



Watersheds-at-risk Analysis as a Guide for Ground Water Management

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Outline

- 1) Review of regulations governing ground water withdrawals.
- 2) Watersheds-at-risk analysis.
- 3) Work Group recommendations

Review of regulations

Public Law 2005 Chapter 452

- Stakeholder process
- Ensure a consistent, integrated and scientifically sound water withdrawal policy.
- Review existing geological, hydrogeological information in order to ensure that withdrawal of ground water does not have an undue adverse effect on waters of the State.

Review of regulations

Public Law 2005 Chapter 452

- Identify and assess criteria that should influence whether and how the State regulates or otherwise manages withdrawal of groundwater
- Assess the projected costs to the State and to applicants for withdrawal of groundwater for complying with any changes in state law

Stakeholder participants

State agencies

Water utilities

Municipalities

Farmers/Aquaculture

Consultants

Legislature

Water bottlers

Attorneys

Environmental organizations

Watershed-at-Risk Analysis

- Part of an effort to better define the problem of unsustainable use of water resources.
- Made possible by public investments in important datasets and analyses.
 - Digital watersheds
 - Flow monitoring and regional regression equations
 - Water-use reporting
 - Long-term precipitation records

Watershed-at-Risk Analysis

Assumptions

- Long-term average water resource available within a watershed is equal to the long-term average annual runoff from the watershed.
 - Annual runoff = annual precipitation - evapotranspiration

Watershed-at-Risk Analysis

Assumptions

- Net runoff must supply minimum in-stream flow requirements.
- Analysis includes both surface and ground water.
- Does not consider cumulative in-stream flow from upstream watersheds

Watershed-at-Risk Analysis

Data Sources

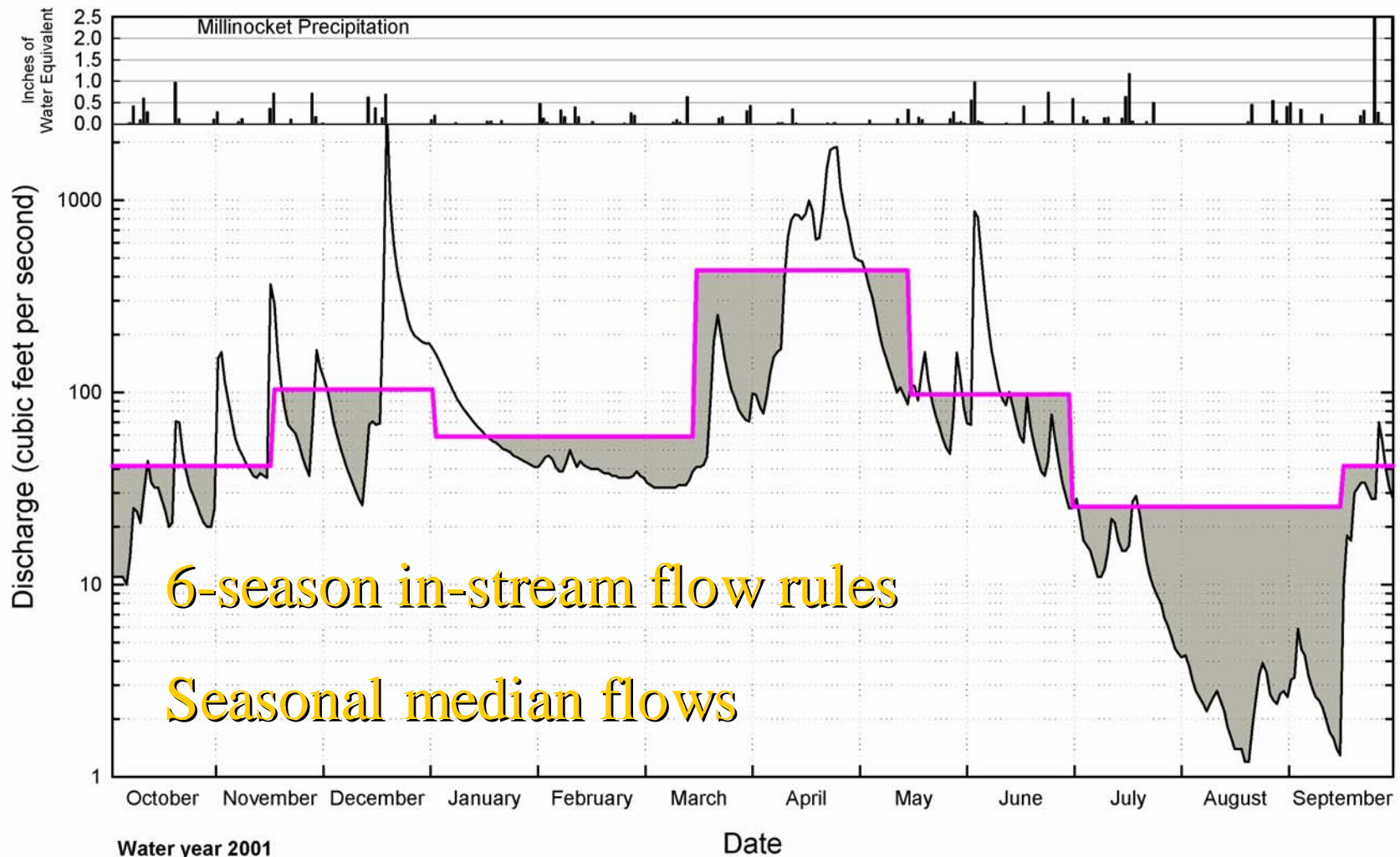
- NRCS 12-digit HUCS, digital.
- Long-term average annual runoff (Dudley, 2004).
 - $Q_{\text{ann}} = 1.151(A^{0.991})(10^{0.023*\text{pptW}})$
 - Q_{ann} is the annual runoff in cubic feet per second
 - A is the watershed area in square miles
 - pptW is the mean winter precipitation in inches of water

Watershed-at-Risk Analysis

Data Sources

- The minimum required in-stream flow for a watershed was initially estimated from regional regression equations for monthly median flows developed by the US Geological Survey (Dudley, 2004) and cited in the provisional in-stream flow rules adopted by the BEP.

Kingsbury Stream near Abbot Village

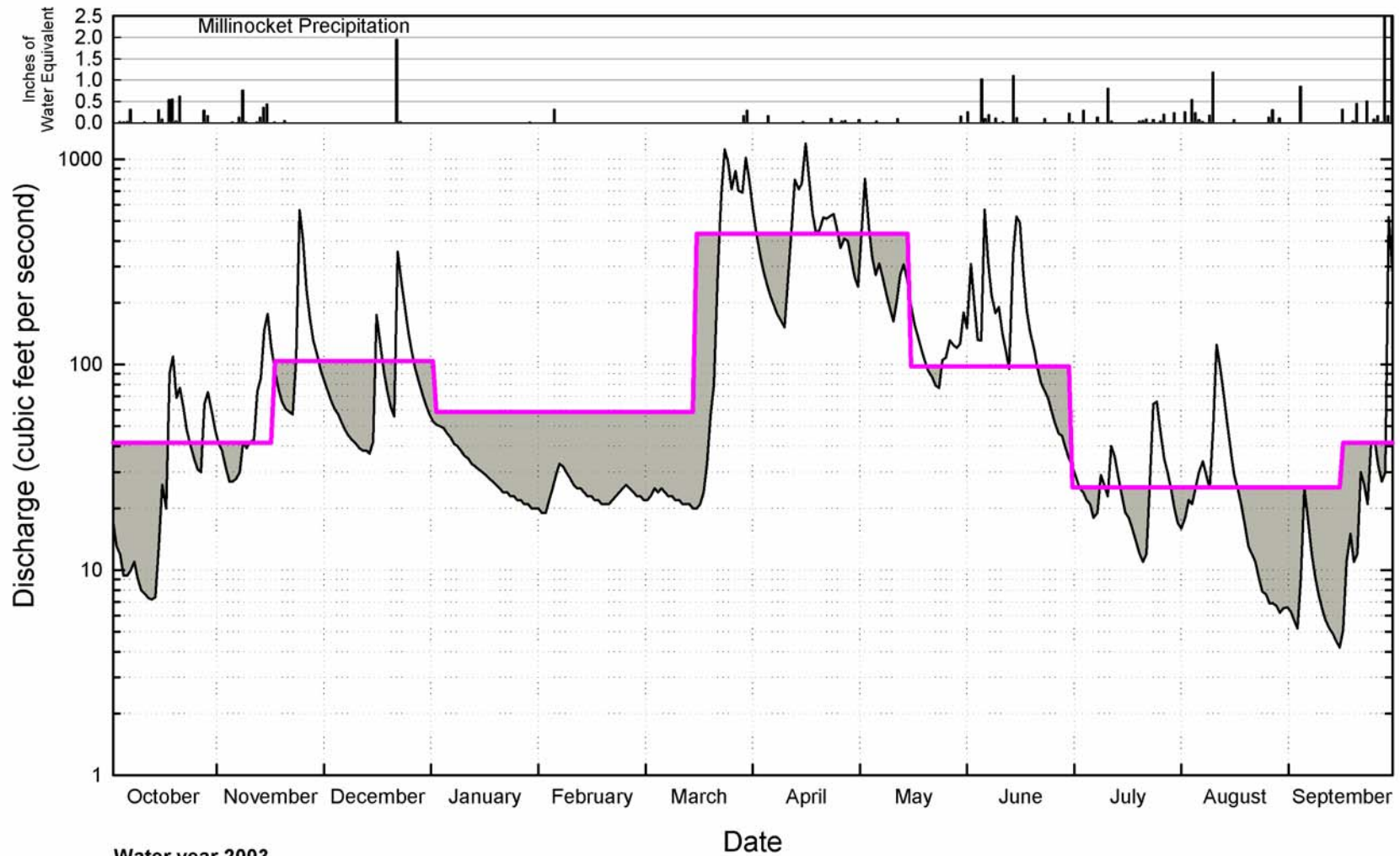


6-season in-stream flow rules

Seasonal median flows

Water year 2001
Drainage area: 94.5 sq mi
Mean annual precipitation: 45.9 inches
Fraction aquifer: 0.008
Distance from coast: 106 mi
Withdrawal thresholds: from Dudley (2003)

Kingsbury Stream near Abbot Village



Water year 2003

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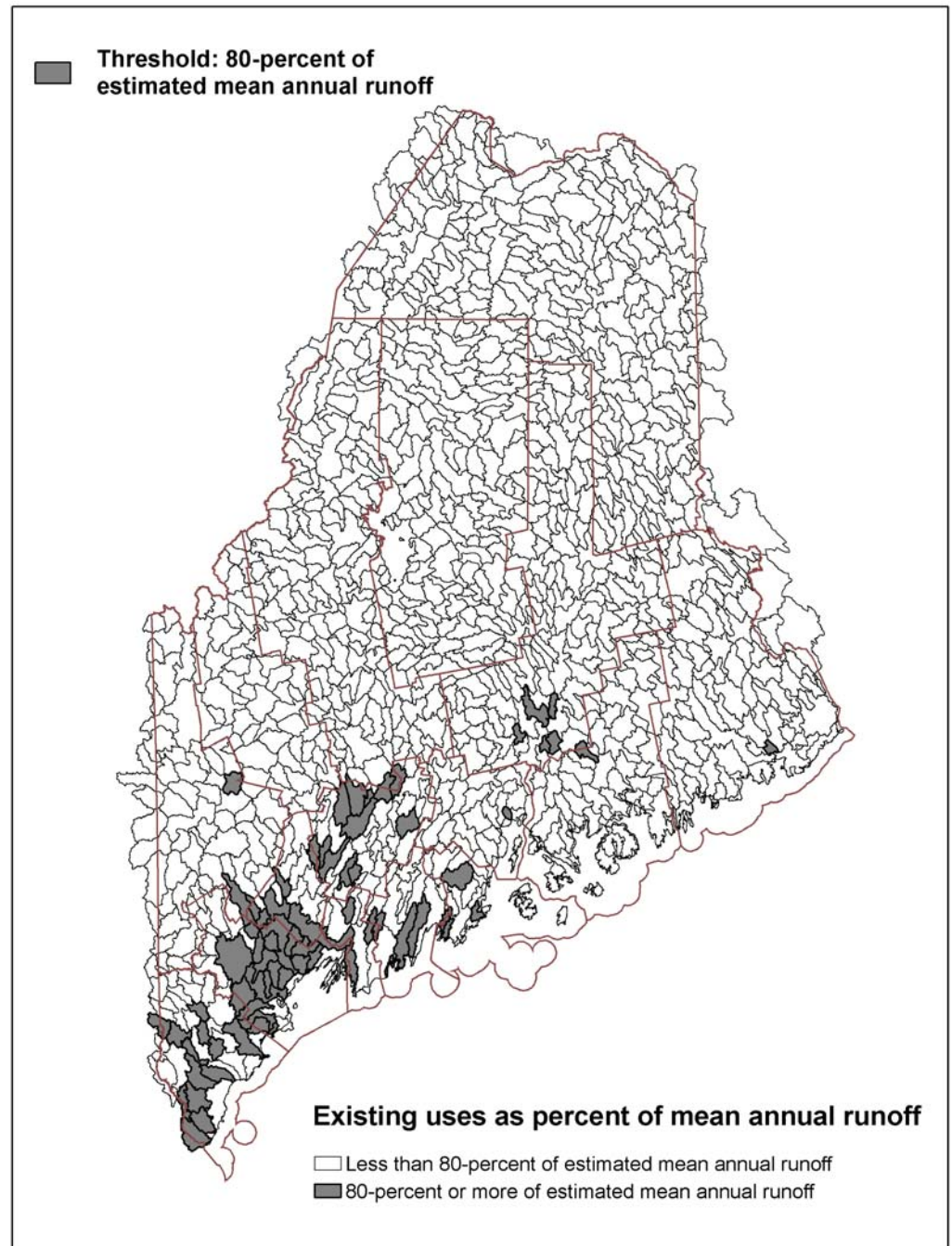
Watershed-at-Risk Analysis

Data Sources

- Consumptive water uses
 - Public water supply withdrawals (PUC).
 - Reported water use by other major water users.
 - Estimates of withdrawals by smaller water users regulated by the DWP.
 - Agricultural water withdrawals reported to DAFRR
 - Private domestic water use estimated from 1990 and 2000 Census data

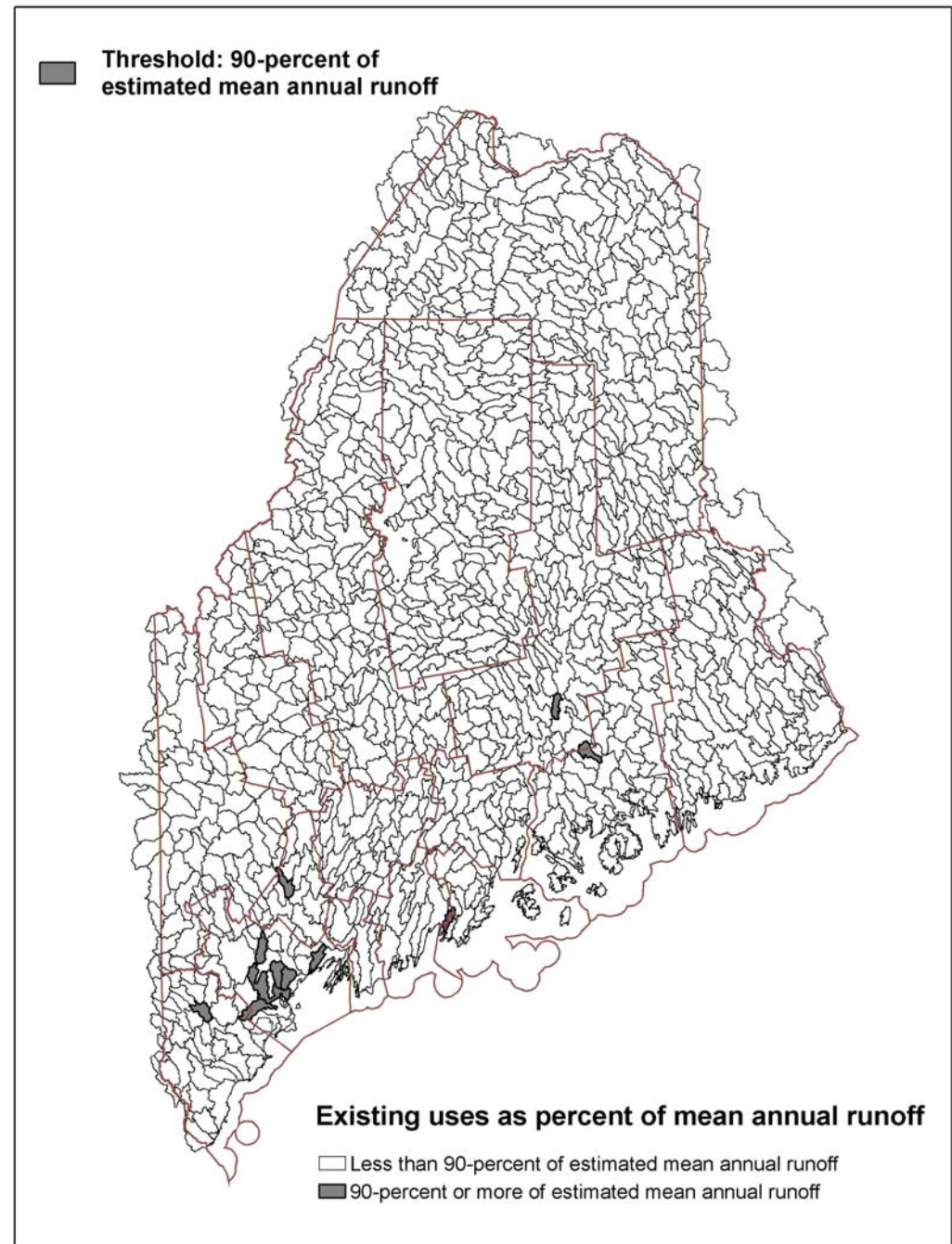
Results

Threshold: 80%
of estimated
mean annual
runoff



Results

Threshold: 90%
of estimated
mean annual
runoff



Recommendations

- Watershed approach to addressing water issues.
 - Tier 1: Full assessment of water supply and demand.
 - Tier 2: Convene watershed group to develop water management plan.
 - Tier 3: ??