Summary of Preliminary Responses **Attachment 1**

Climate Change Expert Feedback

The table below summarizes key feedback received so far. This document is intended to inspire discussion and additional questions for discussion with the Climate Change Expert Panel during the May 25, 2021, IRP Climate Change Experts Panel workshop.

	Question	Key Points
1	**What major components contribute to the range of future climate outcomes?**	• California is already warming and experiencing a range of impacts of a changing climate. • These impacts span everything from changing precipitation patterns, rising sea level, declining snowpack, increased drought, increased extreme precipitation events, and an expansion in the area burned by wildfires. All of these impacts have implications for understanding future supply and demand for water resources in California. • How much the climate changes and the extent to which we experience changes in the intensity or severity of many of these impacts are related to global emissions of greenhouse gases, which directly determine how much warmer the planet will get and how well we plan and manage for these changes. • How well we can project future climate changes is limited by global, regional, and local climate and hydrologic modeling techniques. However, models have performed well against observed warming (Figure 3 in Attachment 2) and are the best source of information to understand future climate. • Being a savvy consumer of future climate change information is required to ensure proper use and application of these data in water resources management and planning (see Questions 2-4 for more on modeling techniques and Question 8 for planning with this uncertainty).
2	**How do we apply global climate model output that examines climate change over a long timeframe to the shorter 25-year IRP planning horizon?**	• While changes are not as significant as those seen by the end of the 2100s, climate changes are still apparent in the GCMs in the next 25-40 years. These changes are still significant to water management, especially when considering the range of future projections (not just averages). Both the higher and lower ends of the mid-21st century range would provide useful comparison points. • The sources of uncertainty (i.e., the range of future projections) differ depending on what period you are most interested in exploring.

3	**What approaches or methodologies do you recommend for quantifying how climate change (e.g., changing temperatures and precipitation) affect Southern California and its imported supply watersheds?**	• To better understand potential impacts of global climate change at regional or local scales, there are many methods one can use. • Hydrologic projections (otherwise known as "climate change scenario studies" or "chain-of-models approaches") are commonly used in climate change assessments. • Regardless of the method used (see Question 4 on ways to select an appropriate method), recognize there should be a range of possible outcomes. Models, while helpful tools in exploring possible futures, cannot predict the future.
4	**What models and downscaling techniques are available and appropriate for the relevant regions?**	• Downscaling refers to techniques employed to make global-scale information more applicable to regional or local scales. There are a variety of different downscaling techniques that are used to produce regionally downscaled climate information. These techniques are continually under development and significant advancements have been made in recent years. This work is likely to continue to evolve. • Practitioners should consider what variables (e.g., seasonal temperature changes, annual precipitation) are of greatest interest to help identify models that would be most appropriate. • There is a range of data available to support modeling efforts.
5	**If the models and downscaling techniques differ for each region, how do we ensure internal consistency within the analysis?**	• This is not an uncommon challenge. It is better to use the model that captures the impact of interest for a particular question/region vs. trying to use a model that is universal. • The most important thing is to be sure choices are placed in context. To be consistent, one approach would be to use similar GCMs, downscaled in ways most appropriate to the questions of interest. Another approach would be to consistently look at an ensemble of models and results that are 90% and 10% of the range (see full answer for why Reclamation decided to use 90% and 10%, Metropolitan may choose different percentiles.) • No model is perfect and cannot provide all answers. They are one tool in the toolbox.
6	**What hydrologic changes are anticipated for the relevant regions?**	• This is a question that lengthy reports are written on. We will expand on this question throughout the course of our work with Metropolitan. To provide an illustration of some of the material we could provide, we share some highlights. New information shared here focuses on the Colorado River basin.

7	**What are the important underlying climate change drivers that influence demands, and how do they affect demands in each of the three major demand sectors (single-family residential, multi-family residential, commercial/industrial)?**	• Temperature, and to a lesser extent precipitation, are the major climate drivers influencing water demand. Here, we describe the impact of climate changes on major end uses and the extent to which each of these end uses is associated with the three major demand sectors: single-family residential, multi-family residential, and non-residential (or commercial, industrial, and institutional).
8	**What other recommendations do you have for our planning?**	• **Prudent Planning and "Reasonable Worst-Case Future":** By this we mean, planning for a future that is both politically possible to plan for, and climatologically possible without being on the extreme tail. This requires balancing the politically possible and the "climatologically problematic". That is to say, some futures are too hard to plan for politically and too uncertain to plan for based on climate models. For example, given the strong tie between flow reductions over the last 21 years and rising temperatures in the Colorado River Basin, prudence dictates that planning use flows less than the last 21 years. It remains an active area of inquiry about how much less. Planning for California would likely require some very wet, flood prone scenarios along with drought scenarios. Ultimately, the determination of a 'reasonable worst-case future' is a policy decision informed by qualitative weighting of certain and less certain science.