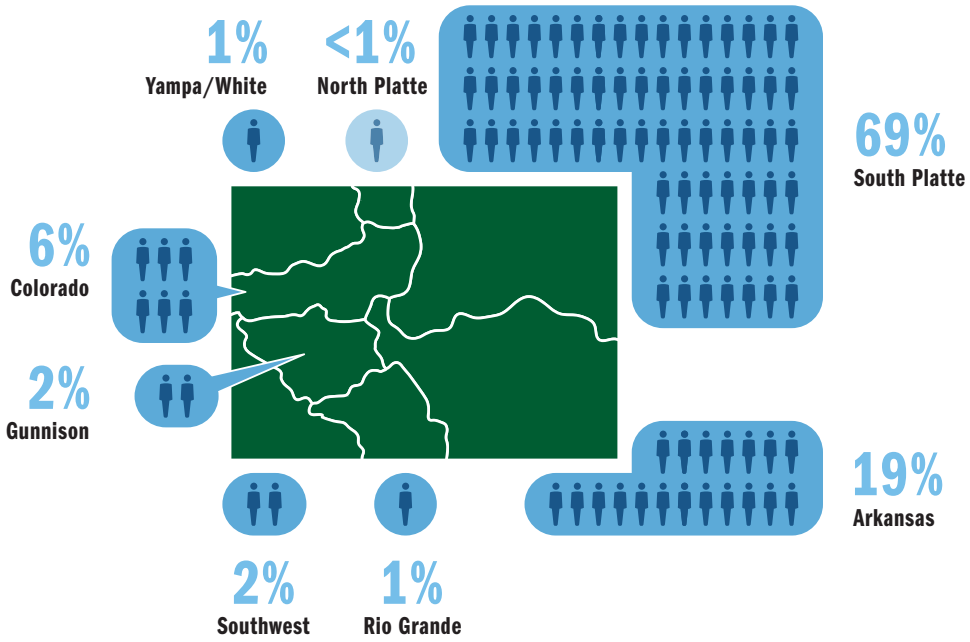
FIGURE Nº 1 2008 POPULATION DISTRIBUTION BY RIVER BASIN.

The vast majority of Colorado's population is concentrated on the eastern side of the state, a trend that is expected to continue through 2050.



Growing Municipal Water Needs

Population of the South Platte River Basin

The overwhelming majority of Colorado's population is concentrated on the eastern side of the state—in fact, 69% now live in the South Platte Basin (Figure 1), a trend that is expected to continue through 2050.[8]

Although a super-majority of residents live within the South Platte Basin, Colorado's population is particularly concentrated along the "Front Range"—a band of cities and communities located immediately east of the Rocky Mountains. Projected population increases over the coming decades are *the* driving force for our state's increasing municipal water demands. Consequently, this report focuses on the water supply strategies available to the Front Range area of the South Platte Basin. Throughout this report, any reference to the Front Range means the counties of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Elbert, Jefferson, Larimer, Teller, and Weld.

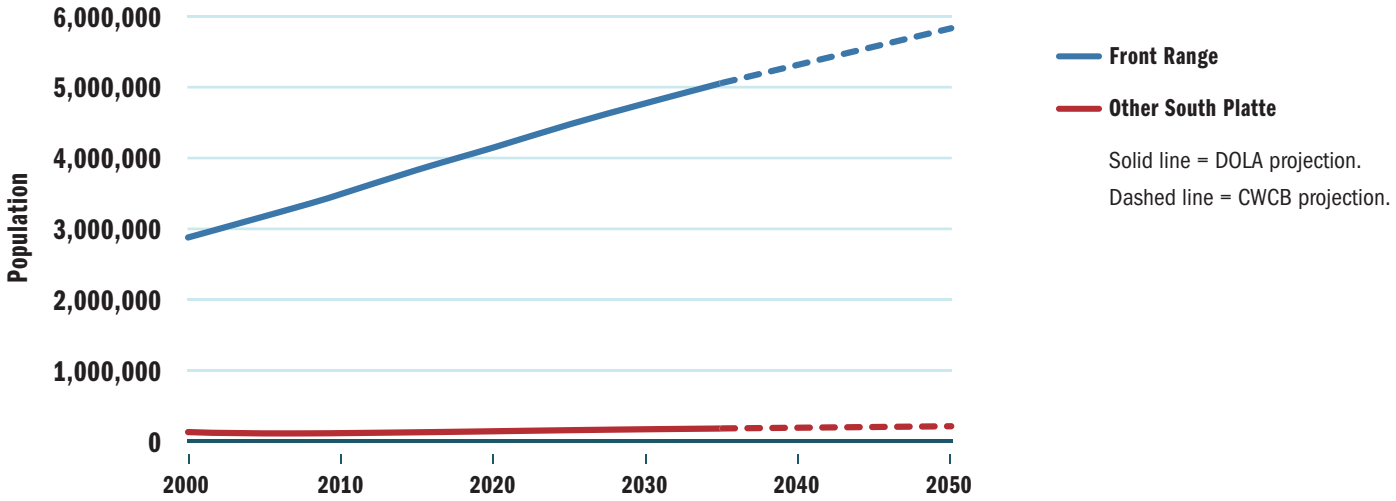
According to Colorado Department of Local Affairs (DOLA), the population of the Front Range is expected to increase by nearly 1.7 million people between 2008 and 2035, for a total population of just over 5 million residents. Additional modeling performed by the CWCB suggests the Front Range could grow by 2.5 million people between 2008 and 2050 under a medium population growth scenario, for a total population of close to 5.8 million residents by 2050 (Figure 2).[9]

Colorado's population is particularly concentrated along a band of cities and communities located immediately east of the Rocky Mountains.

Construction in Denver, CO.

FIGURE Nº 2 POPULATION PROJECTIONS FOR THE SOUTH PLATTE BASIN.

The population of the Front Range is expected to nearly double between 2008 and 2050 for a total population of close to 5.8 million residents under a medium population growth scenario.



Front Range Projected Water Demand

Increasing population along the Front Range will drive demand for additional municipal water supply. In July 2010, the CWCB released a final report estimating these future demands.[10] Herein, we use CWCB's estimates of future demand under a medium population growth scenario that include the effects of passive conservation.* The CWCB estimates that demands for the 5.8 million residents and industry of the Front Range in 2050 will be approximately 1.06 million acre-feet annually (Figure 3).

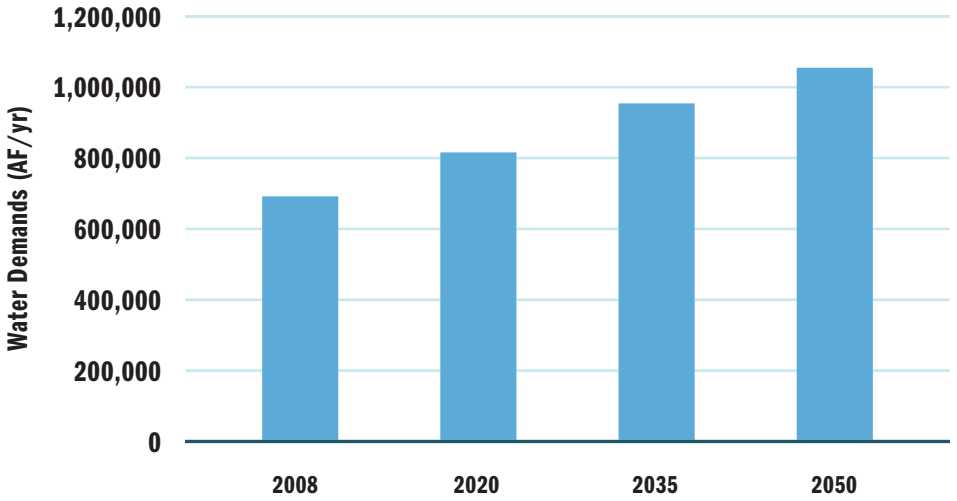
Existing Water Supplies

Front Range providers obtain municipal water supplies from local surface water and groundwater, as well as through transbasin diversions from the Western Slope. It is difficult to estimate the total municipal water supply available in any one year, so the CWCB uses year 2008 demands as a proxy for existing water supplies because it is assumed that all demands in 2008

* The CWCB estimates passive conservation will reduce per capita demands by 10% between 2008 and 2050.

FIGURE Nº 3 PROJECTED FRONT RANGE WATER DEMANDS.

The CWCB estimates Front Range demands in 2050 will be approximately 1.06 million acre-feet annually under a medium population growth scenario.



were met with available supplies. For the Front Range, this equates to a water supply (from both local and transbasin sources) of approximately 695,000 acre-feet per year.

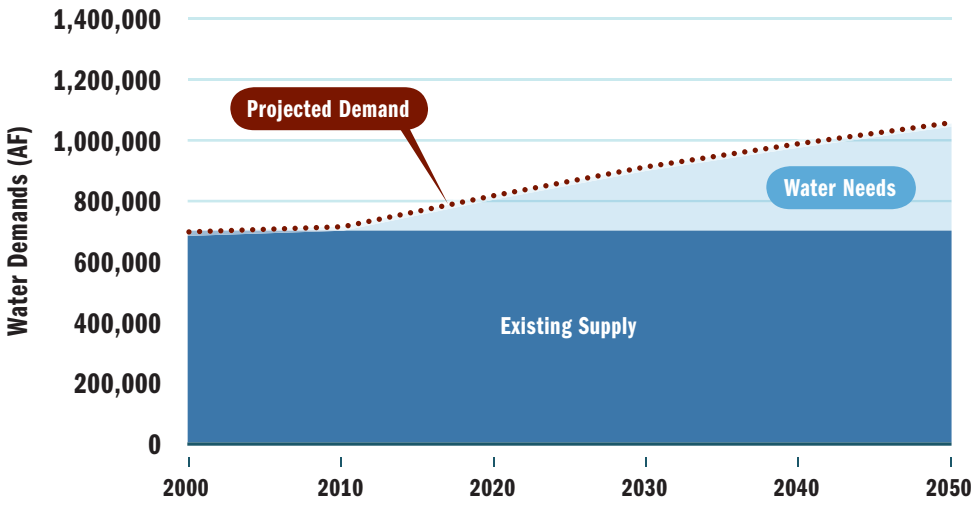
Future Municipal Water Needs

With existing supplies of 695,000 acre-feet annually and projected demands in 2050 of 1.06 million acre-feet, the Front Range will require additional water supply to meet the demands of its growing population (Figure 4). We assume the Front Range will need 365,000 acre-feet of additional supply by 2050 to fully meet projected demands.

It is important to note a few things. First, this needs projection is for the Front Range as a whole, and does not take into account more localized water supply and demand issues; a lack of data precludes more specific analysis. Second, the water needs described here are not the same as CWCB's projected "gap" for this area because: 1) we merge the South Platte and Metro basins, 2) we exclude non-Front-Range counties from our analysis, and 3) our needs projection does not account for the additional supply that would result from all Identified Projects and Processes. Finally, we do not account for potential climate change impacts or a reduction in groundwater availability in the basin, which are important concerns for us, as well as for some water providers.

FIGURE Nº 4 ESTIMATE OF FRONT RANGE WATER NEEDS.

Using the most current CWCB data, we assume the Front Range will need 365,000 acre-feet of additional supply by 2050 to fully meet projected demands.



Meeting Municipal Water Needs

In the following chapters of this report, we describe how development of select structural water projects, increased water conservation, water reuse projects, and agricultural and municipal water supply cooperation can more than meet the Front Range's 2050 water needs without additional, large-scale, environmentally damaging water supply developments from the Western Slope. For each of these strategies we provide:

- A description of what the strategy is and how it works, with examples
- A discussion of the concerns associated with increased implementation of the strategy
- An estimate of the potential future volume of water available from the strategy

Climate Uncertainty and Western Water Supplies[11]

The U.S. Global Climate Change Research Program has concluded that "[h]uman-induced climate change appears to be well underway in the Southwest." During the 20th century, global average surface temperatures increased by 0.6°C (1°F) and multiple data sets confirm widespread warming in the western U.S. over that same period, consistent with the global trend.

Climate change may already be impacting western water resources. Although the continental U.S. generally became wetter during the 20th century, scientists analyzing long-term observational trends report evidence of increased drought severity and duration in the western U.S. Global climate models project further water cycle changes, which, combined with increasing temperatures that will drive increased demands, may signal serious water supply and water rights administration challenges in the decades and centuries ahead.

Recent model projections indicate that as climate change advances, the Intermountain West and Southwest is likely to become drier as well as hotter. In a recent comprehensive assessment, researchers found that 46 of 49 global circulation model (GCM) simulations project a more arid southwestern U.S. in future years. Looking forward to mid-century, 23 of 24 GCM runs project decreased runoff for the Upper Colorado River on the order of 5% to 20%. Ominously, climate change models predict that droughts will become the norm in the Southwest and that some will be more severe than any experienced in centuries.

Beyond affecting water supply, warmer temperatures also affect water quality and fish habitat. Researchers examining this response found that the effect of doubled carbon dioxide (CO_2) concentrations on lake water temperatures could cut in half the habitat available for coldwater fish, while habitat for warm-water fish would increase. A warmer and drier climate in the western U.S. would reduce stream flows as well as increase stream temperatures, with severe consequences for coldwater fish, such as native trout. Warmer temperatures and reduced stream flows also enhance the growth of nuisance aquatic organisms, such as blue-green algae, which in turn can lead to low-oxygen conditions that threaten aquatic life. These potential impacts to the quantity and quality of water supplies underscore the need for providers to integrate and address climate change into their water planning.

As climate change advances, the West is likely to become drier as well as hotter.

Water trickles through a sandstone desert canyon wash.