Appendix H
Portfolio Performance Scorecard

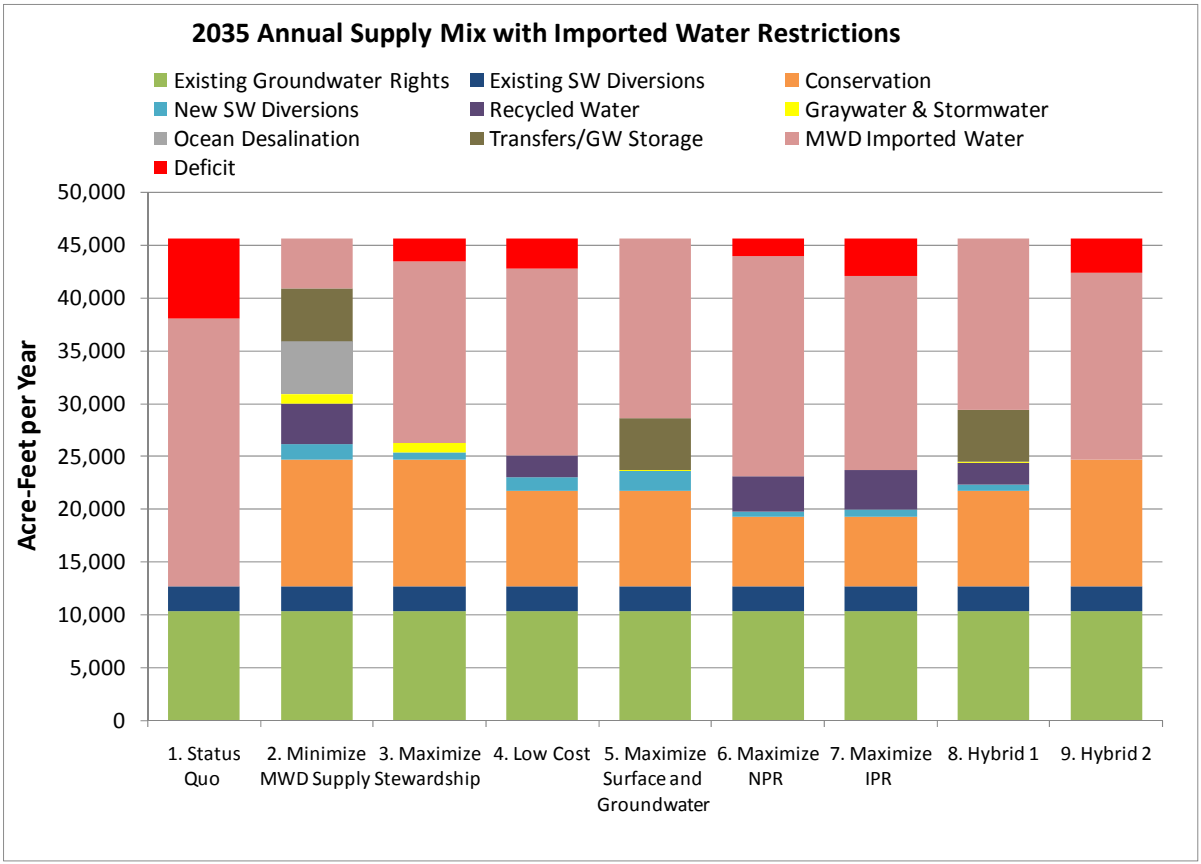
The portfolio performance scorecard (or raw performance) represents the ability of a portfolio to achieve a given objective, regardless of the importance or relative weighting of the objective. The portfolio performance scorecard is provided as Table 6-1 of the main report. This appendix provides more discussion of the raw performance evaluations under each of the planning objectives.

Note that the scales vary among the performance measures - in some cases, a higher score means better performance (such as groundwater replenishment); in other cases, a higher score means worse performance (such as supply deficits or costs). The scales for each performance measure are adjusted accordingly in the decision model prior to portfolio ranking (see Section 5.8 of main report).

H.1 Provide a reliable water supply

Vulnerability to Delta Supply Restrictions

Portfolio reliability under Delta supply restrictions was analyzed by applying a 20 percent regional shortage scenario to the 2035 planning year, and calculating the portion of MWD imported water supply that PWP could expect to receive based on the drought formula presented in the 2008 MWD Water Supply Allocation Plan.

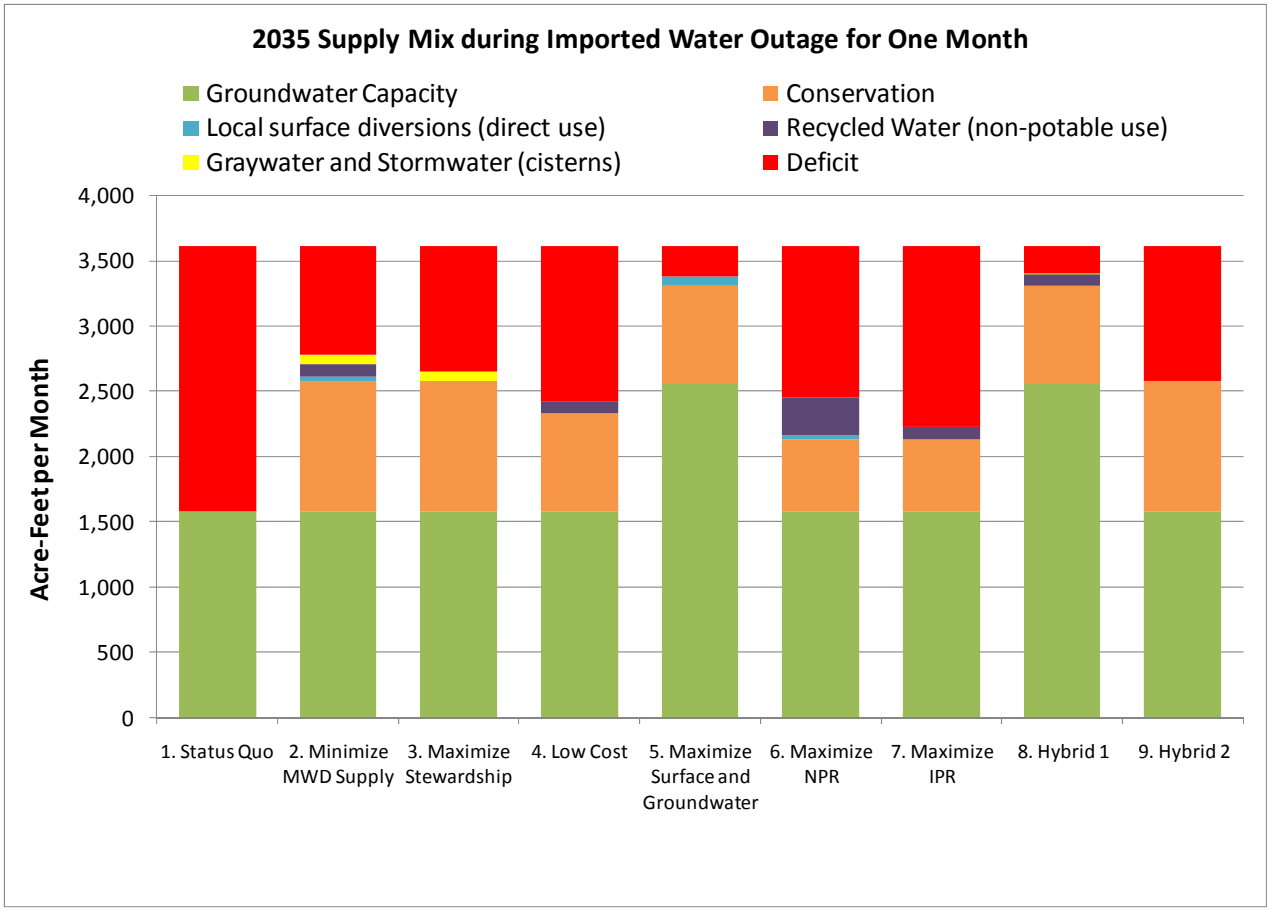


Note that the drought allocation among the portfolios varies based on the type of supply projects or programs pursued and the overall reliance on MWD water supply. In general, projects that are favored in the drought formula include conservation and non-potable recycled water, along with "extra-ordinary" supply such as water transfers and banking programs. An example of this is demonstrated between Portfolios 6 and 7, which have a very similar supply mix under normal conditions, but non-potable reuse performs better in the drought formula than indirect potable reuse (which becomes part of the groundwater system before becoming supply delivered to demands). Therefore, Portfolio 6 has a smaller deficit.

The results show that, under a 20 percent MWD regional shortage, the status quo future would face shortages of around 7,500 AFY in 2035. However, these deficits could be cut in half or eliminated depending on the portfolio of projects pursued.

Maintain a system that can be independent of imported water for a short term

This scenario measures the projected 2035 deficit during a one-month period with no supply from MWD facilities. PWP should be prepared to respond to a temporary shut-down of supply from MWD. In this scenario, PWP would utilize groundwater wells at full capacity. Any options that produce supply by recharging the groundwater system are lumped into the groundwater capacity (green bar).

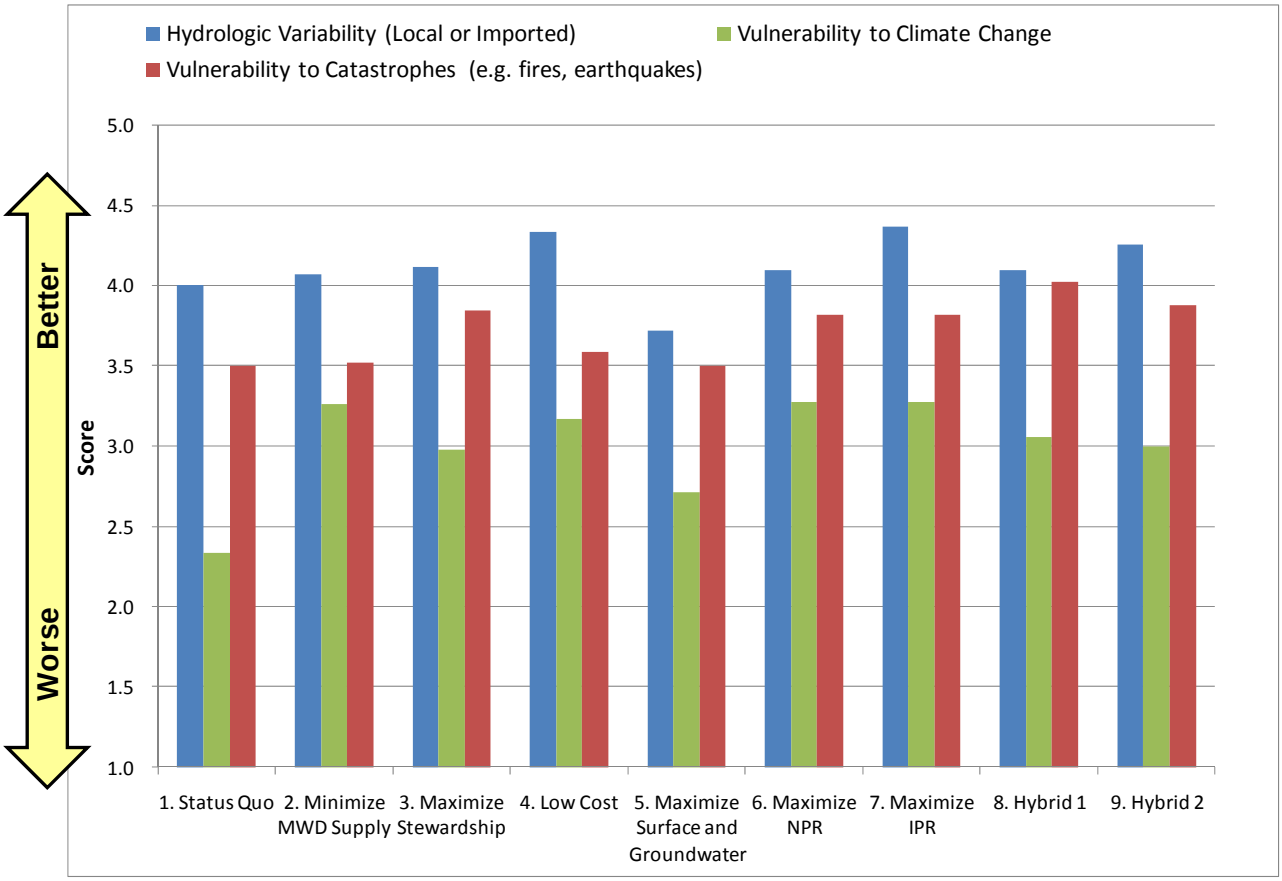


The portfolios that clearly perform better than others are those that have increased groundwater well capacity as part of the Pasadena Groundwater Storage Program, which proposes the East-side Well Collector and new injection/extraction wells.

Note that some projects that perform well in drought conditions, such as ocean desalination or water transfers, do not perform well in this emergency scenario since the supply from these sources would have to be delivered via MWD facilities.

Other reliability performance measures

Other reliability performance measures include: (1) Hydrologic Variability, (2) Vulnerability to Catastrophes, and (3) Vulnerability to Climate Change. The scores for these performance measures are qualitative in nature, and guidance on qualitative scoring is provided in Appendix F.



Although there is much variation in scores among the individual options, there is not much variation when the scores are rolled up to the portfolio level of analysis. Vulnerability to catastrophe only varies by 0.5 point among the portfolios on a scale of 1 to 5, and portfolio scores for hydrologic variability also vary by less than one point. The most significant difference among the portfolio performance is with vulnerability to climate change (green bar), in which the status quo scenario is clearly the most vulnerable - primarily due to the heavy reliance on imported water.

H.2 Maintain affordability, while addressing fairness and equity

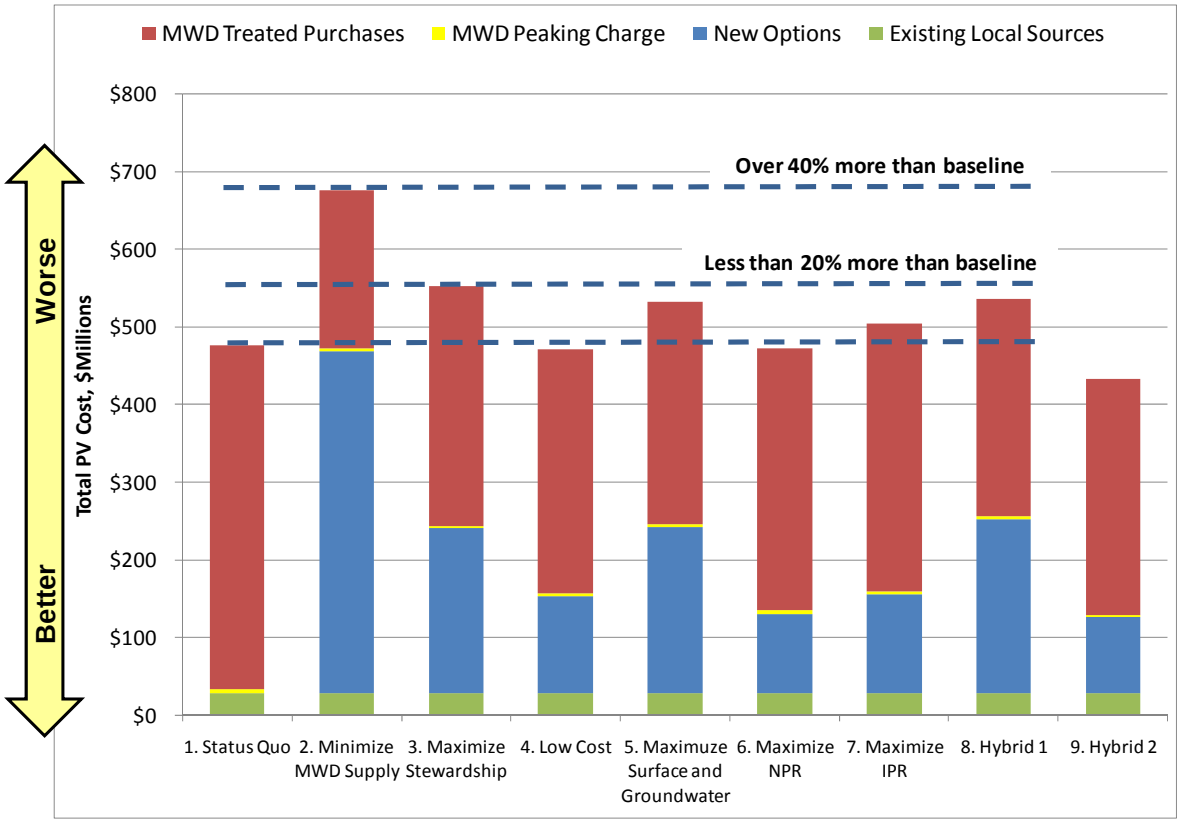
Total Life-cycle Cost

This performance measure represents the total cost of the portfolio over the entire planning horizon, including costs that would be shared with partners or customer/developers. Relative costs to PWP are evaluated in another performance measure.

For each portfolio, the following method was used to determine the life-cycle cost:

- First, projecting all capital and O&M costs into the future, including impacts of inflation.
- Second, bringing all future costs back to today's dollars using a present value factor that reflects the time value of money.

Refer to Appendix D for details on the calculation of this performance measure.



As shown in the figure above, there are a few portfolios that have the same or less total cost than the status quo scenario. All except for one portfolio cost less than 20 percent more than the status quo. The most expensive portfolio is the 'Minimize MWD Supply' portfolio, which is a "do everything" approach that has significant capital and O&M costs for new options that do not completely offset the cost of imported water.

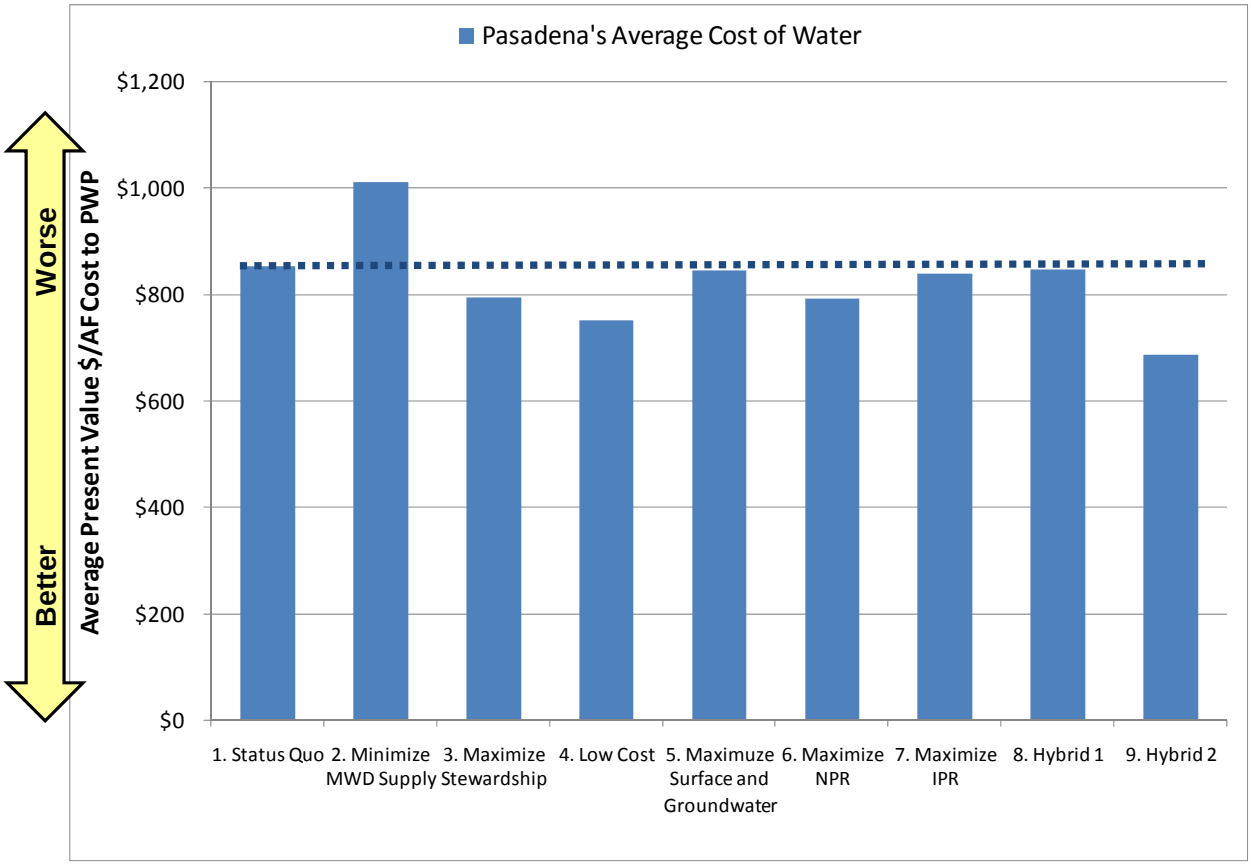
Pasadena's Average Cost of Water

This performance measure estimates the projected unit cost for PWP, meaning it does not include costs that would likely be paid by customers, developers, and partners.

For each portfolio, the following method was used to determine the unit cost:

- First, projecting all capital and O&M costs into the future, including impacts of inflation.
- Second, bringing all future costs back to today's dollars using a present value factor that reflects the time value of money.
- Third, dividing the total present value costs by the total water demand (before water conservation) to calculate the unit cost in dollars per acre-foot.

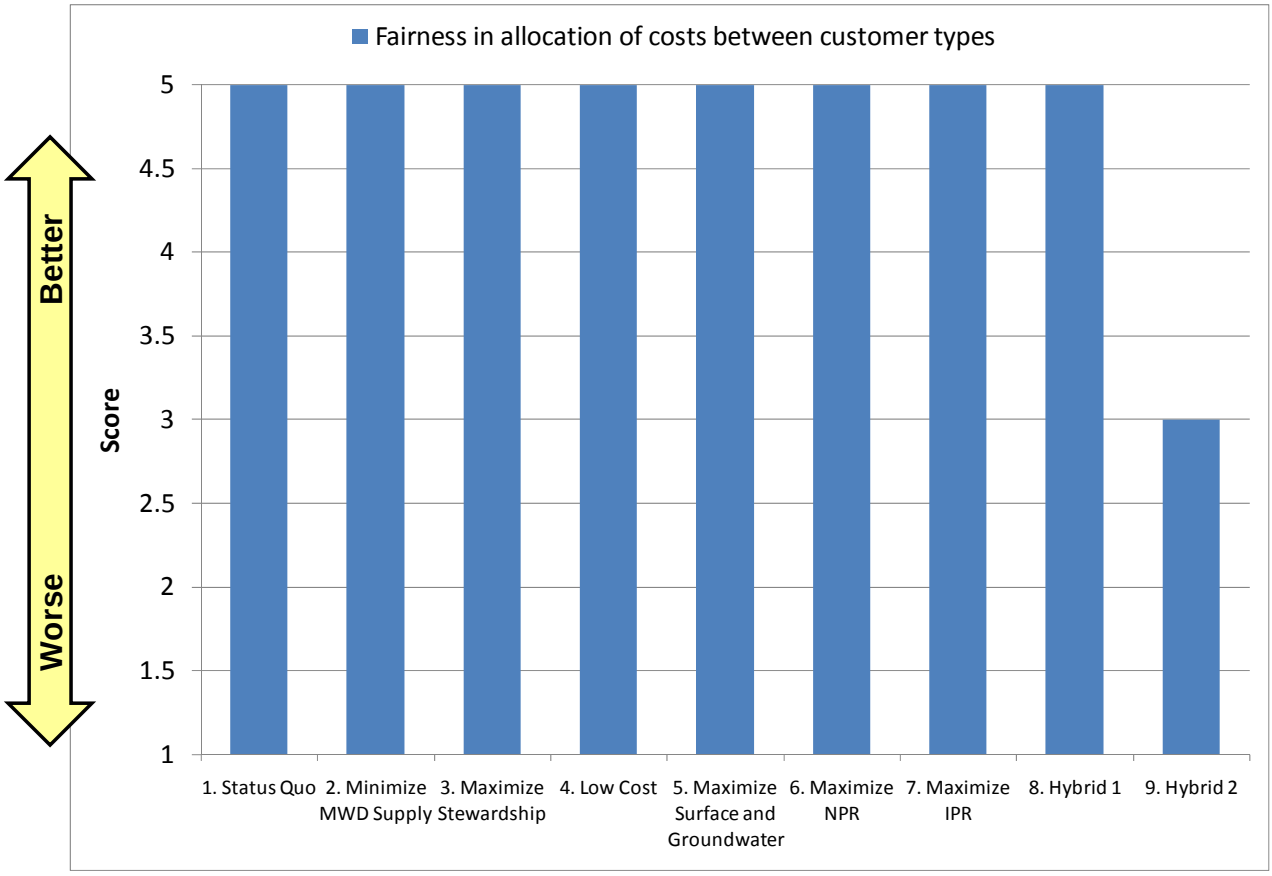
Refer to Appendix D for details on the calculation of this performance measure.



As shown above, all but one portfolio has the same or less cost to Pasadena than the status quo (or "do nothing" approach). This is a significant finding given that some portfolios will provide multiple benefits under other planning objectives.

Fairness in allocation of costs between customer types

The scores for this performance measures are qualitative in nature, and guidance on qualitative scoring is provided in Appendix F.



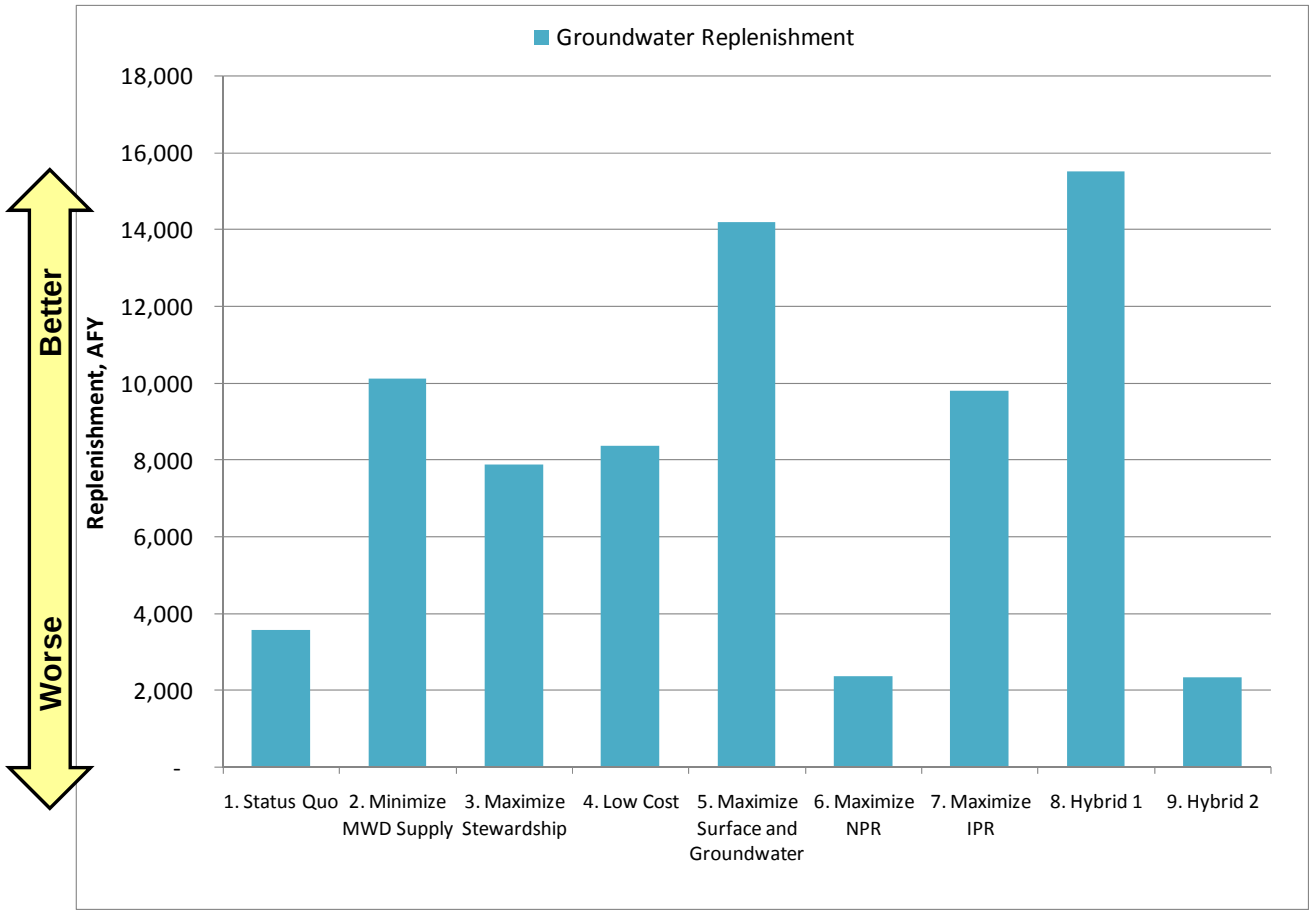
The WIRP analysis estimates the overall cost of each portfolio. However, a detailed assessment of how this cost would be allocated fairly to customers will likely be determined through a subsequent rate study when the WIRP is completed. As shown above, it is assumed that a fair rate structure/pricing approach will be able to be implemented for all portfolios except the Hybrid 2 portfolio. Under this portfolio, where the 10% of single family users are targeted to reduce demands by 70%, a very aggressive and penalty-based pricing of water would have to be implemented. This would go well beyond water budget-based rate structures, and therefore would likely get challenged by these top users as being potentially unfair and punitive.

It should be noted that WIRP results were tested assuming a score of 5 for all portfolios in this performance measure, and the overall recommendations did not change.

H.3 Protect and enhance source waters and the environment

Replenish the Raymond Groundwater Basin

This performance measure accounts for the total average annual water replenished to the groundwater basin in 2035, regardless of the quantity that becomes available as supply for PWP.

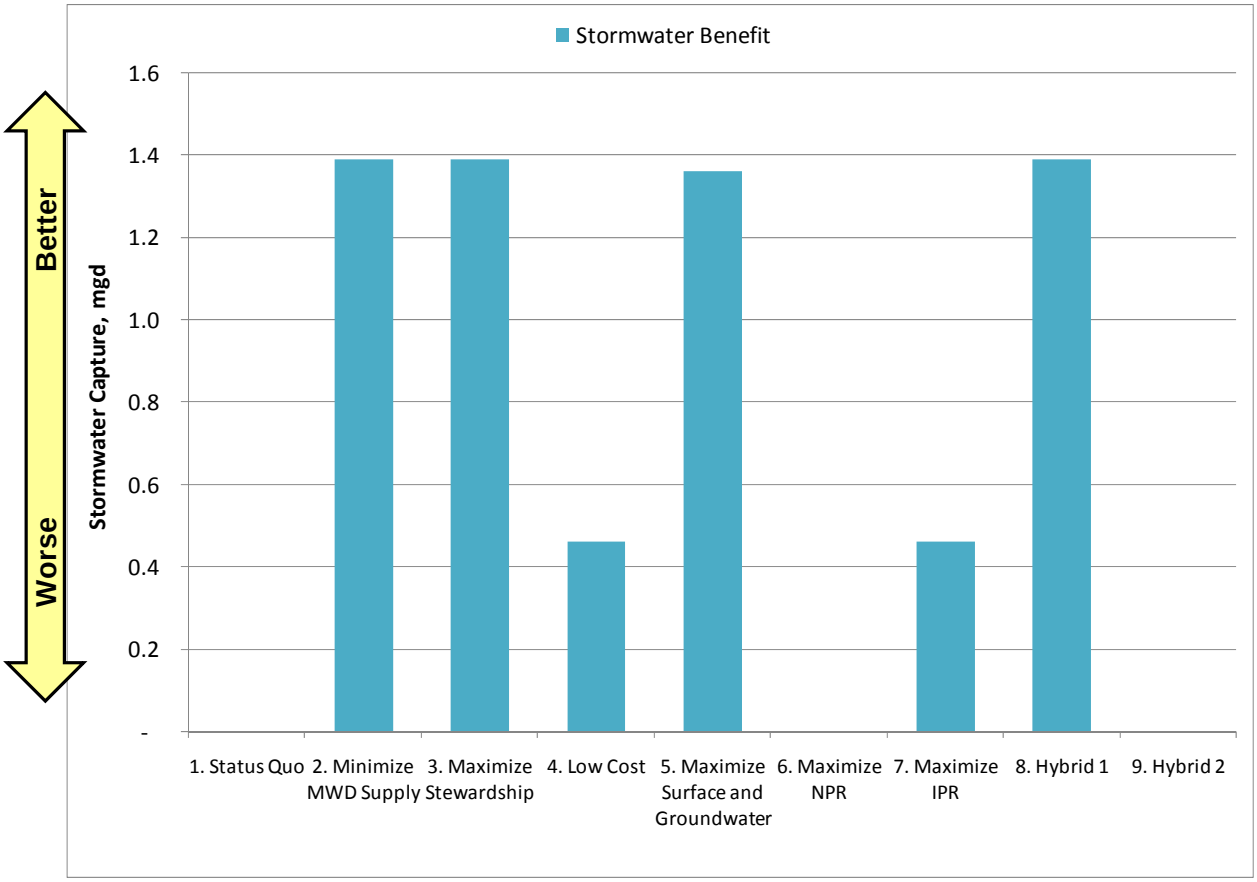


Replenishment in the status quo is based on recharge occurring through existing diversions and spreading operations by PWP in the Arroyo Seco and Eaton Wash watersheds. The amount of potential replenishment varies widely among the portfolios – with some portfolios showing reduced replenishment due to outdoor conservation and others showing increased replenishment by over 15,000 AFY on average.

The portfolio with the most potential for groundwater replenishment is Hybrid 1, which includes Devil's Gate storage to Eaton Canyon, recycled water recharge (Indirect Potable Reuse), imported water recharge (Pasadena Groundwater Storage Program), and all stormwater options.

Reduce stormwater pollutant discharges to creeks and rivers

This performance measure accounts for the total average stormwater capture in 2035, regardless of the quantity that becomes available as supply for PWP.



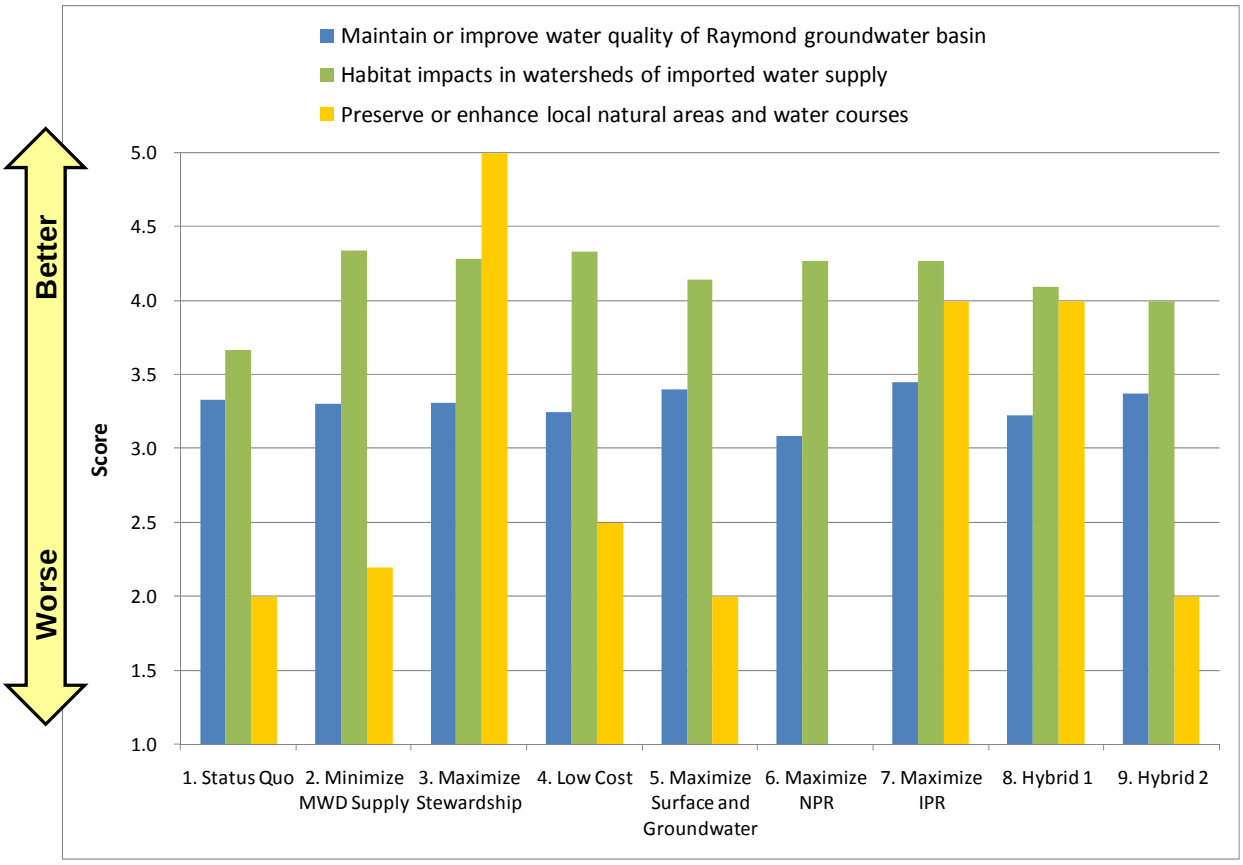
Urban stormwater runoff picks up surface pollutants and flows to into a storm drain pipes that discharges to streams or flood control channels, and ultimately to the ocean. This stormwater runoff can be captured to reduce pollutant loads and improve water quality of the receiving water bodies.

Projects included in portfolio evaluation that reduce on-site urban stormwater runoff include residential rain barrels and bioswales, commercial/institutional bioswales, and permeable pavement. In addition, the Devil's Gate storage to Eaton Canyon option could reduce stormwater discharge in concept, by routing stormwater to existing spreading areas for groundwater recharge.

The Low Cost and Maximize Indirect Potable Reuse options have the Devil's Gate Storage to Eaton Canyon project only. The four highest performing portfolios have the Devil's Gate storage to Eaton Canyon plus all other on-site stormwater/urban runoff options.

Other environmental performance measures

Other environmental performance measures include: (1) Maintain or improve water quality of the Raymond Groundwater Basin (blue bars), (2) Habitat impacts in watersheds of imported water supply (green bars), and (3) Preserve or enhance local natural areas and water courses (yellow bars). The scores for these performance measures are qualitative in nature, and guidance on qualitative scoring is provided in Appendix F.



Maintain or Improve water quality of Raymond Groundwater Basin

Although there is much variation in scores among the individual options, there is not much variation when the scores are rolled up to the portfolio level of analysis. Based on these results, all portfolios maintain water quality and there are none that significantly reduce or improve water quality.

Habitat impacts in watershed of imported water supply

Again, this performance measure does not have much variation among the portfolios when the scores are rolled up to the portfolio level of analysis. The status quo portfolio is the one portfolio that clearly has the worst score – due to the heavy reliance on imported water.

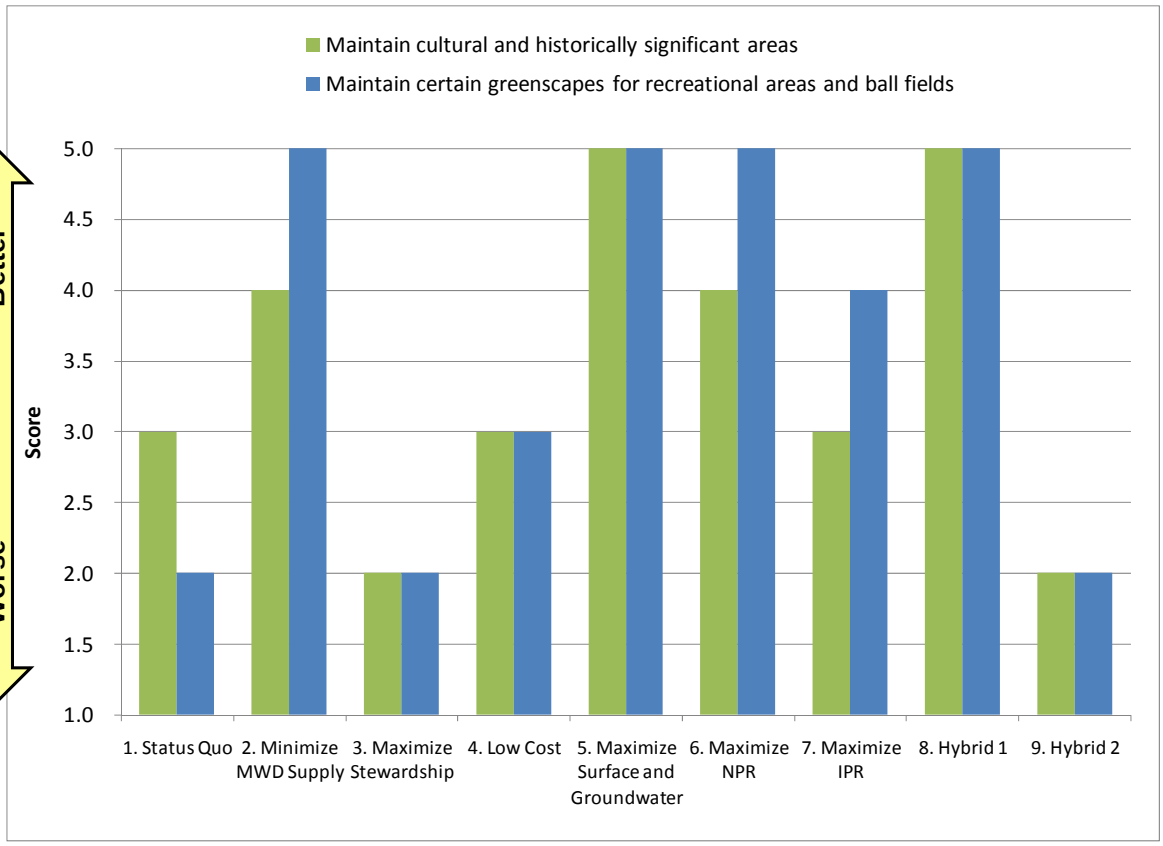
Preserve or enhance local natural areas and water courses

This performance measure has more variation among the portfolios. The focus of this performance measure is on long-term habitat impacts in the Arroyo Seco and Eaton Wash stream areas, which are recognized as important habitat areas to unique and endangered species. Any options that divert water away from the natural stream, such as tunnel water diversions or diversions to expanded spreading or treatment, have a potential negative impact. Options that improve habitat conditions include the Devil's Gate storage option which in concept would enhance environmental flows downstream of the dam. In addition, recharge of recycled water has a potential positive impact by providing more consistent year-round flows into existing spreading areas, as long as water quality objectives are met.

The Maximize Stewardship portfolio performs the best here, since it includes Devil's Gate Storage to existing spreading in Eaton Canyon, and no other stream diversions. The Non-potable Reuse portfolio performs the worst since it includes tunnel diversions without the Devil's Gate Storage project.

H.4 Protect cultural and recreational resources

There are two performance measures under this objective: (1) Maintain cultural and historically significant areas, and (2) Maintain certain greenscapes for recreational areas and ball fields. The scores for these performance measures are qualitative in nature, and guidance on qualitative scoring is provided in Appendix F.



There is significant variation in the portfolio performance in meeting this objective, depending on three main factors: 1) level of new conservation, 2) recycled water for non-potable reuse, and 3) projected supply shortages during imported water restrictions.

Maintain cultural and historically significant areas

Cultural areas are maintained if there are no supply shortages and if the maximum conservation is not implemented (which requires drought-tolerant landscapes with would change the cultural appearance of neighborhoods). The three portfolios with no supply shortages during imported water restrictions are (1) Minimize MWD Supply , (2) Maximize Surface and Groundwater, and (3) Hybrid 1. Portfolios that have maximum conservation (which lowers the performance score) include (1) Minimize MWD Supply, (2) Maximize Stewardship, and (3) Hybrid 2.

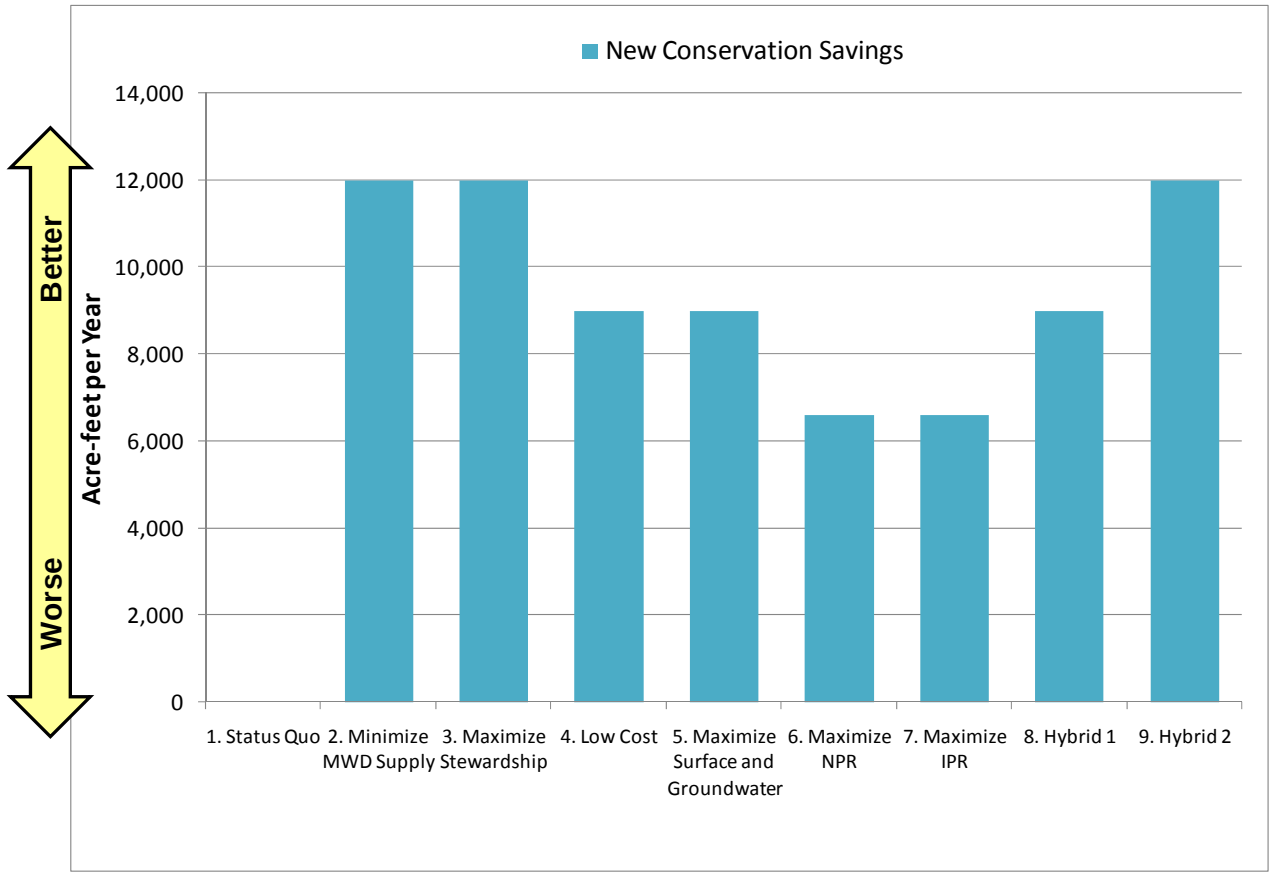
Maintain certain greenscapes for recreational areas and ball fields

Greenscapes in recreational areas and ball fields are maintained if there are no supply shortages and if portfolios maximize recycled water to non-potable demands (such as irrigation). Recycled water is a drought-proof source of supply and not subject to restrictions during shortage periods. The three portfolios with no supply shortages during imported water restrictions are (1) Minimize MWD Supply, (2) Maximize Surface and Groundwater, and (3) Hybrid 1. Only one portfolio maximizes non-potable reuse (named Non-potable Reuse).

H.5 Maximize efficiency of water use

Portfolios that perform well in this objective have the maximum level of new conservation, with an estimated annual savings of 12,000 acre-feet (AF) by 2035.

It should be noted that all new portfolios are designed to meet Governor Schwarzenegger's goal of 20 percent savings by 2020 under the Water Conservation Act of 2009 (SB-7). The new portfolios with lower levels of new conservation are paired with increased recycled water use to non-potable demands to meet SB-7.



H.6 Maintain quality of life and positive economic climate

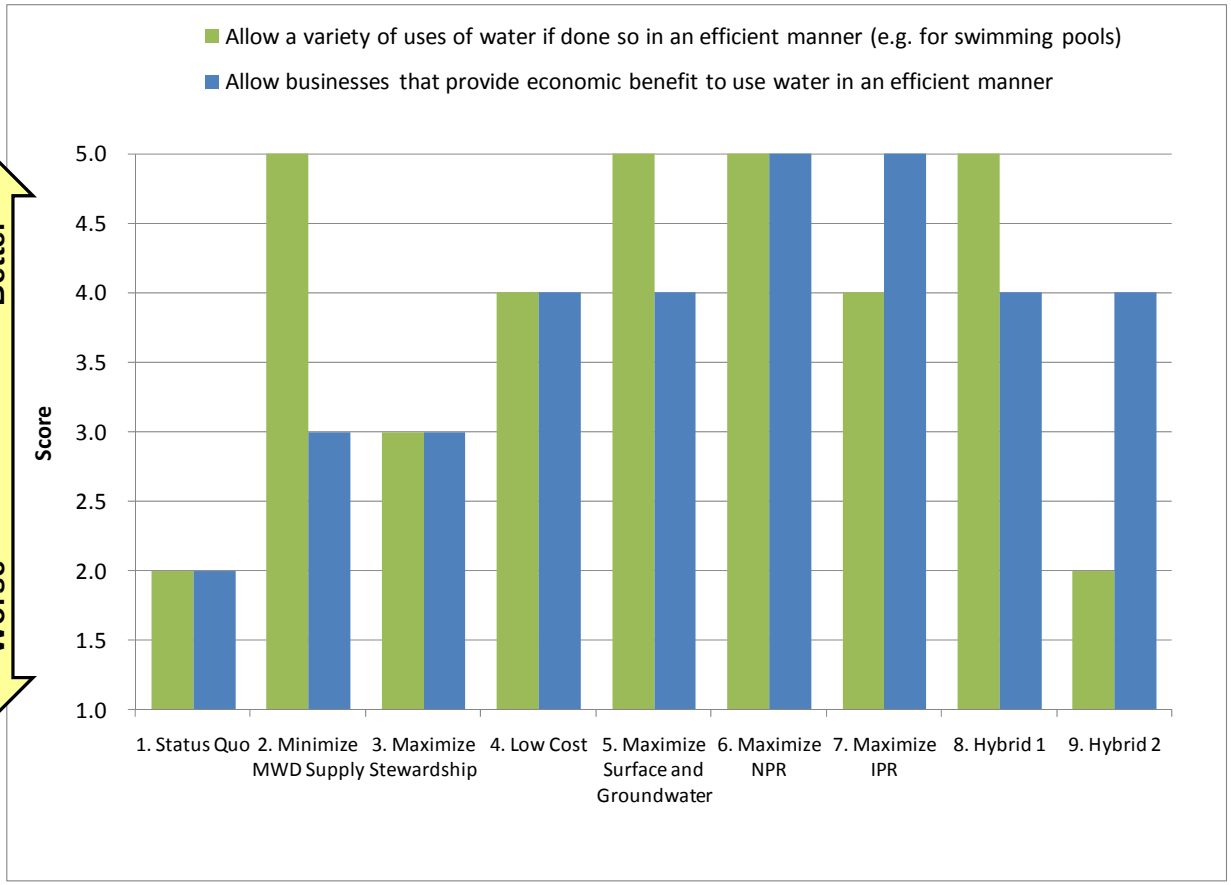
There are two performance measures under this objective: (1) Allow a variety of uses of water if done so in an efficient manner (e.g. swimming pools), and (2) Allow businesses that provide economic benefit to use water in an efficient manner. The scores for these performance measures are qualitative in nature, and guidance on qualitative scoring is provided in Appendix F.

Allow a variety of uses of water if done so in an efficient manner (e.g. swimming pools)

A variety of water uses is allowed (see green bars) if there are no supply shortages and if portfolios maximize recycled water to non-potable demands such as irrigation. Recycled water is a drought-proof source of supply and not subject to restrictions during shortage periods. The three portfolios with no supply shortages during imported water restrictions are (1) Minimize MWD Supply , (2) Maximize Surface and Groundwater, and (3) Hybrid 1. Only one portfolio maximizes non-potable reuse (named Non-potable Reuse).

Allow businesses that provide economic benefit to use water in an efficient manner

This performance measure considers the burden on developers and businesses for new conservation and certain stormwater options. Portfolios that implement higher levels of conservation will have a lower score in this performance measure (see blue bars). At the same time, any portfolios that are subject to supply shortages receive a lower score due to the negative perception of chronic shortages that may dissuade businesses or developers from the area. Portfolio that perform well in this performance measure include Maximize Non-potable Reuse and Maximize Indirect Potable Reuse, which have the lowest level of new conservation and no stormwater options.

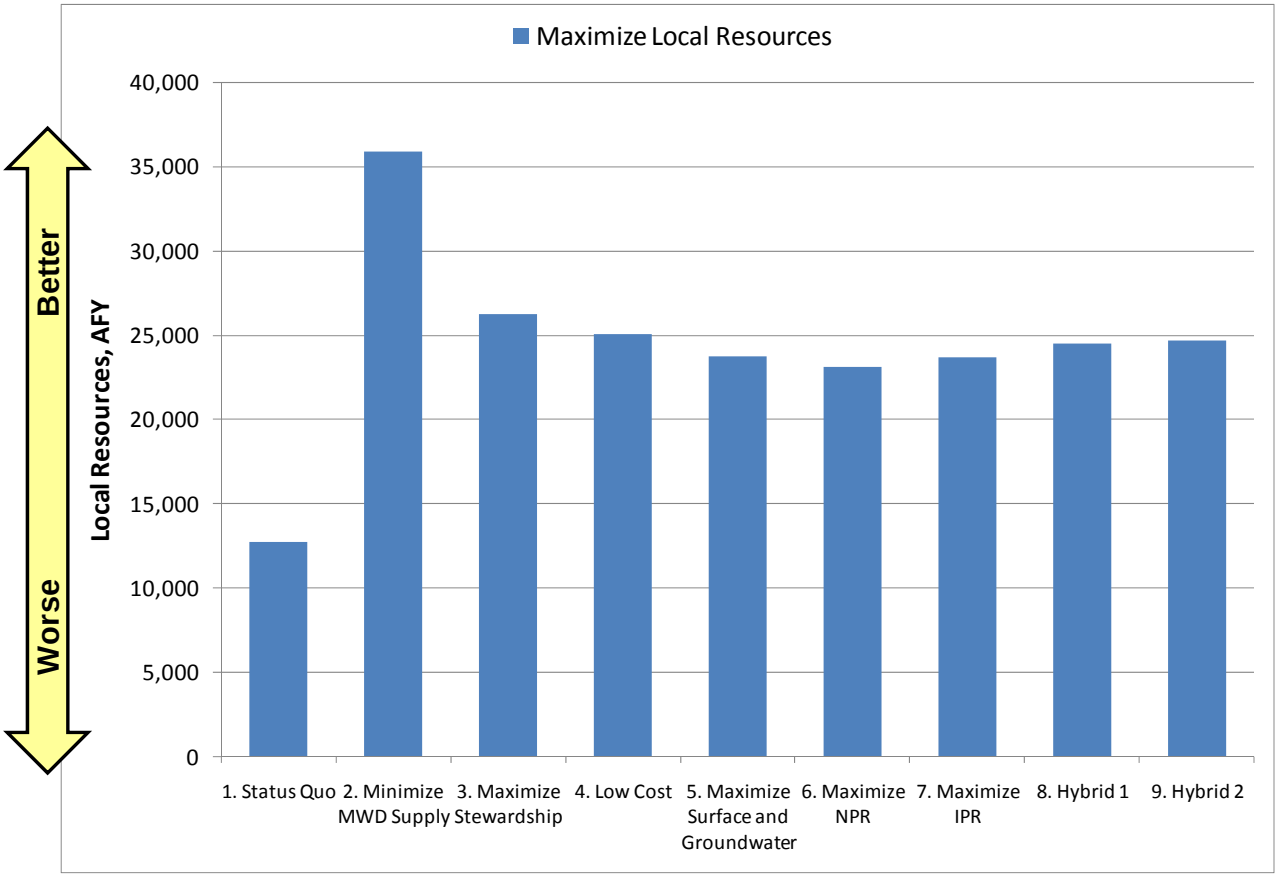


H.7 Reduce risk and maximize opportunities

Maximize Local Resources

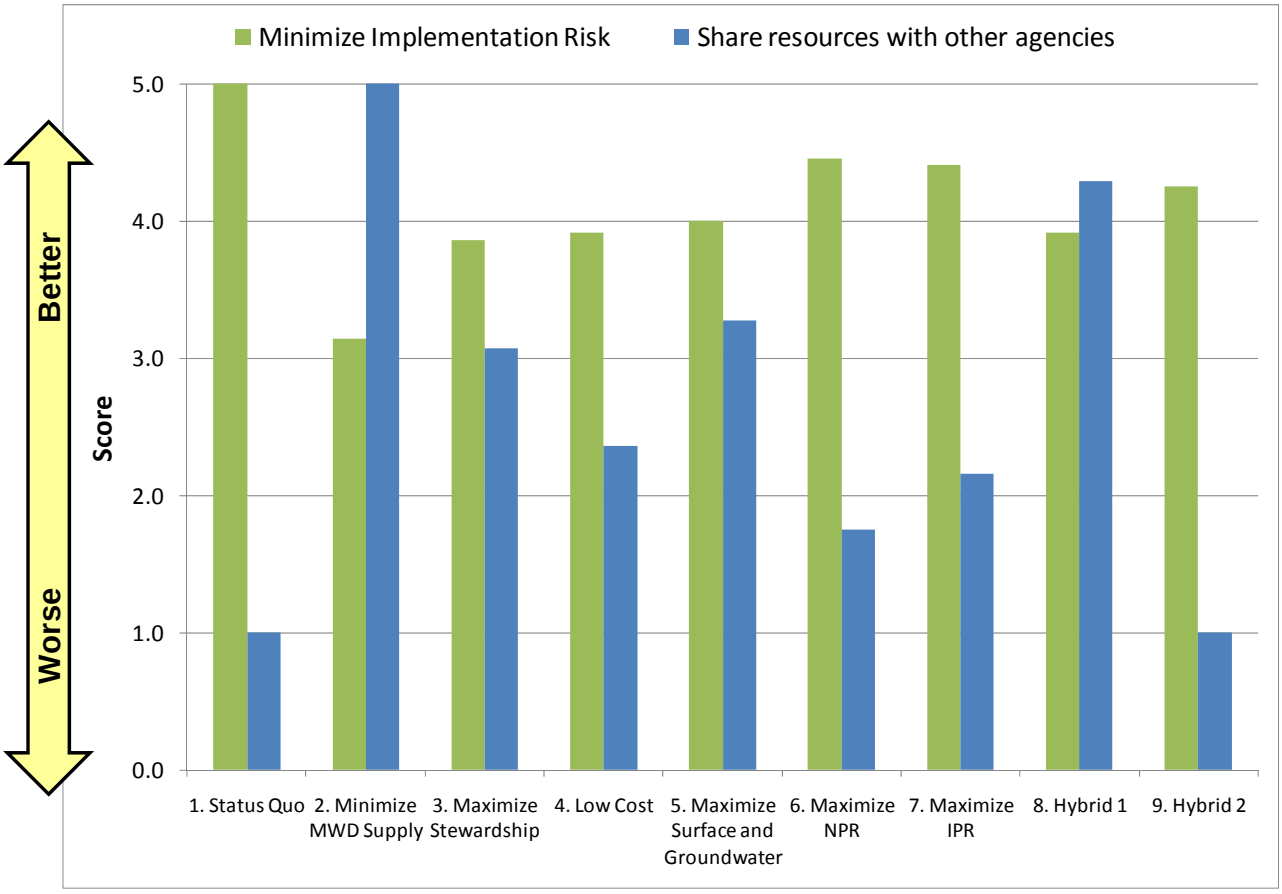
This performance measure is based on the projected 2035 annual supply mix. Local resources include anything that is not imported (such as recycled water, conservation, ocean desalination, local surface water, and stormwater).

The portfolio that clearly performs the worst here is the status quo, which relies heavily on imported water in the future. The Minimize MWD Supply portfolio performs the best. The other portfolios are in between, but there is not much variation among them.



Other risk and opportunity performance measures

Other performance measures under this objective include: (1) Minimize Implementation Risk, and (2) Share resources with other agencies. The scores for these performance measures are qualitative in nature, and guidance on qualitative scoring is provided in Appendix F.



Minimize Implementation Risk

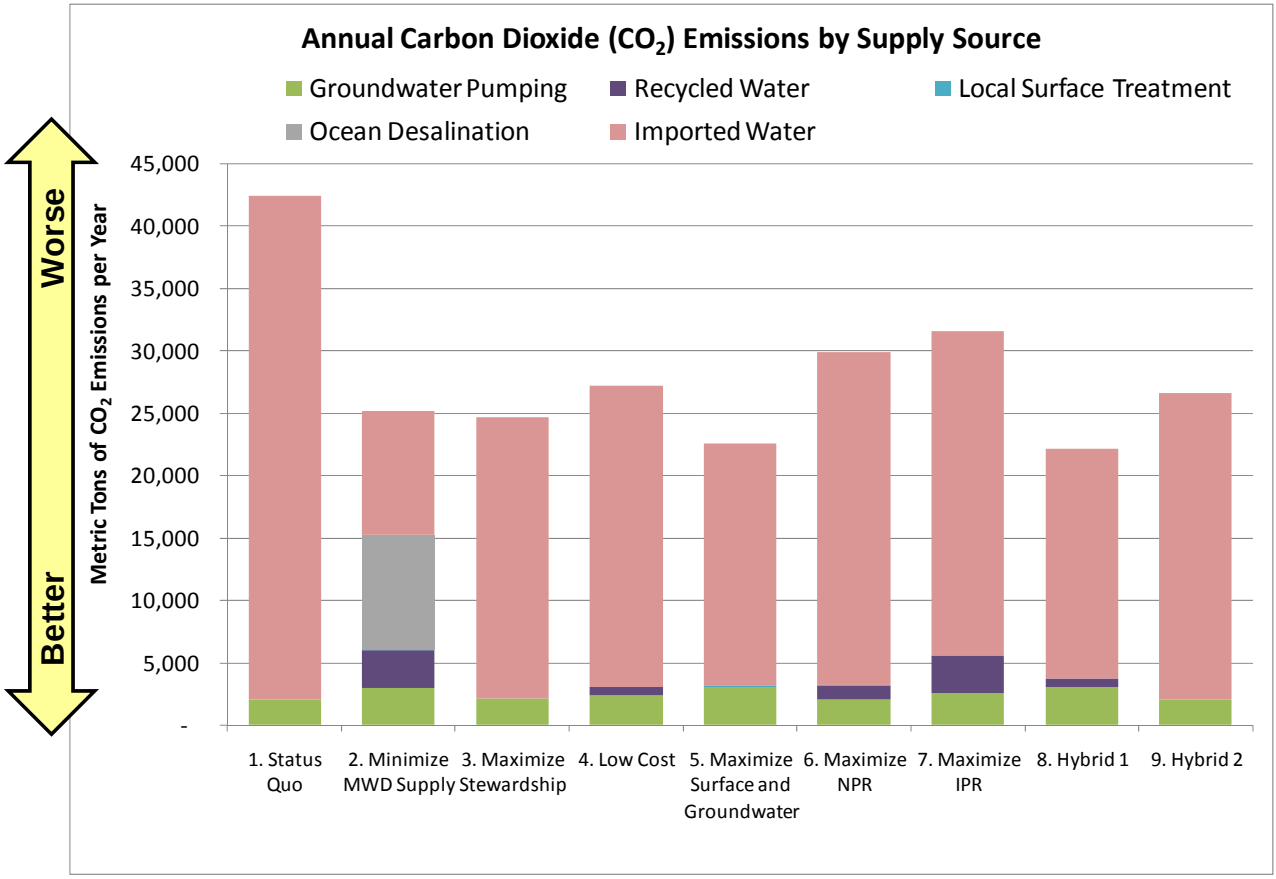
The status quo scenario would be the easiest to implement since it represents the "do nothing" approach. On the other hand, the Minimize MWD Supply would require the most effort to implement since it represents the "do everything" approach. The other portfolios do not show much variation in implementation risk.

Share resources with other agencies

There appears to be much variation among the portfolios in this performance measure. The Minimize MWD Supply and Hybrid 1 portfolios have the most potential for partnerships and funding resources, while the Status Quo and Hybrid 2 have the least potential.

H.8 Reduce energy footprint for water operations

This performance measure is based on the projected average annual supply mix in 2035, and applies estimates of average carbon dioxide emission per acre-foot of the various water sources.



The two sources with the highest carbon emissions include imported water due to the extensive pumping requirements for conveyance, and also ocean desalination due the energy requirements for treatment.

The portfolio that clearly has the most carbon dioxide emissions is the status quo portfolio, which relies heavily on imported water. All other portfolios reduce emissions, with Maximize Surface and Groundwater Supply and Hybrid 1 portfolios performing the best.

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