GARY FISKE AND ASSOCIATES, INC.
Water Resources Planning and Management

Date: April 23, 2015
From: Gary Fiske
To: Water Supply Advisory Committee
Re: Modeling Results: CRec Conservation Programs

This memo reports the results of the Confluence modeling of CA-03, CRec. CA-03 is a collection of conservation programs that reduce demand. The assumed annual savings of this alternative is assumed to be 188 mg, with 129 mg of that in the peak-season and the remaining 59 mg in the off-peak season.

The January interim demand forecast was modified to reflect the above seasonal savings. All other modeling assumptions were unchanged.[1]

Impacts on System Reliability

Figure 1 shows the peak-season shortage duration curves assuming DFG-5 flows with current supplies that we have seen before (see my March 9 memo). This is one depiction of the reliability "problem" that we want to solve with our alternatives and ultimately resource portfolios. Tables 1 and 2 summarize the information shown in these curves in two different ways. Table 1 shows the probabilities of exceeding designated shortages in any year. Table 2 shows the probabilities of each shortage exceedence event occurring at least once over the next 30 years. Thus, for example, with historic flows, there is a 10% likelihood of a peak-season shortage greater than 5% in any year. Over the next 30 years, there is a 95% likelihood of experiencing at least one year with that size peak-season shortage.

[1] For the sake of consistency with the other CA analyses, the most recent interim demand forecast modifications were not used. The conclusions about the impacts of any of the alternatives will not be significantly changed as a result of the new demand forecast.

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Figure 1. Peak-Season Shortage Duration Curves with Current System: DFG-5 Flows

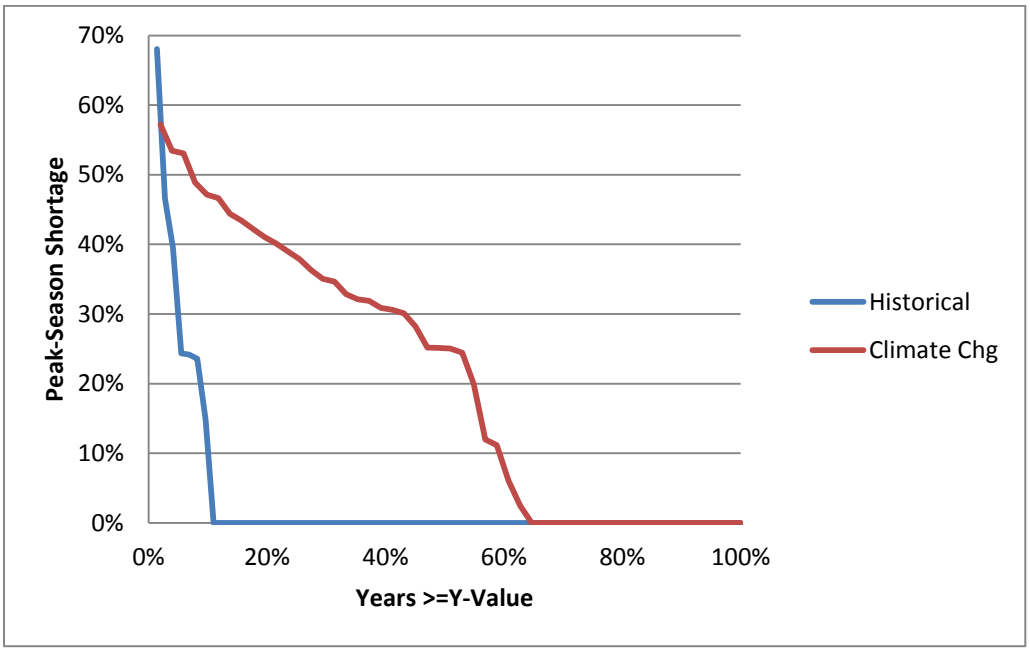


Table 1. Probabilities of Peak-Season Shortage Events in Any Year

Shortage Event	Historic	Climate Change
>50%	1%	6%
>25%	4%	51%
>15%	8%	55%
>5%	10%	61%

Table 2. Probabilities of Occurrence of Peak-Season Shortage Events Over 30-Year Period

Shortage Event	Historic	Climate Change
>50%	34%	84%
>25%	72%	100%
>15%	92%	100%
>5%	95%	100%

Figure 2 shows how these curves are improved through this supply alternative.

Table 3 shows the probabilities of exceeding designated shortages in any year. Table 4 shows the probabilities of each shortage event occurring at least once over the next 30 years. Thus, for example, with historic flows, there is a 3% likelihood of a peak-season shortage greater than 5% in any year. Over the next 30 years, there is a 57% likelihood of experiencing at least one year with that size peak-season shortage.

Figure 2. Peak-Season Shortage Duration Curves with CRec Conservation: DFG-5 Flows

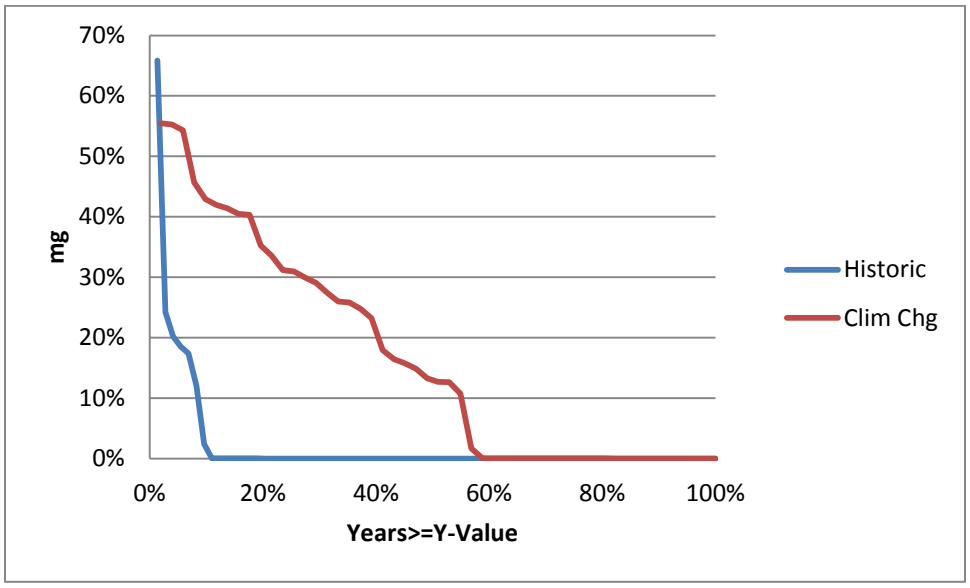


Table 3. Probabilities of Peak-Season Shortage Events in Any Year

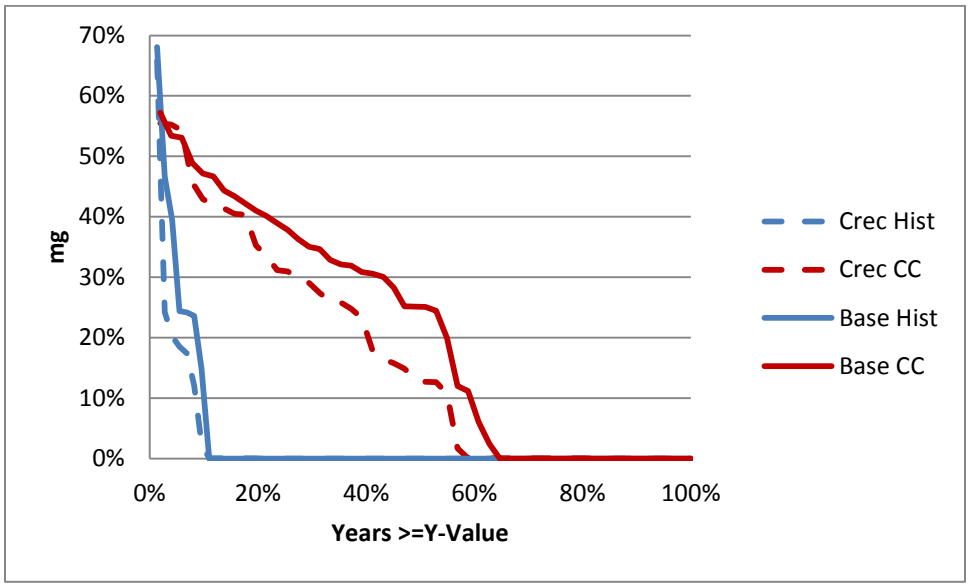
Shortage Event	Historic	Climate Change
>50%	1%	6%
>25%	1%	35%
>15%	7%	45%
>5%	8%	55%

Table 4. Probabilities of Occurrence of Peak-Season Shortage Events Over 30-Year Period

Shortage Event	Historic	Climate Change
>50%	34%	84%
>25%	34%	100%
>15%	88%	100%
>5%	92%	100%

Although the shapes of the curves in Figure 1 and Figure 2 are much the same, the shortage magnitudes are in fact reduced. This is seen more readily in Figure 3 which superimposes the two sets of curves.

Figure 3. Comparison of Peak-Season Shortage Duration Curves with and without CRec



Project Yield

The difference between the highest points in Figure 1 and Figure 2 tells us the worst-year yield of this alternative, i.e., how well this alternative does in reducing the worst-year peak-season shortage. Expressed volumetrically, this difference is about 130 mg with historic flows, and 90 mg with climate change.

Across all hydrologic conditions, the average reduction in peak-season shortage is about 25 mg with historic flows and 100 mg with climate change. In many hydrologic years the benefit is greater than the actual demand reduction because of the in-lieu storage in Loch Lomond that results from the demand reductions.

Conclusion

The worst-year benefits of this demand-side alternative are commensurate with the magnitude of the peak-season demand reduction. However, under other hydrologic conditions, the reliability benefit can exceed the savings because of the ability to retain more water in Loch Lomond which is then available to serve demand when needed.