

## Abstract

As California is currently facing one of the most severe droughts in history, vegetation has become visibly dry, stream and river flows are in decline, water levels in lakes and reservoirs are falling, and the depth of water in wells has decreased. Unfortunately, the drought has continued and there is a strong possibility of long-term impacts on the state's population and economy. Some long-term impacts may consist of groundwater level declines, land subsidence, seawater intrusion, and damage to ecosystems. These complications will be costly in the long run and it would be best for California to take precautions for the well being of their future. This project is aimed at studying the California drought and their causes and effects from a demand perspective. Analysis of the water usage data from USGS (United States Geological Survey) shows that the agricultural sector is the dominant water consumer followed by the public water supply. A perusal of time trends shows that there has been a decline in the public water supply and domestic consumption in recent times. We researched different water policies that may have impacted these drastic changes. We

## Objective

can be incorporated into the quantitative drought framework to inform. Our main focus was to analyze the California drought from a water budget perspective.

## Water Policies

In 1991, a severe drought in California started. California needs to conserve as much water as possible, which is why the government has created water policies. New policies have affected the residents in many ways; for example, water bill prices are on the rise. Water usage policies have made California more aware of how they use water; water usage per capita steadily decreased from 1986 to 1991 (see Figure 3). Public supply usage decreased by 10% from 1990 to 1995 and irrigation water usage also plummeted from 1995 to 2000 by 20% (even though California's major industry is agriculture). The American people should be concerned because California plays an important role in producing a lot of the country's food. According to California Governor Jerry Brown, residents of California should take shorter showers, reduce toilet flushes, and not water their lawns or wash their cars so often in order to save water. On January 17, 2014, a State of Emergency was directed to state officials to take all necessary actions to reduce water consumption by 20% (by referring residents and water agencies to the Save Our Water campaign)

## Results

California's Water Usage For Each County Per Category

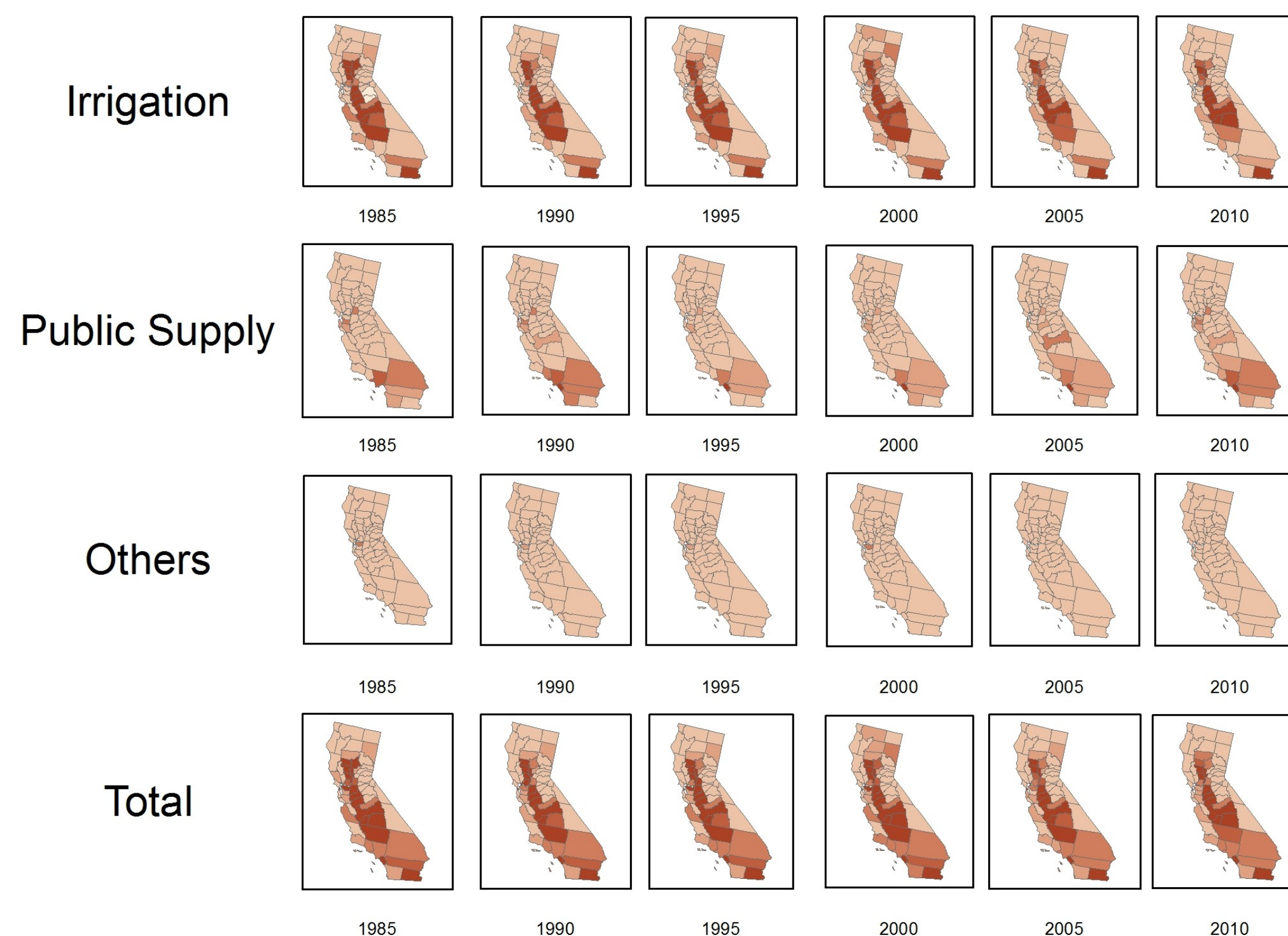


Figure 1: Fresh water withdrawals per county from 1985-2010

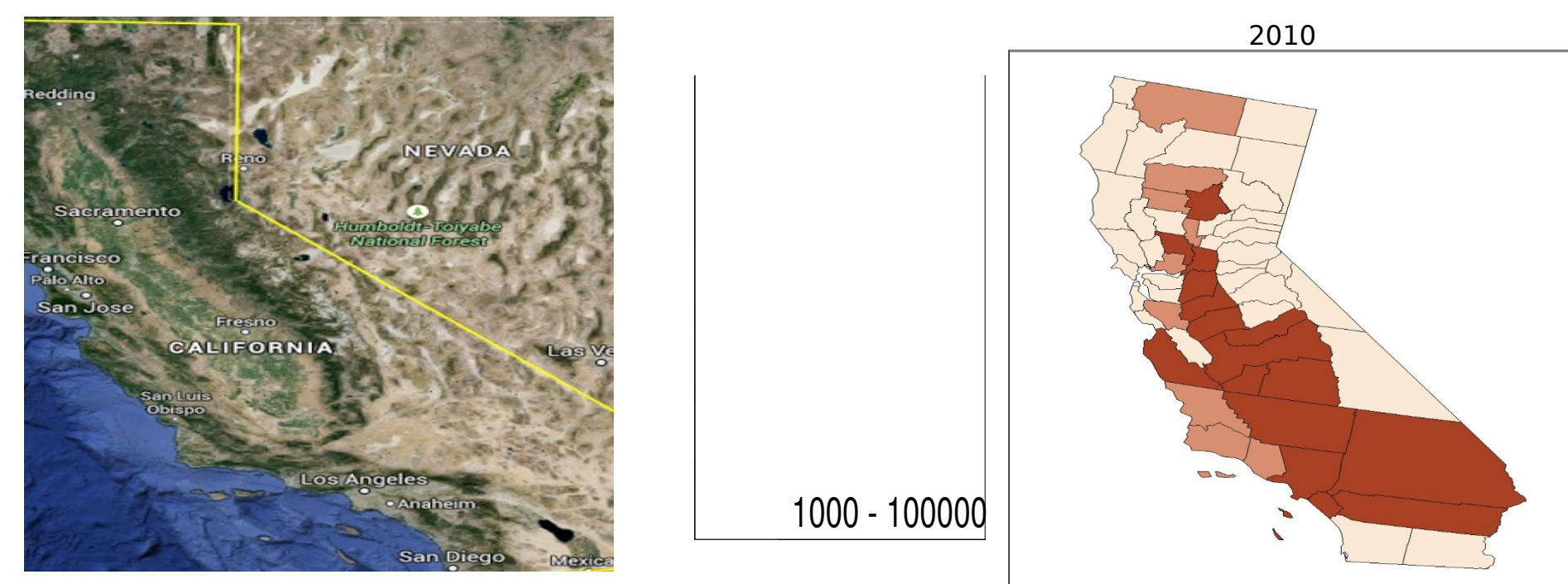


Figure 2: Satellite image of California and fresh groundwater withdrawals from 2010

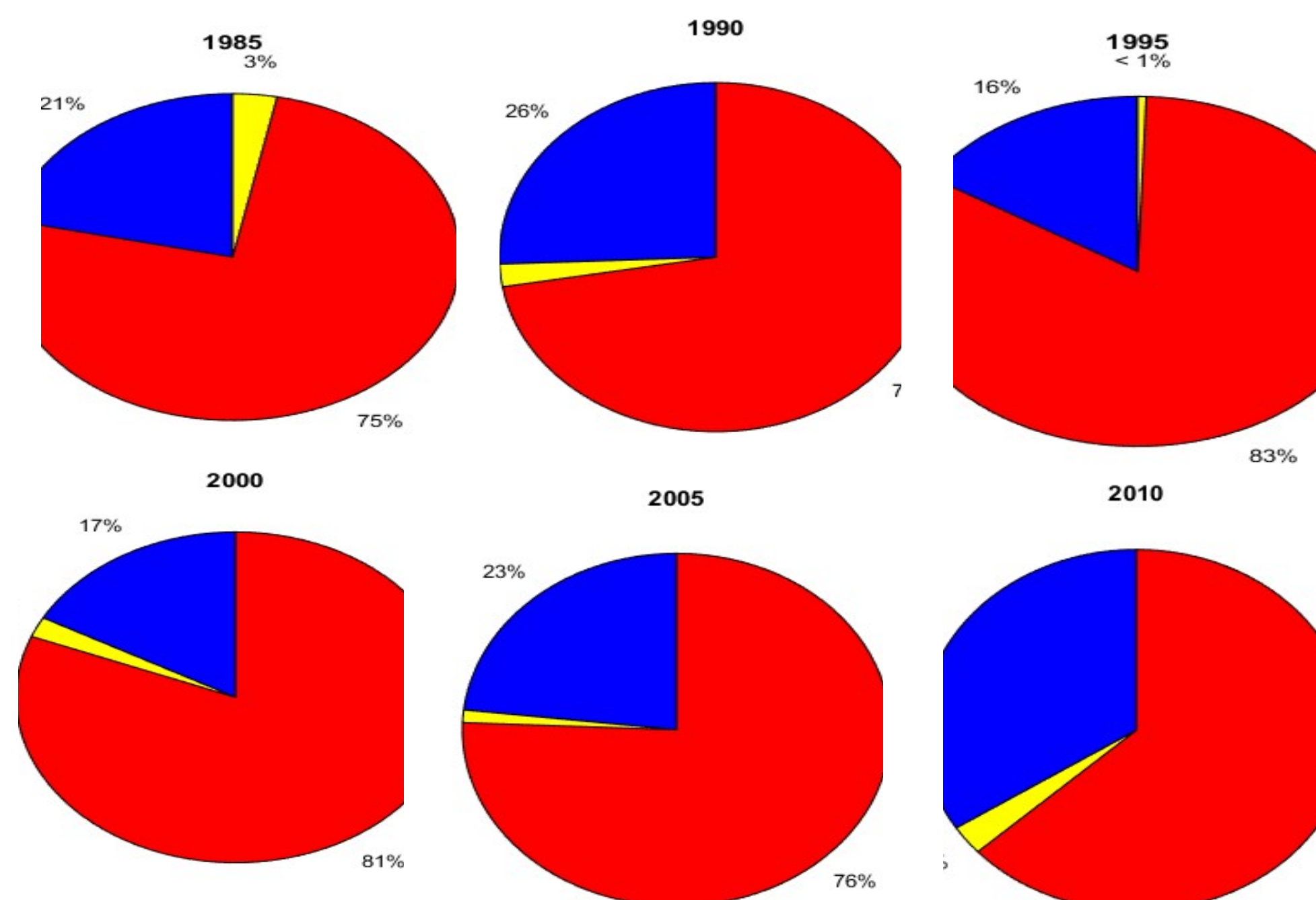


Figure 3: Fresh water withdrawals for California from 1985-2010

## Methods

In order to obtain our results, we used many different programs. To create our maps that calculated deficit (figure 1), we used ArcGIS. Through ArcGIS, we created a shape file for California and its counties, and imported water usage data from the USGS onto the map. This allowed us to plot data from 1985-2010 on separate maps. We created our pie charts through MATLAB, by also analyzing USGS data. We obtained yearly data from the USGS website for each sector in saline and fresh water, and only used fresh water data for each needed sector. After collecting our data, we coded through MATLAB and created 6 pie charts (figure 3).

## Conclusion

California has weathered many droughts, including four in the past four decades, but the current drought has been more widespread than most, covering the entire state. The drought poses major challenges in how to manage water to support a growing population and economy, which is why the government needs to take action. Current policies are aimed towards reducing domestic water usage, such as restricting unnecessary water usage of citizens and educating their communities to save water. Although the amount of water used by citizens has steadily declined over time, irrigation usage is still substantial. It would be beneficial for California to cut back on irrigation, but agriculture is a major part of California's economy. California should focus on new irrigation methods that

## References

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