

**The 2014 Massachusetts Water Management Act regulations:
A primer for conservation groups**

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Disclaimer

The Massachusetts Rivers Alliance is solely responsible for the content of this primer.

1. Introduction

In 2014, the Massachusetts Department of Environmental Protection (MassDEP) issued revised Water Management Act (WMA) regulations designed to achieve a better balance between human water needs and the health of rivers and streams. These regulations were developed as part of the Commonwealth's multi-year Sustainable Water Management Initiative, aka "SWMI", which started in 2010, and used science and modeling tools to better understand how water withdrawals affect stream flows and habitat for riverine ("fluvial") fish like Tessellated Darters and Fallfish, that need flowing water for all or part of their life cycle. The Sustainable Water Management Initiative was launched primarily in response to lawsuits filed against MassDEP claiming water withdrawals caused sections of some rivers and streams, notable the Ipswich River, to chronically dry up.

The purpose of this primer is to provide people who are concerned about rivers, streams, fish and groundwater with a basic understanding of the 2014 WMA regulations and how to use them. For those seeking official, detailed and comprehensive information about the regulations, please refer to MassDEP's *Water Management Act Permit Guidance Document* (November 7, 2014) and the revised WMA regulations at [310 CMR 36:00](#).

This Primer focuses on three key purposes of the Sustainable Water Management Initiative and the revised WMA regulations:

- 1) - Minimize existing water withdrawal impacts in already impacted areas,
- 2) - Mitigate increased withdrawals commensurate with impact, and,
- 3) - Protect quality habitats and avoid further degrading unhealthy aquatic habitats.

Jargon alert

The terms used in the revised regulations are challenging, but the primer uses them because understanding and navigating the WMA permitting process requires a basic knowledge of this regulatory language. The primer, however, tries to explain the key regulatory and scientific terms in a manner that will be helpful to the reader.

Acknowledgements

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2. SWMI Interactive GIS Map – the starting place

Assessment – Do the map!

Before getting involved with the permitting process, you need to find out what water withdrawals are taking place in your area of interest, be it a large watershed, a wildlife sanctuary, a parcel of conservation land, or your own backyard. You also need to learn how these withdrawals are affecting streamflows and the quality of riverine fish habitat in your rivers and streams.

One of the best ways to find out is to do an online mapping exercise. You will need internet access, and a computer with Adobe Flash Player 10 or higher, and JavaScript enabled in your browser. If you have any difficulty using the map, contact Richard Friend at MassDEP richard.friend@state.ma.us or call (617) 654-6522. If you or your organization have GIS capability and would like to make your own maps using data layers from the SWMI map, contact Brian Brodeur at MassDEP Brian.Brodeur@State.MA.US or call #617-574-6802.

Two points of information before you get started.

August Medians

While doing the mapping exercise, keep in mind that most of the key information in the map is based on August median streamflow, groundwater withdrawals, and surface water and groundwater discharge data. Why August and why median data? August represents the late summer period of July – September, when streamflows are naturally at their lowest due to high rates of water use, evaporation and transpiration, and fish and other aquatic life are most stressed. Median values represent the midpoint in a range, where 50 percent of the values are greater than the median and 50 percent are less than the median, which is considered most representative of actual conditions.

Streamflow Criteria

Streamflow criteria will be mentioned during the mapping exercise and are an important feature of the revised WMA regulations. They establish limits of allowable environmental degradation caused by groundwater withdrawals. There are essentially two kinds of streamflow criteria, those that limit impairment of riverine fish communities known as the “Biological Categories,” and those that limit depletion of natural streamflows in August and other bioperiods known as “Groundwater Withdrawal Categories.” They are calculated at the subwatershed or subbasin scale, and based on the total of all applicable upstream withdrawals.

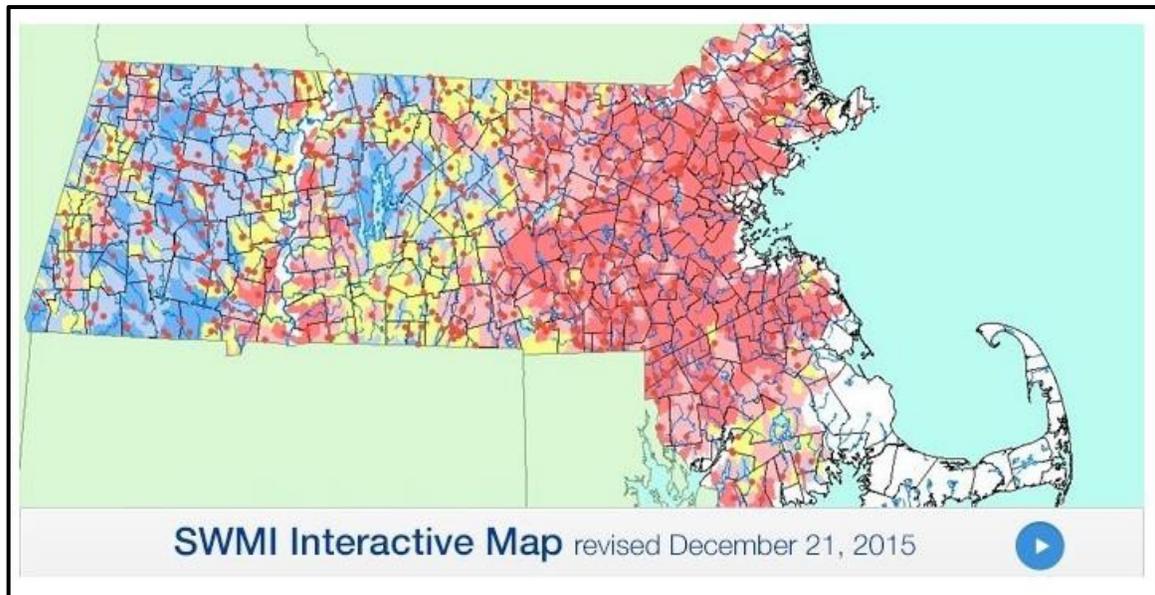
These streamflow criteria have a number of caveats. They do not apply everywhere in Massachusetts and only affect groundwater withdrawals permitted under the WMA. In addition, they do not automatically prohibit WMA permit applicants from proposing increased groundwater withdrawals that would violate the applicable streamflow criteria.

Despite these and other limitations, the streamflow criteria should help us to protect high quality aquatic habitats in the state’s rivers and streams, and prevent further damage to areas already impacted, but not severely degraded, by groundwater withdrawals.

The description of the streamflow criteria at 310 CMR 36.14(1) in the revised WMA regulations is provided on page 40 of the primer.

Find the SWMI Interactive GIS Map

Begin by going to MassDEP's web page titled, "[SWMI Technical Resources](#)" and find the [SWMI Interactive GIS Map](#). This map allows you to view multiple data types by displaying or hiding different data layers. Take a minute to look at the map. Where is your place of interest? What is the dominant color in that part of the state? Next click on the link above the map to the two-page PDF document titled "[Instructions for Using the SWMI Interactive GIS Map](#)." Review it.

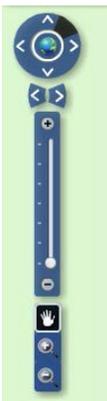


Zoom into your area of interest

Click on the [SWMI Interactive GIS Map](#) itself, or the white arrow in the blue circle in the lower right-hand corner of the map. Then click "OK" on the blue disclaimer box.

Navigation Tool

Next, find the Navigation Tool in the upper left hand corner of the screen, and zoom into your area of interest. Double-clicking a point on the map will center and zoom into it. Clicking on the hand symbol allows you to grab the map and move it manually in any direction on your screen.



Find an address

Another option for locating places on the map is to use the *Find an address* tool located in the menu of tool icons along the top of the map. Click on its red bullseye button icon and enter a street address, including town, state and zip code. This tool won't work without a zip code. This tool is your best bet for finding a precise location, because the SWMI map does not include a map layer for roads.



Find the “Map Contents” box

Find the **Map Contents** box, which is located in the lower left corner of your screen. Expand the box to see all the major map layers. It can be moved to any location on your screen.



View the seven key map layers

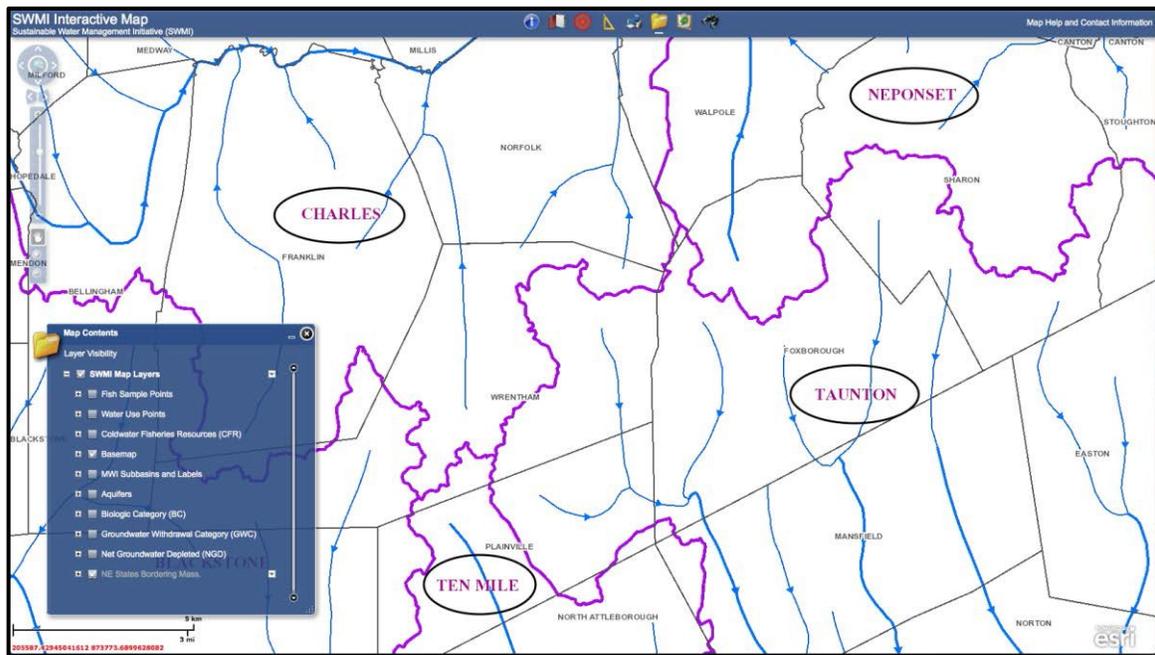
Seven of the nine map layers in the **Map Contents** box contain information critical to the environmental protections incorporated into the revised WMA regulations. They are:

- Basemap
- MWI Subbasins and Labels
- Water Use Points
- Biologic Category (BC) – Should be “Biological”
- Groundwater Withdrawal Category (GWC)
- Net Groundwater Depleted (NGD)
- Coldwater Fisheries Resources

You can add six of these layers to the map by clicking on the box to the left of each layer’s name. “Basemap” is visible by default. The regulatory significance of each layer will be explained in the text.

Basemap

The “Basemap” map layer is displayed by default when you open the map, and actually comprises four other map layers called “Flow lines,” “Town Lines,” “Major Watersheds,” and “Hydrography.” You can see them by clicking on the “+” sign to the left of the checkbox. All but “Hydrography,” which shows rivers, streams, lakes, ponds and wetlands, are displayed automatically when you open the map. To turn any of these four layers on or off, click the “+” (plus sign) next to the left of the “Basemap” layer.



Screenshot of four Major Watersheds (Basin) boundaries with names circled.

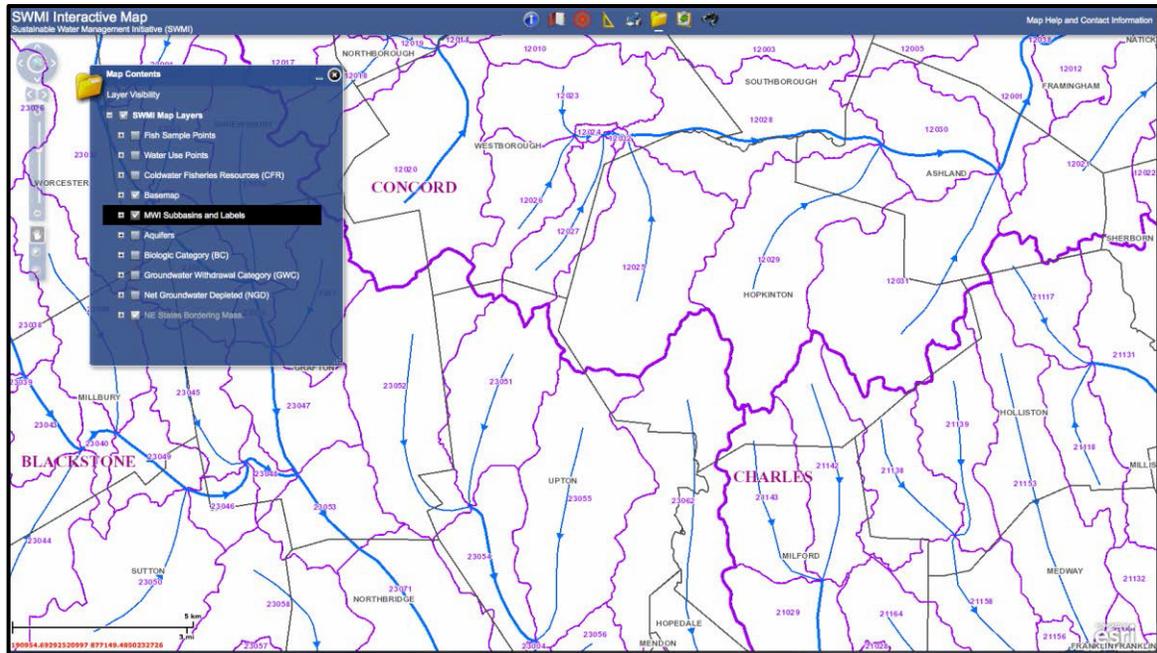
Why the “Basemap” layer is important

“Basemap” and the “Major Watersheds” map layer within it, display the boundaries of the state’s 26 major watersheds, which are more commonly called “Major Basins” or “Basin,” and appear as heavy purple lines labeled with purple capitalized river names such as “NEPONSET,” “CHARLES,” “TAUNTON,” and “TEN MILE.” MassDEP issues and renews WMA permits by Basin. This is because WMA regulations require MassDEP to assess the cumulative impacts of all WMA withdrawals on the total volume of water available in that Basin during a drought. In addition, the WMA regulations established most permit expiration dates according to Basin location.

MWI Subbasins and Labels

Click on the map layer called “MWI Subbasins and Labels” in the **Map Contents** box. You may need to zoom further into the map see the subbasin boundaries and their 5-digit codes or labels. Notice that more blue flow lines and arrows appear as the subbasins are displayed and enlarged. (If “Flow Lines” are not visible, expand the “Basemap” map layer and check “Flow Lines” to display them.)

This layer shows the boundaries of approximately 1,500 subwatersheds within the major watersheds or basins called “subbasins.” The acronym “MWI” stands for “Massachusetts Water Indicators,” which is itself the abbreviated title of a 2009 US Geological Survey (USGS) study ([USGS SIR 2009-5272](#)) that describes the subbasins and simulations of natural and human impacted streamflows at the outlets of 1,395 of these 1,500 subbasins.



Screenshot of subbasins and their 5-digit labels.

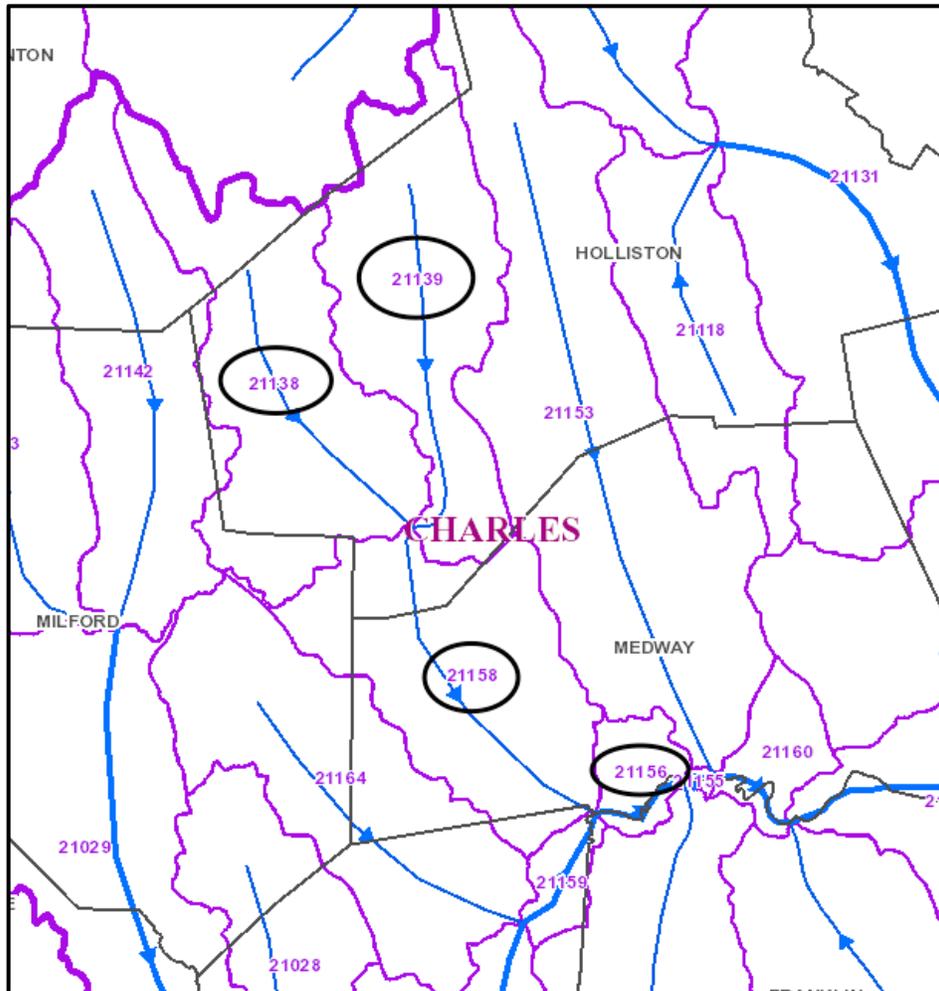
Why the “MWI Subbasins and Labels” layer is important

The subbasin is the geographic and hydrologic unit to which most environmental protections are attached in the revised WMA regulations. This is why knowing the location, classification and 5-digit label of the subbasin(s) in your area is critical.

Why the “Flow Lines” layer in the Basemap is important

The key characteristic of these subbasins is that they do not exist in isolation; they are “nested.” The conditions in one subbasin are a function of the conditions in every upstream subbasin that drains to it. The practical implication is that you need to identify and evaluate conditions in any contributing subbasin.

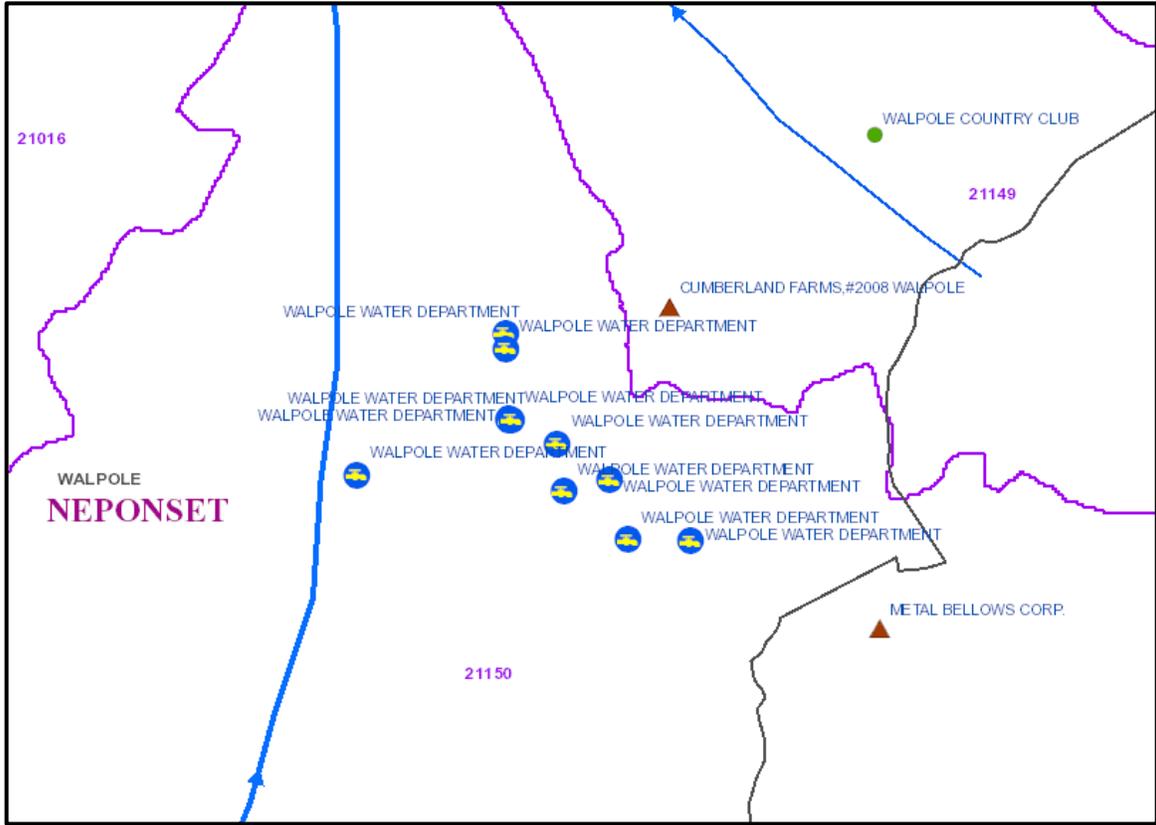
This means looking closely at the blue flow lines and arrows in the subbasins and the directions of their arrows, because the “Flow Lines” map layer shows how the subbasins are hydrologically connected. In the example below from the Charles River Basin, you can see that subbasins 21138 and 21139 drain to 21158, which drains to 21156. The only way to know what upstream subbasins contribute to a subbasin of interest, is to view it on the map. The numbering of the subbasins does not tell you how they are connected, or which major basin it is in.



Screenshot of four nested subbasins in the Charles Basin with their labels circled.

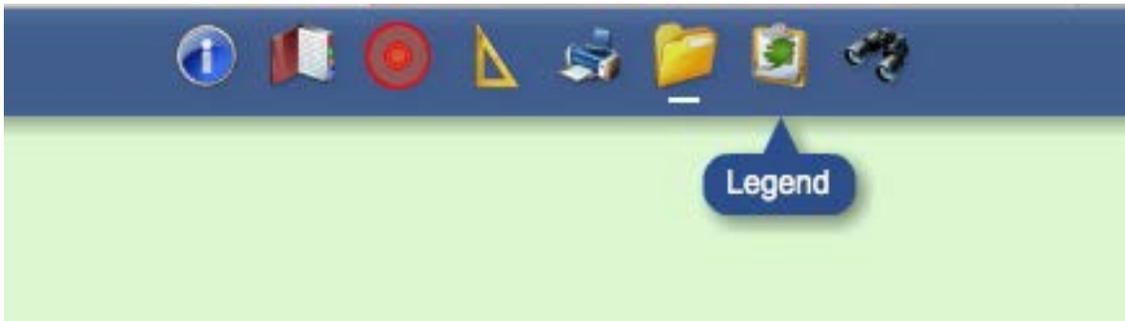
Water Use Points

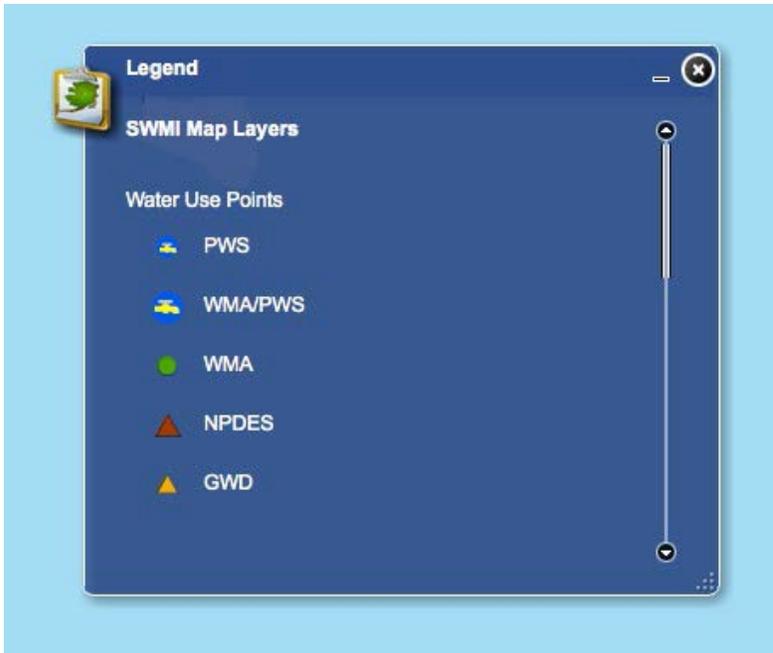
Click on the map layer called “Water Use Points” in the **Map Contents** box.



Screenshot of water withdrawal and discharge locations in a part of the Neponset Basin.

The symbols for each type of water point can be found by clicking on the “Legend” icon at the top of the map. Note: The “Water Use Points” map layer must be checked in the **Map Contents** box and the water point symbols visible on the map in order for the “Legend” to display the water point symbols.





What to look for on the map and in the Legend

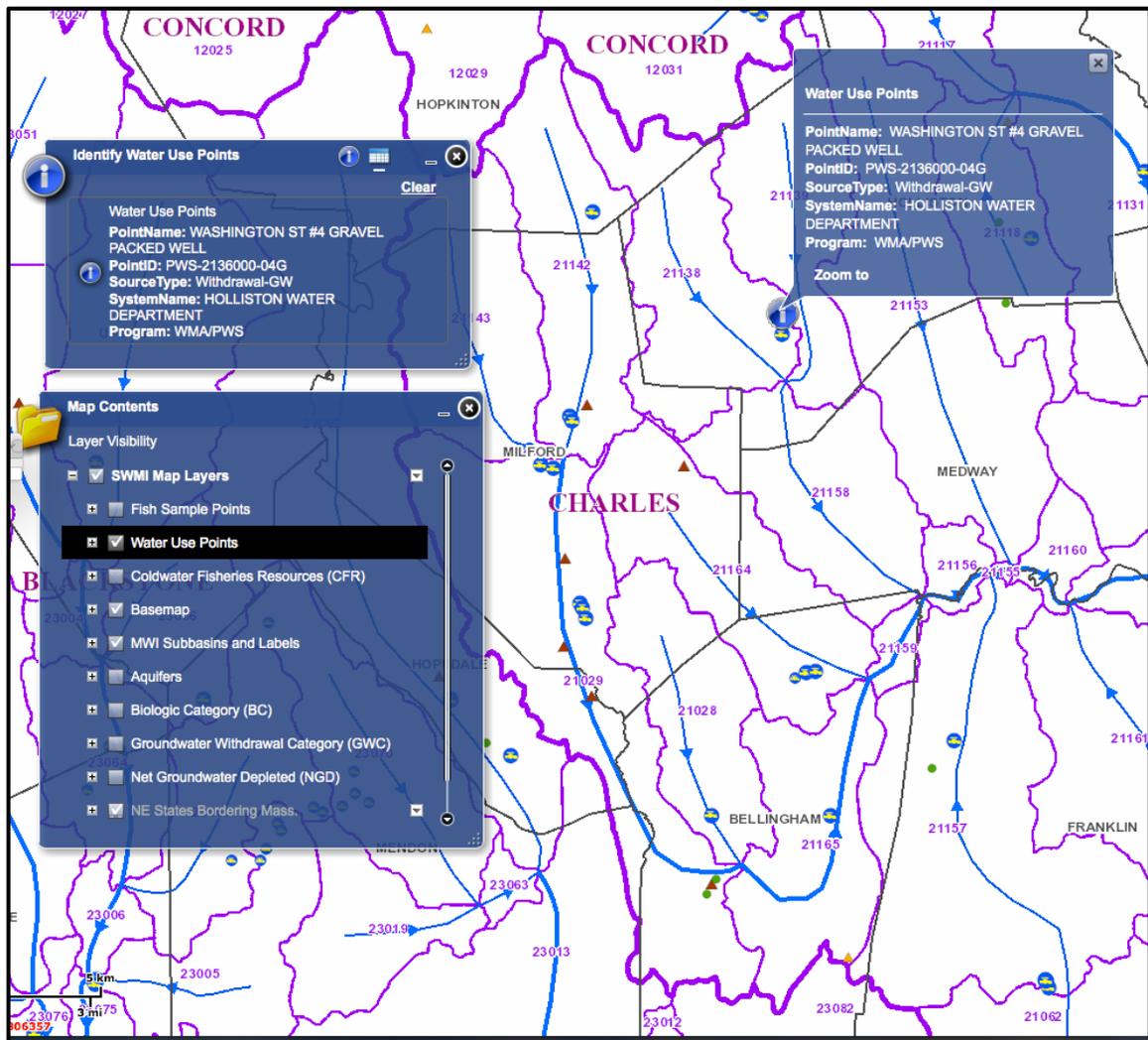
Large spigots labeled “WMA/PWS” and green dots labeled “WMA” mark the location of all surface and groundwater withdrawals regulated under the WMA. The large spigots (WMA/PWS) are public water supplies and the green dots (WMA) are water withdrawals for golf courses, condominiums, industries, cranberry bogs and other non-public water supplies. They may be registered WMA sources or permitted WMA sources. We will explain the difference later in the primer.

The small spigots labeled “PWS” are not regulated by the WMA because these withdrawals are less than 100,000 gallons per day. Examples include water supplies for camps, restaurants, gas stations, and schools. These withdrawals are subject to federal Safe Drinking Water Act (SDWA) rules; however, these rules mostly address water quality, not water quantity.

Identify Water Use Tool

To find the name and ownership of each source, use the “Identify Water Use Points” tool at the top of the map. This tool also tells you if the withdrawal is from a well, reservoir or other surface water. Unfortunately, the tool does not provide the WMA permit number for the WMA regulated sources, and in fact, does not differentiate between WMA registered sources and permitted sources. Note, the “PointID” number, which is provided, is not a WMA permit or registration number.





Screenshot of Water Use Points information for WMA/PWS well located in a Charles subbasin.

Why the “Water Use Points” layer is important

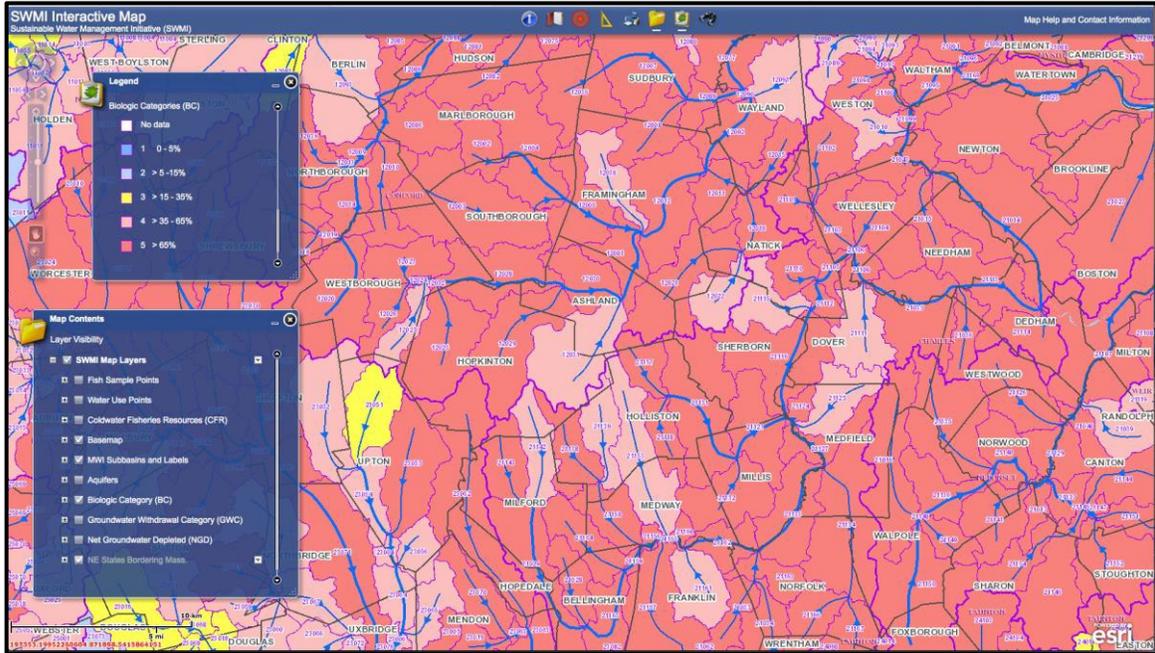
Finding out if there are WMA regulated withdrawals in your area of interest is essential to participating in the permitting process. The most efficient way to get this information is to view the SWMI map.

Online WMA Permit Spreadsheet

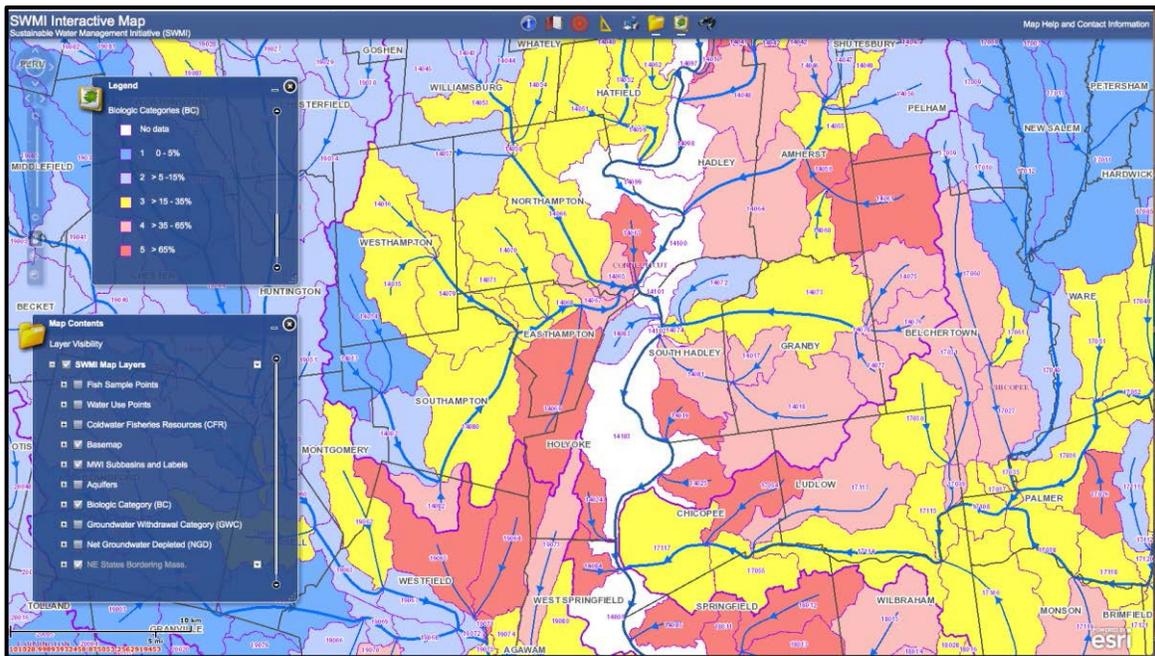
If you have WMA withdrawals, the next step is to find out if any of the withdrawals are permitted under the WMA, and if so, what are their permit numbers. Using the “SystemName” presented in the “Identify Water Use Points” information box, along with the name of the basin and town in which the withdrawal point is located, you can query an online Excel spreadsheet of WMA permits by town, facility, basin, and permit number. The spreadsheet is posted on the Massachusetts Rivers Alliance website at [WMA Permit Spreadsheet](#). If the spreadsheet doesn’t contain the information you need, contact Richard Friend of the MassDEP Water Management Program in Boston at richard.friend@state.ma.us or (617) 654-6522.

Biological Category (BC)

Turn off the “Water Use Points” map layer and click on the “Biologic Category” map layer. Click on the “Legend” and scroll down to find the color-code for the five “Biologic Categories (BC).”



Screenshot of Biological Categories map layer in Metrowest Communities.



Screenshot of Biological Categories map lay in Connecticut River Valley communities.

The “Biological Category (BC)” map layer displays the simulated ecological health of rivers and streams in each of the 1,395 assessed subbasins during the period 2000-2004 using riverine fish communities as a surrogate for aquatic habitat integrity. The white areas on the map, including over 100 delineated subbasins, could not be assessed because of the hydrology in these areas and model limitations.

Each color-coded Biological Category, ranging from 1 to 5, represents increasing alteration or degradation of the riverine fish community in response to impervious cover and August groundwater withdrawals in 2000-2004. The categories are based on the *simulated* numbers and species diversity of riverine fish that one would expect to find in a subbasin’s rivers and streams during this late summer period. Although simulated, the classification of subbasins according to Biological Category was developed using extensive fish sampling data collected by MassWildlife.

Riverine fish communities are good indicators of stream and river health because these fish need flowing water for all or a portion of their life cycles. Examples in Massachusetts’s rivers and streams include: Blacknose dace, Brook trout, Fallfish and White suckers. The image of riverine fish below came from the cover of USGS report, [Factors Influencing Riverine Fish Assemblages in Massachusetts 2011/5193](#), which determined the response of riverine fish communities to specific human impacts and natural conditions in Massachusetts, and generated most of the science that created the Biological Categories.



As you go from Biological Category 1 to Biological Category 5, there is a marked decline in riverine fish numbers and species diversity, with sensitive species typically absent from subbasins classified as Biological Categories 4 & 5. Indeed, Biological Category 3 is the threshold below which the riverine fish community is severely damaged. On the SWMI Interactive GIS Map, it is the color yellow, like a flashing warning light. In Biological Category 3, sensitive flow-dependent riverine fish species like Fallfish may still be maintaining populations but in considerably reduced numbers. More tolerant species such as sunfish, which are not flow-dependent, likely dominate the fish community and about two-thirds of sensitive species, such as Brook trout and Blacknose dace, have been lost.

Biological Category (BC)	Map color	Range of alteration of riverine fish community	WMA Streamflow criterion ¹	Simulated 2000-2004 <u>existing condition</u> of aquatic habitat as indicated by health of riverine fish community. Percent impervious cover estimated for 2000-2004. ² *Descriptive terms below are not official, regulatory terms.
1		0-5%	5%	Very good
2		>5-15%	15%	Good
3		>15-35%	35%	OK
4		>35-65%	65%	Poor
5		>65%	65%	Severely impaired
No data		?	?	?

Why the Biological Category and its range of percent alteration matters – it determines the streamflow criterion for each assessed subbasin

The Biological Categories can be confusing because changes in the composition of the riverine fish community are measured as percent alterations, and each biological category represents a *range* of percent alterations. These ranges are important, however, because the upper bound of each range is the streamflow criterion for that Biological Category. (See Biological Category table above.) For example, all of the assessed subbasins that are classified as Biological Category 3 subbasins have a streamflow criterion of 35%, which is the maximum allowable alteration or degradation of the riverine fish community that can occur before the subbasin becomes a Biological Category 4 or 5. The criterion, be it 5% for Biological Category 1 or 15% for Biological Category 2, is an important regulatory line in the sand. Increased groundwater withdrawals that would cause or contribute to crossing that line, thereby moving a subbasin into a higher, more impaired Biological Category, would only be allowed if the permittee demonstrated there was no feasible alternative that was less environmentally harmful.

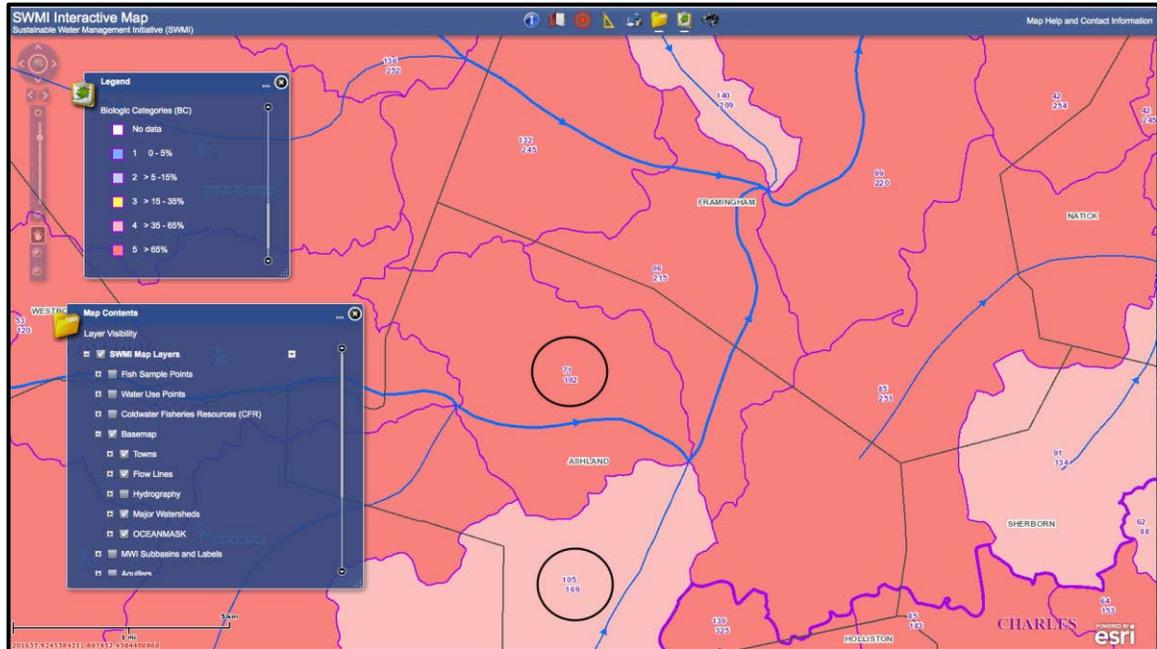
Although the revised regulations define the streamflow criterion for each Biological Category as the upper limit of the range of alteration for that category, Biological Category 5 has no lower limit and therefore no range, only an upper limit of >65%. Common sense suggests that a > 65% streamflow criterion is not a true criterion, as it potentially allows for infinite degradation of the riverine fish community.

¹ Streamflow criteria for the Biological Categories can be found at 310 CMR 36:14(1)(a) in the revised WMA regulations and on page 40 of this primer.

² The terms describing habitat conditions e.g. “Very good,” “Good,” etc. are interpretations by the Massachusetts Rivers Alliance of more detailed descriptions in the [Massachusetts SWMI Framework Appendices, November 28, 2012](#), pages 16-19.

Interesting but not critical to permitting: Fish by the numbers

In addition to the colors of the five Biological Categories, this map layer also displays riverine fish population estimates for two different scenarios, one above the other. You need to zoom in to see them.



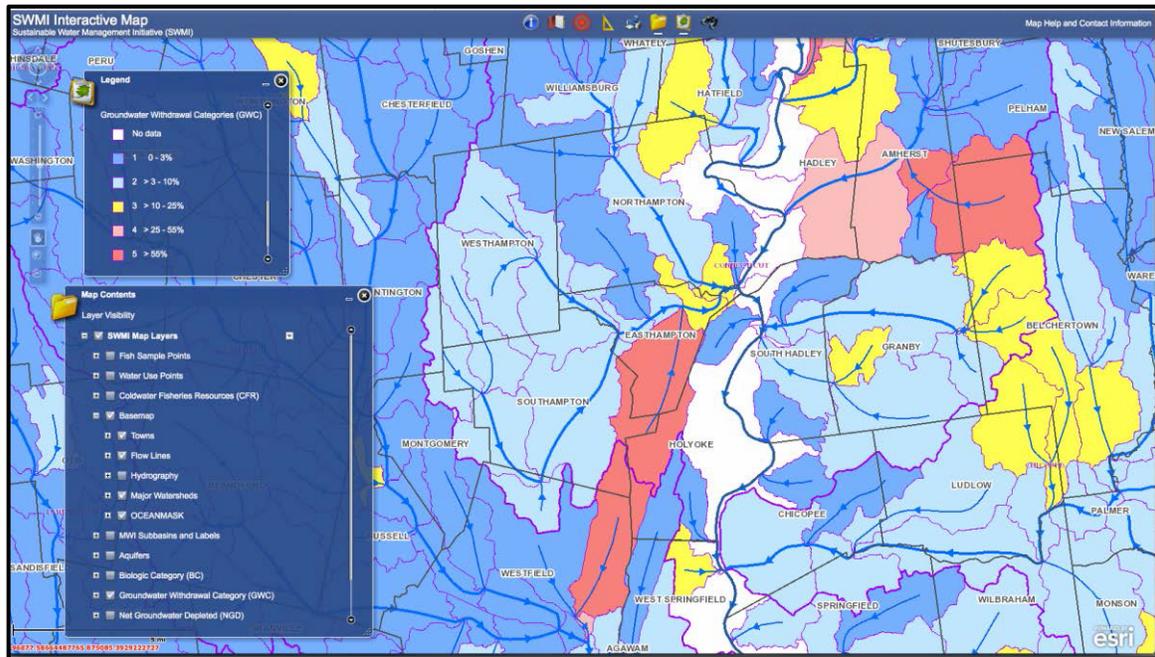
Screenshot of Biological Category (BC) map layer showing pair of circled fish numbers.

The value displayed at the bottom of the pair is the modeled number of riverine fish one would expect to find with no groundwater pumping and 1% impervious cover; a near natural condition. The value at the top is the modeled number of riverine fish one would expect to find with estimated impervious cover and 2000-2004 August groundwater withdrawals. These numbers are not used in permitting, but give you an idea of what is often the great gulf between what should be there and the simulated 2000-2004 existing condition.

As previously mentioned, the computer model that categorized the health of riverine fish communities during the period 2000-2004 relied on actual fish survey data collected by the MassWildlife. The sampling locations and number of riverine fish caught per hour at each site can be viewed by clicking on the "Fish Sample Data" map layer; however, these data are not particularly useful for regulatory purposes. To get the most comprehensive and up to date information about riverine fish populations in your area of interest, Contact Richard Hartley Richard.Hartley@state.ma.us or (508)-389-6330 at the MassWildlife.

Groundwater Withdrawal Category (GWC)

Turn off the “Biological Category” map layer and click on the “Groundwater Withdrawal Category (GWC)” map layer. Then click on the “Legend” and scroll down to find the color-code for the five “Groundwater Withdrawal Categories (GWC).”



Screenshot of Groundwater Withdrawal Categories in southern Connecticut River Valley.

The “Groundwater Withdrawal Category (GWC)” map layer displays the ratio of the 2000-2004 August groundwater withdrawals to simulated August median streamflow in each of the 1,395 assessed subbasins. More simply, it shows the reduction of August median streamflow caused by 2000-2004 August groundwater pumping. Again, the white areas on the map were not assessed.

Each color-coded Groundwater Withdrawal Category, ranging from 1-5, represents increasing losses of August median streamflow, measured as a percent of that streamflow, due to 2000-2004 August groundwater withdrawals. Like the Biological Categories, each Groundwater Withdrawal Category represents a range of values expressed as a percent.

The purpose of the Groundwater Withdrawal Categories is to isolate the impact of groundwater withdrawals on the health of riverine fish communities during the late summer period. Research shows that while both groundwater withdrawals and impervious cause significant harm to riverine fish communities, impervious cover has a greater impact than groundwater withdrawals. In order to separate the effects of groundwater pumping on riverine fish communities from impervious cover, scientists ran the subbasin assessment model with impervious cover set to 1%, a near natural condition. The resulting Groundwater Withdrawal Categories are essentially a subcategory of the Biological Categories, which were generated by the same model but reflect the impact of *existing* impervious cover on riverine fish in the assessed subbasins. This relationship helps explain why the 2000-2004 August groundwater withdrawals associated with each Groundwater Withdrawal Category result in the Biological Category of the same number under conditions of 1% impervious cover.

Groundwater Withdrawal Category (GWC)	Map color	Ratio of 2000-2004 August groundwater withdrawals to August median (modeled) streamflow	WMA Streamflow criterion ³	Health of Riverine Fish Community - Assuming low (1%) impervious cover, the range of ratios for each GWC would result in the same alteration of the riverine fish community as the BC of the same number. *Descriptive terms below e.g. "Good" are not official, regulatory terms.
1		0-3%	3%	= Biological Category 1 - Very good
2		>3-10%	10%	= Biological Category 2 - Good
3		>10-25%	25%	= Biological Category 3 - OK
4		>25-55%	55%	= Biological Category 4 - Poor
5		>55%	55%	= Biological Category 5 - Severely impaired
No Data		?	?	?

Why the Groundwater Withdrawal Categories and their range of percent matters – it determines the streamflow criterion for each assessed subbasin

Similar to the Biological Categories, the upper limit of each Groundwater Withdrawal Category is the streamflow criterion for that category. (See Groundwater Withdrawal Category table above.) For example, all of the subbasins that are classified as Groundwater Withdrawal Category 3 subbasins have a streamflow criterion of 25%, which is the maximum 2000-2004 August groundwater withdrawal to August median streamflow ratio, expressed as a percent, that can occur before the subbasin becomes a Groundwater Withdrawal Category 4 or 5. For riverine fish, this means that when the volume of groundwater pumped from a subbasin exceeds 25% of August median streamflow, the health of that community will decline such that it becomes a much more degraded Category 4 or 5 fish community. Also, keep in mind that the health a riverine fish community in a Groundwater Withdrawal Category 3 subbasin is the same as one in a Biological Category 3 subbasin with 1% impervious cover.

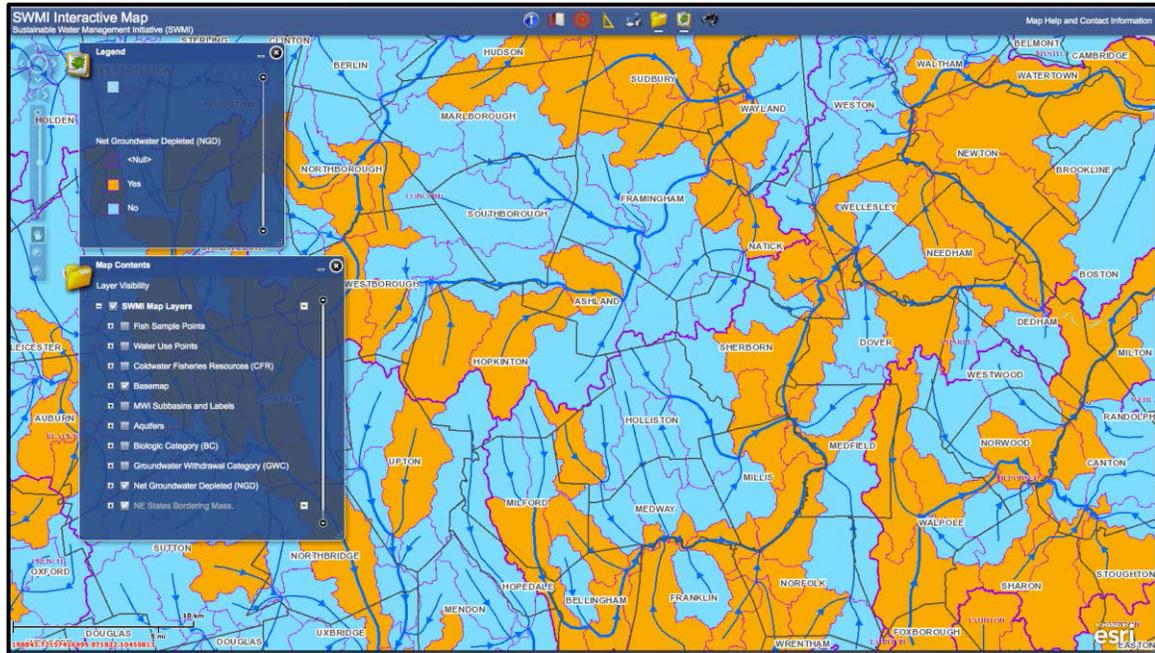
These streamflow criteria, whether 3% for Groundwater Withdrawal Category 1, or 10% for Category 2, are an important regulatory line in the sand. Increased groundwater withdrawals that would cause or contribute to crossing that line, thereby moving a subbasin into a higher, more impaired Groundwater Withdrawal Category, would only be allowed if the permittee demonstrated there was no feasible alternative that was less environmentally harmful.

Although the revised regulations define the streamflow criterion for each Groundwater Withdrawal Category as the upper limit of the range, Groundwater Withdrawal Category 5 has no lower limit and therefore no range, only an upper limit of >55%. Again, common sense suggests that a > 55% streamflow criterion is not a true criterion, as it potentially allows for infinite degradation of the riverine fish community.

³ Streamflow criteria for the Groundwater Withdrawal Categories can be found at 310 CMR 36:14 (1)(b) in the revised WMA regulations and on page 40 of this primer.

Net Groundwater Depletion (NGD)

Turn off the Groundwater Withdrawal Categories and click on the “Net Groundwater Depletion (NGD)” map layer, as they can’t be viewed simultaneously. Then click on the “Legend” and scroll down to find the color code for the “Net Groundwater Depleted (NGD).” Is all or part of your area of interest in an orange subbasin?



Screenshot of August Net Groundwater Depleted subbasins in Metrowest region of eastern Massachusetts.

This map layer shows which subbasins have August Net Groundwater Depletion of 25% or greater. August Net Groundwater Depletion (NGD) is the percent change in modeled, natural August median streamflows due to groundwater withdrawals, while also taking into account groundwater recharge from septic systems and ground discharges of wastewater during the late summer period. Subbasins depleted 25% or more are orange, while the blue subbasins are either not depleted, or depleted less than 25%. It is important to understand that the previously discussed Groundwater Withdrawal Categories do not account for groundwater recharge from septic systems and ground discharges of wastewater.

Why the (August) Net Groundwater Depletion (NGD) map layer matters

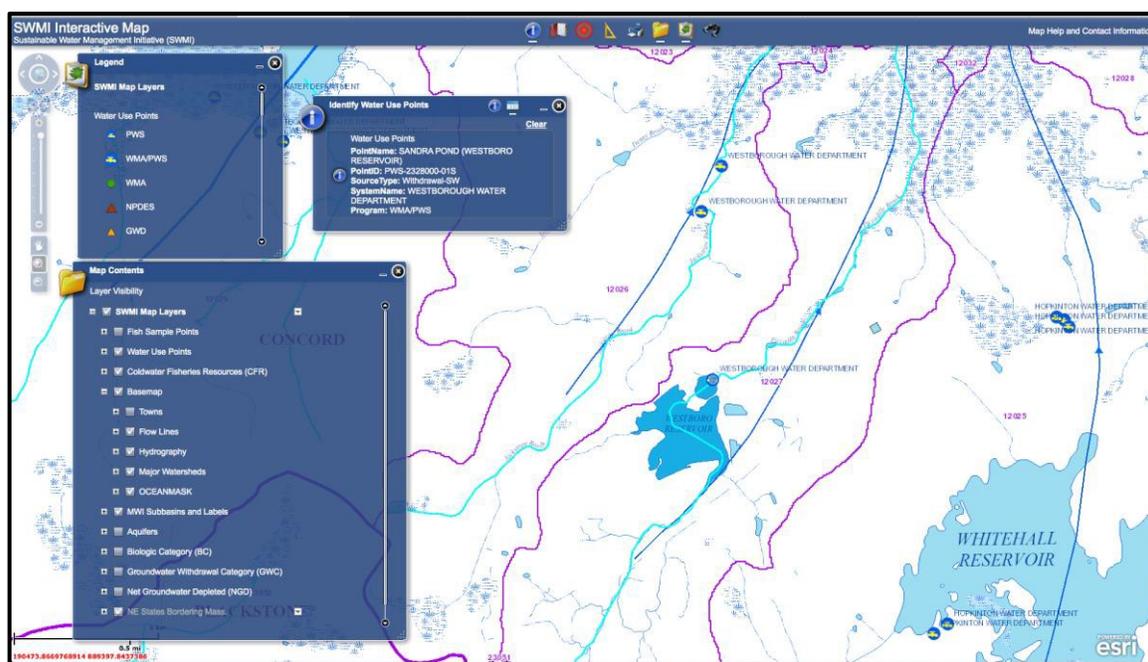
This map layer called “Net Groundwater Depleted (NGD)” is important because it determines whether a permit applicant needs to minimize the impacts of existing water withdrawals. Any applicant requesting a WMA groundwater withdrawal in a subbasin that is 25% or more August Net Groundwater Depleted, must submit a minimization plan as part of their permit application.

Seasonal Groundwater Withdrawal Categories: Missing from the map

The revised WMA regulations also incorporate the concept of “Seasonal Groundwater Withdrawal Categories” but there is no map layer that graphically displays the “Seasonal Groundwater Withdrawal Categories” and their associated stream flow criteria. These categories are based on the ratio of 2000-2004 groundwater withdrawal volume to the natural or “unimpacted” median monthly flow for four other bioperiods, namely fall, winter, spring and early summer. These criteria are applied by MassDEP on a site-specific basis. They can be found at 310 CMR 36:14 in the revised WMA regulations and on page 40 of this primer.

Coldwater Fisheries Resources (CFR)

Turn off the “Net Groundwater Depletion (NGD)” map layer, click on the map layer titled “Cold Water Fisheries Resources (CFR),” and look for light blue-colored lines along stream segments. These are the state’s designated coldwater fisheries. The names of most of these streams, as well as the names of rivers, lakes and ponds, will become visible if you turn on the “Hydrography” map layer within the “Basemap” layer and maximize the zoom on the map. Next, click on the “Water Use Points” map layer if it is not already visible. Do you see any WMA water withdrawals located close to a coldwater fishery?



Screenshot of coldwater fisheries and water withdrawal points in Westborough and Hopkinton.

What is a coldwater fisheries resource (CFR)?

A coldwater fishery resource is defined as a waterway that meets at least one of the following criteria:

- a) Brook, brown or rainbow trout reproduction has been determined to take place in this stream;
- b) Slimy sculpin, longnose sucker, or lake chub are present;
- c) The water is part of the Atlantic salmon restoration effort or is stocked with Atlantic salmon fry or parr.

These criteria are designed to separate coldwater fish populations that are supported by wild reproduction from those waterbodies that might receive stocked coldwater species. Any waterbody not identified as a coldwater fishery may be a warmwater fisheries habitat or may be a coldwater community that has not been sampled and mapped by MassWildlife.

Why the “Cold Water Fisheries Resources (CFR)” map layer matters

Any WMA permit applicant with a well or surface water withdrawal that impacts a state designated coldwater fishery must evaluate options for shifting that withdrawal to different withdrawal points. If options exist, the WMA permittee must minimize their impact on that coldwater fishery. This requirement applies statewide, even in the white unassessed areas on the SWMI map. See 310 CMR 36.22(4) in the revised regulations.

Next Steps

Now that you have explored the online SWMI map, you know if there are WMA and other types of water withdrawals and coldwater fisheries in your area of interest and in which basins these are located. If your area overlays any of the 1,395 delineated subbasins, you also know if the area is categorized as having good or bad riverine fish habitat, significant August groundwater withdrawals relative to median August natural streamflow, or streams depleted from the use of groundwater. You may have also have learned that these biological, groundwater withdrawal and Net Groundwater Depletion data do not exist for your area, because your area was white on the SWMI map.

Next we will look at the WMA regulations.

3. What the revised WMA regulations require

What is the Massachusetts Water Management Act?

The [Massachusetts Water Management Act](#) (WMA), a 1985 statute enacted in response to the drought of 1980-81, regulates large water withdrawals. Specifically, the Act regulates water withdrawals that average 100,000 gallons per day or more during any three consecutive months in a 12-month period and applies to both surface water and groundwater withdrawals. However, the law allowed water withdrawals that existed between 1981 and 1985 to be registered. Some public water suppliers, such as the City of Pittsfield, as well as many large commercial and agricultural water users, still rely exclusively on these registrations for their water. These registrations, which require metering and reporting of withdrawals but little else, must be renewed every 10 years.

Increased water withdrawals above the registered volume of a water source, new withdrawal points, and since 1985, all new water withdrawals of 100,000 or more per day, require a permit. Permits are issued for up to 20 years. In this way, the WMA created a bifurcated world of permitted and registered water withdrawals. The distinction is important because only permitted withdrawals, not registered withdrawals, are subject to the Act's revised 2014 regulations, which require many permittees to reduce the impacts of their withdrawals on rivers and streams.⁴ However, many public water suppliers have both permitted and registered water sources. Because public water suppliers must manage their sources as a single interconnected system, the regulations that apply to the permitted sources also apply to the entire system, including the water from registered sources. As a result, while about 85% of all WMA withdrawals are by volume *registered* withdrawals, the new regulations effectively apply to about 60-70% of all WMA withdrawals.

The WMA has always required that MassDEP consider the protection of the environment along with many other competing interests when allocating water. However, the 2014 regulations mark a new stage in the evolution of the WMA, where the impacts of water withdrawals on streamflow and aquatic habitat are explicitly recognized, and to some degree, addressed. This section describes the basic requirements of these new regulations.

Standard permit conditions of the revised regulations

The revised regulations require that all public water suppliers meet the following conditions to improve efficiency and promote water conservation:

- Implement conservation measures and best management practices described in the Massachusetts Water Resources Commission's [Water Conservation Standards](#) (revised June 2012). These actions include water audits and leak detection, metering, pricing, residential and public sector conservation, industrial/commercial conservation, lawn/landscape conservation, and education and outreach
- Meet performance standard of 65 residential gallons per person per day
- Meet performance standard of 10% unaccounted for water use
- Limit non-essential outdoor water use during the period May 1st – September 30th

⁴ A 2010 court decision established MassDEP may also set conditions for registered withdrawals under the Water Management Act. However, the agency must first promulgate new regulations and has thus far declined to do so.

The revised regulations also impose standard water conservation requirements on WMA permittees that are not public water suppliers such as cranberry growers and golf courses. Their requirements can be found in MassDEP's [Water Management Act Permit Guidance Document](#), (November 7, 2014), Chapter 5.

Beyond standard conditions: permit tiers, mitigation and minimization

Above and beyond implementing the standard conditions, the revised regulations will require many permittees to address the environmental impact of their water withdrawals, with an emphasis on mitigating impacts on streamflows and coldwater fisheries.

The actions that permittees need to take depend primarily on four factors:

- the amount of water requested relative to their “baseline” volume;
- the presence or absence of state designated cold water fisheries (CFRs);
- whether the requested volume (if greater than baseline) will violate streamflow criteria, causing a subbasin to move into a worse Biological Category and/or Groundwater Withdrawal Category;
- whether the proposed withdrawal is in an August Net Groundwater Depleted subbasin (25% or more depleted).

We will begin by examining the first factor - the difference between the applicant's requested water withdrawal and its baseline volume - because it determines whether or not a permittee will need to mitigate their increased withdrawal, and in some cases to seek and evaluate alternative sources of water to meet their needs.

Baseline water volumes and how they determine permit “tier”

MassDEP, not the permittee, calculates the actual baseline water withdrawals for the period 2003-2005, or just 2005, whichever volume is greater, and to this, adds 5%. If the permittee has water sources in more than one basin, MassDEP also calculates a separate baseline for the sources in each basin, as well as a system-wide multi-basin baseline. Baseline calculations take into account withdrawals from both registered and permitted sources, and cannot be lower than registered volumes regardless of 2003-2005 water use. The baseline volume should not be confused with the maximum authorized withdrawal volume in the existing permit, or the actual annual withdrawal volumes reported in the years since 2005.

MassDEP chose the 2003-2005 period to calculate baseline water use because the model used to develop the biological and groundwater withdrawal categories and their associated streamflow criteria used groundwater withdrawal and other data from approximately this same period (2000-2004). For this reason, the categories and streamflow criteria represent a kind of baseline themselves as they characterize the conditions in the 1,395 subbasins during the years 2000-2004.

Understanding water needs forecasts (WNF) and the volume requested

Staff at the Massachusetts Department of Conservation and Recreation (DCR) develop water needs forecasts for public water suppliers who need to renew or obtain a Water Management Act (WMA) permit, and provide these to the permittee, MassDEP, and other stakeholders. DCR staff use a methodology approved by the Water Resources Commission and described in the [Policy for Developing Water Needs Forecasts for Public Water Suppliers and Communities and Methodology for Implementation](#).

A water needs forecast is the estimated volume of water a public water supplier will need to provide to meet the needs of its service area over a given future period. Most Water Management Act permits – and therefore water needs forecasts – apply to a fifteen to twenty-year period. DCR only develops forecasts for public water suppliers. Other types of WMA permittees must determine and justify their own future water needs to MassDEP.

The forecast considers four components of water use: residential use, nonresidential use (including commercial, industrial, institutional, and municipal water use), treatment plant use, and unaccounted-for water (UAW). Two scenarios are then provided in the forecast. The first, the “65/10” scenario, incorporates water-use efficiency standards. This scenario assumes that the future population will meet the residential consumption standard of 65 gallons per person per day, and that the water system will meet the UAW performance standard of ten percent. The second scenario, “Current Trends,” assumes that current patterns of residential water use and UAW will continue in the future.

To account for uncertainties in population and employment projections, the forecast includes a buffer of five percent of the total projected need, which is used at MassDEP’s discretion. The forecast may also include an allowance for “future significant change,” defined as “large expected deviations from current water-use trends, such as a new water-intensive industry moving to town.”

The forecast does not – and is not intended to – address water availability or impacts that additional water withdrawals may have on the environment, water resource sustainability, or other competing uses. These considerations are factored in by DEP through processes separate from the forecast.

In their applications for WMA permits, applicants may request whatever volume they think is necessary to meet their future water needs. However, in most cases, MassDEP relies on DCR’s forecasts to write the permits. MassDEP preferentially looks to the 65/10 scenario in writing permits, but may allow for a transition from the Current Trends scenario to the 65/10 scenario over the permit period to allow time for the applicant to come into compliance with the standards. Additionally, for communities where the current trends forecast is lower than the 65/10 forecast, communities may request the lower volume, or something in between, to reduce the amount of mitigation they will need to provide (some 80%+ of water suppliers in the state now report using less than 65 gallons per person per day). Finally, the public has an opportunity to comment on permits, and MassDEP may consider additional information provided by the applicant or the public in establishing permit allocations.

Permit tiers 1, 2, 3

The permit Tier into which an application falls is critical, because it tells you whether the permittee will need to mitigate or, as stated in the regulations “offset through mitigation,” the impact of their proposed water withdrawal, by taking “measures commensurate with impacts”. It also determines whether a permittee will have to evaluate alternative water sources.

Permit Tiers are essentially a way to group applications into broad categories that require more or less analysis by the applicant and more or less complex review by the agencies. MassDEP assigns a permit tier to a permit application based on:

- whether the requested withdrawal volume is above or below the applicant’s baseline
- the potential for an increased groundwater withdrawal to violate streamflow criteria, thereby changing the Biological Category and/or Groundwater Withdrawal Category of a subbasin to a more degraded category.

How permit tiers are determined by MassDEP

Tier 1 Permits: The permittee’s requested volume does not exceed its baseline water use and therefore, no mitigation is required. Streamflow criteria, if applicable, are not violated. Tier 1 applies statewide, including the white areas of the SWMI map, and to permittees with groundwater withdrawals, surface water withdrawals, or both.

While no mitigation is required, a Tier 1 permittee still needs to “minimize” impacts if any of their wells are located in a 25% or more August Net Groundwater Depleted (orange) subbasin. In addition, if Tier 1 permittees have wells or surface water withdrawals that impact designated coldwater fisheries, these impacts must also be minimized. The term “minimization” will be discussed in more detail later in this section.

Tier 2 Permits: The permittee’s withdrawal request exceeds their baseline, but will not violate streamflow criteria, which would cause a subbasin to slide into a more degraded Biological Category and/or Groundwater Withdrawal Category. Tier 2 permittees must “mitigate” the portion of their requested volume that exceeds the baseline volume. Tier 2 permittees must provide as much direct gallon for gallon “mitigation” as possible. If mitigation cannot be accomplished entirely through direct mitigation, then the permittee must achieve it through indirect mitigation activities as well. The term “mitigation” will be discussed in more detail later in this section.

Tier 2 applies statewide, including the white areas of the SWMI map, and to permittees with groundwater withdrawals, surface water withdrawals, or both. Regardless of whether the requested withdrawal volume is less than the maximum withdrawal authorized in the existing permit, it must be mitigated because it exceeds the baseline.

Like Tier 1 permittees, Tier 2 permittees with wells in a 25% or more August Net Groundwater Depleted (orange) subbasin, must minimize the impact of those wells. And if they have wells or surface water withdrawals that impact designated coldwater fisheries, these impacts must also be minimized.

Why Tier 2 the highest permit tier for some WMA permittees

One of the oddities of the revised regulations is that Tier 2 is the highest tier that MassDEP can assign to permittees with only surface water sources, about 20 permittees in all, including the cities of Lowell, Worcester, Brockton, Marlborough and Taunton. Tier 2 is also the highest tier for any permit located in one of the white areas on the SWMI map. The reason for this limitation is that Biological and Groundwater Withdrawal Categories and their streamflow criteria do not apply to these permits. They do not apply to permittees with only surface water sources because the operation of reservoirs and their impacts on streamflow vary throughout the state and could not be accounted for in the model used to develop the categories and streamflow criteria. Similarly, the categories and streamflow criteria do not apply to permitted withdrawals in the white areas of the SWMI map, namely the southern portion of the South Coastal Basin, Cape Cod and the Islands, portions of Buzzards Bay, and areas along the mainstem of the Connecticut and Merrimack Rivers, because the model could not simulate the groundwater-driven hydrology of these areas. Nevertheless, these permittees still need to mitigate their increased withdrawals.

Tier 3 Permits: Tier 3 permits involve requests for groundwater withdrawals that exceed baseline and violate streamflow criteria, which would cause one or more subbasins to slide into a more degraded Biological Category and/or Groundwater Withdrawal Category. Mitigation and an alternative source feasibility analysis are required. If the applicant also has wells in an August Net Groundwater Depleted subbasin, they will need to minimize too.

A tier 3 applicant must demonstrate to MassDEP that there is no feasible alternative water source that is less environmentally harmful than the groundwater withdrawal points identified in the application. They must show that:

- All alternative groundwater sources are in the Groundwater Withdrawal Categories 4 or 5;
- Using an alternative groundwater source in a different subbasin would cause an “adverse change” to that subbasin’s biological, groundwater withdrawal category, or seasonal groundwater withdrawal category; (The term “adverse change” is used but not defined in the regulations.)
- Taking water from an alternate surface water source would cause unacceptable streamflow impacts or affect the permittee’s ability to meet demonstrated water needs.

If the permittee is successful in showing that there is no feasible alternative source that is less environmentally harmful, the applicant must mitigate and minimize their proposed groundwater withdrawal commensurate with impact. The regulations at 310 CMR 36.22(7)(b) & (c), give MassDEP authority in the case of tier 3 permits to decide what is the appropriate “scope” of mitigation, the value of indirect mitigation given the severity of the impact (i.e. the degree to which streamflow criteria would be violated) and the proximity of proposed mitigation to the affected subbasins.

MassDEP online permitting tool

You can assess whether the proposed increased groundwater withdrawal would violate streamflow criteria, i.e. change a subbasin to a more degraded biological or groundwater withdrawal category yourself using MassDEP’s online [WMA Permit Tool](#). You will need Microsoft Access software and a PC. Correspondingly, you can use the tool to determine what it would take to improve the Biological or Groundwater Withdrawal Categories one or more levels. Note: The tool does not allow you to evaluate the impact of proposed groundwater withdrawals on *seasonal* groundwater withdrawal categories. This must be determined by MassDEP.

If you use a Mac, or do not have access to a PC with Microsoft Access software, MassDEP will run the tool for you. Contact Richard Friend at MassDEP richard.friend@state.ma.us or call (617) 654-6522 for assistance.

What is mitigation?

The revised WMA regulations define mitigation as “activities undertaken that offset the impacts of ground or surface water withdrawals by improving streamflow or aquatic habitat.” The regulations further require tier 2 and 3 permittees to submit a mitigation plan with an implementation schedule as part of their application. The approved mitigation plan becomes part of the new or renewed permit.

Direct mitigation

When preparing the plan, the permittee must first evaluate opportunities for direct mitigation, which means activities that can be volumetrically quantified and compared to the permittee’s required mitigation volume, including but not limited to:

- releases from surface water impoundments that increase downstream flows;
- stormwater recharge of groundwater, including disconnecting or removing paved and other impervious areas directly connected to surface water;
- recharging groundwater with wastewater;
- reducing infiltration and inflow (I/I) to sewer systems
- activities or water releases that will offset impacts to coldwater fisheries, if applicable. (the term “offset” is in the revised regulations but is not defined)

If the permittee cannot achieve all the mitigation necessary with “direct” gallon for gallon releases and/or recharge, then they must evaluate indirect mitigation measures.

Indirect mitigation

Indirect mitigation consists of activities that will improve flowing water habitats in rivers and streams. These activities include but are not limited to:

- repair/replace culverts to meet stream crossing standards
- remove a dam or flow barrier
- improve fish passage
- restore streambanks
- restore stream channels
- restore streamside buffer
- restore habitat
- develop and implement stormwater bylaw with recharge requirements
- develop and implement stormwater utility
- implement MS4 requirements
- develop and implement low impact develop (LID) bylaws
- develop and implement private irrigation well bylaw to conform with public water use restrictions
- preserve undeveloped land

Credits for mitigation

MassDEP is still working on how to credit certain kinds of direct mitigation, namely, how to credit activities such as infiltration and inflow (I/I) removal from sewer systems and stormwater recharge. For indirect mitigation, MassDEP has developed a scoring system that is described in detail on page 39 in Section 9 of their *WMA Permit Guidance Document* (November 7, 2014.)

For both types of mitigation, the regulations require MassDEP to consider the proximity of proposed mitigation to an applicant’s withdrawal point(s), as well as the net groundwater depletion of the subbasin where the mitigation would occur. The regulations also give DEP discretion to retroactively credit mitigation measures implemented since 2005 if it can be demonstrated that these measures will mitigate the impact of the increased withdrawal. Retroactive credit is not automatic and the applicant must demonstrate that past “mitigation” will mitigate the

impact of the proposed withdrawal. See 310 CMR 26.22(6)(d) and (7)(d).

MassDEP should update their WMA Permit Guidance Document (November 7, 2014) as new information becomes available, but in the meantime, check with WMA program staff to learn their current thinking on scoring of mitigation measures, whether direct or indirect.

What is minimization?

As just discussed, mitigation is required when the permittee's proposed withdrawal exceeds their baseline water use. However, whether mitigation is required or not, permittees may also need to *minimize* the impacts of their water withdrawals on coldwater fisheries and net groundwater depleted subbasins. "Minimization" is defined in the revised regulations as "measures that reduce withdrawals from, or return groundwater to, the subbasin or river basin from which a withdrawal is made, or other management measures intended to improve streamflow" (310 CMR 36.03.)

Minimization is required in two situations:

- when a permittee has a well located in one of the 1,395 assessed subbasins that is 25% or more August Net Groundwater Depleted, i.e. the subbasin is orange on the SWMI map
- when a permittee has a well or surface water withdrawal that impacts a coldwater fishery anywhere in the state - even in the white areas

First we will consider the requirements pertaining to coldwater fisheries.

Coldwater fisheries

Coldwater fisheries are important to protect coldwater fish such as Brook trout, Brown trout, American Brook Lamprey, Longnose suckers and Slimy sculpin. These fish need relatively cold flowing water to reproduce and thrive. Urbanization in Massachusetts, and its attendant increases in groundwater depletion, altered streamflows, and impervious surfaces - has degraded or destroyed a lot of habitat for these coldwater species. For this reason, all permittees with one or more withdrawals that impact a coldwater fishery must evaluate options for reducing their impact on the fishery. A coldwater fishery is considered "impacted" by MassDEP if the permittee's water withdrawal(s) reduces streamflow in the affected river or stream.

The requirements vary depending on the permit tier. At a minimum, all permittees with groundwater or surface withdrawals that impact cold water fisheries must conduct a "Coldwater Fish Resource Optimization Review," which means they must consult with MassWildlife staff about the coldwater fisheries impacted by their withdrawals and evaluate the option of shifting pumping to one or more of the permittee's other wells or surface water sources. In particular, the permittee is expected to conduct a desktop modeling or "optimization" exercise to identify the pumping regimes with the least impact on the affected coldwater fisheries, particularly during the late summer period. For example, could a well further away from a coldwater stream be pumped more and the well closest to it pumped less, while still meeting water demand? The modeling results, referred to as an "implementation plan" in the regulations, are then submitted to MassDEP as part of the permit application. If the permittee finds that it is feasible to change the pumping regime, presumably the "implementation" plan will propose doing so. But if the permittee concludes that it is not possible or feasible or prudent to change the pumping regime, then no further action is required.

Tier 2 or 3 permits, which require mitigation, must also go further. In the case of tier 2 or 3 permits, permittees must identify and evaluate measures that will “offset” impacts to coldwater fish resources as part of the larger mitigation plan. The term “offset” is used at 310 CMR 36.22(6)(a)(5) but not defined; however, it appears to set a higher standard than for tier 1 permits.

Coldwater Fish Information

As previously described, the best way to find out if there is a designated coldwater fishery in a subbasin is to turn on the SWMI map layer called “Cold Water Fisheries Resource (CFR)” and look for the light blue lines. To see the names of streams, rivers, lakes and ponds, you need to turn on the “Hydrography” map layer and maximize the zoom. In addition, a list of state-designated coldwater fisheries streams organized by watershed, stream name, or SARIS (unique stream number) can be found at the online [MA Department of Fish & Game Cold Water Fish Resources List](#). Note that the 7-digit SARIS stream numbers have nothing to do with the 5-digit subbasin labels. Contact Richard Hartley at MassWildlife, Richard.Hartley@state.ma.us or (508)-389-6330, for questions about specific streams and coldwater fish populations.

Subbasins with 25% or greater August Net Groundwater Depletion

Permittees with groundwater withdrawals in subbasins with an August net groundwater depletion of 25% or greater are required to develop and implement a plan to minimize impacts. These permittees may also have surface water withdrawals, but this requirement is triggered only by groundwater withdrawals in an August net groundwater depleted subbasin. The minimization plan is supposed to be submitted to MassDEP as part of the permit application.

The key elements of minimization planning are:

a. Desktop Optimization

Similar to the optimization review required for minimizing impacts to coldwater fisheries, the regulations instruct permittees to minimize depletion of groundwater during the late summer period (July-September) by optimizing use of the applicant’s pumping of groundwater and surface water sources in subbasins that are less groundwater depleted, or by using alternative sources or interconnections with other suppliers.

b. Water Releases and Returns

The regulations also require an analysis of the feasibility of releasing water from surface water impoundments, if any, and other measures that return water to the subbasin or water source to improve streamflow, while taking into account the ability of the applicant to meet demand. Returns include stormwater recharge, infiltration/inflow (I/I) reductions, and groundwater discharges of wastewater that would benefit the quantity and timing of streamflow. Potential returns should be evaluated and prioritized in the following order: to the same August net groundwater depleted subbasin, same major basin, and finally another major basin.

c. Conservation measures more stringent than standard permit conditions

In addition, the regulations require adopting restrictions on nonessential outdoor water use that are more stringent than those required by the standard permit conditions, as well as implementing

water conservation measures more stringent than those required by the standard permit conditions. And, if relevant, adopt agricultural, horticultural or industry-specific best management practices to reduce water demand.

What MassDEP means by conservation measures “more stringent” than standard permit conditions

MassDEP has defined what is meant by non-essential outdoor watering limits *more stringent* than standard regulatory requirements in Table 5a-4 on page 18 of their Nov. 7, 2014 WMA Permit Guidance Document. The “standard” regulatory requirements can be found at 310 CMR 36.28(4) and only require “seasonal limits on nonessential outdoor water use from May 1st to September 30th”.

Table 5a-4: Calendar and Streamflow Options for Nonessential Outdoor Watering Restrictions for Minimization Planning (sources in subbasins with August NGD greater than 25%)

Outdoor Water Use Restrictions for Minimization Plans**	Calendar Option		Streamflow Option	
	All Season (May 1–Sept 30)	When 7-day low-flow trigger occurs	When flow is below ABF	When 7-day low-flow trigger occurs
Below 65 RGPCD	2 days, no 9 am to 5 pm	1 day, no 9 am to 5 pm	2 days, no 9 am to 5 pm	1 day, no 9 am to 5 pm
Above 65 RGPCD	1 day, no 9 am to 5 pm	1 day, no 9 am to 5 pm	1 day, no 9 am to 5 pm	1 day, no 9 am to 5 pm

Which outdoor water use restrictions apply to a community that must “minimize” depends on whether the rate of residential water use in the community met the state’s performance standard of 65 gallons per person per day or less during the previous year. To find out if a community has met this standard the previous year and going back to 2009, go to the state’s online page titled [Performance Standards for Public Water Supplies - RGPCD & UAW](#) and download these data either as a PDF or Excel file. Note that towns are listed chronologically by WMA permit number, which is challenging. You can find the town’s permit number by going to the spreadsheet of WMA permits by town, facility, river basin, and permit at [WMA Permit Spreadsheet](#), which is located on the Massachusetts Rivers Alliance website.

Beyond rules for non-essential outdoor watering, what constitutes water conservation measures more stringent than the standards in the [Massachusetts Water Resources Water Conservation Standards](#) (revised June 2012) is not defined in either the revised regulations or MassDEP’s Guidance document.

Safe Yield

Safe yield is a legal and technical term whose calculation and application was the subject of lawsuits and much debate during the Sustainable Water Management Initiative. In the WMA, it is defined as the amount of ground and surface water that can be continuously withdrawn from a water source during an extended drought. The regulations at 310 CMR 36.03 mirror the definition in the WMA: “Safe Yield means 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.”

The new regulations contain a new way of calculating Safe Yield that was developed by MassDEP. The new methodology is described in the regulations at 310 CMR 36.13. The Safe Yield numbers are meaningless as a backstop to water over-allocation in Massachusetts. This is because these numbers are annualized and applied at the major river basin scale, rather based on monthly or seasonal volumes applied at the subbasin scale. Most of the new safe yields double or triple the previously authorized safe yields—“safe yields” that already were not sustainable and in excess of current withdrawals.

In reality, the amount of water available is much less than the new Safe Yields established, and of course the safety of the yield also depends on the withdrawal points. These safe yields are not “safe” for people or the environment. The streamflow criteria are intended to at least protect the status quo for streamflow and aquatic habitat protection in the regulations, but in adopting these new higher safe yields, DEP has basically made this fundamental concept in the WMA irrelevant. Not all of Massachusetts is subject to the streamflow criteria, and it remains to be seen how these criteria will be implemented by MassDEP.

4. The once-in-20 year opportunity

So, when and how should you or your organization get involved? As of October 2016, MassDEP had renewed or issued just eight WMA permits under the 2014 regulations, so many opportunities remain for you to engage meaningfully in the process. If your watershed's WMA permits have already been issued, do not despair. There is also a five-year review of WMA permits by DEP.

Permit duration

Water Management Act permits are typically granted for 20 years, the maximum allowed by regulation, but the 20 years is divided into five-year increments, often with increasing water volumes authorized for each five-year period. Because 20 years is a long time, MassDEP has the authority to review a permittee's compliance with the permit at the end of each five-year period. At that time, MassDEP may request, and the permittee must submit, any information that MassDEP needs to conduct the review. The regulations do not mandate these five-year reviews, but MassDEP has maintained that it will conduct these reviews.

MassDEP permits by major basin schedules

MassDEP is supposed to renew all permits and/or issue new permits located in the same Major River Basin during the same time period. This is because MassDEP must assess the cumulative impact of all withdrawals on the Safe Yield of the Basin. They must also assess the cumulative impact of all permitted withdrawals in the Basin on the biological and groundwater withdrawal categories and streamflow criteria of the subbasins.

A list of the 26 Basins with the effective dates of permits in these basins, and their 1st and 2nd expiration dates are presented on the next page. All the expiration dates were legislatively extended by a total of four years back in 2010 and 2012 under the Permit Extension Act. Many of the permit expiration dates have passed without renewal of the permits. These permits have been administratively continued as "interim" permits. Interim permits are valid for one year, but can be renewed.

When does the permitting process start in your area?

To find out when permitting begins, check MassDEP's online [Water Management Act Permit Outreach and Renewal Schedule, updated October 2016](#). Then email or call Duane LeVangie, Chief of the MassDEP's WMA Program at duane.levangie@state.ma.us, or (617)-292-5706 to get the latest information.

36.17: Effective Dates and Expiration Dates for Permitting by Water Source

(1) For each water source, the date on which these regulations took effect (effective date), the date on which the first set of permits did or will expire (first expiration date), and the expiration date for the second set of permits (second expiration date) are as follows:

<u>Water Source</u>	<u>Effective Date</u>	<u>First Expiration Date</u>	<u>Second Expiration Date</u>
Hudson Basin	August 31, 1988	August 31, 2008	August 31, 2032*
Blackstone Basin	February 28, 1989	February 28, 2009	February 28, 2033*
Charles Basin	February 28, 1989	February 28, 2009	February 28, 2033*
Ipswich Basin	August 31, 1989	January-March 2015*	August 31, 2029
North Coastal Basin	August 31, 1989	August 31, 2009	August 31, 2033*
Boston Harbor Basin	February 28, 1990	February 28, 2015*	February 28, 2030
Taunton Basin	February 28, 1990	February 28, 2015*	February 28, 2030
South Coastal Basin	August 31, 1990	August 31, 2015*	August 31, 2030
Cape Cod Basin	November 30, 1990	November 30, 2014*	November 30, 2030
Islands Basin	February 28, 1991	February 28, 2015*	February 28, 2031
Buzzards Bay Basin	May 31, 1991	May 31, 2015*	May 31, 2031
Concord Basin	August 31, 1991	August 31, 2015*	August 31, 2031
Ten Mile Basin	November 30, 1991	November 30, 2015*	November 30, 2031
Deerfield Basin	February 29, 1992	February 29, 2016*	February 28, 2032
Housatonic Basin	May 31, 1992	May 31, 2016*	May 31, 2032
Farmington Basin	August 31, 1992	August 31, 2016*	August 31, 2032
Westfield Basin	November 30, 1992	November 30, 2016*	November 30, 2032
Millers Basin	February 28, 1993	February 28, 2017*	February 28, 2033
Chicopee Basin	May 31, 1993	May 31, 2017*	May 31, 2033
Quinnebaug Basin	August 31, 1993	August 31, 2017*	August 31, 2033
Connecticut Basin	November 30, 1993	November 30, 2017*	November 30, 2033

*Expiration date extended by four years by St. 2010, c. 240, as amended by St. 2012, c. 238, collectively known as the Permit Extension Act.

Overview of the WMA permitting process

Below are the basic steps in the WMA permit renewal process. Detailed information about the process is available in the WMA Policy Guidance Document, (November 7, 2014) in chapter 3 - “Overview of the Permitting Process”, and the regulations themselves at 310 CMR 36.21-27. Review the steps. Some of the actions described below may have already taken place in your area.

1) DCR develops Water Needs Forecasts

As mentioned previously, the Department of Conservation and Recreation (DCR) prepares Water Needs Forecasts for communities and their public water suppliers. These forecasts estimate water needs for the next 20-year period. The amount of water granted in WMA permits for municipal water suppliers should not exceed their Water Needs Forecasts; however, MassDEP has made exceptions to this.

WMA permittees that are not public water suppliers determine their own water needs, subject to MassDEP approval.

2) MassDEP holds Outreach Workshops for the major basin

MassDEP holds a Basin outreach workshop in each major Basin for all existing Basin permittees. At the workshop, MassDEP explains the new regulations and additional information required to complete renewal and new applications in a PowerPoint presentation and informal Q & A. MassDEP posts the PowerPoint presentations online. Go to the EEA [Water Management Act Permit Renewal and Outreach](#) page and look for the “WMA Presentation” under each Basin heading. It is an extremely good idea to attend these, as you will get an overall summary of MassDEP’s process, and learn specifics about the plans for your watershed. It is also a good opportunity to ask questions.

At the workshop, MassDEP staff will also distribute a one-page *Permit Renewal Summary Sheet* to each existing permittee in the basin and provide copies to other interested parties in attendance or upon request. These Permit Renewal Summary Sheets contain critical information collected by MassDEP, some of it not available anywhere else. They include the permittee’s baseline volume, requested volume, estimated permit tier, subbasins impacted and their respective biological and groundwater categories. An example can be seen on the next page. Staff from MassWildlife and the DCR also participate in the workshops and provide information about coldwater fisheries and Water Needs Forecasts, respectively.

3) Permittees submit permit renewal applications at least 12 months before first permit expiration date

If needed, an application for a new permit can be filed concurrently with MassDEP. Permittees must apply for a new permit, as opposed to a renewal, if they are requesting more water than their existing authorized volume. Because of the delay in issuing WMA permits and MassDEP’s issuance of interim permits, many permittees filed their renewal applications years ago, before the revised regulations and guidance were finalized. Presumably the permittees will have a chance to modify their applications once permitting starts.

**Permit Renewal Summary Sheet
Hopkinton Water Department, 9P-2-14-139.01**

Existing Total WMA Authorization (mgd)	1.21
Registration Volume (mgd)	0.56
Permitted Volume (mgd) includes purchased volume	0.65

Number of Sources	Ground	Surface
	8*	0

*5 wells are permitted

Reported Use Summary	2010	2011	2012	2013	2014*	2010-2014 Average
Actual Withdrawal (mgd)	0.58	0.60	0.59	0.67	0.62	0.61
Volume purchased (mgd)	0.42	0.40	0.41	0.38	0.41	0.40
Total (mgd)	1.00	1.00	1.00	1.05	1.03	1.02

*The 2014 total of source volumes is less than the reported finished water total.

Performance Standard Summary	Base from DCR Forecast	2013 DEP Accepted	Statewide Standard
Residential gallons per capita/day (RGPCD)	NA	61	65
Percent Unaccounted for Water (UAW)	NA	26	10

Water Needs Forecast Summary

Water Needs Forecast Scenarios	2021	2026	2031	5% Buffer	2031 + buffer
Based on 65 RGPCD and 10% UAW (mgd)	Temporary Allocation				
Based on Current Trends (mgd)					

Permit Data Summary

Permit Requirements Information		Comments
Estimated total allocation (reg + perm)	1.21	Current allocation includes volumes purchased from Ashland.
Baseline (BL) in mgd	0.98	Baseline is equal to the 2005 authorized rate.
Projected increase above BL	0.23	Based on current allocation minus baseline volume.
Estimated Permit Tier	3	Increase above baseline changes GWC in subbasin 12031.
Mitigation Plan Required?	Yes	New groundwater discharges may be considered for mitigation credits.
Coldwater Fishery Resource (CFR) Consult?	No	No CFRs in subbasins.
Minimization Required?	Yes	August net depletion is greater than 25% in subbasins 12025 & 12029

Subbasin Data Summary	subbasin 12025	subbasin 12031	Non-essential Outdoor Water Use Streamflow Trigger Information May 1 through Sept 30			
Percent August Net Groundwater Depletion	62.0%	Surcharged	USGS Gage 01098530 - Sudbury River at Saxonville, MA			
MWI Affected Flow (for use in Source Optimization for Minimization Planning)	0.382	1.247	Time Period	May - June	July - Sept	7 Day Low Flow
Groundwater Withdrawal Category (GWC)	5	2	Trigger Value	108 cfs	38 cfs	15 cfs
Does increase above BL cause GWC change?	No	Yes				
Biological Category (BC)	5	4				
Does increase above BL cause BC change?	No	Yes				
Permitted Sources	04G, 05G, 06G	07G,08G				
Registered only Sources	01G, 02G, 03G	None				

4) MassDEP posts notice of all renewal applications in a Basin in the Environmental Monitor and accepts public comments for 30 days

It's unclear how this is going to work since many renewal applications were filed many years ago. Presumably, DEP will re-post notice once they start reviewing the permit review. The *Environmental Monitor* is at <http://web1.env.state.ma.us/eea/emepa/emonitor.aspx>.

5) Permittees meet with MassDEP and other state agencies as needed

Either before or after they submit their permit applications to MassDEP, permittees meet and consult with MassDEP and sometimes other agencies such as the MassWildlife and DCR to review and discuss permit-specific circumstances and outline their mitigation and minimization plans.

6) MassDEP sends permittees requests for more information deemed necessary to complete their applications, called "Orders to Complete"

Permittees have 90 days to respond to the request, but can request additional time. DEP may also ask for additional information based on responses to the Order to Complete.

7) MassDEP determines that the permit renewal application is "complete" after receiving the applicant's response to the order to complete

This starts the clock ticking for MassDEP. They then have 30 days to issue a draft permit. There is no public notice of the letter that MassDEP sends to the permittee telling them that their application is "complete."

8) MassDEP produces draft permit and announces availability of Draft permit published in the Environmental Monitor

9) 30-day public comment period on draft permit

10) MassDEP issues Final Permit

Permit issued 90 days after application is complete or within one year if DEP determines additional time is necessary for proper consideration. A few permits subject to the new regulations and permit amendments have been issued. To obtain copies of these permits, go to MassDEP web page [Water Management Act Permits & Decisions](#). To find draft permits, go to [Draft Water Management Act Permits 2016](#).

11) The permittee, another party with standing, or a group of 10 citizens, can appeal the permit for an administrative hearing at MassDEP. Appeals must be filed with MassDEP within 21 days of the date of final permit issuance

5. Engaging with permittees and the permitting process

Not only is the permitting process complicated, but each group or individual comes to it with varying knowledge and resources. To the extent possible, try to identify what you want to accomplish before getting involved. Are there specific streams, rivers or coldwater fisheries that you want to protect or restore? Are there particular permits or large withdrawals that will impact these resources? Does your organization own and manage conservation land or a wildlife refuge that is potentially impacted by the water withdrawals? Are you concerned about restoring depleted groundwater resources and making your area more resilient to the effects of climate change?

As soon as possible, ideally well before the town or other permittee submits their renewal application, get to know the people who manage the permitted water withdrawals in your area of interest and learn about their systems. Let them know your priorities and what you may have to offer in the way of expertise, ongoing environmental restoration projects, and joint funding opportunities. Also get to know the staff at the MassDEP Water Management Act Program, and the person(s) who will be writing the permits in your area. There is a lot of key permit application information, such as baseline and permit tier, that is determined by MassDEP, not the permittee. MassDEP WMA Program Boston and Regional staff contact information can be found by emailing Duane LeVangie, Chief Water Management Act Program at duane.levangie@state.ma.us 617-292-5706. Do not be reluctant to call MassDEP or to request a meeting with them to discuss particular problem withdrawals. Also contact Duane LeVangie via email and ask that you receive a copy of all draft permits when issued in your watershed.

Get involved in mitigation and minimization planning early

For the environmental community, the key step in the permitting process is the development of mitigation and minimization plans. Ideally, you want to find out what permittees are considering and what analysis they have already done before the plans are submitted to MassDEP as part of the application or response to an “Order to Complete” letter. It is best to share your ideas for mitigation, minimization, as well as any constructive feedback on plans they may have in mind, directly with the permittee in writing and in direct conversation, as early as possible in the process. Many communities are not familiar with the range of mitigation and minimization options at their disposal. Offering detailed suggestions of what you think would be the best approach, as early in the process as possible, is critical. If possible, do not wait to offer your suggestions to DEP during the public comment process. By that time, the applicant is likely to be much less receptive to new suggestions and creative ideas, and it is unrealistic to expect MassDEP to explain your ideas to the applicant and convince the applicant of their merit for you. Early, detailed, direct engagement with the applicant is the most effective strategy wherever possible.

While early engagement with the applicant is key, it is also beneficial to engage with MassDEP early as well. Let MassDEP know what your concerns and questions are as early in the process as possible. Hopefully you can share feedback on your ideas that you have received from the applicant when you meet with MassDEP. While there is no formal opportunity in the process for third parties to meet with MassDEP, ask for a meeting anyway. MassDEP staff are likely to be interested in your input. If possible, try to meet with MassDEP or at least send them something in writing before they issue the order to complete, that way MassDEP will be able to ask the applicant to respond to some of your questions if they feel they are relevant. Because there is no formal opportunity for third parties to have a pre-permitting consultant with MassDEP, it can be difficult to know when to do this, but in general, shortly after the Basin outreach meeting is a good time.

SWMI Grants – a possible funding source

Since 2012, MassDEP has offered “SWMI” grants to communities and public water suppliers, including some who have partnered with watershed groups, to fund preliminary mitigation and minimization planning efforts. Two excellent examples of these projects are “Sudbury-Assabet-Concord River (SuAsCo) Watershed Sustainable Water Management Initiative (SWMI) Feasibility Analysis, June 30, 2014” and “Neponset Water Management Act Planning Project, June 30, 2013”. To find information about the SWMI grants and summaries of all the SWMI projects funded to date (2012-2016), go to the [Water Management Act Grant Programs for Public Water Suppliers](#) webpage, go to the bottom of that page to find [Project summaries from past years](#). Another round of SWMI grants were offered this past summer (2016), and it is likely that more will be offered in 2017. For more information, contact Duane LeVangie, Chief Water Management Act Program at duane.levangie@state.ma.us or (617)-292-5706.

Comment Letters

Groups and individuals have two important formal opportunities to comment during the WMA permitting process – when the permit application is submitted and when MassDEP issues the draft permit. You can comment on the permittee’s application for 30 days after MassDEP posts notice on the Environmental Monitor and the draft permit for 30 days after it is posted on the state’s [Environmental Monitor](#). To see examples of actual comment letters, go to [Letters & Testimony](#) on The Massachusetts Rivers Alliance website.

In some cases, the permit applications were submitted long ago, before the new regulations were even issued. But if you do get the chance to review applications, look for and closely examine any plans for mitigation, minimization, or demand management plans. Similarly, when the draft permit is issued, make sure it contains, if applicable, meaningful mitigation, minimization, or demand management plans, as well as an implementation timeline for each plan.

Appealing the Final Permit

If efforts to obtain meaningful minimization and mitigation fail, and in your view this permit will significantly impact streamflow in your watershed, you may wish to appeal the permit for an administrative hearing. However, be aware that permit appeals are time-consuming and costly. While an appeal is pending, the permittee may not access a permitted increased withdrawal volume. On the flip side, the permittee is not subject to the new permit conditions while the appeal is pending. If you are considering this route, we urge you to seek the advice of a lawyer with experience in Water Management Act litigation.

Process for 4 basins that had 2nd expiration dates extended

The new WMA regulations will be incorporated into permits in the Hudson, Blackstone, Charles and North Coastal Basins during the next scheduled 5-year reviews, which may take place in 2018.

Information Checklist

Before contacting permittees and writing letters, it is essential to do some homework. Most of the critical information you need you must get from MassDEP, specifically the Permit Renewal or Permit Summary Sheet for each permittee, which tells you the permit tier, and if applicable, the volume of water to be mitigated. You will not find this information in the permit applications.

CHECKLIST:

- Do the SWMI map exercise for your area.
- Check MassDEP's online [*Water Management Act Permit Outreach and Renewal Schedule, updated October 2016*](#), to see where the permittees and MassDEP are in the permitting process, then call MassDEP WMA Program staff for the latest information.
- Get a copy of each Permittee's one-page *Permit Renewal Summary Sheet* from MassDEP so that you know their baseline water use, requested volume, estimated permit tier, and whether the permittee's withdrawals are located in an 25% or greater August Net Groundwater Depleted (orange) subbasin or might impact coldwater fisheries.
- If applicable, use MassDEP's online [*WMA Permit Tool*](#) to assess whether a proposed increased groundwater withdrawal would violate streamflow criteria, i.e. change a subbasin to a more degraded Biological and/or Groundwater Withdrawal Category. Remember, if you use a Mac, or do not have access to a PC with Microsoft Access software, MassDEP will run the tool for you. Contact Richard Friend at MassDEP richard.friend@state.ma.us or call (617) 654-6522 for assistance.
- Review MassDEP's relevant online WMA PowerPoint Basin presentation(s), if available for your area of interest.
- Get to know the people who have WMA water withdrawals in your area and learn about their system.
- Smile!

6. WMA Permitting Resources

State agency staff

Duane LeVangie
MassDEP
Chief, Water Management Program
One Winter Street, Boston, MA 02108
duane.levangie@state.ma.us
(617)-292-5706

Richard Friend
Mass DEP – Online SWMI map contact
Water Management Program
One Winter Street, Boston, MA 02108
richard.friend@state.ma.us
(617)-654-6522

Todd Richards
MassWildlife
Assistant Director of Fisheries
1 Rabbit Hill Road Westborough, MA 01581
Todd.Richards@state.ma.us
(508)-389-6336

Anne Carroll
DCR–Water Needs Forecast Office of Water Resources
251 Causeway Street, Boston, MA 02114-2119
anne.carroll@state.ma.us
(617)-626-1395

Examples of potential mitigation and minimization projects

[Charles River Watershed Association Blue Cities Initiative](#)

CRWA's Blue Cities Initiative incorporates the design of natural green corridors and infrastructure to help treat stormwater runoff before it enters the Charles and its tributaries, through plant filtration and infiltration into the ground – all while enhancing neighborhoods and connecting existing open spaces.

Massachusetts Clean Water Toolkit - A brand new online resource for information about stream restoration is the new [Massachusetts Clean Water Toolkit](#) website, in particular the interactive river scenarios at [Stream Corridor and Shoreline Restoration](#). This website is designed to be the Commonwealth's primary public education resource on nonpoint source pollution. The Toolkit, developed by Geosyntec Consultants, includes sections focused on the major categories of nonpoint source pollution, 127 fact sheets on best management practices to reduce pollution, and a collection of interactive scenarios based on Massachusetts landscapes that allow users to explore ways to reduce pollution and improve water quality in a variety of highly detailed landscapes including residential, agricultural, urban, roads, construction, and shoreline restoration.

New England Water Works Association (NEWWA) Toolkit of BMPS for Water Resource Management (2008) – This is a helpful document written for water supply managers and municipal officials.

Massachusetts Division of Ecological Restoration (DER) within the MA Department of Conservation and Recreation. Go to <http://www.mass.gov/eea/agencies/dfg/der/aquatic-habitat-restoration/river-restoration/river-continuity-program.html>. For example, check out their [Stream Continuity Program](#), which works to reduce impediments to movement of fish, wildlife and other aquatic life that require instream passage, and their [River Restoration Program](#), which helps with dam removal.

Division of Ecological Restoration

251 Causeway St., Suite 400
Boston, MA 02114
(617)-626-1540

Low Impact Development practices (LID)

Local land use rules for development and redevelopment play an important role in water management. Most development involves extensive clearing and grading, converting forests and other natural land cover that absorbs, cleans, and infiltrates water into large areas of impervious surfaces interspersed with lawn and other irrigation-intensive landscaping. Low Impact Development (LID) techniques that maintain natural hydrology and the capacity of land to filter and infiltrate precipitation can help a community conserve water resources while reducing its regulatory burdens such as WMA permit requirements and MS4 stormwater management rules.

[Analysis Local Land Use Regulations LID Chart](#)

This template enables communities to evaluate their zoning, subdivision, site plan, and stormwater regulations in relation to LID. Completion of this analysis can help communities address the local regulatory review requirements of the MS4 permit.

It is based on model bylaws and regulations from EEA
http://www.mass.gov/envir/smart_growth_toolkit/

And an LID regulatory review template by the Metropolitan Area Planning Council.
<http://www.mapc.org/low-impact-dev-toolkit>

Note that a stand alone stormwater bylaw that supports LID is important but not sufficient. If zoning and subdivision regulations still require large lots and wide roads with curbing and piped stormwater, LID cannot be effectively implemented. Communities need to look at their land use regulations more comprehensively in relation to protection of water resources.

For More Information:

Cost-Effective LID: www.massaudubon.org/LIDcost

EPA Green Infrastructure Wizard: www.epa.gov/giwiz/

WMA Streamflow Criteria – 310 CMR 36.14(1)

36.14: Streamflow Criteria

(1) Streamflow criteria are established by the categories described at 310 CMR 36.14(1)(a) through (c), which describe the modeled 2000-2004 existing conditions at the subbasin scale across a gradient of alteration from least to most altered for five bioperiods: early summer (May-June), late summer (July through September), fall (October and November), winter (December through February) and spring (March and April). The streamflow criterion for each category is the upper limit of the ranges shown at 310 CMR 36.14(1)(a) through (c). Withdrawals that contribute to a subbasin changing to a more altered category do not meet streamflow criteria and will only be permitted if the permittee demonstrates that there is no feasible alternative available to meet demonstrated water needs, and the permittee undertakes mitigation commensurate with the impacts of the withdrawal to the greatest extent feasible.

(a) Biological Category for each subbasin is based on the simulated 2000-2004 existing condition of aquatic habitat using fluvial fish community characteristics as the surrogate indicator variable. Each biological category represents the percent alteration within the range of these fluvial fish community characteristics as a function of the following subbasin parameters:

1. impervious cover;
2. cumulative groundwater withdrawal as a portion of the unimpacted August median flow;
3. stream channel slope; and
4. percent wetland within the stream buffer area.

Simulated Alteration of Fluvial Fish Community Characteristics.

- Biological Category 1: 0% to 5%
- Biological Category 2: >5% to 15%
- Biological Category 3: >15% to 35%
- Biological Category 4: >35% to 65%
- Biological Category 5: >65%

(b) Groundwater Withdrawal Category for each subbasin is based on the ratio of the 2000-2004 groundwater withdrawal volume to the unimpacted median monthly flow for August and represents conditions during the late summer bioperiod (July through September). Each groundwater withdrawal category represents the range of this ratio that would result in the biological category of the same number under conditions of low (1%) impervious cover.

Simulated Groundwater Withdrawal Ratio for the Late Summer Bioperiod.

- Groundwater Withdrawal Category 1: 0% to 3%
- Groundwater Withdrawal Category 2: >3% to 10%
- Groundwater Withdrawal Category 3: >10% to 25%
- Groundwater Withdrawal Category 4: >25% to 55%
- Groundwater Withdrawal Category 5: >55%

(c) Seasonal Groundwater Withdrawal Categories for each subbasin are based on the ratio of the 2000-2004 groundwater withdrawal volume to the unimpacted median monthly flow for the four other bioperiods below.

Seasonal Groundwater Withdrawal Ratios for Additional Bioperiods

	Fall (Oct-Nov)	Winter (Dec-Feb)	Spring (March-April)	Early Summer (May-June)
Seasonal Category 1:	0% to 3%	0% to 3%	0% to 3%	0% to 3%
Seasonal Category 2:	>3% to 5%	0% to 3%	0% to 3%	>3% to 5%
Seasonal Category 3:	>5% to 15%	>3% to 10%	>3% to 10%	>5% to 15%
Seasonal Category 4:	feasible mitigation and improvement/no numeric criteria			
Seasonal Category 5:	feasible mitigation and improvement/no numeric criteria			