# Salinity Management Issues Facing Southern California

***Richard Atwater*** *– Inland Empire Utilities Agency*

One of our nation's most valuable commodities is pure, high-quality water. However, this critical resource is threatened each year by the influx of salts originating from human, industrial, and natural processes. Although salt is integral to the survival of all plant and animal life by helping to maintain healthy cell functioning, all life forms have limits to their salt tolerance. Too much salt stunts growth and limits crop yields. In humans, salt regulates metabolism but in excess amounts raises blood pressure. Excess salt in water also affects its potability, taste, and smell. The detrimental effects of salt accumulation are wide-ranging and critical for water managers to address.

Farmers must have quality water to grow their crops. Industry must have low-saline water for manufacturing. Residential water users will seek alternative and more expensive drinking water supplies when high saline levels affect taste. Salinity's economic impact in the United States is enormous. According to the U.S. Bureau of Reclamation, the Lower Colorado River Basin alone suffers yearly damages of more than $375 million as a result of saline Colorado River water.

California has one of the most intricate water systems in the world, depending heavily on water importation. The bulk of the state's population—over 20 million—lives in Southern California cities. Much of this population is dependent on flows from the Colorado River, a water source with over twice the salts (on average) of Northern California water sources.

To control salt levels, California blends Colorado River water with the typically less saline State Water Project (SWP) water from the Sacramento-San Joaquin Delta. However, as environmental and urban demands reduce exports of fresh water from the north, salinity levels in Southern California are rising. Further, the salinity of both SWP and Colorado River waters continues to rise due to increased agricultural return flows and urban discharge. Walt Pettit, former executive director of the California State Water Resource Control Board, has said, "Salinity in Southern California is probably the biggest water problem that isn't being adequately addressed."

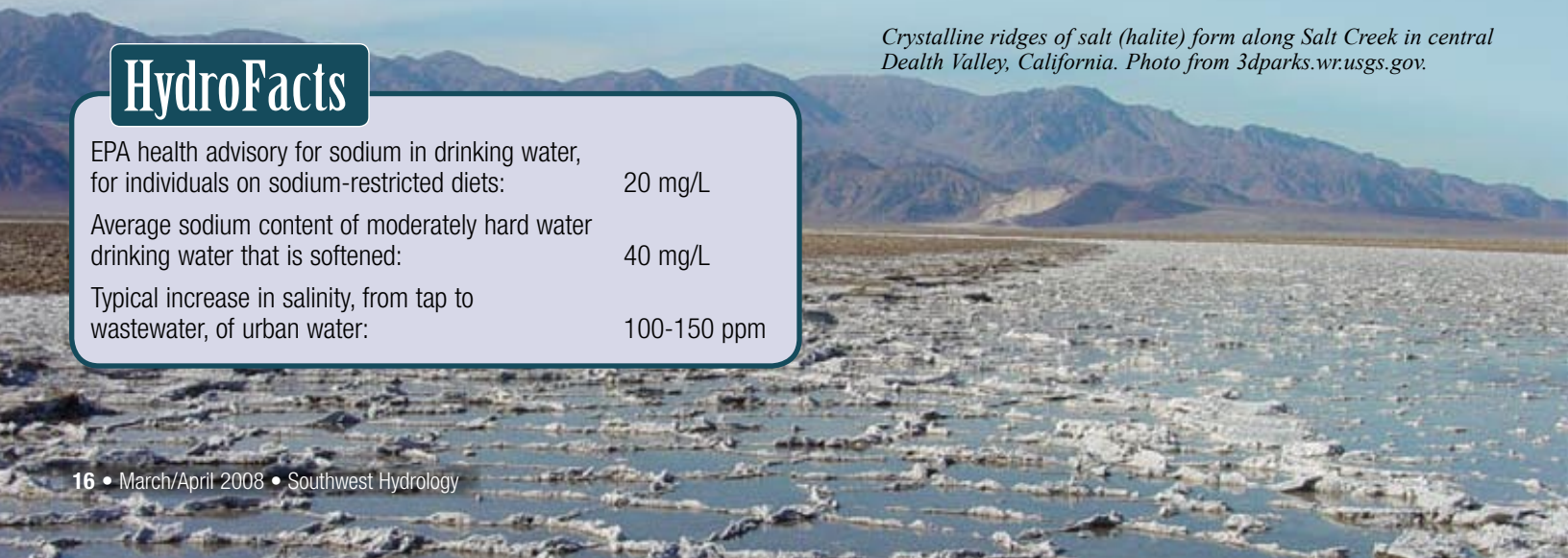
*The impacts of salinity are not alleviated once salts are removed from the water supplies in desalination facilities.*

## Dealing with Salt

One of the most effective forms of salt removal is the use of desalination facilities, typically using reverse osmosis. Desalination can remove salts from groundwater, reclaimed water, and ocean water. Groundwater desalination has the highest priority in Southern California because of its lower cost compared to treating reclaimed and ocean water, and because of the abundance of water systems dependent upon groundwater wells in the region. Many Southern California groundwater basins have significant salt contamination resulting from historic use of imported Colorado River water supplies and agricultural irrigation practices.

The impacts of salinity are not alleviated once salts are removed from the water supplies in desalination facilities, however. The brines that are discharged from the facilities are sent to wastewater treatment plants (WWTPs), which often receive brine loads from industrial wastewater dischargers as well. Salt loads to the sewer system are further increased by the growing use of home water softeners. Cost impacts of the combined brine discharges on top of the regular municipal wastewater load can be significant, and include loss of hydraulic capacity of sewerage systems, infrastructure degradation of WWTPs from corrosion, loss of reclaimed water use due to higher salt loads, lowering of the value of and ability to reuse biosolids, and mineral salt pollutants that adversely affect downstream reuse of the watershed supplies.

Other sources of salt to the watershed include nonpoint source loads from



*Crystalline ridges of salt (halite) form along Salt Creek in central Dealth Valley, California. Photo from 3dparks.wr.usgs.gov.*

## HydroFacts

| | |
|---|---|
| EPA health advisory for sodium in drinking water, for individuals on sodium-restricted diets: | 20 mg/L |
| Average sodium content of moderately hard water drinking water that is softened: | 40 mg/L |
| Typical increase in salinity, from tap to wastewater, of urban water: | 100-150 ppm |

*Inland Empire Utility Agency operates the Chino Basin I desalter, which produces 14 million gallons of purified water daily.*

agriculture and urban landscapes. These salts are flushed into the ground through irrigation and natural recharge and further degrade groundwater supplies. Their origins can often be traced to lawn, landscape, and agricultural fertilizers and manure from confined animal facilities.

## A Multi-Pronged Approach

To help tackle the salinity problem, a coalition of concerned stakeholders, the Southern California Salinity Coalition, was formed in 2000 under the leadership of the Metropolitan Water District of Southern California (MWD). The stakeholders represent organizations with a variety of functions and interests, but with the mutual goal of addressing salinity issues regionally. The group is taking a multi-pronged approach to develop measures that address salt loading and removal as outlined in its Southern California Salinity Management Program (SCSMP).

**Desalination** – Desalinated water could be stored to help drought-proof the Southern California region. SCSMP aims to decrease salinity in underground basins through desalination technologies, and reduce salts in wastewater sources to allow greater recycling.

**Brine Disposal** – A groundwater desalination program will require conveyance of the resulting brine to coastal WWTPs for discharge into the ocean. New brine pipelines are needed to transport salts from inland desalination and industrial discharge locations to these coastal WWTPs.

**Wastewater Collection Systems** – Any program to remove salts from the water supply must also include measures to manage saline discharges to WWTPs. SCSMP supports efforts to separate high-saline wastewater from sewer collection systems and thereby reduce costs associated with treatment, biosolids, and water recycling.

**Watershed/Source Control** – The impacts of urbanization include increased nonpoint source salt contributions. The SCSMP calls for the establishment of effective watershed management activities to control these loads to streams and rivers. Funding would be used to help determine the sources of salt loading in watersheds and thereafter implement best management practices to control the problem. In addition, public education programs will be developed on issues related to salt contamination of watersheds.

**Research and Development Programs** – A final but necessary factor for effective implementation is the support of desalination research and development. SCSMP has advocated increases in federal research and development with the U.S. Bureau of Reclamation to reduce costs associated with importing total dissolved solids from imported water, groundwater, recycled water, and agricultural drainage. Emphasis is on the support of pilot-scale demonstration projects resulting from the research and development activities.

To help unite these efforts, the coalition hosts workshops and other forums with state and federal officials to collaborate on actions to reduce the impacts from salinity.

*Contact Richard Atwater at atwater@ieua.org.*