The Salton Sea

The Salton Basin is an 8,360 square mile, closed, sub-sea level basin in the low desert of southern California and northern Mexico. The basin is actually part of the Colorado River delta: in the last thousand years, the Colorado River has meandered west and filled the basin at least three times forming a freshwater lake called Lake Cahuilla. Each time, the River eventually returned to its more easterly channel leaving the lake to evaporate.

The Salton Sea was formed in 1905 when massive flooding caused the Colorado River to break through an irrigation canal headwork and flow freely into the Salton Basin for 18 months. Since then, the Sea's existence has been maintained primarily by agricultural return flows from the Imperial, Coachella, and Mexicali Valleys.

The Salton Sea is California's largest lake. At a surface elevation of 227 feet below sea level, it has a surface area of 243,718 acreas (381 square miles). The maximum depth of the Sea is about 51 feet and the average depth 31 feet. The annual inflow to the Sea averages about 1,300,000 acre-feet, carrying approximately 4,000,000 tons of dissolved salt.

Salton Sea Problems

The Salton Sea is beset by several serious problems. Because the Sea has no outlet, water is lost only through evaporation , leaving dissolved salts behind and graually raising salinity. The Sea's salinity has now reached 44 parts per thousand (ppt), about 25% higher than ocean water. This elevated salinity may partially explainan apparent decline in orangemouth corvina, the most popular sportfish.

The Sea's elevation has also gradually risen. Homes and economics businesses have been flooded and abandoned. Paradoxically, the rise in the Sea's level has also been beneficial by keeping salinity from rising even higher.

The inflows to the Salton Sea contain high levels of nutrients making the Sea a highly eutrophic (very productive) body of water. This high primary productivity explains the productivity of the fishery but also contributes to periodic fish kills via deoxygenation due to decomposition of 1(the heavily organic sediment after it has been resuspended by high winds, or 2)dead algae following planktonic 'blooms.'

http://www.sci.sdsu.edu/salton/Salton%20Sea%20Description.html

Approximately 10-15% of the inflow to the Salton Sea originates in Mexico and is carried to the Sea via the New River. Because of the discharge of industrial pollutants and poorly treated sewage in the Mexican city of Mexicali, the New River has been called the most polluted river in the country. However, the discharge of at least some industrial pollutants has declined in recent years and the remainder is diluted by Imperial Valley agricultural drainwater. The sewage essentially undergoes natural treatment during its 60 mile passage to the Sea: data collected by the Regional Water Quality Control Board indicate that the bacterial load is greatly diminished at the mouth of the river. The Sea's high salinity may also serve as a barrier to bacterial pollution.

The Salton Sea has unfortunately become known for its massive fish and bird dieoffs. fish kills due to deoxygenation have occurred in the Sea since the fishery was established. Winter dieoffs of tilapia, an African fish introduced in 1964, are also common due to that species intolerance of low temperatures. More recently, the U.S. Fish and Wildlife Sesrvice has identified a dinoflagellate parasite *Amyloodinium ocellatum* ˆas a potential explanation for other tilapia dieoffs. Sever dieoffs have also occurred among a variety of bird species: eared greebes (cause unknown, possibly toxin from a red tid), cormorants (Newcastle disease), and pelican (botulism transmitted through tilapia infected with the vacterium*Vibrio alginolyticus*). Whatever the proximal causes of these mortality events, the Sea's elvevated salinity likely plays some role in their occurrence by increasing the overall physiological stress on the organisms.

The trace element selenium has caused mortality and/or developmental deformities among wildlife at several irrigated areas in the western U.S. and has been studied in the Salton Basin by the U.S. Department of the Interior. Unlike the situation at Kesterson reservoir in central California - the most infamous case of selenium poisoning - selenium in the Salton Sea is derived from irrigation water, not irrigated soils. The selenium concentration in Salton Sea water is very low, about 1 part per billion, but levels in the Sea's sediment and biota are at levels of concern. Selenium is unlikely to be a direct cause of wildlife mortality in the Salton Sea but, like salinity, may be contributing to physiological stress, in particular weakening immune systems.

As of February 1995, at Salton Sea water surface elevation 220.0 feet below sea level, the surface area was 262,517 acres with a total capacity of 9,420,566 acre-feet.

The desert climate of the Salton Trough is characterized by extreme aridity and high summer temperatures. Average annual precipitation is slightly less than 3 inches on the valley floor and about 40 inches at the crests of the San Jacinto Mountains. Maximum

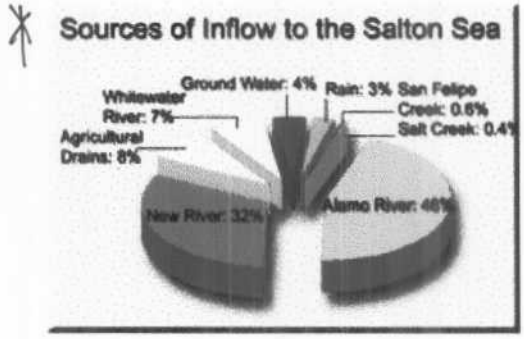
summer temperatures commonly exceed 104 degrees Fahrenheit, and winter minimums are seldom below 32 degrees Fahrenheit.

Salton Sea Authority

The Sea's Vital Statistics:

The Salton Sea, located in the southeastern corner of California, is actually a lake which occupies a desert basin known as the Salton Sink. This body of water covers a surface area of 376 square miles, making it larger than Lake Tahoe and Mono Lake. In fact, the Salton Sea is the largest lake in California. The Sea's current elevation is about 227 feet below mean sea level, its maximum depth reaches 51 feet and its total volume is about 7.5 million acre-feet.

The Salton Sea has a unique make-up. By virtue of its location in the Colorado Desert ecosystem, an area with average annual precipitation of less than 3 inches per year, the Sea receives minimal inflow from rain.



As an agricultural drainage reservoir, the Salton Sea serves an important purpose for the productive agricultural valleys that adjoin it. As an agricultural sump, the Sea consists primarily of commercial agricultural drainage. In fact, 90 percent of the entire inflow to the Sea is agricultural runoff from the Imperial, Coachella, and Mexicali Valleys.

This inflow carries nutrients, such as phosphates and nitrates, which support the rich and abundant life in the Sea. The inflow also carries an abundance of salt (and, thus, the Sea's name). Currently, the salinity level of the Salton Sea is 44 parts per thousand (ppt), compared to 280 ppt for Utah's Great Salt Lake, about 210 ppt for Israel's Dead Sea, 87 ppt for Mono Lake and 35 ppt for the Pacific Ocean.

Salinity

The Sea derives its name from what is now so abundant in its waters - salt. When the Salton Sea formed in 1905, it was a freshwater lake. Over the years, the water has evaporated, leaving behind high

concentrations of salt. Today, the Colorado River is pumped for agricultural use throughout its length and by the time it reaches Imperial Dam, it already contains high levels of salt. Farmers in the Imperial and Coachella valleys use more water than they need for their crops to flush out salt buildup in the soil, bringing in significant new water to sustain the Sea, but also bringing in additional salt.

The issue of salinity has become a major focus as outlined in the Environmental Impact Statement/Environmental Impact Report, because it is reaching a level where it is likely to interfere with fish reproduction and, ultimately, survival. Loss of fish species would greatly impact the Sea's productive sport fishery, and the food source of fish-eating birds that flock to the Sea.

There are five alternatives proposed for addressing issues of water quality at the Sea; all five have salinity reduction as a goal. The aim is to remove at least the amount of the new salt entering the Sea (5 million tons/year).

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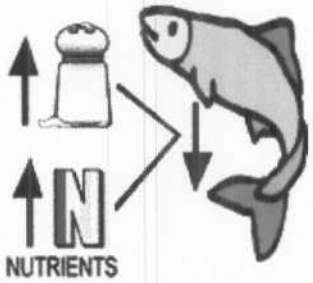

Nutrients

In addition to being highly saline, the Sea is highly eutrophic, meaning that it is full of nutrients. The nutrients come from dying organic matter in the Sea (algae bloom, dead fish, decaying plants, etc.) and from agricultural and other chemicals entering the Sea.

The high levels of nutrients foster the algae blooms. Algae bloom and die quickly. When they die, they pull oxygen from the water, often to levels that deprive the fish of life. Fish die-offs return nutrients to the Sea as they decompose, keeping the nutrient cycle going. Many consider eutrophication a larger threat to wildlife than high salinity, but it is a much more complex issue to address.

Some have suggested fish harvesting, removing up to a third of the tilapia population of the Sea each year, as a means of reducing fish densities, and, therefore, nutrient levels. Others have suggested that even if nutrient levels in the water were reduced, nutrients present in the sediments would replace whatever nutrients were removed. In fact, due to natural eutrophication processes, even if the Sea were completely replaced by clean water, nutrient levels would return to

current numbers in one to two years. So, if salinity levels were to drop, nutrients could increase. Further research into nutrient management is underway.