MWD
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Date: January 2, 2008

To: Board of Directors

From: Stephen N. Arakawa, Manager, Water Resource Management

Subject: Staff Recommendation for a Water Supply Allocation Plan Board Report

Attached is the Staff Recommendation for a Water Supply Allocation Plan Board Report including the Supply Allocation Plan Formula attachment, which was inadvertently omitted in the first mailing on December 27, 2007.

Stephen N. Arakawa

Attachment

cc: Member Agencies

MWD
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Report

Water Resource Management

- Staff Recommendation for a Water Supply Allocation Plan

Summary

Since July 2007, staff has been working cooperatively with the member agencies to develop a formula and implementation plan to allocate supplies to the member agencies in case of shortage. As a result of that process, staff developed a recommendation for a Water Supply Allocation Plan for consideration by the Board. The recommendation includes the specific formulas for calculating member agency allocations, as well as providing the key implementation elements needed for administering an allocation, if it is declared.

Attachments

Attachment 1: Staff Recommendation for Supply Allocation Plan Formula

Detailed Report

Background

Calendar Year 2007 introduced a number of water supply challenges for Metropolitan and its service area. Critically dry conditions have affected all of Metropolitan's main supply sources. In addition, a ruling in the Federal Courts in August provided protective measures for the Delta Smelt in the Sacramento/San Joaquin River Delta and has brought uncertainty about future pumping operations from the State Water Project. This uncertainty, along with the impacts of current critically dry conditions, has raised the possibility that Metropolitan may not have access to supplies necessary to meet total firm demands and may have to allocate supplies in the next few years.

At the present time, Metropolitan does not have an approved plan and formula for allocating supplies to its member agencies. In 1999, the Board approved the *Water Surplus and Drought Management Plan* (WSDM Plan). The WSDM Plan has served as the framework for managing Metropolitan's portfolio of water resources in both wet and dry conditions. Although the WSDM Plan does not contain a specific formula for supply allocation, it does contain principles that provided policy direction for the development of an allocation plan. Staff, through a cooperative process with the member agencies, has developed a recommended Supply Allocation Plan including major administrative implementation elements for the Board's consideration.

Metropolitan staff is aware that the potential implementation of an allocation plan will create different member agency and retail agency actions to manage shortages. These actions could have unforeseeable outcomes on the retail customers and on the elements of the proposed allocation plan. Therefore, staff recommends that the proposed Supply Allocation Plan have a sunset date effective three years following the approval of the plan. Staff further recommends that a member agency workgroup process be convened in the year prior to the effective sunset date to identify adjustments and improvements to be considered in an updated plan.

Principles and Considerations for Allocation

The WSDM Plan incorporated a guiding principle to be followed in the development of an allocation:

> "*Metropolitan will encourage storage of water during periods of surplus and work jointly with its Member Agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage.*"

The guiding principle provides the direction that the allocation plan developed by staff must address disparate impacts at the retail water use level across Metropolitan's service area.

The WSDM Plan also included considerations to accomplish an equitable regional allocation of Metropolitan supplies during times of shortage. These considerations include:

- The impact on retail customers and the economy
- Allowance for population and growth
- Change and/or loss of local supply
- Reclamation/Recycling
- Conservation
- Investment in local resources
- Participation in Metropolitan's non-firm (interruptible) programs
- Investment in Metropolitan's facilities

The recommended Supply Allocation Plan has considered and addresses each of these Principles and considerations.

Plan Development Process

Metropolitan staff has been working closely with the member agency managers and their staff to develop a supply allocation plan. The process, which was initiated in July 2007, has been interactive and cooperative. In addition, the Board has also been updated with progress reports on a regular basis, with three Oral Reports (September, October, and December) and an Information Board Letter in November. The Information Board Letter contained a draft proposal for supply allocation that had nearly identical elements to the plan being recommended in this report.

Since July, the different elements of the proposed plan have been discussed at five Member Agency Manager workgroups. These workgroups have provided an arena for in-depth discussion of the objectives, mechanics, and policy aspects of the different parts of the allocation plan. Metropolitan staff has also met with individual member agencies for detailed discussions of the elements of the recommended proposal. Fifteen member agencies have engaged staff in this process. Staff has also provided presentations and feedback to a number of member agency caucuses and working groups, and in doing so have introduced the elements of the proposal to many non-member retail agencies that are in the Metropolitan service area. The discussions, suggestions, and comments expressed by the member agencies during this process have contributed significantly to the recommended staff proposal in this report.

Supply Allocation Formula

A recommend allocation formula (Proposal) has been developed that addresses the principles and considerations for allocation from the WSDM Plan. The Proposal directly considers impacts at the retail level and seeks to address the issue of agencies experiencing shortages that are significantly more severe than other parts of the service area. The Proposal also accounts for and addresses the considerations of growth, local investment, changes in supply conditions, and the demand hardening aspects of recycling and conservation.

The key elements of the Proposal are described below. The detailed operational elements of these objectives, and all calculations used in the Proposal (including a numerical example), are discussed in **Attachment 1**.

Establishing Member Agency Needs for Metropolitan Water

- **Base Period** – Use of historical data is needed to estimate retail demands, locally supplied water, and wholesale water needs for each member agency. The Proposal recommends that a three-year average, with the initial period being 2004 through 2006, be used for all elements requiring a historical basis. Staff also recommends that updates to this base period should be discussed through a cooperative process with the member agencies to fairly address impacts from mandatory conservation and public outreach messaging that is occurring as a result of the current water supply situation.
- **Growth Adjustment** – Estimates of retail demands are adjusted for growth that occurred between an allocation year and the base period. The Proposal recommends the use of county level estimates of average annual growth in population as a proxy for specific member agency growth. Agencies will also have an option to use a weighted average of population and job growth instead of population alone.

- **Local Supply Adjustment** – Base Period Estimates of locally supplied water need to be adjusted for gains and losses. These adjustments are critical to having reasonable estimates of total retail water needs. While unforeseen losses and gains may be adjusted for through the recommended appeal process, it is preferable for agencies to declare or project planned gains and foreseeable or realized losses prior to the implementation of an allocation stage.
- **Extraordinary Increases in Local Supply –** These increases, defined as previously unscheduled water transfers or groundwater mining, are accounted for differently than other increases in local supply. This is to ensure that agencies that have access to additional, unplanned water during the times of a shortage are not discouraged from producing it. The Proposal recommends that the amount of Extraordinary Increase in Local Supply be counted as an increase in the Base Period local supply, in a scaled fashion tied to the declared Regional Shortage Level. This essentially reserves a percentage of the supply exclusively for the member agency who procured it. Column-5 in the table of allocation elements below shows the percentage of Extraordinary Increase that is counted towards the local supplies in the allocation formula.
- **Conservation Savings –** Effectiveness in implementing water savings devices, both through active programs and through plumbing code-based installation, creates a demand hardening effect that the plan seeks to address through a Conservation Demand Hardening Credit. Metropolitan staff is calculating estimated conservation savings through the use of an accounting model that uses estimates of conservation savings devices, along with standardized water savings rates, to estimate the conservation savings seen by each member agency.
- **Conservation Rate Structure –** The Proposal also includes consideration for those agencies whose retail users are subject to a qualifying conserving water rate structure. For the purposes of this plan, a qualifying rate structure is defined as having at least two tiers of volumetric water rates with a price differential between the top and bottom tiers of at least 10 percent. Agencies seeking consideration will be required to submit documentation of the percentage of their Base Period Retail Demand that is covered by a qualifying rate structure. An amount equal to .5 percent of the covered Base Period Retail Demand will be added to the Conservation Savings described above, and thus be considered in the calculations of the Conservation Demand Hardening Credit.

Table of Allocation Elements

The following table contains the major percentage elements of the allocation plan. The columns are defined as follows:

(1) Regional Shortage Level – This is a declared level that will be set by the Board in response to water supplies being short of adjusted base period demands.

(2) Regional Shortage Percentage – This is the approximate maximum percentage shortage that is related to a declared Regional Shortage Level.

(3) Wholesale Minimum Allocation – This is the initial allocation, in percentage terms of adjusted Base Period wholesale needs, which will be provided to each member agency. In terms of reduction, this is equivalent to a percentage reduction in wholesale needs of one and a half times the Regional Shortage Percentage.

(4) Retail Impact Adjustment Maximum – This is the maximum amount of additional allocation, in percentage terms of adjusted Base Period wholesale needs, that an agency would receive to address disparate impacts at the retail level caused by an across the board percentage allocation of wholesale supplies. Member agencies will receive a prorated amount of this factor based on their dependence on Metropolitan supplies.

(5) Extraordinary Increase Percentage – As defined above, this is the percentage of an Extraordinary Increase in local supplies that is counted toward the estimate of an agency's local supplies.

(6) IAWP Reduction – This is the percentage of decreases in available IAWP supplies in conjunction with reductions in firm supplies.

(1) Regional Shortage Level	(2) Regional Shortage Percentage	(3) Wholesale Minimum Allocation	(4) Retail Impact Adjustment Maximum	(5) Extraordinary Increase Percentage	(6) IAWP Reduction
1	5%	92.5%	0.0%	0%	30%
2	10%	85.0%	0.0%	0%	30%
3	15%	77.5%	7.5%	15%	40%
4	20%	70.0%	10.0%	20%	50%
5	25%	62.5%	12.5%	25%	75%
6	30%	55.0%	15.0%	30%	90%
7	35%	47.5%	17.5%	35%	100%
8	40%	40.0%	20.0%	40%	100%
9	45%	32.5%	22.5%	45%	100%
10	50%	25.0%	25.0%	50%	100%

Water Supply Allocation for Regional Shortage Level 1 & 2

For shallow regional shortages, which are defined as being 10% or less, the proposal recommends an across the board reduction in the wholesale supplies to all agencies, with adjustments for conservation demand hardening. The across the board reduction will be set by providing a Wholesale Minimum Allocation and a Conservation Demand Hardening Credit. There is no further adjustment to address disparate retail level shortages in Shortage Levels I & II. Given that Base Period and Allocation Year supplies and demands have been calculated, there are three steps needed to calculate an agency's allocation.

- **Step 1 - Wholesale Minimum Allocation**: Provide an agency an amount of supply equal to a reduction in their wholesale demand of one and a half times the Regional Shortage Level. This is done by multiplying an agency's Allocation Year Wholesale Demand by the Wholesale Minimum Allocation percentage found in the table of allocation elements.
- **Step 2 - Conservation Demand Hardening Credit:** Provide a credit calculated by multiplying an agency's quantified conservation savings (in acre-feet) and multiplying by the estimated retail level shortage that the agency would have prior to adding the credit. The estimated retail level shortage is calculated by adding an agency's Wholesale Minimum Allocation and Allocation Year Local Supplies, dividing by the Allocation Year Retail Demand, and subtracting the result from 100 percent.
- **Step 3 – Total M&I Allocation:** Add the Wholesale Minimum Allocation and the Conservation Demand Hardening Credit.

Supply Allocation for Regional Shortage Level 3 and Higher

For deeper regional shortages, which are defined as being greater than 10%, the proposal adds a Retail Impact Adjustment Allocation. This is the method to address disparate retail level shortages across the member agencies.

- **Step 1 - Wholesale Minimum Allocation** – Provide an agency an amount of supply equal to a reduction in their wholesale demand of one and a half times the Regional Shortage Level. This is done by multiplying an agency's Allocation Year Wholesale Demand by the Wholesale Minimum Allocation percentage found in the table of allocation elements.
- **Step 2 - Retail Impact Adjustment Allocation** – Provide an agency an amount of supply equal to their Allocation Year Wholesale Demand multiplied by their Retail Impact Adjustment. The amount of the adjustment for each member agency is prorated on a linear scale, based on its dependence on Metropolitan at the retail level. For agencies that are 100 percent dependent on Metropolitan, this method will result in an allocation of Metropolitan supplies that, at the retail level, will result in a shortage equal to the Regional Shortage Percentage. The maximum adjustment for each declared Regional Shortage Level, called the Retail Impact Adjustment Maximum, can be found in the table of allocation elements.
- **Step 3 - Conservation Demand Hardening Credit:** Provide a credit calculated by multiplying an agency's quantified conservation savings (in acre-feet) and multiplying by the estimated retail level shortage that the agency would have prior to adding the credit. The estimated retail level shortage is calculated by adding an agency's Wholesale Minimum Allocation, Retail Impact Adjustment Allocation, and Allocation Year Local Supplies, dividing by the Allocation Year Retail Demand, and subtracting the result from 100 percent.
- **Step 4 – Total M&I Allocation:** Add the Wholesale Minimum Allocation, Retail Impact Adjustment Allocation, and the Conservation Demand Hardening Credit

Major Implementation Elements

The proposal also provides recommended implementation elements that are necessary for administering an allocation plan during a time of shortage. These elements cover the processes needed to declare a shortage level as well as providing a penalty rate structure for enforcing each agency's allocation.

Allocation Period

The recommended allocation period covers twelve consecutive months, from May of a given year through the following April. This period was selected so as to minimize the impacts of varying SWP allocations. By May, the majority of the winter snowfall accumulation period has passed, and will allow staff to make an allocation based on a stable supply picture. Since this period is four months following the beginning of the year, Base Period calculations will be adjusted by an additional 33% of the rate used to account for growth in a member agency.

Setting the Regional Shortage Level

Metropolitan staff shall be responsible for recommending a Regional Shortage Level for Board consideration. The final recommendation shall be based on water supply availability and Metropolitan water supply management actions, storage, and transfer operations that are consistent with those outlined in the WSDM Plan adopted by the Board in 1999, and the monthly status reports provided to the Water Planning and Stewardship Committee. Metropolitan's Board, through the Water Planning and Stewardship Committee, shall be responsible for approving the final Regional Shortage Level at its April meeting. The proposal also recommends that, barring unforeseen large-scale circumstances, the shortage level be put in place for the entire allocation period without change. This will allow a stable planning platform for the agencies.

Allocation Appeals Process

An appeals process will be necessary for the administration of any changes or corrections to an agency's allocation. Metropolitan shall designate an Appeals Liaison as the official point of contact for all information and inquiries regarding appeals. Basis for appeals claims can include but are not limited to:

- Adjusting erroneous historical data used in base year calculations
- Adjusting for loss or gain in local supply
- Adjusting for extraordinary increases in local supply

Appeals shall be evaluated and approved or denied by Metropolitan staff determination. For process transparency, Metropolitan staff shall provide a report to the Board of Directors on submitted appeals, including the basis for determination of the outcome of the claim. For large claims, defined as those that would change an agency allocation by a threshold of 10% and at least 5,000 acre-feet, Metropolitan staff shall refer the claim to the Board of Directors through the Water Planning and Stewardship Committee for approval.

Allocation Penalty Rates

Member agency allocations shall be enforced through a penalty rate structure. The recommended penalty rate structure is an ascending block structure. This structure provides a lower penalty for minor overuse of allocations, and a higher penalty for major overuse of allocations. The structure and applicable rates are listed in the table below.

Use Up to and Including:	Base Water Rate	Penalty Rate	Total Rate
100% of Allocation	Tier 1*	0	Tier 1*
100% < Use <= 110%	Tier 1*	3 x Tier 2	Tier 1* + (3 x Tier 2)
Use > 110%	Tier 1*	5 x Tier 2	Tier 1* + (5 x Tier 2)

*The base water rate shall be the applicable water rate for the water being purchased. In most cases, it will be the Tier 1 rate (plus Treatment Surcharge for treated water deliveries). However, it is possible that the water being purchased would be in the amount that would put an agency beyond its Tier 1 limit. In that case, the base water rate will be the Tier 2 rate (plus Treatment Surcharge for treated water deliveries).

The penalty rates shall be based on the official Metropolitan water rates in effect the last day in April of the twelve-month allocation period. Metropolitan staff will produce monthly reports of each member agency's water use compared to allocations, based on monthly delivery patterns to be submitted by the member agency. These reports and comparisons are to be used for the purposes of communicating potential underage/overage of an agency's annual allocations. No billing or assessment of penalty rates shall take place until the end of the twelve-month allocation period. Penalty rates and charges shall only be assessed to the extent that an agency's total annual usage exceeds its total annual allocation.

Penalty Rates in Recognition of Section 135 of the MWD Act

Section 135 of the Metropolitan Water District Act declares that a member agency has the right to invoke its preferential right to water. Each year, Metropolitan calculates each agency's percentage of preferential rights based on a formula of collected cumulative revenues. A table of the percentages of preferential rights, as of July 2007, follows.

Member Agency	Percent of Total Preferential Right
City of Beverly Hills	1.01%
City of Burbank	0.95%
Central Basin MWD	7.62%
City of Compton	0.26%
Foothill MWD	0.68%
City of Glendale	1.28%
Las Virgenes MWD	0.78%
City of Long Beach	2.57%
City of Los Angeles	21.16%
City of Pasadena	1.08%
City of San Fernando	0.10%
City of San Marino	0.20%
City of Santa Monica	0.89%
Three Valleys MWD	2.59%
City of Torrance	1.18%
Upper San Gabriel MWD	3.81%
West Basin MWD	8.19%
City of Anaheim	0.95%
City of Fullerton	0.59%
MWD of Orange County	14.00%
City of Santa Ana	0.77%
Eastern MWD	3.05%
Western MWD	3.58%
Inland Empire Utilities Agency	2.45%
San Diego CWA	16.46%
Calleguas MWD	3.80%

In recognition of these preferential rights, the proposal includes a discounted penalty rate schedule. As part of the determination of a Regional Shortage Level, Metropolitan staff shall also calculate an allocation of a like amount of water supply to each member agency based on its percent of total preferential rights. Member agencies that are exceeding their allocations under the Proposal but not exceeding an equivalent calculation using preferential rights shall be subject to the penalty rate schedule below:

Use Up to and Including:	Base Water Rate	Penalty Rate	Total Rate
100% of Allocation	Tier 1*	0	Tier 1*
100% < Use <= 110%	Tier 1*	2 x Tier 2	Tier 1* + (2 x Tier 2)
Use > 110%	Tier 1*	4 x Tier 2	Tier 1* + (4 x Tier 2)

*The base water rate shall be the applicable water rate for the water being purchased. In most cases, it will be the Tier 1 rate (plus Treatment Surcharge for treated water deliveries). However, it is possible that the water being purchased would be in the amount that would put an agency beyond its Tier 1 limit. In that case, the base water rate will be the Tier 2 rate (plus Treatment Surcharge for treated water deliveries).

As previously stated, the penalty rates shall be based on the official Metropolitan water rates in effect the last day in April of the twelve-month allocation period. Metropolitan staff will include equivalent preferential rights calculations in monthly reports of each member agency's water use compared to allocations.

Interim Agricultural Water Program Reductions and Rates

There has been much discussion regarding the relationship of allocations of firm municipal and industrial demands to the delivery of water supplies under the Interim Agricultural Water Program. Some of the agencies have the opinion that IAWP deliveries should be curtailed at a very aggressive rate as firm demands are being reduced, and some feel that IAWP deliveries should be curtailed 100% prior to any reductions in firm demands. In the last Board approved allocation plan (1995 Drought Management Plan), there was a reduction schedule approved that tied reductions in IAWP deliveries to reductions in firm demands. Staff recommends maintaining the relationship developed and approved in the 1995 plan. However, staff also recommends that agencies taking water under the IAWP pay the full firm rate once deliveries to firm municipal and industrial demands are curtailed.

Staff Recommendation for Supply Allocation Plan Formula

This attachment provides a detailed overview of the elements that are needed to calculate a member agency's allocation under the recommended Supply Allocation Plan. Following the overview, a detailed example is provided showing how these key objectives are implemented in calculating an allocation.

Base Period Calculations

The first phase in estimating retail demands and wholesale water needs in the allocation year is to establish a historical base period with established water supply and delivery data. The base period for each of the different categories of demands and supplies is calculated using data from the three most recent non-shortage years; exceptions to this methodology are noted in the following descriptions of base period calculations.

Base Period Wholesale Demands: Firm demands on Metropolitan for the base period are calculated using a three year average of full-service, seawater barrier, seasonal shift, and surface storage operating agreement demands.

Base Period Local Supplies: Local supplies for the base period are calculated using a three-year average of groundwater production, groundwater recovery, Los Angeles Aqueduct supply, surface-water production, and other imported supplies. Non-potable recycling production is not included in this calculation. (This is to address the impact of demand hardening due to recycled water use)

Base Period Retail Demands: Total retail municipal and industrial (M&I) demands for the base period are calculated by adding the Base Period Demands on Metropolitan, and the Base Period Local Supplies.

Base Period In-lieu Deliveries: Base period in-lieu deliveries to member agency storage are calculated using a three-year average of in-lieu deliveries to long-term groundwater replenishment, conjunctive use, cyclic, and supplemental storage programs.

Base Period IAWP Deliveries: Through discussions with the member agencies, fiscal year 2003/04 was established as the base period for IAWP deliveries. This baseline will remain in place for the period in which the IAWP reduction is in effect, and for droughts continuing into successive years.

Base Period Conservation: Conservation savings for the base period are calculated using modeled estimates of the most recent year's savings from active, passive, and system losses. Note that this is different than other Base Period calculations, which used three-year averages. This is because, for demand hardening purposes, it is preferable to use the most recent estimate of installed water savings as opposed to a three-year average. Modeled estimates are generated using device-based savings and decay rates provided by California Urban Water Conservation Council and other recognized sources. These estimates currently include savings accumulated from Metropolitan funded programs. Agencies with verified conservation device installations from conservation efforts funded without Metropolitan assistance can be added through an appeals process.

Retail Water Rate Conservation: An additional consideration will be given to agencies whose retail use is subject to a qualifying conserving water rates structure. The qualifying rate structure is defined as one with at least two tiers of volumetric rates, with a price differential between the bottom and top tiers of at least 10 percent. Agencies will be allowed to submit a report of the percentage of their total service area retail demand that is covered by a qualifying water rate. Upon verification of the report, the agency will be given a credit of .5 percent of covered Base Period Retail Demand to be added to the Base Period Conservation estimate listed above.

Allocation Year Calculations

The next phase in estimating water needs in the allocation year is to adjust the base period estimates of retail demand for population or economic growth, and to adjust for changes in local supplies.

Allocation Year Retail Demands: Total retail M&I demands for the allocation year are calculated by adjusting the Base Period Retail Demands for growth.

Growth Adjustment: The growth adjustment is calculated using the average annual rate of population growth over the three-year base period. The population growth rate is calculated using county level data generated by the California Department of Finance. On an appeals basis, Member Agencies may request that their adjustment be calculated using a weighted combination of population and employment growth rates.

Allocation Year Local Supplies: Allocation year local supplies are estimated using the base year local supplies plus Base Period In-Lieu Deliveries. In-lieu deliveries are added to reflect the corresponding reduction in base year local production that was required to take in-lieu deliveries. Adjustments are also made for gains and losses of local supply, and extraordinary increases in production over the base year. These adjustments are made to give a more accurate estimate of actual supplies in the allocation year, and in turn more accurately reflect an agency's demand for Metropolitan supplies.

Gain of Local Supply Adjustment: This adjustment accounts for planned or scheduled gains in local supply production above the base period, which are not due to extraordinary actions to increase water supply in the allocation year. These previously scheduled increases in supply programs or local production are added to the base period local supplies.

Loss of Local Supply Adjustment: This adjustment accounts for losses of local supply production from the base period. Losses of local supply, due to such things as hydrology or water quality, are subtracted from the Base Period Local Supplies. Losses of local supply that are not covered by this adjustment include groundwater losses that are less than or equal to base period replenishment deliveries (for a two year period following interruptions of replenishment deliveries) and supplies that were used to cover IAWP shortages, and are no longer available to meet firm demands.

Extraordinary Increased Production Adjustment: This adjustment accounts for extraordinary increases in local supplies above the base period. Extraordinary increases in production include such efforts as purchasing transfers or mining of groundwater basins. In order not to discourage such extraordinary efforts, the only a percentage of the yield from these supplies are added back to Allocation Year Local Supplies. This has the effect of "setting aside" the majority of the yield for the agency who procured the supply. The following table shows the percentages of the Extraordinary Increases in Local Supply that are counted in each level of supply allocation.

Regional Shortage Level (%)	Percentage Counted in Local Supply
1 (5%)	0%
2 (10%)	0%
3 (15%)	15%
4 (20%)	20%
5 (25%)	25%
6 (30%)	30%
7 (35%)	35%
8 (40%)	40%
9 (45%)	45%
10 (50%)	50%

Allocation Year Wholesale Demands: Demands on Metropolitan for the allocation year are calculated by subtracting the Allocation Year Local Supplies from the Allocation Year Retail Demands.

Allocation Formula and Accounting

The following table contains the elements of the allocation formula that are used in the allocation formula that is equitable on the wholesale level, while helping to minimize hardships experienced by individuals and by the regional economy at the retail level.

(1) Regional Shortage Level	(2) Regional Shortage Percentage	(3) Wholesale Minimum Allocation	(4) Retail Impact Adjustment Maximum	(5) Extraordinary Increase Percentage	(6) IAWP Reduction
1	5%	92.5%	0.0%	0%	30%
2	10%	85.0%	0.0%	0%	30%
3	15%	77.5%	7.5%	15%	40%
4	20%	70.0%	10.0%	20%	50%
5	25%	62.5%	12.5%	25%	75%
6	30%	55.0%	15.0%	30%	90%
7	35%	47.5%	17.5%	35%	100%
8	40%	40.0%	20.0%	40%	100%
9	45%	32.5%	22.5%	45%	100%
10	50%	25.0%	25.0%	50%	100%

Shortage Levels: Metropolitan's plan proposes a formula that allocates shortages of Metropolitan supplies over ten levels: from 5 to 50 percent, in five percent increments.

Shortage Percentage: The maximum total regional shortage percentage of Metropolitan's available supplies when compared to the sum of the demands in the allocation year.

Wholesale Minimum Allocation: The Wholesale Minimum Allocation is established to ensure a minimum level of wholesale water service (Metropolitan supplies) at the member agency level, and sets the target for recognizing a member agency's ongoing investment in Metropolitan's system. The Wholesale Minimum Allocation ensures that Member Agencies will not experience shortages on the wholesale level that are greater than one-and-a-half times the percentage shortage of Metropolitan regional water supplies. The Wholesale Minimum Allocation is equal to 100 percent minus one-and-a-half times the shortage level.

Retail Impact Adjustment Maximum: The Retail Impact Adjustment Maximum is the factor used to address major differences in retail level shortages associated with across-the-board cuts. The purpose of this adjustment is to ensure that agencies with a high level of dependence on Metropolitan do not experience highly disparate shortages compared to other agencies when faced with a reduction in wholesale water supplies. The Retail Impact Adjustment Maximum factor is calculated as the difference between the Regional Shortage Percentage and the Wholesale Minimum Allocation. The amount of the adjustment each member agency receives is prorated on a linear scale, based on its dependence on Metropolitan at the retail level. The prorated amount of allocation is referred to as the Retail Impact Adjustment Allocation. For agencies that are 100 percent dependent on Metropolitan, this method will result in an allocation of Metropolitan supplies that, at the retail level, will result in a shortage equal to the Regional Shortage Percentage. In other words, through this allocation, no agency will

experience a greater percentage shortage than the regional shortage percentage. This adjustment is only applied when Metropolitan shortage levels are three or greater.

Conservation Demand Hardening Credit: The Conservation Demand Hardening Credit is used to address the increased difficulty in achieving additional water savings at the retail level that comes as a result of successful implementation of water conserving devices. The credit is calculated by multiplying an agency's quantified conservation savings (in acre-feet) by its estimated retail shortage percentage prior to applying the credit.

M&I Allocation: The allocation of Metropolitan supplies to an agency for its Municipal and Industrial retail demand is the sum of the Wholesale Minimum Allocation, the Retail Impact Adjustment, and the Conservation Demand Hardening Credit.

IAWP Allocation: The IAWP allocation is calculated by decreasing the base year IAWP deliveries by the percent IAWP reduction.

Total Allocation: The total allocation of Metropolitan supplies to an agency is calculated by adding together the M&I Allocation and the IAWP Allocation.

Allocation Example – Calculating Base Period Information to Determine Allocation Year Needs

The following example gives a step-by-step description of how the recommended formula would be used to calculate an allocation of Metropolitan supplies for a hypothetical member agency.

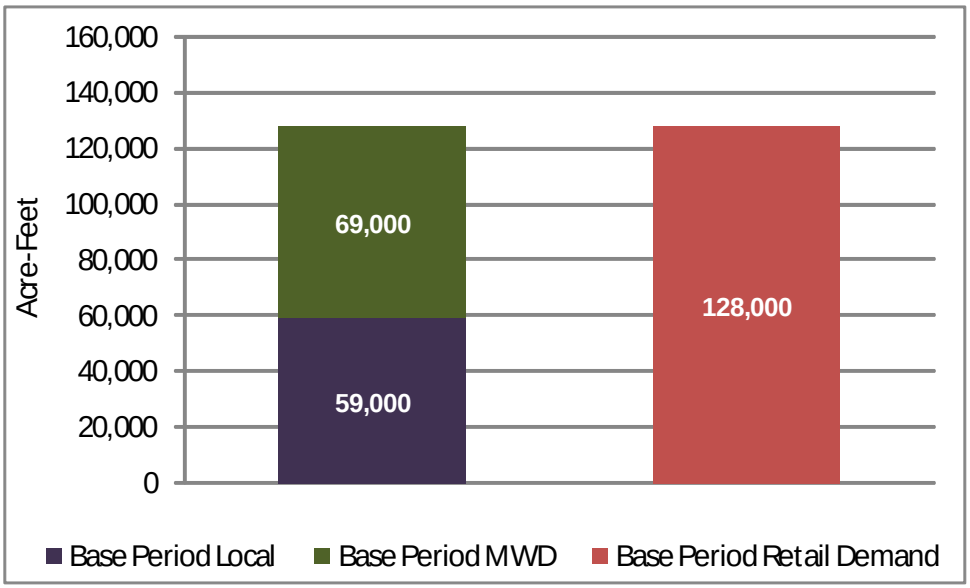
Step 1: Calculate Base Period Retail Demand

The first step in developing an agency's allocation is to estimate the agency's retail level water needs. Two pieces of information are required to calculate retail level water needs: (1) The amount of local supplies that were produced in the base period, and (2) The amount of MWD demands in the base period.

Base Period Local Supplies are calculated using a three-year average of groundwater, groundwater recovery, Los Angeles Aqueduct supply, surface water, and other non-Metropolitan imported supplies. For the example, this agency had an average local supply in the Base Period of 59,000 acre-feet.

Base Period Wholesale Demands on Metropolitan are calculated using the same three-year time period as the Base Period Local Supplies. The Base Period Wholesale Demands on Metropolitan include full-service, seawater barrier, seasonal shift, and surface storage operating agreement. For the example, this agency had a combined average wholesale demand on Metropolitan of 69,000 acre-feet.

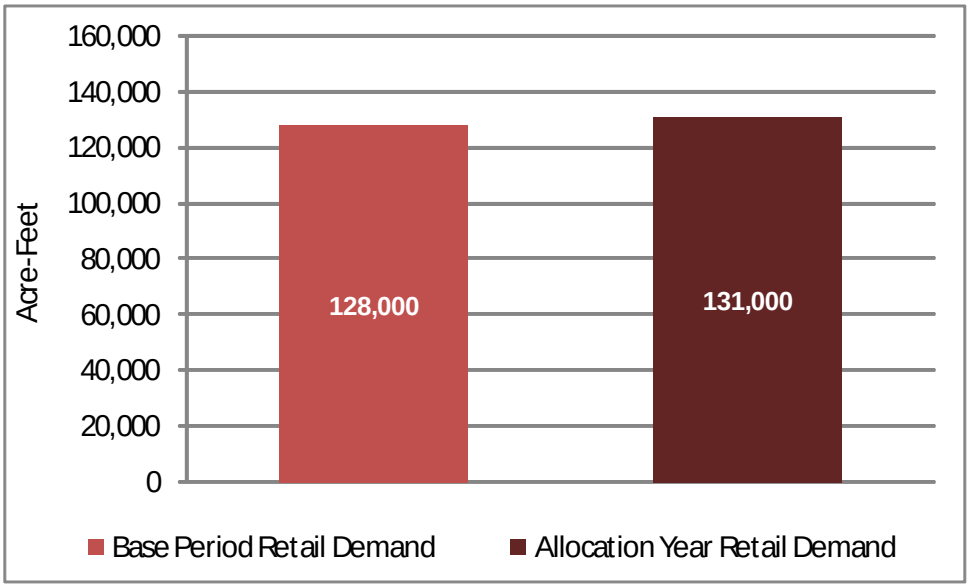
Base Period Retail Demand can be calculated once the information described above has been calculated. The sum of the Base Period Local Supplies and the Base Period Wholesale Demands equals the Base Period Retail Demand. For the example, this agency had a Base Period Retail Demand of 59,000 + 69,000 = 128,000.



Step 2: Adjust Base Period Retail Demand for Growth

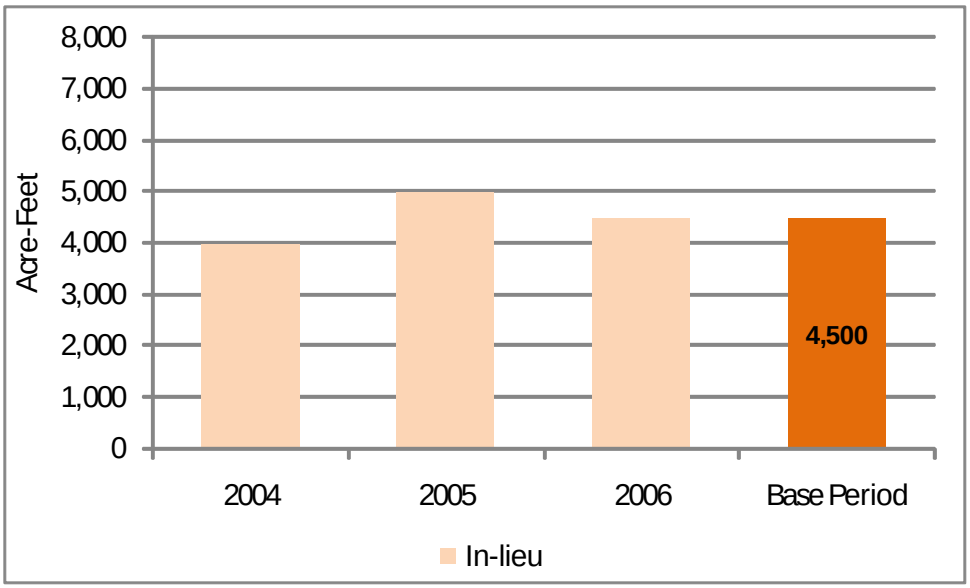
The second step in developing an agency's allocation is to adjust the Base Period Retail Demand for growth that occurred since the Base Period. The growth adjustment is calculated using the average annual rate of county-level population growth over the three-year base period, or using a weighted combination of population and employment growth rates if an agency so requests through the appeals process.

Allocation Year Retail Demand is the result of applying the growth adjustment to the Base Period Retail Demand. It represents a reasonable estimate of the total amount of firm water that an agency needs at the retail level in the year of allocation. In the chart below, the Base Period Retail Demand is adjusted upwards by 3,000 acre-feet based on average annual growth rates, resulting in an Allocation Year Retail Demand of 131,000 acre-feet.



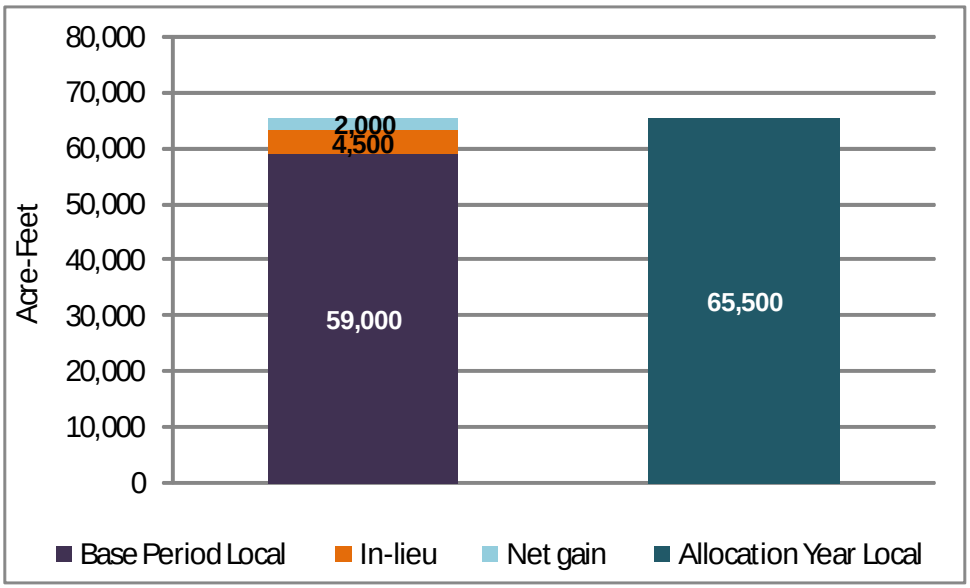
Step 3: Adjustment for changes in local supply from the Base Period

The third step in calculating this agency's allocation is to calculate the agency's local supply production in the year of the allocation. This is done by using Base Period Local Supplies that were calculated in Step One as a base estimate, and adding back base period in-lieu deliveries and any gains or losses. Base Period In-Lieu Deliveries are calculated by averaging in-lieu deliveries from the same three-year period that was used to calculate the Base Period Local Supplies and Demands. This step is important because, in order to have certified in-lieu deliveries in the Base Period, an agency had to have reduced its available local supplies. Missing this step would underestimate the amount of local supplies that an agency should be expected to produce.



In addition to adding in base period in-lieu deliveries, the Base Period Local Supplies are adjusted for gains and/or losses of supply that are occurring in the allocation year. If this agency had undertaken extraordinary efforts to secure alternative supplies, this Extraordinary Increase in Local Supplies would also be added here.

Allocation Year Local Supplies are the result from adjusting the Base Period Local Supply for all of the changes listed above. The following chart shows how Base Year Local Supplies, Base Year In-Lieu Deliveries, and adjustments for gains or losses of supply are added together to produce an estimate of the Allocation Year Local Supplies. The chart below shows that an agency that had 59,000 acre-feet of Base Year Local Supplies, 4,500 acre-feet of Base Year In-Lieu Deliveries, and 2,000 acre-feet of net gains in local supply would have Allocation Year Local Supplies of 65,500 acre-feet.

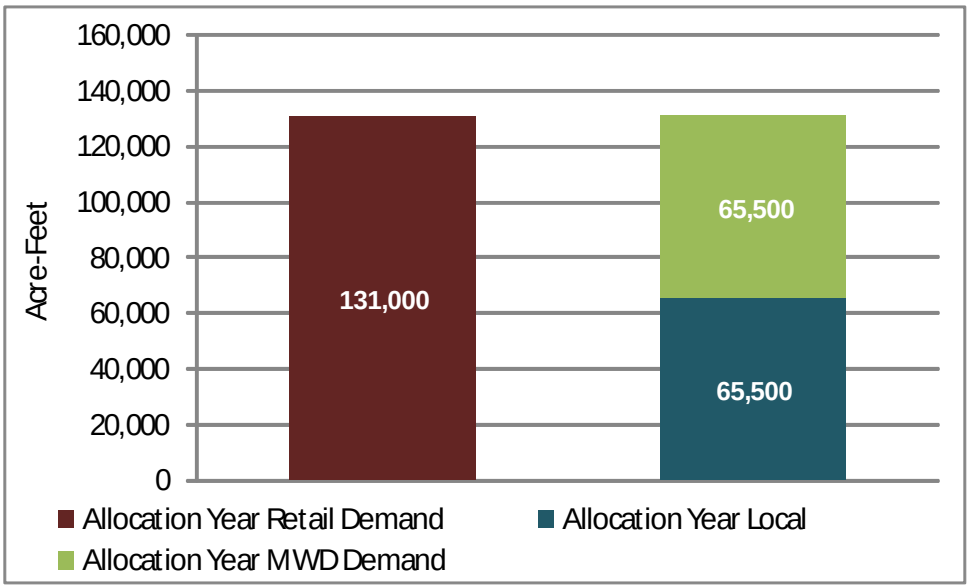


Step 4: Calculate Wholesale Water Needs in the allocation year

Now that both the Allocation Year Retail Demands and the Allocation Year Local Supplies have been estimated, the agency's Allocation Year Wholesale Demand can be calculated.

Allocation Year Wholesale Demands on Metropolitan are calculated by subtracting the Allocation Year Local Supplies from the Allocation Year Retail Demands. Any demand that is remaining after the agency's local supplies are accounted for represents demand for wholesale supplies from Metropolitan. For the example, the agency has an Allocation Year Retail Demand of 131,000 acre-feet and an Allocation Year Local Supply of 65,500 acre-feet. Subtracting these two figures provides Allocation Year Wholesale Demands of 65,500 acre-feet.

Dependence on MWD is calculated as the percentage of an agency's retail need that is met by Metropolitan wholesale supplies. This example shows that 50 percent of this hypothetical agency's Allocation Year Retail Demands will be met by local supplies and 50 percent by wholesale Metropolitan deliveries, resulting in a Dependence on MWD of 50 percent.



Step 4: Calculate Base Period Conservation Savings

Estimating conservation savings is a key step in calculating the appropriate size of the Conservation Demand Hardening Credit. The premise of the credit is to provide additional allocation to an agency based on estimates of conservation savings. Successful implementation of conservation saving devices make it more difficult for retail level consumers to achieve additional reductions in water use compared to those consumers who have not installed water savings devices.

Base Period Conservation is calculated using a tool developed by Metropolitan staff. This tool uses as inputs the total amount of conservation savings devices and programs installed by each member agency, and standardized water savings factors provided by the CUWCC and other recognized bodies. In addition, agencies that have retail use that is covered by a qualifying conserving water rates structure would be able to add .5 percent of their covered Base Period Retail Demand to the Base Period Conservation. For the example, the agency is estimated to have 14,500 acre-feet of quantified conservation savings.

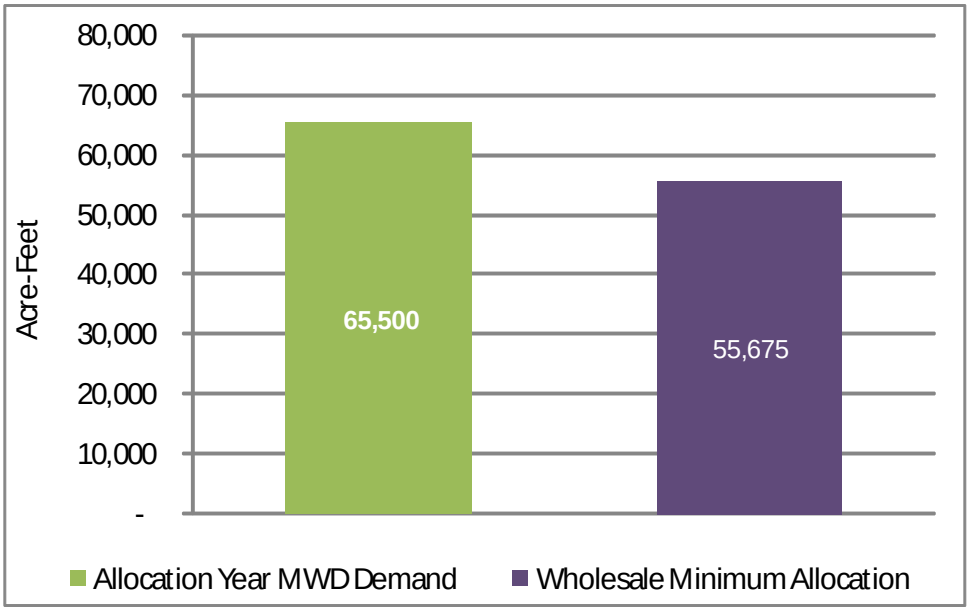
Allocation Example – Calculating Supply Allocation in Regional Shortage Levels 1 & 2

For shallow regional shortages, which are defined as being 10% or less, the proposal recommends an across the board reduction in the wholesale supplies to all agencies, with adjustments for conservation demand hardening. The across the board reduction will be set by providing a Wholesale Minimum Allocation and a Conservation Demand Hardening Credit. There is no adjustment to address disparate retail level shortages in Shortage Levels 1 & 2. This example will follow the allocation formula accounting, through a Regional Shortage Level-2 (10 percent). The table below shows the essential elements of the allocation formula under a Regional Shortage Level-2.

(1) Regional Shortage Level	(2) Regional Shortage Percentage	(3) Wholesale Minimum Allocation	(4) Retail Impact Adjustment Maximum	(5) Extraordinary Increase Percentage	(6) IAWP Reduction
2	10%	85.0%	0.0%	0%	30%

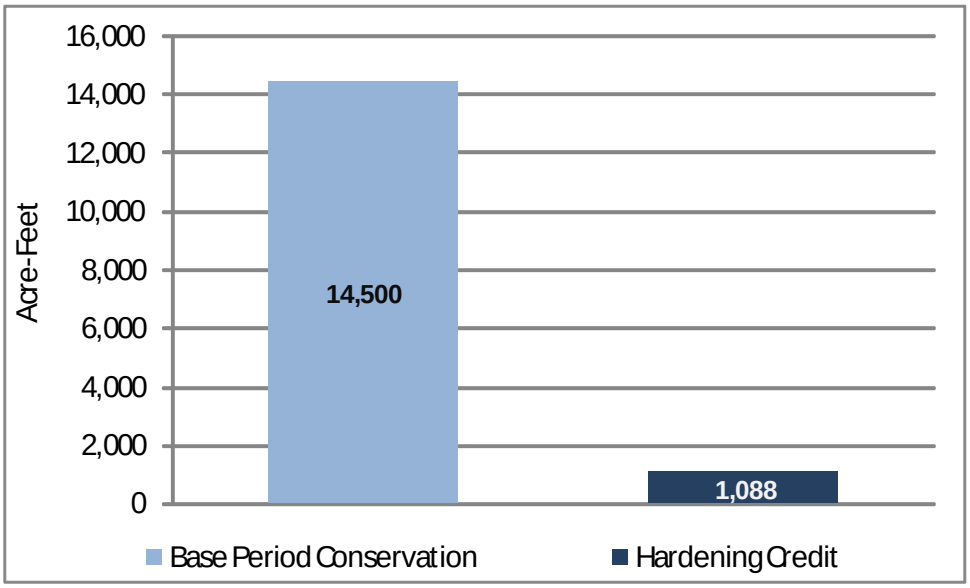
Step 1: Calculate Wholesale Minimum Allocation

The Wholesale Minimum Allocation is calculated by multiplying the agency's Allocation Year Wholesale Demand by the Wholesale Minimum Allocation percentage from the allocation table. The following chart illustrates this calculation. The agency has an Allocation Year Wholesale Demand of 65,500 acre-feet, and the allocation table provides a factor of 85 percent in a Regional Shortage Level-2. Based on this, the agency would receive a Wholesale Minimum Allocation of .85 x 65,500 = 55,675 acre-feet.



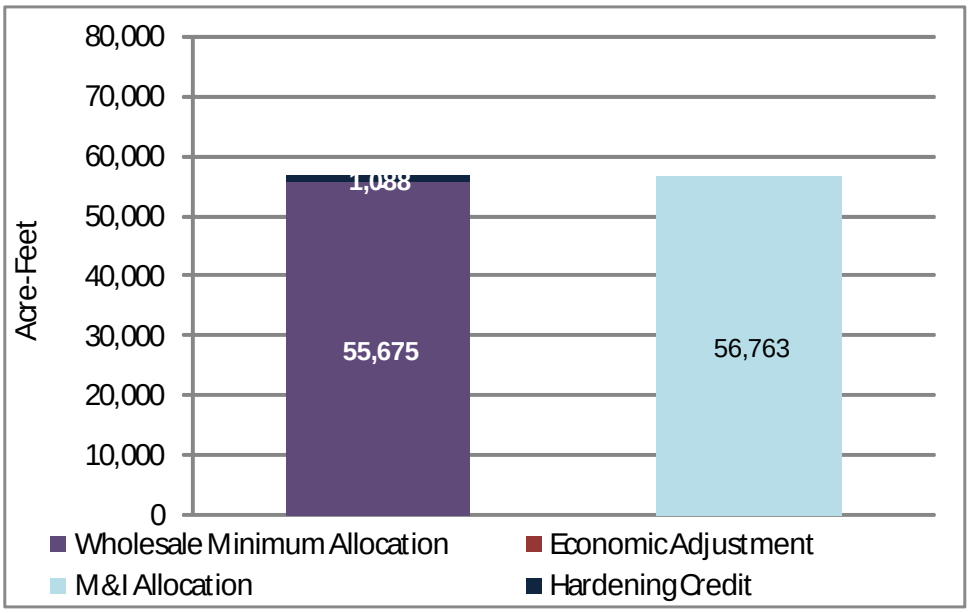
Step 2: Calculate Conservation Hardening Credit

The Conservation Hardening Credit is calculated by multiplying the agency's Base Year Conservation savings by the estimated retail level shortage for the agency. From the steps above, this agency has a Wholesale Minimum Allocation of 55,675 acre-feet, Allocation Year Local Supplies of 65,500 acre-feet, and Allocation Year Retail Demands of 131,000 acre-feet. To calculate the estimated retail level shortage prior to receiving the Conservation Hardening Credit, add the Wholesale Minimum Allocation, the Retail Impact Adjustment Allocation, and the Allocation Year Local Supplies, divide by the Allocation Year Retail Demand, and subtract the result from 100%. Doing so results in an estimated retail level shortage of 100% - ((55,675 + 65,500) / 131,000) = 100% - 92.5% = 7.5%. Multiplying this agency's Base Period Conservation savings of 14,500 acre-feet by 7.5% of estimated retail level shortage provides the Conservation Hardening Credit of 1,087.5 acre-feet.



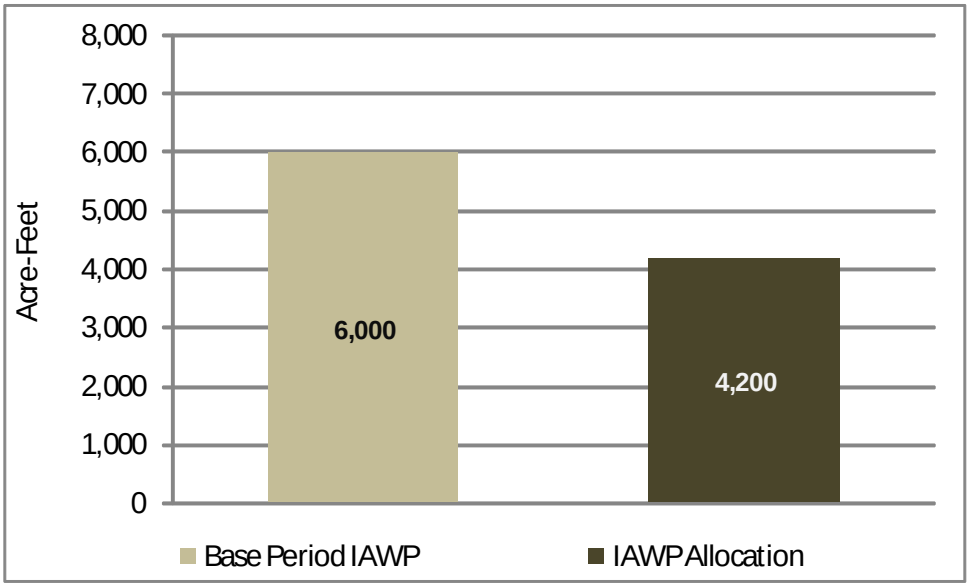
Step 3: Add the Wholesale Minimum Allocation and the Conservation Hardening Credit to get the final M&I agency allocation

The chart below shows how the Wholesale Minimum Allocation of 55,675 acre-feet and the Conservation Hardening Credit of 1,087.5 acre-feet are added together to total to the final M&I allocation of 56,762.5 acre-feet.



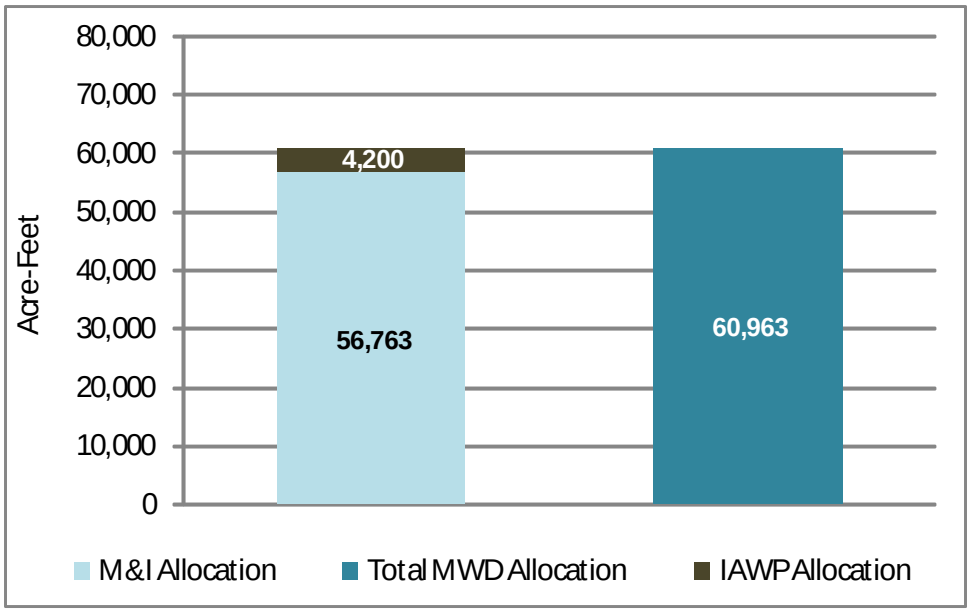
IAWP Allocation

The IAWP allocation for this agency is calculated by reducing the Base Year IAWP deliveries by the percent IAWP reduction. Under a Regional Shortage Level-2 (10 percent) this agency would see a 30 percent reduction in IAWP deliveries in the allocation year. For this agency, this would result in an IAWP Allocation of 6,000 x .7 = 4,200 acre-feet. The following chart illustrates this calculation.



Total Allocation

The final step in calculating this agency's allocation of Metropolitan supplies is to sum up all of the elements of the allocation formula that were calculated above. In this example, the agency would receive 56,762.5 acre-feet of M&I Allocation, plus 4,200 acre-feet of IAWP Allocation, for a Total Allocation of 60,962.5 acre-feet.



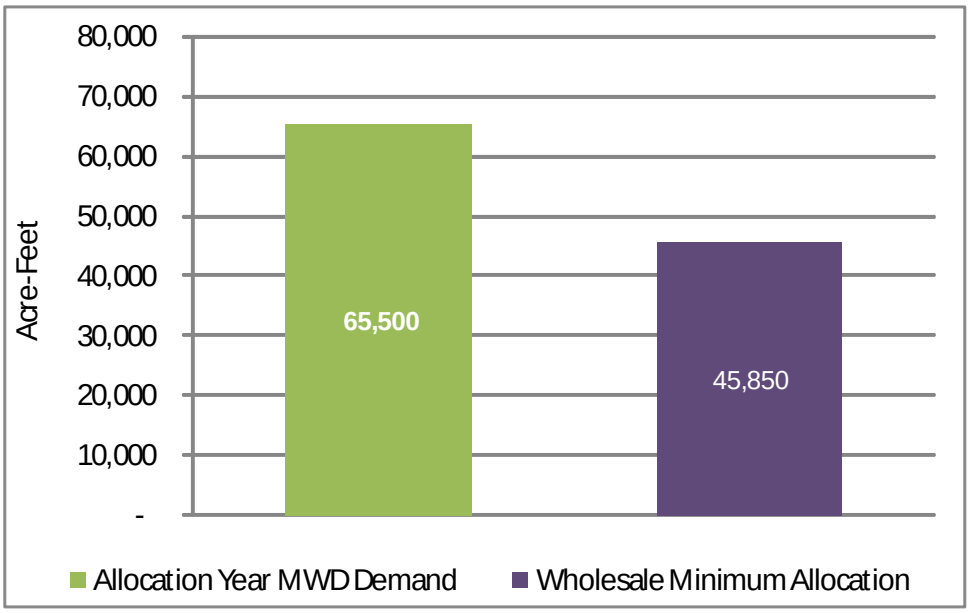
Allocation Example – Calculating Supply Allocation in Regional Shortage Levels 3 and Above

For deeper regional shortages, which are defined as being greater than 10%, the proposal recommends adding a Retail Impact Adjustment Allocation to address disparate retail level shortages. This example will follow the allocation formula accounting, through a Regional Shortage Level-4 (20 percent). The table below shows the essential elements of the allocation formula under a Regional Shortage Level-4.

(1) Regional Shortage Level	(2) Regional Shortage Percentage	(3) Wholesale Minimum Allocation	(4) Retail Impact Adjustment Maximum	(5) Extraordinary Increase Percentage	(6) IAWP Reduction
4	20%	70.0%	10.0%	20%	50%

Step 1: Calculate Wholesale Minimum Allocation

The Wholesale Minimum Allocation is calculated by multiplying the agency's Allocation Year Wholesale Demand by the Wholesale Minimum Allocation percentage from the allocation table. The following chart illustrates this calculation. The agency has an Allocation Year Wholesale Demand of 65,500 acre-feet, and the allocation table provides a factor of 70 percent in a Regional Shortage Level-4. Based on this, the agency would receive a Wholesale Minimum Allocation of .70 x 65,500 = 45,850 acre-feet.

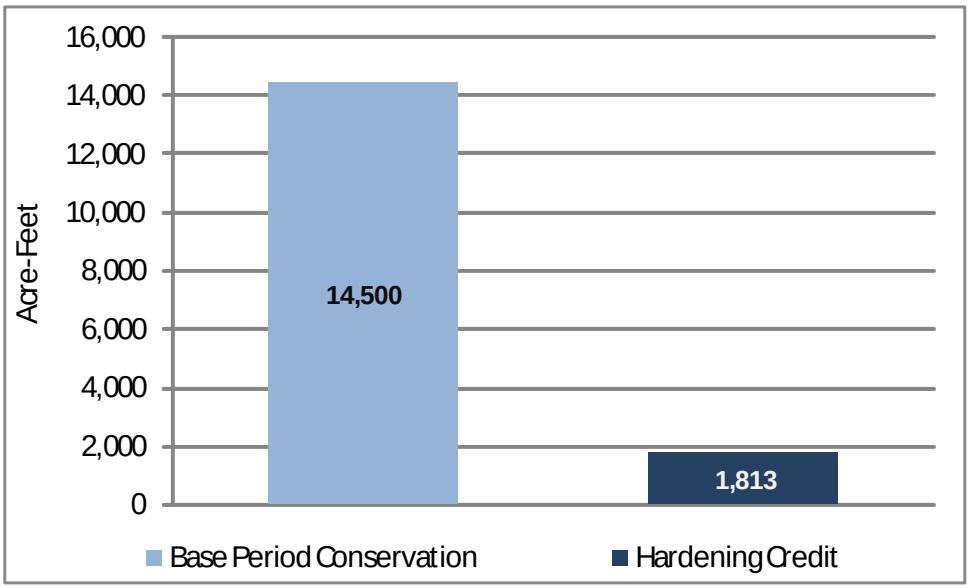


Step 2: Calculate Retail Impact Adjustment Allocation

The next step in determining this agency's allocation is to calculate the Retail Impact Adjustment Allocation. Recall from the allocation table, the Retail Impact Adjustment Maximum factor is the difference between the Wholesale Minimum Allocation and the Regional Shortage Percentage. Under a Regional Shortage Level-4 (20 percent), the Retail Impact Adjustment Maximum factor available to any agency is 10 percent. In a previous step, this agency was calculated as having a 50 percent Dependence on MWD. Under this example the agency would receive 50 percent of the 10 percent Retail Impact Adjustment Maximum factor, equaling an additional 5 percent allocation. This 5 percent is multiplied by the agency's wholesale demands on Metropolitan of 65,500 acre-feet, giving a total Retail Impact Adjustment Allocation of 3,275 acre-feet

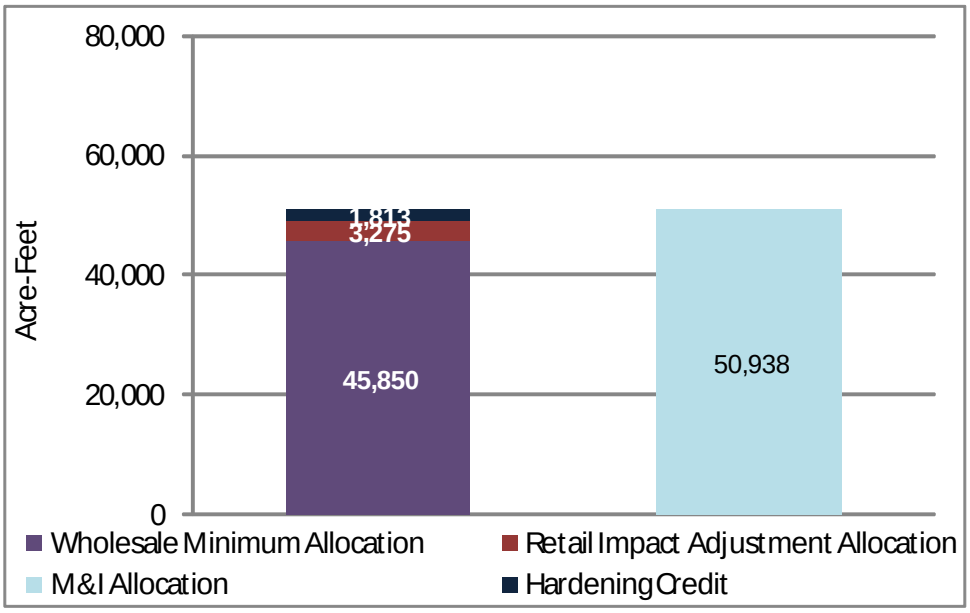
Step 3: Calculate Conservation Hardening Credit

The Conservation Hardening Credit is calculated by multiplying the agency's Base Year Conservation savings by the estimated retail level shortage for the agency. From the steps above, this agency has a Wholesale Minimum Allocation of 45,850 acre-feet, a Retail Impact Adjustment Allocation of 3,275 acre-feet, Allocation Year Local Supplies of 65,500 acre-feet, and Allocation Year Retail Demands of 131,000 acre-feet. To calculate the estimated retail level shortage prior to receiving the Conservation Hardening Credit, add the Wholesale Minimum Allocation, the Retail Impact Adjustment Allocation, and the Allocation Year Local Supplies, divide by the Allocation Year Retail Demand, and subtract the result from 100%. Doing so results in an estimated retail level shortage of 100% - ((45,850 + 3,275 + 65,500) / 131,000) = 100% - 87.5% = 12.5%. Multiplying this agency's Base Period Conservation savings of 14,500 acre-feet by 12.5% of estimated retail level shortage provides the Conservation Hardening Credit of 1,812.5 acre-feet.



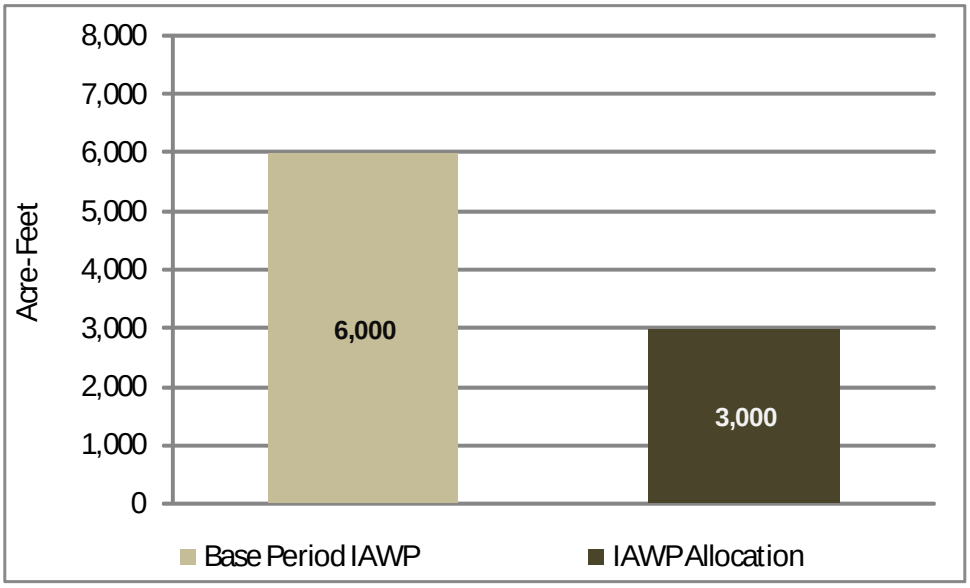
Step 4: Add the Wholesale Minimum Allocation, the Retail Impact Adjustment Allocation, and the Conservation Hardening Credit to get the final M&I agency allocation

The chart below shows how the Wholesale Minimum Allocation of 45,850 acre-feet, the Retail Impact Adjustment Allocation of 3,275 acre-feet, and the Conservation Hardening Credit of 1,812.5 acre-feet are added together to total to the final M&I allocation of 50,937.5 acre-feet.



IAWP Allocation

The IAWP allocation for this agency is calculated by reducing the Base Year IAWP deliveries by the percent IAWP reduction. Under a Regional Shortage Level-4 (20 percent) this agency would see a 50 percent reduction in IAWP deliveries in the allocation year. For this agency, this would result in an IAWP Allocation of 6,000 x .5 = 3,000 acre-feet. The following chart illustrates this calculation.



Total Allocation

The final step in calculating this agency's allocation of Metropolitan supplies is to sum up all of the elements of the allocation formula that were calculated above. In this example, the agency would receive 50,937.5 acre-feet of M&I Allocation, plus 3,000 acre-feet of IAWP Allocation, for a Total Allocation of 53,937.5 acre-feet.