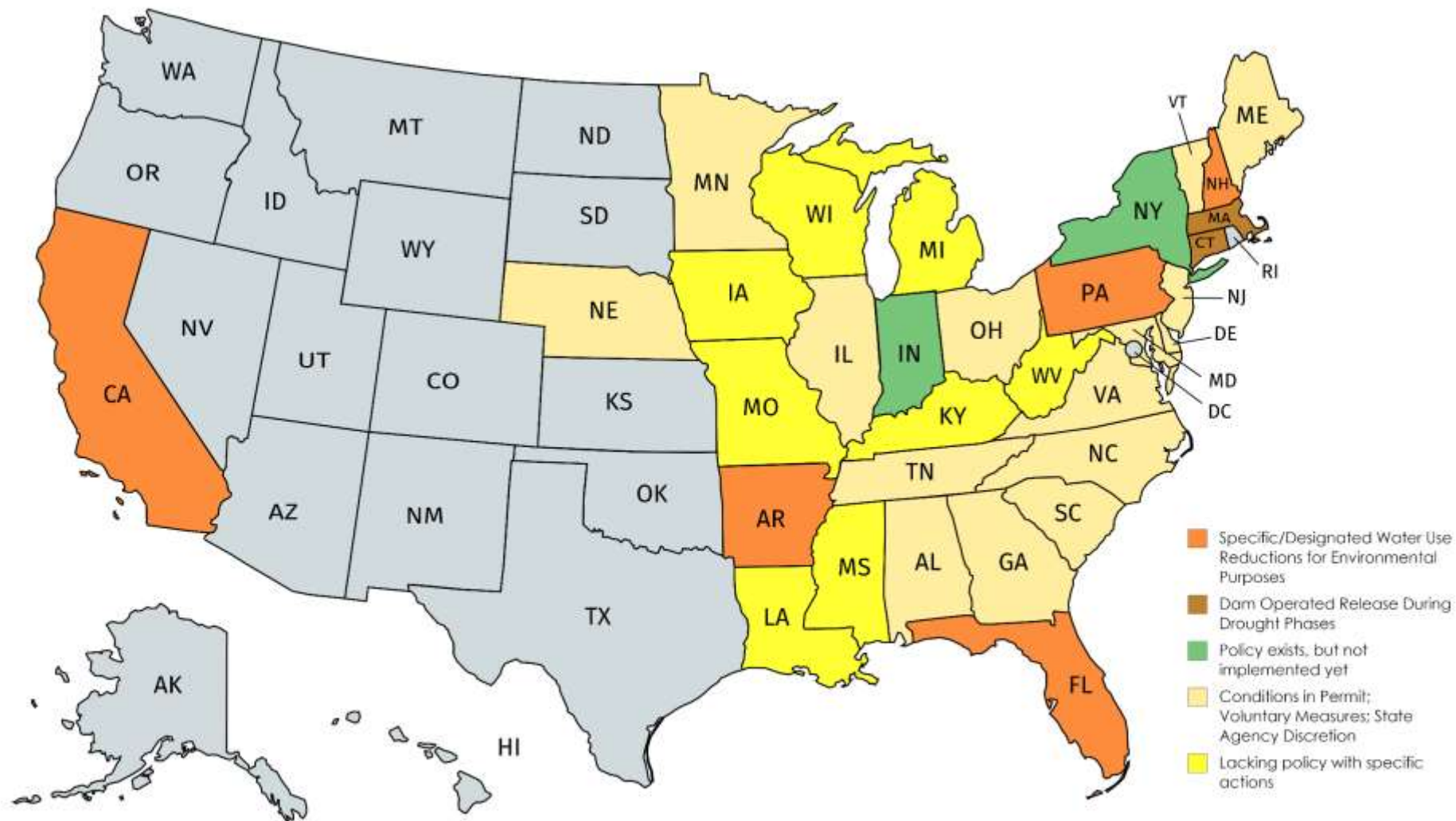


Wetness percentiles are relative to the period 1992-2012.
The root zone is defined as the top 1 meter of soil.
Cell Resolution is 1/2 degree.
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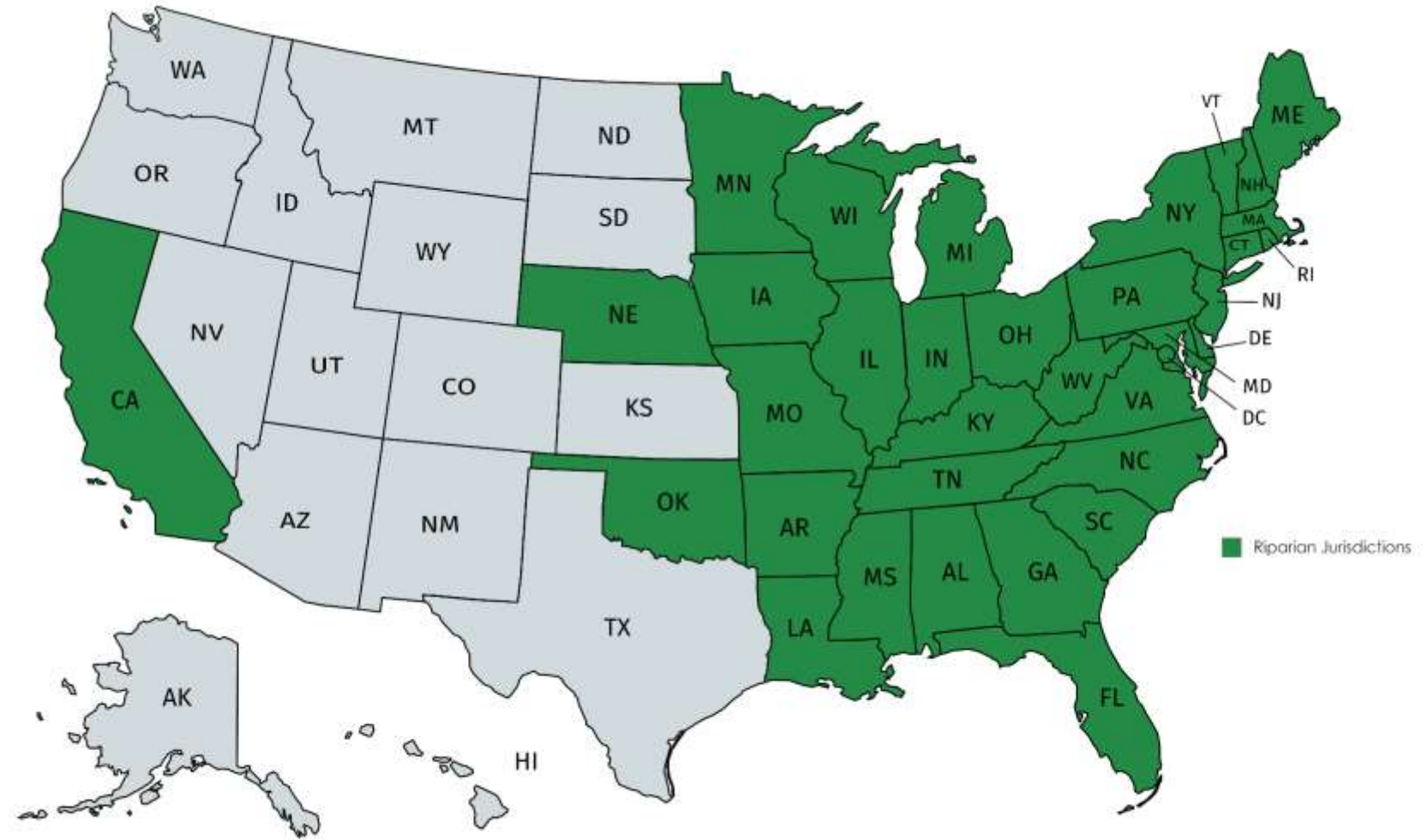


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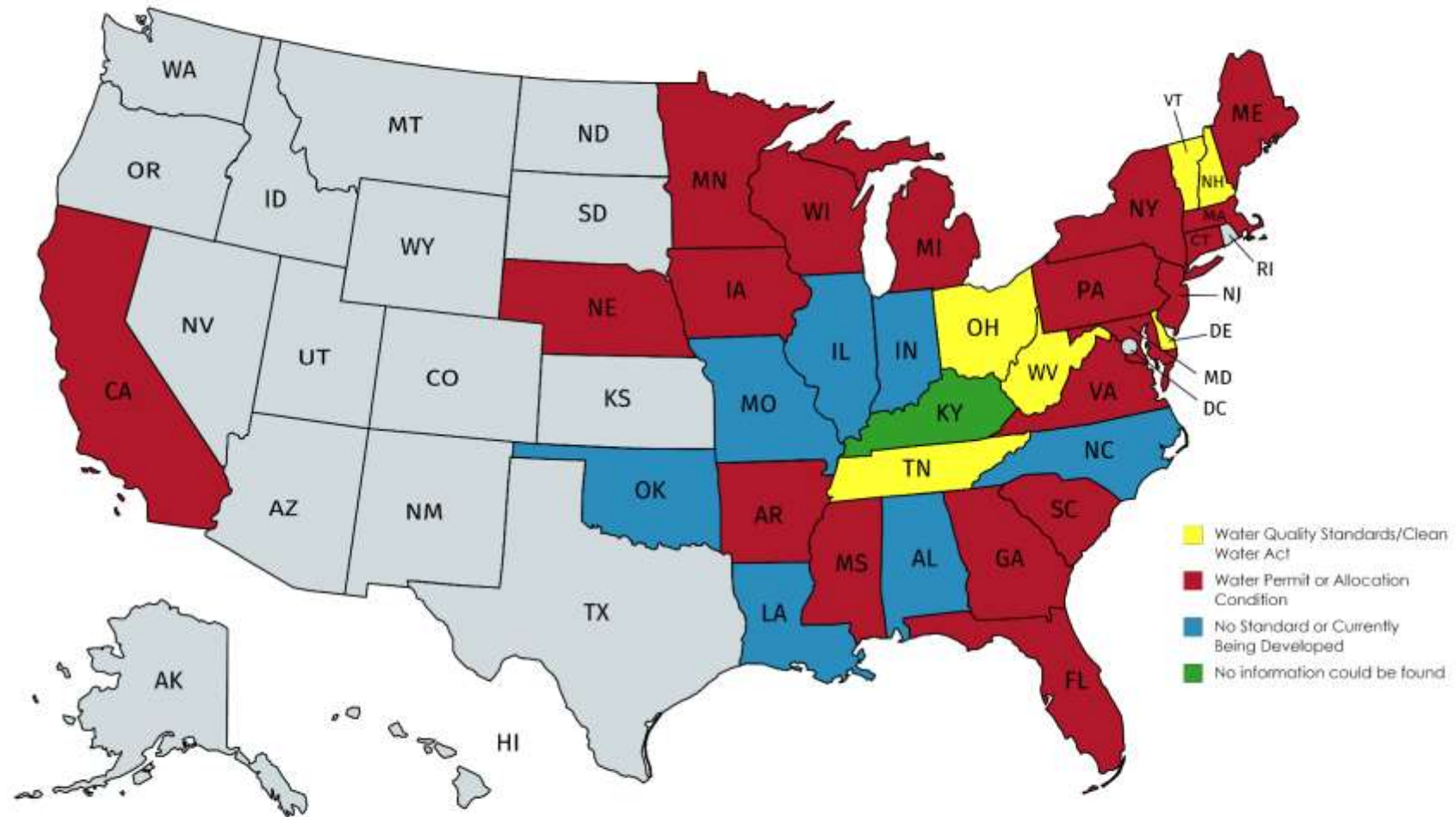
With respect to drought, **most** policies in place rely on voluntary measures to reduce water use and give human needs highest priority



For surface water regulation, riparian law is used predominately in the eastern United States



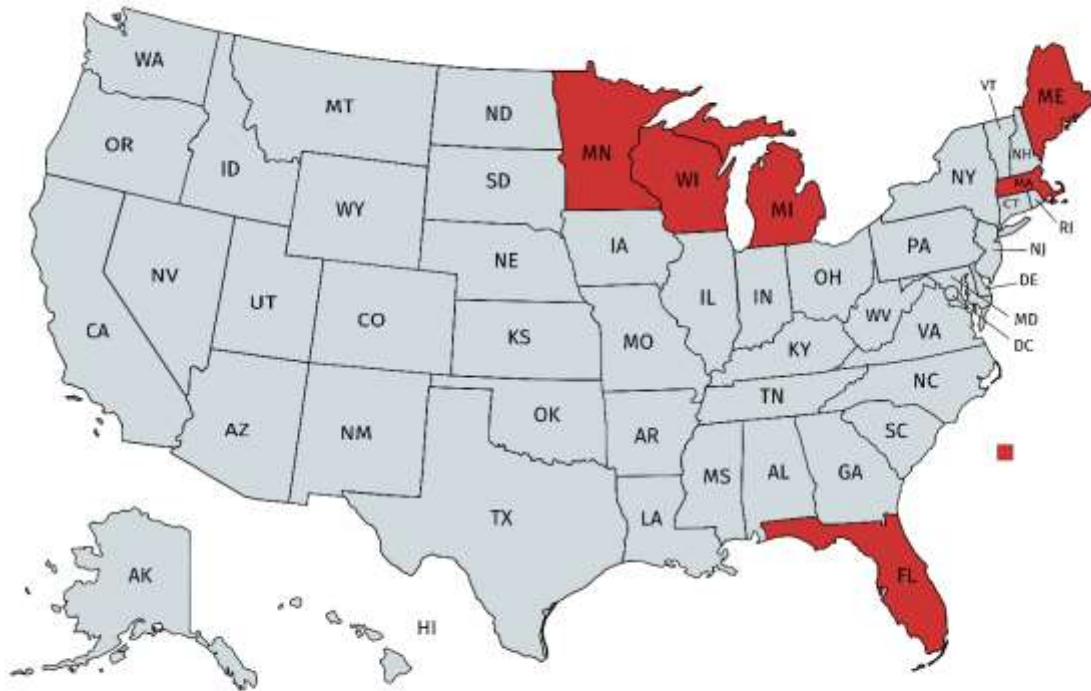
Under riparian law, instream flows are protected primarily through water quality standards, permit conditions, or a combination of both



A scenic view of a river flowing through a forest with autumn foliage. The river is rocky and has a small waterfall or rapids in the distance. A person is standing in the river in the distance. The text "CASE STUDIES" is overlaid in the center of the image.

CASE STUDIES

A number of riparian states have policies in place to manage water levels in lakes for ecological purposes



- WI is currently undertaking a 4 year study on the impact of climate and groundwater use on lake levels
- FL sets minimum levels for lakes to maintain ecological integrity
- ME mandates designated levels in lakes for biological reasons, such as fish life cycles

State codes have addressed minimum levels in lakes or ponds

2017 Minnesota Statutes

103G.285 SURFACE WATER APPROPRIATIONS.

Subdivision 1. **Waiver.** The commissioner may waive a limitation or requirement in subdivisions 2 to 6 for just cause.

Subd. 2. **Natural and altered natural watercourses.** If data are available, permits to appropriate water from natural and altered natural watercourses must be limited so that consumptive appropriations are not made from the watercourses during periods of specified low flows. The purpose of the limit is to safeguard water availability for in-stream uses and for downstream higher priority users located reasonably near the site of appropriation.

Subd. 3. **Water basins.** (a) Permits to appropriate water from water basins must be limited so that the collective annual withdrawals do not exceed a total volume of water amounting to one-half acre-foot per acre of water basin based on Minnesota Department of Conservation Bulletin No. 25, "An Inventory of Minnesota Lakes," published in 1968.

(b) As a condition to a surface water appropriation permit, the commissioner shall set a protective elevation for the water basin, below which an appropriation is not allowed. During the determination of the protective elevation, the commissioner shall consider:

- (1) the elevation of important aquatic vegetation characteristics related to fish and wildlife habitat;
- (2) existing uses of the water basin by the public and riparian landowners; and
- (3) the total volume within the water basin and the slope of the littoral zone.

Subd. 4. **Water basins less than 500 acres.** As part of an application for appropriation of water from a water basin less than 500 acres in surface area, the applicant shall obtain a statement of support with as many signatures as the applicant can obtain from property owners with property riparian to the water basin. The statement of support must:

- (1) state support for the proposed appropriation; and
- (2) show the number of property owners whose signatures the applicant could not obtain.

Subd. 5. **Trout streams.** Permits issued after June 3, 1977, to appropriate water from streams designated trout streams by the commissioner's orders under section [97C.005](#) must be limited to temporary appropriations.

Subd. 6. **Contingency planning.** An application for use of surface waters of the state is not complete until the applicant submits, as part of the application, a contingency plan that describes the alternatives the applicant will use if further appropriation is restricted due to the flow of the stream or the level of a water basin. A surface water appropriation may not be allowed unless the contingency plan is feasible or the permittee agrees to withstand the results of not being able to appropriate water.

History: [1990 c 391 art 7 s 30](#); [2010 c 361 art 4 s 54](#)

6. **Water level requirements for Class GPA waters.** Except as provided for in this section, water levels of Class GPA waters shall be maintained as they naturally occur. Withdrawal or other direct or indirect removal, diversion, activity or use of these waters that causes the natural water level to be altered shall occur as provided in paragraph 6-A below.

A. **Water level established by standard allowable alteration.** Water levels in Class GPA waters may not be less than the levels defined in subparagraphs [A\(1-3\)](#) below, except when natural conditions alone cause those levels to be less, or where the Commissioner has determined, as established in sections 7 or 8 of this chapter, that site-specific water levels may be established that are protective of all water quality standards, including all designated uses and characteristics of those waters.

(1) **Class GPA waters without a natural surface water outlet.** Water levels must be maintained within the seasonal levels listed below, unless as a naturally occurring condition:

- (a) within 1.0 foot of the normal high water from April 1 to July 31; and,
- (b) within 2.0 feet of the normal high water from August 1 until March 31.

(2) **Class GPA waters with a natural surface water outlet, including beaver dams.** Water level must be maintained within the seasonal levels listed below, unless as a naturally occurring condition:

- (a) within 1.0 foot of normal high water from April 1 to July 31; and,
- (b) within 2.0 feet of normal high water from August 1 to March 31.

Flow in the outlet stream must be sufficient to maintain seasonal aquatic base flow, as defined in sections 4, 5, 7, or 8 of this chapter with adjustment for evaporation loss from the Class GPA water, or the natural inflow minus evaporation, whichever is less.

Minimum Flows and Minimum Water Levels (MFLs)

Florida's fresh water sources, including rivers, streams, lakes, springs, wetlands and aquifers, have intrinsic economic, ecological and aesthetic value. Each water body needs a certain amount of water to properly function and retain its value. For example, Florida's springs are important warm water refuges for the endangered West Indian manatee during the winter. The rivers connecting the springs to the sea must maintain certain depths and widths in order for manatees to be able to pass through during colder months. Scientists study each unique water system, assess the water resource values associated with the system (such as kayaking, fishing or manatee passage), and identify the minimum flow or level that must be maintained to protect those resource values.

It is possible for consumptive use to lower the flows and levels of water bodies to a point that the resource values are significantly harmed. To prevent this harm, the districts are responsible for identifying and establishing the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. This limit is the minimum flow or minimum level. MFLs must be established consistent with section 373.042, F.S., and Rule 62-40.473, F.A.C.

A map of all of the adopted MFLs in the state is available [here](#).



WHAT ABOUT FLOWS?

In Arkansas, the Natural Resources Commission has the statutory power to allocate water during shortages for certain purposes, amounting to an “adjudication”

Hunting Camp/Farmer Local Agreement Example

In times of shortage, priority given to:

- Agriculture
- Industry
- **Minimum Streamflows**
- And so on.....



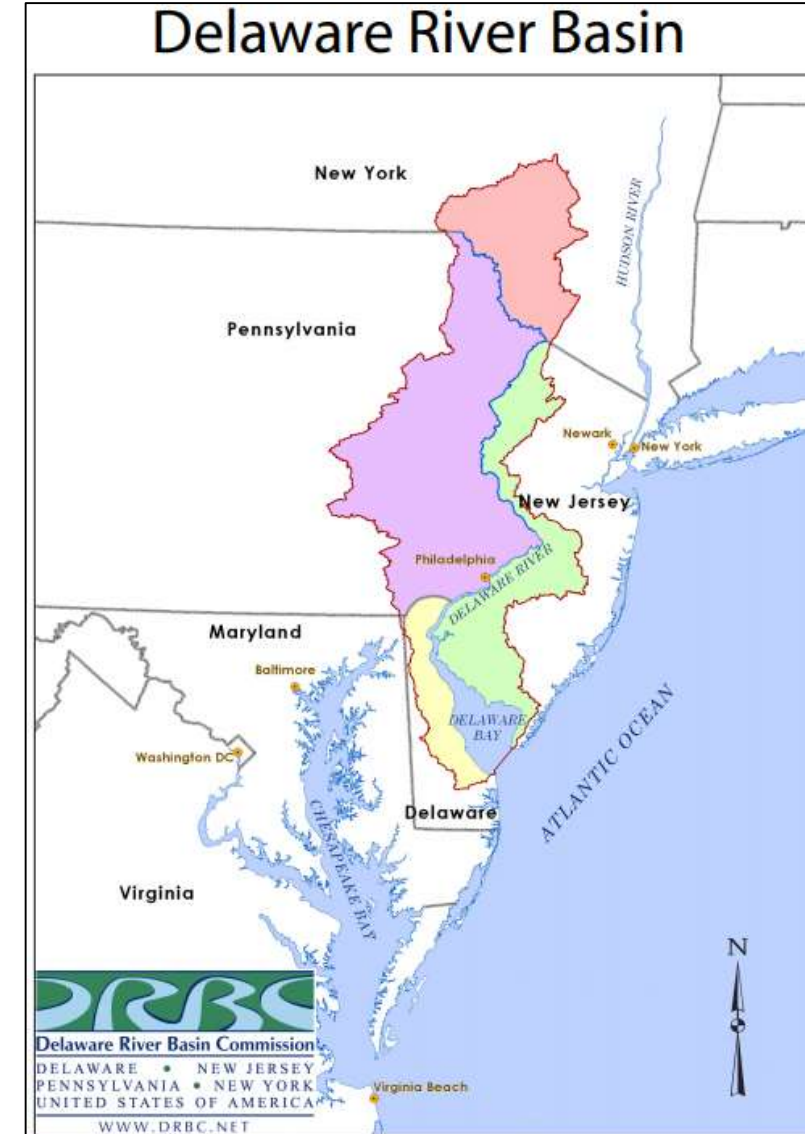
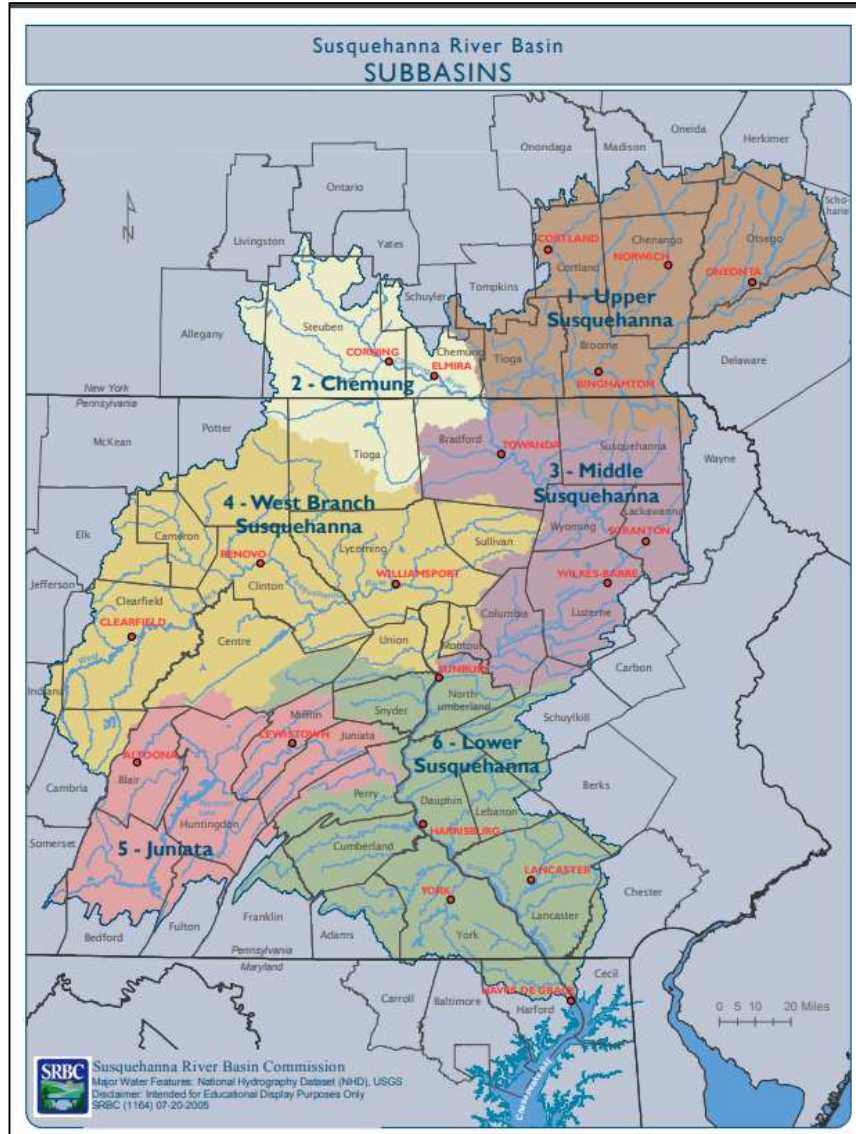
Source: Public Domain, Pixabay

and



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In the Mid-Atlantic region, river basin commissions (federal interstate agencies) have developed flexible flow management for drought periods



River basin commissions are federal interstate agencies in which each partner (state) shares equal responsibility for managing the river and its watershed

- Permitting authority
- Data collection
- Protected area designations
- Enforcement
- Quantity and quality
- Formed from compacts



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The Delaware River Basin Commission has a broad array of tools to preserve flows in the entire Delaware River watershed, such as a flexible flow management program

DRBC Supports the Decree Parties' 10-Year Extension of the Flexible Flow Management Program

For Immediate Release

October 26, 2017

(West Trenton, N.J.) -- The Delaware River Basin Commission (DRBC) today recognized with appreciation the new 10-year, two-part Flexible Flow Management Program (FFMP) that was unanimously approved by the parties to the 1954 U.S. Supreme Court Decree, which are the basin states of Delaware, New Jersey, New York, and Pennsylvania and the City of New York (NYC) (the decree parties).

"This new agreement helps to balance the water supply needs of the four basin states and NYC," said DRBC Executive Director Steve Tambini. "At the same time, the agreement continues to evolve to better protect aquatic life, enhance flood mitigation and recreation, manage droughts, and repel the upstream migration of salty ocean water into the Delaware Estuary during periods of low river flow."

The new agreement guides the releases of water from New York City's Neversink, Pepacton, and Cannonsville reservoirs, flow objectives in the main stem Delaware River, and out of basin diversions by New York City and New Jersey. The most recent iteration of the agreement expired in May. Since then, the decree parties have negotiated the new agreement using updated forecasting tools and data.

"We are proud to have furnished the decree parties with expert modeling and technical support, along with the staff level coordination needed for informed decision-making. Members of the DRBC staff worked hard to ensure the parties had the best possible information as they developed this new plan," said Tambini.

The decree parties were also supported by the DRBC's Regulated Flow Advisory Committee (RFAC), a DRBC technical working committee focused on flow management that provides a vehicle for public input to the decree parties. Many of the changes in the 2017 FFMP were made in response to constructive public input obtained through the RFAC process.

"As the agreement enters the implementation stage, DRBC staff will continue to offer its technical expertise and RFAC process to support and advise the decrees parties as they consider ways to continue to adapt and improve relevant water resource management within the Delaware River Basin," said Tambini.

The DRBC is a federal/interstate government agency responsible for managing the water resources within the Delaware River Basin without regard to political boundaries. The five commission members are the governors of the basin states (Delaware, New Jersey, New York, and Pennsylvania) and the commander of the U.S. Army Corps of Engineers' North Atlantic Division, who represents the federal government.

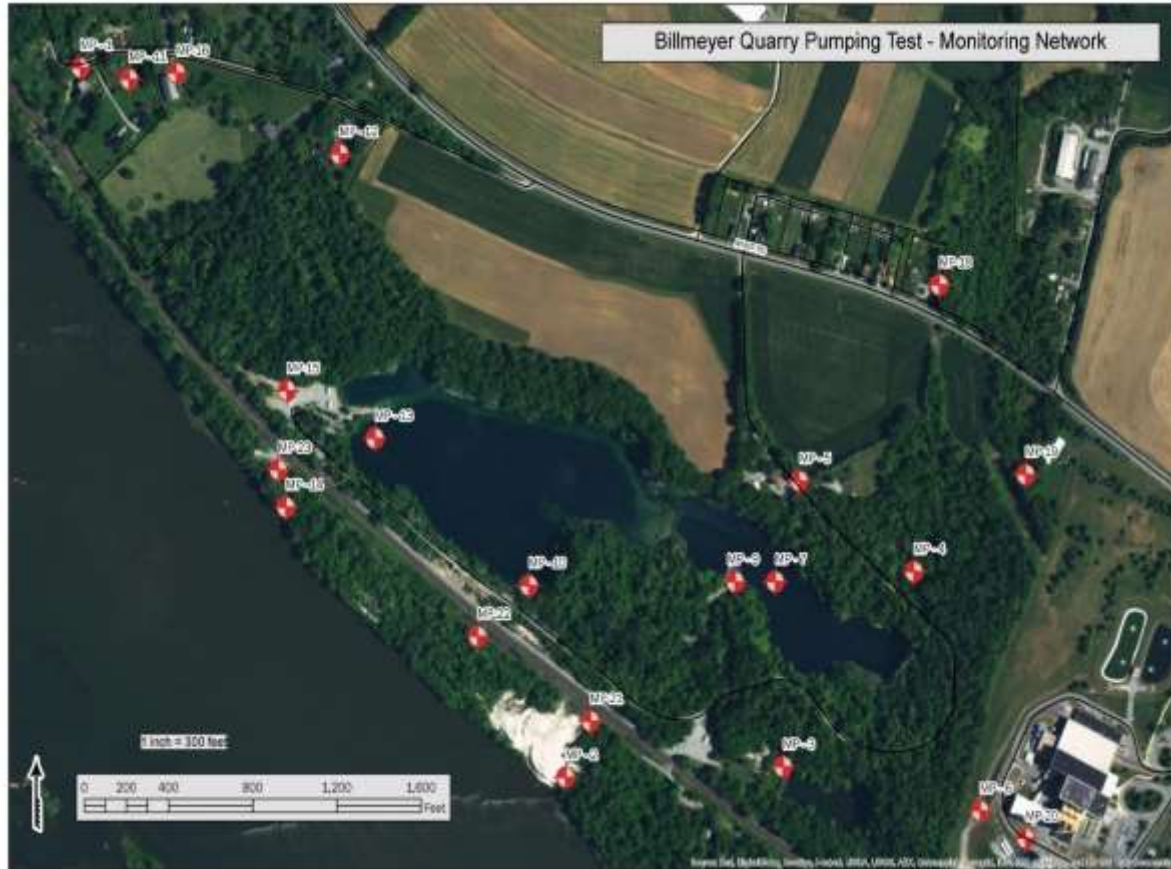
More Information

Office of the Delaware River Master

[Flexible Flow Mgmt. Highlights](#)

- Maintenance of tailwater habitat protection for trout
- Drought stages lead to specified and quantified releases throughout basin to maintain flow; salt line
- State-of-the-art forecasting and data collection used to determine flow balance

Similarly, the Susquehanna River Basin Commission has explored new ways to augment low flows, such as use of old quarry sites in drought times



© Susquehanna River Basin Commission

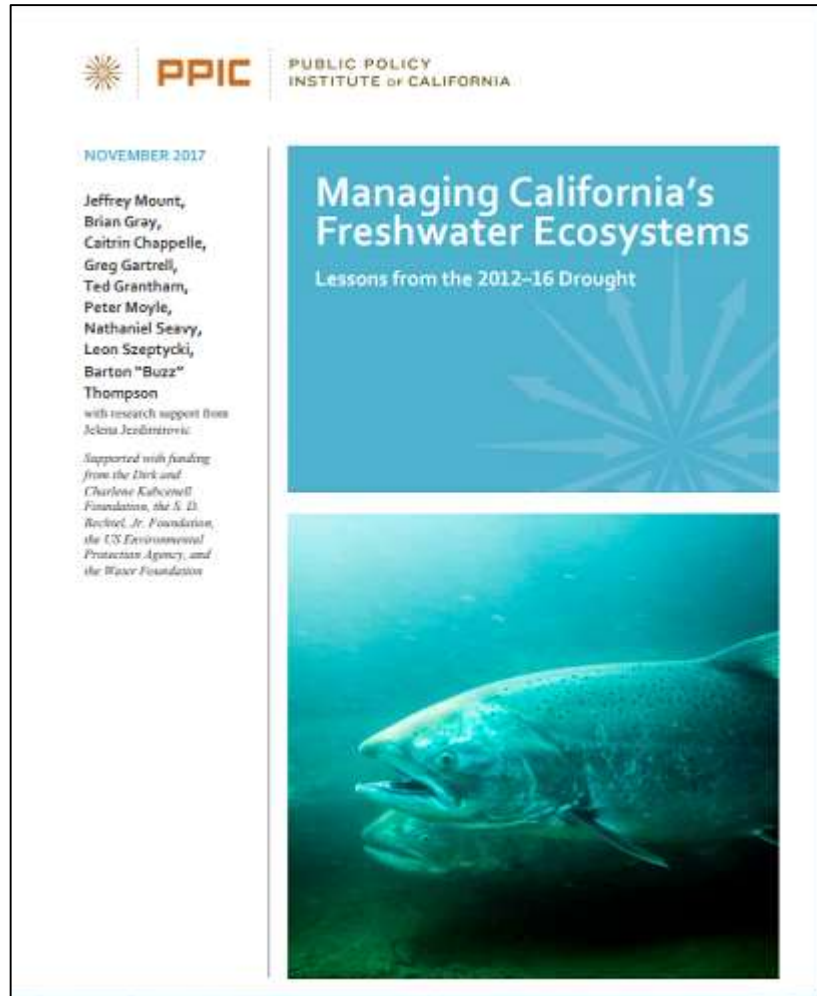


© Susquehanna River Basin Commission

Highlights:

- Water quality tests completed, monitoring network installed, aquifer tests, pumping tests proved no negative impacts, about 4 million available gal/day for low flow

As a result of the recent five-year drought in California, three areas of reform have been suggested for law and policy to address future drought periods



- 1) Water accounting improvement
- 2) Watershed level plans setting ecosystem priorities and identifying tradeoffs
- 3) Ecosystem water budget

What can we learn by looking at all these states?

- Manage **lake levels** around the concept of **ecological integrity**, coupled with **models and good data**;
- **Success** shown through river basin commissions maintaining flows through **reservoir operations, water user control, & creativity**; and
- **Advanced planning** based on ecosystem operating needs and accurate water use accounting is vital.



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Sulphur fly hatch, Fisherman's Paradise, Spring Creek, PA

Questions?

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