

Poor Little Pecks Brook: Balancing lake goals and downstream needs in an urban watershed.

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Background

Many Massachusetts lake managers use drawdowns to control invasive aquatic plants. Town Conservation Commissions have authority to permit fall drawdowns and spring refills, using timing and volume guidelines in "Eutrophication and Aquatic Plant Management in Massachusetts: Final Generic Environmental Impact Report". These are:

Drawdown

- Occurs between November 1 - December 1.
- Outflow should not exceed 4 cubic feet per square mile (cfsm).
- Once target water level is achieved, match outflow to inflow.

Refill

- Achieve full lake level by April 1.
- Keep outflow above 0.5 cfsm.



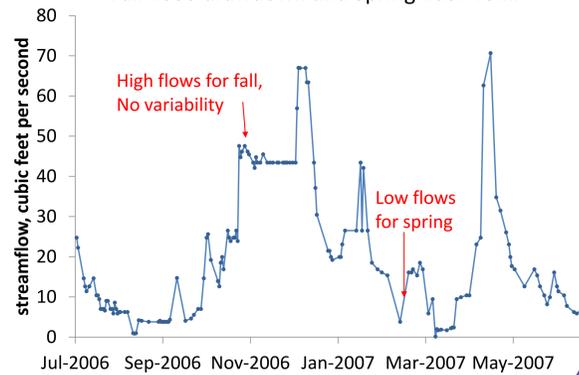
Onota Lake, Pittsfield, MA

What this can look like in practice

Streamflow in Pecks Brook, Pittsfield, MA
Fall 2006 drawdown and Spring 2007 refill



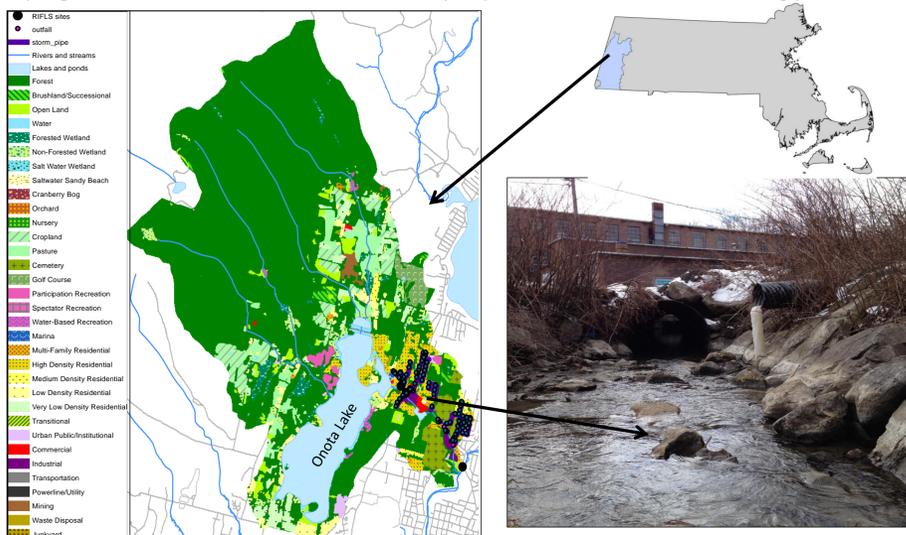
Pecks Brook, just downstream of Onota Lake, in April 2006



Data collected by River Instream Flow Stewards (RIFLS) volunteers.

Study Area – Why Pecks Brook?

Concerns about the impacts of drawdown and refill to downstream flows as well as low & no flow events observed during summer in several Housatonic watershed streams led the Housatonic Valley Association to contact DER's River Instream Flow Stewards (RIFLS) program. Pecks Brook stood out as a heavily impacted stream – but had willing partners.



Pecks Brook flows under an industrial complex, over a few dams, and catches stormwater from multiple outfalls.

Approach

DER staff have worked with partners in the Housatonic watershed to develop supplemental guidance to reduce the impacts of drawdowns to the downstream flow regime. Since 2013, the City of Pittsfield is piloting this approach in Pecks Brook.

Original Approach – Numeric Flow Targets

Month	Low Flow (10 th %)	Target Streamflow is between:		High Flow (90 th %)	GEIR Guidelines
		Minimum (25 th %)	Maximum (75 th %)		
October	0.19	0.29	0.67	1.43	4 max (during drawdown)
November	0.29	0.38	1.62	2.48	
December	0.38	0.48	1.62	2.38	
January	0.38	0.48	1.24	2.10	--
February	0.38	0.57	1.24	3.15	--
March	0.67	1.05	2.86	3.53	0.5 min (during refill)
April	1.43	2.29	4.96	5.91	--
May	0.76	1.24	2.19	3.05	--
June	0.38	0.38	1.14	2.48	--
July	0.19	0.29	0.48	0.67	--
August	0.10	0.10	0.38	0.67	--
September	0.10	0.10	0.38	0.57	--

Stakeholders & lake managers were not comfortable using these target flows. Note: All values are in cfsm. Percentiles derived from natural flow estimates from MA Sustainable Yield Estimator & Indicators of Hydrologic Alteration software.

The Approach we Used

1. Provide conceptual and narrative guidance

- We outlined natural flow patterns (e.g., extreme rates of change before and after drawdown and refill exceed natural rates of change in storms).
- We provided specific guidance for each season. For example, in summertime:
 - Maintain lake at spillway elevation.
 - Release water during large storms, as coordinated with storage and flood prevention needs.
 - Maintain downstream flows greater than or equal to the modeled 10th percentile flows.

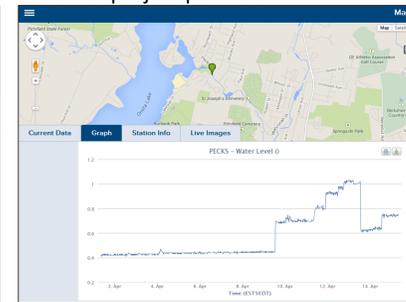
Note: copies of this guidance document are available.

2. Make real-time data available to project team.

DER staff and RIFLS volunteers have monitored streamflow at Pecks Brook since 2006. In 2013 DER added a telemetry station, so that continuous data are now available online for the dam manager and other project partners.



DER staff install telemetry station



Real time data from Pecks Brook

3. Assess biological communities

Project partners wanted to know a little more about what species actually exist in this impacted habitat, and whether improving the flow regime will boost aquatic communities. We conducted fish and macroinvertebrate sampling at Pecks Brook, two other sites downstream of lakes with drawdowns, and a reference site, all in the Housatonic watershed.



DFW staff conduct fish sampling

Results

"Now we're managing with an eye toward downstream flows." – Jim McGrath, Pittsfield Park, Open Space, and Natural Resource Program Manager & Onota Lake dam operator

Biotic sampling suggests hope for Pecks Brook

Habitat and biotic assemblage characteristics at four sites.

Habitat score from rapid bioassessment protocols visual assessment in 2014 (Barbour et al. 1999).

Fish metrics from multipass removal in 2013 (not adjusted for capture efficiency).

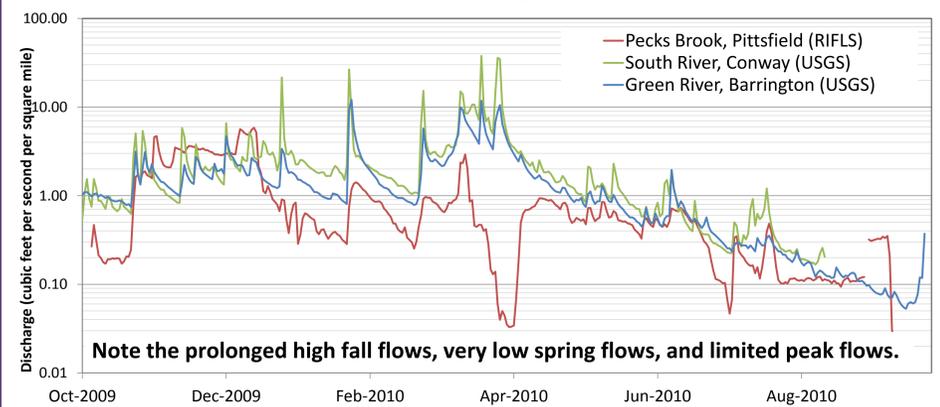
Macroinvertebrate metrics based on average of three riffle samples in 2014. For each metric, sites scoring highest are colored blue; those scoring lowest are colored orange.

Habitat & Biotic Metrics	Reference Site	Sites Downstream of Lakes with Drawdowns		
		Cone Brook	Pecks Brook	W Branch Housatonic
Habitat				
Total Score	154	129	161	113
Fish Assemblage				
Total Richness	8	9	7	13
Fluvial Species Richness	4	3	1	3
Total Abundance	212	696	257	963
% Fluvial Species	99.5	93.7	84.0	41.5
% Coldwater Species	22.2	0	0	0
Macroinvertebrate Assemblage				
Richness	40.3	16.0	22.7	22.7
EPT [*] Richness	21.0	6.7	11.0	7.7
% EPT [*]	56.3	78.8	65.0	34.6
HBI [†] Score	4.2	5	4.4	4.7
RBP [‡] Score	40.7	23.3	30.0	29.3

^{*}EPT = Ephemeroptera, Plecoptera, Trichoptera
[†]HBI = Hilsenhoff Biotic Index (higher score = lower water quality; Hilsenhoff 1982)
[‡]RBP = Rapid Bioassessment Protocol III multimetric score for macroinvertebrates (Barbour et al. 1999)

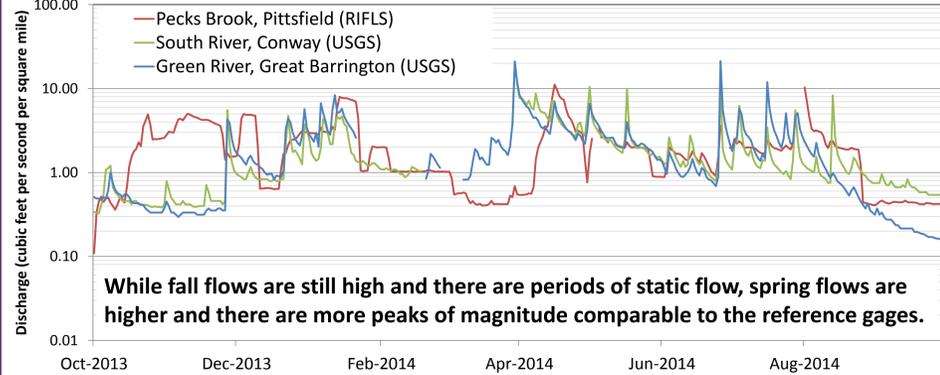
Streamflows more closely resemble those at reference gages

Pecks Brook vs. nearby USGS reference gages, BEFORE IMPLEMENTATION



Note the prolonged high fall flows, very low spring flows, and limited peak flows.

Pecks Brook vs. nearby USGS reference gages – BEGAN IMPLEMENTING GUIDANCE IN FALL 2013



While fall flows are still high and there are periods of static flow, spring flows are higher and there are more peaks of magnitude comparable to the reference gages.

Next Steps

- Continue to implement guidance and explore possible tweaks (i.e., to improve variability).
- Add telemetry at the lake level to improve real-time decision making.
- Continue biological surveys as appropriate to understand any impacts of changed management.
- Consider opportunities for similar approaches at other lakes with drawdowns.

