Gerald (Jerry) Johns *was appointed Deputy Director of Water Resources Planning and Management of the California Department of Water Resources (DWR) by Governor Arnold Schwarzenegger on August 2, 2004. He had been serving as the acting Deputy Director since January 2004. He was the Assistant Division Chief of the Division of Water Rights for the State Water Resources Control Board for 14 years prior to joining DWR. Jerry has many years of experience in both water rights and water quality. During his more than 26 years at the Water Board, he worked on numerous issues, some that were controversial. In June of 2001, Jerry left the Board to become the Chief of the newly created Water Transfers Office of DWR. Jerry was also responsible for programmatic activities related to DWR's Environmental Water Account and the State's Dry Year Program. As Deputy Director, Jerry oversees statewide programs for DWR including Water Supply Planning and Local Assistance and the four DWR Districts, Bay-Delta Office, Environmental Services, Water Use Efficiency, and Water Transfers, Colorado River and Salton Sea. Jerry earned both his M.S. in freshwater ecology and B.S. in zoology from the University of California, Davis.*

STATEWIDE WATER SUPPLY: WHY DESALINATION?

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Introduction

Brackish water and seawater desalination has evolved into a viable water supply alternative in over 120 countries around the world. Figure 1 shows the worldwide trend in desalination technology.

Desalination is becoming an integral part of California's future water supply portfolio. It is estimated that California's population will increase by 12 million by the year 2030. Other factors contributing to California's water supply challenges include climatic changes, the imminent compliance with the Colorado River 4.4 plan, successive and extended periods of drought, and the growing need for environmental and ecosystem restoration.

Water conservation, water recycling, and most recently desalination are gaining considerable attention from scientists, resource planners, policy-makers, and other stakeholders in addressing supply reliability in California. The main driving force for the renewed interest in water desalination is the remarkable technological advancement in desalination processes particularly membrane technology and energy recovery equipment, which has recently led to a much lower cost of desalinated water than 15 years ago. Figure 2 shows the trend in seawater desalination cost

over the past 30 years. Desalination has the potential to offer an alternative water supply that is more reliable and drought proof, bringing about a diversified and more secure water resources portfolio for many local areas of the state.

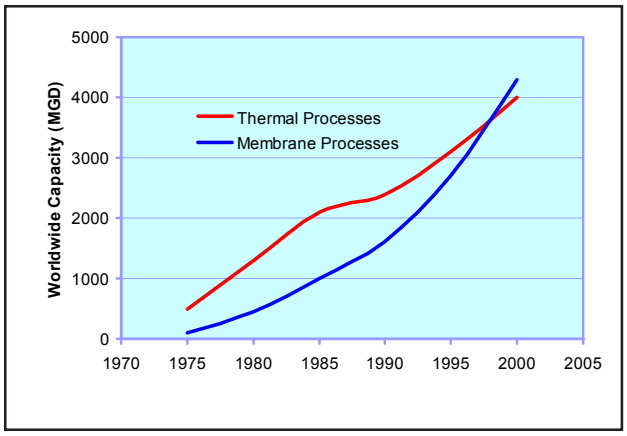

Figure 1. Trend in Worldwide Desalination

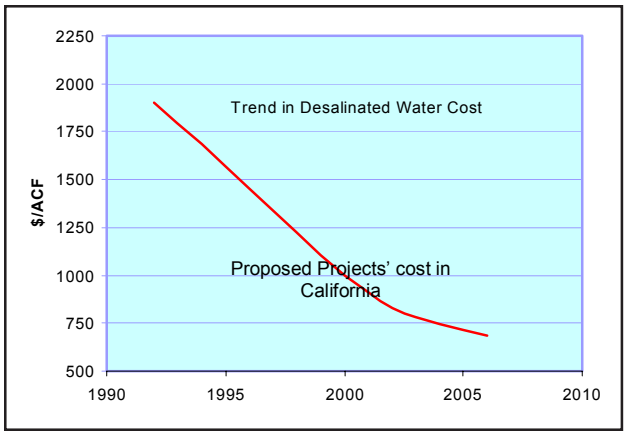

Figure 2. Trend in Desalinated Seawater Cost

The State Legislature recognized the future importance of seawater and brackish water desalination through legislation. In 2002, the Legislature approved Assembly Bill 2717 (Robert Hertzberg). The bill asked the Department of Water Resources (DWR) to convene the California Water Desalination Task Force to look into potential opportunities and impediments for using ocean water and brackish water desalination, and to examine what role, if any, the State should play in furthering the use of desalination technology. The report containing the Task Force findings and recommendations was prepared with significant input from its members comprised of representatives from twenty-seven organizations. The Task Force outlined key findings that provide context for evaluating desalination. The findings included some facts and figures about brackish and seawater desalination in general and highlights of several environmental issues as well as cost, energy, and permitting issues related to desalination.

One of the primary findings of the Desalination Task Force is that economically and environmentally acceptable desalination should be considered as part of a balanced water portfolio to help meet local areas existing and future water supply and environmental needs. The Task Force forecasted that the potential for the increased use of desalination in California is significant and that the opportunities are great for providing water supply from seawater and brackish water desalination as well as recovering contaminated groundwater.

Current and Potential Desalinated Water Use in California

Californians have used desalinated water since 1965. Desalinated water use is expected to dramatically increase in the near future as water agencies need to supplement their water supplies. Today, California's water agencies and industry desalinate annually about 50,000 acre-feet and most of this is brackish water desalination.

Although most estimate that desalination will contribute less than 10 percent of the total water supply needs in California, this still represents a significant portion of the State's water supply portfolio. There is a potential of about 0.5 million acre-feet of additional desalinated water by the year 2030. Of that amount, about 0.2 million acre-feet would be ocean water desalination. This potential of new water could meet the household water demands of about 20 percent of the additional 12 million Californians projected by 2030. However, such potential is contingent upon a capital investment of 0.9 to 1.9 billion dollars. Figure 3 shows the range of water supply benefits presented in the draft California Water Update Plan, which is being finalized.

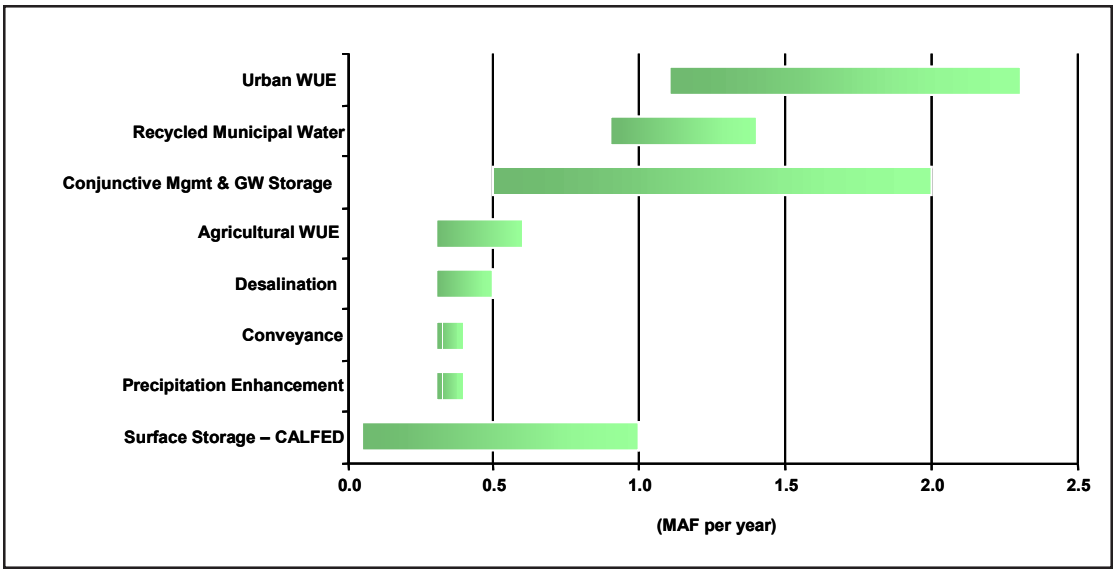

Figure 3. Range of Water Supply Benefits

Major Issues in Desalination

Cost – Desalination has historically been prohibitively expensive. The improvements in technology and the rising cost of conventional water supplies have made desalination competitive with importing water and recycled municipal wastewater in a number of cases. However, cost is still an issue to consumers. The cost will be influenced by the type of feedwater, the available concentrate disposal options, the proximity to distribution systems, and the availability and cost of power. In some cases, the higher costs of desalting may be offset by the benefits of increased water supply reliability and/or the environmental benefits from using desalination for a water supply instead of other sources that could place further stress on fresh water environmental reserves.

Environmental impact & permitting – Brackish water desalination plants have fairly routine environmental and permitting requirements. Coastal desalination plants, however, face much closer scrutiny. With a location within the coastal zone, and with the need for water intake and outfall structures, there will be considerable reviews by numerous agencies and organizations.

Seawater intakes – Existing seawater intake systems for power plant cooling are proposed as the source of supply for almost all of the currently proposed desalination plants. These existing intake systems can have impacts on the coastal zone. Addressing these issues may limit the potential capacity of seawater desalting on the coast.

Concentrate discharge - Desalination plants of any type produce a salt concentrate that must be discharged. Brackish water plants in California discharge their concentrate to municipal wastewater treatment systems where they are treated and blended with effluent prior to discharge. Seawater desalination produces a concentrate approximately twice as salty as seawater. In addition, residuals of other treatment chemicals may also be present in the brine. The plants currently being planned would utilize existing power plant outfall systems to take advantage of dilution and mixing prior to discharge. Studies have been conducted for a number of proposed coastal desalination plants and others are currently underway. The availability of power plant cooling systems to dilute the concentrate prior to discharge to the ocean will also be affected by the future of coastal power plants as discussed in the prior section.

Energy use – Desalination's primary operation cost is for power. A 50 mgd seawater plant (approximately 50,000 acre-feet per year assuming operating 90% of the time) would require about 33 MW of power. The reduction in unit energy use has been among the most dramatic improvements in recent years due to improvement in energy recovery systems. For comparison, the current energy costs of desalination along the southern coastal areas of California is about 30% greater than the energy required to import water from northern California.

Growth-inducing impacts – In a number of locations, primarily coastal communities, the availability of water has been a substantial limitation on development. Desalination on the coast is now a much more affordable option in comparison to the past. The lack of water may no longer be as strong a constraint on coastal development as it once was. Population growth along the coast would lead to increasing pressure on coastal zone resources. These are local issues that need to be addressed by the local communities.

Water rights – Proposed private desalination operations raised concerns among some public officials and advocacy groups, who worry that ocean water as a public resource will be exploited for private profit and sold to the highest bidder. In addition, multinational companies could try to use international trade agreements to get around local and state environmental regulation. This raises the issue of water rights. Under the Porter-Cologne Water Quality Control Act, the State Water Resources Control Board (SWRCB) has the ultimate authority over water rights and water quality policy of the State. In accordance with its water rights responsibilities, the SWRCB has the authority to amend water rights. Water rights are likely not needed for proposed desalination facilities using water from the open ocean, but may be needed by facilities proposing to use water from enclosed or semi-enclosed areas, such as bays or estuaries, or saline groundwater. Applicant and lead agencies should contact the SWRCB to determine whether a specific desalination project will require a water right (California Coastal Commission, March 2004 Seawater Desalination and the California Coastal Act report, page 92).

Proposition 50 Water Desalination Grants

In November 2002, California voters passed Proposition 50, the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002. Chapter 6 of Proposition 50, entitled Contaminant and Salt Removal Technologies, allocates the sum of $100 million to be available for grants for seawater and brackish water desalination projects as well as projects for treatment or removal of contaminants such as MTBE, NDMA, perchlorate, and other emerging contaminants. The California Department of Water Resources administers a $50 million desalination program for seawater and brackish water desalination projects under Chapter 6(a). The program provides grants for construction projects as well as research and development, feasibility studies, pilot and demonstration projects. This grant program aims to assist local public agencies with the development of local water supplies through brackish water and ocean water desalination. A Proposal Solicitation Package and application submittal guidelines was released for the first cycle of this program on 10-25-04. It is posted on the Department's website at: http://www.owue.water.ca.gov/finance/index.cfm.

Fifty million dollars in grants under Sections 6(b) and 6(c) covering the treatment and removal of contaminants and disinfection technologies will be administered by the California Department of Health Services.

Summary

Water conservation, water recycling, and most recently desalination are gaining considerable attention from scientists, resource planners, policy-makers, and other stakeholders to address water supply reliability issues in California. The main driving force for the renewed interest in water desalination is the remarkable technological advancement in desalination processes which has recently led to a much lower cost of desalinated water than fifteen years ago.

Desalination has the potential to offer an alternative water supply as part of a balanced water portfolio for many areas of the State. In California, it is reported by the California Water Plan update, that desalination has a potential to generate about 0.5 million acre-feet of additional desalinated water by the year 2030. Of that amount, about 0.2 million acre-feet would be ocean water desalination. This potential of new water could meet the household water demands of about 20 percent of the additional twelve million Californians projected by 2030.

The California Desalination Task Force identified the potential water supply benefits associated with the increased use of desalinated water as well as the challenges facing California in regard to it. The Department of Water Resources will continue its efforts to provide technical and financial assistance to pursue desalination as an important water supply strategy for California's diversified water portfolio.