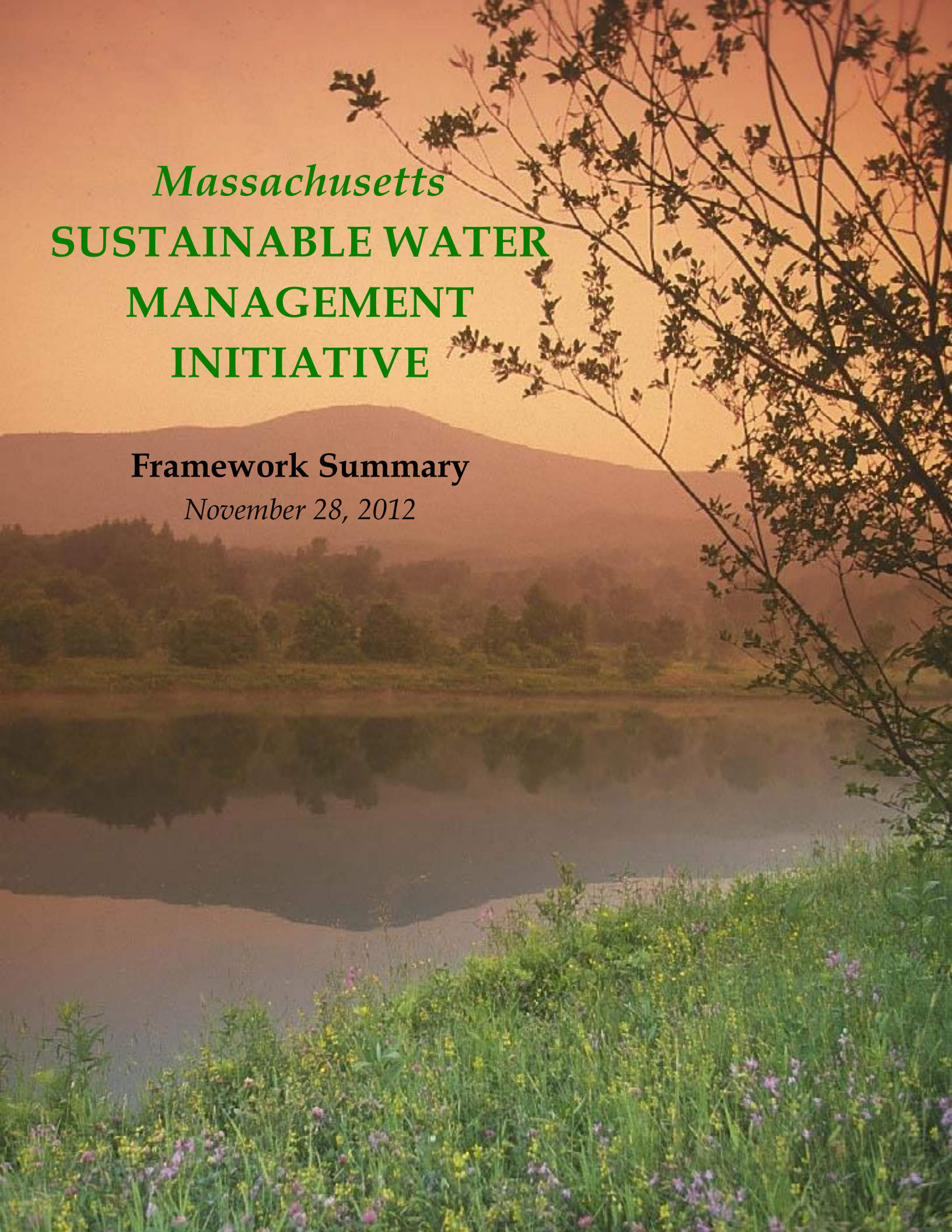

Massachusetts
SUSTAINABLE WATER MANAGEMENT INITIATIVE

Framework Summary

November 28, 2012

Dear Fellow Massachusetts Citizens:

I am pleased to present the Final Framework Summary for the Massachusetts Sustainable Water Management Initiative (SWMI). The SWMI Framework is a result of a collaborative effort between the public and the Commonwealth's environmental agencies: the Executive Office of Energy and Environmental Affairs (EEA), the Department of Environmental Protection (MassDEP), the Department of Fish and Game (DFG), and the Department of Conservation and Recreation (DCR).

Nearly three years ago, EEA launched SWMI, seeking the advice of the public on the development of a water allocation program that satisfies both ecological and human water needs. The initiative's Advisory Committee and Technical Subcommittee, which included a wide range of stakeholders of differing perspectives, provided recommendations on the development of a system that classifies ecological health, streamflow criteria that recommend maximum levels of water withdrawals to protect habitat, and Safe Yield that defines the maximum dependable withdrawal that can be withdrawn during drought. These products will be incorporated into water withdrawal permits, issued by MassDEP under the Water Management Act (WMA).

The SWMI Framework reflects considerable public participation and comment, which were carefully considered throughout the SWMI process. Currently, the agencies are engaged in a pilot project involving four water suppliers, collecting data, evaluating potential minimization and mitigation options, considering how wastewater returns will be applied, and evaluating how to use site-specific data in the permitting process. Results of this project, which is expected to be finalized by late 2013, will help inform the drafting of WMA regulations to implement SWMI.

EEA is grateful to everyone who provided considerable time and thoughtful insight during the Sustainable Water Management Initiative. We will continue to work with our stakeholders as the WMA regulations are revised. We look forward to moving ahead on this important initiative and successfully implementing principles of sustainable water resources management in the Commonwealth.

Sincerely,

Richard K. Sullivan, Jr.
Secretary of Energy and Environmental Affairs

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1. Archfield, S.A., Vogel, R.M., Steeves, P.A., Brandt, S.L., Weiskel, P.K., and Garabedian, S.P., 2010, The Massachusetts Sustainable-Yield Estimator: A decision-support tool to assess water availability at ungaged stream locations in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2009-5227, 41 p. plus CD-ROM.
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Executive Summary

In 2010, the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) created the Sustainable Water Management Initiative (SWMI) with support from the Department of Environmental Protection (MassDEP), the Department of Fish and Game (DFG), and the Department of Conservation and Recreation (DCR). An Advisory Committee and a Technical Subcommittee, comprising a wide range of stakeholders, were established to advise EEA and its agencies on sustainable management of water resources that balance human and ecological needs.

Starting in 2014, the framework established in the SWMI process will guide MassDEP's permitting of water withdrawals under the Water Management Act (WMA). This final framework summary describes the various elements developed through SWMI and outlines how MassDEP will apply these elements to the Water Management Act permitting program.

Why SWMI is needed

People, businesses, and natural resources all need adequate water to survive. Massachusetts receives 44 inches of precipitation in an average year, which is plentiful compared to other parts of the country, and most of the time provides us with enough water to meet the needs of people and the environment. However, because this rainfall varies across the state, and is not always used in the most optimal way, during months of low rainfall or periods of drought, we cannot always meet the wide variety of human and ecological needs. As a result, the full range of public use and enjoyment of our rivers and streams becomes compromised. Conflicts can be most severe during the summer and fall months, when human demand is highest (for example, because of lawn watering), and streamflows are naturally lowest. In extreme cases, this has resulted in streams drying up seasonally and loss of fish and other aquatic species dependent on those habitats. It was also evident that our current water allocation system needed repair because disputes between stakeholders over how MassDEP makes permit decisions allocating water under the Water Management Act have led to costly litigation, long delays, and lack of certainty in permit decisions.

Therefore, the Commonwealth launched SWMI to develop and implement water policy that supports ecological needs while meeting the needs of economic growth. The successful implementation of this initiative will bring about clear, predictable and science-based permitting, ensure prudent and sustainable use of water, maintain healthy watersheds and gradually improve degraded ones.

Major Elements of SWMI

Safe Yield - Safe Yield establishes the maximum amount of water withdrawal that can be allowed at a major basin scale during drought conditions, and incorporates environmental protection factors and hydrologic factors. The Safe Yield is calculated as 55% of the Drought Basin Yield plus Reservoir Storage Volumes.

Seasonal Streamflow Criteria - Streamflow criteria will guide WMA permitting decisions seasonally and at a sub-basin scale so as to maintain the magnitude and timing of the natural flow regime. In establishing streamflow criteria the Technical Subcommittee relied on statistical analyses, stakeholder input and best professional judgment, based on concepts supported in the scientific literature (Davies and Jackson, 2006). The foundation of streamflow criteria is the USGS peer reviewed science that demonstrated a significant negative association between aquatic health and ground water withdrawals and impervious surfaces.

Baseline - The baseline is a reference point against which a request to withdraw groundwater will be compared to determine whether the request represents an increase in withdrawals from the basin.

Application to Water Management Act Permitting

Groundwater withdrawal requests will be assessed against the Safe Yield, seasonal streamflow criteria and baseline established during the permitting process. A flexible and transparent permitting process will incorporate mitigation requirements according to the following principles:

- Acknowledge and preserve critical existing water supply areas and legitimate future need;
- Minimize existing water withdrawal impacts in already impacted areas , taking into account cost and feasibility;
- Mitigate increased withdrawals commensurate with impact, taking into account cost and feasibility; and
- Protect quality habitats and avoid further degrading unhealthy aquatic habitats.

Technical and Financial Support

Pilot analyses are being conducted to evaluate how the SWMI framework will be applied to a diverse and select group of four communities so that opportunities and costs of potential actions will be better known to the communities and agencies. In addition, the EEA agencies are evaluating what kind of support can further assist communities or water suppliers with implementation measures to support water management and aquatic habitat.

Lastly, MassDEP in cooperation with other EEA agency staff expects to conduct an expansive 18-month Permit Renewal Outreach Effort that will assist permittees implementing the SWMI Framework throughout the 20-year WMA permit.

Part A: Sustainable Water Management Initiative (SWMI) Process and Principles

The SWMI Process

In 2010, the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) created the Sustainable Water Management Initiative (SWMI) with support from the Department of Environmental Protection (MassDEP), the Department of Fish and Game (DFG), and the Department of Conservation and Recreation (DCR). An Advisory Committee and a Technical Subcommittee, comprising a wide range of stakeholders, were established to advise EEA and its agencies on sustainable management of water resources that balance human and ecological needs, and inform MassDEP's implementation of the Water Management Act and the development of Safe Yield.

SWMI Principles

At the outset of the SWMI process, the Advisory Committee adopted an overall principle to help frame the discussion on sustainable water resources management:

> *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.*

This principle will help frame water resources discussions and decisions within the Commonwealth in the years to come.

Stakeholder Involvement and Outreach

Over the 18-month effort, EEA's Sustainable Water Management Initiative Advisory Committee, Technical Subcommittees, and various workgroups held a series of working meetings and met over 50 times. Agency technical staff used data obtained from peer-reviewed USGS studies, as well as input from stakeholders, to develop discussion drafts and proposed approaches to issues. These formed the technical underpinnings for the SWMI framework. Public comments were welcomed in writing and at meetings throughout the process. EEA and its agencies also met individually with several stakeholder groups and other interested entities to present and explain details of the framework. A website was established that included material from all committee meetings; this information can be found at: http://www.mass.gov/eea/swm.

A draft framework was developed by EEA agency staff and issued to the public on February 3, 2012. A comment period was established and was open for two months. Comments received were carefully reviewed and helped inform this final framework. Elements of this framework are currently being tested through a pilot study (described in Part C) and over the course of the

next year will be revised as necessary and incorporated into MassDEP Water Management Act regulations.

The US Geological Survey (USGS) study (Armstrong et al., 2011), conducted to support SWMI, and its use to guide Water Management Act permitting have both been carefully deliberated. The agencies thoroughly reviewed the technical comments on the study prepared on behalf of the Massachusetts Water Works Association (MWWA), and in addition to the peer review conducted as part of the USGS study itself, asked two additional reputable scientists to review the USGS study and the comments of MWWA. Both the MWWA and the two independent peer reviewers made helpful comments and suggestions, and EEA understands that both sets of comments were affected by limitations on time and availability of data.

Part B: Sustainable Water Management Initiative Key Components

Introduction
This part of the document describes the various elements of the Sustainable Water Management Initiative (SWMI) framework.

Key components of the framework include:

1. **Safe Yield** – Safe Yield establishes the maximum amount of water withdrawal that can be allowed at a major basin scale during drought conditions, and incorporates both environmental protection factors and hydrologic factors. Safe Yield is calculated as 55% of the Drought Basin Yield plus Reservoir Storage Volumes.

2. **Seasonal Streamflow Criteria** – Streamflow criteria will guide WMA permitting decisions seasonally and at a sub-basin scale so as to maintain the magnitude and timing of the natural flow regime. In providing advice on development of streamflow criteria, the Technical Subcommittee relied on statistical analyses, stakeholder input and best professional judgment, based on concepts supported in the scientific literature (Davies and Jackson, 2006). The foundation of streamflow criteria is the USGS peer reviewed science that demonstrated a significant negative association between aquatic health and ground water withdrawal and impervious surfaces.

3. **Baseline –**Baseline is a reference point against which a request to withdraw water will be compared to determine whether the request represents an increase in withdrawals from the basin.

1. Safe Yield - Method Summary

A. Safe Yield

Section 2 of the Water Management Act defines Safe Yield as "the maximum dependable withdrawals that can be made continuously from a water source including ground or surface water during a period of years in which the probable driest period or period of greatest water deficiency is likely to occur; provided, however, that such dependability is relative and is a function of storage and drought probability."

Safe Yield will be calculated as 55% of the Drought Basin Yield (monthly drought year flows) plus Reservoir Storage Volumes. Each component is further described below.

B. Drought Basin Yield

For most basins, drought basin yield is based on estimated near natural drought year flows as generated by the USGS Sustainable Yield Estimator (Archfield et al., 2010). State agency staff evaluated a range of flow statistics (Q_{75} – Q_{90}) on an annual time step and found that Q_{90} flows across the major basins in the state are equal to, or lower than, the drought of record flows (generally the year of 1965). The monthly Q_{90} flow statistic represents a value that is exceeded 90% of the time during that month over the period of record (over 44 years). To address stakeholder concerns about seasonal fluctuations in streamflow, MassDEP used an annualized Q_{90} based on averaging of monthly Q_{90} streamflows. An annualized flow is the mean of the monthly Q90 flows. This value represents a drought year in which every month is in a drought. Applying this annualized monthly Q_{90} provides consistency across all basins, meets the intent of "probable driest period" in the Safe Yield definition from both a statistical and historical stand point, and incorporates concerns about seasonal fluctuations in streamflow.

In areas where application of USGS analysis is generally not available, a separate methodology (using best available data) has been developed. These basins are the South Coast, Plymouth Carver Aquifer, Cape Cod, and the Islands. (See Appendix B for further details on the methodology).

C. Recommendation of 55% for potential allocation as an Environmental Protection Factor

The USGS fish and habitat study (Armstrong et al., 2011) found a significant relationship between alteration of August median flows (Q_{50} flows), and relative abundance of fluvial fish (an indicator of aquatic habitat quality). Based on study results, the SWMI participants determined that alterations greater than 25% were expected to cause significant impact. Staff looked at the volume represented by 25% of the Q_{50} for each month, and determined what percent of the monthly Q_{90} it represented. On average, 25% of the Q_{50} is roughly equivalent to

60% of the Q_{90}. It was a little higher in some months and a little lower in others and also varied similarly across watersheds. An additional protection factor of almost 10% was subtracted from the 60% of Q_{90} to result in 55% of Q_{90} as the Safe Yield.

Because 55% of the Drought Basin Yield (annualized Q_{90}) was chosen as the highest total volume that could be allocated, this would leave 45% of the flow in the river as protection against a drought condition on an annualized basis, so as to meet the statutory requirement that withdrawals not exceed the amount of water that can dependably be withdrawn. It is important to remember that 90 percent of the time, a higher portion of monthly flows than the Safe Yield limit would remain in the river, and in average or wet years, much greater amounts of streamflow will be present in the rivers. In addition, at the seasonal and sub-basin scale, Streamflow Criteria and permit tiers requirements provide greater environmental protection.

D. Reservoir Storage Volumes

As required by the Water Management Act, reservoir storage volumes were included in development of the Safe Yields. Storage volumes for reservoirs that store more than one year of average inflow were included. (See Appendix A for full methodology.) The following is the amount of extra storage (above demand) in a drought year for those reservoirs that qualify:

Chicopee	214.0 MGD (MWRA-Quabbin, Fitchburg)
Nashua	138.8 MGD (MWRA-Wachusett)
Westfield	14.9 MGD (Springfield)
Narrangansett	12.6 MGD (Fall River)
Quinebaug	0.4 MGD (Southbridge)
Boston Harbor	0.6 MGD (Winchester)
Charles	0.5 MGD (Lincoln)
Housatonic	0.12 MGD

Although these reservoir volumes are added to the total Safe Yield of a basin, a water user that does not get its water from these reservoirs cannot be allocated these volumes when determining if withdrawal requests exceed the Safe Yield criteria. These volumes are tied to the water users that these reservoirs service.

E. Sub-Basin Safe Yields

Individual Safe Yields are generated for three parts of the Boston Harbor Basin (Mystic, Weymouth/Weir, and Neponset), as well as two sub-basins in the South Coastal Basin (North and South Rivers, South Coastal Shore). These sub-basin delineations are consistent with those adopted by the Massachusetts Water Resources Commission in 1985.

As suggested by stakeholders, the regulations will also incorporate maps or other representations showing areas that have high percentages of groundwater withdrawal, and stating that conditions to minimize environmental impacts and mitigate flow depletion in these areas to the greatest extent feasible shall be implemented pursuant to the special conditions to protect streamflow criteria contained in the permitting section of the WMA regulations.

F. Safe Yield and Allocations

When determining the amount of water available within the Safe Yield of a basin, the regulations will allow MassDEP to take into consideration legal agreements between a permit applicant and an owner of property that restrict by easement the property owner's right to withdraw water from the basin, and enforceable agreements or orders that restrict or prohibit a registrant's right to withdraw water from the basin.

Table 1. Safe Yield and its Components by Major Basins

Basin Name	Drainage Area sq mi	Annualized Basin Yield Q90 (MGD)	Draft Reservoir Storage Volumes (MGD)	Draft Safe Yield: 55% of Q90 +Storage (MGD)	Total Annualized Authorized Withdrawals (MGD)	Total Annualized Registered Volume (MGD)	2008 Reported Use (MGD)
Blackstone	357.8	135.6	0	74.6	36.0	25.4	29.0
Boston Harbor Total	291.6	99.1	0.6	see subbasins	38.6	31.62	28.7
19c BH Weymouth & Weir	106.6	33.8	0.0	18.6	16.6	15.48	16.1
19b BH Neponset	108.9	39.4	0.0	21.7	15.4	9.95	8.3
19a BH Mystic	76.1	25.9	0.6	14.8	6.6	6.19	4.2
Buzzards Bay[A]	374.3	177.5[A]	0	148.0	85.1	74.01	73.7
Cape Cod[A]	394.8	261.1	0	261.1	52.5	33.47	39.9
Charles	310.8	116.9	0.5	64.8	46.5	34.12	34.7
Chicopee	722.2	253.1	214.0	353.2	205.0	201.76	124.1
Concord	399.6	158.9	0	87.4	36.4	28.64	27.1
Connecticut	7,368.6	3,393.5	0	1,866.4	149.2	144.56	115.7
Deerfield	663.5	236.4	0	130.0	3.9	3.77	2.6
Farmington	151.9	46.0	0	25.3	0.0	0	0.0
French	94.7	35.8	0	19.7	4.3	4.22	2.7
Housatonic	500.2	159.2	0.12	87.7	35.6	29.35	18.4
Hudson	219.9	67.2	0	37.0	14.1	10.69	8.6
Ipswich	155.3	53.4	0	29.4	32.8	29.59	24.3
Islands[A]	142.1	94.0	0	94.0	7.4	5.2	6.4
Merrimack	3,902.0	1,667.5	0	917.1	82.3	56.91	57.4
Millers	389.1	120.1	0	66.1	10.9	8.73	7.7
Narr-Mt. Hope Bay	111.9	44.3	12.6	37.0	13.4	12.69	14.3
Nashua	507.8	212.3	138.8	255.6	180.6	167.46	146.4
North Coastal	170.4	46.1	0	25.4	21.9	20.8	18.4
Parker	81.8	26.9	0	14.8	2.5	1.63	2.3
Quinebaug	153.8	57.2	0.4	31.9	5.6	2.69	2.8
Shawsheen	78.1	26.4	0	14.5	5.0	5.01	3.8
South Coastal	240.4	92.9	0	see subbasins	see subbasins	see subbasins	see subbasins
21a North & South Rivers	120.6	42.2	0	23.2	14.4	12.71	13.8
21b South Coastal Shore[A]	119.8	N. A.[A]	0	50.1	33.9	23.97	19.0
Taunton	529.8	244.2	0	134.3	94.2	67.55	67.9
Tenmile	48.6	19.3	0	10.6	12.9	9.99	8.9
Westfield	516.5	152.5	14.9	98.8	56.1	51.1	44.3

[A] Based all or partially on Recharge Method (see Appendix B)

2. Streamflow Criteria

A. Overview

To complement Safe Yield, which establishes an upper limit on water withdrawals on an annual and major basin scale, the SWMI process developed Streamflow Criteria, which will guide WMA permitting decisions over a seasonal time-frame and at a sub-basin scale. Seasonal Streamflow Criteria have been developed for five periods for each of the approximately 1,400 sub-basins that have been delineated by the USGS (Archfield et al., 2010).

Development of streamflow criteria followed a three step process:

1. Determining "Biological Categories" - using the best available science to categorize the existing biological conditions of Massachusetts' flowing water habitats, using fish communities as a surrogate for aquatic habitat integrity;
2. Determining "Groundwater Withdrawal Levels" - the estimated August median streamflow alteration, due solely to the impact of groundwater withdrawals, that corresponds with a change in the biological category of a stream; and
3. Developing seasonal adjustments to the August median Groundwater Withdrawal Levels to reflect the pattern of water use in Massachusetts and the importance of seasonality in maintaining the natural flow of water over time.

B. Determination of Biological Categories

In developing the biological categorization of flowing water habitats in Massachusetts based on the condition of fisheries resources (see Appendix C for a full description), the SWMI Technical Subcommittee relied on statistical analyses, stakeholder input and best professional judgment. Development of biological categories was also based on concepts supported in the scientific literature (Davies and Jackson, 2006) and the results of the USGS report on Factors Influencing Riverine Fish Assemblages in Massachusetts (Armstrong et al., 2011). This type of categorization, which looks at alteration-ecological response relationships, is a key element of the commonly cited Ecological Limits of Hydrological Alteration (ELOHA) framework (Poff et al., 2010).

The relative abundance of fluvial fish, expressed as catch per unit effort (CPUE), was used as a surrogate for the current condition of fisheries resources. CPUE is a widely recognized and accepted fisheries statistic and is an index of fish population density. Generally, for two similar habitats (e.g. those with similar gradient, geology, and watershed size), the one with the higher CPUE, is considered to be of higher quality. The USGS model that estimated fluvial fish relative abundance (Armstrong et al., 2011) was statistically significant and was the best model that incorporated flow, impervious cover, and natural basin characteristics (drainage area, channel slope, and percent sand and gravel).

The fluvial fish relative abundance model is a linear model and produces smooth curves that do not contain inflection or "break" points. Quantile regression and input from the SWMI technical committees and stakeholders was used to delineate categories for management purposes. The result is a series of categories with each category corresponding to different fluvial fish relative abundance with changes in flow and/or impervious surface (Figure 1). It is intended that this model be used as a statewide-screening tool.

C. Description of Biological Categories

i. Category 1 (0 to 5% Alteration of the Range of Fluvial Fish Relative Abundance)
Represents high quality aquatic habitat in the Commonwealth, relatively un-impacted by human alteration (as expressed by impervious cover and flow alteration).

ii. Category 2 (5 to 15% Alteration of the Range of Fluvial Fish Relative Abundance)
Represents quality fisheries resources with good species diversity and balanced, adaptive fish communities.

Biological Category	Biological Alteration %
1	< 5%
2	5 to < 15%
3	15 to ≤ 35%
4	35 to < 65%
5	> 65%

Table 2: Biological Categories

iii. Category 3 (15 to 35% Alteration of the Range of Fluvial Fish Relative Abundance)
Represents fish communities that have exhibited considerable change in the structure of the fish community. Sensitive species may still be maintaining populations but at considerably reduced abundances. More tolerant individuals are likely to dominate fish community structure.

iv. Category 4 (35 to 65% Alteration of the Range of Fluvial Fish Relative Abundance)
Represents fish communities that have undergone reductions in sensitive taxa, fluvial species diversity, and substantive reductions to relative abundance.

v. Category 5 (65% or greater alteration of the Range of Fluvial Fish Relative Abundance)
Represents fish communities that have undergone severe changes to their structure and function.

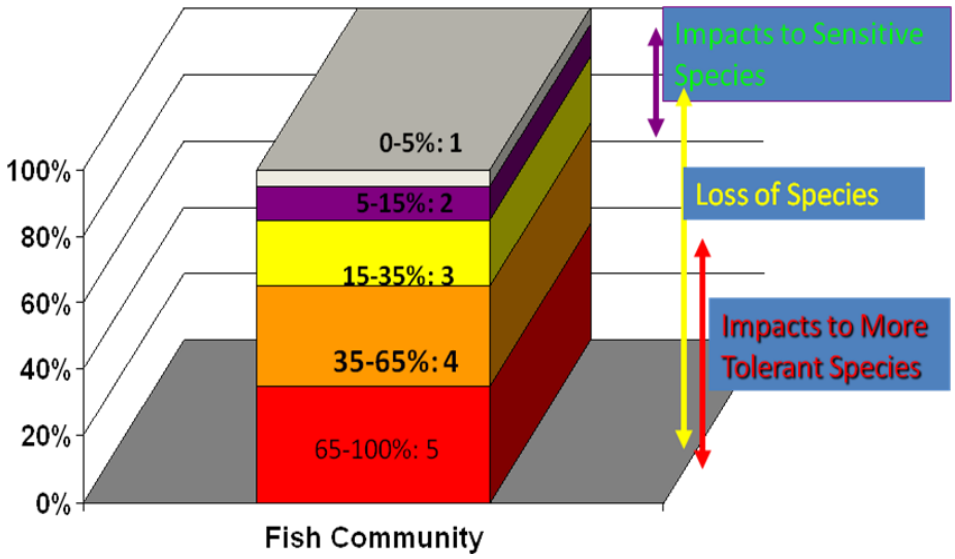

Figure 1: Fish Community Response - % Alteration of the Range of Fluvial Fish Relative Abundance

NOTE: The biological categories are based in part on a statewide model (using actual data) that has been scientifically peer reviewed and validated. However, the variables within the model are either measured from GIS large-scale overlays (impervious surface, watershed area, wetland area) or are themselves modeled (August flow alteration). There may be particular sub-basins in which the variables within the model are less certain and can be obtained in the field. Recognizing this, MassDEP Regulations and guidance based on this framework will give water withdrawal applicants an opportunity to demonstrate that the model has placed a particular location in an incorrect category.

D. Determination of Groundwater Withdrawal Levels

Streamflow Criteria were developed using the Biological Categories that were based on the USGS model (Armstrong et al., 2011) and input from the SWMI Advisory Committee and Technical Subcommittee. The boundaries of the five Biological Categories correspond with the boundaries of estimated August median flow alteration resulting from groundwater withdrawals by holding constant the other three explanatory variables - impervious cover, channel slope, and wetlands buffer area.

Under conditions of low impervious cover (set at a background value of 1%) and holding all other explanatory variables constant, the following breakpoints between Groundwater Withdrawal Levels (GWL) (formerly referred to as "Flow Levels") - the estimated flow alteration in a stream due to the impact of groundwater withdrawals alone - were calculated:

1. 3% reduction of the unaffected August median flow due to groundwater withdrawals corresponded to a shift from Biological Category 1 to 2 and we therefore selected it as the breakpoint between GWL 1 and 2
2. 10% reduction of the unaffected August median flow due to groundwater withdrawals corresponded to a shift from BC 2 to 3 and we therefore selected it as the breakpoint between GWL 2 and 3
3. 25% reduction of the unaffected August median flow due to groundwater withdrawals corresponded to a shift from BC 3 to 4 and we therefore selected it as the breakpoint between GWL 3 and 4
4. 55% reduction of the unaffected August median flow due to groundwater withdrawals corresponded to a shift from BC 4 to 5 and we therefore selected it asthe breakpoint between GWL 4 and 5

For the above calculation, the unaffected flow was determined by using the USGS Sustainable Yield Estimator (Archfield et al, 2010) at the pour point (exit) of the sub-basin and including the flow from any upstream sub-basins. Withdrawals were based on 2000 – 2004 annual average withdrawals for all WMA registered and permitted wells and estimated private well withdrawals in the sub-basin and upstream sub-basins. As outlined in the Mass Water Indicators study (Weiskel et al., 2009) annual average withdrawals were adjusted by a seasonal peaking factor of 115.5% to determine August monthly withdrawals. The percent alteration of August flow was determined by dividing the August withdrawals by the August unaffected flow, which presumes a 1:1 relationship between withdrawals and streamflow reduction. The resulting Groundwater Withdrawal Levels are shown in Appendix E.

Table 3. Groundwater Withdrawal Levels and Associated Impacts to August Median Streamflows

Groundwater Withdrawal Levels (GWLs)	Range of Alteration of Unimpacted August Median Flows due to Groundwater Withdrawal
1	0 to < 3%
2	3 to <10%
3	10 to <25%
4	25 to <55%
5	55% or greater

E. Development of Seasonal Streamflow Criteria from Groundwater Withdrawal Levels

Streamflow criteria are the recommended maximum levels of water withdrawals that protect habitat categories. Groundwater Withdrawal Levels, which provide levels of August median streamflow alteration as a result of groundwater withdrawals and correspond to the Biological Categories, have been adopted as the July-August-September (i.e., summer) Streamflow Criteria. For example, the Streamflow Criteria, or amount of alteration of median August streamflow that could occur in a sub-basin classified as GWL 3 is less than 25%. The summer Streamflow Criteria were then used to develop Streamflow Criteria for other seasonal periods; these will be used in permitting as a guidepost to maintain the magnitude and timing of the natural flow regime through the year. The period of July-August-September represents low flow summer months, the October-November period represents the fall months, the December-January-February period represents winter months, the March-April period is reflective of high flow spring months, and the May-June period represents early summer. The seasons were developed using the months that closely mimicked the bioperiods found in "Characteristics and Classification of Least Altered Streamflows in Massachusetts" (Armstrong et al., 2008, USGS SIR 2007-5291).

Seasonal streamflow criteria were determined for seasons other than July-August-September under two basic assumptions: 1) streamflow alteration is highest in the summer months when demand is high and streamflow is at its annual low; and 2) those basins with higher alteration in August (i.e. higher groundwater withdrawal levels) will also typically have higher alterations in other seasons. For example, a basin with 10% August flow alteration will most often also alter the April streamflow to a greater percent than a basin with an August alteration of 5%. Streamflow criteria for all seasons (Table 4) illustrate that percent alterations in non-summer seasons are typically less than in the summer seasons when demand is highest. Setting seasonal streamflow criteria in this fashion recognizes the pattern of water use in Massachusetts and also recognizes the importance of seasonality in maintaining the natural hydrograph.

Table 4. Seasonal Streamflow Criteria

Groundwater Withdrawal Levels	% Alteration of estimated unimpacted monthly flow from ground water withdrawals				
	Jul-Aug-Sep	**Oct-Nov**	**Dec-Jan-Feb**	**Mar-Apr**	**May-Jun**
1	3%	3%	3%	3%	3%
2	10%	5%	3%	3%	5%
3	25%	15%	10%	10%	15%
4	Feasible Mitigation and Improvement				
5					

3. Baseline

Baseline is a reference point against which a withdrawal request will be compared in order to determine a new or increasing withdrawal. The SWMI baseline will continue to use the same base years used in the existing MassDEP methodology for baseline[1], because this period is not substantially different from the period (2000 to 2004) used by USGS in the estimates of flow alteration.

The new baseline proposal is the higher of 2003-2005 average use plus an additional 5%, or 2005 use, plus an additional 5%. This additional 5% reflects that fact that there may be increases in water use since this time period for new economic growth. If baseline is the registered volume, no additional percentage can be added.

The following qualifiers continue to be in effect:

1. baseline cannot be lower than the registered volume
2. baseline must be in compliance with existing permitted volume
3. baseline cannot be more than the volume provided in new twenty-year water needs forecasts developed by the agencies.

Public water systems (PWS) that are in multiple basins will have separate baselines for each basin calculated as outlined above and a total system-wide allocation allowing no more than these two values combined. The above listed qualifiers will continue to apply. If either value is exceeded, the baseline condition would be considered to have been triggered.

[1] Baseline is currently defined as the volume withdrawn in compliance with the Act during the calendar year 2005, the average volume withdrawn in compliance with the Act from 2003 to 2005, or the registered volume, whichever is the highest.

Part C: Sustainable Water Management Initiative Application to Water Management Act Permitting

Introduction

This part of the document outlines how the key concepts of the Sustainable Water Management Initiative (SWMI) framework described in Part B will be applied to the Water Management Act permitting program. The elements that will be applied and implemented in permitting include:

1. **Water Management Act Permitting for Groundwater –** This describes how the SWMI concepts will be applied in permitting for groundwater withdrawals.

2. **Water Management Act Permitting for Surface Water –** This describes how the SWMI concepts will be applied in permitting for surface water withdrawals.

3. **Offset and Mitigation Measures –** Offset and mitigation measures will be used to minimize and compensate for impacts of increased water withdrawals.

4. **Low Flow Statistic –** A low flow statistic has been developed to guide restrictions on non-essential outdoor water use in Water Management Act (WMA) permits.

5. **Redundant Wells –** A permit that incentivizes pubic water system development of redundant sources to registered-only users.

6. **Basin Planning Consultation –** Coordinating efforts between EEA agencies and water users to consul**t** on the 20-year permit renewal process in a way that fully integrates the SWMI Framework.

1. Water Management Act Permitting for Groundwater - Tiers and Conditions

This section describes enhancements including new levels of review, permit conditions, and options for offsets and mitigation, which will be incorporated into the Water Management Act (WMA) process for permitting groundwater withdrawals. The permitting framework involves a tiered process for reviewing permit applications, offsets and mitigation options (including an evaluation of treated wastewater returns), and consultation with state agencies. The Water Management Act regulations will contain wording making it clear that Safe Yield is not a water allocation scheme. With few exceptions, it is highly unlikely that the full Safe Yield volume will be allocated, given application of streamflow criteria. The language used to convey this intent will be developed in the regulatory process.

Application of the SWMI framework to Water Management Act permitting reflects the following principles:

- Acknowledge critical existing water supply areas and legitimate future need. Existing water supply areas, or those sub-basins that currently provide public water (approximately 492 small sub-basins out of 1395 or 35%) are considered critical areas. In many cases, these areas are also categorized as Groundwater Withdrawal Level 4 or 5.

  Those communities that maintain existing demand and do not ask for water above their baselines will not be required to achieve the numerical Seasonal Streamflow Criteria, but must implement standard WMA permit conditions 1-8 which are part of existing permits (see Appendix G) including the revised condition 6, the 7-day low flow restriction on non-essential outdoor water use.

- Minimize existing water withdrawal impacts, to the greatest extent feasible, taking cost into account, in Groundwater Withdrawal Levels 4 and 5.

- Mitigate increased withdrawals commensurate with impact.

- Protect quality habitats and avoid degrading healthy aquatic habitats. A high level of review is required for areas with high quality natural resources, which includes basins categorized as Biological Category 1, 2 or 3, and basins with cold water fisheries (see Appendix H for definition of CFR or cold water fisheries resources).

- Avoid backsliding out of a Groundwater Withdrawal Level or Biological Category unless there is no feasible alternative, and in that case, mitigate for the increased withdrawal commensurate with impact.

A. Incorporation into Permits

The new permitting regime outlined here applies to both entities who seek to renew an existing WMA permits and entities applying for new WMA permits. In order to determine the level of review and requirements, permittees will work with MassDEP to:

a. Establish its baseline volume (as defined in Part B Section 3) and ascertain whether its request is below or above this baseline volume. Each of these two outcomes is associated with a different set of requirements.
b. Determine the Groundwater Withdrawal Level of its water supply sub-basins using maps developed by the state and found at: http://www.mass.gov/dep/water/resources/swmi.htm.
c. Establish whether the increase in volume requested will cause backsliding to occur (i.e., will result in a drop in either groundwater level or biological category)[2].

The above steps will help put the permittee in one of three review **Tiers** (see Table 5).

Tier 1	No Additional groundwater withdrawal request above baseline and no change in Groundwater Withdrawal Level or Biological Category
Tier 2	Additional groundwater withdrawal request above baseline and no change in Groundwater Withdrawal Level or Biological Category
Tier 3	Additional groundwater withdrawal request above baseline AND change in Groundwater Withdrawal Level and/or Biological Category

Approximately 190 public water supply (PWS) permits are affected by these requirements, and approximately 60 PWS are registered only and not subject to these permit requirements. Of the 190 supplies with permits, about 50 of them are not expected to need additional water and would be considered Tier 1 withdrawals. This leaves, 140 permitted public water supplies which appear to need additional water, making them Tier 2 or Tier 3 withdrawals.

We estimate that 100 public water supplies are subject to minimization requirements because they are in groundwater withdrawal levels 4 and 5. Approximately 110 public water supplies are potentially subject to mitigation requirements because demands are expected to increase and they are located in Groundwater Withdrawal Levels 4 or 5, or are supplied by surface water sources. It is important to note that future needs and DCR projections could change the number and/or the volumes which need to be mitigated.

[2] Note: the SWMI link on the MassDEP webpage contains several datasets, such as the Sustainable Yield Estimator database on water use volumes that will be useful in this determination.

WMA permit conditions for each of the Tiers are as follows:

1) **Tier 1 - Actions required of those staying below baseline**
    a. Minimize impacts of existing withdrawals through demand management, using standard conditions that have been used by approximately half of Massachusetts communities (WMA Conditions 1-8, see Appendix G).
    b. Those above 25% estimated August alteration due to groundwater withdrawals (i.e. Groundwater Withdrawal Levels 4/5s) must further minimize existing impacts to the greatest extent feasible, taking cost into account (as outlined in Table 6)[3].
    c. If a cold water fisheries resource (CFR) is present in the withdrawal sub-basin as mapped by the Department of Fish & Game, they must conduct a desktop pumping evaluation and consult with agencies to minimize impact of withdrawals on CFR.

2) **Tier 2 - Actions required of those asking to increase withdrawals above baseline but not backsliding to a lower biological category or change in groundwater flow level**
    a. Continue Demand Management efforts per 1) a. and b. above.
    b. If in a Groundwater Withdrawal Level 4 or 5, or in a Biological Category 1, 2, or 3, develop a Mitigation/Offsets plan to mitigate the impact of the additional withdrawal above baseline, and implement the plan if/when the withdrawal exceeds the baseline (see Part B Section 3)[4].
    c. Those already above 25% alteration must demonstrate no feasible alternative source if their request for increased withdrawal is greater than 5% of August median flow.
    d. Agency consult may be required if current flow alteration is greater than 25% or the sources are in a sub-basin with SWMI-defined natural resource areas (i.e. BC 1-3) or there is a CFR.

3) **Tier 3 – Actions required of those asking to increase withdrawals above Baseline that result in backsliding to a lower biological category or change in groundwater flow level**
    a. Continue Demand Management efforts per 1) a. and b. above.
    b. Demonstrate that there is no feasible alternative source that is less environmentally harmful.
    c. If in a Groundwater Withdrawal Level 4 or 5, or in a Biological Category 1, 2, or 3, develop a Mitigation/Offsets plan to address the additional withdrawal above baseline, and implement the plan if/when the withdrawal exceeds the baseline (see Part B Section 3).

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[3] The SWMI pilot projects underway in 2012-2013 will inform the EEA agencies on the costs and benefits of a variety of minimization and mitigation options. See Part D.

[4] The SWMI pilot projects are also informing the EEA agencies on how mitigation commensurate with impact could be required and evaluated.

d. Agency consult may be required if current alteration is greater than 25% or your sources are in a sub-basin with SWMI-defined natural resource areas (i.e. BC 1-3) or there is a CFR.

B. Application of the Seasonal Streamflow Criteria

When a WMA permit is issued, a determination will be made of the Seasonal Streamflow Criteria at each of the applicant's withdrawal points (well fields may be considered as a single location). For example, each location will have Seasonal Streamflow Criteria associated with that location's Groundwater Withdrawal Level and Biological Category, (as developed in 2011 using 2000 to 2004 withdrawal data). Existing sources in sub-basins that are classified as Groundwater Withdrawal Level 4 or 5 will evaluate the potential to minimize existing impacts and develop a plan for feasible improvement.

Agency staff will assess the potential impact of the applicant's requested withdrawal increase on the Seasonal Streamflow Criteria. For example, if the entire withdrawal volume were to be pumped from a single well, the impact of that withdrawal will be assessed in terms of how that would affect the achievement of Seasonal Streamflow Criteria in each of the seasonal periods. This analysis will be used to determine if "backsliding" would occur as a result of the proposed increased withdrawal. Backsliding refers to conditions that would put a stream into the next lower level of either the Groundwater Withdrawal Level (in any season) or Biological Category (for example, from Biological Category 3 to 4). New or increased withdrawals with seasonal flow alterations above those listed for Groundwater Withdrawal Level 3 or with proposed backsliding will only be permitted with a demonstration that no feasible alternative source is available that is less environmentally harmful.

C. Site Specific Study

A permittee has the option of doing a site-specific study to demonstrate that local conditions are significantly different from those that are reflected in the statewide Groundwater Withdrawal Level and Biological Category as shown on the SWMI maps. (SWMI maps and data can be viewed at: http://www.mass.gov/dep/water/resources/swmi.htm). The EEA agencies are currently utilizing the pilot study to develop a methodology for this option.

Table 5. WMA Permit Tiers for Groundwater Withdrawals

NOTE: All permits require Standard Permit Conditions for all surface and groundwater withdrawals. These include conditions such as 65 rgpcd, 10% UAW, outside water use restrictions, and standard conservation BMPs.

			SPECIAL CONDITIONS	
	PERMIT REVIEW TIERS	**REVIEW THRESHOLDS**	**RESOURCE SPECIFIC CONDITIONS AND AGENCY CONSULTATION**	**SEASONAL GROUNDWATER WITHDRAWAL LEVELS 4 and 5**
No Change in Groundwater Level[B] or Biological Category[C]	**Tier 1**	No additional withdrawal request above baseline	If a CFR is present in GWL 4/5, conduct a desktop pumping evaluation and consult with agencies to minimize impact of withdrawals on CFR	Overall Concept: **Minimize** existing impacts to the greatest extent feasible[A] I. Evaluate the following potential actions to develop a plan based on improvement and feasibility: 1) optimization of existing resources; 2) use of alternative sources, including sources available to meet seasonal needs; 3) interconnections with other communities or suppliers; 4) releases from surface water impoundments; 5) outdoor water restrictions tied to streamflow triggers; 6) implementation of reasonable conservation measures consistent with health and safety; 7) New England Water Works Assoc. BMP toolbox; 8) other measures that return water to the sub-basin or basin intended to improve flow. II. Implement the plan
	Tier 2	Additional withdrawal request above baseline	Consult with agencies if CFR is present or if in BC 1, 2, or 3 to evaluate and implement feasible mitigation[D], commensurate with the impact from the additional withdrawal to ensure that streamflow criteria are met	**Minimize** impacts by implementing Tier 1 Conditions. **Mitigate** impacts commensurate with impact from additional withdrawal[D], in consultation with agencies Demonstrate no feasible alternative source that is less environmentally harmful[E], if additional withdrawal is greater than 5% unimpacted August median flow

	PERMIT REVIEW TIERS	**REVIEW THRESHOLDS**	**SPECIAL CONDITIONS**
If Backsliding is Proposed	**Tier 3**	Additional withdrawal request above baseline, AND Seasonal Groundwater Withdrawal Level[B], and/or Biological Category change	All Groundwater Levels - Demonstrate no feasible alternative source that is less environmentally harmful[E] Groundwater Levels 4 and 5 - Tier 1 Conditions apply. **Mitigate** impacts commensurate with impact from additional withdrawal[D], in consultation with agencies In Natural Resource areas such as BC 1, 2 or 3, or CFR - Evaluate and implement feasible **mitigation**[D], commensurate with impact from additional withdrawal, based on consultation with agencies

A) In determining if an action is feasible, the following should be taken into consideration: level of improvement; costs; the purview that is under the authority of the permitee, and adaptive management

B) Groundwater Withdrawal Level is Seasonal Streamflow Criteria - see Table 3

C) Biological Categories - see Table 2

D) From Offsets/Mitigation Table - see Table 6

E) ".....source that is less environmentally harmful" is defined as a source that is not in a groundwater level 4 or 5, and with excess capacity where additional withdrawal would not result in backsliding to a more altered groundwater level (e.g., groundwater level 2 to groundwater level 3).

2. Water Management Act Permitting for Surface Water

Recognizing that the USGS report (Armstrong et al., 2011), upon which the Biological Categories and the Groundwater Withdrawal Levels were based, evaluated the association of fluvial fish relative abundance and groundwater withdrawals but did not include an analyses of surface water reservoirs or withdrawals, WMA permit applications for surface water withdrawals shall be evaluated separately from groundwater withdrawals. The following will be applied to permits of surface water withdrawals:

For surface water withdrawal requests, applicants shall be required to comply with WMA standard permit conditions 1-8, including the revised condition 6 regarding the 7-day Low Flow restriction on outdoor water use (See Part C Section 4). Applicants who wish to develop watering restrictions different from those described in the standard permit conditions will be required to develop drought and demand management plans and tie outdoor watering restrictions to these plans. Applicants will also need to evaluate the feasibility of implementing releases of water in order to improve down-streamflow and mimic the natural hydrologic regime.

For requests above baseline, in addition to the standard WMA permit conditions, applicants will mitigate impacts commensurate with impact from withdrawal, in consultation with agencies; will develop drought and demand management plans; and will evaluate the feasibility of implementing releases.

As surface water impacts are evaluated, findings will be incorporated into future permit requirements.

3. Offsets and Mitigation

As described in Part C Section 1 of this framework, WMA permits will require mitigation commensurate with impacts, taking into account cost and feasibility.

Working in consultation with the agencies, permittees can choose from six categories of offset/mitigation actions (Table 6):

1. In-streamflow improvement
2. Habitat improvement
3. Wastewater improvement
4. Stormwater/impervious cover
5. Water supply management
6. Demand management

Permittees that are able to quantify their offset/mitigation measures and demonstrate a gallon-for-gallon replacement will be presumed to satisfy the "mitigation commensurate with impact" requirement. For measures where precise quantification is more difficult, proponents will ensure that the proposed mitigation measures are commensurate with the impact of the withdrawal by using other options from the offsets/mitigation table. While some options in Table 6 may be difficult to quantify, they offer the potential benefit of improving flow and aquatic health, and proponents are strongly encouraged to consider those measures. In addition to the options in Table 6, proponents may propose other actions for review and approval through the consultation process with the agencies.

The process for evaluating mitigation projects continues to be studied and developed through the pilot studies. It is expected that in general, priority will be given to mitigation projects that are near the source of impact as opposed to further away. Furthermore, in recognition of the fact that many communities have already taken pro-active and effective measures, mitigation projects implemented within the previous 5-year period and that continue to provide a benefit today will be considered, consistent with the principles identified in this section.

The general sequence of steps is as follows:

1. Compute volume of water requested above baseline.
2. Evaluate wastewater returns to determine whether any mitigation credit can be given and subtract that from the amount determined in step 1. The methodology for accounting wastewater returns is being informed by the pilots. For NPDES surface water discharges, the following is proposed as an interim approach:

a. Evaluation will be provided by agency staff on a case by case basis as part of permitting.
b. Groundwater withdrawals must be downstream of permitted wastewater discharges (NPDES) return and under the influence of the river segment that is receiving the return.
c. Credit will be capped at 100% estimated natural August median flow or less. If a segment is surcharged (resulting from the discharge of wastewater) beyond 100%, the additional credit above 100% cannot be applied.
d. The NPDES credit will be applied after groundwater withdrawal level and permitting tiers assignment.

3. The amount that remains is what needs to be mitigated. Develop a proposal for mitigation actions and quantify offset/mitigation volumes, where possible.
4. Consult with agencies on proposed approach.

Table 6: Offset and Mitigation

CATEGORY	OFFSET / MITIGATION ACTION
INSTREAM FLOW	For surface water withdrawals downstream releases of at least August Q75 flows from May to September (w/o affecting ability to meet demands)
	For surface water withdrawals downstream releases of at least August Q90 flows from May to September (w/o affecting ability to meet demands)
	DFG-approved releases in non-summer months to support fish migration
WASTEWATER IMPROVEMENT - NEW	Additional wastewater recharge through septic or treated groundwater discharge
	I/I removal
STORMWATER / IMPERVIOUS COVER IMPROVEMENT	Recharge stormwater (through approaches such as LID, urban tree planting, etc.)
	Adopt a stormwater utility
	Adopt MS4 requirements for municipality not subject to MS4
	Implement MS4 requirements for municipality subject to MS4
	Remove impervious cover or disconnect effective impervious area
WATER SUPPLY IMPROVEMENT	Adopt an Enterprise Account
HABITAT IMPROVEMENT	Install and maintain a fish ladder
	Remove a dam or other flow barrier
	Acquire/protect water supply or high quality natural resource lands
	Replace/resize identified culverts to improve habitat connectivity
	Restore stream buffers
	Establish and/or contribute into a mitigation fund for aquatic habitat restoration
DEMAND MANAGEMENT	Adopt ban on non-essential seasonal water use
	Adopt a water bank
	Adopt bylaw to extend water use restrictions to private wells (if the community has a large number [> x%] of private wells)
	Adopt DEP-approved conservation water rates
	Increase billing frequency based on actual meter readings to monthly billing
	Install new radio-read (remote) water meters
	Reuse wastewater
	Achieve higher rates of water efficiency: 50/55/60 rgpcd
	Adopt best available technology bylaw for irrigation systems
	Provide water saving devices (faucet aerators & low flow showerheads)
	Provide rebates for watersmart appliances
	Adopt 1 day/week calendar or 0 day/week streamflow trigger
	Increase billing frequency based on actual meter readings from less than quarterly to
Other	Industrial, Commercial or Institutional Water Conservation Program
OTHER	Implement project(s) as scoped and coordinated with environmental agencies
	Additional action(s) proposed by community with points determined through the consultation process

* depending on location and amount

Note: Credits will be considered for measures implemented within the previous 5-year period. Credits will also be considered if measures were implemented previously and are still in effect.

4. Low Flow Statistic - Application of a low-flow statistic for restrictions on non-essential outdoor water use in WMA permits (Modifying Existing Standard Permit Condition 6)

Concept: To increase sensitivity to streamflow impacts, rely on a low-flow statistic instead of the current drought advisory declaration to trigger more restrictions on appropriate non-essential outdoor water use.

Background: Currently, public water supplies (PWS) can choose to use either a streamflow trigger or a time-of-year trigger (known as a "Calendar Trigger") to determine the extent of outdoor watering. Those choosing to use the Calendar Trigger for implementing water use restrictions are also subject to a drought trigger that results in greater restrictions for those PWS not meeting the limit on residential water use of 65 gallons per capita per day (RGPCD) (i.e., non-essential outdoor watering decreases from 2 days to 1 day per week).

The current drought trigger is based on the state's Drought Management Plan and it requires more stringent measures when a Drought Advisory or higher is declared. This drought declaration process includes review of seven indices including monthly streamflow, ground water levels, fire danger, and crop moisture index. However, not all indices are streamflow related, and these can sometimes result in a drought declaration that is less responsive (i.e., slower to go into effect and slower to expire) at the local level than it might be if it considered streamflows alone by relying on a low-flow statistic.

Low-flow statistics: Through SWMI, the state is proposing a trigger that is more reflective of local low-flow streamflow conditions by using a low-flow statistic. Once the low-flow statistic is triggered at the gage that is associated with a permit, the community/water user will be expected to impose more stringent streamflow conditions as outlined in the table below.

Several low flow statistics were considered. The median value of annual 7-day low flows for the period of record for a local USGS gage (referred to as the "7-day low-flow statistic" or "7-day LF") was the statistic of choice and will be used to replace the existing WMA Standard Permit Condition 6, which restricts non–essential outdoor water use. Other statistics that were evaluated include 7Q10, no increase in zero-flow days, and USGS 7-day streamflow.

Table 7 compares the current approach to the proposed new trigger and associated outdoor watering restrictions.

Table 7. Outdoor Water Use Restrictions

CURRENT APPROACH

	CALENDAR TRIGGER		STREAMFLOW TRIGGER		
	Starting on May 1	**If Drought Advisory Declared**	**flow above ABF**	**flow below ABF**	**If Drought Advisory Declared**
Below 65	7 days (no 9 to 5)	7 days (no 9 to 5)	7 days (24 hrs)	7 days (no 9 to 5)	7 days (no 9 to 5)
Above 65	2 days (no 9 to 5)	1 day (no 9 to 5)	7 days (24 hrs)	1 day (no 9 to 5)	1 day (no 9 to 5)

NEW APPROACH[a]

	CALENDAR TRIGGER		STREAMFLOW TRIGGER		
	Starting on May 1	**Low Flow Trigger activated**	**flow above ABF**	**flow below ABF**	**Low Flow Trigger activated[c]**
Below 65[b]	7 days (no 9 to 5)	1 day (no 9 to 5)	7 days (24 hrs)	7 days (no 9 to 5)	1 day (no 9 to 5)
Above 65[b]	2 days (no 9 to 5)	1 day (no 9 to 5)	7 days (24 hrs)	2 days (no 9 to 5)	1 day (no 9 to 5)

[a] Surface water suppliers with a MassDEP-approved drought management plan that includes environmental considerations shall implement restrictions based on those approved in that plan. Those with existing permit conditions requiring water use restrictions more restrictive than those proposed above may be required to maintain existing permit conditions.
[b] Based on reported RGPCD from previous year annual statistical report.
[c] Proposed low-flow trigger is annual 7 day low-flow, calculated from period of record for local gage.

5. Redundant Wells

The SWMI framework encourages optimization of water supply sources so that withdrawals will have the least impact on streamflow. The EEA agencies encourage registered users to take a similar approach and will facilitate public water system development of "redundant" sources that address public health and safety concerns or provide environmental benefits through optimization.

Definition

Redundant Well permits are for registered-only users seeking to develop a redundant well. To be considered a redundant well the source must either address a particular public health and safety concern (and not cause any additional environmental impact) or provide a net environmental benefit. Also, it should not increase overall withdrawal volumes. Note that a redundant well is not a replacement well as defined by Chapter 4 of the Drinking Water Guidelines. Redundant wells must be located within the sub-watershed (defined at the Hydrologic Unit Code 12 scale (HUC-12)) as the original source. Redundant well permit applications shall be reviewed and implemented under the Water Management Act in the manner described below.

Implementation

Applicants for redundant wells will need to complete the standard required elements of the Source Approval Process and Water Management Program as outlined in Chapter 4 and Chapter 10 of the Drinking Water Guidelines. The information necessary to complete the Source Approval Process addresses many of the issues considered in the Water Management Act permit application process. Included in this review will be an evaluation of the redundant well's compliance with the streamflow criteria and its ability to improve the streamflow impacts of the applicant's existing authorized sources. These reviews occur concurrently and, as such, Water Management Act permit applications must be submitted at the same time as the Source Final Report. During the Water Management Act permit application review process the project proponent shall make a demonstration that the redundant well is necessary to address public health and safety concerns (and will not cause any additional environmental impact) or provides a net environmental benefit.

Conditions to address site specific environmental concerns identified in the permit process may be applied to redundant wells as necessary, as has historically been done in Water Management Act permits. The volume of withdrawals from the redundant well in combination with the existing wells shall not exceed the three-year rolling annual average of withdrawals from the registered source(s) within the HUC -12. The three-year rolling annual average shall be determined based on the three calendar years preceding the date of application for a redundant well.

This permit is available only to registered users seeking to develop a redundant well after promulgation of revised WMA regulations. Existing permittees with sources that may now be considered redundant and with no additional volumes allocated in their permit will continue to be subject to the system-wide conditions included in their permit now or as amended.

MassDEP is considering modification of Chapter 4 of the Guidelines and Policies for Public Water Systems to facilitate siting of replacement wells. The modification could provide that a well that is installed within 50-500 feet of an existing well may be permitted as a replacement well project, which receives a simplified Source Approval permitting process, as described in Section 4.15 of the Guidance.

6. Basin Planning Consultation

Approach for 20-Year Permitting and Outreach and Consultation

The Water Management Act regulations established a rolling schedule for permitting in Massachusetts' 27 major river basins. Permitting began in 1988, with all twenty-year permits within a river basin scheduled to expire at the same time. However, it is important to note that in recent years, the original schedule for the river basins has been modified as the result of two-two year-extensions on permits provided for in the Permit Extension Act. This has resulted in an extension of all permits for a total of 4 years beyond their original expiration dates. Water Management Act permits extended by the Permit Extension Act will now begin to be renewed on a staggered schedule starting in 2014.

Implementing SWMI through the Water Management Act permitting process will require an enhanced process to develop appropriate permit conditions. The following outlines the proposed schedule for consultation among the permittees and EEA agencies to develop mitigation measures, and for outreach to permittees to ensure they understand the process and have sufficient time to develop the information needed to renew permits.

Existing Outreach Meeting

Historically, MassDEP and DCR have conducted a 20-Year Permit Renewal Outreach Workshop six months in advance of a basin's permit expiration date. Permit holders, municipal officials, watershed organizations, and other stakeholders are invited to this meeting, where DCR and MassDEP discuss the renewal and demand projection process and answer questions. DCR prepares draft water demand projections for the PWS prior to this initial meeting. One-on-one meetings with permit holders are held before or after the meeting, as necessary.

Revised Outreach Meeting

MassDEP, in cooperation with other EEA agency staff, expects to conduct a 20-Year Permit Renewal Outreach Workshop as described above but on a different schedule, and will expand the discussion to include the SWMI Framework (Groundwater Withdrawal Levels, Biological Categories, and general minimization/mitigation measures). The goals of the basin-wide workshop will be to provide an overview of:

1. The water needs forecasting policy and methodology
2. The WMA permit renewal process
3. The science and policy of SWMI:
    a. Help stakeholders (especially permit holders) understand the SWMI Framework and GWL/BC of their sub-basins;
    b. Outline potential individual actions that have been identified by agency staff that could improve environmental conditions (including GWL, BC, CFR) within the watershed;

c. Outline opportunities to address cumulative basin impacts that have been identified by agency staff;
d. Outline how potential minimization/mitigation options and costs will be incorporated into the permit renewal review;
e. Outline the minimization/mitigation consultation session that will be part of the permit renewal process for permittees with withdrawals that impact Quality Natural Resource Areas (BC 1, 2, and 3) or areas with flow or biological problems (GWL/BC 4 and 5);
f. Outline how permittees will develop information about specific minimization/mitigation options and costs as part of the permit renewal process (Information will be requested in the Order to Complete that is prepared as part of the permit renewal process.); and,
g. Identify ways in which communities can lower their respective minimization or mitigation costs by acting collectively, e.g. a multiple-municipality approach to developing a new water supply or connecting to an existing system.

Revised Process and Estimated Timelines

1. 15 – 18 months in advance of the basin permit expiration date, inter-agency (MassDEP, DCR, EEA, DFG) staff will meet to review water demand projections prepared by DCR staff and have a discussion on general and basin-specific areas of concern. Discussion will center on existing basin status (GWL, BC), identification of Quality Natural Resource Areas (BC 1, BC 2, BC 3, and CFR) and flow- and biologically-altered areas (GWL 4 and 5, BC 4 and 5), options for meeting current and future water demands, alternatives, general minimization and mitigation options, and other environmental considerations. This meeting will help agency staff prepare for the Outreach Workshop, consultation session, and permitting, especially issues to be addressed in Orders to Complete that will be required of permittees as part of the permit renewal process.
2. 12 - 15 months in advance of the basin expiration date, the Outreach Workshop will be held.
3. Between 12 and 9 months in advance of the basin expiration date, staff would schedule individual town consultation sessions for permittees with withdrawals that impact Quality Natural Resource Areas or GWL 4/5. A consultation session worksheet (to be developed) would have previously been discussed and distributed at the Outreach Workshop. This worksheet will include information permit holders will bring to, or at least be prepared to discuss at, their individual consultation session if one is required. Efforts will be made to include other local stakeholders (such as environmental groups) that have expertise and information on mitigation options and can help inform and enhance the actions the towns can take.

4. 9 - 12 months in advance of the basin expiration date, the permit renewal application will be filed. (Note this will require a regulation change since renewal applications are now required to be filed 3-4 months in advance of the expiration date.)
5. Consultation sessions continue.
6. 6 - 9 months in advance of the of the basin expiration date, Orders to Complete will be issued, with a 3-month deadline for permit holders to respond.

Part D: SWMI Implementation

1. Pilot Application of SWMI

Goal

The goal of the pilot analyses is to evaluate how the SWMI framework will be applied to a diverse and select group of communities so that mitigation and minimization opportunities and costs of potential actions will be better known to the communities and agencies. The process of developing regulations is occurring on a parallel track. As the regulations will codify how the SWMI framework will be implemented, the pilot analyses can inform and guide their development. MassDEP reiterates that it will not issue the regulations in final form until the pilots are reasonably completed.

Pilot Communities

Four public water suppliers are participating in the Pilot Project: Amherst, Danvers-Middleton, Dedham-Westwood, and Shrewsbury. Their water supply sources represent a broad range of environmental conditions including varying volumes of water withdrawals relative to the August median streamflow, varying wastewater disposal methods (i.e., on-site domestic septic systems versus large surface water discharges), groundwater supply sources located in one or multiple major basins, presence or absence of cold-water fisheries resources, and varying Groundwater Withdrawal Levels (GWL) and Biological Categories (BC).

Scope of Work

MassDEP and the other EEA agencies have been working with a consultant team who has been evaluating the draft SWMI Framework for MassDEP Water Management Act permitting for four Public Water Suppliers (PWS) in a voluntary, non-binding exercise.

Phase 1 tasks include:

1) Gather background data and identify existing studies;
2) Evaluate how to take wastewater discharges into account;
3) Evaluate minimization of impacts in Groundwater Withdrawal Level 4 and 5 sub-basins;
4) Evaluate options for mitigating and offsetting proposed water withdrawal increases;
5) Coordinate with PWSs, Watershed Groups, and EEA Agency Staff; and,
6) Prepare a Phase 1 Draft Report.

Phase 2 tasks include:

1) Supplement activities from Phase 1;
2) Desktop pumping evaluation, optimization, and evaluating alternative sources;

3) Mock permitting exercise and consultation with EEA agencies;
4) Conducting a data review and preparing a scope of work for a site-specific study;
5) Creating a SWMI evaluation data checklist;
6) Coordinate with PWSs, Watershed Groups, and EEA Agency Staff; and,
7) Prepare Phase 2 Draft and Final Reports.

Details on some key components of the tasks which are underway are summarized below.

Provide options for desktop pumping evaluation, optimization, and evaluating alternative sources.

Through the SWMI process, the agencies have called for a number of procedures that are difficult to define with precision but which are intended to be used during the evaluation of impacts, minimization options, and mitigation options. The consultant will provide guidance, worksheets, and/or templates on how to conduct desktop pumping evaluations or optimization requirements in the four pilot communities. The optimization assessment will include an evaluation of the potential to preferentially pump wells near enough to surcharged streams to take advantage of induced infiltration. These evaluations are not intended to involve fieldwork, but should provide the water supplier and agencies with potential source operational procedures intended to minimize impacts to sub-basin streamflow while recognizing other constraints associated with the needs of a water supply system. The consultant will provide guidance on optimization and on evaluating existing potential alternative sources for water suppliers in the four pilot communities. The consultant will identify any existing tools or templates that will facilitate a desktop pumping evaluation and optimization evaluation.

Mock permitting exercise and consultation with EEA agencies.

Under the Draft Framework, permittees in certain tier levels may be required to mitigate impacts commensurate with withdrawals. The mitigation requirements will be determined in consultation with EEA agencies. For the pilot study, MassDEP has chosen one of the four PWSs to participate in a mock permitting exercise, including necessary consultation sessions with the EEA agencies to identify potential minimization/mitigation options. This mock permitting exercise will identify what minimization/mitigation activities would be considered feasible for the PWS if they were to seek an increased withdrawal volume, and provide estimates of the costs and benefit of such activities. The consultant will document the SWMI-related permit conditions, including mitigation and minimization activities and a possible implementation schedule. The mock SWMI-related permit conditions will be developed in coordination with MassDEP, the Department of Conservation and Recreation (DCR) and the Department of Fish and Game (DFG).

Site-Specific Study

In consultation with its sister agencies, MassDEP will establish a process for an applicant to do a site-specific evaluation of streamflow and aquatic habitat conditions in the applicant's basin. This may include one or both of the following: (1) reviewing the data input to the USGS studies from which the Flow Level and Biological Categories were derived for data accuracy and for significantly changed pumping conditions and/or; (2) performing a site-specific study to assess streamflow and habitat conditions.

2. Financial Support and Incentives

Recognizing that meeting new WMA permit requirements may necessitate additional investments by public water suppliers, EEA and its agencies will facilitate the implementation of the Sustainable Water Management Initiative through the use of appropriate and available financial supports.

Role of Incentives
Incentives will provide communities or water suppliers with assistance to implement measures that are otherwise costly and that can motivate implementation of other measures that support sustainable water management and aquatic habitat - such as removal of a dam that is not used for a water supply reservoir or for flood control purposes.

Types of Incentives
Potential Mitigation Financing Sources: EEA and its agencies agree with the SWMI Advisory Committee that it would be most desirable to identify sources of funding to support implementation of SWMI related projects, such as habitat or streamflow improvement and mitigation. EEA has identified new sources of funds, potentially available between FY12 and FY16, for this effort. Specifically, the Patrick Administration's 5-year capital budget plan includes approximately $11M in funding in FY-12 to FY-16 to assist communities and water suppliers in implementing the new requirements. A $1M grant program for FY-13 is currently underway. EEA encourages this grant program and other initiatives to build off of the "Go-With-The-Flow" program described below.

EEA will also work with the Legislature to include authorizing language for capital expenditures to support sustainable water management efforts in future Environmental Bond Bills.

Go-With-The-Flow
EEA and its agencies support the concept of the Go-with-the-Flow program, proposed to the SWMI Advisory Committee by the Massachusetts Water Works Association. Ideally, the program would be modeled after the Commonwealth's Green Communities Program with eligibility requirements for participation and funding for participants to implement measures that protect, enhance and restore rivers and streams in Massachusetts. Alternatively, the program could use a preferential scoring system to direct funding to those municipalities or water suppliers who meet specific criteria. This is similar to the past practice of using Commonwealth Capital scores in the awarding of state agency grants and loans.