

Advisory Committee

Presentation Title: Incorporating SWMI into the Water Resources Management Program Regulations

Date of Presentation: 5 December 2013

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The following presentation is offered for discussion purposes only and does not necessarily represent current statute, regulation, or policy positions of the Commonwealth of Massachusetts unless specifically acknowledged.

This presentation is not to be cited as a reference. It's purpose is to foster open and broad discussion of the issues of sustainable water management as well as help assure public awareness of the discussions as of the date of the presentation.

Incorporating *SWMI* into the Water Resources Management Program Regulations

Update for the *SWMI* Advisory Committee
December 5, 2013



Presentation Overview

- SWMI Mission
- SWMI Timeline & Accomplishments
- Incorporating SWMI into WMA Regulations and Guidance
 - Safe Yield
 - Permit Requirements- Overview
 - Standard Permit Conditions
 - CFR Consult
 - Minimization
 - Mitigation by Tier
 - Cost Considerations and Crediting Mechanisms
 - Site Specific Fish Community Assessment & Data Refinement
 - Tools and Resources
 - Permit Process
 - Grants and Pending Legislation



SWMI Advisory Committee

Mission:

Advise EEA and agencies on how to ensure that the Commonwealth's abundant water resources are protected and sustainably managed

Overall principle adopted:

“The Commonwealth's water resources are public resources that require **sustainable management practices** for the well-being and safety of our **citizens**, protection of the **natural environment**, and for **economic growth**.”



SWMI Timeline

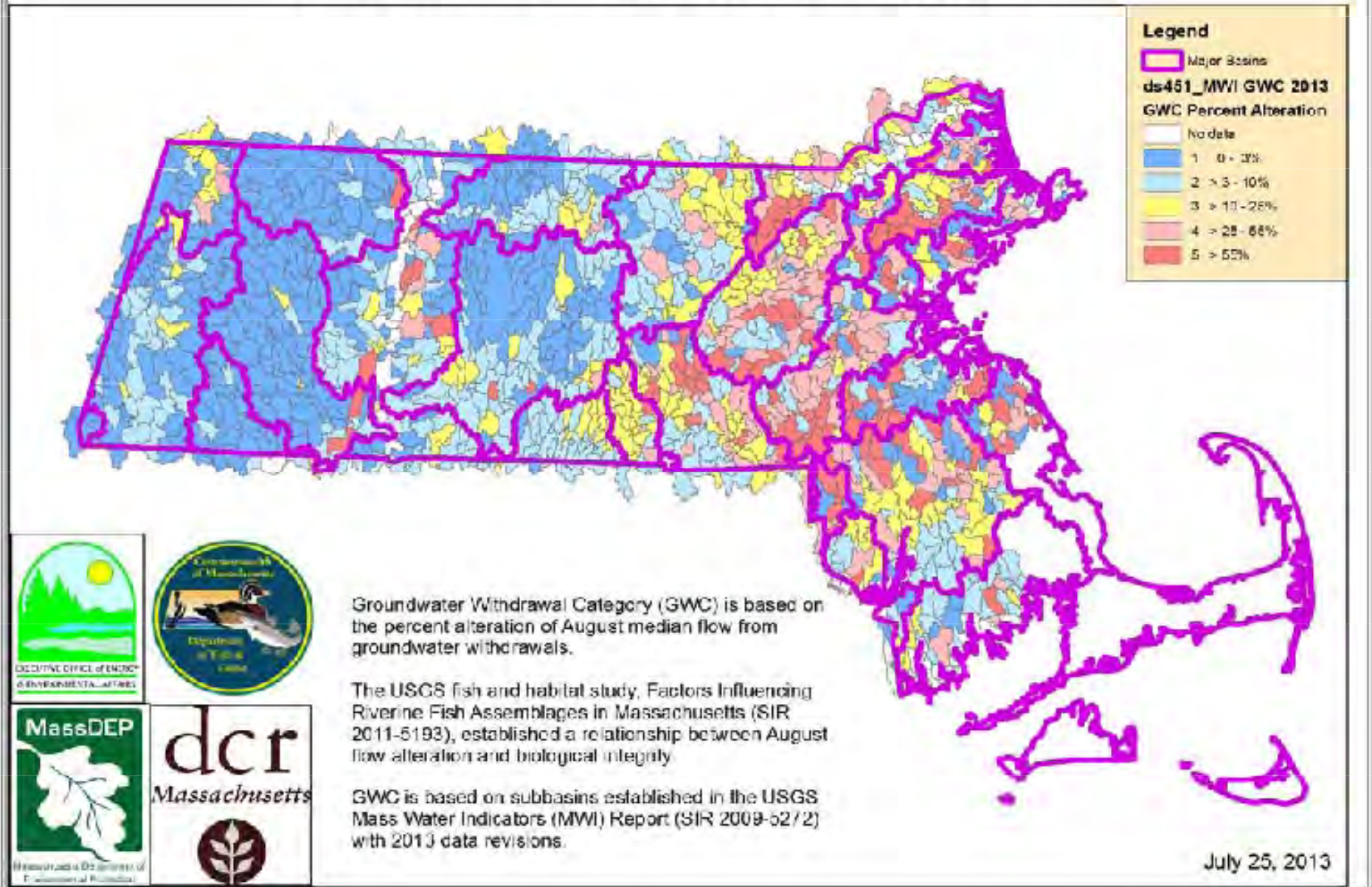
Timeframe	Accomplishment
2007 to 2011	USGS Studies
January 2010 to February 2012	SWMI Process: 15 Advisory Committee Meetings 18 Technical Committee Meetings Numerous Work Group Meetings
November 2012	SWMI Framework released
May 2012 to February 2013	SWMI Pilots
January to June 2013	SWMI Grants, round 1 (round 2 under review)
Ongoing	Deliberations with stakeholder representatives
Ongoing since March 2013	Regulation and Guidance development



Science and Policy Informing SWMI

- USGS Studies: August withdrawals and Impervious cover have significant impact on fluvial fish
- Advisory and Technical Committees helped us develop policy from science
- Categories 1-5 (1=least impact, 5 = most impact)
 - Use fluvial fish as surrogate for healthy aquatic habitat
 - Biological Category (BC), includes impervious cover
 - Groundwater Withdrawal Category (GWC), compares withdrawals to simulated unimpacted August flow
- Streamflow Criteria (**310 CMR 36.14**)

Groundwater Withdrawal Category (GWC) for the Sustainable Water Management Initiative (SWMI)



Groundwater Withdrawal Category (GWC) is based on the percent alteration of August median flow from groundwater withdrawals.

The USGS fish and habitat study, Factors Influencing Riverine Fish Assemblages in Massachusetts (SIR 2011-5193), established a relationship between August flow alteration and biological integrity.

GWC is based on subbasins established in the USGS Mass Water Indicators (MWI) Report (SIR 2009-52/2) with 2013 data revisions.

July 25, 2013



SWMI Pilot Study

- Road tested the SWMI framework
 - Amherst
 - Danvers-Middleton
 - Dedham-Westwood
 - Shrewsbury
- Mock consultation/review of presenting circumstances
 - Source review
 - Withdrawal request
 - Impact on BC/GWC and CFR
 - Minimization/Mitigation
- Site-Specific Study (Amherst and Shrewsbury)



What did we learn from the Pilots?

Need more guidance on:

- Quantifying mitigation credits
- Credits for on-going mitigation measures
- Defining minimization requirements
- Clarifying the timing of mitigation measures
- Evaluating cost and feasibility
- How affordability is considered

Mock consultation

- Applicants will need more prep time vs. existing process

Site-Specific Study Options

- Need to define the goal
- Method needs clarification
- Who is eligible

Financial Resources: Grants and Proposed Legislation

- Applicants must be a public water supplier and/or municipality with a valid WMA Permit.
 - *Partnerships encouraged*
 - *Highly impacted basins or subbasins*
- Funds to assist with WMA compliance
- Covers planning and implementation projects
- ~\$900,000 awarded in 2013
- ~\$1 million proposed for 2014
- 10 recipients in 2013, with awards ranging from \$50,000 to \$140,000
- Senate Bill 1880 (pending)



Incorporating SWMI

From the SWMI FRAMEWORK and PILOTS
to the WMA REGULATIONS and GUIDANCE

- Sustainable Management,
- Protection of the Natural Environment, and
- Economic Growth.



SWMI Components and Achievements

- Safe Yield
- Streamflow Criteria based on Science
- Permitting
 - Balance human and environmental need
 - Establish up front permit rules and conditions
 - Minimize use and mitigate commensurate with impact where applicable
- Encourage Economic Growth and Sustainable Long-term Water Use

Safe Yield and Environmental Protection

310 CRM 36.13

Major Basin
Scale

WMA Safe Yield =

55% of Drought Basin Yield + Reservoir Storage

Potentially
Allocatable
Water

**Safe Yield Drought
Protection =**

Remaining 45% of Drought Basin
Yield

+

Subbasin
Scale

Streamflow Criteria

Seasonal
Flow



Permit Conditions Summary

- Standard Conditions for all permitted groundwater and surface water withdrawals
- CFR Consult for groundwater and surface water withdrawals in subbasins with potentially impacted Coldwater Fishery Resources (CFRs)
- Minimization for groundwater withdrawals in “ $\geq 25\%$ August Net Groundwater Depleted” Subbasins
- Mitigation Tiers in consultation with agencies based on Tier determination for withdrawal (ground or surface) requests above baseline

Permit Requirements <i>(new in green)</i>	Applicability of Requirements
1. Water Conservation Standards	Yes, required for all
2. Performance Standards (65 rgpcd and 10% UAW)	Yes, required for all (with exceptions on Cape & Islands for RGPCD)
3. Limits on non-essential water use	Yes, required for all (with alternative approach for Cape & Islands)
4. <i>Minimization of existing impacts</i>	Required if 25% Aug net groundwater depleted
5. <i>Coldwater Fish Optimization Plan</i>	Required if CFR present in source subbasin

WMA Standard Permit Conditions

310 CMR 36.28(4)(c)

- Conservation Requirements
 1. 65 residential gallons per capita day (RGPCD)
 2. 10% unaccounted-for-water (UAW)
 3. BMPS (leak detection & repair, metering etc.)
 4. Seasonal limits on nonessential outdoor water use (revised per SWMI with inclusion of 7- Day Low Flow Trigger)

Nonessential Outdoor Water Use Restrictions

Alternative plan for Cape and Islands to be developed

Uses that are not required: for health or safety reasons; by regulation; for the production of food or fiber; for the maintenance of livestock; or to meet the core function of a business

CALENDAR		
	Starting May 1	7 day Low Flow Trigger
Below 65	7 days *	1 day *
Above 65	2 days *	1 day*

STREAMFLOW		
Flow above ABF	Flow below ABF	7 day Low Flow Trigger
7 days	7 days*	1 day*
7 days	2 days*	1 day*

* No watering 9 am to 5 pm on any day

ABF: Aquatic Base Flow

7 Day Low Flow is calculated from the period of record flows from a local USGS stream gage

Minimization

Minimization is required in subbasins defined as having an August net groundwater depletions of 25% or more by MWI* data.

August net groundwater depletion is the estimated streamflow level in an unimpacted subbasin, minus groundwater withdrawals, plus returns to groundwater via septic systems and/or groundwater discharges, for the month of August.

Minimization Requirements:

- Desktop Optimization
- Water Releases and Returns - *to the greatest extent feasible*
- Additional Conservation Measures - *to the greatest extent feasible*

* MWI data is based on estimated and reported withdrawals and returns for the years 2000-2004



Minimization- Desktop Optimization

Compare and screen subbasins with groundwater sources

1. Is a Coldwater Fishery Resource present?
2. Change in category if pumping shifted?
3. How much water is available (considering withdrawals and returns)?
4. What is the GWC percentage? (withdrawals/unaffected flow)
5. Other sensitive receptors?

Compare groundwater to surface water sources

6. Is there a surface water supply? With a release plan?

Minimization- Optimization Example

Optimization Parameters	subbasin A	subbasin B	subbasin C	subbasin D
1) CFR present?	yes	yes	no	yes
2) Change in BC/GWC?	no	no	no	no
3) Net water available (cfsm)	0.02	.35	.35	0.01
4) GWC %	90%	29%	26%	80%

- Preferred results highlighted in blue
- Screening shows subbasin C most preferred for shifting/increasing pumping



Minimization- Surface Water Releases and Returns

Releases


- **If** applicant has surface water supply impoundment(s),
- **And** impoundments have the capacity for releases,
- **Then** suppliers would determine if releases could be made and develop and implement a release plan subject to MassDEP approval.



Minimization- Outdoor Water Use Restrictions

Requirement: Implement restrictions on nonessential outdoor water use that go beyond standard permit conditions

- If you are above 65 rgpcd: no more than 1 day per week
- If you are below 65 rgpcd: no more than 2 days per week
- or propose an equivalent action.



Minimization- Additional Reasonable Conservation

- Adopt reasonable and cost-effective water conservation measures that go beyond the Standard Conditions
- Guidance provides 18 additional measures (from recommendations in Water Conservation Standards)
- Minimization plan should focus first on meeting 65 rgpcd and 10% UAW if not meeting

Coldwater Fishery Resource (CFR) Consult



310 CMR 36.22(4)

- DFW will screen subbasins for potential impacts to CFRs
- Basin Meeting serves as preliminary consult
- Goal- identify ways to reduce impacts through optimization



Mitigation Overview

- Mitigation Tiers
- Mitigation Hierarchy
- Example Calculation
- Wastewater Adjustments
- Direct Mitigation
- Location Adjustment Factor
- Indirect Mitigation
- Timing and Implementation
- Mitigation and Cost Feasibility Guidance
- Credit for On-going Mitigation Measures

Tier Determination for Mitigation

310 CMR 36.19

- 3 Permit Tiers define mitigation requirements
- “Impact” quantified as increase over baseline and if increase causes a category change (i.e. backsliding)

Tier 1: no increase above baseline

Tier 2: increase above baseline

but no change in BC or GWC

Tier 3: increase above baseline AND change in BC or GWC

- change in BC or GWC is evaluated for August unless withdrawals are greater during other periods
- Cumulative Assessment

Baseline is based on the largest of either:

- 2003 – 2005 water use + 5%
- 2005 water use + 5 %
- the community’s registered volume
- Volume must be in compliance

Mitigation Tier Conditions- Groundwater

310 CMR 36.21(3)

Groundwater Mitigation Conditions by Tier	Tier 1	Tier 2	Tier 3
a. Commensurate Mitigation	Not required	Yes, required for all	Yes, required for all (up to 2x indirect)
b. No feasible alternative source	Not required	Not required	Yes, required for all

Mitigation Tier Conditions - Surface Water

310 CMR 36.21(4)

Mitigation Conditions by Tier for Surface Water Withdrawals	Tier 1	Tier 2
1. Summer Management Plan with Environmental Considerations <ul style="list-style-type: none"> a. restrictions tied to reservoir elevations and other environmental considerations (such as evaluating releases, fisheries management plan, or consideration of an alternative approach for watering restrictions) in these plans. 	Required when requesting alternative summer outdoor water use restrictions	
2. Mitigation <ul style="list-style-type: none"> 2. commensurate with impact from withdrawal above baseline, in consultation with agencies. Surface Water Release preferred if possible. 	Not applicable	Yes, required for all

Mitigation- Plans

Retroactive mitigation credits for activities completed and still in effect

Action hierarchy

- 1st: Demand Management to keep volumes below baseline
- 2nd: Direct/quantifiable mitigation
- 3rd: Indirect/non-quantifiable mitigation

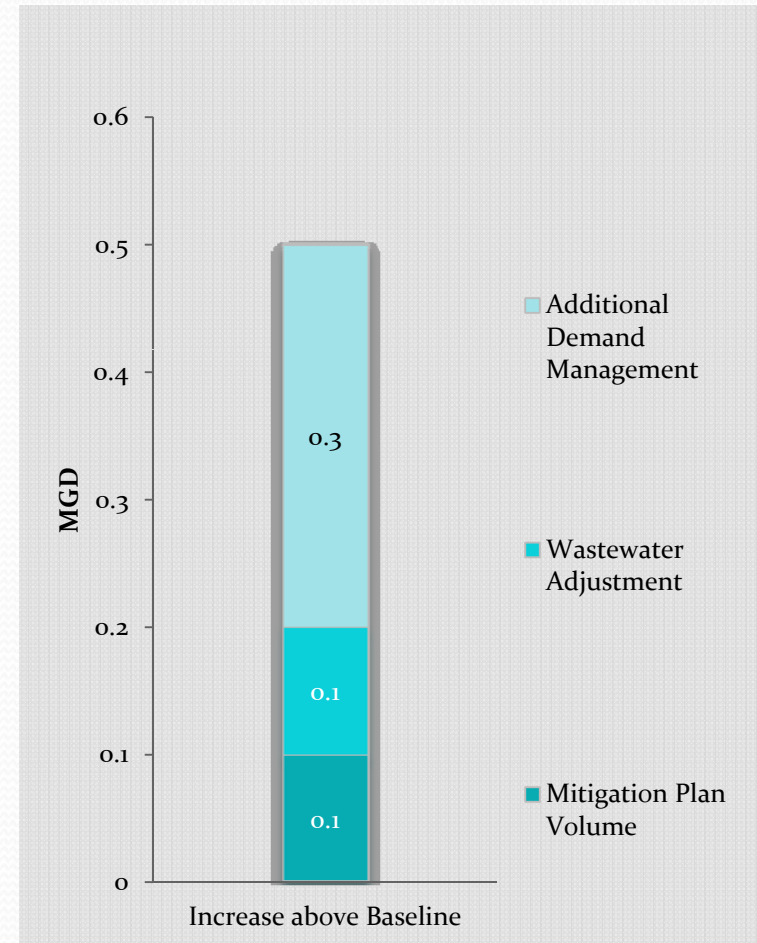
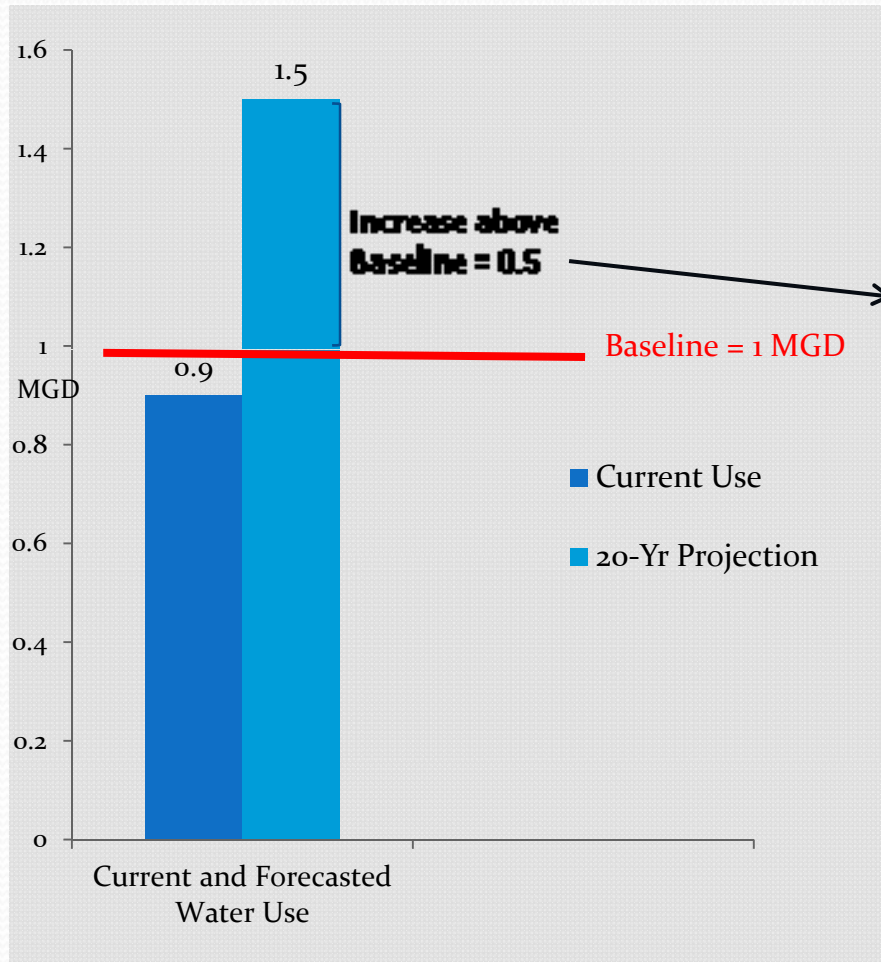
Location hierarchy (where a choice exists)

- 1st: same subbasin as withdrawals (considering water quality)
- 2nd: same major basin as withdrawals
- 3rd: different major basin

Mitigation Plan Timelines

- Mitigation Plan must be submitted at start of permit period
- Timeline may phase implementation of mitigation
- Any volumes withdrawn over Baseline must be mitigated prior to when those volumes are withdrawn
- DEP will make reasonable allowances if withdrawals are already over baseline

Mitigation- Example Calculation



Take cost and feasibility into account

Accounting for Wastewater Returns

310 CMR 36.21(3)(b)(1) & (4)(b)(1)

- Wastewater Returns via groundwater discharge:
Mitigation volumes may be adjusted downward based on the volume of water returned via septic systems and permitted groundwater discharge locations (less a 15% consumption factor).
- Wastewater Returns via surface water discharge (NPDES): Eligible sources located on stream reaches with significant surcharge volumes (>10% above annual average flow & more than 1 mgd) may receive direct or indirect credits based on source and location specifics
 - Blackstone, Concord and Taunton are the only basins with subbasins meeting this surcharged reach criteria



Direct Mitigation

Based on a calculated volume of water returned within the basin, due to enhanced groundwater contribution to streamflow or surface water releases.

Eligible Activities:

1. Surface Water Releases
2. Stormwater Recharge (directly connected impervious area redevelopment to recharge)
3. Infiltration and Inflow Improvements

Mitigation- Location Adjustment Factor

310 CMR 36. 21(3) & (4)

Wastewater Adjustments and Direct Mitigation shall be subject to a **Location Adjustment Factor (LAF)**

- 100% in major basin*
- 50% outside major basin*
- 75% outside major basin if shown that area of return is more depleted than area of withdrawal*

* (less 15% consumption factor for wastewater)



Indirect Mitigation

- Based on a qualitative assessment of environmental improvements that help compensate for the stream impacts of the withdrawals.
- The relative value of the mitigation activity is determined by a credit system that scores benefit to:
 - Instream flow
 - Aquatic Habitat (water quality, physical habitat and stream continuity)
 - Water Supply Protection



Retroactive Mitigation Credit

- Previously completed activities may be credited
 - Benefit On-going
 - Subject to DEP Review and Approval
- Examples:
 - Stormwater retrofits since 2005
 - Bringing wastewater back (since 2005) via new Groundwater Discharge permits
 - Longstanding release requirements or fishery management plans



Indirect Mitigation Activities

- Remove dam/flow barrier
 - Culvert replacements meeting crossing standards
 - Stream bank/channel/buffer restoration
 - Install & maintain fish ladder
 - Acquire property in Zone I or II, or for other resource protection
 - Stormwater bylaw with recharge requirements
 - Stormwater utility *
 - Implement MS4 4*
 - Aquatic habitat restoration fund
 - Infiltration/Inflow removal program
 - Surcharged Reach Optimization Plan
 - Private Well Bylaw
 - Other
- *must result in increase recharge to get credit

Indirect Mitigation- Credit Table

Indirect mitigation (mgd)	Credits required for Tier 2	Credits required for Tier 3
0 to 0.1	Up to 10	Up to 20
0.1 to 0.2	Up to 20	Up to 40
0.2 to 0.3	Up to 30	Up to 60
0.3 to 0.4	Up to 40	Up to 80
0.4 to 0.5	Up to 50	Up to 100
0.5 to 0.6	Up to 60	Up to 120
0.6 to 0.7	Up to 70	Up to 140
0.7 to 0.8	Up to 80	Up to 160
0.8 to 0.9	Up to 90	Up to 180
0.9 to 1	Up to 100	Up to 200
1.0 or more	case by case	case by case



Mitigation Cost Feasibility

- Designed for applicants who are concerned that their mitigation plan is cost prohibitive.
- Applicant may submit a 20-year budget along with their mitigation plan.
 - estimated operating costs
 - estimated capital improvement costs
- MassDEP will review the mitigation plan and budget with the applicant.
- Cost feasibility assessments will be based on impacts to rates, both year over year and over the 20-year permit period.

Data Refinement Options

- Data Refinements used in determining BC or GWC
 - Pumping volume adjustments
 - Subbasin boundary adjustments
 - Hydrologic/geologic considerations
 - Other refinements through groundwater modeling
- Schedule for submitting Data Refinements
 - Submit by date outlined in regulations to be considered as part of the cumulative picture for the 20-Year Renewal or first Post-SWMI 5-Year Review for the basin
 - Submit as part of new permit application

310 CMR 36.20
(1) and (2)

Site Specific Fish Community Assessment

310 CMR 36.20 (3)

- Only available to Tier 1 applicants subject to Minimization
- Conduct the site-specific fish community assessment in accordance with a fish sampling and collection protocol approved by DFW
- Applicants fish community will be compared to other fish communities in the same GWC
- If fluvial fish relative abundance is greater than 75th percentile of those in the same GWC, minimization will not be required
- Minimization conditions suspended for duration of study (5 years)

Tools and Resources- DEP Website

The screenshot shows a Mozilla Firefox browser window displaying the Sustainable Water Management Initiative (SWMI) website. The browser's address bar shows the URL: www.mass.gov/eea/agencies/massdep/water/watersheds/sustainable-water-management-initiative-swmi.html. The website header includes the Mass.gov logo and navigation links for State Offices & Courts, State A-Z Topics, and State Forms. The main navigation menu lists categories: Agriculture, Energy & Utilities, Environmental Protection, Fisheries, Wildlife & Habitats, Water & Climate Change, Recreation & Conservation, and Services & Assistance. The page content includes a search bar, a breadcrumb trail (Home > MassDEP > Water Resources > Wetlands & Watersheds > Sustainable Water Management Initiative (SWMI)), and a section titled "Sustainable Water Management Initiative (SWMI)". The text describes an interactive GIS map and provides a list of "SWMI Materials and Links" such as "Sustainable Water Management Initiative", "Fish Data Variables & Regression Equation Solver", and "Division of Fisheries & Wildlife Fish Data (MS Excel)". A map titled "SWMI Interactive Map" is displayed, showing a colorful map of Massachusetts with a play button icon. The map is dated "Revised July 31, 2013".

<http://www.mass.gov/eea/agencies/massdep/water/watersheds/sustainable-water-management-initiative-swmi.html>

Find by Subbasin ID: Find by PWS System Name:
 Find by PWSID: Find PWS by Town Name:

Click to use pull downs and to View All Subbasins

All Water Use Points in Subbasin Report

Calculation Tool Report

Subbasin Characteristics

Click on "X" in upper right of this form to close this window and return to main page.

Sub Basin ID: **22016** Major Basin: **South Coastal** HUC12 Name: **Indian Head River-Indian Head Brook to mouth**

Subbasin Cumulative Data (includes this subbasin and all upstream contributing subbasins)			
Subbasin Information	August Wastewater Discharges (mgd)	August Groundwater Withdrawals (mgd)	Additional GW Withdrawal Volume to Cause a Change in Existing GWC and BC:
Area (Square Miles): 47.45	Ground Water Discharge: 0.000	PWS and Commercial Wells: 2.072	To Change GWC (mgd): 0.460
Impervious Cover (%): 15.0	Septic Systems: 1.963	Private Wells: + 0.111	To Change BC (mgd): 0
Surface water withdrawals exist in or upstream of subbasin: YES	Surface Water (NPDES): 1.626	Total Groundwater Withdrawals: = 2.183	

Individual Subbasin Data (only includes this subbasin)

Quality Natural Resource Exist: No
 Coldwater Fisheries Resource Exist: No

Unaffected streamflow, Ground Water withdrawals, Groundwater Withdrawal Category (GWC) and Biologic Category (BC).

Estimated August Condition	Proposed Changes to existing GW Withdrawal	Existing vs. Proposed
Unaffected Streamflow (mgd)* <input type="text" value="10.569"/>	Change (+/-) to existing GW Withdrawal (mgd) <input type="text" value="0"/>	<input type="button" value="Calculate"/> <input type="button" value="Clear"/>
GW Withdrawals (mgd)** - <input type="text" value="2.183"/>	Unaffected Streamflow(mgd) <input type="text" value="10.569"/>	
(Unaffected Streamflow) - (GW Withdrawals) = <input type="text" value="8.386"/>	Proposed Total GW Withdrawal (mgd) - <input type="text" value="2.183"/>	
(GW Withdrawals) / (Unaffected Streamflow) = <input type="text" value="20.7%"/>	(Unaffected Streamflow) - (Prop. GW Withdrawal) = <input type="text" value="8.386"/>	
Groundwater Withdrawal Category (1-5) GWC: <input type="text" value="3"/>	(Proposed GW Withdrawal) / (Unaffected Streamflow) = <input type="text" value="20.7%"/>	<input type="text" value="0%"/> Percent Difference
Biologic Category (1-5) BC: <input type="text" value="5"/>	Proposed Groundwater Withdrawal Category (1-5) <input type="text" value="3"/>	<input type="text" value="NO"/> Change in GWC?
	Proposed Biologic Category (1-5) <input type="text" value="5"/>	<input type="text" value="NO"/> Change in BC?

Permit Renewal Process

Months before permit expires	Activity
20 months	Start Basin Planning Process <ul style="list-style-type: none">•Draft water needs forecasts developed,•consultations upon request
16 months	Basin Outreach Meeting
12 months	Permit Filing Deadline <ul style="list-style-type: none">•Public Comment Period•consultations as necessary
9 months	Orders to Complete Issued by DEP
6 months	Response to Orders to Complete Due
3 months	Draft Permit Issued for Comment



What's Next?

- Formal Public Hearings and Comment – January-February (60 Days)
- Outreach on Proposed Regulations – Ongoing
- Final Regulations Promulgated – Summer 2014
- Additional USGS Studies
 - Surface Water
 - Groundwater recharge areas
 - Impervious Cover
- Resume Permitting

River Basin Permitting Dates

1 Year Interim Permits
expected to be issued.

Basins previously permitted to be
adjusted at next 5-Year Review

Water Source	Projected 5- Year Review Issuance
Hudson	November 2015
Blackstone	February 2017
Charles	February 2017
North Coastal	February 2016

* Basins with Permits on File

Water Source	Expiration Date	Outreach Meeting
Cape Cod *	November 2014	January 2015
Ipswich *	Early 2015	March 2015
Boston Harbor * /Taunton *	February 2015	April 2015
Islands *	February 2015	May 2015
Buzzards Bays	May 2015	February 2015
Concord	August 2015	May 2015
South Coastal *	August 2015	October 2014
Ten Mile	November 2015	August 2014
Deerfield	February 2016	November 2014
Housatonic	May 2016	February 2015
Westfield	November 2016	August 2015
Millers	February 2017	November 2015
Chicopee	May 2017	February 2016
Quinebaug	August 2017	May 2016
Connecticut	November 2017	August 2016
Nashua	February 2018	November 2016
French	May 2018	February 2017
Shawsheen	August 2018	May 2017
Merrimack	November 2018	August 2017
Parker	February 2019	November 2017
Narragansett	May 2019	February 2018