The Salton Sea.
An Eco-Biography
of California's Largest Lake

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Introduction

A Sea of Paradox

In today's California, the Salton Sea is a little-known landmark with few visitors to its shores. Yet those visitors who do know it often develop a fascination with this body of water, and for good reason. The Sea rests in a basin that was once filled by a giant prehistoric inland sea, known as Lake Cahuilla. The modern-day Sea, formed in the beginning of the twentieth century, was a result of an engineering disaster. Within a few decades, it became a popular leisure hotspot, but the thriving tourist oasis turned into a nightmare as the ecological crises of the Sea escalated. Agricultural runoff has fed the Salton Sea throughout this modern time with conflicting outcomes: It has stopped the Sea from evaporating yet, at the same time, allowed incredibly high amounts of minerals to accumulate in its depths. As a result, the Sea has become much saltier than the oceans. But what else does the Salton Sea have to tell its visitors? And why, in particular, would an environmental historian be intrigued by the Sea?

For over one hundred years, humans have tried to tame or adjust the forces of nature at the Salton Sea. They redirected one of the most unpredictable currents of the North American continent, the Colorado River, and introduced new fishes to the Sea's waters and new plants to its surroundings. And they have continued to transform the Sea in order to adapt it to human needs. As a result of those struggles, the Salton Sea became a place of paradox. It is a place of hope but also a place of loneliness, of helplessness and of ignorance. It is a spot where dreams came true only to be followed by horrifying nightmares. It is a beautiful oasis, but at the same time, it is filthy and bleak. It is an ecosystem that is constantly dying and simultaneously reviving itself. The Sea kills the fishes it carries, yet it constitutes an ecosystem so productive that even though millions of fish die and rot every year, there are more and more fishes. Today, the Sea suffers from bad health,

with an unflattering reputation among humans of a failed utopia, yet one of a welcoming sanctuary for hundreds of bird species.

The Sea is a mysterious place. In its waters, a curious interplay developed between the aquatic species and the variety of microbial growth. Its past conveys a time when people danced on its shores and fishes danced on its surface. Its southern shores became host to underground volcanoes and mud geysers, and in the southwest, an army test site emerged, where secret military experiments contributed to the development of the atomic bomb. And yet other spots reveal a history of disappointments, such as the failed attempt to repeat the success of Palm Springs on the Sea's western shore. Confronted with this intense interplay between culture and nature, it seems only natural for an environmental historian to develop a fascination with the Salton Sea.

Why an Eco-Biography of the Salton Sea?

This study is an eco-biography of the Salton Sea, focusing on the period between 1905 and 1977. The Salton Sink remains a regional focus. This geographical sink is located in southeastern California, in the Colorado Desert. The Sea rests in the sink's lowest elevations while the majority of the sink's remaining surface is occupied by the Imperial and Coachella Valleys. With a surface area of 347 square miles or 900 square kilometers and a volume of over 6 million-acre feet (as registered in 2018), the Salton Sea is the biggest lake in California, both by area and by volume. The Sea's southernmost point is located 30 miles from the U.S.–Mexican border, and the basin that it spreads across straddles the United States and Mexico.[1]

[1] U. S. Department of the Interior, U.S Geological Survey, *State of the Salton Sea: A Science and Monitoring Meeting of Scientists for the Salton Sea*, Open-File Report 2017–1005, by Douglas A. Barnum, Timothy Bradley, Michael Cohen, Bruce Wilcox, and Gregor Yanega, (Reston, VA: U.S. Geological Survey 2017), 1-3, https://pubs.usgs.gov/of/2017/1005/ofr20171005.pdf; U.S Department of the Interior, Bureau of Reclamation, *Restoration of the Salton Sea, Volume 1: Evaluation of the Alternatives,* December 2007, 1-3, https://www.usbr.gov/lc/region/saltnsea/finalreport/Vol1/Chp1.pdf.

The concept of an eco-biography derives from Mark Cioc's study of the Rhine River, entitled *The Rhine: An Eco-Biography, 1815-2000*. Cioc, an environmental historian, approaches the Rhine in a way that is personal, viewing it as a living being, and seeks to portray both the history of the river's environmental decline and the efforts made toward its restoration. The environmental historian Thomas Lekan describes Cioc's study as a "cautionary tale about the unforeseen consequences of the Enlightenment's belief in the need to 'improve' natural systems to suit human economic need."[2] It is this compelling focus on human beliefs and interests and their impact on an ecosystem that has strongly influenced the approach of this study.[3]

Faithful to the approach of an eco-*biography*, this study provides an account of the Sea's life, focusing on a specific stage of its life (1905-1977). The year 1905 marked the beginning of the two-year-long flood that created the modern Salton Sea, while 1977 was the end of a two-year period in which tropical storms devastated the region. And in keeping with a biographical account, the Salton Sea is perceived as a living presence and referred to as the Sea, as if referring to a personal name. But why is the approach of eco-biography particularly useful in the case of the Salton Sea?

In taking this approach, this study investigates the Sea as a living organism comprising both cultural (human) and ecological (natural) actors. It focuses on the interconnection between nature and human actors, where the latter are defined by their interests. Furthermore, this study attempts to include a variety of factors that define and shape a life. For instance, every life has a beginning, and in the case of the Salton Sea, it originates from its parent, the Colorado River. Moreover, this study recognizes that each life, including the life of an ecosystem, is full of potential but is, at the same time, impaired by hardship, including sickness and imbalance. The Sea, as this study discusses,

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[2] Thomas Lekan, "Lekan on Cioc, 'The Rhine: An Eco-Biography, 1815-2000,'" H-German, H-Net Reviews, July 2003, accessed January 14 2019, https://networks.h-net.org/node/35008/reviews/43707 /lekan-cioc-rhine-eco-biography-1815-2000.

[3] Mark Cioc, *The Rhine: An Eco-Biography, 1815-2000* (Seattle, Wash.: University of Washington Press, 2006).

is a life abundant in paradox and coincidence, and a life subject to confusing expectations. And the goal of this study is to provide an account of that life, of when the Sea thrived and when it suffered ecologically from stress and strain, or even illness.

Thus this study is also an *eco*-biography. It describes a stage in the life of an ecosystem that emerges and undergoes constant transformations. The ecosystem is understood as a system which encompasses "both the organic and inorganic elements of nature bound together in a single place, all in active, reciprocating relationship."[4] Just as a human body consists of different body parts and millions of microbes, the ecosystem of the Salton Sea consists of numerous components, including the water, the soils underneath it, the plants that surround it, and the billions of inhabitants such as birds, fishes, arthropods, and microbes. Moreover, it is strongly interconnected with the cultural elements, including human settlements and the agricultural or warfare industries.

Human Desire and Nature's Responses

This eco-biography places a strong emphasis on tensions between the history of state administrations and engineering projects and the loss in biodiversity at the Salton Sea. It shows that those changes that take place very rapidly can turn a "lucky" and "privileged" place into a damaged and forgotten landscape. This study serves as evidence that environmental responsibility is often overshadowed or even excluded by hunger for profit. Furthermore, it demonstrates that short periods of success, prosperity, and a sense of achievement are followed by large-scale losses.[5]

The questions posed by this study relate mainly to the human desire for predictability (the desire to control) and its unintended consequences, and to

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[4] Carolyn Merchant, ed., *Major Problems in American Environmental History* (Boston, MA: Houghton Mifflin Company, 1993); Donald Worster, "Appendix: Doing Environmental History," in *The Ends of the Earth: Perspectives on Modern Environmental History*, eds. Donald Worster and Alfred W. Crosby (Cambridge: Cambridge University Press, 1988), 6.

[5] Cioc, *The Rhine*, 4-18.

the value assigned by human actors to selected parts of the Salton Sea ecosystem. Why do we forgive and forget that our human endeavors are utopian and result in unintended consequences? When do we *allow* nature to act — allow natural processes their own agency — rather than force them to re-act to our desires to intervene? And what does the Salton Sea have to tell us about our dreams of prosperity? Did those dreams on the shores of the Sea collapse because of environmental issues?

The significance of this study lies in the gathering together and analysis of the different layers — both cultural and natural — that shaped the accelerated transformations of the Salton Sea. Throughout the roughly seventy years presented in this study, the Sea gathered quite the collection of odd and even obscure phenomena, which oftentimes occurred in a dramatic manner. Within this relatively short period of time, the Sea has demonstrated the far-reaching devastation of land reclamation projects in the American West. Thus, selecting the Salton Sea as a subject of research offers a unique opportunity to examine an area of the American West which is rather small but which, at the same time, contains a very high concentration of aspects characteristic to the entire West. The Salton Sea has been both an outlet for water distributed via the Hoover Dam and an integral part of the agricultural industry for the Imperial and Coachella Valleys. As such, the Sea can serve as a vehicle to explore larger environmental issues in the American West.

The concept of eco-biography, as introduced by Mark Cioc, considers humans to be the principal actors whose actions determine the transformations of an ecosystem. Adapting a similar approach, this study divides the human actors into various groups of interest in order to picture their motivations and interests. Farmers, local and federal administrative agencies, scientists, leisure business owners, and the military are among some of those groups.[6]

[6] Cioc, *The Rhine*, 4-18.

The various interests of those groups were multifaceted. One the one hand, groups were overly-ambitious and demanding with short-term, often contradictory, interests that were focused mainly on profit. On the other hand, there was a simple and unquestioning attraction to the beautiful and mysterious landscape of the Salton Sea. And there was a scientific fascination with the mysteries of the Sea, as well as the warfare industry's pragmatic approach to using the Sea.[7]

While this study gives considerable attention to the unintended consequences in the cultural transformations of landscape, the elements of the ecosystem remain a strong focus. The marine species acorn barnacles, the various fish species, including the mullet and corvina, and the microorganisms, such as the genus of bacteria Beggiatoa, all belong to a myriad of ecological protagonists that tell the story of adaptation and transformation at the Salton Sea. The American white pelican, pictured as the introductory image, is among the most prominently discussed inhabitant of the Sea. This image of a pelican, perched on a telegraph pole, captures the essence of what is meant by eco-cultural transformations. As human interests and interventions are abandoned, like a telegraph pole submerged in the rising waters of the Sea, nature re-uses the pole in its own interests, as does the pelican, for a perch from which to hunt. Yet this is but one of many examples that depicts the Sea's transformation.

Each chapter of this study covers a distinctive aspect. The first chapter provides an analysis of the power and politics of water in the Salton Sink, depicting the conflicts among powerful private companies that surrounded the emergence of the Sea in the early twentieth century. The second chapter pictures the early scientific perceptions of the Sea, including the insights from botany, geology, ornithology, and other scientific fields. The third chapter examines a selection of agricultural produce from the first decades of the industry in the Imperial Valley and how they shaped the Salton Sea. The fourth chapter focuses on the relationship between World War II warfare tests and the unintended introduction of the acorn barnacle, which became

[7] Cioc, *The Rhine*, 4-18.

one of the Sea's key species. The fifth and sixth chapters explore the booming leisure industry at the Salton Sea in the 1950s and 1960s, and the experiments with transplanting various aquatic species. The seventh chapter reflects on the decline of the Sea into an unbalanced ecosystem, touching upon such aspects as salinity and contamination.

Reviewing the Relevant Literature

The transformations of the Salton Sea have been abrupt. Yet one wonders why the field of environmental history has paid limited attention to California's largest lake. The author and conservationist William DeBuys remains the sole author of an environmentally-focused study dedicated to the Salton Sea in the field of humanities. One further example is an ongoing research project by Jason R. Parry, *The Toxic Water Clock: On the Salton Sea and Project Iceworm*. Focusing on the Salton Sea and Greenland's ice sheet, Parry examines the behavior of polluted water, seeking to determine the reversibility of environmental damage.[8]

Perhaps because of the Sea's striking visual properties, it is the visual aspect that seems to have conquered the narrative of the Sea. A variety of books dedicated to the Salton Sea have a strong visual focus. Kim Stringfellow's *Greetings from the Salton Sea*, Kevin Blake's *Salton Sea Resort: Death in the Desert,* and Karl Anderson's *The Salton Sea* all tell the story of the Salton Sea primarily through the application of visual sources, including historical images, postcards, maps, and graphs.

Recognizing a very distinctive visual aspect of the Salton Sea, the biologist Christina Agapakis initiated a research project rooted in the fields of history, biochemistry, and art. Her 2013 "Bacterial Encounters" exhibition portrayed contrasts and similarities between artifacts from her microbial collection, the

[8] Laura Deal, "Hazardous Time-Scapes: How to Make Sense of Toxic Landscapes from Multiple Timed, Spaced, And Embodied Perspectives?" Seeing the Woods, A Blog by the Rachel Carson Center, January 24, 2018, accessed February 15, 2019, https://seeingthewoods.org/2018/01/24/hazardous-time-scapes-how-to-make-sense-of-toxic-landscapes-from-multiple-timed-spaced-and-embodied-perspectives/.

isolation and analysis of Salton Sea microbes, with satellite images of the region, "exploring the symbolic and literal connections of microcosm and macrocosm."[9] While it was not purely environmental history, Agapakis' research combined various disciplines in a narrative manner.[10]

The sources selected for this study go beyond the field of history. Touching upon aspects of science, agriculture, the military, and tourism, this study draws heavily on literature from those fields. Moreover, studies in the fields of botany, ethology (animal behavior), ichthyology, ornithology, hydrology, and geology serve as highly valuable contributions to exploring the Sea.

In order to understand the transformations of the Salton Sea, it is necessary to place those transformations within the bigger picture of the American West. Marc Reisner's *Cadillac Desert*, James Lawrence Powell's *Dead Pool,* and Donald Worster's *Rivers of Empire* are among the particularly relevant secondary sources dedicated to water and the American West. Those critiques of the American West serve as a vitally important tool for exploring the Salton Sea. In addition, studies with a focus on the entire state of California complement the greater panorama of the environmental history of the Salton Sea region. Among those, Lawrence Culver's recreation-focused study *Frontier of Leisure* and Jared Farmer's study of the history of dendrology *Trees in Paradise* are the most prominent.

Press articles constitute the majority of the primary sources relevant to this study. Journalism has flourished at the Salton Sea since the very beginning of the twentieth century, and according to Farr, one of the first historians of the Imperial Valley, the strong need for publicity resulted in the practice of intensive daily reporting. The *Imperial Valley Press*, the *San Bernardino Sun*, the *Calexico Chronicle*, the *Los Angeles Herald,* and other local newspapers provide a valuable record of transformations of the Salton Sea

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9 Christina Agapakis, "Bacterial Encounters at the Salton Sea," *Scientific American* (online), May 28, 2013, accessed February 14, 2019, https://blogs.scientificamerican.com/oscillator/bacterial-encounters-at-the-salton-sea/.
10 UCLA Art Sci (website), "Christina Agapakis 'Bacterial Encounters' Exhibition," accessed February 14, 2019, http://artsci.ucla.edu/?q=events/christina-agapakis-%E2%80%9Cinside-out-body%E2%80%9D

and a fascinating glimpse into how the various human actors perceived the Sea.[11]

In addition, this study draws from the wide selection of books and articles dedicated exclusively to the Salton Sea. The early historical accounts include Finnis Farr's *The History of Imperial County, California* and Otis B. Tout's *The First Thirty Years*, published in 1918 and 1931, respectively. The studies published in recent time are William DeBuys' *Salt Dreams. Land and Water in Low-Down California* and Russell Rathbun's *The Great Wall of China and the Salton Sea*.

Perhaps the most widely known historical study of the Salton Sea is the 1999 *Salt Dreams*, which provides a detailed account of the Salton Sea region from prehistoric times until the late twentieth century. DeBuys has a strong environmental angle, covering a myriad of topics, including the politics of water in the Imperial Valley and the history of Native American tribes in the region. While *The Great Wall of China* is Rathbun's memoir, written in essay-form, he cites, in academic style, a variety of well-documented sources, which makes it a highly relevant addition to this study. The unusual title of his book, published in 2017, derives from the poetic notion that the only two man-made objects that can be seen from space are the Wall of China and the Salton Sea.

One of the most quoted sources throughout this study is *Birds of the Salton Sea* published in 2004. This thick volume is dedicated exclusively to the Sea's avian diversity. Listing hundreds of bird species, the authors Michael A. Patten, Guy McCaskie and Philip Unitt investigate their habits and migration patterns, and attempt to describe the birds' unique personalities. In addition, they discuss the issues of salinity and contamination of the Sea from both a historical and a hydrological perspective. Lastly, a selection of scientific surveys of the Salton Sea published by the United States Geological Service serve as a crucial component of the sources used in this study.

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[11] Finis C. Farr, *The History of Imperial County, California* (Berkeley, CA: Elms and Frank, 1918), 219-223.

Since each chapter of this study has a distinctive focus, a separate literature review will be presented in brief at the beginning of each chapter.

Prehistoric Waters: Sculpting The Salton Sink

While this study focuses on the events that began in the early twentieth century, it should be noted that the sink that welcomed the Salton Sea in 1905 has long carried evidence of an ancient lake. From a geological perspective, this sink (known as the Salton Sink or the Salton Basin) is certainly unique. Located 234 feet below sea level, it is among one of the areas lowest in elevation in the United States.

The basin was formed roughly three million years ago by the combined forces of the Pacific Ocean and the Colorado River. In its southern part, a long branch of the ocean extended northward from the Gulf of California, forming a giant saltwater lake. In the northern part, the Colorado River sculpted a delta, allowing its water to enter the lake. In the delta, the river continued to shape the mountains and canyons, and deposited enormous amounts of silt, until it changed its path to the eastern part of the basin, finishing its journey in the Gulf of California. The silt that was building up throughout the years continued to form the area and left the sink without an outlet. Hence the bowl-like shape of the Salton Sink that we know today.[12]

With time, the water in the basin evaporated and left behind a thick layer of salt, encrusted in the dry soils of the emerging desert. The area remained dry until a series of episodes began in which the sink filled and then emptied through evaporation. The river kept changing its course, filling the area and leaving it again. Throughout thousands of years the Colorado River refilled the sink in a cycle of between 400 and 600 years. The temporary body of water would remain in the basin for just a few years, and the last of such

[12] Pat Laflin, *The Salton Sea: California's Overlooked Treasure*. Indio, CA: The Periscope, Coachella Valley Historical Society, 1995, Chapter 1; Otis B. Tout, *The First Thirty Years: Being an Account of the Principal Events in the History of Imperial Valley, Southern California, U.S.A.* (Imperial, CA: Imperial County Historical Society, 1931), 17-20.

episodes was recorded by the Cahuilla Indians in the seventeenth century. They fished the temporary lake, seeing it slowly evaporate.[13]

Aside from small-scale irrigation attempts undertaken by the Cahuilla Indians, there was no interest in irrigating this desert region before the 1850s. For decades, to thousands of explorers, settlers and gold-seekers, the sink located between two mountain ranges was just one of many obstacles on their way further west. This changed in the 1850s when William R. Blake, a geologist serving for an expedition whose goal was to determine a suitable path for a railroad to the Pacific coast, noticed a pattern of lines running along the mountain landscape. After closer examination, he realized that he found himself standing within the basin of an ancient lake. Those lines marked the shorelines of a prehistoric sea, dividing the mountain ranges of the Chocolate Mountains and Santa Rosa Mountains into layers of different colors. Blake named the long-gone body of water Lake Cahuilla and became the first western explorer to dedicate considerable attention to this part of the desert.[14]

There was one particular aspect that drew Blake's attention. The geologist noticed several Cahuilla Indians who harvested crops in the Colorado Desert redirecting water from local streams. He thus suggested that this hot, barren area that mortified travelers on their way west could be transformed into a successful farming ground if water were to be redirected from the Colorado River.[15]

Inspired by Blake's suggestions, Oliver Wozencraft dedicated his life's work to developing the first large-scale, commercial irrigation project in the Salton Sink. Wozencraft, a well-known negotiator between California Native American tribes and the government of the United States, and a great advocate of desert irrigation in California, began his efforts in 1857. He soon

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[13] Laflin, *The Salton Sea*, Chapter 1; Tout, *First Thirty Years*, 17-20; Daniel Trembly MacDougal, *The Salton Sea: A Study of the Geography, the Geology, the Floristics and the Ecology of a Desert Basin* (Washington, D.C.: The Carnegie Institution of Washington, 1914), 17-19, https://archive.org/details/saltonseastudyof00macduoft.

[14] Tout, *First Thirty Years*, 21-23; Farr, *History of Imperial County*, 83-86.

[15] Farr, *History of Imperial County*, 83-86.

received support from the California Legislature to irrigate over six million acres in the Salton Sink. But shortly after Congress approved the irrigation of half of those lands, the Civil War began, and the approval was withdrawn. Wozencraft continued to lobby for the plan with mixed responses from the federal government until he died unexpectedly in 1887.[16]

In the 1860s, as Wozencraft was drafting his plan to irrigate the Salton Sink, the renowned geologist John Wesley Powell initiated and conducted expeditions and scientific studies of the American West. One of his most famous was the Powell Geographic Expedition of 1869 when he mapped and surveyed vast regions of the Green and Colorado Rivers. Ten years after the expedition, as the director of the United States Geological Service (USGS), he submitted a report to the commissioner of the General Land Office. *A Report on the Lands of the Arid Region of the United States* was a treatise against the idealized American dream of westward migration. Powell denied virtually every vision and myth about how the American West would become the "Garden of the World,"[17] demonstrating that the methods of agriculture applied in other parts of the United States would not work in the West. Powell's assessment, based on a careful study of the geology, flora, fauna, and climate, claimed that the lands would only be useful if a small number of settlers were to have a separate system of water and land rights. He based his assumption on farms that would be placed right alongside of riverbanks and that any water used for irrigation would be returned to the riverbank.[18]

In 1883, Powell addressed the lawmakers who denied his proposals and pushed towards extensive agricultural use of land in the American West: "Gentlemen, you are piling up a heritage of conflict and litigation over water rights, for there is not sufficient water to supply the land," he warned.[19]

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[16] Tout, *First Thirty Years*, 22-26.

[17] James Lawrence Powell, *Dead Pool: Lake Powell, Global Warming, and the Future of Water in the West* (Berkeley, CA: University of California Press, 2010), 41.

[18] Powell, 41-43.

[19] Michael Hiltzik, "The False Promise of Hoover Dam," *Los Angeles Times*, online Collections, July 5, 2010, accessed on March 14, 2018, http://articles.latimes.com/2010/jul/05/opinion/la-oe-hiltzik-hoover-dam-20100705/2.

While the debates around land use and irrigation were taking place, George Dubrow, a businessman from San Francisco, turned his entrepreneurial eye on the Salton Sink. If there was one certainty about the Salton Sink, it was its rich mineral and salt content. In 1885, Dubrow established a successful commercial salt mine, the New Liverpool Salt Company. His salt mine was the only business in the late nineteenth century in the Salton Sink.

In the end, Powell's bill drafts on land use and irrigation would never pass. Instead, the developing federal strategy pushed the American West in the direction of mass pioneer settlement. Not even two decades had passed since Powell's warning when the idea to irrigate the lands in the Salton Sink re-emerged.

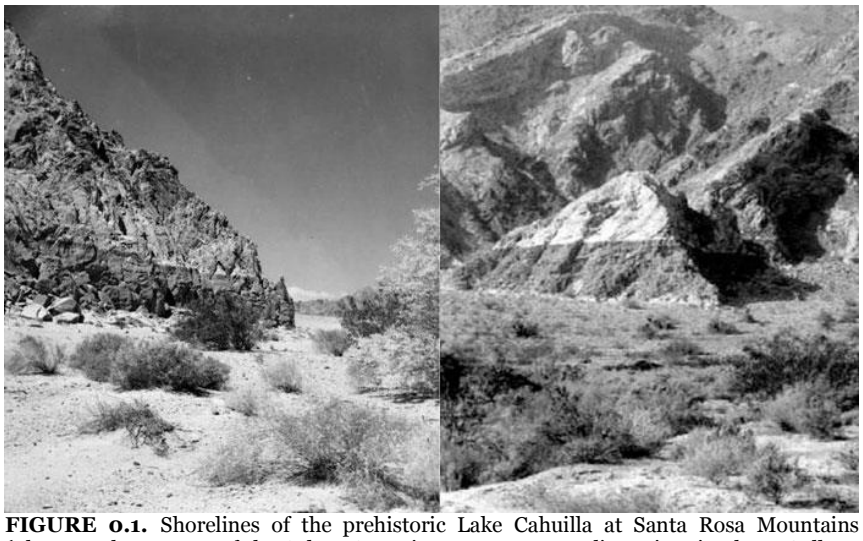

FIGURE 0.1. Shorelines of the prehistoric Lake Cahuilla at Santa Rosa Mountains (Photograph courtesy of the Salton Sea History Museum, online Historic Photo Gallery, https://www.saltonseamuseum.com/.)

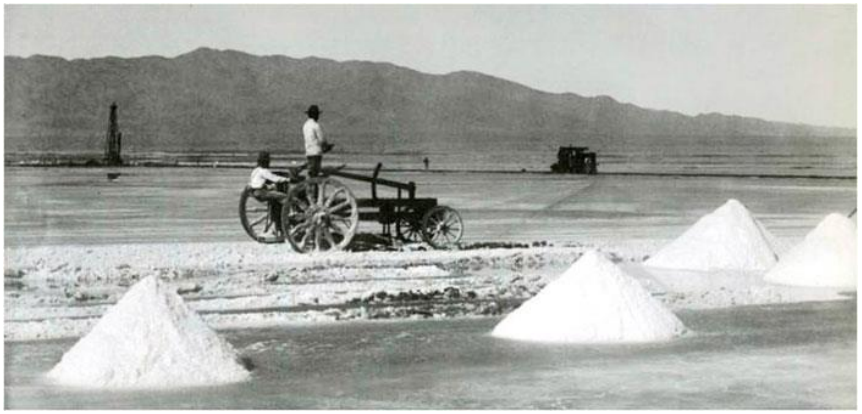

FIGURE 0.2. The New Liverpool Salt Works, close to the present-day North Shore, date unknown. (Photograph courtesy of the Salton Sea History Museum, online Historic Photo Gallery, https://www.saltonseamuseum.com/.)

Chapter One
THE BIRTH OF THE SEA

The Blamed and the Praised

In 1904, heavy silting clogged the newly developed irrigation canals of the Imperial Valley, causing the hydraulic engineers responsible for their maintenance to redirect the Colorado River through a new intake. The river surprised local settlers with a series of floods, which lasted for almost two years. Water rushed through the Valley, destroying settlements and crops, and rested in the Salton Sink, where a new body of water began to form. An ancient inland sea was reborn in the desert and became known as the Salton Sea. In the years of its infancy, the Sea was nothing more than an unpleasant surprise, but it quickly found a permanent place on the maps of the American West.

Who were those engineers, who boldly cut into the riverbed? Who financed their undertakings? How did the flooding start and why did it stop? And finally, how come a giant inland sea emerged and remained in the Salton Sink? The first aim of this chapter is to answer those questions by providing a detailed account of the attempts to irrigate the desert of California between 1892 and 1907. Secondly, it focuses on the power and politics of water in the Salton Sink in the context of the clash between the private enterprises and the federal water resource management agency, the United States Reclamation Service.

The events portrayed in this chapter are embedded within the large-scale phenomenon of "reclaiming" land of the American West, that is, making it suitable for farming purposes and developing it for large settlements. At the turn of the twentieth century, the plan to reclaim the desert by redirecting the major rivers of the West was supported by a variety of specific engineering plans and by a number of successful implementations of

irrigation measures. In Northern California, the Sacramento-San Joaquin River Delta gained the nickname "California's Holland" since a grid of levees enabled the agricultural development of the area in the 1850s. In 1862, the Homestead Act enabled American citizens to put in a claim for 160 free acres of federal land in the western states, causing a population influx. In the 1870s, Mormons established settlements in Arizona and Utah, redirecting water from the Gila, Duchesne, and Colorado rivers. A scientific exploration of the West followed.[20]

After his expedition to the Colorado River between 1869 and 1871, John Wesley Powell described the river as "fretful" and "angry," and the lands of the Colorado River Delta as unsuitable for farming. Ten years after his expedition, he commenced his role as director of the United States Geological Service (USGS). The USGS was founded in 1879 with the goal to examine the landscape in the United States, focusing on the availability of natural resources and the assessment of risk of natural hazards. Powell estimated that only two percent of the western lands were suitable for agriculture and he thus recommended caution in carrying on with the western land reclamation. But as the federal land development strategy grew more aggressive, the federal government continued to pass laws which enabled a rapid reclamation of the western lands. The Desert Land Act, passed in 1877, was an amendment to the Homestead Act, allowing potential settlers to apply for a land entry to irrigate and reclaim the land. The Homestead Act prescribed the residence requirement, which made it obligatory for the claimant to live on the land while it was being reclaimed. The Desert Land Act abolished this legal provision, allowing land speculation companies to acquire vast amounts of land with the help of hired entrymen, who provided false settlement claims. The new legislation created room for fraud on an unprecedented scale, releasing hundreds of thousands of acres into the hands of businessmen with no geological expertise. Amidst those

[20] Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York, NY: Viking, 1986), 41-43.

circumstances, the reclamation pioneers set step in Southern California, seeking to turn the Salton Sink into a green oasis.[21]

The history of the emergence of the Salton Sea has been told by many different voices, and many of them contradict each other. When disasters occur, legends of heroes and villains emerge, creating polarized narratives of the praised and the blamed. The early years of reclamation projects in the American West produced a myriad of sources portraying the irrigation pioneers as almost superhuman creatures with abilities to fight rivers and move mountains. Surveys and scientific studies of the Colorado Delta, such as James D. Schuyler's *Report on Irrigation from the Colorado River Below Yuma, Arizona by Pumping Versus Gravity Canals*, convey confusing messages regarding the land usability and suitability for reclamation purposes. While Schuyler acknowledges the unsuitability of the Colorado Delta for agriculture, he clearly encourages irrigating the region.

This chapter aims to combine the accounts that provide a specific reconstruction of what occurred in the Salton Sink between 1905 and 1907 with those that describe the area from a romanticized perspective. Three primary sources are of particular relevance to providing the historic account. Finis C. Farr's *The History of Imperial County, California*, published in 1918, includes a detailed description of the flood and a comprehensive history of all major settlements of the Imperial Valley. Farr's history of reclamation is a history of grandeur, heroism, and achieving the impossible, and his portrayal of the Imperial Valley paints it as an oasis of fertility and prosperity. In *The Salton Sea: An Account of Harriman's Fight with the Colorado River*, George Kennan provides a rather biased biography of the railroad executive, accompanied by the history of his achievements in the flood management process, and the account of Harriman's conflict with the then president of the United States, Theodore Roosevelt. Margaret Romer's *History of Calexico* complements the first two sources with a fact-based account of the Imperial County settlement, focusing on the daily struggles of

[21] Edward Dolnick, *Down the Great Unknown: John Wesley Powell's 1869 Journey of Discovery and Tragedy Through the Grand Canyon* (New York, NY: HarperCollins, 2002), 227-238; Powell, *Dead Pool*, 40-42; Reisner, *Cadillac Desert,* 42-44.

its inhabitants. In addition, Charles Rockwood's personal accounts, alongside geological surveys, are relevant to this chapter.

Farr's and Kennan's accounts polarize between the blamed and the praised, focusing on three actors. Charles Rockwood of the California Development Company is blamed for mismanagement, negligence, and for causing the flood. E. H. Harriman, the railroad executive engaged in the flood management, is praised as the hero who succeeded in saving the Imperial Valley and winning a battle against nature. Lastly, the Colorado River is portrayed as a hero and a villain interchangeably. Every so often, Farr and Kennan describe it as a life-giving source and caretaker of the Imperial Valley. But as soon as the river acts differently to how the engineers and investors expected, it is blamed for attacking settlements and portrayed as an evil aggressor.[22]

The Dirt Investments

The idea to bring water to the Salton Sink was abandoned for several decades after Oliver Wozencraft's efforts proved to be unsuccessful. In 1892, the investor John C. Beatty established the Colorado River Irrigation Company, whose purpose was to bring irrigation to Southern California. Like many men before him, Beatty dreamed of becoming the first to succeed in irrigating the California desert, and he offered the position of technical advisor to Charles Rockwood. The plan was rather ambitious, as it assumed that within the first two years, three million acres between San Diego and Baja California would be supplied with water.[23]

Rockwood happily accepted the offer. To the young hydraulic engineer from Michigan, bringing water to the desert appeared challenging but not impossible. He commenced work, convinced that the river's capacity provided an inexhaustible source of water. He proposed a draft of the

[22] Jonathan Hughes, *The Vital Few: The Entrepreneur and American Economic Progress* (New York, NY: Oxford University Press, 1986), 388-389.
[23] "To Irrigate Arid Lands: Incorporation of the Colorado River Company," *New York Times*, May 13, 1983, https://www.nytimes.com/search/.

irrigation system but had to abandon it due to a legal obstacle. The Mexican legal system imposed a significant limitation to irrigation efforts, prohibiting the ownership of land within one mile from the border. Coincidentally, the area considered to be crucial to successfully irrigate the Salton Sink was located in the borderland between the United States and Mexico.[24]

Upon a close examination of the area, Rockwood realized that the most efficient way to break into the river would be through the Mexican territory, just as Oliver Wozencraft had suggested in his earlier plans. A range of sandy hills stretched between the Colorado River and the Salton Basin, standing in the way of irrigation canals and passing through the Mexican border. Since the previous overflows of the Colorado River had occurred around those hills, it seemed sensible to reconstruct the river's natural path. Rockwood suggested to take water twelve miles above the border settlement of Yuma, and to redirect it southward around those sandy hills so that it would flow northward back to the sink. The canal would be fifty miles long and it would cross the land belonging to General Andrade, the Mexican Consul in Los Angeles. Beatty approved of the plan but failed to guarantee sufficient funds. After several months of searching for investors, Beatty admitted that there was very little interest to invest in irrigation projects and he decided to abandon the business completely.[25]

Rockwood had just travelled to Europe to meet a Scottish investor, who had an option on a large part of the land that the Colorado River Irrigation Company needed for irrigation. Rockwood succeeded in convincing him to resign from this option so that the land status would be clear but found out about the devastating news upon his return back to the United States. The corporation went bankrupt after Beatty sold the stock, profiting greatly from the enterprise. The bankruptcy was accompanied by a severe economic depression, which struck the United States in 1893.[26]

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[24] "To Irrigate Arid Lands: Incorporation of the Colorado River Company," *New York Times*, May 13, 1983; Tout, *First Thirty Years,* 28.
[25] Farr, *History of Imperial County,* 154-156; Margaret Romer, *A History of Calexic*o (Los Angeles, CA: Historical Society of Southern California, 1922), 9.
[26] Romer, 10; "Director Beatty Accused of Fraud, Application for Temporary Receivers for the Colorado River Irrigation Company," *New York Times*, September 11, 1894,

Despite the series of disappointments, Rockwood firmly and stubbornly believed in the success of irrigating the Salton Sink. He sued Beatty for his outstanding salary from the Colorado River Irrigation Company. But instead, he was offered to collect all maps, records, and data from the company. He agreed to this offer and in 1896, together with Anthony H. Heber, a land agent from Chicago, Rockwood established the California Development Company (CDC). Its goal was to continue efforts to irrigate the Salton Sink. Heber became the president of the CDC, while Rockwood took on the role of head engineer. The company was registered in New Jersey, where the search for the first investors began. The search proved to be tedious for Rockwood, who realized that eastern investors still had a strong aversion against irrigation projects. As Rockwood and Heber were searching for investors, John C. Beatty stood trial for fraud, but was not convicted.[27]

The first years of the CDC were challenging for Charles Rockwood. In 1896, he fell ill with typhoid fever and upon his recovery, he received a series of rejections from potential investors. With the "tenacity of a bulldog,"[28] he continued his efforts to acquire funds, but was soon faced with the news of a series of deaths among the potential investors. Then, the severe economic depression of 1896 rendered Rockwood's efforts useless. He regained hope in 1898, when the President of the Hamilton Trust Company of Brooklyn, Silas B. Dutcher, developed interested in the project. However, Dutcher withdrew his advance payment after the Hamilton Trust became affected by the battleship *Maine* sinking in Havana. Furthermore, the company's financial insecurity was deepened by the Spanish-American War of 1898. By 1899, the CDC was in severe debt and close to bankruptcy. For several months, Heber sustained the company by selling jewelry from his private possessions.[29]

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https://www.nytimes.com/search/; George Kennan, *The Salton Sea. An Account of Harriman's Fight with the Colorado River* (Imperial Valley, CA: Macmillan, 1917), 21.
[27] Michael Hiltzik, *Colossus: The Turbulent, Thrilling Saga of the Building of Hoover Dam* (New York, NY: Free Press, 2010), 24; Kennan, *The Salton Sea*, 21; "Director Beatty Accused of Fraud, Application for Temporary Receivers for the Colorado River Irrigation Company," *New York Times*, September 11, 1894.
[28] Romer, *History of Calexico*, 11.
[29] Romer, *History of Calexico*, 11-23.

In 1900, the outlook began to improve for Rockwood's enterprise. Not only was he able to secure sufficient investments, he also managed to hire the irrigation pioneer George Chaffey. Chaffey enjoyed an excellent reputation among the hydraulic engineers, as he had successfully implemented large-scale irrigation projects in different parts of the world. Together with his brother William Benjamin Chaffey, he worked on the first settlements of Ontario in Canada and Mildura in Australia and became famous for founding the settlement of Etiwanda in California in 1891. Etiwanda, a part of Rancho Cucamonga, was situated in San Bernardino County and became a model town for many other settlements in Southern California. Chaffey became obsessed with irrigating the land south of San Bernardino County, which inspired him to make a very generous offer to Rockwood. First, he became one of the company's main investors and then its new chief engineer. Chaffey took over Rockwood's position in 1900, redesigning the entire engineering strategy of the CDC.[30]

Chaffey committed himself by contract to construct a canal system that would not exceed the total cost of $150,000 and that would provide the Imperial Valley with 400,000 acre-feet of water per year. He abandoned Rockwood's initial plan to dig around the sand hills and decided to proceed with the opening at Pilot Knob, close to Yuma. The plan was to cut a canal to redirect water from the Colorado River into its natural overflow channel, the Alamo River. The digging began in spring 1901.[31] George Kennan described the digging process, praising Chaffey's efficiency and time management skills:

> Putting in a head-gate there [at Pilot Knob], they carried their main canal southward across the Mexican boundary, in a course nearly parallel with the river, until they reached the barranca or dry overflow channel known, as the Alamo. As this ancient watercourse meandered westward in the direction of the Salton Sink, they were able to clear it out, enlarge it, and utilize most of it as a part of their irrigation

[30] Romer, 12-13.
[31] Kennan, *The Salton Sea*, 23-24.

system. Then, at a point about forty miles west of the Colorado, they carried their canal northward, across the boundary line again, into southern California. The work throughout was pushed with great energy, and on the 14th of May, 1901, a little more than a year after Mr. Chaffey assumed direction of affairs, water was turned in at the Pilot Knob head-gate, and the irrigation of the Salton Sink became a certainty, if not a fully accomplished fact.[32]

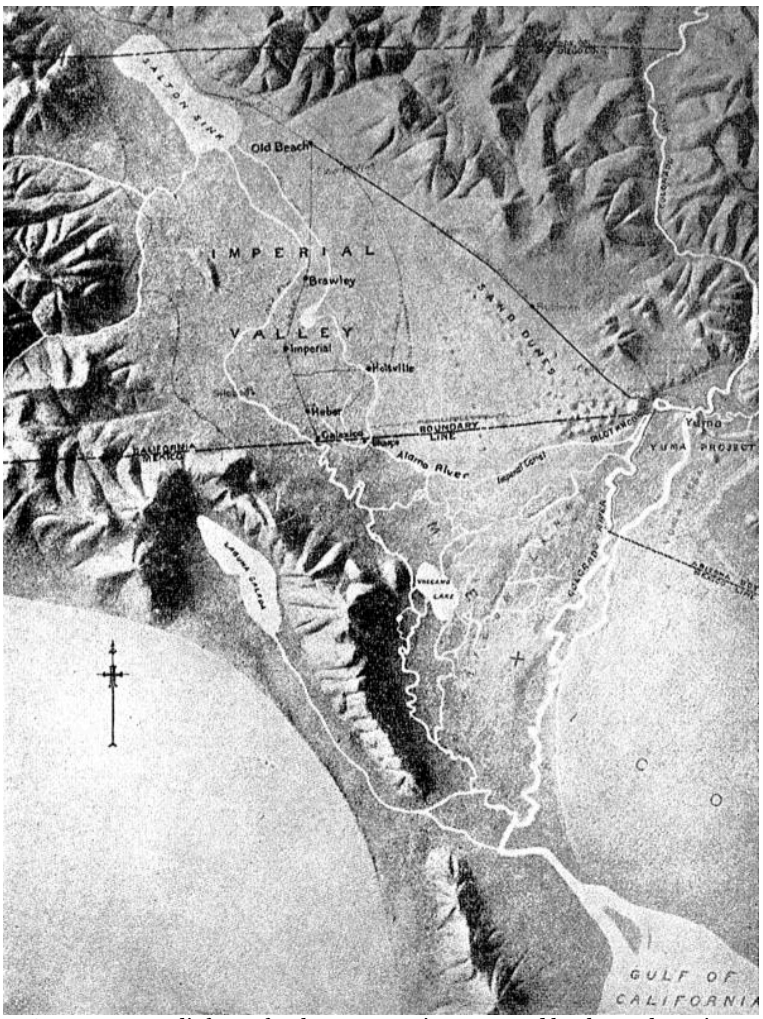

FIGURE 1.1. A relief map for the Yuma Project prepared by the Reclamation Service in 1904. The description states: "The floods soon made Salton Sea of the Salton Sink, shown on the map." (Tout, *The First Thirty Years*, 49.)

The Promised Land

The investments secured by Rockwood in 1900 were not sufficient to cover the costs of the canal construction. Chaffey believed that selling land in the

[32] Kennan, 24.

Salton Sink could tackle the growing debt of the CDC and in 1900, he established the Imperial Land Company (ILC) as a branch of the CDC. The goal of the ILC was to advertise and sell the land to potential settlers. Aware of the fact that many feared the extreme weather conditions, Chaffey prepared an advertising campaign, using a carefully selected vocabulary to portray the Salton Sink as the future agricultural oasis. The ILC avoided words like "desert" or "sand" and Chaffey named the area "Imperial Valley." "Imperial" indicated a bright future of the western irrigation empire, while "valley" sounded more appealing than "sink" or "basin."[33]

The Imperial Valley reflected the spirit of reclamation emerging in the American West, calling for a rapid, large-scale population influx. By the end of 1900, the colonization of the Valley began under the Desert Land Act of 1877, which promoted the development of public lands in the arid West. Successful applicants received a land entry for 640 acres and permission to irrigate the land for farming purposes. The Imperial Land Company offered help to the applicants, and in turn it received twenty-five percent of the sales of water stock and of land sale profit. To prove that the ground was fertile once irrigated, Rockwood and Chaffey set aside several acres of land, where they cultivated various plants. After a few months, the first crops were harvested, and this attracted hundreds of new settlers.[34]

In June 1901, the Imperial Valley received water for the first time via the Alamo Canal, also known as the Imperial Canal. In 1902, the population of the Imperial Valley reached two thousand and by 1903, it had grown to seven thousand. The CDC dug four hundred miles of ditches around the area, providing water for over one hundred thousand acres. Between 1902 and 1904, the Southern Pacific Railroad entered the valley, with the new branch extending between the growing settlements of Imperial, Holtville, Brawley, El Centro, Mexicali, and Calexico. However, a crisis emerged in 1903, as the population of the Imperial Valley was reaching 10,000 residents. The water

[33] Edgar F. Howe and Wilbur Jay Hall, *The Story of the First Decade in Imperial Valley*, California (Imperial, CA: Edgar F. Howe & Wilbur J. Hall, 1910), 65-58.
[34] Romer, *History of Calexico*, 13-14.

supply slowed down as the ditches were clogged with a thick layer of silt carried into the valley by the Colorado and Gila Rivers.[35]

The CDC constructed a "waste-gate," a structure that carried the water away from the canal, only to waste it, so that the canal would stay dry. Silt was then removed from the canal, but the intervention proved to be a massive failure, resulting in even more clogging and hundreds of thousands of cubic meters of wasted water.[36]

By the end of 1903, the two-year-old layer of silt was thick enough to block the main canal almost entirely, leaving the farming grounds without a water supply. Almost all crops were lost during the winter of 1903-1904, and hundreds of farmers began to file lawsuits against the CDC. In an attempt to bring immediate relief to the farming grounds, Anthony K. Heber suggested dynamiting the main gate, which would let the river flood into the canal and flush out the silt. Rockwood was reluctant about this plan, worried that destroying the gate might redirect the whole river into the Imperial Valley. Instead, he decided to open a new gate. The goal was to create a new intake to bypass the clogged canals and direct the water to the area that was silt-free. Rockwood knew of one serious obstacle to this plan. As the intake had to be cut four miles south of the border, the intervention had to be approved by the Mexican government, which would be a tedious task. However, there was one more obstacle that Rockwood didn't foresee, and it was much more serious than he could have imagined. The Colorado River was about to begin its "semi-millennial change of course".[37]

A closer look at the land surveys from the early reclamation period shows that the silt problem could hardly have been a surprise to Rockwood and Chaffey. James D. Schuyler was among the many hydraulic engineers who predicted the assets and drawbacks of irrigating the American West. In his 1901 *Report on Irrigation from the Colorado River Below Yuma, Arizona*

[35] Kennan, *The Salton Sea*, 25-28; Tout, *First Thirty Years*, 48-50.
[36] Kennan, *The Salton Sea*, 32-33.
[37] Kennan, 35.

by Pumping Versus Gravity Canals, Schuyler suggested that the thick and clogging character of the Colorado River silt deserved closer attention:

> The disposal of the silt and sand constitutes the chief difficulty in irrigating from the Colorado River. The percentage of silt carried by the river varies very greatly, and the amount of it has never, to my knowledge, been very definitely determined.[38]

The silt could be found in high waters of the river and consisted of very fine sand, which, as the stream became faster, changed to "very tenacious, plastic clay." Schuyler found that while the "usual" sand could easily be removed from the canals, "the clay mud is much more difficult to handle, and must be allowed to dry out for weeks before one can walk over it."[39]

Schuyler was a strong advocate of land reclamation, with a curious ability to notice the difficulties and deny their severity at the same time. As a highly acknowledged engineer and a member of the Board of Consulting Engineers, he pushed through the Owens River water supply project and influenced other mass-scale water projects, as well. In his assessment of the Colorado River, he alerted the readers to consider the difficulty of coping with the silt, but at the same time, reassured them that controlling the river was undoubtedly feasible. He described the Colorado River's silt as the "most discouraging and expensive stuff to get rid of, as it is so very sticky and tenacious."[40] However, only a few pages further into his assessment, Schuyler concluded: "By enlarging and improving the plant there is no reason why you should not control the water supply of the valley and secure a fair interest on your investment."[41]

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[38] James D. Schuyler, *Report on Irrigation from the Colorado River Below Yuma, Arizona by Pumping Vs. Gravity Canals,* (Los Angeles, CA: James D. Schuyler, Consulting Engineer, 1901), 4, https://calisphere.org/item/ark:/86086/n2df6q21/.
[39] Schuyler, 4.
[40] Schuyler, *Report on Irrigation*, 4.
[41] Schuyler, *Report on Irrigation*, 9; American Society of Civil Engineers, "James Dix Schuyler," accessed September 21, 2015, http://www.asce.org/uploadedFiles/About_Civil_Engineering/Engineering Projects/Sweetwater%20Bio-Sec5.pdf.

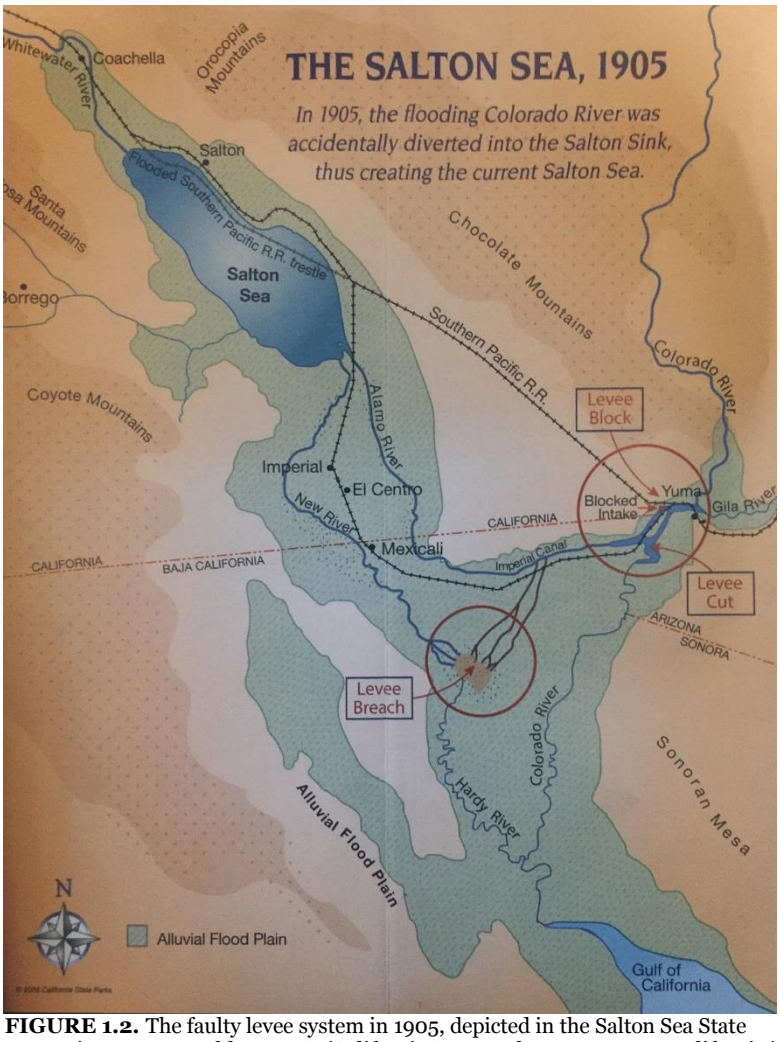

FIGURE 1.2. The faulty levee system in 1905, depicted in the Salton Sea State Recreation Area pamphlet, 2008. (California State Parks, Sacramento, California.)

The Unfortunate Breach

In the Imperial Valley of 1904, Schuyler's promise of prosperity was not yet fulfilled. The investment was far from lucrative for the California Development Company, which received damage claims from the frustrated settlers reaching $500,000. As the canals continued to clog, Chaffey confirmed the need to proceed with the Mexican intake in order to relieve the narrowing canals. The CDC applied to the Mexican government for permission to own land that bordered Mexican territory and to use it for redirecting the canals. After the permission was repeatedly denied, Rockwood established a subsidiary corporation in Mexico, which operated under a Mexican charter.[42]

[42] Romer, *History of Calexico*, 21, 32-33.

In June 1904, the attorney of the CDC and the then-president of Mexico, Porfirio Díaz, signed an agreement approving the redirection of the Colorado River through Mexico on behalf of the CDC. The agreement only allowed the redirection after December 1905, but Rockwood and Chaffey began to cut the intake in October 1904. Rockwood later explained that this decision resulted from a misunderstanding, claiming that the CDC attorney sent him a telegraph from Mexico City stating that he should proceed with the cut. However, Rockwood did not provide a copy of the telegraph, nor was a statement from the CDC attorney included in the available sources.[43]

The new opening was fifty feet wide. Initially, the water calmly entered the valley, as the water level was very low in the autumn season. Rockwood and Chaffey planned to construct a permanent gate that could close the intake in case of a flood. However, the first flood came earlier than they anticipated.[44]

In early 1905, the stream of the Colorado River suddenly became stronger, pushing more silt into the canals. Despite the tremendous strength that the river applied to the structures, the intakes were not becoming broader but narrower, with the heavy sediment settling on the bottom. Within a few weeks, the river left the canals altogether, changing its course towards the Imperial Valley. The January flood destroyed crops and left behind a thick layer of silt. When another flood struck in March, Rockwood decided to close the lower intake, hoping that this would shut the river off. What he didn't know was that this was just the beginning of a series of floods that would continue for almost two years.[45]

[43] Charles Rockwood, *Born of the Desert* (Calexico, CA: Calexico Chronicle, 1930), 6-7; Romer, *History of Calexico*, 24.
[44] Rockwood, *Born of the Desert*, 6-7; Romer, *History of Calexico*, 24.
[45] Rockwood, *Born of the Desert*, 4-6.

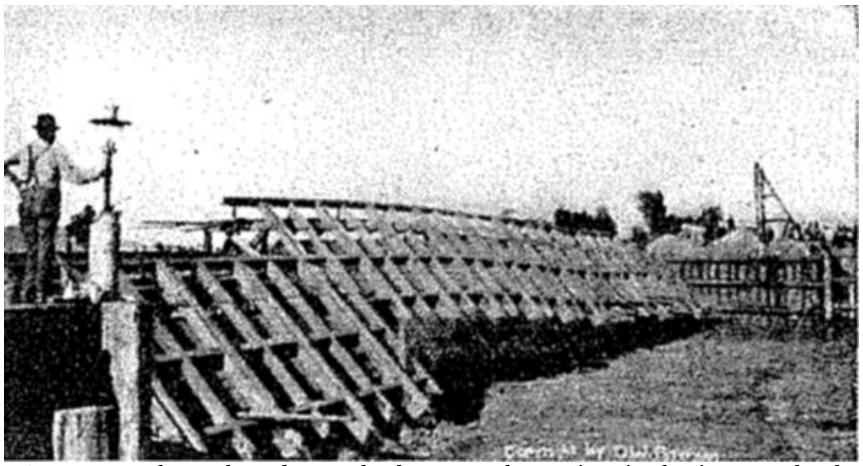

FIGURE 1.3. The Rockwood gate, also known as the Mexican intake, in 1905, shortly before it was destroyed. (Tout, *The First Thirty Years*, 49.)

The Unstoppable River

Rockwood knew that between the 1870s and the 1890s, the Colorado River had flooded the Salton Sink on three occasions, and that there had been no multiple floods in one year. Thus, he assumed that the flood season was over and returned his attention to the silt problem. But his fears of the river changing its course towards the Imperial Valley settlements came true, when the newly cut canal opening allowed for the swelling stream to break into the area. First, the water filled the Volcano Lake in Mexico and then rushed towards the Imperial Valley through the Alamo Canal. Inevitably, the water headed towards the lowest surface: The depression of the Salton Sink.[46]

In order to tackle the initial flooding, the CDC constructed a temporary dam of piles and sandbags across the gap. However, a second flood wiped the dam away. The CDC rebuilt it, only to see it destroyed a few weeks later. By April 1905, the opening, initially sixty feet wide, was 160 feet wide, and there were no funds left for further rescue measures. In May, the CDC reached out to the executives of the Southern Pacific for aid, requesting a $200,000 loan. Rockwood believed that the CDC provided new customers to the Southern Pacific by reclaiming the territory for the new settlers. Therefore, he

[46] Kennan, *The Salton Sea*, 60.

reasoned that the railway network should support the flood management efforts.[47]

Julius Kruttschnitt, the General Manager of the Southern Pacific, declined the request, but the president of the company, Edward Henry Harriman, accepted it. The loan followed under the condition that the Southern Pacific would temporarily take control of the CDC. After the loan was granted, the Southern Pacific was allowed to elect one of the company's three directors and it owned fifty-one percent of its stock. Rockwood and Chaffey remained active in the company, but Heber, the first company president, was forced to withdraw.[48]

Twenty-five years after the flood, Charles Rockwood provided a personal account of the disaster, describing his motivations and struggles in bringing water to the Imperial Valley. Interestingly, he was aware of the fact that the terrain was unsuitable for agriculture, which did not stop him from proceeding with the hydrological projects. His autobiography *Born of the Desert* reveals his ambition and drive to achieve financial success through his engineering knowledge. When things went wrong, Rockwood blamed the misfortunes on investors or bad timing. Referring to the 1905-1907 floods, he claimed that he was not the one to blame, as the situation was unprecedented: "I doubt as to whether anyone should be accused of negligence, or carelessness, in failing to foresee what had never happened before."[49]

In his memoir, Rockwood confessed that there was pressure from "several of the leading men from the Valley" to proceed with cutting the breach. Moreover, he was determined to avoid further failures, as they would

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[47] Harry Thomas Cory, *Report on the Financial Condition of the California Development Company and its Subsidiary Company, La Sociedad de Riego y Terrenos de la Baja California* (Washington, DC: Government Printing Office, 1906); *Harry Thomas Cory and William Phipps Bake, The Imperial Valley and the Salton Sink* (San Francisco, CA: J.J. Newbegin, 1915), 1291-1293, https://archive.org/details/imperialvalleya00blakgoog/page/n8; Romer, *History of Calexico*, 23-24.
[48] Cory, *Report on the Financial Condition*, Cory and Bake, *The Imperial Valley*, 1291-1293; Romer, *History of Calexico*, 23-24.
[49] Rockwood, *Born of the Desert*, 3.

inevitably lead to bankruptcy of the CDC. He stressed that the decision to cut the intake was the cheapest one, since the CDC lacked funds. Moreover, he was convinced that it would have been successful in redirecting the water to where it was needed, had the river not rebelled.[50]

However, Rockwood's decisions were not met with understanding. The local press blamed him for negligence and E. H. Harriman's biographer, George Kennan, accused him of underestimating the severity of the situation until it was too late. Kennan claimed that Rockwood initially saw the flood as a useful way to broaden the canals of the CDC and that he expected the waters to simply flow into the sink, causing no harm to the crops or to the settlements. When the Southern Pacific assumed control over the CDC and flood management, Rockwood was overshadowed by the "Railroad Tycoon" E. H. Harriman.[51]

No End in Sight

Edward Henry Harriman built his career from working as a Wall Street message boy to the most powerful railroad executive in the country. After he had taken control of the Union Pacific in 1890, he expanded the railroad system of the United States and gained acclaim for his 1899 voyage, the Harriman Alaska Expedition. The famous naturalist, John Muir, one of the participants of the Alaska Expedition and Harriman's close friend, stressed Harriman's strong determination: "None I ever knew faced the storm and stress of the world's affairs more calmly and resolutely, nor have I ever known another with such power of performance."[52]

Harriman took over the rescue action within days after the loan was granted to the CDC. It was June 1905, and the Colorado River was discharging 900,000 cubic feet of water per second. The water was flooding into the

[50] Rockwood, 6-7.
[51] Kennan, *The Salton Sea*, 50.
[52] Maury Klein, *The Life and Legend of E. H. Harriman* (Chapel Hill, NC: University of North Carolina Press, 2000); John Muir, *Edward Henry Harriman* (New York, NY: Doubleday, Page and Company, 1912), 2-4.

Salton Sink with a great speed, leaving the facilities of the Liverpool Salt Company completely under water. With the rights transferred to him by Rockwood, Harriman was in charge of virtually all CDC actions and also fully engaged with the Southern Pacific as the managing body of rescue operations.

Harriman appointed Epes Randolph as the new president of the California Development Company. Randolph, a civil engineer with previous experience in flood control, estimated that the $200,000, suggested by the CDC as the amount needed to stop the flood, constituted only a part of what was actually required. He adjusted the quote to $750,000 and assured Harriman that with these financial resources, bringing the river back to its old channel would be feasible.[53]

In October 1905, the CDC, fully under control of the Southern Pacific, attempted to close the break once again but failed, and the waters of the Gila River rose by ten feet several weeks later. The November flood was remembered as the most destructive in the flood season of 1905, leaving most irrigation canals and miles of the Southern Pacific tracks under water. Randolph decided to build two head gates and a by-pass to redirect the river into its old canal. The first was to be constructed near Pilot Knob on a rock foundation and was made of steel and concrete. The second was to be built north from the intake and was to be constructed with wood. Those gates were planned to be finished in three months, but the construction of the first took seven months and the second was finished in eleven months. But even if the gates had been finished, they would not have resisted the flood of the summer of 1906, the strongest one to date at the time.[54]

1906 was an unfortunate year in California. On April 18, an earthquake rocked San Francisco, causing a destructive fire which lasted for days. Thousands of people were killed and almost the entire city was devastated. The earthquake, which would be remembered as the worst such event in the

[53] Kennan, *The Salton Sea*, 40-45.
[54] "Salton Sea is Still Rising," *Los Angeles Herald*, October 30, 1905, https://cdnc.ucr.edu; Cory and Bake, *The Imperial Valley*, 1302-1305.

history of the United States, greatly affected E. H. Harriman. He became involved in rescue operations in San Francisco while still managing the situation in the Salton Sink. In the Imperial Valley, further floods washed away the gates built by Rockwood. In the midst of those events, Rockwood resigned from his position at the CDC. Randolph appointed Harry Thomas Cory as head engineer and issued a request to the Southern Pacific for more funds to stop the flood. Harriman agreed to subsidize further rescue works with $250,000.[55]

In May of 1906, the destruction had grown greater than any of the previous floods. Twelve thousand settlers were in danger, as six billion cubic feet of water per hour rushed into the sink, raising the level of the Salton Sea by seven inches each day. The Liverpool Salt Company was sixty feet under water, together with crops of the Imperial Valley and parts of the Southern Pacific tracks. The cities of Calexico and Mexicali were destroyed, and an aggressive soil erosion made a large part of the Valley unsuitable for agriculture for many years to come.[56]

The most severe threat came from the "cutting back" of the torrents. With the lower stratum of soil deeply cracked, the fast stream of the river washed away the soft silt like "powdered sugar," destroying the upper strata. The gorge was rapidly widening, and the river ripped out an enormous amount of soil, up to four times more than the total digging of the Panama Canal.[57]

[55] Kennan, *The Salton Sea*, 56.
[56] Kennan, 55.
[57] Romer, *History of Calexico,* 26.

FIGURE 1.4. The Southern Pacific rails destroyed by the flood, 1905. (Photograph courtesy of the Salton Sea History Museum, online Historic Photo Gallery, https://www.saltonseamuseum.com/.)

The Calexico Flood

The border city of Calexico was affected by the floods more severely than any other settlement. After it had been established by the Imperial Land Company in 1899, it rapidly became the largest settlement of the Imperial Valley. In the first week of July 1906, the Calexico settlers found themselves directly in the path of the river's cutting back stream. To try to protect the town from destruction, the CDC and Calexico residents constructed a levee. For forty-eight hours, men, women, and children from the settlement worked alongside the CDC workers, piling up sandbags as the water level rose. Those who did not have shovels used saucepans and other household items. From time to time, the levee broke under the weight of the ongoing flood and then, the work started all over again. After two days, there were no sandbags left and the settlers used bedding and mattresses to stuff into the breaking levee.[58]

Kennan noted that during the flood, wind was all that could be heard as the settlers were abandoning the town to find shelter on the hills. The wind was

[58] "Calexico Menaced by River Flood," *San Francisco Call*, December 9, 1906, https://cdnc. ucr.edu; Romer, *History of Calexico*, 27.

louder than the raging water of the Colorado River, leaving the screams of those who called for help unheard.[59]

After two days, the water was several feet deep, and it became clear that an evacuation was necessary. Hundreds of people fled the town, seeking shelter in the surrounding hills. Others constructed simple wooden rafts and found themselves floating away, carried by the strong wind. Once the waters quieted down, dozens of people could be seen scattered around the area on tiny islands, waiting to be rescued by boats. The official crossing between the United States and Mexico was under water, and many of those who tried their luck with rafts suddenly found themselves on Mexican territory.[60]

The Calexico historian Margaret Romer, who witnessed the flood, appreciated the role that trees played in the rescue operations:

> There was a row of stately cottonwood trees along one side of the Company offices, that had been tenderly raised and were highly prized. [...] These trees had to give their lives to help save the town, they were hewn down and suspended by chains in the river channel that the angry waters might beat against them and thus spare the bank on the Calexico side of the river. The noble trees did their work well. They saved that bank.[61]

Rock Beats Water

It was summer of 1906. The flood had continued for seventeen months and all of the attempts to close the breach failed. It became clear to the CDC that the Imperial Valley needed a plan with more material, more manpower, and more money than any of the previous attempts.

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[59] Kennan, *The Salton Sea*, 85; Romer, *History of Calexico*, 27.
[60] "Calexico Menaced by River Flood," S*an Francisco Call*, December 9, 1906; Romer, *History of Calexico*, 27.
[61] Romer, *History of Calexico*, 27.

The plan was to dump rock into the breach with a speed faster than the speed of the water stream. The Southern Pacific provided a specially designed branch of railroad that would allow the engineers to transport the materials to the strongest part of the stream. The railways were laid on a trestle, which extended for several miles across the breach. The Southern Pacific provided steamers, a dozen trains, and three hundred of the largest side dump cars, also known as "battleships" or "mammoths." Since each car carried sixty tons of material, both the trestle and the railways had to be fortified to keep the construction from collapsing.[62]

The operation relied on rock as main material to fill the sandbags, rather than sand that had been used previously. While sand was fairly easy to find in the desert, rock had to be purchased from quarries and the local ones did not have the capacity to provide the thousands of tons needed for the "final fight" with the Colorado River. The CDC purchased material from quarries in the radius of four hundred miles and after those were emptied, more quarries across the whole United States were engaged to supply the necessary amount of rocks. In addition, hundreds of tons of gravel, timber, and sand were gathered to aid in closing the breach.[63]

Thousands of men were needed to carry out the operation. In addition to workers from California, two thousand people from the tribes of Pimas, Papago, Maricopas, and Yumas from Arizona, as well as Cocopahs and Dieguenos from Mexico were forced to join the operation. Workers from Mexico and from native tribes were placed in camps and subjected to martial law. Each worker was assigned to either a day or a nighttime shift, each twelve hours long.[64]

The work began on 1 August 1906. Hundreds of men worked day and night for twenty days, constructing "with baling-wire, steel cable and two thousand cords of brush, about 13,000 square feet of mattress, which was enough to

[62] Kennan, *The Salton Sea*, 64-65.
[63] Tout, *First Thirty Years*, 104; Cory and Bake, *The Imperial Valley*, 1291-1293.
[64] Tout, *First Thirty Years*, 104.

cover the bed of the river from shore to shore with a double thickness of blanketing about one hundred feet in width".[65]

Next, they built a railway trestle through the crevasse and soon thereafter, trains were running through it, dumping tons of rock onto the mattress. In the meantime, they extended the bypass of Rockwood's head-gate and began diverting water through it. However, the gate broke in October, turning the bypass into the main river. The fifth major attempt to control the flood failed.[66]

Frederick H. Newell, the director of the Reclamation Service at the time, was present at the closure of the break in December 1906 and remembered the loud sound of the rock dumping process. Heavy locomotives pulled hundreds of train cars filled with rock. Hundreds of workmen pushed down the rock, hurrying before the next load arrived. When reaching the trestle, the larger stones were broken by "pop-shots," and the noise sounded like live artillery. Added to the roar of the waters were the whistle signals, the orders shouted towards the workers, and the bustle of "an army working day and night to keep ahead of the rapid cutting of the stream."[67]

It cost $100,000 to dump three hundred carloads of rock, sixty tons each, into the crevasse. After the gate was destroyed, Cory and his crew continued to dump rock on the mattress until it filled the opening in the beginning of November. But on 7 December, another flood ripped the gate open and let the river flow into the sink again.

[65] Kennan, *The Salton Sea*, 68-69.
[66] Kennan, 68-69.
[67] Kennan, 85; Romer, *History of Calexico*, 27.

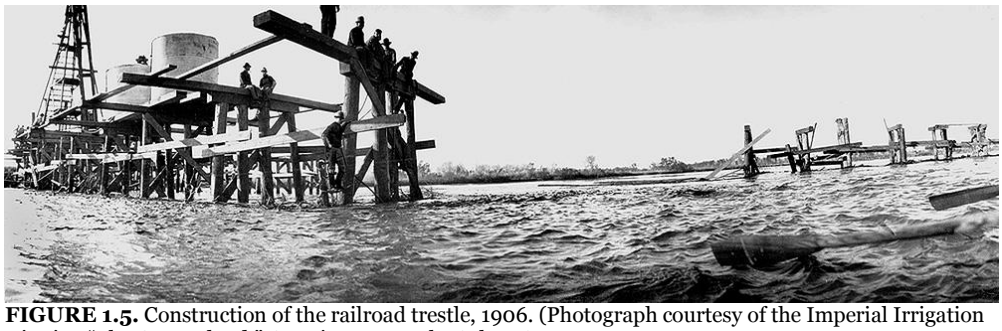

FIGURE 1.5. Construction of the railroad trestle, 1906. (Photograph courtesy of the Imperial Irrigation District, "The Great Flood," Greetings From the Salton Sea, http://www.greetingsfromsaltonsea.com/flood.html.)

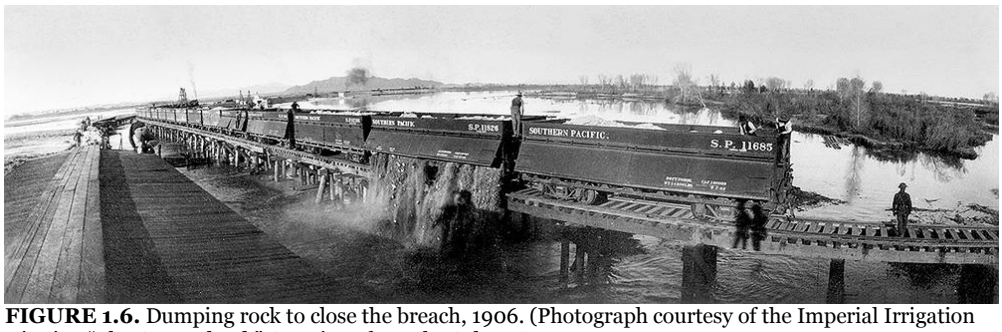

FIGURE 1.6. Dumping rock to close the breach, 1906. (Photograph courtesy of the Imperial Irrigation District, "The Great Flood," Greetings from the Salton Sea, http://www.greetingsfromsaltonsea.com/flood.html.)

FIGURE 1.7. The rails of the Southern Pacific were moved to a trestle during the flood. The shore underneath was covered with debris from property destroyed by the flood, 1907. (Photograph courtesy of the Salton Sea History Museum, online Historic Photo Gallery, https://www.saltonseamuseum.com/.)

The relations between President Theodore Roosevelt and E. H. Harriman were far from friendly. Both men were engaged in a heated argument about workers' unions in 1905, as Roosevelt's view on labor rights began to tilt to the pro-union side. Trying to satisfy both the demands of disgruntled labor unions and of the corporations, Roosevelt struggled to settle on a specific labor policy. He considered Harriman's views on the labor unions too radical, as demonstrated by a letter written in December 1906 in which he called Harriman an "undesirable citizen", comparing him to the persecuted unionists Debs, Moyer, or Haywood.[68]

In light of the extent of floods' destruction, the absence of the federal government in the rescue operations seems rather odd. But was the matter a private or a public one? All funds and the entire workforce, including engineers, were provided by the CDC and the Southern Pacific. The government was not engaged with flood management on any level, which was partly justified by the fact that the breach was caused by a private company. However, the length and the strength of the flood was a large-scale disaster that required a federal intervention. Moreover, the government still legally owned the flooded lands. While the settlers inhabited the Imperial Valley and purchased the land from private companies, the law privatizing the land was still pending. In addition, the floods affected not only the Imperial Valley, but also the federal project of the Laguna Dam. With the canals constantly breaking, the Laguna Diversion Dam on the southeastern border between California and Arizona was in danger of being destroyed. Furthermore, thousands of acres of farmland from the Laguna Dam project were being ripped apart, rendering them unusable for future irrigation.[69]

[68] Tout, *First Thirty Years*, 107.
[69] "Ask Federal Aid for Imperial: State's Representatives at Washington to Urge Appropriation by Congress – Must Curb River," *San Francisco Call*, December 14, 1906, https://cdnc.ucr.edu; "Laguna Dam May Be Destroyed," *San Francisco Call*, January 28, 1907, https://cdnc.ucr.edu.

The situation in the Salton Sink complicated the already fragile relationship between E. H. Harriman and the then President of the United States, Theodore Roosevelt. A series of misunderstandings was followed by bitter disappointment and mutual reluctance. The conflict escalated in December of 1906, when Harriman, weary of funding and coordinating the rescue operations, approached the President. Roosevelt addressed Harriman with the following telegram: "I assume you are planning to continue work immediately on closing break in Colorado River. I should be fully informed as to how far you intend to proceed the matter."[70]

Harriman responded that he had already spent $2 million and that an additional $350,000 was needed. He expected the government to provide further funds, and the Reclamation Service[71] to coordinate the work with the engineers and workers provided by the CDC, and the infrastructure provided by the Southern Pacific. In his response, Roosevelt made it clear that any intervention from the Reclamation Service would have to be approved by Congress, which was about to break for the holiday season. The President concluded:

> This is a matter of such vital importance that I wish to repeat that there is not the slightest excuse for the California Development Company waiting an hour for the action of the Government. It is its duty to meet the present danger immediately, and then this Government will take up with it.

Harriman responded: "You seem to be under the impression that the California Development Company is a Southern Pacific enterprise. This is erroneous." He continued to explain that while the Southern Pacific provided the loan to the CDC, it was not responsible for the breach. He explained that the Southern Pacific had no interest in saving the Imperial Valley, as the

[70] All telegrams throughout this section are quotes taken from Kennan, *The Salton Sea*, 77-80.
[71] The United States Reclamation Service, established in 1902 within the Department of Interior, was a federal agency responsible for water resource management. In 1923, it was renamed the "Bureau of Reclamation" (USBR). The history of the USBR will be discussed in detail in Chapter 3.

railroad tracks were already placed high enough so that the flood would not affect them. However, Harriman informed the President that he would continue the works, and that he would later apply for reimbursement to the Department of Interior.[72]

Coined by the press as "a gigantic battle between man and nature," Harriman's last attempt to stop the flood finally resulted in success. In the last days of December 1906, another rock dumping operation began. The work was exhausting for the fifteen hundred workers at the opening. One thousand flat cars and "battleships" arrived simultaneously on two new trestles constructed across the opening and dumped the material in one go. As they destroyed the heavier pieces of rock with dynamite, two Mexican workers lost their lives falling from the trestle to the stream.[73]

After a few more rounds of rock dumping, the flood was officially considered over on 10 February 1907. On 20 February, Harriman shared the good news with John Muir, stating: "The Colorado River broke out again, but we closed it on the 11th, for good, I hope."[74]

In January 1907, Roosevelt urged Congress to compensate Harriman's financial effort to tame the flood, but his request was ignored. In 1909, then President William Howard Taft repeated Roosevelt's request, which again, received no attention. The final rejection came in 1911, when Congress officially refused to reimburse the cost. Many members of Congress were convinced that it was not the CDC who caused the breach, but the Mexican government who failed to supervise the construction of the canals. Many

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[72] "Will Look to Congress," *Imperial Valley Press* (El Centro, CA), December 22, 1906, https://cdnc.ucr.edu; Tout, *First Thirty Years*, 107.
[73] "Harriman and the Runaway River," in *A Treasury of Railroad Folklore: The Stories, Tall Tales, Traditions, Ballads and Songs of the American Railroad Man, ed.* B. A. Botkin and Alvin F. Harlow (New York, NY: Crown Publishers, 1953); "Barriers of Rock Washed Away: Colorado River Makes More Work for the Engineers Who Are Fighting Flood," *San Francisco Call*, February 3, 1907, https://cdnc.ucr.edu; "Will Wait Until River Falls," *San Francisco Call*, December 12, 1906, https://cdnc.ucr.edu; Romer, *History of Calexico*, 32.
[74] "The Colorado River No Longer Pours into Imperial Valley—Salton Sea Will Disappear in About Ten Years," *Sacramento (CA) Union*, February 12, 1907, https://cdnc.ucr.edu; Letter from E. H. Harriman to John Muir, February 20, 1907, John Muir Papers, Holt-Atherton Special Collections, University of the Pacific Library, https://www.pacific.edu/university-libraries/find/holt-atherton-special-collections/john-muir-papers.html.

newspapers urged a federal reimbursement, pointing to the fact that the government was responsible for the lands of the Imperial Valley and for the Laguna Dam. However, the matter was never taken up again.[75]

Harriman's efforts to contain the floods remained unnoticed by officials from the federal institutions and by the State of California. Moreover, the dispute over union laws between him and Roosevelt continued after the flood. Roosevelt released his opinion about Harriman being "an undesirable citizen" in an official statement in April 1907, causing widespread protests around the country, with protesters wearing buttons and banners saying, "I am an undesirable citizen." Two years later, E. H. Harriman died.[76]

In 1909, two months after Harriman's death, the Southern Pacific won a foreclosure case against the CDC, which had functioned independently from the Southern Pacific since 1907. The CDC was ordered to reimburse the Southern Pacific almost $1.5 million, which was the total cost of the flood rescue efforts. The decision meant bankruptcy for the CDC and confirmed that the CDC was to be held responsible for negligence in flood management measures.[77]

The reputation of the CDC was destroyed by the press, which reported widely on the floods. In December 1906, the *Imperial Valley Press* wrote:

> The company entered upon its construction work with large plans, but with inadequate capital. All of its structures for the control and distribution of water were temporary in character, being built of wood and of the smallest possible dimensions.[78]

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[75] "Government Should Help," *Los Angeles Herald*, December 12, 1906, https://cdnc.ucr.edu; House Report No. 1936, 61st Congress, 3d Session, 153-157, "Is Mexico to Blame?" *Sacramento (CA) Union*, December 12, 1906, https:// cdnc.ucr.edu; "Appeal to Congress for Square Deal," *Imperial Valley Press* (El Centro, CA), February 5, 1910, https://cdnc.ucr.edu.
[76] Tout, *First Thirty Years*, 107.
[77] "Southern Pacific Wins," *Imperial Valley Press* (El Centro, CA), November 20, 1909, https://cdnc.ucr.edu.
[78] "The Damages," *Imperial Valley Press* (El Centro, CA), December 1, 1906, https:// cdnc.ucr.edu; "The President's Message: Message to Congress by President Roosevelt'

Five years after the flood, the discussion between the engineers and their critics continued. A 1912 article titled "Colorado River Feared No More," published by the *San Francisco Call*, quoted Cory, who pronounced Rockwood, Heber, and himself not responsible for the failed flood management. He claimed that the flood was caused by "politics and errors" and insisted that further irrigation projects should remain in hands of private investors, who were "interested in the welfare of the community." Strongly emphasizing that politicians should be kept away from the irrigation projects, he added that the experience gathered by the CDC provided an expertise to avoid similar mistakes in the future and that it helped to develop an effective line of measures to cope with controlling the Colorado River stream.[79]

FIGURE 1.8. A 1910 photograph of the Salton Sea. The description states: "The runaway Colorado did great damage in 1906 but some compensation is afforded in the serene beauty of the Salton Sea, which it formed." (Howe and Hall, *First Decade in Imperial Valley, California*, 282.)

FIGURE 1.9. *Left*, Cracked grounds at the northern part of the Salton Sea, close to Mecca, shortly after the flood waters subsided, 1911. (MacDougal, *The Salton Sea,* 30.)
FIGURE 1.10. *Right*, Clayey lumps remained on vast areas surrounding the Salton Sea after the flood waters subsided in 1907. (MacDougal, *The Salton Sea*, 30.)

Regarding Situation on the Lower Colorado," *Imperial Valley Press* (El Centro, CA), January 19, 1907, https://cdnc.ucr.edu.

[79] "Colorado River Feared No More," *San Francisco Call*, February 7, 1912, https://cdnc.ucr.edu.

After the river had calmed, most of the Salton Basin dried out. But a vast inland sea remained in the depression of the Salton Sink. The nature writer George Wharton James was one of the first to paddle in the Salton Sea. In *The Wonders of the Colorado Desert*, he described his journey through the Salton Sink shortly after the Colorado River began overflowing into the Imperial Valley. The presence of water in the desert confused him and caused him to experience a fata morgana, a mirage right above the horizon:

> On the early morning of March 29, as we rowed across the south end of the Salton Sea, the whole San Bernardino range toward the east offered us an ever-changing panorama of mirage effects. My companion and I both saw it at one and the same time. He cried out as I was about to do so, "Cantilever bridge and structural ironwork!" It verily appeared like a vast cantilever bridge, with somewhat irregular steelwork, but clearly defined, connected with a vast extension of piled-up steel columns that reminded one more of the steel-framed skyscrapers of New York in the process of construction than anything else.[80]

The young Salton Sea was subject to many jokes and perceived by the settlers merely as a “side-effect” of the flood. On 1 April 1906, a few weeks before one of the most severe floods, the *New York Times* published an April Fools’ Day story on the Salton Sea:

> The recent extreme cold weather in the southwestern part of the United States has produced one extremely curious result: The Salton Sea, which is produced by the overflow of the Colorado River into a depression in Southern California, has been frozen over to a great depth. The Southern Pacific Railroad, which has been greatly

[80] George Wharton James, *The Wonders of the Colorado Desert* (Boston, MA.: Little, Brown, and Company, 1906), 136, https://archive.org/details/wondersofcolorad01jame/page/n11.

> embarrassed by the flooding of its tracks occasioned by the risking of the water, has moved its tracks to the ice, and is now running over the surface.

The article continued by stating that the Salton Sea became the new meatpacking district due to the freezing temperatures, and that the settlers of the Imperial Valley were enjoying ice-skating on the frozen surface of the lake. Strangely enough, the article was taken seriously by Philadelphia's *Public Ledger*, which reprinted it on 19 April. It was the first and the last time T*he New York Times* printed an April Fools' Day story.[81]

By the end of 1906, the Salton Sea was fifty miles long, five to twenty miles wide, and growing, fed by the increasing inflow of agricultural runoff. Yet, many articles speculated about the possible disappearance of the Sea. After the Reclamation Service launched a scientific study to measure evaporation levels, some results predicted that the Salton Sea would dry out in the following decade while others insisted that it would never evaporate. But the Sea grew steadily, and in 1907, it scared the residents of the Imperial Valley once again. In February, a strong wind formed waves on its surface, threatening local villages and destroying parts of the Southern Pacific tracks.[82]

J. Smeaton Chase paid tribute to the desert's wild, untouched, and mysterious territories in his memoir *California Desert Trails*. The nature writer idealized the desert and marveled about the stunning beauty of the Salton Sea:

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[81] "Nature's Packing Plant: Salton Sea Freezes Salt Gathers - And There You Are," *New York Times*, March 31, 1906, https://www.nytimes.com/search/; "Nature's Packing Plant," *Daily Public Ledger* (San Francisco, CA), April 19, 1906, 4, https://cdnc.ucr.edu; "Railroad News," *Los Angeles Herald*, December 18, 1907, 12, https://cdnc.ucr.edu.

[82] "Gossip in Railway Circles," *San Francisco Call*, January 25, 1907, https://cdnc.ucr.edu; "Recession of Salton Sea," *Imperial Valley Press* (El Centro, CA), December 7, 1907, 10. https:// cdnc.ucr.edu; "Salton Sea Facts," *Imperial Valley Press* (El Centro, CA), December 28, 1907, 3, https://cdnc.ucr.edu; James*, Wonders of the Colorado Desert*, 50; "The Colorado River No Longer Pours into Imperial Valley - Salton Sea Will Disappear in About Ten Years," *Sacramento (CA) Union*, February 12, 1907, p. 2; "Waves of Salton Sea Beat Over S.P. Tracks," *Los Angeles Herald*, February 27, 1907, 2, https://cdnc.ucr.edu.

> [The Salton Sea] is at best a rather cheerless object, beautiful in a pale, placid way, but the beauty is like that of the mirage, the placidity that of stagnation and death. Charm of color it has, but none of sentiment; mystery, but not romance. Loneliness has its own attraction and it is a deep one; but this is not so much loneliness as abandonment, not a solitude sacred but a solitude shunned. Even the gulls that drift and flicker over it seem to have a spectral air, like bird-ghosts banished from the wholesome ocean.[83]

FIGURE 1.11. George Wharton James' 1906 sketch titled *Salton Sea by Moonlight*. (James, *Wonders of the Colorado Desert,* 31.)

Building Castles in the Sand

While the California Development Company struggled to create an agricultural oasis in the Imperial Valley while relying exclusively on private funds, the federal government established a governing body whose entire focus was on managing water resources in the American West. The Reclamation Service was not engaged in the flood management process at the Salton Sink, but its activities reshaped the irrigation system of the Colorado River Delta, greatly influencing the Salton Sea. The first of those activities was the Yuma Project, which was launched in 1903, just as the California Development Company was failing to remove silt from the clogged canals. Thus, to understand the role of the federal government in the emergence of the Salton Sea, a brief return to the pre-flood years is necessary.

[83] Joseph Smeaton Chase, *California Desert Trails* (New York, NY: Houghton Mifflin Company, 1919), 194, https://archive.org/details/californiadeser01chasgoog.

The Reclamation Service, (renamed "The United States Bureau of Reclamation" in 1923), conducted a number of water management activities in the West. It was created under the Reclamation Act, which was passed by the United States Congress in June 1902. The act allowed for the use of federal funds in irrigation projects in twenty states in the American West. It also introduced a system of repayments, in which the water users from the irrigated lands paid back construction costs for the projects supplying their farms with water.[84]

The Service was in charge of large-scale water projects, managing every step from the very beginning of the planning process to construction and maintenance. It supervised hydroelectric generation, lab tests, management of water rights of Native American tribes, parks and recreation, and many other areas. However, the Reclamation Service was utterly ineffective in its first two decades due to limited resources and chaotic management. Most of the ambitious plans for water diversion, delivery, and storage imposed by the Department of Interior were impossible to execute, as there was a major shortage of land surveys and a lack of qualified engineers to execute the plans.[85]

Between 1902 and 1907, the Service became famous for its poor settlement patterns, as it initiated thirty projects across the western states. The example of land acquisition and distribution demonstrates how tedious it was for the Service to plan and execute in the first years, and how overwhelmed it was with the climatic conditions of the West. Purchasing a piece of land suitable for agriculture was a matter of luck, as the system was managed by inexperienced and understaffed branches of the Service. Thousands of settlers were publicly dissatisfied with the quality of land and with the repayment schedules. The overwhelming majority of newcomers had no previous experience with farming in a desert climate and suffered massive losses of crop. Others were not able to pay off the interest simply because the

[84] Reisner, *Cadillac Desert*, 113-119, 134-137.
[85] Reisner, 113-119.

soil on the land they purchased was not fertile. In some cases, settlers arrived on their new land to find that the irrigation canals planned for the area had not yet been finished. Amid this chaos, the government was constantly changing the repayment schemes for the irrigated lands. Finally, the deadline for payment was increased from eight years to "infinite" due to lack of surveys. This caused enormous difficulties for the Reclamation Service, whose main source of funding was public land revenues.[86]

The Service entered the competition to irrigate the Salton Sink in 1903, when the construction of the Yuma Project began. The project, with its troublesome Laguna Dam section, demonstrated the lack of direction in the first federal reclamation projects. The Yuma Project was planned as a network of diversion dams and canals and was constructed between 1903 and 1915. It was the first project of the Reclamation Service and a problematic one from the beginning. First, a conflict of interest arose from the dedication of the channels to two completely different regions. Yuma County in Arizona and Imperial County in California were to share water, which caused difficulties in planning and construction. Secondly, the Yuma Project was constantly flooded, as the problem with silt clogging was enormous. This meant an ongoing struggle with canal maintenance.[87]

The Laguna Dam was a particularly troubling segment of the Yuma Project. It was divided into the Valley Division, which supplied Arizona, and the Reservation Division, which became the new main supply for the Imperial Valley. The dam was under constant risk of destruction and was almost completely destroyed during the flood season of 1905-1907. Flood prevention works became an integral part of the Yuma landscape, maintaining the anxiety that the floods, which created the Salton Sea, could strike again. In 1911, the flood destroyed a major part of the Yuma Project. On 27 May, the *Lompoc Journal* reported:

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[86] Wallace Stegner, "Striking the Rock-Water and the Arid West" in *Major Problems in the History of the American West*, ed. Clyde A. Milner III (Boston, MA: Cengage Learning, 1997), 401-402.
[87] "Reclamation Bureau's Engineer Declares Boulder Dam Project Six Months Ahead of Schedule," *San Bernardino (CA) Sun*, April 14, 1931, https://cdnc.ucr.edu.

> The million dollar dam just completed by the United States Government in Mexico [...] has been rendered practically useless by a break in the Bee River levee above. Through a gap 900 feet wide and rapidly lengthening a mighty volume of water is rushing. The river is rising and will continue to do so for a month, so there is no hope of checking the flow. This means that the entire lower Imperial Valley may be flooded, the great irrigation systems ruined, and the damage that accompanied the filling of the Salton Sea five years ago perhaps repeated.[88]

The Yuma Project posed a threat of diverting water in the wrong direction. Gravity was supposed to carry the stream down to the Imperial Valley, but the river frequently rebelled against this expectation. In 1917, thousands of carloads of rock were dumped into the irrigation system to calm the stream. The flooding stopped and the Reclamation Service announced it as a long-term success in flood prevention efforts in the Imperial Valley. However, four months later, the Colorado River destroyed the levees again and continued to flood thousands of acres of fields. In addition to those common flooding incidents, there were major floods in 1912, 1916, 1918, and an earthquake in 1915, all causing heavy damage to the Imperial Division.[89]

Amid these dramatic circumstances, press reports about the Reclamation Service oscillated between feelings of incompetence and confidence in the federal officials. An Arizona Republican involved in planning the Yuma Project embarrassed himself during a planning meeting, confusing the Colorado River with the New River. Trying with "painful efforts to understand" the geography of the region, he continued to "make a mess" of it, as he was unaware of the basic features of the geography of the Yuma region.[90]

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[88] "Imperial Valley Flooded," *Lompoc (CA) Journal*, May 27, 1911, https://cdnc.ucr.edu.
[89] "Engineers Working to Prevent Flood of Colorado River," *Los Angeles Herald*, June 26, 1917, https://cdnc.ucr.edu; "Flood Threatens Imperial Valley," *Sacramento (CA) Union*, July 2, 1917, https://cdnc.ucr.edu.
[90] "Freaky Colorado's Erratic Course," *Imperial Valley Press* (El Centro, Ca), July 17, 1909, https://cdnc.ucr.edu.

In 1911, Oscar Lawler, the assistant to the United States Attorney General, visited Mexico with the goal to "explain to Mexicans the job of controlling the Colorado River," as the *Imperial Valley Press* specified, "with regard to plans for the harnessing of the restless and unruly Colorado River: to make it flow – where man wants it to flow." Lawler had no engineering background, but he was convincing enough to secure a payment of one million dollars in gold for irrigation projects from the Mexican government.

Lawler prepared a set of arguments to convince Mexican officials, focused on the risk of flooding, which, according to Lawler, would inevitably create another Salton Sea on Mexican territory. He warned the Mexican officials that another flood such as the one that had created the Salton Sea would be so destructive that the "wonderful development of agricultural lands in Mexico would be lost forever." The *Imperial Valley Press* journalist reported from Lawler's visit in Mexico in a cocky tone, referring to the neighboring state as the "Land of Manana" and ensuring readers that water should flow into the "thirsty grounds" in "poco tiempo" as soon as the investment was made.[91]

The significance of the report on Lawler lies in the word it used to promote the reclamation project. Lawler wants "to make it [the Colorado River] flow – where man wants it to flow." The "man" is an archetypical creator of a utopian American West, his "want" becomes a caprice, a symbol of man's entitlement. The Reclamation Service created the Yuma Project in this spirit of entitlement, but the Colorado River remained skeptical, no matter what *man* would *want*. The Yuma Project could not be saved from its bitter end.[92]

The environmental historian Donald Worster authored the famous claim, considering the Reclamation Service as the destructive elite of the doomed-to-collapse "hydraulic society." The Service promoted a vicious cycle, causing disasters and then creating new inventions to deal with those disasters. To Worster, the agency embodied the "centralization and capture of power" that

[91] "Freaky Colorado's Erratic Course," *Imperial Valley Press* (El Centro, CA), July 17, 1909.
[92] "Laguna Diversion Dam," Projects and Facilities, Bureau of Reclamation, U.S. Department of the Interior, accessed March 15, 2018, https://www.usbr.gov/projects/index.php?id=297.

imposed senseless goals, narrowing the horizon to the one and only water empire. This power entanglement resulted in a loss of local autonomy. Its flawed system was full of "infrastructure traps," hanging on the verge of total collapse, but never quite reaching it. The measures of constant re-shaping, re-building, and re-digging, proclaimed by the Department of Interior as great innovations, were nothing more than an aid to solve "self-generated problems."[93]

At the Salton Sea, the emergence of the federal agency caused friction with private enterprises. While the Reclamation Service was not active in flood management between 1905 and 1907, it surprised the weakened water companies in 1909, as it stepped into the Salton Sea region with a strong strategic move.

After the floods stopped, the California Development Company went bankrupt. Dozens of new, smaller companies emerged, attempting to take over the water distribution market. The officials of the Reclamation Service badmouthed private water companies as grafters and speculators accountable for "wild cat location schemes."[94] With the dedication of the Yuma Project in sight, the state did not want private land agents to promote lands that it provided with water. In the spring of 1909, the Service withdrew 350,000 acres of state land east of the Salton Sea for surveying purposes. This was all of the land in the Imperial Valley that had not yet been reclaimed. This withdrawal meant a pause in further settlement and from any farming usage. The *Imperial Valley Press* described this tactic as a war declaration on the California Development Company and the Southern Pacific. The official statement from the Reclamation Service claimed that this decision was born from the need to determine whether there was a need for a new canal extension from Yuma. This extension would call for moving water from the Laguna Dam through the lands east of the Sea. The decision

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[93] Donald Worster, *Under Western Skies: Nature and History in the American West* (New York, NY: Oxford University Press, 1992), 15, 57; Donald Worster, *Rivers of Empire: Water, Aridity and the Growth of the American West* (New York, NY: Oxford University Press, 1985), 48-60.
[94] "Lands Reserved for New System," *Imperial Valley Press* (El Centro, CA), April 17, 1909, https://cdnc.ucr.edu.

blocked virtually all further land sales in the area, as it was not certain where the canals would go, which areas they would cover, or the scale of the project. There were no funds dedicated to the project and it was not certain whether there would ever be. But the Reclamation Service demonstrated its presence in the Salton Sea region, influencing the distribution of power over the large water projects and over the land distribution for several years to come.[95]

Among all the dams, canals, and levees in the region, the Salton Sea stood out. It was not planned. It was not predictable. What is more, it was a stark reminder of the uncomfortable truth that the Colorado River was untamable and dangerous. In its first years, the Sea was ridiculed, speculated about, feared, and romanticized. Whether the reactions were positive or negative, it simply did not go unnoticed. The Salton Sea was not expected to come and no one anticipated it to stay. But, as a 1908 *Imperial Valley Press* article noted, "Sea came to stay" and was not going anywhere.[96]

[95] Worster, *Rivers of Empire*, 48-46; "Lands Reserved for New System," *Imperial Valley Press* (El Centro, CA), April 17, 1909.
[96] "No Subsidence of the Salton Sea," *Imperial Valley Press* (El Centro, CA), June 20, 1908, https://cdnc.ucr.edu.

Chapter Two
DISCOVERING AQUATIC NATURE

The Natural Charm

After the floods, the Salton Sea remained in the depression of the desert, gathering the wastewater from the surrounding fields. However, it became something more than just a by-product of floods and of farming infrastructure. Emerging as a separate and independent entity, the Sea began to reveal its unique personality. The Sea's set of distinctive qualities included the gravity of its depression, which pulled the water towards its bottom, and the humidity, treasured by many plant and animal species amidst the aridity of the desert. The shallow parts of the water attracted waterbirds, while its depths gave fishes potential to thrive. A distinctive ecosystem was emerging in the desert, one that had never been observed before, and numerous scientists became attracted to this phenomenon. Geologists, chemists, biologists, and ornithologists arrived at the Salton Sea shores, enchanted with the charming weirdness of its water, soil, alkali, plant tissues, and microbes.

The Sea became known in the scientific community as a host to diverse research projects, astonishing those who examined it with its curious productivity. This chapter reflects on those new scientific perceptions of the Salton Sea, which emerged after the flood. The biologists Daniel Trembly MacDougal and Melvin Brannon, the ornithologist Joseph Grinnell, and the ichthyologist Barton Warren Evermann all explored the Salton Sea in its first decade, and their accounts serve as the core sources to this chapter. In addition, the chapter portrays the newly arrived fishes and birds, focusing on the American white pelicans, double-crested cormorants, and the "dancing fish," the common mullet. Their portrayals are based on the aforementioned scientific accounts and on two additional publications: *Birds of the Salton Sea: Status, Biogeography, and Ecology*, coedited by Michael A. Patten, Guy

McCaskie and Philip Unitt, and Jonathan P. Balcombe's *What a Fish Knows: The Inner Lives of Our Underwater Cousins*. Furthermore, this chapter offers an excursion to the extinct volcano named "Mullet Island," where the self-proclaimed "Captain" Charles Davis created an entertainment program for the Salton Sea visitors and established a large-scale commercial fishing business. Lastly, it explores the emergence of mysterious and very loud mud geysers, which emerged at the Salton Sea shores after the flood.

First Encounters with the Sea

What would the Sea have looked like in the years after the flood? There was certainly no "one" Salton Sea that one can think of when looking at this period as its size was constantly changing. During the flood, it had spread over an area of about 475 square miles (roughly one quarter of today's size of the Great Salt Lake in Utah). By 1920, it was covering less than three hundred square miles, and its deepest point was about thirty feet. The young Salton Sea was just like any young being: playful and full of potential. But it was never independent as its existence fully relied on the surrounding farms lands. As a closed sump with no access to any other source of water, it was dependent on what remained from watering the fields. Its shores and beaches widened during the summer when the evaporation was the strongest. In winter, as farmers released the surplus water supplies, the Sea swelled.

While the floods that created the Salton Sea came abruptly, the sink had long been prepared for receiving and nourishing the water. Thousands of years of seismic activity and underground pressure allowed millions of tons of nutrient-rich brine to be pushed to the surface. The brine settled on the Earth's crust and dried, leaving behind a thick coat of salt and nutrients. This is what made the Salton Sea a eutrophic lake, which means a lake "well-fed" (coming from the Greek word *eutrophos*). In the process of eutrophication of a lake, overly generous amounts of minerals and nutrients are released into the water, causing an overgrowth of algae and plants.

Thus, a rapid transformation began with the flood. As the Colorado River water was settling in the Salton Sink, the thick salt crust began to dissolve, making the water saltier and saltier by the hour. Thousands upon thousands of tons of alkaline-encrusted nutrients were turning the river water into warm brine. With the addition of salty agricultural runoff, the salinity increased so rapidly that in just a few decades, the Sea would become saltier than the ocean.[97]

In the first decade after the flood, the small community of Mecca became the point of departure for those who wanted to explore the Salton Sea. Coachella Valley emerged as an agricultural colony northwest of the Salton Sea, becoming the twin-valley to the Imperial Valley, which fed it from the south. Mecca was located in the eastern part of the Coachella Valley, at the northern tip of the Salton Sea. The distance from the town to the shore changed depending on the water level. As the most popular spot to begin a cruise through the waters of the Salton Sea, Mecca became the Sea's first unofficial harbor due to its close proximity to the local roads.

Travelers were often overwhelmed by the vastness of the Sea. A whole day on a motorboat would allow a traveler to only explore just a small part of it, and the journey was often disturbed by strong waves and winds, just like on the open sea. Those who did dare to leave the shore were confronted with surprises common for seas and oceans rather than for lakes. They observed volcanic islands and underwater volcanoes, and in rare cases they encountered sea turtles and sea lions, alligators and coral reefs. In addition, they were confronted with the wildest and rarest of bird species, who were drawn to the abundance of fish.

Those who first became interested in cruising the Sea included nature writers, local farmers, who explored it in their leisure time and out of curiosity, and scientists who recognized the Sea as an interesting research subject. They began the journey in Mecca and traveled through the clear and

[97] Michael A. Patten, Guy McCaskie, and Philip Unitt, eds., *Birds of the Salton Sea: Status, Biogeography, and Ecology* (Berkeley, CA: University of California Press, 2004), 9-11.

silent waters, surrounded by the Chocolate Mountains on one side and the Santa Rosa Mountains on the other. The travelers marveled about the beauty of the Salton Sea, and about its charming, mysterious qualities. Their records paint an intriguing picture of the Sea, both from the outside and from the inside.

In the Sea's early years, its level was decreasing by fifty inches per year, and its surface was spotted with emerging halves of railway tracks and telegraph poles and of crops and old farm fences rusting away. On the shores, hundreds of sandbags remained from the flood rescue attempts, and the damaged Southern Pacific railroad entered the Sea on its eastern shore. In the beginning, the Sea was full of fish, and the water was so clear that the fishes swimming among the cortex-deprived woods could be seen from above the surface. A few miles into the Sea, the surface widened and became smooth, free from the flood remains. In many spots, the marine bacteria Beggiatoa created white, milky traces. Wind stirred currents and waves on the surface. On remote islands, cormorants and pelicans were building their nests, using mesquite branches and pieces of fabric from the sandbags.[98]

The water was very salty and rather clear but frequently stirred by winds, which were particularly strong in autumn and created heavy waves. As its waters were constantly evaporating, the Sea left behind a layer of trees, covered by water during the flood but which on exposure had barely decomposed. And in the Sea's depth, curious chemical processes were taking place, causing an explosive growth of bacteria and algae that would change the Salton Sea forever. During the occasional algal blooms, those microorganisms caused the waters to reflect many different colors: green and blue, reddish and white.[99]

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[98] Melvin A. Brannon, *The Salton Sea: The Action of Salton Sea Water on Vegetable Tissues* (Chicago, IL: Kessinger Publishing, 1914), 71-72.
[99] John S. Brown, *Water-Supply Paper 490 A: Routes to Desert Watering Places in the Salton Sea Region, California* (Washington, D.C.: Government Printing Office, 1920), 68-69; John S. Brown, *Water-Supply Paper 497: The Salton Sea Region, California. A Geographic, Geologic, and Hydrologic Reconnaissance with a Guide to Desert Watering Places* (Washington, D.C.: Government Printing Office, 1923); Brannon, *The Salton Sea,* 71-75.

In the first few years after the flood, the waters on the northern edge of the Salton Sea were so shallow that the boats had to be tied to the submerged mesquite bushes several hundred yards from shore. Closer to the edges of the Sea, the mud turned what was a pleasant cruising experience into exhausting work, of having to push the boat through the "tenacious clay." In winter, the water was a few feet deeper, but even then, boats got stuck in silty waters.[100]

In the shallow, warm waters, overly enriched with minerals, algae began to bloom, making the Sea a hospitable place for fish growth. Five years after the flood, the fish population was expanding so fast that its weight began to push against dams and canals of the Imperial and Coachella valleys. Tons of fishes were jammed against the diversion dam of the North End Water Company, and to avoid damage to construction works, builders decided to dynamite them. For days, blasters were throwing explosives into the water, and loud explosions were echoing throughout the Salton Sea and its surroundings. The Sea was indeed well-nourished and able to support various life forms. However, many human actors continued to anticipate its demise.[101]

Sea Came to Stay

While the Salton Sea was transforming into a permanent resident of Southern California, many expected its disappearance. The United States government was so certain that the Sea would evaporate that in 1909, ten thousand acres of land underneath the still existing Salton Sea were reserved for Torres-Martinez Desert Cahuilla Indians, residents of Imperial and Riverside Counties.

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[100] Joseph Grinnell, "Birds of a Voyage on Salton Sea," *The Condor* 10, no. 5 (September-October 1908): 191, https://sora.unm.edu/sites/default/files/journals/condor/v010n05/p0185-p0191.pdf; Barton Warren Evermann, "Fishes of the Salton Sea," *Copeia*, no. 34 (August 24, 1916): 61, https://www.jstor.org/stable/1436917.

[101] "Big Increase in Lettuce Growing," *Los Angeles Herald*, October 15, 1921, https://cdnc.ucr.edu; "Fish Dynamited," *Los Angeles Herald,* June 7, 1912, https://cdnc.ucr.edu.

Other voices reasoned against the assumption that the Sea would disappear. The *Imperial Valley Press* was the main voice against those prophecies, and in 1908, it warned its readers not to trust "some ignorant scribbler" who assumed that the Sea was dying. This "scribbler" was a journalist from the *Redlands Review*, who noticed a layer of dead fish and vegetable matter decomposing at the Salton Sea. He assumed that the area of the Sea drying up was expanding and that the Salton Sea would soon disappear entirely. In response to his article, the *Imperial Valley Press* stated: "Inflow compensates for evaporation, and water level is just where it was last year as seen from railroad trestle – Sea came to stay, and is still here."[102]

The travelers who frequently passed by the Salton Sea with the Southern Pacific Railroad did not observe even a one–inch drop and denied any rumors of evaporation. This was indeed an easy way to observe the sea level, as the rails were located just at the shore of the Salton Sea. Based on the travelers' observations, the article claimed that "theories and calculations of rate of evaporation are as impotent as injunctions to dry up Salton Sea. The inflow equals the evaporation, and there is no prospect that Salton Sea ever will disappear or even recede materially."[103]

The government began to conduct evaporation tests at the Salton Sea in 1907. The Weather Bureau established a research site at the Sea to carry out measurements, conducted by the Reclamation Service, with hope that it would help in creating estimations for technical designs of federal water projects. The site, located on the eastern shore of the Sea, was named the Salt Creek Evaporation Station. The Bureau found that the climatic conditions of the Salton Sea were "almost ideal" to determine storage capacities for reservoirs. The measurements helped to improve or estimate the financial costs of potential water projects: "The shrinkage of a few feet applied to the surface of some huge reservoir would mean the loss of capacity to irrigate

[102] "No Subsidence of the Salton Sea" *Imperial Valley Press* (El Centro, CA), June 20, 1908, https://cdnc.ucr.edu.
[103] "No Subsidence of the Salton Sea," *Imperial Valley Press* (El Centro, CA), June 20, 1908.

several thousand acres and might, in extreme cases even invalidate its financial success."[104]

Another federal agency, the United States Geological Service (USGS), was commissioned to determine the future of the Salton Sea. In 1908, it published a survey that announced the Sea's disappearance in the following ten to twelve years. In spite of the survey data being incorrect, the information was spread among other government agencies. As a result, the government made the decision to dedicate land under the Sea to the Torres-Martinez Desert Cahuilla Indians. The report was heavily criticized by the local press. In the summer of 1908, the *Imperial Valley Press* investigated the shortcomings of the USGS work at the Salton Sea. The newspaper claimed that the survey had been executed with the assumption that the wastewater of the Imperial Valley canal system would never increase the Sea's volume. Moreover, the USGS scientists assumed that the evaporation would not increase even if the volume of water in the reservoir increased. The survey was also using wrong data, mistakenly estimating the depth of the Salton Sea to be seventy-five feet in 1907, when in fact it was eighty-nine feet. It became obvious that the hydrographer who had conducted the study was not familiar with basic evaporation laws. Assuming that the whole Salton Sea had the same depth, he did not take into account that evaporation would depend on the depth of water.[105]

A 1910 *Lompoc Journal* article denounced the "confusion of the whole tribe of government experts" and "kindergarten scientists" and predicted the Salton Sea would grow rather than vanish:

> When the area is reduced to about twenty-five square miles, the inflow, if not increased, will be sufficient to raise the water five feet a

[104] "Evaporation Test Ended," *Imperial Valley Press* (El Centro, CA), November 26, 1910, https:// cdnc.ucr.edu.
[105] "Theory and Fact about Salton Sea," *Imperial Valley Press* (El Centro, CA), December 17, 1910, https://cdnc.ucr.edu; "No Subsidence of the Salton Sea," *Imperial Valley Press* (El Centro, CA), June 20, 1908; "Shuts off Colorado's Break," *Los Angeles Herald*, February 12, 1907, https://cdnc.ucr.edu; "Evaporation from the Salton Sea," *Imperial Valley Press* (El Centro, CA), September 12, 1908, https://cdnc.ucr.edu; "According to Government Experts," *Lompoc (CA) Journal*, February 5, 1910, https://cdnc.ucr.edu.

> year, and that will balance the evaporation. But the inflow probably will increase and the rate of evaporation become less, and it is not unreasonable to expect that a permanent body of water covering about fifty square miles will remain after the twelve years allowed by official theorists for the disappearance of Salton Sea.[106]

The *Imperial Valley Press* constituted the strongest voice against the predictions of the Sea's disappearance. But it seems to have had its own agenda in this fierce discussion. The newspaper played an important role in maintaining the myth of the Imperial Valley becoming an oasis of prosperity. However, if the Sea evaporated, it would cause an environmental disaster. In theory, the disappearance of the Sea would not change much in settlers' lives. The land exposed by the evaporating water was unusable for agricultural use as it was covered with a mixture of salt and silt. Whether the Salton Sea would shrink or grow a few feet per year did not affect any local communities as the closest settlements were miles away from the shore. But in practice, a rapid evaporation could prove disastrous to the local farming as drying of the exposed matter increased the risk of a pestilence plague. Given that the newspaper supported the narrative of the Imperial Valley as an agricultural paradise, it can be assumed that it had a strong interest in undermining any rumors of the Sea vanishing as this could scare away potential land buyers.[107]

In spite of the criticism of the 1908 survey, in 1910, the USGS reconfirmed its prediction that the Salton Sea would disappear within the following twelve years. Meanwhile, the Weather Bureau closed the Salt Creek Evaporation Station. Interestingly, the agency abandoned the site without much interest in selling the property for an adequate price. The *Imperial Valley Press*, which clearly opposed the activities of the federal agencies in the region, reported on the site's liquidation in 1910 with the headline *Public Property at Salton Station Virtually Given Away*. The Weather Bureau was reported to have sold the property for a mere $266 to a private buyer. The site had been acquired for thousands of dollars and was used for only three years, and

[106] "According to Government Experts," *Lompoc (CA) Journal*, February 5, 1910.
[107] "No Subsidence of the Salton Sea," *Imperial Valley Press* (El Centro, CA), June 20, 1908.

all fourteen rooms of the building were still in perfect condition. The newspaper accused the Bureau of "squandering public property" and disrespecting the local real estate market.[108]

One of most reliable voices in the evaporation debate came neither from the press nor from the government bodies but from a scientist who had developed a deep interest in the Salton Sea. Daniel Trembly MacDougal had been conducting thorough research of the Sea since 1907 and contributed to popularizing it in the scientific community. His conclusion on the possibility of the Sea vanishing was clear. MacDougal calculated that it would take a century for it to disappear, assuming that there would be no additional inflow into the Sea. Since the agricultural inflow was increasing, further discussions about the disappearance of the Sea were rendered senseless. MacDougal's calculations were proven right as it became clear that the Sea was not vanishing away.[109]

FIGURE 2.1. The islands and shores of the early Salton Sea, ca. 1908. (MacDougal, *The Salton Sea,* 120a.)

The Pioneer Plant Physiologist Reaches the Salton Sea

Daniel Trembly MacDougal was an ecologist and plant physiologist with wide experience in researching sensory mechanisms of plants. He was most interested in how desert plants reacted to irritations and how they moved

[108] "Evaporation Test Ended," *Imperial Valley Press* (El Centro, CA), November 26, 1910.
[109] Daniel Trembly MacDougal, "A Decade of the Salton Sea," *Geographical Review* 3, no. 6 (June 1917): 458, https://www.jstor.org/stable/207690.

and changed their growth mechanism depending on their surroundings. His extensive research in water-plant relations, with a focus on the swelling and growth of plant tissues in relation to water supply, made him known as a leading expert in desert ecology. After years of research in various institutions, including the United States Department of Agriculture, the University of Minnesota, and the New York Botanical Garden, MacDougal accepted the offer to become the first director of the Desert Laboratory, Tumamoc Hill, in Tucson, Arizona. The laboratory was established in 1906 by the Carnegie Institution and quickly became known for its "pioneering research into the biology and ecology of desert plants and animals."[110]

In the Desert Laboratory, he worked closely with Godfrey Sykes, with whom he undertook several major expeditions. Sykes was just as famous as a scientist and engineer as he was as an eccentric explorer and adventure-seeker. MacDougal and Sykes initiated the Carnegie Desert Botanical Laboratory expedition to Pinacate, the little-known region in northwestern Mexico, and crossed the Libyan Desert together. In 1905, they commenced a long-term field study of the Colorado River delta and the Salton Basin. MacDougal was drawn to the peculiarities of the region, to its volcanic landscape, the alkaline soils, and the tepid waters of the Salton Sea. For a number of years, the two returned to the delta at least twice a year. In 1907, they decided to dedicate an entire expedition to the newly emerged Salton Sea.[111]

The goal was to gain a better understanding of the geography, geology, and floristics of the Salton Basin. MacDougal and Sykes explored the beaches, the hills, and the surrounding desert, and then chose to cruise the waters of the Sea. The expedition was launched from Mecca and followed the Sea's western shoreline. As one of the first scientists to become acquainted with this new ecosystem, MacDougal gathered countless data, recognizing the Salton Sea as a valuable research site. He gathered samples of water, soil, and plant tissues, and transported them to the Desert Laboratory. His

[110] Forrest Shreve, "Daniel Trembly MacDougal: Pioneer Plant Physiologist," *Plant Physiology* 14, no. 2 (April 1939): 191-202, https://doi.org/10.1104/pp.14.2.191.
[111] Shreve, 191-202.

findings were used in a variety of journal articles and books, but two studies were dedicated to the Salton Sea exclusively. The 1914 book *The Salton Sea: A Study of the Geography, the Geology, the Floristics, and the Ecology of a Desert Basin* is a thick, comprehensive account of the first scientific encounters with the Salton Sea. The 1917 article *A Decade of the Salton Sea,* published in the *Geographical Review,* is a an eighteen-page summary of the transformations of the Salton Sea since its emergence in 1907.

How did the Salton Sea welcome MacDougal during the 1907 expedition? The first impression was astonishing. The Sea surprised him with its immense size and with how "wild" it was. One gunshot scared all birds in a two-mile radius, leaving an impression that the area had never seen a human before. He was also the first to observe that the water was salty and alkaline and the first to assume that the salinity would increase. Moreover, he concluded that the Sea had less impact on the local climate than many had claimed.[112]

After the Sea had appeared in the Salton Sink, several scientists suggested an upcoming increase of humidity in the area, caused by evaporating waters. They predicted that Arizona, especially, would be affected by heavy rain. But MacDougal's study concluded that even if the whole Sea evaporated and fell on Arizona, the rainfall would be hardly noticeable. "It would be as reasonable to suppose that an enlargement of the fountain basin in Madison Square would affect the climate of New York, but the delusion in question will doubtless be paraded for a century to come," MacDougal stated.[113]

He classified the soils in the basin, including those in the farming areas and at the beaches of the Salton Sea. Two types of soil dominated in the basin: the desert soils of the bajada, or the mountain front, and the river alluvium soils of the Colorado Delta. The former could be mostly found in the

[112] Janice E. Bowers, "A Debt to the Future: Achievement of the Desert Laboratory, Tumamoc Hill, Tucson, Arizona," *Desert Plants* 26, no. 1 (2010): 25, https://repository.arizona.edu/bitstream/ handle/10150/556672/dp_26_01-025-040.pdf?sequence=1&isAllowed=y; "Cruise of the Chuckawalla," *Imperial Valley Press* (El Centro, CA), February 1, 1908, https://cdnc.ucr.edu.
[113] "Cruise of the Chuckawalla, "*Imperial Valley Press* (El Centro, CA), February 1, 1908.

Coachella Valley. It was a light, sandy and gravelly "young" soil and was very successful for agriculture if irrigated well. The latter soil was similarly fertile and could be found in the Imperial Valley. But the fine structure of its particles made the delta soil very heavy and difficult to work with. It contained sand but had a sticky texture, similar to clay.[114]

Beaches of the Salton Sea were made of a mixture of those two types of soils. MacDougal classified two-thirds of the Sea's northwestern shore as desert soils of mountain washtype. He described the whole area as sandy and gravelly, with some exceptions, where silt layers were found. The largest one was five miles long and could be found at the extreme northwestern end of the Sea. At the southeastern third, heavy and muddy soils dominated. They were so soft that a landing with a boat was impossible. MacDougal determined that the shore soils were also highly fertile, but their salt content was so high that hardly any vegetation could possibly grow here. In addition, saline water destroyed all living plants except for the common phragmites and grasses, such as distichlis, juncus, and typha, which were able to submerge their roots one or two feet deep into the alkaline and saline muds without suffering any damage.[115]

MacDougal observed large amounts of American white pelicans, noticing that many of them began to nest on the shores and islands of the Sea. He attributed this to the generous amounts of fishes for the birds to feed on. MacDougal became interested in exploring the practices of the pelicans but not from an ornithological perspective. As a plant physiologist, he was interested in the impact that the birds could have on the flora of the Salton Sea. He noted that "the pelicans also alight and stand in ranks along muddy shores, and might in this manner deposit seeds in rows or lines."[116] To examine the issue further, MacDougal visited the pelicans' nests where he discovered seeds not typical for the region. He found seeds of the tree

[114] MacDougal, *The Salton* Sea, 29-32.
[115] MacDougal, 29-32.
[116] MacDougal, 143.

Spirostachys africana, a species typical to Southern Africa. The pelicans were depositing new species of grass, too.[117]

The Devil Tree

While MacDougal was interested in the presence of foreign seeds in the area, he also paid particular attention to a desert native, the mesquite tree. This desert tree that belongs to the legume family originates from North America and can live up to three hundred years. Its appearance depends on its access to water. If water is scarce, a mesquite tree develops as a shrub, two to three feet tall. If it is abundant, it grows as high as sixty feet tall. A mesquite taproot can grow as far as 180 feet underground, depending on how deep it needs to go to find a source of water. Mesquite trees conquered the desert through their ability to absorb vast amounts of groundwater. Since a mesquite is able not only to find water but also to claim it all to itself, it has gained the reputation of the "devil tree." For if a mesquite accommodates itself in a certain area, other plants around it suffer from lack of water.[118]

MacDougal reported on a wide distribution of the mesquite trees at the Salton Sea, "abundant in the alkaline flats from Indio to Mecca, river bottoms in Imperial Valley, dunes at Indio, and mounds east of Holtville and Calexico, Dos Palmas, Westmoreland, Alamo River near the Mexican boundary."[119] He observed the peculiarities of the relations between mesquite and water:

> It is widely variant in habit, being no more than a shrub on the upper parts of the bajadas or rocky slopes, while it becomes a tree of some size in the Delta, where it is the dominant woody plant. Its abundance in the alluvial lands and along streamways gives especial significance to its relations to water.[120]

[117] MacDougal, 143.
[118] MacDougal, 118, 123, 143, 163.
[119] MacDougal, 109.
[120] MacDougal, 109.

Mesquite leaves consist of twelve to eighteen small leaflets, distributed in two symmetrical rows. They have a delicate appearance and vary in color from grey to blue or light green. The soft and silky leaves serve as a cover to long and very sharp thorns. If a person cuts their skin with a mesquite thorn, inflammation and swelling occur, and the wound heals very slowly. Flowers and generous amounts of seed pods decorate the mesquite tree as well. The yellow flowers bloom in the early spring, while the pods remain attached to the trees throughout the year, gradually releasing the seeds. Each of the pods carries ten to twenty seeds, and those are nutritious for humans and animals. To many Native American tribes, the mesquite trees served as a source of food, medication, and wood, while during the Civil War, grounded mesquite beans replaced coffee.[121]

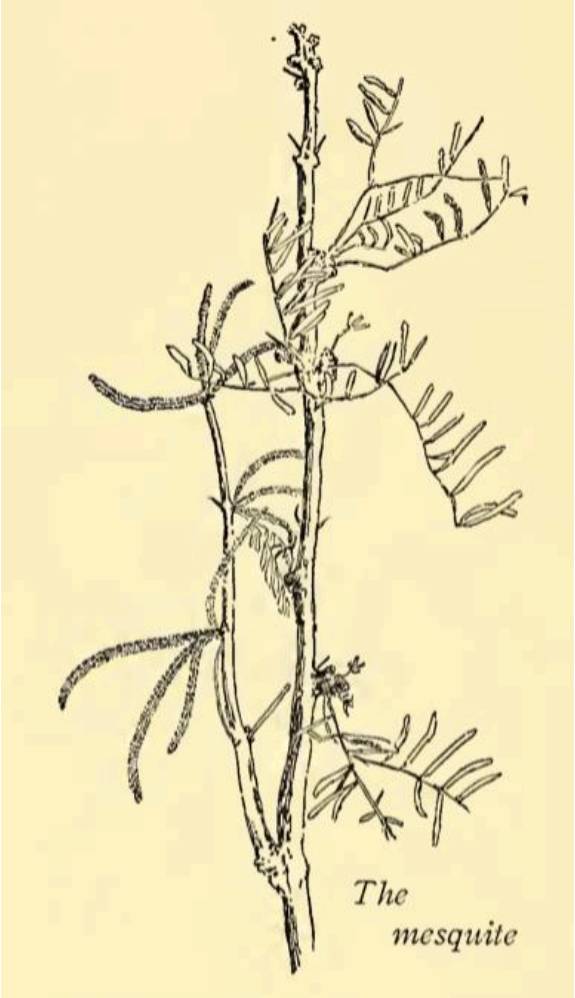

FIGURE 2.2. *The Mesquite*, sketched by George Wharton James. (James, *Wonders of the Colorado Desert,* 31.)

[121] MacDougal, 109, 149; Jay W. Sharp, "Mesquite Tree," DesertUSA, accessed 14 May 2018, https:// www.desertusa.com/flora/ mesquite-tree.html.

MacDougal meticulously examined the Salton Sea mesquite, finding that this tree had a peculiar ratio between the trunk and the branches: "It is seldom that a mesquite can be found with a single trunk more than a foot to the point of branching,"[122] he observed. In many cases, branches began to grow from the very first inch above ground, giving the tree an appearance of a large bush, which indicated the scarcity of groundwater. He observed that the mesquite trees were heavily infested with the leafless desert mistletoe, growing small red fruit on its fine branches. MacDougal described the mistletoe as "an evident drain on the vitality of its hosts" which "sometimes causes their death."[123]

He wondered, whether the sudden presence of the Salton Sea could influence the distribution of the mesquite seeds in the desert. He knew that the seeds could be transported by attaching to birds' feet. But could the water itself help in spreading them at great distances? In order to test this, MacDougal began a series of "flotation tests." He transported the Salton Sea water to the Desert Laboratory in Tucson, where it was placed in containers. To determine whether the Salton Sea had any peculiar qualities, other containers were filled with tap water. Then, MacDougal removed the mesquite seeds from the pods, making sure to extract seeds in various states. Some of them were whole, while others were broken or fragmented. He released generous amounts of those seeds into the containers and left them there for a month.[124]

MacDougal's tests demonstrated that the mesquite seeds were not keen on using water as a way of transportation. He noticed that while some fragmented seeds were able to float, the waters and the high temperature caused them to ferment and did not allow a successful spreading through the Salton Sea waters. The tap water containers produced the same result, leading MacDougal to the conclusion that it was not the Salton Sea water but water in general that mesquite seeds were not fond of. He pointed to the

[122] MacDougal, *The Salton Sea,* 101.
[123] MacDougal, *The Salton Sea,* 101-102.
[124] MacDougal, 149.

nutritional value of the submerged seeds: "The fermentation of the material in the fleshy part of the pods made a strong odor, but no germinations ensued. The fleshy pods are attractive as food to many animals, perhaps to the larger birds, although the author knows nothing as to the extent to which they are so used."[125]

While MacDougal acknowledged his limited ornithological knowledge, another scientist made an effort to focus exclusively on the avian diversity of the newly emerged Salton Sea.

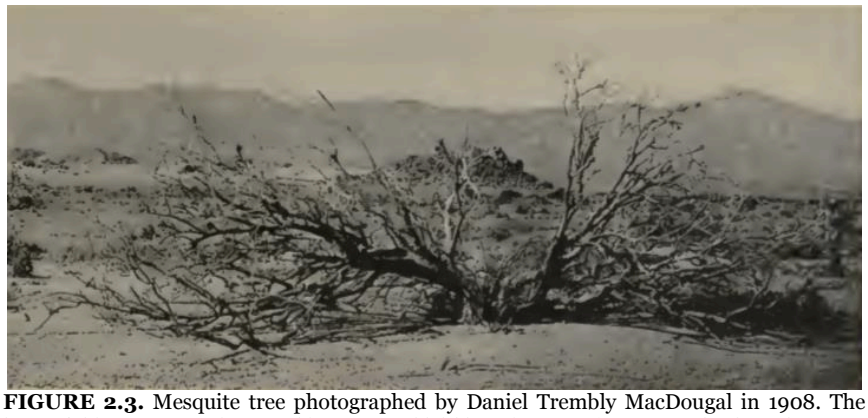

FIGURE 2.3. Mesquite tree photographed by Daniel Trembly MacDougal in 1908. The base of this tree was submerged in 1906 and laid bare in 1907. (MacDougal, *The Salton Sea*, 72a.)

The Forage in the Tepid Brackish Waters

Joseph Grinnell was a man of few words. The highly regarded ornithologist from the Museum of Vertebrate Zoology at the University of California found it very difficult to write, putting a lot of effort into describing his field trips in a way that was "factual, precise, and varied in expression." In the spring of 1908, Grinnell and two companions took a cruise around the Salton Sea with the purpose to explore the diversity of its waterbirds. Grinnell's article *Birds of a Voyage on Salton Sea,* published in the ornithology magazine *The Condor* in 1908, is a brief, protocol-like account. But even the fact-oriented

[125] MacDougal, 149.

scientist with an aversion to a superfluous narration encountered a sense of wonder at the Salton Sea.[126]

Grinnell's expedition took off from the shores of Mecca. He found the navigation to be fairly easy with the surrounding navigation points. Telegraph lines partly submerged in the Salton Sea waters marked the take off, and on one of the shores, the railroad entered the Sea, helping to estimate the distance. Grinnell noticed that the Sea was filled with reminders of the flood. In its most shallow parts, the remains of partly decomposed crops floated on the water's surface.[127] While passing through the western part of the sea, the boat got stuck in a chicken-wire fence from a flooded farm. Grinnell described the remains of the disaster: "Over several square miles the water was dotted with protruding bushes; and here and there rows of cottonwoods, all dead, marked the site of former ranches."[128]

The expedition was heading for Echo Island, forty miles south of Mecca. The journey took nine hours, but the cool and gentle breeze made the journey pleasant. In the morning light, Grinnell noticed how the surrounding mountains made the landscape so pleasant to the eye. On its north end, "rain-sculptured ridges of the Chocolate Mountains presented ever-changing shades of brown, which give them their name"[129] and in the south, the mysterious Santa Rosa Mountains peaked above the water's surface. However, the travelers learned that at the Salton Sea, one could not rely on their eyes. Confused by the heat and the water's reflections, they were blinded by the sun and confused by strange mirages.[130]

Grinnell committed himself to the task of observing waterbirds while ignoring reptiles, mammals, and land birds. But the huge amount of fish caught his eye, especially alongside the railway tracks. In 1908, the Southern Pacific was still passing over a trestle built across the Sea, before its rails

[126] Jean M. Linsdale, "In Memoriam: Joseph Grinnell," *The Auk* 59, no. 2 (April 1942): 279, https:// www.jstor.org/stable/4079557; Grinnell, "Birds of a Voyage,"185.
[127] Grinnell, 186.
[128] Grinnell, 185.
[129] Grinnell, 185-186.
[130] Grinnell, 185-186.

were moved to dry lands. Grinnell noticed that the tracks were surrounded by fishes feeding from leftover victuals that passengers were disposing of from passing trains. He observed large amounts of dotted carp, striped Colorado perch, and whiskery catfish. The abundance of fish attracted great masses of birds. Cormorants, great blue herons, and the red-eyed American eared grebes rested between hunts on the telegraph poles and in the partly submerged bushes.[131]

Before reaching Echo Island, the expedition encountered red-eyed common loons, black-headed caspian terns, and cormorants, with their "strange saw-filing calls." Then, the mysterious pelicans appeared on the horizon. Those flighty birds were difficult to observe as they escaped upon hearing sounds of a boat. Grinnell noted that the Salton Sea had become home to "the southernmost recorded nesting-colony of the American White Pelican,"[132] but he was not able to observe or photograph the birds as they had left the nests. The photos of eggs in the nests became the only evidence of the presence of pelicans. Their escape became an impressive spectacle as they could be counted in thousands. Grinnell described the birds as volatile but able to organize themselves into a perfectly coordinated choreography:

> The sight of the great white birds rising in masses from their nesting grounds was exciting in the extreme; for I had never seen this species under such circumstances before. They wheeled in great circles overhead, crossing and recrossing over their breeding grounds, or glided out to sea in intersecting V's. When flapping, their wings gave out a loud swish, and the many at once produced a roar. But when sailing close overhead on motionless wings they made a whispering, whistling sound, as of the wind blowing thru the chinks of an old building.[133]

[131] Grinnell, 186.
[132] Grinnell, 187.
[133] Grinnell, 186-188.

Even as the night approached, the birds did not return and kept at a distance of at least a mile away, circling and swimming in large "rafts."[134]

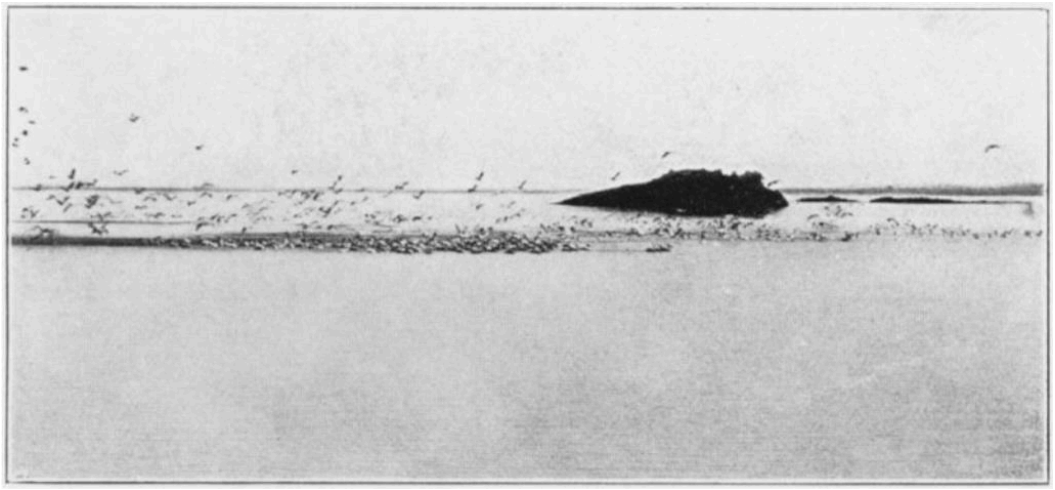

FIGURE 2.4. A colony of American white pelicans "rafting" on the waters of the Salton Sea, 1908. (Grinnell, "Birds of a Voyage," 189.)

The white pelicans received a lot of attention from the naturalist Sir John Richardson, who classified them in the early eighteenth century in *Fauna Boreali-Americana*. Richardson described the pelicans as "heavy bodied," very rare birds, and one distinctive to the American continent:

> I feel great pleasure, good reader, in assuring you, that our White Pelican, which has hitherto been considered the same as that found in Europe, is quite different. In consequence of this discovery, I have honoured it with the name of my beloved country, over the mighty streams of which, may this splendid bird wander free and unmolested to the most distant times, as it has already done from the misty ages of unknown antiquity.[135]

In their study of the Salton Sea birds, the California ornithologists Michael A. Patten, Guy McCaskie and Philip Unitt pay particular attention to the order of pelecaniformes, describing their habits and migration patterns. The study depicts the distinct personalities among the birds that inhabit the Sea and the individual stories of their arrivals and departures. Patten, McCaskie and

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[134] Grinnell, 186-188.
[135] John Richardson, William Swainson, and William Kirby, *Fauna Boreali-Americana: Or the Zoology of the Northern Parts of British America* (London: John Murray, 1829), 472.

Unitt point out that the "images of the Salton Sea are strongly associated with various Pelecaniformes,"[136] including the double-crested cormorants, the tropical frigatebirds, or the various pelican species. The order of pelecaniformes includes medium- and large-sized waterbirds, and its name originates from the Greek word *pelekus,* meaning "axe." A typical feature of all birds from this order is that they are totipalmates, which means that they have four toes connected by a webbing. *Birds of the Salton Sea* emphasizes the critical importance of the Salton Sea to the avian diversity of North America, particularly to pelicans: "The Salton Sea is the only locale where both the American White Pelican and the Brown Pelican have bred."[137]

The American white pelicans are among the largest birds in North America, with a wingspan reaching to up to ten feet. They gracefully move around water but are most magnificent when they fly. Witnessing a flock of pelicans in motion is an extraordinary experience, revealing mighty, giant creatures that resemble prehistoric flying reptiles. They move around in groups of dozens or even hundreds. Pelicans forage in brackish water. When they forage together, they often move rapidly on water in a seemingly choreographed motion, synchronously diving underneath the surface: "some forage in shallow impoundments, frequently swimming while dipping their heads in grand, synchronous movements."[138] Most of the American white pelicans nest in the northern and western regions of the United States and in British Columbia, Canada's westernmost province. Those birds choose the southern regions of California and Mexico as temporary homes for the wintering period, hence Grinnell's astonishment in discovering breeding grounds of pelicans at the Salton Sea. Interestingly enough, these magnificent birds breed in rather unremarkable and modest-looking domiciles. Building a nest is a hasty process for the American white pelicans. They collect a pile of whatever materials are available, just to separate the territory from where they lay their eggs. At the Salton Sea, sticks, grass, and sand became their main building materials.[139]

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[136] Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 80.
[137] Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 80.
[138] Patten, McCaskie and Unitt, 82-83.
[139] Patten, McCaskie and Unitt, 82-83.

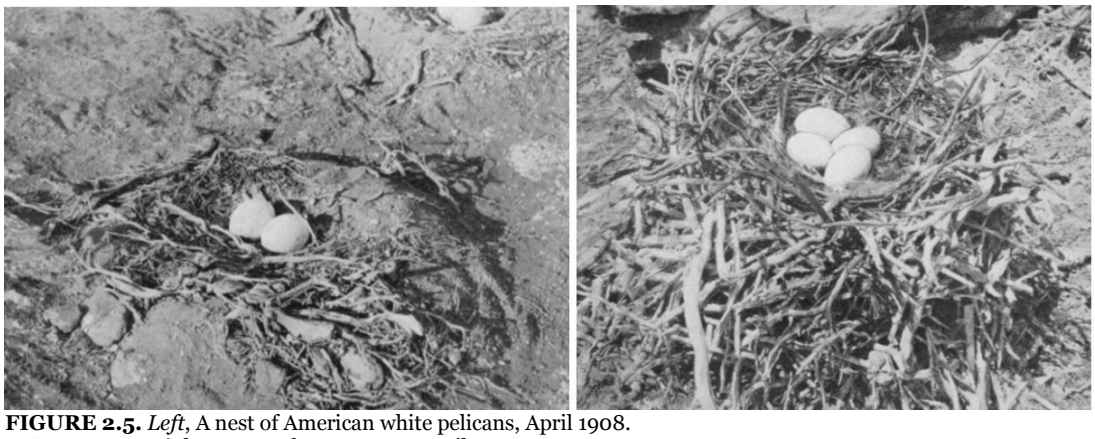

FIGURE 2.5. *Left*, A nest of American white pelicans, April 1908.
FIGURE 2.6. *Right*, A nest of cormorants, April 1908.
(Grinnell, "Birds of a Voyage," 188, 190.)

The American white pelicans became one of the most popular waterbird species of the Salton Sea. They became a common winter visitor shortly after the flood but remained fairly common in summer, too. In the first decade after the flood, there were as many as two thousand birds to be found at the Sea, and the numbers grew rapidly soon reaching tens of thousands. The white pelicans make a sturdy impression, and their most characteristic feature is their oddly shaped beaks. The very prominent, sharp, orange beak is as long as the bird's corpus. The pouch of its lower part is usually folded, but as soon as a pelican forages, it expands. The birds swallow several gallons of water and filter out the liquid to swallow the remaining fish, usually of the smaller variety. During the breeding season, females develop an additional pouch on the upper part of the beak, which looks like a bump, and as soon as the breeding season ends, they shed the additional tissue.[140]

The pelicans found many features of the Salton Sea particularly appealing. They felt invited by the remote sandy islands surrounded by shallow water, sandbars, and mudflats. Even today, they arrive at the Salton Sea in thousands, all at once, and most depart again in March or April, flying towards the San Gorgonio Pass, forming huge kettles of thousands of birds that can be seen circling around the north end of the Salton Sea. They begin their pairing early, in the beginning of January, and first eggs appear between April and June.[141]

[140] Patten, McCaskie and Unitt, 82-83.
[141] Patten, McCaskie and Unitt, 82-83.

It is worth noting that pelicans have gained a symbolic value as a caring and self-sacrificing parent. In ancient times, pelican mothers were thought to feed their babies with their own blood in times of famine. A mother pelican was believed to open her breast with her beak and feed the young, saving them from starvation. This legend was adapted by early Christians, who used the image of the feeding pelican mother to portray the ultimate sacrifice of Jesus Christ.

Having paid a visit to the pelican colonies, Grinnell's expedition continued in search for cormorants. The companions took a rest to enjoy "a prolonged bath in the tepid brackish waters of Salton Sea," but got so severely sunburned that even a week later their backs still suffered. An unpleasant surprise occurred when the wind became stronger. Waves began to pound against the boat, filling it with water and ruining cameras and lenses. In the late afternoon, they reached the "small rocky ledge" of the Pelican Island, where hundreds of double-crested cormorants were building nests.[142]

Many features of the double-crested cormorants are the opposite of the sturdy pelicans. A cormorant has a long body, a long neck, and a rather small beak, which helps it to catch small fish. Its orange-red cheeks (gular skin) and long white feathers above its eyes are a contrast to its all-black body. Cormorants prefer to build nests in trees, but if needed, they are content with an island instead. Cormorants can be recognized by their deep grunt call, which Grinnell marveled about in his writings.[143]

Birds of the Salton Sea lists the double-crested cormorants as one of the major bird species inhabiting Salton Sea, describing them as very social and friendly birds, able to co-exist with other aquatic bird species. Cormorants join the American white pelicans to forage and tend to imitate the pelican's behavior, while remaining faithful to certain habits of their own: "birds with

[142] Grinnell, "Birds of a Voyage," 189.
[143] Grinnell, "Birds of a Voyage," 187.

flocks of American White Pelicans forage in the manner of that species yet still pull back their wings before submerging the head."[144]

In the first decades of the Salton Sea, the cormorants were most common during their post-breeding period. From January until April only a few birds could be found there, and then in May, arrivals began in thousands. Cormorants nest on small islands, volcanic rocks with a sandy base, and they are especially keen on occupying the mouth of the Alamo River, where beds of matted reeds invite them to build nests. From June until September, they can be found in virtually every body of water across the Imperial Valley. They forage by plunge diving, diving up to twenty-five feet deep, and in a manner similar to the pelicans, they filter the swallowed water in their throats. Japanese fishermen have learned to take advantage of this habit and famously use cormorants as an aid for catching fish. Tied to a fishing boat, a cormorant hunts right next to the fisherman, who then empties the larger fish from the bird's throat, letting the bird feed on the smaller ones. However, the most distinctive habit of cormorants is their post-hunting drying of feathers. Their feathers are not waterproof, so cormorants have to dry them after each forage. They stand up tall and spread their wings, which can be as wide as sixty inches, waiting until the feathers dry off.[145]

[144] Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 85-86.
[145] Patten, McCaskie and Unitt, 85-86.

FIGURE 2.7. *Left*, An American white pelican flying above the Salton Sea, 2018.
FIGURE 2.8. *Right,* American white pelicans foraging in the Salton Sea, 2018.
(Photographs by Velma Ruiz Pacrem)

FIGURE 2.9. *Left*, A double-crested cormorant, Salton Sea, 2017.
FIGURE 2.10. *Right,* A cormorant drying its wings after forage, 2017.
(Photographs by Jasmyn Phillips)

Fishing from The Train

Just a few months after Grinnell's expedition, O. S. Westover, a passenger of the Southern Pacific traveling from Los Angeles, noticed fishes feeding at the tracks. People fed them with breadcrumbs from the dining cars. On his return trip, he was equipped to fish. With a line tied to his cane, he made a cast from the rear end of the train. Although the train was moving quite fast, he managed to catch a fish and thereby started a fashion of fishing from the moving train at the Salton Sea.[146]

Almost a decade had passed since the flood when the ichthyologist Barton Warren Evermann, from the United States Bureau of Fisheries, noticed that fishes in the Salton Sea were multiplying beyond expectations. In his 1916

[146] "Beach Fishing Cannot Hold a Candle to This," *Los Angeles Herald*, June 1, 1908, https://cdnc.ucr.edu.

account, he identified six dominant fish species of the early Salton Sea: the carp, the mullet, the bonytail, the humpback sucker, the Colorado River trout, and the desert pupfish.[147]

The presence of carp and trout in the Salton Sea seemed odd to Evermann. Carp developed into the largest population of fish in the Salton Sea, but they were not native to the Colorado River. The ichthyologist assumed that several carp must have escaped from a private pond in Arizona into the Colorado and then proceeded to the Sea. Ten-pound carp, which were exceptionally large for this species, appeared to be common in the Salton Sea, but Evermann was even more surprised to encounter trout. After all, trout dislike warm, salty, alkaline water, but in the Salton Sea, they grew larger than in their more common habitats. The alkali, however, bleached their scales, turning their typical golden-green skin covered with brown dots into a tone brighter than usual.[148]

Next to the carp, Evermann observed that the common mullet had become the most abundant fish in the Salton Sea, growing up to six pounds. Then, in the shallow springs of the Sea's northern end, in the shade of cattails, an "interesting little fish" caught his eye. In water just a few inches deep, covered with a "thick coating of algae of various species," the very small desert pupfish with a distinctive tropical appearance found its home. It was not a surprise that these three-inch bright-blue fish thrived in the Salton Sea water as they feel best in high temperatures and saline waters with low oxygen content. These robust creatures can survive in low oxygen concentration and are more tolerant to salinity than any other freshwater fishes. Thus, as one of a few species, the desert pupfish welcomed not only the nourishing algae but also the saline and the one-hundred-degree temperature of the Salton Sea springs.[149]

[147] Evermann, "Fishes of the Salton Sea," 62.
[148] Evermann, "Fishes of the Salton Sea," 61-62.
[149] Evermann, 61-62.

Evermann noticed the thick algae on the surface of the water. Why was there so much of it? It was clear to the scientists that the mineral richness of the Salton Sea waters enabled a variety of life forms to grow there. Why this occurred, however, was not determined until Melvin Brannon, a PhD candidate in botany at the University of Chicago, paid attention to the decomposing mesquite clumps. Brannon's dissertation became a milestone in the Salton Sea research and was included in Daniel Trembly MacDougal's famous Salton Sea Study.

Brannon observed an odd phenomenon related to the tree tissues of the Salton Sea and focused on the desert native mesquite tree. When the Salton Sink was flooded in 1905, most of the trees became fully submerged. But when they resurfaced in the following years, they seemed untouched by the decomposition processes. Brannon noted that the mesquite trees "remained absolutely intact during the eight months of submergence in sterilized Salton Sea water,"[150] which made him certain that there was something about the Salton Sea yet to be discovered. To him, it provided a unique opportunity to examine how highly saline and evaporating water influenced newly submerged plant tissues. He presented his findings in a spirit of excitement, keeping the reader in suspense until the very end.[151]

Why was it unusual for the plants to emerge from the Salton Sea looking as if they were mummified? Submerging any plant in water for several weeks should be biologically fatal to that plant. However, the temperature, light, and richness in gases of the Salton Sea were favorable for a bacterial flora to develop. An examination of the Sea waters revealed a liquid rich in bacterial growth, which was caused by its high mineral content and the decomposing processes of the organisms underneath the surface. From the analysis of water samples, Brannon found that the amount of certain minerals like sodium and magnesium doubled between 1907 and 1911, and aluminum even

[150] Brannon, *The Salton Sea,* 72.
[151] Brannon, *The Salton Sea,* 71-74.

tripled. The content of sulfuric acid, a strong dehydrating agent, doubled, which provided an explanation for the mummification processes of trees. The sulfuric acid drew water out from plant tissues, disturbing their decomposition.[152]

In the case of mesquite, Brannon found that its core tissues did not undergo the process of petrification (mineralization of tissues) and only its cortex decomposed within several years. To further test this phenomenon, he began to ship barrels filled with samples of Salton Sea water to Chicago. In the botanical laboratory of the Plant Biology Institute at the University of Chicago, desert conditions were recreated to test other plant species. Brannon placed branches of fresh mesquite and other plants in closed containers and observed how sulfuric acid acted. As a result, he found a very rapid growth of Beggiatoa, a genus of bacteria typical for wastewaters rich in sulfuric acid. Leaving white traces and making the water slightly blurry, Beggiatoa is usually an indicator of pollution in seawater. Brannon looked again at the mesquite, with its decomposed cortex and untouched core, and there, he found his final conclusion. The unusual plant decomposition was caused by bacteria and other microorganisms from the soil crust of the Salton Sea. Feeding on the cortex of the submerged plants, Beggiatoa and other bacteria caused the production of sulfuric acid, which then dehydrated and mummified the core tissues of the trees.[153]

Brannon's research revealed that at the Salton Sea, the smallest actors became the most powerful ones. While his conclusion focused on the bottom of the Salton Sea food chain, it explained the hyperfertility of the Sea's fishes, which were overly nourished with the plentiful algae. It was the microbes that provided nutrition for the algae, which in turn were very nutritious for fishes and other underwater organisms. The algae cells, each one equipped with a pigment that could change the color of the water to red, green, or white, gathered in a thick, warm layer and welcomed fish to lay eggs. The abundance of fish invited birds and could effortlessly provide nutrition for

[152] Brannon, 71-74.
[153] Brannon, 73-74.

the birds' breeding grounds, spreading across the shores and islands of the Salton Sea. With time, this nutritional richness became one of the major hazards of the Sea. But several decades would have to pass until it became clear that what seemed to fill the Sea with life, brought sickness, death, and decay.

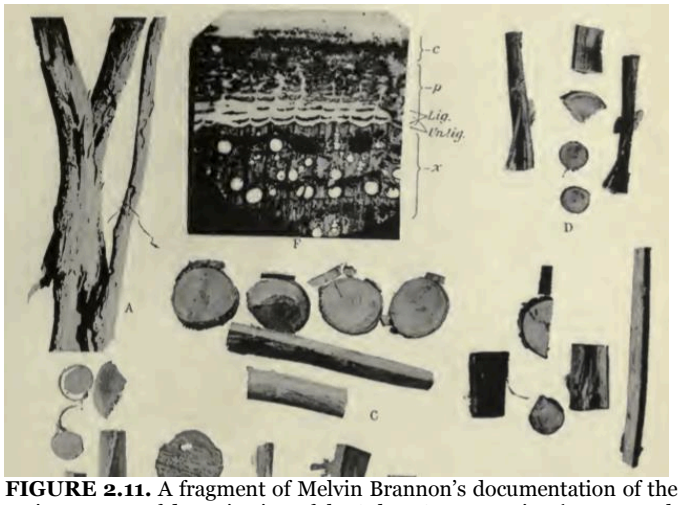

FIGURE 2.11. A fragment of Melvin Brannon's documentation of the various stages of decortication of the Salton Sea mesquite. (MacDougal, *The Salton Sea*, 74b.)

The Dancing Fish

While people navigated through the Salton Sea with the help of telegraph poles, the colorful bacteria provided a system of navigation for the fishes. The fish population was supported by trillions of bacteria-forming algae, which sustained the ecosystem and worked to support its balance. A symbiosis between bacteria and fishes is an ancient and mysterious one, but it is certain that bacteria-coated algae provide direction, camouflage, and breeding grounds to illuminate the surroundings for fishes and attract prey. Fishes have the ability to smell and see the algae, but also to detect it through their skin, sensing the thick texture. It is no wonder that all their senses are equipped to detect algae, for without the microbes, fishes would die.[154]

[154] Ed Yong, *I Contain Multitudes: The Microbes Within Us and a Grander View of Life* (New York, NY: Ecco, 2018), 13, 23; Jonathan P. Balcombe, *What a Fish Knows: The Inner Lives of Our Underwater Cousins* (New York, NY: Scientific American/Farrar, Straus, and Giroux, 2017), 33, 53.

The Salton Sea algal blooms are so large that they can be seen from space, and the amount of sunlight is the main reason for their immense volume. Just like plants, algae are powered by sunlight, which is necessary for the process known as fixing carbon. This transformation of the sun's energy to provide food for plant cells can be achieved with photosynthesis or chemosynthesis. In the process of photosynthesis, the algae turn carbon dioxide and water into sugars. During chemosynthesis, bacteria use sulfur and other chemicals to extract nutrition. They oxidize sulfur and use the liberated energy to fix carbon, "spitting out" pure sulfur as a waste product of the process. In addition to its life-sustaining qualities, algae carry "clouds for thousands of tiny, dancing creatures," such as amoebas and other single-celled organisms.[155]

To fishes, algae are priceless and thus, all of the fishes' senses are equipped to perceive them. However, the concept of how fishes perceive is a disputed one, not only within the scientific community. In many cultural representations, a fish stands for passivity, speechlessness, and lack of identity. The common English expression "there are plenty of fish in the sea" indicates an abundance and deprives fishes of being seen as creatures with distinctive personalities. In Poland, a rather cruel expression "children, like fish, should keep quiet" ("ryby i dzieci głosu nie mają") deprives fishes (and children) of voice and agency. A similar German expression "mute as a fish" ("stumm wie ein Fisch") depicts fishes as creatures which lack in presence.

However, fishes are also a subject of a favorable representation, as the simplified drawing of a fish became the predecessor of the Christian cross. "Ichthys," adapted from the Greek *ikhthýs*, meaning "fish," became the secret sigh of early Christians who considered fish to be a sacred food. The word itself depicted as *ΙΧΘΥΣ* served as an acronym for "Jesus Christ, Son of God, Savior." In addition, there are those mundane expressions that indicate the value of fish, which can be found in the Mediterranean region and in Slavic languages. The Spanish expression "ser un pez gordo" ("to be a fat

[155] Yong, *I Contain Multitudes*, 29, 172-173.
NASA Visible Earth, "Algal Bloom in the Salton Sea, California," October 22, 2003, accessed June 12, 2018, https://visibleearth.nasa.gov/view.php?id=69143.

fish") means to be important. The "fat fish" is the boss, the person in charge, the prosperous one.

Fishes are a valuable reminder of our long forgotten underwater past, existing even before reptiles and birds evolved. Fish spines and brains reveal the ungraspable truth of our common evolutionary ancestry, and their behavioral patterns indicate a creature so complex and fascinating that humans can be proud to call it their ancestor. The ethologist Jonathan Balcombe studied fish behavior and created a distinctive narrative style to interpret the past and presence of fishes. In the international bestseller *What a Fish Knows*, Balcombe uses his unique style to interpret the ways that fishes act, assuming that they also think, feel, and comprehend. He speculates that consciousness evolved first in fishes. That premise seems reasonable to him as fishes were the first vertebrates with over one hundred million years of evolution behind them before modern mammals even set foot on land. Moreover, the extent of their colonization of virtually all the Earth's waters indicates a conscious strategy behind it. While the debate regarding fish consciousness is as endless as the concept of consciousness itself, it is useful to assume that fishes can feel, think, and strategize, or "use their brains to achieve some quite useful outcomes."[156] In addition, fishes are able to perceive natural electrical stimuli through the sense of electroreception, and with the support of their heightened sensitivity, they have the undeniable ability to make decisions that involve complex and solution-oriented thinking processes.[157]

At the Salton Sea, humans were heavily involved in introducing and wiping out dozens of fish species. Throughout the 1940s and 1950s, trucks were loaded at the Gulf of California with living fish and transported to the Sea tons of gropers, corvinas, and other fishes. It seemed that the only rule that was applied to this practice was to clear the load of sharks before releasing fishes into the Salton Sea. This undertaking is portrayed more extensively in the fourth chapter, which focuses among others on sportfishing.

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[156] Balcombe, *What a Fish Knows*, 85.
[157] Balcombe, *What a Fish Knows*, 60, 82-85.

In the decades after the flood, mullets conquered the Salton Sea waters. A common mullet is a fish with a long, thin body, which can grow to up to four feet. "As beautiful as they are common,"[158] mullets have a shiny, silver scale and a pair of fins located on their backs, with "cream-colored tail margins and rear fins," and a "yellow-tinged border between their metallic backs and white bellies." Mullets most frequently dine on organic material, such as algae or invertebrate, so their teeth and mouth are small. But their well-developed digestive system includes a pharynx, a muscular stomach, and a set of large, pink lips.[159]

Mullets are social fishes, always moving in groups, which form graceful constellations that move in synchronized choreographies. These groups are very attached to their breeding grounds. It has been determined that mullets establish their breeding sites "according to social convention." They are sexually active throughout the year, mating on a daily basis, and maintain a "culture" of constant mating sites for years, choosing them independently from the availability of resources. As Balcombe claims: "Mating site locations are not based on some intrinsic quality of the site, but instead represent culturally transmitted traditions."[160]

Mullets have another "cultural" practice, which ethologists have yet to explain. These fishes frequently leap above the water's surface in what seems to be a playful ritual. Usually, fishes jump out of water in an attempt to escape predators. But mullets do it regardless of circumstances. They take as many as seven leaps in a row, a foot up in the air and three feet long. Interestingly, all eighty species of mullet perform this ritual, but there is no adequate explanation for it. Some ethologists theorize that they do so to displace skin parasites. Others claim that leaping enables better oxygen absorption. However, jumping requires more energy than would be gained by the additional inflow of oxygen, and it appears to be simply too random as

[158] Balcombe, 99.
[159] Balcombe, 98-99.
[160] Balcombe, 160-161; John R. Paxton and William N. Eschmeyer, *Encyclopedia of Fishes* (San Diego, CA: Academic Press, 1998), 186.

a measure against parasites. It seems to be nothing more than an entertaining routine, which often becomes a sophisticated show where a mullet jumps over floating objects, such as sticks or other fishes. Thus, with the expansion of the mullet population, the Salton Sea gained a group of particularly joyful inhabitants, which chose the surface of the Sea as their playground.[161]

Peter Pan of the Desert

The plentiful fishes in the Salton Sea became a tourist attraction for the passengers of the Southern Pacific. Trains stopped at the trestle and the conductors went outside to throw refuse and bread for the fishes to feed on. The water was so crowded with hungry carp that a legend of "how you could walk across Salton Sea on the backs of the fish" was passed among the travelers.[162]

But there was a man who was not happy with the abundance of carp. His name was Charles A. Davis, but he was given many names: "Old Nick," "the Monarch of the Mullet Island," or, as the *Riverside Daily Press* described him, the "tall, bronzed, aggressive and enthusiastic, king of the Salton Sea island and virtual ruler of the only submarine empire in the world." The self-proclaimed "Captain" Davis was an adventurer from Massachusetts, one of the early inhabitants of the Salton Sea, and one of the first mammals who chose the Sea as their home. For decades, his nomadic lifestyle took him to hundreds of places ranging from Alaska to Mexico. It was not, however, until he reached the Salton Sink, that he decided to settle down.[163]

Davis had first arrived in the California desert in 1898. He bought a piece of land in the south of the Salton Sink, at the foot of an extinct volcano. He

[161] Balcombe, *What a Fish Knows,* 98-99.
[162] "More Water Wanted for Salton Sea," *Riverside (CA) Daily Press*, August 11, 1917, https:// cdnc.ucr.edu.
[163] "More Water Wanted for Salton Sea," *Riverside (CA) Daily Press*, August 11, 1917; "Believe Huge Animal Is Elephant," *Los Angeles Herald*, September 23, 1921, https://cdnc.ucr.edu; Laflin, Chapter 8; "Famous Dodge Climbs Over Rocks to Top of Volcano," *Los Angeles Herald*, August 20, 1921, https://cdnc.ucr.edu.

constructed a cabin among mud geysers and sand dunes, where a sign "Hell's Kitchen" welcomed visitors at the entrance. The name was a reminder of the eternal desert heat but also of the fact that the spot was located 264 feet below sea level. The floods of 1905-1907 wiped out Davis's belongings, but after they ended, the volcano emerged in the southeast part of the Sea. Depending on the level of the Salton Sea, the volcano was an island in winter or an island peninsula in summer, never wider than fifty feet. Davis called this stripe of land "Mullet Island," as a tribute to the immense amounts of mullet in the surrounding waters. His "barren domain" was very volcanic and sturdy, but Davis transformed it into a place of leisure and entertainment. After the Sea settled in the Salton Sink, he added a boat landing, a café, and a dance hall to his property, and decorated all the walls with pictures of himself in various phases of his life.[164]

The "Captain" fathered other eccentric projects. In 1913, he brought several sea elephants to Venice Beach in Los Angeles and taught them to perform tricks. The animals escaped captivity into the ocean, which depressed Davis so much that for weeks, he wandered Venice beaches at nights, whistling for them and trying to bring them back to their cage.[165]

Often quoted in the local press as the expert on the Salton Sea ecosystem, Davis had a curious need to determine which species belonged where. Once he believed that a certain animal would thrive in the Salton Sea, he put an enormous effort into introducing it. He released sea lions into its waters, experimented with sea fish species, and transported shell crabs from the Atlantic straight into the Salton Sea. What drove him was a mixture of his intuition, wacky taste, and business ambitions, but he lacked a scientific and long-term orientation.[166]

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[164] Laflin, Chapter 8; "More Water Wanted for Salton Sea," *Riverside (CA) Daily Press*, August 11, 1917; "Believe Huge Animal Is Elephant," *Los Angeles Herald*, September 23, 1921; "Famous Dodge Climbs Over Rocks to Top of Volcano," *Los Angeles Herald*, August 20, 1921.
[165] "Believe Huge Animal Is Elephant," *Los Angeles Herald*, September 23, 1921; "More Water Wanted for Salton Sea," *Riverside (CA) Daily Press*, August 11, 1917.
[166] "More Water Wanted for Salton Sea," *Riverside (CA) Daily Press*, August 11, 1917; Laflin, Chapter 8; "More Water Wanted for Salton Sea," *Riverside (CA) Daily Press*, August 11, 1917.

The local press frequently reported on odd species that were encountered at the Salton Sea. In 1910, six friends who took a cruise around the Salton Sea, in a tiny boat named "Prosit," were surprised to encounter turtles and floating coral reefs. The same year, the *Imperial Valley Press* warned about alligators swimming in the Salton Sea. It became obvious that the alligators were breeding there as both mature and young ones could be observed. Did the creatures belong to one of Davis's projects? He did not take credit for their presence, but it can be safely assumed that he contributed to the presence of many other exotic species at the Salton Sea.[167]

In 1917, when the Sea was subsiding by four feet per year, Davis became committed to driving carp out of the Salton Sea waters and coyotes from its shores. In his eyes, the rainbow trout and the common mullet were the only sweetwater species "allowed" in the Sea. Mullet fishing promised great profit, but their spawn and young mullets were the source of nutrition for the voracious carp. Davis built weirs in his fishing grounds, "banishing" the carp and effectively driving it out from its feeding grounds. When coyotes began to multiply on the shores and islands of the Salton Sea, he strongly endorsed the local water companies to increase the volume of the Salton Sea in order to drive the coyotes out. Davis claimed that the shallow waters enabled the coyotes to swim between islands to steal eggs from ducks and pelicans. Letting in more runoff, Davis suggested, would push them away from the shore.[168]

The main reason for Davis to endorse an ongoing refilling of the sink was his fear of losing his fishing business. His campaign to restore the Sea began in 1917. Luckily for Davis, the amount of runoff was steady enough to guarantee good fishing conditions, and a few years later, his worries were considered

[167] "Cruise on Salton Sea," *Imperial Valley Press* (El Centro, CA), September 17, 1910, https:// cdnc.ucr.edu; "Salton Sea Alligators," *Imperial Valley Press* (El Centro, CA), July 9, 1910, https:// cdnc.ucr.edu; Denise Goolsby, "Off-Beat Salton Sea Stories," *Desert Sun* (Palm Springs, CA), May 14, 2015, accessed May 17, 2018, https:// eu.desertsun.com/story/news/2015/05/14/salton-sea-alligator-islands-graves/27331021/.
[168] "Coyotes Are Numerous," *Riverside Daily (CA) Press*, January 29, 1918, https://cdnc.ucr.edu; "More Water Wanted for Salton Sea," *Riverside Daily (CA) Press*, August 11, 1917.

over. In 1924, President Calvin Coolidge designated the lands under the Salton Sea as a permanent drainage reservoir for agricultural wastewater, which provided a long-term guarantee for a steady increase in the Sea's volume. In the 1920s, Davis shipped hundreds of thousands of tons of fish to San Francisco, Seattle, and other fish markets. Mullet was considered a delicacy, and his "alfalfa-fed" large fish was in demand. By 1928, carp had vanished from the Salton Sea, and mullet became the fish with the largest population.[169]

Mullet Island was a very hot place, but the temperatures were still as much as twenty degrees lower than in other parts of Southern California. The promise of a gentle breeze drew visitors from the Imperial Valley but also from Los Angeles. At Hell's Kitchen, Davis welcomed them with entertainment and served various dishes with the Salton Sea mullet. By 1921, Mullet Island became a popular tourist attraction, and remained one for the next twenty-five years. Almost every night, the place was full of visitors. They rented boats and attended shore dinners and dance parties.[170]

In 1921, Mullet Island received wide attention as "The Famous 300,000 Dodge Brothers motor car" climbed to its top. Hell's Kitchen and Davis were prominently featured in the *Los Angeles Herald*, along with a picture of the scout car, standing on top of volcanic "rocks and boulders thrown together in great piles."[171]

[169] "Mullet from the Salton Sea," City and Valley News, *Riverside Daily (CA) Press*, June 24, 1921, https://cdnc.ucr.edu; Brown, *Water-Supply Paper 497*, 69.
[170] "More Water Wanted for Salton Sea," *Riverside Daily (CA) Press*, August 11, 1917; Laflin, Chapter 8.
[171] "Famous Dodge Climbs Over Rocks to Top of Volcano," *Los Angeles Herald*, August 20, 1921.

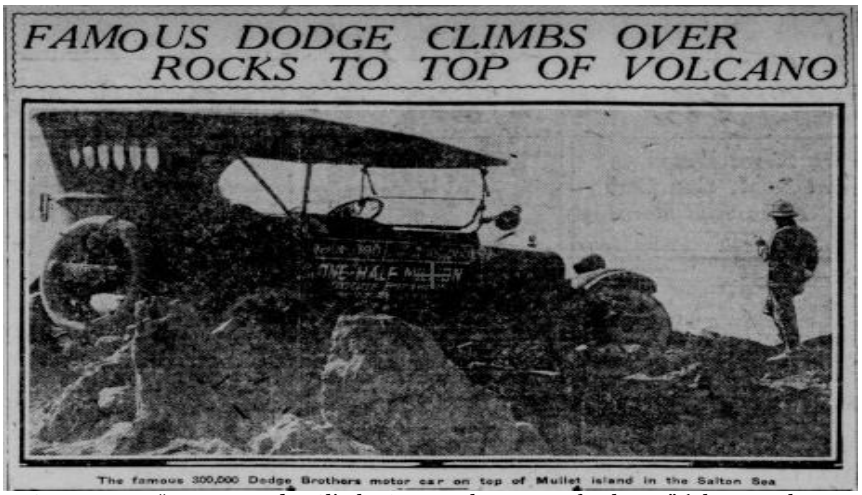

FIGURE 2.12. "Famous Dodge Climbs Over Rocks to Top of Volcano." (Photograph courtesy of the *Los Angeles Herald*, August 20, 1921, https://cdnc.ucr.edu/.)

Many of the Sea's visitors remembered Hell's Kitchen as "Paint Springs." Davis used the mineral pigments from the active mud volcanoes located around the Salton Sea to paint his Mullet Island property. He colored some of the pigments and left others untouched, and decorated his island with green, blue, yellow, brown, black, and red paint. Mud geysers appeared at the Salton Sea after the floods, becoming a tourist attraction for visitors and an object of interest for scientists.[172]

FIGURE 2.13. Hell's Kitchen Cafe, dance hall, and boat landing, with Captain Davis seated, date unknown. (Photograph courtesy of the Coachella Historical Society, http://www.greetingsfromsaltonsea.com/.)

[172] "Paint Springs at Salton Sea," City and Valley News, *Riverside Daily (CA) Press*, February 24, 1921, https://cdnc.ucr.edu.

After the Sea had been created, a loud, explosive and smelly performance began to take place at its shores. In his history of the Imperial County, Finis C. Farr claimed that there was "nothing quite so actively real to be found in California [...] as the numerous little mounds on the verge of the Salton Sea, which are in a state of continual eruption."[173] Those mounds were miniature active volcanoes and from their craters, steam, brine, and gases were released. The mud volcanoes were difficult to approach as they were surrounded by muddy areas. But the loud sound of explosions that they created echoed through the area for many miles. The discharge of the craters included a brown or yellow-grey sulfurous slime "running down the hot rugged sides from the lip of the crater," releasing a strong, unpleasant smell of combustion, similar to foul eggs. Every minute or so, a discharge of hot fluid was shot twenty-five to seventy-five feet into the air.[174]

Daniel Trembly MacDougal became interested in the craters during his expeditions to the Sea. In his Salton Sea study, he mentioned the "dull rumbling sound" of the "innumerable small mud cones, solfataras, and boiling pools of mud and water" that released sulfurous gases, steam, mud, and brine. Those cones, sized between one and ten feet, were the spots where underground pressure was released through the Earth's surface, reaching thousands of feet deep.[175]

Why did this phenomenon occur specifically in the Salton Sink? The entire delta region of the Colorado River shows impressive evidence of volcanism. The region is geologically distinct as it is the largest, most active spot of volcanic activity in the United States, next to Yosemite. The extinct Pinacate Peaks, located in Sonora in Mexico, are the most prominent craters, and three hundred miles from there, the eastern part of the Salton Sea is placed

[173] Farr, 291.
[174] Farr, 291-292.
[175] MacDougal, *The Salton Sea,* 10; "Salton Sea Is Shrinking Fast," *Sacramento (CA) Union,* December 2, 1919, https://cdnc.ucr.edu.

on twenty-five square miles of hot porous rock. Between this layer of rock and the Earth's surface, steaming hot brine creates pressure so strong that it would be able to power the most powerful geothermal energy plant on Earth. To the east and the west of the Salton Sink, there are two faults that determine the constantly ongoing geological transformation of the region. These faults have three major impacts. Firstly, they cause the region to continue sinking even deeper. Secondly, they make the area prone to seismic activity. In 1906, when the deadly 7.9 magnitude earthquake struck and devastated the city of San Francisco, a smaller earthquake was recorded in the Imperial Valley. This continuation of a major seismic movement spread downward from San Francisco to the fault-plane that passed along the great interior valley of California and moved further towards the Gulf of California. The third major impact of the faults is that they very slowly continue to tear the Earth's crust apart, thinning it, and forming a rift valley, where a new crust is created underneath the spreading, thin layer. This structure resembles the spreading center of Iceland or of the mid-Atlantic ridge and enables an easy release of magma to the Earth's surface.[176]

Deep underneath the ground, an immense pressure is generated, making the Imperial Valley region one of the world's largest areas potentially suitable for using geothermal resources. Over one mile underground, a layer of magma remains in constant motion. Pushing against the hard crust, the magma creates an upward heat flow that is released on the Earth's surface in an incredibly loud and explosive process. Generous amounts of carbon dioxide or other gases and fluids are released through vents known as hot springs. MacDougal observed that at the Salton Sea, the mud released by the mudpots comes not only from the underground steam but is also mixed with the water from the Colorado River overflow. The water, as it infiltrates into the hotbeds of rocks close to the surface, is then converted to steam and mixed with brine. As it bursts through silt deposits, mud is created and released hundreds of feet high.[177]

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[176] MacDougal, *The Salton Sea,* 10; Maven's Photoblog, "The mud volcanoes of the Salton Sea," accessed May 3, 2018, http://mavensphotoblog.com/2012/01/08/the-mud-volcanoes-of-the-salton-sea/.
[177] MacDougal, *The Salton Sea,* 10.

How do the springs, pots, and geysers differ from one another? MacDougal introduced the various terms in the Salton Sea study, coining them as "manifestations of volcanic energy." Springs, according to MacDougal, are all spots on the Earth's surface where an underground moisture is released under pressure, which makes it visible on the surface. Thus, any type of an explosive pot is a hot spring. Mudpots are similar to wells and are filled with warm mud. The mud, filled with organic substances, metals, and salts, bubbles in the throat and the crater of each mudpot, squirting out and splashing into the surroundings. A geyser is a more violent formation. Its discharge is not mud but clear water and steam, and it is rooted deeper underground than a mudpot, reaching for spots very close to magma. Geysers explode in intervals, but those are usually difficult to determine, just as a formation of a new geyser often comes as an explosive surprise.[178]

MacDougal mentioned two accounts of mudpots and geysers at the Salton Sea, both of which were related to the history of Native American tribes in California. The tribe of Cocopah, who inhabited the Colorado River delta in the nineteenth century, used the mudpots to punish sorcery and other crimes. Those tribe members who were found guilty of wrongdoing were dropped into a pool of boiling mud as punishment. A second account had its origins in a United States military operation. In 1850, a series of wars and massacres, known as the California Indian Wars, began. The California State Militia and the United States Army fought the Indigenous people of California in a series of battles, acting upon the Act for the Government and Protection of Indians, which allowed for enslaving of Native American people. In 1852, Major Samuel P. Heintzelman commanded the Yuma Expedition, a military campaign against the Quechan people (Yuma Indians). As the infantry crossed through the Salton Sink, Heintzelman was astonished to have discovered "clouds of steam arising from the southwest portion of the desert."[179]

[178] MacDougal, 9.
[179] MacDougal, 10.

In 1919, over a decade after MacDougal's first expedition to the Salton Sea, new craters began to emerge in large numbers on the eastern shore of the Sea, close to Imperial. In just one day, on June 26, on two acres of dry and crusted land, hundreds of mud geysers of various sizes suddenly started to spit out smoke, steam, and a lava-like substance, shooting it sixty feet into the air. *The Riverside Daily Press* reported that within an hour, the craters "instantaneously transformed from bubbling geyserettes into miniature volcanoes through some internal convulsion of the earth"[180] and kept multiplying by the minute. Unable to find the cause of this phenomenon, the journalists ascribed it to an unknown seismic activity. However, close to the extinct Pinacate volcanoes, in the Sonora region of Mexico, a 6.8 magnitude earthquake had been recorded four weeks before, which could have explained the sudden "sprouting" of the geysers.[181]

As the Sea kept shrinking in the summer months of 1919, more and more adobe mudpots were left behind. The explosions tore holes in the earth four to ten feet wide and twelve feet deep, turning the crusted desert soil into a sump of boiling mud. Soon, the spot developed into a tourist attraction. Between sightseeing tours of Palm Springs and the date gardens of the Coachella Valley, visitors arrived at the Salton Sea to admire the mud volcanoes. Those visits were not always pleasant. In 1920, two children sank into the mud and were almost swallowed by the geysers. Worried about potential casualties from the desert quicksand, newspapers issued warnings for visitors: "caution must be used in exploring mysteries of the mud geysers of the Salton Sea," *The Riverside Daily Press* alerted.[182]

Captain Davis was not the only one to notice the value of the colorful pigmentation released by the adobe mudpots. In 1920, the *Mariposa Gazette*

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[180] "Geysers at Salton Sea," City and Valley News, *Riverside (CA) Daily Press*, June 30, 1919, https://cdnc.ucr.edu.
[181] "Salton Sea Is Shrinking Fast," *Sacramento (CA) Union*, December 2, 1919; MacDougal, *The Salton Sea,* 10; "Geysers at Salton Sea," City and Valley News, *Riverside (CA) Daily Press*, June 30, 1919; "Mud Geysers Sprout Along Salton Sea," *Morning Press* (Santa Barbara, CA) September 28, 1919, https://cdnc.ucr.edu; "Peculiar Mud Geysers," *Healdsburg (CA) Enterprise*, October 30, 1920, https://cdnc.ucr.edu.
[182] "On the Social Merry-Go-Round with Evelyn," *Desert Sun* (Palm Springs, CA), December 30, 1938, https://cdnc.ucr.edu; "Mud Volcanoes Dangerous," City and Valley News, *Riverside (CA) Daily Press*, February 6, 1920, https://cdnc.ucr.edu.

attempted to popularize the practice of using the mud to paint walls: "Utilization of the new-found color supply may soon render the continuation of European imports of such pigment as unnecessary," the newspaper assumed.[183]

The vision, anticipated by the *Gazette,* of using the mudpots as a source for paint production, never became reality. But the soils of the Salton Sink nourished an industry, which became so powerful that it changed the consumption habits across the United States. The Imperial Valley had only received water in 1901 for the first time, but in just a decade, it became widely known as "America's winter salad bowl," as it provided the majority of produce for the entire country, all year long.


Yes—There Are Volcanoes in Southern California!

Strange as it may seem, in Southern California—the land of movie stars and beaches—there are volcanoes. They are located in the desert near Salton Sea. Above are pictured volcanic mud eruptions, a whim of Mother Nature. A geologist traveled there recently in a Chevrolet coupe to study the phenomena. Tons of silt from the Colorado River, heat, pressure and readjustment of strata are responsible for the mud volcanoes.

FIGURE 2.15. Active mud pots close to Calipatria, 2018. (Photograph courtesy of the *Coronado (CA) Journal*, "Yes–There Are Volcanoes in Southern California," May 4, 1932.)

FIGURE 2.15. Active mud pots close to Calipatria, 2018. (Photographs by Jasmyn Phillips)

[183] "Salton Sea Is Disappearing," *Mariposa (CA) Gazette*, November 27, 1920, https://cdnc.ucr.edu; Goolsby, "Off-Beat Salton Sea Stories."

Chapter Three
CALIFORNIA'S IRRIGATED PARADISE

"The more golden the lily, the more certain that someone has gilded it."
Aldo Leopold, *A Sand County Almanac*[184]

The Source Of Nourishment

A gaze upon the satellite image of the Salton Sea reveals a strong attachment between the Sea and the surrounding farming lands. The fields spread in a chess-like pattern, extending southward from the Sea towards the Imperial Valley and northward into the Coachella Valley. Without those squares and rectangles, in countless shades of green and brown, the Sea would lose over ninety percent of its water inflow.[185]

The strong relation between the Salton Sea and agriculture is unquestionable. The produce that has been harvested in the Imperial and Coachella Valleys has fed consumers who buy the fruits and vegetables available in the grocery stores throughout the whole country. But it has also fed the Salton Sea, as the water used for irrigation passes forward into the Sea, the official agricultural sump of the Imperial Valley. Through this process, in which the Salton Sea absorbs the irrigation water, the relationship between the cultivated plants and the Sea becomes an intimate one. The fields and the Sea keep each other company in a curious symbiosis. The runoff system is critically important to the agriculture, and without the runoff, the Salton Sea would be doomed to a slow but steady decline.

This chapter steps onto the dry land of the Salton Sea area, exploring those agricultural developments which are most relevant to the Sea. Three themes have been selected from the three decades that followed the birth of the Sea.

[184] Aldo Leopold, *A Sand County Almanac. With Other Essays on Conservation from Round River* (New York, NY: Oxford University Press, 1966), 150.
[185] Redlands Institute, *Salton Sea Atlas* (Redlands, CA: Esri Press, 2002), 38.

Firstly, a focus on specific produce enables an exploration of the cultural transformations that emerged through agriculture in the Salton Sea area. Date palm trees tell a story about the federal interest in agriculture and about the visual transformation of the Salton Sea. Lettuce and cantaloupes allow us to understand the emergence of the labor movement among farmworkers while contextualizing the nationwide changes in eating habits. Secondly, the arrival of a large waterfowl population at the Salton Sea, followed by the emergence of duck hunting as a leisure activity, reveals the problematic relationship between wildlife protection and agriculture. Thirdly, the major reform of the Reclamation Service in 1924 followed by the construction of the Boulder Dam (later renamed as the Hoover Dam) and the All-American Canal had severe consequences for the Salton Sea. The Boulder Dam, the tallest dam on Earth at the moment of its dedication, and the All-American Canal, "the world's biggest ditch," were constructed by the USBR, and their dedication completed the process of separating the Salton Sea from its parent river, changing its water content and transforming the landscape of canals surrounding the Sea. Hence the last focus of this chapter is one that depicts the large-scale and revolutionary modifications of the land reclamation infrastructure of the 1920s and 1930s.[186]

This chapter focuses on the Imperial and Coachella Valleys and on the southeastern region of the Sea, where "the Salton Sea Wild Life Tract" was established in 1930 to protect waterfowl bird species. Additionally, an excursion two hundred miles north to the Black Canyon is necessary to follow the process of separating the Sea from the Colorado River. While the primary focus is on the developments in the 1920s and 1930s, the period shortly after the flood is discussed as well.

The year 1924 should be regarded as a milestone in the history of the Salton Sea. President Calvin Coolidge issued the Public Water Reserve Order which withdrew over 120,000 acres of public land underneath the Salton Sea, dedicating it as storage for agricultural drainage water. The President's

[186] Sterling Gleason, "Digging the World's Biggest Ditch," *Popular Science* 129, no. 4 (October 1936): 11-13.

decision and the legislation for it came after the United States Geological Survey (USGS) published two surveys of the Salton Sea region. In those reports, the USGS estimated the resource deposits of the area. Most importantly, it defined the Salton Sea waters as unusable: "The Salton Sea is of practically no importance as a source of water supply,"[187] one of the surveys stated, pointing to its extremely high mineral content and warning about the "alkali-coated and mud-cracked flats" left by evaporation. With this conclusion, the Salton Sea gained the long-term assignment of gathering all wastewater from the Imperial and Coachella Valleys.

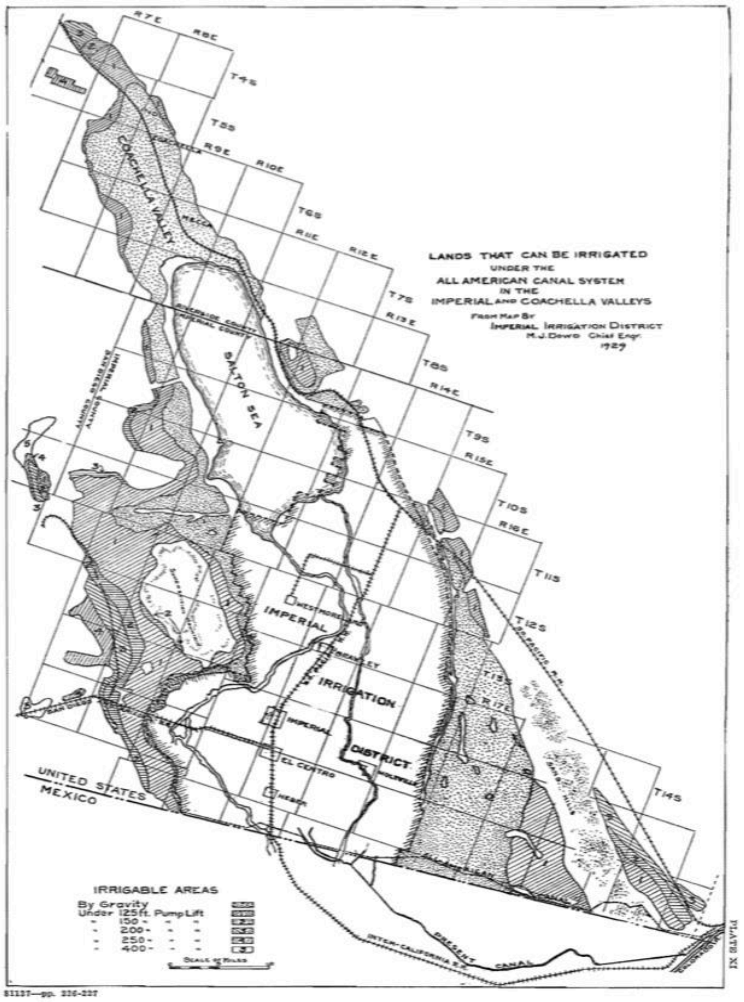

FIGURE 3.1. A map depicting the strategically crucial position of the Salton Sea within the irrigation systems of the Imperial and Coachella Valleys, 1929. (Tout, *The First Thirty Years*, 145.)

[187] Brown, *Water-Supply Paper 497*, 69.

As the Sea took root in the Salton Sink in the first decades after the flood, two neighboring agricultural regions emerged next to it. The Imperial and Coachella Valleys grew attached to both of the Sea's narrowest tails, in the south and in the northwest, respectively. Not only did they keep the Sea company, but they also determined its volume. The water level of the Sea depended on the amount of water released by the irrigation canals via the Whitewater River at the northern tip of the Sea, and the Alamo and New Rivers in the south.

Before reaching the Sea, the water traveled a long way with the stream of the Colorado River. The journey took several steps. The water departed at the very source of the Colorado River, in the mountain pass of La Poudre in the Rocky Mountains in Northern Colorado. Flowing hundreds of miles through Utah, Nevada, and Arizona, it passed through dozens of diversion dams. After slowly making its way through the artificial reservoirs of the Imperial Irrigation District, it then flowed towards Mexico and the Gulf of California, and a large part was distributed through the Salton Sea area with its system of rivers and canals.

The two-year flood that had created the Salton Sea did not discourage new settlers from coming to the Imperial Valley. A 1910 report conducted by the State of California concluded that as a result of an eight yearlong development, there were 3,500 farms under cultivation in the Imperial Valley, spread over 350,000 acres. The 700-mile-long canal system was maintained by private companies. In 1911, Thomas Cory of the California Development Company (CDC) formed a new enterprise, which consolidated the CDC and over a dozen other water companies. The goal was to create a unified force of private companies in order to prevent the Reclamation Service from gaining power in the area. Cory became the president of this new enterprise, the Imperial Irrigation District (IID), which became the largest water management body in the Salton Sea region and took charge of nearly all the farming land in the Imperial Valley. The IID gradually

purchased all assets that had belonged to the bankrupt CDC, and within a decade, the IID was in charge of 500,000 acres of farmland. To Thomas Cory, this meant that the lands he managed had quadrupled since the floods had started in 1905. The IID gained monopoly in the fully privatized water market of the Imperial Valley, distributing water via the Alamo Canal constructed by the CDC, which connected the Colorado River with the Alamo River. However, the struggles to maintain the canal systems continued. The scale of the floods decreased, but the floods never stopped completely, making it necessary to provide constant flood relief management for the fragile canals. In addition, new settlers were often dissatisfied as the land they acquired was so far from the canals that irrigation was rendered impossible.[188]

In 1907, the *Imperial Valley Press* made a case for the Imperial Valley, advertising its climate and flavors. Full of poetic glare and exaggeration, the article stated that "The Imperial Valley is no place for spring poets. There's so much springtime here they'd work themselves to death."[189] Titled "Desert Fantasies," the article presented a fantasized reality of what life was like in the Imperial Valley:

> To-day on the writer's dinner table were lettuce, carrots, peas, young onions and the meat platter was garnished with parsley. [...] Besides all these two or three times a week fresh tomatoes have appeared on the table, picked from the vines back of the house. This is not written to make any eastern person feel badly or to brag, but to enlighten some poor struggling soul that there is a release from his bondage of the frozen parts of the eastern states and a place he may live like a prince if he will but put a little work into the ground. [...] Here he sees acres and acres of growing barley, green fields of alfalfa and the timid rows and rows of cantaloupes — all of which are but waiting for the

[188] "Making a Garden out of a Desert," *Los Angeles Herald*, February 20, 1920, https://cdnc.ucr.edu; "Water Company Affairs," *Imperial Valley Press* (El Centro, CA), June 13, 1908, https://cdnc.ucr.edu; "Why Land was Withdrawn," *Imperial Valley Press* (El Centro, CA), May 1, 1909, https://cdnc.ucr.edu.
[189] "Desert Fantasies," *Imperial Valley Press* (El Centro, CA), March 16, 1907, https://cdnc.ucr.edu.

> magic love warmth of the great sun to leap into added stature and to heap up added wealth for the farmer. He [...] has the right to be the most satisfied farmer on earth. And the old Sol knows he's the biggest and best friend the valley has.[190]

The climate of the Imperial Valley enabled the landowners to provide fresh produce all year long. Delivering the majority of winter vegetables to the rest of the country, the Valley became the country's "winter salad bowl" and "America's Amazing Winter Garden."[191] The continuous supply of fresh produce transformed the eating habits of the Eastern States, and in California, an entirely new lifestyle change was emerging. "Your physician [...] will advise you to be vegetarians if you want to live in this warm climate," the *Imperial Valley Press* advertised in 1908.[192]

In Riverside County, southeast from the San Bernardino Mountains, the Coachella Valley emerged at the turn of the twentieth century as another farming landmark. The acreage of cultivated land of Coachella was considerably lower than in the Imperial Valley, with 100,000 acres irrigated in the early twentieth century. In the first three decades of the twentieth century, the Coachella Valley emerged as the leading supplier of dates, alfalfa, tomatoes, and grapes. In contrast to the Imperial Valley, the Coachella Valley was situated upon large reserves of artesian water. Landowners received their water via flowing artesian wells, which were constructed at advantageous costs. However, the water level began to drop in 1915, and the Coachella Valley County Water District was formed with the quest to extend the irrigation system.[193]

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[190] "Desert Fantasies," *Imperial Valley Press* (El Centro, CA*)*, March 16, 1907.
[191] "Valley Is Given Boost in Ad Run in "The Traffic World" by the Southern Pacific Railroad," *Calexico (CA) Chronicle*, February 6, 1928, https://cdnc.ucr.edu.
[192] "Main Street Scott's Grocery in El Centro," advertisement, *Imperial Valley Press* (El Centro, CA), June 13, 1908, https://cdnc.ucr.edu; William DeBuys, *Salt Dreams: Land & Water in Low-Down California* (Albuquerque, AZ: University of New Mexico Press, 1999), 183; Joanne L. Rondilla, Rudy P. Guevarra Jr., and Paul Spickard, R*ed and Yellow, Black and Brown: Decentering Whiteness in Mixed Race Studies* (New Brunswick, NJ: Rutgers University Press, 2017), 59.
[193] Coachella Valley County Water District. *Coachella Valley's Golden Years,* rev. ed. (Indio, CA: Coachella Valley County Water District, 1978), 2-3, 10, 38.

The practices related to water were dramatically different in both valleys. The Imperial Valley was in the immediate vicinity of the Colorado River which made it difficult to control the amount of water distributed via the canal system. As a result, the problem of surface runoff from the Imperial Valley, also known as tailwater, greatly transformed the Salton Sea. The surface runoff is the amount of water wasted in the process of water transport and irrigation, and in the Imperial Valley, the water companies and landowners created vast amounts of waste. Each time a canal was clogged, the floodwater rushed towards the Salton Sea, expanding its size. When landowners overestimated the amount of needed water, they released the surplus to the Sea. In the Coachella Valley, the farmers used the water supply more sparingly as the distribution of the artesian water was easier to control than the untamed Colorado River. Thus, while both valleys released their runoff to the Salton Sea, the amount released by the Imperial Valley was overwhelmingly greater.

The New Seeds

At the Salton Sea, it was the bird population that became the fastest-expanding one. For thirty years after the flood, birds were drawn to the Sea in unprecedented numbers. In the Imperial Valley, they gained a reputation for being the loudest among all of the new inhabitants. In 1908, an essay in the *Imperial Valley Press* celebrated the arrival of singing birds. Just a few years earlier, birds of prey dominated the desert. But the squawk of the hawks and buzzards was rather unpleasant to the human ears. There had been some sparrows in the area, but they were not of the singing variety. With the emergence of agriculture, the water, the alfalfa, and the trees welcomed new birds and their "cheery songs":

> To such oases the song birds come, and the grove is filled with the piping of the blackbird by day and the marvelous melodies of the mockingbird by night. In a few more years no reminder of the grim

> and silent-waste of the desert of the Colorado will be found in all this broad green valley.[194]

The water, especially large lakes such as the Salton Sea, attracted large numbers of waterfowl. Emerald-headed ducks and black-and-white geese were most prominent, followed by ibises with beaks elegantly matching their bright red legs. Gulls, too, were arriving in large flocks. "Alfalfa and trees are robbing the desert of its terrors," the article stated. In the desert heat, not even a roof above one's head gave relief. But if a farmer sat down under a tree in his four-year-old grove, where thick grass was growing under fruit trees, the temperature was ten degrees lower than in the barren desert terrain. Smaller birds chose those groves to nest, which troubled many landowners as the birds fed on the ripening fruit. California blackbirds, all black, with a little red splash on their wings, claimed the trees as their new homes. Their songs were "simpler than that of the rollicking meadowlark, but [...] a blithe little bit of a tune, whistled merrily by a sociable troubadour of the fields." Meadowlarks, with their bright yellow bellies and black ties around their necks, could be found there too, alongside the cooing doves.[195]

In 1918, Aldo Leopold observed heavy waterfowl traffic in his tour of the Colorado Delta and was delighted by the presence of such regional inhabitants as storks, cormorants, various species of ducks, and of course, the pelicans. These thousands of birds brought with them countless of seeds attached to their feathers or clinging to the mud on their feet. Seeds of grass, flowers, or trees were largely released to the Salton Sea, where birds arrived to forage and to build nests.[196]

As mentioned in the previous chapter, Daniel Trembly MacDougal attributed the transportation of seeds to pelicans and cormorants more than any other birds. But people brought seeds with them, too. Lettuce, cucumbers, berries,

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[194] "Metamorphosis of the Desert," *Imperial Valley Press* (El Centro, CA), June 20, 1908, https:// cdnc.ucr.edu.
[195] "Metamorphosis of the Desert," *Imperial Valley Press* (El Centro, CA), June 20, 1908; Patten, McCaskie, and Unitt, *Birds of the Salton Sea,* 195-196, 303-304.
[196] Leopold, *Sound County Almanac*, 150-151; MacDougal, *The Salton Sea,*143, 180.

and alfalfa arrived with the new settlers in the form of seeds or seedlings, and soon new plants appeared at the experimental farming sites.[197]

The Gilded Facade of Land Reclamation

New settlers were becoming rooted in the desert of California. The urban growth in the Salton Sink region brought about new towns, such as El Centro, Brawley, Calexico, and Imperial, where "far away in every direction the mystic aridity stretched like one scene from the inferno that Dante had overlooked."[198] Families moved from tents to brick houses. Markets, schools, and businesses were emerging; the Southern Pacific rails were growing. But the road system was poor, leaving travelers and their vehicles victims of the desert dust. Moreover, water was still scarce in many settlements that were located many miles from water sources. Finis Farr, one of the most prominent advocates of land reclamation in the Salton Sea region, marveled about this miraculous development, but struggled to name benefits of living in the Imperial Valley aside from fresh air, beautiful sunsets, and open spaces.[199]

Amid the difficult conditions, to have lived in the Salton Sea area for just a few years was enough to be considered a pioneer or a senior citizen. Those who had been there for four or five years were referred to as "old-timers." But in spite of the hardships, the population of the Salton Sink region was growing. In 1909, the *Imperial Valley Press* celebrated its eighth birthday with a nostalgic article:

> Then [in 1901] New River and the Alamo were dimly traceable courses over the sand of old overflows. Now they are gorges sixty feet deep and half a mile wide, and through them soil enough to make a New England county has been washed into Salton Sea and is not missed. Then the editor looked south from Imperial and saw only the fantastic

[197] MacDougal, *The Salton Sea*, 123.
[198] Farr, *History of Imperial County*, 264.
[199] Farr, *History of Imperial County,* 246, 264-268.

> creations of the mirage. Now, if an editor in Imperial could look south without incurring danger of mental derangement, he would see a real city looming above his horizon and growing greater every month. The eight years that have passed [...] have wrought great changes in the desert. [...] Greater progress, greater development, undoubtedly will mark the next eight years, and in the work of reclamation and betterment, material and moral, the Imperial Valley Press will try loyally to do its part.[200]

The article conveys to the reader all the major aspects which characterized life in the first decades south of the Salton Sea: A constant risk of natural disasters and their normalization, the land reclamation propaganda that aimed to create a narrative of the Imperial Valley becoming a blossoming paradise, and the constantly changing landscape of the desert, accompanied by rapid urbanization. The "gilded" days of land reclamation began, and the numerous historians from the era contributed to creating imagined narratives of the American West. As the expansion of irrigation canals continued and the profits from agriculture increased, the façades of the system seemed stable, but everything beneath remained fragile.

Farr celebrated the grandeurs of reclamation by comparing the Imperial Valley to Ancient Egypt:

> There is in America a nomadic race of beings, always pressing toward the frontier and carving empires to endure for the ages. Here in Imperial Valley, last of the American frontiers, they saw their opportunity, and we may believe that as they settled down near the river to make new habitation they but duplicated the processes of the ancient Assyrians and Egyptians, throwing off the nomadic instinct for the time being and adding to the processes of the ancients the skill of the moderns.[201]

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[200] "Eight Years Old," *Imperial Valley Press* (El Centro, CA), April 10, 1909, https://cdnc.ucr.edu.
[201] Farr, *History of Imperial County*, 154.

The "skill of the moderns" was the knowledge derived from scientific surveys:

> There is no alchemy and no mysticism in the methods whereby the desert is reclaimed. Everywhere in modern husbandry the scientist is analyzing the soil and determining the element that is lacking for highest productivity, and he has discovered that in arid lands the one missing element is moisture. That supplied, the plant food that has been accumulating through the ages brings forth crops to astonish those unacquainted with the desert.[202]

Farr was also complementary towards the solid scientific background of large water projects. However, as demonstrated in the previous chapter with the example of the predictions that the Salton Sea would disappear, some of those scientific surveys that Farr's generation relied on wrong information.

Underneath the gilded layer of storytelling, the daily lives of landowners were certainly full of hardship. The historians Benny J. Andrés and Sterling Evans observe that in the first decades of the twentieth century, "farmers grappled with the complex matrix of weather, soil, irrigation, crops, and marketing."[203] If things went well, an Imperial Valley farmer sold his hard-earned produce at one of the local markets in Imperial or in Calipatria. But skill, perseverance, and luck were all a must for those who wanted to survive. There were floods, droughts, and earthquakes. If crops were not destroyed by breaking levees, pests or alkali posed a risk. Land assessment and water stock payments were often unaffordable, and landowners frequently found themselves in heavy debt. With truck farming replacing traditional methods, expensive equipment had to be acquired and maintained. The workers suffered greatly, too. If things went well, and the landowner sold the produce, they got paid. But more often than not, this was not the case.

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[202] Farr, 154.
[203] Benny J. Andrés and Sterling Evans, *Power and Control in the Imperial Valley: Nature, Agribusiness, and Workers on the California Borderland, 1900-1940* (College Station, TX: Texas A&M University Press, 2016), 69.

Malnourishment, illness, poverty, and discrimination overshadowed the workers' lives in Southern California.[204]

Water was always the biggest cause of concern in the Imperial Valley. It was never simply a case of not enough water, but rather a case of either too much or not enough. There were some groundwater sources, but water came almost exclusively from the Colorado River through the faulty levee system. The water companies had their hands full trying to prevent the incoming water from overflowing the fields. A 1911 case shows how unstable the system was. In the fall, the Colorado River appeared to have disappeared! Close to Yuma, the river began to flow into a hole in the ground, missing the irrigation canal. The main speculation was that the water was flowing into the Salton Sea through an underground channel. Tons of dead fish were found lying in the drying lakebed of the artificial Volcano Lake, creating an unbearable stench. The fields of the Imperial Valley were cut off from their water inflow, and the landowners were unable to provide produce for the Thanksgiving markets of New York and other eastern states. It took months until the hole disappeared, and the river returned to flow into the irrigation canal.[205]

The local press played an important role in creating and spreading a gilded layer over the fragile reality. The case of the 1915 earthquake demonstrates this rather well. In June of 1915, the 6.3 magnitude earthquake caused many deaths and destroyed extensively the settlements and canals. A *Los Angeles Herald* article entitled "Damages to Canal Only $3000," published just two days after the disaster, focused on the advantages of the earthquake. It stated that "business was resumed under almost normal conditions throughout the Imperial Valley"[206] and that the local residents were pleased to hear that the costs of repair would be lower than anticipated. "Bright features of the situation" or "fortunate" are expressions far from the words usually used to

[204] Andrés and Evans, 70; "Damages to Canal Only $3000," *Los Angeles Herald*, June 24, 1915, https://cdnc.ucr.edu.
[205] "Colorado River Drops into Sink," *Mariposa (CA) Gazette*, September 16, 1911, https://cdnc.ucr.edu; "Colorado River is again Amuck," *Sacramento (CA) Union*, October 23, 1909, https://cdnc.ucr.edu; "Inspection of Canal System by Receiver and Engineers," *Imperial Valley Press* (El Centro, CA), November 19, 1910, https://cdnc.ucr.edu.
[206] "Damages to Canal Only $3,000," *Los Angeles Herald*, June 24, 1915.

report on an earthquake of such an immense magnitude. In addition to being overly optimistic, the article contained false statements. It reported that the "only loss of life" was on the Mexican side of the border (which was listed as positive news), when, in fact, six people were killed in El Centro. It talked of minor damages, but the earthquake cost the Imperial Valley settlements over one million dollars.[207]

In spite of all these difficulties, the Imperial Valley gained a reputation as one of the most fertile places in the United States. The "felix culpa," the blessing in the misfortunes of the irrigated desert, was the fertility of its soils. The freshly deposited silt from the Colorado River, discharged over the Salton Sea region in millions of cubic meters every year, was a menace to the canal system but also a great fertilizer. In the first decades of the twentieth century, this soil transformed the Salton Sea region into an oasis of fertility. In spite of the fact that a generous amount of fertile nutrients remained in the canals and extensive farming greatly increased soil erosion, virtually any seed successfully sprouted once planted in this ground.[208]

The fields of the Salton Sea region were predominantly used for fast-growing produce. As an example, the Irwin's Fruit Stand, first opened in 1908 at the El Centro market, sold berries, cherries, apricots, cucumbers, tomatoes, lettuce, onions, cabbage, and squash. The farmers abstained from cultivating slow-growing and water-demanding produce. Oranges and other citrus orchards, so popular in other parts of California, caused many farmers in the Imperial Valley to go bankrupt. Corn was planted for local markets, but it could not compete with the Midwestern production. But in Coachella Valley, a very special plant emerged, taking center stage and outshining other abundant but modest varieties of fruits and vegetables. The date palm tree transformed the Salton Sea visually. At the same time, it embodied the hunger for power and profit of the land reclamation projects.[209]

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[207] "Damages to Canal Only $3,000," *Los Angeles Herald*, June 24, 1915; Carl H. Beal, "The Earthquake in the Imperial Valley, California, June 22, 1915," *Bulletin of the Seismological Society of America* 5, no. 3 (September 1915): 130.
[208] MacDougal, *The Salton Sea,* 7.
[209] Andrés and Evans, *Power and Control*, 69; Douglas C. Sackman, *Orange Empire: California and The Fruits of Eden* (Berkeley, CA: University of California Press, 2009);

In *Trees of Paradise*, the environmental historian Jared Farmer provides the history of the Golden State told from the perspective of four tree species: Redwoods, eucalyptus, citruses, and palms. He points out that while in other parts of the world, palm trees are a source of nutrition, in California their mere function is to serve as ornaments. "Planted for what they mean rather than for what they do,"[210] the palm trees add monetary value to property. With palm trees as an inseparable element of the landscape, Hollywood became a symbol of fame and wealth. Twenty miles north from the Salton Sea, the settlements of Palm Desert, Thousand Palms, and Palm Springs became famous for their date gardens and for their emerging holiday resorts. In early twentieth century California, the palm tree became a symbol of wealth, abundance, and leisure.[211]

But palm trees were not native to California with the exception of the fan palm, also known as *Washingtonia filifera*. The fan palm is a tree of modest size with flat, fan-shaped fronds. Once a year, it produces fruit whose "thin edible flesh surrounding a large bony seed ripens in early fall."[212] When new settlers introduced other palm tree varieties in the late eighteenth century, the *Phoenix canariensis*, "the most majestic palm in the world," overshadowed the native fan palm. Known as the Canary Island date palm, this variety is very tall with a wide crown, heavy with strong and thick fronds. However, contrary to what the name suggests, its fruit is not edible for humans.[213]

While decorative palm trees conquered the Golden State, the agricultural empire of Southern California considered the date-bearing palm trees from

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"Irwin's Fruit Stand" and "Cantaloupe Trucks," advertisements, *Imperial Valley Press* (El Centro, CA), June 20, 1908, https://cdnc.ucr.edu.

[210] Jared Farmer, *Trees in Paradise: A California History* (New York, NY: Norton, 2013), 337.

[211] Jared Farmer, *Trees in Paradise: A California History* (New York, NY: Norton, 2013), 337, 367-368, 352-361, 412-413.

[212] MacDougal, *The Salton Sea,* 101.

[213] Farmer, 339, 370; MacDougal, *The Salton Sea,* 101.

the “old world” to be more valuable. Harvesting the dark, sweet date became an obsession at the Salton Sea.

The history of the date is a history of madness. In the maddening heat of the desert, it is palm trees that indicate the closeness of an oasis, a wash, or a canyon.[214] To Paul F. Starrs, the geographer and historian of California agriculture, the date stands for obsession to gather and possess: “[…] a marvel of sweetness and varying texture, […] to bite into a date is to journey back in time, to human origins and our curious, if not obsessive, hunger for the sweet.”[215]

Humans have been obsessed with the date palm tree for thousands of years. To the Ancient Egyptians, it indicated the agricultural value of the irrigated land at the Nile. The sweetness of the “Old World Fruit” unified Christians, Muslims, and Jews. No other fruit is mentioned as often in the Old Testament as the date. In the book of Genesis, Tamar, whose name means “date palm tree,” overcomes all difficulties to provide offspring to Judah, son of Jacob.[216] In the Book of Psalms, the palm tree symbolizes the virtuous:

> The just shall flourish like the palm tree […]
> Planted in the house of the Lord,
> they shall flourish in the courts of our God.
> They shall bear fruit even in old age,
> they will stay fresh and green.[217]

In the New Testament, the palm tree becomes a symbol of blessing, when crowds greet Jesus with branches of date palm tree as he triumphantly enters the city of Jerusalem.[218]

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[214] Paul F. Starrs and Peter Goin, *Field Guide to California Agriculture* (Berkeley, CA: University of California Press, 2010), 172-174.
[215] Starrs and Goin, 172-173.
[216] Gen. 38:1-30 (New American Bible).
[217] Ps. 92:13-15 (NAB).
[218] Jules Janick, "Fruits of the Bibles," *HortScience* 42, no. 5 (August 2007): 1072-1073, https://hort.purdue.edu/newcrop/janick-papers/fruits-bible.pdf; Jn. 12:12–13 (NAB).

Dates have an intoxicating effect on the human body. Due to their extremely high sugar content, they could be considered a drug. Their penetrating sweetness overwhelms human taste buds. The highly concentrated fructose causes humans to release a lot of saliva and sends a signal to the brain to release endorphins. Those morphine-like substances provide a feeling of comfort and tranquility. But like all drugs, sugar is addictive and can bring those who consume too much of it out of balance. People under pressure might feel manipulated by their sugar cravings. As an energy source, sugar is a quick and tasty option, but the least efficient one.[219]

In *The Botany of Desire*, the best-selling study of human behavior related to the consumption and harvesting of plants, Michael Pollan argues that sweetness carries an animalistic desire, becoming the prototype of all other human desires and powering the force of evolution. Pollan's claim, however, goes further as he assumes that it is not humans who domesticate plants, but plants who domesticate humans. Based on this premise, it can be assumed that date palms manipulated their way to the American West, enchanting humans with their beauty and the sweetness of their fruit.[220]

Date palms are moody and high maintenance trees. They drink a lot, but only tolerate groundwater. They despise humid air and belong to the minority of those plants that can be spoiled by rain. There are male and female plants, very similar to each other when seedlings are still young. Once grown, they do not share their fruit easily from their crown, leaving it hanging several feet up their thin trunk. In order to be pleasant to the human eye, the palm tree crowns have to be pruned. Otherwise, the dry leaves remain attached to the stem, indicating neglect.[221]

The agriculturists commissioned by the federal government to test various plant species at the Salton Sea considered the conditions at the Sea to be

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[219] Diane Ackerman, *A Natural History of the Senses* (New York, NY: Vintage Books, 1991),150-151.
[220] Michael Pollan, *The Botany of Desire: A Plant's Eye View of the World* (New York, NY: Random House, 2008), 16-19.
[221] Starrs and Goin, *California Agriculture*, 173-174; "Dates in California," *Imperial Valley Press* (El Centro, CA), October 19, 1907, https://cdnc.ucr.edu.

perfect for harvesting dates. Thousands of acres of the Imperial and Coachella Valleys were set aside for mass cultivation, but the palm trees were also planted for decoration on streets and beaches. As ancient Islamic texts advised, the trees were planted twenty-five feet apart. But from the four thousand varieties available worldwide, only a dozen or so made it to the Salton Sea region. With time, the Coachella Valley became the leading region in palm date production, leaving the Imperial Valley behind.[222]

Just like a royal visitor, the date palm was escorted into the Coachella Valley by government officials. In 1905, the federal government established experimental date gardens in Mecca and Indio, planning to spread the seedlings to the local landowners. The project was overseen by the Arizona Agricultural Experiment Station, which ordered thousands of plants from Egypt, Algeria, Tunis, and the Persian Gulf. In Mecca, seedlings were planted close to the shore of the Salton Sea, while the Indio garden emerged ten miles northwest from the Sea. A pleasant surprise came two years later when the first dates began to ripen on the trees. The plants seemed to be doing very well in the area. It usually took at least five years for a palm to grow strong enough to produce fruit, but at the Salton Sea it grew more rapidly, providing as much as four hundred pounds of fruit per year.[223]

The Deglet Noor variety grown on the date palm *Phoenix dactylifera* became the guinea pig of irrigation tests. The test station experimented with different methods of irrigation and their effect on the dryness and ripeness of the fruit. In addition to the state site, the California Date Company and other private enterprises began to cultivate the Deglet Noor. In 1908, the California Date Company planted ten acres north of Brawley with the Deglet Noor. The records from those experiments demonstrated that the Deglet Noor variety grew up to look entirely different than the original species.[224]

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[222] "Syndicate to Raise Dates in California," *Los Angeles Herald*, July 18, 1919, https://cdnc.ucr.edu; Starrs and Goin, *California Agriculture*, 173-174.
[223] "Dates in California," *Imperial Valley Press* (El Centro, CA), October 19, 1907.
[224] "Dates Doing Well," *Imperial Valley Press* (El Centro, CA), December 17, 1910, https://cdnc. ucr.edu; "Imperial Valley Dates," *Imperial Valley Press* (El Centro, CA), October 1, 1910, https://cdnc.ucr.edu; "Ripe Deglet Noors," *Imperial Valley Press* (El Centro, CA), October 8, 1910, https://cdnc.ucr.edu; "Another Date Experiment," *Imperial Valley Press* (El Centro, CA), April 25, 1908, https://cdnc.ucr.edu.

The federal experiments were overseen by Robert H. Forbes, a chemist and agriculturist from the Arizona Agricultural Experiment Station. Forbes had learned about irrigation and plant cultivation in the irrigated regions of Egypt, Haiti, and West Africa, and attempted to interpret the desert of the American West through the lens of the knowledge he gained overseas. He had gained experience with planting date palms in Arizona where the plants were commonly attacked by two insects: *Parlatoria blanchardi* and *Phoenicococcus marlatti,* commonly known as the Parlatoria and Marlatt scale. After only five years of cultivation, the scale attacked the plants at the Salton Sea. The Cahuilla Indians had developed a strategy against insects attacking the fan palm. Using a burning torch, they carefully applied heat to the affected trees. If done right, this method killed insects and promoted fruit growth. Forbes oversaw a similar method in Mexico where farmers drenched tree trunks in gasoline and set them on fire. At the experimental date gardens, Forbes's method of fighting insects became even more aggressive, and soon, the highly anticipated date palm trees were soaked in gasoline and wounded by flames. Soon after Forbes's experiment, the agriculturalists applied an even deadlier weapon to fight Parlatoria and Marlatt. In 1910, after several rounds of gasoline torch burning, they ordered the palm trees in Indio and Mecca to be sprayed with carbon bisulfate, a highly toxic compound.[225]

[225] Charles C. Colley, *The Century of Robert H. Forbes* (Tempe, AZ: Arizona Historical Society, 1977); Virginia E. Rice, "The Arizona Agricultural Experiment Station: A History to 1917," *Arizona and the West* 20, no. 2 (Summer 1978): 124-126; Robert H. Forbes, "The Gasoline Torch Treatment of Date Palm Scales," *Journal of Economic Entomology* 6, no. 5 (October 1913): 415-416, https://doi.org/10.1093/jee/6.5.415; Farmer, *Trees in Paradise*, 340; "Dates Doing Well," *Imperial Valley Press* (El Centro, CA), December 17, 1910.


FIGURE 3.2. *Left*, A young date palm tree, ca. 1910. (Howe and Hall, *First Decade in Imperial Valley, California*, 52.)
FIGURE 3.3. *Right*, An irrigated field in Mecca, at the shores of the Salton Sea. Rows of maize in foreground and recently planted cuttings of date palm trees on the left, 1912. (MacDougal, *The Salton Sea,* 136a.)

Down to Earth—Fruitless Labor

Hanging high on the date palm trees of the Coachella Valley, the dates have demonstrated how the myth of abundance shaped the agricultural practices at the Salton Sea. Closer to the soil, heads of lettuce and cantaloupe plants, harvested in the Imperial Valley, tell another story. It is the story of the farmworkers whose labor contributed to the idea of abundance becoming reality. As the landowners dreamed of "unlimited Western agriculture,"[226] they needed more and more workers to fulfill this dream. They welcomed mechanization and were not shy of utilizing pesticides and herbicides, but the majority of the labor rested in the hands of farmworkers.[227]

During the first two decades of the twentieth century, the Salton Sea area became an important transit point for illegal immigrants. The landowners of the Imperial Valley welcomed their arrivals, since the agricultural production suffered from a constant shortage of workers. But instead of a steady income and improved living conditions, the workers experienced poverty, misery, and discrimination. Titles of works dedicated to farm workers in Southern California leave hardly any room for any other interpretation. Next to the novel *The Grapes of Wrath*, studies such as *The Invisible People*, *Chasing*

[226] Michael L. Johnson, *Hunger for the Wild: America's Obsession with the Untamed West* (Lawrence, KS: University Press of Kansas, 2007), 241.
[227] Johnson, *Hunger for the Wild*, 241.

the Harvest, or *Bitter Harvest* tell stories of people who paid the highest price for the agricultural development of the desert. In the burning sun and strong winds of Southern California, this "invisible community"[228] worked with their wrists deep in thick, crusting soil. Theirs were the hands that touched each and every head of lettuce, each cantaloupe fruit that grew from the California soil, and yet, they remained unseen or discriminated against.[229]

Xenophobic sentiments against the Chinese became strong in the United States after the Chinese Exclusion Act of 1882, which prohibited the immigration of workers from China. By the 1910s, tens of thousands of Chinese continued to enter California illegally through the Mexican border, but many of them were deported. Those who hid in sand dunes, waiting for the right moment to cross the border, often did not make it. Their desperate attempts to enter the United States often ended in exhaustion or death. Most of the people who made it through the desert continued their journey to other parts of the country. But the Imperial Valley needed workers, and thus many Chinese immigrants decided to stay there illegally.[230]

A 1914 drug smuggling case demonstrates the prejudice that the Imperial Valley landowners had against the Chinese workers. In the summer of 1914, a rancher from Brawley was arrested for smuggling opium. He justified his decision to engage in the drug business with his difficult financial situation. As he had been unable to pay the water assessments, he agreed to transport cans of opium across the state. Interestingly, a *Los Angeles Herald* article pitied him, stating that since he was a rancher, he could hardly have been an opium smuggler. The newspaper continued, however, to accuse immigrants

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[228] Gabriel Thompson, *Chasing the Harvest: Migrant Workers in California Agriculture* (London: Verso, 2017).
[229] John Steinbeck, *The Grapes of Wrath* (New York, NY: Penguin Books, 2006); Cletus E. Daniel, *Bitter Harvest, a History of California Farmworkers, 1870-1941* (Berkeley, CA: University of California Press, 1982); "Contraband Chinese," *Imperial Valley Press* (El Centro, CA), January 28, 1911, https://cdnc.ucr.edu; "Held on Charge of Smuggling Chinese," *Los Angeles Herald*, September 24, 1908, https://cdnc.ucr.edu; "Two Chinese Are Held as Contraband," *Los Angeles Herald*, August 2, 1915, https://cdnc.ucr.edu.
[230] "2000 Chinese Are Wanted in Imperial Valley," *Sacramento (CA) Union*, July 13, 1917, https://cdnc.ucr.edu; "Find Two Smuggled Chinese Near Death," *Los Angeles Herald*, May 28, 1921 https://cdnc.ucr.edu; Farr, *History of Imperial County*, 184.

of the white man's crime, stating that the only reason he had smuggled drugs was to satisfy the demand of "negroes and Chinese."[231]

Between 1905 and 1917, the total annual revenue from farming throughout the Imperial Valley increased from close to nothing to twenty million dollars, and more hands were needed for the heavy work. In 1917, the Imperial Valley farmers issued a petition to the Council of Defense requesting permission to allow two thousand workers from China to enter the country. But the Council denied the request and deportations of illegal Chinese immigrants continued. El Centro and other Imperial Valley settlements faced a constant influx of people and mass deportations on an almost daily basis.[232]

The majority of agricultural workers in California came from Mexico. Those who arrived in the first decade of the twentieth century were the first generation of what later became a prominent Mexican community in California. Initially, they arrived as seasonal workers, but with time most of them settled down as permanent residents. The influx of Mexican immigration greatly increased during the Mexican Revolution (1910–1920), and it is estimated that 350,000 Mexicans immigrated to the American Southwest between 1910 and 1930. With the growing number of Mexicans in the United States, the anti-Mexican sentiments spread throughout the country, and in 1928, an immigration bill proposal aimed to restrict Mexican immigration.[233]

In 1929, the stock market crash devastated the U.S. economy, and in the following year, the period of severe dust storms began. Known as the Dust Bowl or the "Dirty Thirties," the storms greatly damaged the farmland of the American Plains, forcing almost four million people to leave their homes between 1930 and 1940. An estimated 400,000 migrants arrived in California from Oklahoma, Arkansas, Kansas, Colorado, Texas, and

[231] "Smuggler Risks 2 Years in Jail to Make $70," *Los Angeles Herald*, July 23, 1914, https://cdnc.ucr.edu.
[232] "To Place 102 Aliens on Armored Train for Deportation," *Los Angeles Herald*, July 22, 1921, https://cdnc.ucr.edu "Find Two Smuggled Chinese Near Death," *Los Angeles Herald*, May 28, 1921.
[233] Rondilla, Guevarra and Spickard, *Decentering Whiteness*, 59-60.

Nebraska, and became known as “Okies” or “Arkies.” The Imperial Valley landowners provided some of them with jobs but did not treat them well. The Anglo-American Dust Bowl immigrants were exploited and forced to live in tents next to ditches in poor conditions. Malnutrition, sickness, and hunger transformed their bodies so heavily that, to the local farmers, they appeared to be a different race or “the lowest subspecies.”[234]

FIGURE 3.4. *Mexican Farmworker Picking Melons in the Imperial Valley, California*, May 1937. (Photograph by Dorothea Lange, courtesy of the Library of Congress, Prints and Photographs Online Catalog, http://www.loc.gov/pictures/.)

The New American Diet

The hardship of the farmworkers’ lives continued regardless of how abundant the harvest was in the Imperial and Coachella Valleys. This abundance was indeed unprecedented as the Imperial Valley alone produced enough vegetables to be able to transform the diets not only in the Salton Sea area but throughout the United States as well. The all-year-long availability of fresh produce transformed eating habits rather dramatically, shifting American meals from predominantly cooked and meat-based to largely raw and vegetable-based.

[234] Christy Gavin and Garth Milam, “A ‘Flat Tired People’: The Health of California's Okies During the 1930s,” California Odyssey: Dust Bowl Migration Archives, Special Topic Series, (Bakersfield, CA: University of California, January 2017), 1-4, http://hdl.handle.net/10211.3/183557.

Consumers throughout the whole country welcomed the new products, which in turn transformed the Salton Sea. As the agricultural sump for the mass-cultivation of fruit and vegetables, the Sea became an integral part of American food consumption. The more this produce was served on tables in New York or Boston, the more water was needed to grow more produce in the "Winter Garden of America." Thus, the popularization of this new American diet had an impact on the volume of the Salton Sea.

The most profitable produce of the Imperial Valley, spreading out over fourteen thousand acres by 1921, was the humble lettuce. Most of it was harvested in Brawley, spreading through desert lands in bright green patterns. The *New York Head*, later renamed as the *Los Angeles Lettuce,* was the most popular variety of lettuce in the country. A farming guide from 1910 described it as an "immense round head with outer leaves dark, head white, crisp, and good flavor."[235] Other varieties described in the guide were the *Big Boston* ("forms a fine head, endures temperature changes well"), the *White Paris Cos* ("tender and crisp, a favorite with foreign residents"), and the *Improved Hanson* ("heads round, very solid and large, green outside and white within: flavor fine: stands heat well"). The Imperial Valley was taking over the lettuce production from the Bay Area, where the temperatures were lower and the ground was more suitable for thick, white leaves of the endive varieties.[236]

"I am told the green lagoons now raise cantaloupes. If so, they should not lack flavour,"[237] wrote Aldo Leopold a decade after his famous hunting trip to the Colorado River Delta. The cantaloupe, also referred to as cantaloup or muskmelon, grew to an exceptionally large size in the Salton Sea region. There was some confusion as to whether it should be classified as a fruit or vegetable, since it had a sweet flavor resembling a strawberry but grew like

[235] "California Vegetables in Garden and Field," *Pacific Rural Press* (San Francisco), May 14, 1910, https://cdnc.ucr.edu.
[236] "California Vegetables in Garden and Field," *Pacific Rural Press (San Francisco)*, May 14, 1910; "Big Increase in Lettuce Growing," *Los Angeles Herald*, October 15, 1921, https://cdnc.ucr.edu; "Timing Early Vegetables," *Pacific Rural Press* (San Francisco), August 26, 1922, https://cdnc.ucr.edu.
[237] Leopold, *Sand County Almanac*, 157.

its cousin the cucumber. The farming guide encouraged ranchers to cultivate cantaloupes:

> Their delight in interior heat, their tolerance of drought, their immense size, when both heat and moisture combine for their advancement, constitute exceptional adaptations for semi-tropical climates, in which they have been famous from the earliest times. California answers their needs to the fullest degree, and they have naturally attained great local esteem and popularity.[238]

The conditions in the Salton Sink allowed for its cultivation in times when the rest of the state was too cold. With the Imperial Valley providing the "very early cantaloup," California became the leading provider of the produce, "furnishing the fruit from May to December in any quantities the available prices make profitable."[239]

Such an abundance of lettuce and fresh fruit was new to the American diet, and consumers were confronted with the newest trend in food culture: The salad. Until the 1920s, salads were little known, and the newspapers continued to advertise this "novelty dish" as an easy-to-make, healthy side. In 1919, the *Pacific Rural Press* instructed that "to satisfy, a salad must be crisp and fresh and not be prepared long before time to serve."[240] Teaching consumers to wash fruit and vegetables before consumption became a crucial part of introducing salads to breakfasts, luncheons, and garden parties. For example, the press recommended to soak lettuce in vinegar as a preventative measure against contracting typhoid fever. But the heavy promotion of washing raw produce triggered a fear of microbes in many people, who, as a result, refused to consume raw products altogether. To most people, steaming and blanching were the only ways they knew to prepare lettuce. Some recipes advertised a "most nourishing" lettuce soup made from lettuce

[238] "California Vegetables in Garden and Field," *Pacific Rural Press (San Francisco)*, May 14, 1910.
[239] Leopold, *Sand County Almanac*, 157; Rondilla, Guevarra and Spickard, *Decentering Whiteness*, 59; "Cantaloupe Crop of Five Million Crates in Imperial Is Seen," *San Bernardino (CA) Sun*, May 10, 1928, https://cdnc.ucr.edu.
[240] "A South African Salad," *Pacific Rural Press* (San Francisco), November 11, 1922, https://cdnc.ucr.edu.

leaves, dried bread, and milk. But raw lettuce was taking over, becoming an ingredient in almost all recipes. Recipes for roasts, fruit salads, and grains published in newspapers called for serving the dishes on "a crown of lettuce leaves." Another common way to consume lettuce was as a salad together with fruit, such as persimmon or cantaloupe, and topped with whipped cream, mayonnaise, and maraschino cherries.[241]

Cantaloupe flesh and lettuce were often served together, but the cantaloupe was used most commonly as breakfast food or as an ingredient of cold drinks and ice cream. A salad of cantaloupe balls with pineapple or a sundae made of cantaloupe, gelatin, and heavy cream were among some popular recipes of the 1920s and 1930s. Even the rind was used in pickle recipes, although the press articles disputed whether the cantaloupe skin was edible.[242]

Lettuce and Cantaloupe Strikes

Throughout the 1920s, the roughness in lives of farmworkers inspired many of them to join the internationally spreading wave of unionism. The Cantaloupe Strike and the Lettuce Strike were the two major strikes that took place in the Salton Sea region in 1928 and 1935, respectively.

The farmworkers did not welcome cultivating lettuce and cantaloupes with the same "great local esteem and popularity" as the above-mentioned farming guides claimed. The soil of the Imperial Valley was terribly difficult to work with. The upper layers of the fields had a very low sand content and were covered with a hard, clay-like crust. This surface did not absorb water easily, making the process of soil punctuation a necessary part of the

[241] "Lettuce Soup Is Excellent," *Sausalito (CA) News*, June 30, 1923, https://cdnc.ucr.edu; "A South African Salad," *Pacific Rural Press* (San Francisco), November 11, 1922; "Tested Recipes for Tasty Dishes," *Los Angeles Herald*, September 19, 1919, https://cdnc.ucr.edu; "A Delicious Luncheon Salad," *Sacramento (CA) Union*, August 15, 1909, https://cdnc.ucr.edu; "Tasty Salad," *Pacific Rural Press* (San Francisco), February 1, 1919, https://cdnc.ucr.edu; "Never Eat Unwashed Fruit," *Los Angeles Herald*, November 27, 1910 https://cdnc.ucr.edu.
[242] "Globe A1 Flour," advertisement, *Los Angeles Herald*, August 14, 1913, https://cdnc.ucr.edu; "Soft Drinks That Are Hard to Eat," *San Francisco Call*, August 18, 1912, https://cdnc.ucr.edu; "Today's Recipes," *San Bernardino (CA) Sun*, August 11, 1933, https://cdnc.ucr.edu; "Now for the Pickles," *Los Angeles Herald*, August 10, 1918 https://cdnc.ucr.edu.

irrigation process. The workers had to make sure that the punctuation went deep enough to cut beneath the upper three inches of the surface, as water tended to be absorbed in this upper part, leaving the deeper parts dry. In the strong heat, the irrigated land often cracked, making the harvest "rather crude," as Farr described it.[243]

In the spring of 1928, three thousand workers unionized under the Union of United Workers of the Imperial Valley. The Mexican workers of the Imperial Valley initiated the strike, organizing the actions without support from other unions. On May 7, they refused to work and left the fields, demanding better housing conditions and a protection system against contractors who refused to abide by the contracts. The farmers, afraid to lose profit from cantaloupes waiting to be harvested, turned to the local sheriff who arrested dozens of strikers and dispersed the strike within three days. As a result, wages were improved, but the strike aggravated anti-Mexican sentiments. The Imperial County established a quota for Mexican immigrants, which was followed by thousands of deportations. But the Cantaloupe Strike of 1928 gained a strong symbolic meaning among the Mexican population. It was the very first attempt to improve working conditions conducted by Mexican workers and inspired other strikes in California in the 1930s. [244]

In 1933, a wave of lettuce strikes emerged in the agricultural region of Salinas Valley. In November, the Cannery and Agricultural Workers Industrial Union (CAWIU) mobilized almost five thousand workers of the Salinas Valley to protest against unfair treatment. Violent acts escalated on both sides, and after four weeks of heated confrontations, militia groups held almost one thousand workers at gunpoint. On September 24, 1934, the army intervened to end the lettuce strike, and as a result, an agreement was

[243] "California Vegetables in Garden and Field," *Pacific Rural Press* (San Francisco), May 14, 1910; Farr, *History of Imperial County*, 184; MacDougal, *The Salton Sea, 89*.
[244] Rondilla, Guevarra and Spickard, *Decentering Whiteness*, 59-60; Charles Wollenberg, "Huelga, 1928 Style: The Imperial Valley Cantaloupe Workers' Strike," *Pacific Historical Review* 38, no. 1 (1969): 45-58, http://phr.ucpress.edu/content/38/1/45.

reached between the conflicted parties, ruling a wage increase for the farmworkers.[245]

The conflict reached the Salton Sea region in 1935 when hundreds of picketers began dumping truckloads of lettuce in the fields of the Imperial Valley. The army intervened, destroying the strikers' camps. Two people died during the riots and hundreds were injured. In the aftermath, hundreds of army officers guarded the fields, while strikes spread through El Centro, Brawley, Westmoreland, Calexico, Holtville, Niland, and Heber. Just like the Cantaloupe Strike, the Lettuce Strike triggered an impulse for further strikes in Southern California. Strikes continued throughout the Great Depression, perceived as acts of communist ideology. As a result, police or army supervision became very common in the towns of the Salton Sea region, as farmers were demanding protection for the "$2 million lettuce crop—[a] principal source of revenue in the valley."[246]

A Hunting Trip to the Salton Sea

While the waters of the Salton Sea echoed with gunshots, silencing workers' strikes, those were not the only gunshots to be heard in the Imperial Valley. Large numbers of waterfowl journeyed to the Salton Sea, which motivated the region's hunting enthusiasts to load up their shotguns. Waterfowl species favor marshes and irrigation ditches, and so waterfowl was most abundant at those parts of the shore where the New and the Alamo Rivers entered the Sea. Initially, duck and goose hunting were popular leisure activities among local residents, but the bird quantities were so enormous that the Salton Sea became a popular hunting spot for the whole state of California.

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[245] "Imperial Fears Strike Rioting," *Madera (CA) Tribune*, February 16, 1934, https://cdnc.ucr.edu; "Strike in Imperial Is Fast Crumbling," *Madera (CA) Tribune*, February 20, 1934, https://cdnc.ucr.edu; "Hint Settlement Imperial Strike," *Madera (CA) Tribune*, February 3, 1934, https://cdnc.ucr.edu.

[246] "Imperial Valley's Lettuce Workers Strike Stalemate," *Madera (CA) Tribune*, March 1, 1935, https://cdnc.ucr.edu; "Violence Flares in Tense Imperial Valley Strike," *Healdsburg (CA) Tribune*, February 20, 1935, https://cdnc.ucr.edu; "Imperial Fears Strike Rioting," *Madera (CA) Tribune*, February 16, 1934; "All Is Quiet in the Strike Area of Imperial Valley," *Desert Sun (Palm Springs, CA)*, March 8, 1935, https://cdnc.ucr.edu; "Strike in Imperial Is Fast Crumbling," *Madera (CA) Tribune*, February 20, 1934.

Local gun clubs, such as the El Centro Gun Club, emerged in the 1910s, accepting between fifteen and fifty members at a time. But it was not until the 1920s and 1930s that the Salton Sea became a country-wide hunting landmark. Farmers from Redlands, business owners from Brawley, engineers from Los Angeles, and conservationists from the Midwest could be found among the hunters, crossing the river banks and boating on the Salton Sea in search of geese and ducks. The gun clubs acquired hunting grounds where they set up tents and provided boats for their members. The early morning hours were best to reserve for a hunting trip, when the birds were most plentiful.[247]

Between the 1910s and 1930s, the Salton Sea significantly transformed the migration patterns of waterfowl across North America. The press reports from the era, including accounts from hunting trips, leave an impression that the numbers of waterfowl were indeed overwhelming. They arrived in hundreds of thousands. Each winter, the Salton Sea welcomed as many as half of the entire population of the Pacific Flyway ruddy duck, amounting to as many as one hundred thousand visitors per year. Among ducks, dozens of varieties could be spotted: Blue-winged teals, cinnamon teals and springs resided at the Salton Sea shores alongside numerous varieties of mallards, wigeons, spoonbills, and canvas. Geese were just as plentiful, including the snow geese and the Ross's geese.[248]

What does the term "waterfowl" convey? The waterfowl species belong to the order of anseriformes, which includes screamers, swans, geese, and ducks. They require water to thrive and are thus drawn to rivers and water reservoirs. All anseriformes are web-footed, which allows them to move on the water's surface with ease. They feed predominantly on plants, seeds, and insects, but they frequently add small fish or clams to their diet. Patten, McCaskie, and Unitt summarize the habits of most waterfowl species as

[247] "Valley Gunners and Valley Ducks," *Imperial Valley Press* (El Centro, CA), January 2, 1909, https://cdnc.ucr.edu.
[248] "Valley Gunners and Valley Ducks," *Imperial Valley Press* (El Centro, CA), January 2, 1909; Patten, McCaskie, and Unitt, Birds of the Salton Sea, 103-122.

"catholic," meaning that they remain in monogamous relationships throughout their lives.[249]

Duck hunting became a leisure activity similar to fishing. Hunters valued these birds for their abundance and their flavor. In contrast, admiring birds for their beauty, majesty, and graceful habits was reserved for the American white pelicans and cormorants. Ducks became an anonymous mass of flesh, similar to fishes. While pelicans and cormorants were flighty and difficult to spot, ducks were the ordinary, "lower-class," waterfowl. Moreover, the local farmers despised these birds, which often fed on their fields, spoiling the produce. While pelicans were treasured for their mere existence, ducks were treasured for their flavor. The *Imperial Valley Press* considered a duck from the Imperial Valley more flavorful than those from other parts of the country:

> Any fresh-water duck killed in Imperial Valley is good to eat. [...] In this region they feed, wholly on vegetable matter–grains and grasses– and the wild flavor is not noticeable. In short, the Imperial Valley duck is as much superior on the table to the duck of the coast regions as the Imperial Valley turkey is to other turkeys.[250]

Aldo Leopold's essay "The Green Lagoons — Colorado River Delta" provides an account of what a hunting trip in the wild Salton Sea region looked like in the 1920s. The essay was published in his famous *A Sand County Almanac*, known as one of "the cornerstones of modern conservation science, policy, and ethics."[251] In 1922, Leopold and his brother traveled through the Colorado Delta, hunting for geese, ducks, and deer. To Leopold, the Colorado Delta region was the embodiment of true wilderness, although in reality, it

[249] Patten, McCaskie, and Unitt, *Birds of the Salton Sea*, 112; "Valley Gunners and Valley Ducks," *Imperial Valley Press* (El Centro, CA), January 2, 1909.
[250] "Valley Gunners and Valley Ducks," *Imperial Valley Press* (El Centro, CA), January 2, 1909.
[251] "A Sand County Almanac," The Aldo Leopold Foundation, accessed September 14, 2018, https://www.aldoleopold.org/about/aldo-leopold/sand-county-almanac/.

was rather far from it, having been largely transformed by the Laguna Dam and other diversions which had blocked the river's natural course.[252]

With no plan and no map, "like the river, we were free to wander," the brothers journeyed through the "waters of deep emerald hue." As they paddled in their canoe for several weeks, the biggest challenge was to find drinkable water. Lagoons were saline, the river was too muddy, and most wells carried brine. To test the sources, they lowered Leopold's dog to the water and if the dog drank, the two hunters were lucky to have found sweet water. But food was abundant as large amounts of geese allowed many successful hunts: "At every camp we hung up, in a few minutes' shooting, enough quail for tomorrow's use." He praised the flavor of the geese, claiming that he had "not seen perfection" until he "roasted a young goose with Delta mesquite."[253]

Leopold was in awe of the wild birds circulating in the Delta:

> Every morning we watched the cackling phalanx head inland from the Gulf, shortly to return, replete and silent. What rare provender in what green lagoon was the object of their quest? Again and again we moved camp gooseward, hoping to see them settle, to find their banquet board. One day at about 8 a.m. we saw the phalanx circle, break ranks, sideslip, and fall to earth like maple leaves. Flock after flock followed. At long last we had found their rendezvous.[254]

Most of the hunting trips were much shorter than that of Aldo Leopold. Members of the gun clubs took day trips to the Salton Sea to hunt. The official waterfowl hunting season began on October 1, when the amounts of birds arriving were at their highest, and ended on January 15. But many hunters continued with their activities throughout the year.

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[252] Leopold, *Sand County Alamac*, 155. DeBuys, *Salt Dreams*, 137-140.
[253] Leopold, *Sand County Almanac*, 151-157.
[254] Leopold, 153.

In 1924, the *Coronado Journal* reported on "millions of ducks flying in the vicinity of the Salton Sea," declaring the waterfowl birds to be "one of the evidences of the great transformation that water has brought to the desert."[255] The geese were so plentiful that hunting enthusiasts from the whole state became attracted to these shooting grounds. The *Los Angeles Herald* advertised a visit to the Salton Sea:

> "Imagine leaving Los Angeles and within nine hours being enabled to shoot enough geese – real wild geese – to well supply your neighbors for Thanksgiving Day dinner?"[256]

Hunters did not mind the 180-mile journey from Los Angeles to the Salton Sea. There were so many geese that with each shot directed at a flock, a bird was killed. To make the shooting even more efficient, many hunters began to use small cannons to shoot several birds at once. By the mid-1920s, bird hunters proclaimed the Salton Sea as the best spot for waterfowl hunting in the whole state, taking the title away from the San Bernardino Valley, where waterfowl numbers decreased.[257]

But why was it that other regions lost their abundance of waterfowl species? The answer can be found in the consequences of intensive farming. In the farming region of Sacramento Valley, agriculture proved to be disastrous for wildlife. Five thousand acres of dedicated wildlife refuge were destroyed by farming in the Sacramento Valley in the second half of the 1920s. Most of those birds that fled from the north chose the Salton Sea to be their next home. And this is how, as gathering birds escaped from other regions, the Salton Sea became one of the most important nesting grounds on the Pacific Coast. But the Sea was not able to protect them from the damages of

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[255] "Duck Hunters Fail to Bag Limits in Valley," *Coronado (CA) Journal*, October 11, 1924, https://cdnc.ucr.edu.
[256] "L.A. Hunters off for Moreno Dam," *Los Angeles Herald*, December 11, 1920, https://cdnc.ucr.edu.
[257] "Metamorphosis of the Desert," *Imperial Valley Press* (El Centro, CA), June 20, 1908; "Duck Hunters Await Oct. 1," *San Bernardino (CA) Sun*, September 28, 1928, https://cdnc.ucr.edu; "L.A. Hunters off for Moreno Dam," *Los Angeles Herald*, December 11, 1920; "Duck Hunters Fail to Bag Limits in Valley," *Coronado (CA) Journal*, October 11, 1924.

agricultural production as the two most popular river mouths at which they often arrived were located right at the northern tip of the Imperial Valley. In spite of the destruction of the Sacramento Valley refuge, the officials of the United States Department of Agriculture decided to establish a bird refuge right at the border of the Imperial Valley.[258]

Before the federal government intervened, the state of California was first to impose hunting limitations on waterfowl hunters. In 1929, the California Fish and Game Commission established ground rules for hunters, forbidding them to hunt more than twenty-five birds per day or fifty per week. In addition, the Commission established public shooting grounds. Those hunters who wanted to use those grounds were required to obtain a waterfowl shooting license, and the Commission claimed that all unlicensed hunters would be arrested. But private shooting grounds remained popular. The same year, the Redlands Delta Duck Club secured lands southeast of the Salton Sea for its twenty members. The private game reserve, which included a luxurious clubhouse, was spread over four hundred acres, out of which eighty were under water.[259]

At the same time, the federal government was taking steps to regulate the hunting grounds. In 1929, the Biological Survey of the Department of Agriculture assessed the Salton Sea as a crucial area for bird migration. The Migratory Bird Conservation Act of 1929 established numerous refuges in the American West, and the Salton Sea was recognized as an important addition to the Los Banos refuge and to the damaged refuge of the Sacramento Valley. The act regulated the prices of land dedicated to refuges and established the Migratory Bird Conservation Commission, whose members determined the locations of the refuges. Just seven months after the act was passed, the severe economic disaster known as the Great Depression began, which meant that funding for wildlife conservation was

[258] "California News Review," *Coronado (CA) Journal*, August 12, 1931, https://cdnc.ucr.edu.
[259] "Two Local Goose Hunters Bag Limit in Record Time," *Los Angeles Herald*, November 26, 1921, https://cdnc.ucr.edu; "Duck Club Will Build New Home," *San Bernardino (CA) Sun*, September 2, 1921, https://cdnc.ucr.edu; "Duck Season Is in the Offing," *Healdsburg (CA) Tribune*, September 28, 1929, https://cdnc.ucr.edu.

discontinued. But the Commission managed to establish a major bird refuge at the Salton Sea, which it assessed as the only area in Southern California meeting all the requirements of an ideal game refuge. In November 1930, President Hoover signed the executive order dedicating thirty-eight thousand acres of federal lands south of the Salton Sea to "the Salton Sea Wild Life Tract." The government withdrew those lands from any land reclamation purposes of the Yuma project and transferred the responsibilities over the lands to the Department of Agriculture. Within the area, it was forbidden to hunt, trap, or disturb any animals. Destroying bird nests and eggs or plants, and making a fire, were prohibited as well.[260]

The ducks and geese gained a shelter at the Salton Sea, but wildlife protection and agriculture did not get along. Agrarian machinery was in full swing, endangering the birds with the possibility of being injured or killed. Moreover, the location of the tract, in close proximity to the Imperial Valley, caused discontent among farmers as they considered ducks to be one of their crops' biggest enemies. But the Department of Agriculture promoted the refuge as beneficial to farming. The plan was to attract birds to the designated areas of the refuge where food would be provided. This was supposed to keep birds away from the fields, but ducks continued to feed on the barley and alfalfa on the farming lands. The only ones who profited from this situation were the gourmet hunters, who considered the meat of barley-fed ducks particularly soft and tasty.[261]

[260] "California News Review," *Coronado (CA) Journal*, August 12, 1931; "Of Interest to All Sportsmen," *Healdsburg (CA) Tribune*, October 5, 1929, https://cdnc.ucr.edu; "Salton Sea Area to Be Bird Refuge," *San Bernardino (CA) Sun*, December 7, 1930; "Fishing and Hunting," *San Bernardino (CA) Sun*, December 14, 1930, https:// cdnc.ucr.edu.
[261] "California News Review," *Coronado (CA) Journal*, August 12, 1931; "Valley Gunners and Valley Ducks," *Imperial Valley Press* (El Centro, CA), January 2, 1909.

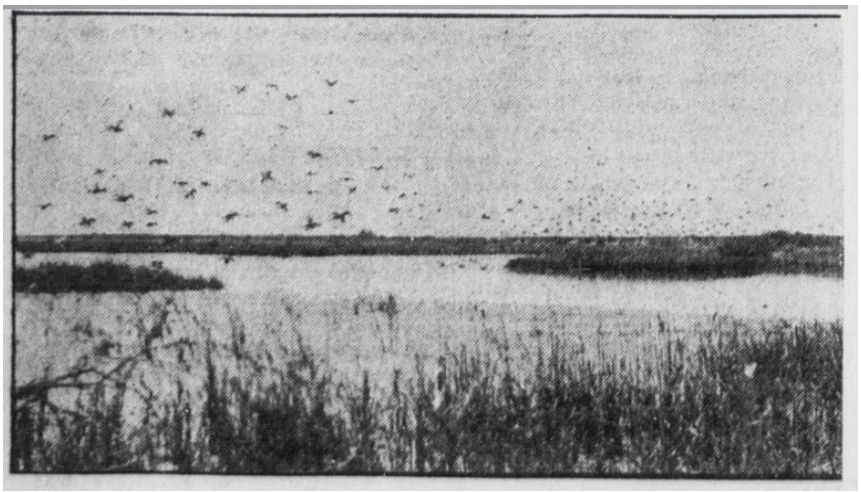

FIGURE 3.5. An abundance of ducks at the mouth of the Alamo River, Salton Sea, 1910. (Photograph courtesy of *Imperial Valley Press* (El Centro, CA), "Submarine Sport," March 12, 1910, https://cdnc.ucr.edu/.)

The River's Curse

In 1924, Congress intervened to tackle the chaos in the Reclamation Service, passing the Fact Finder's Act and ending the first two decades of the Service's activities with a thorough examination. Through this process, negligence cases were to undergo an internal investigation, which would help to determine the causes of dissatisfaction among the settlers. Elwood Mead was appointed the new commissioner. An experienced engineer, and later the namesake to Lake Mead, he transformed the Service from an underfunded and mismanaged agency into an industrious and efficient engineering machine, and he oversaw its projects until his death in 1936. It was after the Fact Finder's Act that the agency was renamed from the Reclamation Service to the Bureau of Reclamation (USBR). The USBR became a major power in the American West and gained control of all water projects. In the 1930s, its impact extended to the Salton Sea.

The 1930s became a decade defined by extremely high unemployment, low wages, and poverty as the Great Depression impaired the American economy. In 1933, President Franklin D. Roosevelt initiated a strong federal response known as the New Deal. The economic relief program was based on heavy federal funding of various programs and public works projects, which included large-scale agricultural and waterpower projects. The USBR hence

gained enormous importance during the 1930s. The Boulder Dam (renamed as the Hoover Dam in 1947), dedicated by Franklin D. Roosevelt on September 30, 1935, was not only the USBR's largest structure completed during the Great Depression but also the largest dam on planet Earth at the time of its dedication.[262]

"No, I didn't build it, but it was based on an idea of mine!" says a beaver to a rabbit, pointing to the Hoover Dam.[263] Behind every joke, there is a grain of truth, and the basic objective of the dam was as simple as that of the dams built by beavers. Its goal was to slow down the flow of the Colorado River and to create a quiet and deep-water reservoir. But the construction of the Hoover Dam, which stretches 1,244 feet across the Black Canyon, was an undertaking on an unprecedented scale. Even today, the dam refuses the Colorado River its natural pathway, pressing against it with almost five million cubic yards of concrete and steel. Lake Mead, its artificial reservoir, is able to store twice the amount of the Colorado's annual flow and diverts it to the All-American Canal. Enabling a more accurate regulation of water transportation to the Imperial and Coachella Valleys, the emergence of those gigantic structures fundamentally changed the Salton Sea.

In the myriad of comprehensive studies on the Hoover Dam and its consequences for the American West, two tendencies appear to be the strongest. The publications by Robert W. Adler, Marc Reisner, and Donald Worster investigate the dam as a major cause in the failures of land reclamation projects in the American West. Other publications, such as Michael A. Hiltzik's *Colossus*, have a stronger popular scientific focus, aiming to provide a detailed account of the construction of the dam. Both

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[262] David P. Billington and Donald C. Jackson, *Big Dams of the New Deal Era: A Confluence of Engineering and Politics* (Norman, OK: University of Oklahoma Press, 2017); "Bureau of Reclamation Historic Dams and Water Projects—Managing Water in the West," National Park Service, U.S. Department of the Interior, accessed March 11, 2018, https://www.nps.gov/nr/testing/ReclamationDamsAndWaterProjects/Water_In_The_West.html; "Reclamation Bureau's Engineer Declares Boulder Dam Project Six Months Ahead of Schedule," *San Bernardino (CA) Sun*, April 14, 1931, https://cdnc.ucr.edu.

[263] Suzanne Smith, "Use Lessons from Technology Innovation to Build Change Elsewhere," Chicago Tribune online, December 14, 2015, accessed February 23, 2018, http://www.chicagotribune. com/bluesky/hub/ct-bc-technology-lessons-bsi-hub-20151214-story.html.

types of work are useful in determining the extent of the impact that the dam had on the Salton Sea.[264]

Arthur Powell Davis, the director of the Reclamation Service from 1914 until 1923, was the first to propose the development of a dam in the Boulder Canyon of the Colorado River. But it was not until December of 1928 that President Coolidge authorized this project and appointed the USBR to execute it. The stock market crash of 1929 followed by the outbreak of the Great Depression marked the beginning of a new era for the USBR as it received an enormous inflow of federal funds and a chance to rehabilitate its damaged reputation by providing jobs during the economic crisis. Seventy large-scale projects were signed off by the USBR before World War II, forty of them during the Great Depression. The Hoover Dam was the largest one of them, and it was largely completed by 1933, before the initial phase of the New Deal began.[265]

The USBR constructed the Hoover Dam between 1931 and 1936, two hundred miles away from the Salton Sea, on the border between Arizona and Nevada. The Black Canyon and the Boulder Canyon met the geological conditions to carry the site without the risk of collapsing. Over twenty thousand workers were employed for the construction, and dozens of them sacrificed their lives building the dam. So many tourists were drawn to the construction site that the workers had to build an observation platform on the canyon rim, and today it still draws as many as one million visitors every year. At the Salton Sea, the emergence of the new dam meant that both the amount and quality of water that fed the Sea would change radically.[266]

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[264] Robert W. Adler, *Restoring Colorado River Ecosystems: A Troubled Sense of Immensity* (Washington, DC: Island Press, 2007); Worster, *Rivers of Empire;* Reisner, *Cadillac Desert*; Hiltzik, *Colossus;* Andrew J. Dunar and Dennis McBride*, Building Hoover Dam: An Oral History of the Great Depression* (Reno, NV: University of Nevada Press, 2001), 41.
[265] Worster, *Under the Western Skies*, 69, 72; Boulder Canyon Project Act of 1928, 70th Cong. US Code § 642 (December 21, 1928).
[266] Dunar and McBride, *Building Hoover Dam*, xvii, 302; "Arizona, Imperial Valley Will Get River Benefits," *The San Bernardino (CA) Sun*, January 13, 1935, https://cdnc.ucr.edu; "The Greatest Dam in the World: Building Hoover Dam," National Park Service, U.S. Department of the Interior, accessed March 19, 2018, https://www.nps.gov/nr/twhp/wwwlps /lessons /140hooverdam/140hoover_dam.html; "The Colorado River and Hoover Dam Facts and Figures," Lower Colorado Region, Bureau of Reclamation, U.S. Department of the Interior, accessed April 4, 2018, https://www.usbr.gov/lc/region/pao/faq.html.

The All-American Canal was a crucial part of the Boulder Dam project. Planned to replace the Imperial Canal, it was to become the new source of water for the areas around the Salton Sea. The planning to construct this new canal began in 1918, before the Boulder Dam construction was even in sight, and its name emerged from the anti-Mexican sentiments related to the Imperial Canal, referred to as "the Mexican menace."[267]

Thomas Cory's Imperial Irrigation District (IID), the enterprise responsible for the management of the Imperial Canal, struggled with the extreme unruliness of the canal system, whose lateral canals were constantly clogged with silt. Moreover, the canal passed through a diversion into Mexico, from which originated the perception of the canal as "the Mexican menace." Because of this diversion, the system required half of the transported water to be distributed in Mexico for half of the usual cost. The IDD, however, was unhappy with this arrangement. Cory wished to control the water costs without any foreign involvement, and the plan for the new "All-American" canal would allow for that. Moreover, the plan foresaw a doubling of the irrigated surface from 515,000 to 900,000 acres. Lastly, while the USBR was responsible for the construction of the canal, the IID was appointed to be in charge of its maintenance.[268]

In 1919, the project was signed off by the USBR and the agreement required that the construction work begin within the following two years. The press reports of that time reveal a great deal of enthusiasm regarding the benefits that the canal would bring to the Imperial Valley. "The wonderful development of Imperial Valley under the Mexican handicap of irrigation and with only two or three inches of rain per year, bids fair to be far surpassed in the grand era just begun," the *Pacific Rural Press* reported in 1919, celebrating the construction of "the great ditch."[269]

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[267] "Biggest American Irrigation Plan," *Pacific Rural Press* (San Francisco), March 8, 1919, https://cdnc.ucr.edu.
[268] "Biggest American Irrigation Plan," *Pacific Rural Press* (San Francisco), March 8, 1919.
[269] "Biggest American Irrigation Plan," *Pacific Rural Press* (San Francisco), March 8, 1919.

But the funding was limited. The All-American Canal was supposed to be financed from bond issues of the IID, and it was not certain whether Congress would provide any financial aid. It was not until the authorization of the Boulder Dam project in 1928 that full funding was secured from the federal government, and the construction work began in full swing. The USBR appointed its chief engineer, John L. Savage, to coordinate the works, and the canal was dedicated in 1942. Six years later, the Coachella Canal began to redirect water from the All-American Canal to the Coachella Valley.[270]

In a 1936 edition of the magazine *Popular Science*, a description filled with admiration for the size of digging carriages describes the canal:

> Rushing through miles of sage and mesquite, plunging under natural watercourses through concrete siphons, the new All-American Canal will tap the Colorado's muddy waters about fifteen miles north of Yuma, Arizona. [...] Reckless indeed seemed the engineers who undertook this job. [...] The main canal will empty into the irrigation network of Imperial Valley, where, under a broiling sun, a phenomenally rich soil puts forth amazing crops. Ultimately, a branch will snake northward to Coachella Valley, the fertile, palm-covered oasis from which come America's homegrown dates.[271]

In addition to silt, the engineers worried about desert sand clogging the canal. To avoid this, a high embankment was added on its sides.[272]

[270] "Biggest American Irrigation Plan," *Pacific Rural Press* (San Francisco), March 8, 1919; Dunar and McBride, *Building Hoover Dam*, 272-279; Coachella Valley County Water District, *Golden Years,* 6-10.
[271] Gleason, "Digging the World's Biggest Ditch," 11-12.
[272] Gleason, "Digging the World's Biggest Ditch," 12-13.

FIGURE 3.6. Pouring concrete into columns of the Hoover Dam, 1934. (Photograph courtesy of the U.S. Department of the Interior, Bureau of Reclamation, Reclamation Photograph Database, https://www.usbr.gov/lc/region/g5000/photolab/gallery_detail.cfm?PICIDTYPE=7260.)

The Separation from the Parent River

The environmental lawyer Robert W. Adler refers to the Hoover Dam as the "plumbing system" of the Colorado River, emphasizing the impact it had on vast regions of Mexico, depriving those areas of their water source. He points out several advantages of the dam. They include providing the "river's liquid gold" to thirty million people, protecting vast regions from floods, and providing electricity with hydroelectric power. In addition, the artificially created reservoirs and the dams attract millions of visitors annually and provide jobs. But Adler, Marc Reisner, and Donald Worster all agree that the disadvantages of the Hoover Dam unquestionably outweigh its advantages.[273]

An apparent disadvantage is the visual dominance of the dam. In his investigation of its construction, Reisner notices how the size of the dam outshone the rest of the area. Visitors who admired the ongoing work from the canyon rim later remembered that it was impossible to say who was

[273] Adler, *Restoring Colorado River Ecosystems,* 4-5; "Graphic Air View Shows Progress on Hoover Dam," *Coronado (CA) Journal*, May 18, 1932, https://cdnc.ucr.edu.

constructing it: “The men working on top were not even ants: they hardly qualified as fleas.”[274]

The dedication of the Hoover Dam completed the process of separating the Salton Sea from its parent river. The dam pushed the Colorado River into the background as the new system trapped and redirected its streams on an unprecedented scale. This separation and fragmentation of nature was not only a visual one. Adler points out that this fragmentation of a once whole system imprisoned the Colorado River water, changing its temperature and the mineral components of the sediment. The liquid released from dams was now more uniform, colder, and carried less minerals and silt than the free-flowing water. This fundamental change of water components and its temperature greatly affected the Salton Sea as the “new” water became more uniform and artificial than the water previously carried through the irrigation canals of the Imperial Canal system.[275]

Throughout the 1930s, the USBR expected that after the dedication of the new dam, the irrigated desert would become the largest cotton supplier in the country. In the 1920s, the cotton-feeding beetle boll weevil destroyed thousands of acres of traditional southern cotton plantations, which encouraged landowners across California to plant cotton in order to satisfy the high national demand. As a result, cotton plantations in the Salton Sea region greatly increased the Sea’s size. But even without the contribution from the land irrigated for cotton cultivation, the construction of the Boulder Dam and the All-American Canal greatly increased the volume of water carried to the Salton Sea. As the acreage of irrigated land doubled between 1928 and 1942, so did the volume of runoff released into the Sea.[276]

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[274] Reisner, *Cadillac Desert*, 129, 120-144.
[275] Adler*, Restoring Colorado River Ecosystems,* 5-7.
[276] Mark Cioc, *The Rhine: An Eco-Biography, 1815-2000* (Seattle, WA: University of Washington Press, 2002), 5; William DeBuys, *Salt Dreams*, 163; Farr, *History of Imperial County,* 158;
“Imperial Valley Cotton Fields,” *Imperial Valley Press* (El Centro, CA), October 31, 1908, https://cdnc.ucr.edu; “California County Nomenclature Interesting Historic High-Lights,” *Sotoyome Scimitar* (Healdsburg, CA), September 26, 1935, https://cdnc.ucr.edu;
Daniel Geisseler and William R. Horwath, "Cotton Production in California," within the project *Assessment of Plant Fertility and Fertilizer Requirements for Agricultural Crops in California*, University of California, Davis, June 2016, 1-4, https://apps1.cdfa.ca.gov

The color of the water that reached the Salton Sink changed as well. Before the dam was built, the Colorado River accumulated sediments and minerals, which often turned the river waters chocolate brown. The riverbed carried these substances through its entire course. After the dedication of the Hoover Dam, the water lost vast amounts of the sediment and mineral content which decreased the brown pigmentation of the river water. Thus, the Salton Sea received the largely sediment-deprived fluid.[277]

The USBR, powered by what Adler refers to as "futility in the name of utility,"[278] was focused on the various functions of the Hoover Dam rather than on its long-term consequences. But all three of the primary functions of the dam — flood control, water supply, and electricity generation — turned out to be an ill-conceived success, considering the dam's maintenance costs. In 1932, the federal government expected that within sixty years, the dam would pay for itself with electricity generation. But even after the dam was completed, the cost of flood control ($2,000 per acre) was higher than the revenue from the land ($150 per acre). Flood control costs became high with the influx of new settlements close to the river. Areas closest to the canals were most affected by floods, so in many cases the USBR redirected the river into other channels, trying to circumnavigate the settlements. But this Sisyphean labor was not effective in preventing floods, which continued in the Colorado River Delta.[279]

The Hoover Dam damaged the liveliness of the Colorado River. But did the dam as a consequence spell the death of the river? In his eco-biography of the river Rhine, Cioc claims that a river is only dead when it cannot support its flora and fauna. The Hoover Dam and the All-American Canal greatly

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/FertilizerResearch /docs/Cotton_Production_CA.pdf; Stacia Dudle, "Agriculture in the Imperial Valley: A Tale of Two Seas," Agriculture, Economy, History, Salton Sea Sense, April 29, 2015, accessed March 3, 2018, https://saltonseasense.com /2015/04/29/agriculture-in-the-imperial-valley-a-tale-of-two-seas/.

[277] Redlands Institute*, Salton Sea Atlas*, 39.

[278] Adler, *Restoring Colorado River Ecosystems,* 6.

[279] "Graphic Air View Shows Progress on Hoover Dam," *Coronado (CA) Journal*, May 18, 1932; "Arizona, Imperial Valley Will Get River Benefits," *San Bernardino (CA) Sun*, January 13, 1935; Dunar and McBride, *Building Hoover Dam*, 303-304; Adler, *Restoring Colorado River Ecosystems,* 5-7.

transformed the ecosystems of the Colorado River. Feeding the river with agricultural runoff and other waste materials, including raw sewage, made the river's ecosystems even more vulnerable, and introducing new species to its ecosystems brought about an imbalance in those systems, causing illness and extinction of birds and fish species. The dam has not even been there for a whole century, but it is already certain that the dam and its system of canals has destroyed over half of Colorado's wetland habitats, damaged natural vegetation, and poisoned the ground with chemicals. Thus, while the river is not dead, its condition can be described as fatal.[280]

The USBR has been subject to extensive scholarly criticism in the field of environmental history. *The Great Thirst*, *Cadillac Desert*, *Rivers of Empire* and *Bitter Harvest* are among dozens of studies pointing to the destructive consequences of massive water projects. In the case of the Hoover Dam, Donald Worster delivers a harsh critique of the land reclamation projects in the American West. To Worster, the Hoover Dam is a crucial representation of the failure of the "hydraulic society." The dam failed to fulfill its purpose and drove the American West towards a greater centralization of power. Worster adds that in spite of reforms and an influx of federal funds, the USBR continued to be affected by a lack of preparedness in crisis management, power struggles, and a bureaucratic mess.[281]

It comes as no surprise that the Bureau created its own narrative. After "Managing Water in the West"[282] for over a century, the USBR has little, if no reflection over the damage it has done. The Bureau considers its early years to have been successful and has created a grand tale of taming nature. Its self-published account, written by the historians William D. Rowley and Andrew H. Gahan, conveys tales of "achievements and achievers," of seeing

[280] Cioc, *The Rhine*, 5; DeBuys, *Salt Dreams*, 163; Adler, *Restoring Colorado River Ecosystems,* 5-7.
[281] Norris Hundley, *The Great Thirst: Californians and Water, 1770s-1990s* (Berkeley, CA: University of California Press, 1992); Daniel, *Bitter Harvest;* Reisner, *Cadillac Desert*; Worster, *Rivers of Empire*, 210-212.
[282] "Reclamation. Managing Water in the West" is USBR's official motto.

opportunities that “private capital did not wish to undertake,” of “promoting growth and prosperity,” and of creating “tremendous possibilities.”[283]

The first water deliveries to the Salton Sea area from the All-American Canal came in the fall of 1941. On December 7, 1941, the Japanese Navy Air Service attacked the United States naval base in Pearl Harbor, which resulted in the US entry into the World War II. At the same time, in the Imperial Valley, seaplanes appeared above the fields of lettuce. But why were those planes taking off and landing at the remote shores of the Salton Sea?

[283] U.S. Department of the Interior, Bureau of Reclamation, *The Bureau of Reclamation. Managing the Water in the West. Origins and Growth to 1945*, by William D. Rowley and Andrew H. Gahan (Denver, CO, 2006), 1, 4-13.

Chapter Four
THE SEA GOES TO WAR

World War II and The Salton Sea

"A lot of good men and a lot of good planes are at the bottom of the Salton Sea," Ted Darcy, a consultant for the United States Navy, was quoted as saying in 1999.[284] Immediately after the attack on Pearl Harbor, the Salton Sea was drafted to war. During World War II, a new perception of the Salton Sea emerged as it became part of the war machine. Rockets, parachute jumps, weapons, and atomic bomb tests became part of the landscape at its southwestern end. But those elements that tell the story of the Sea during wartime do not seem to fit together: What does the Salton Sea have in common with tropical coral islands of the Pacific Ocean? And how is it possible that the United States Navy chose a movie set built by a Hollywood film studio as their training ground? And finally, how could the bombs dropped by the United States on its enemies be connected to an emergence of ocean barnacles in the Southern California desert?

This chapter follows the major developments during the World War II period, focusing on the ecological impact of the war on the Salton Sea. First, the Sea served as a setting for the development of a war propaganda movie in the spring of 1942. In the following months, the Sea became host to the new navy test base, witnessing combat training and warfare tests. Oddly, the presence of the navy in the area made the Sea "one of the few inland lakes in the world that hosts a thriving barnacle population."[285] Furthermore, the American white pelicans returned to the Salton Sea to breed, welcoming the stillness of the shores devoid of busy tourists. But up in the sky above the Sea, the stillness was disturbed by the sound of seaplane war engines. Among thousands of planes that crossed the sky above the Salton Sea, the bomber

[284] "Divers Examine Wreck of Plane in Salton Sea," *Los Angeles Times*, June 15, 1999, https://www. latimes.com/lat-archives/.
[285] Redlands Institute*, Salton Sea Atlas*, 50.

Enola Gay dropped dummy atomic bombs into the Sea as the end of the war was approaching. Meanwhile, the California Department of Fish and Game (CDFG) initiated a series of experiments, restocking the Salton Sea with new fishes in order to make the Sea suitable for successful sports fishery. While on the shores of the Salton Sea, battle training was taking place, underneath its surface, mullet, sargo, corvina, and other fish species were waging a battle of their own.

This chapter focuses on the period between 1941 and 1945. The core sources selected for this chapter are the now declassified documents of the United States Navy. In addition, wildlife studies such as Arnold Ross's *Wonders of Barnacles* and Rachel Carson's contributions to marine biology are highly relevant.

World War II began in 1939, but it was not until 1941 that the United States became entangled in the wartime activities. At the beginning of the war, commercial fishing of mullet peaked at the Salton Sea as German submarines presented a hazard to ocean fishing. Between 1939 and 1941, there was little military activity at the Sea, and on its eastern and northern shores, recreational visitors used the beaches for fishing and swimming. The United States Navy used the Sea as an emergency site and as a swimming spot to train its cadets. In addition, the navy conducted seaplane target testing in the northern part of the Sea. In November of 1941, a few weeks before the Pearl Harbor attack, navy buoys were installed close to Mecca in Date Palm Beach, where the investor named Gus Eilers was struggling to develop the "Salton Sea Resort."[286]

Eilers, a businessman from the Bay Area, had had a grand vision some fifteen years earlier. In 1926, he acquired lands at the North Shore with a plan to build a resort, which would be inspired by visual motifs from Ancient Egypt. Eilers laid out streets and built a long pier at the Sea, but his plans

[286] Denise Goolsby, "Military: Salton Sea was used as 'Wake Island' movie set," *Desert Sun* (Palm Springs, CA), August 22, 2015, accessed May 5, 2018, https://eu.desertsun.com/story/news/2015/08/21/military-salton-sea-part/32128649/.

failed in 1929 when the market crashed, and he was left with no funds. When the navy approached him in 1941 asking for assistance in the maintenance of the Salton Sea emergency site, Eilers agreed to help. The facilities he had managed to build were modest but were enough to station the navy's soldiers. The navy commissioned for these amenities to be renamed as *Seaplane Base, Salton Sea*. The base was used for stationing crews in case of emergency. But there was no navy infrastructure at the base, aside from the piers and wharves at Sandy Beach. When seaplanes landed on the Sea, Gus Eilers collected the plane crews on his own with his rowboat or a motorboat. But the cooperation between the United States Navy and Eilers did not last long. December 7, 1941 marked a shift in American engagement in the conflict as the Japanese attacked the United States' naval base in Pearl Harbor. The United States entered the war with a full-scale engagement of all of its wartime resources.[287]

Playing War

On April 26, 1942, the *San Bernardino Sun* reported that Captain Davis's Mullet Island was temporarily renamed as Wake Island. This renaming was a tribute to the U.S. Marine defenders of Wake Island and a promotion measure for a motion picture produced by Paramount Pictures, a major Hollywood film studio. Filmed in the spring of 1942 at the southwestern shore of the Salton Sea and directed by John Farrow, *Wake Island* was one of the first war propaganda movies produced in the United States. Described by the *New York Times* as "A Stirring Tribute to the United States Marines,"[288] it was the first Hollywood film about American soldiers in World War II and was an inspiration to other war movies such as the 1943 *Destination Tokyo* or the 1956 *Battle of the River Plate*. The movie pictures the developing conflict several weeks prior to the Pearl Harbor attack on the

[287] Goolsby, "Military"; Steve Horvitz, "A Bit of Eden," Salton Sea State Recreation Area, CA, 1998, 3.
Laflin, *The Salton Sea*, Chapter 2; Holger Terp, *Nuclear Weapons Production in the US 1941-2011* (Copenhagen, Denmark: Danish Peace Academy, 2004), 119.
[288] "The Screen: 'Wake Island,' a Stirring Tribute to the United States Marines, With Brian Donlevy in the Cast, at the Rivoli Theatre," *New York Times*, September 2, 1942, https://www.nytimes.com/search/.

Wake Island military camp, followed by a re-enactment of the Battle of Wake Island, which began on the day following the Pearl Harbor attack.[289]

Wake Island was a patriotic, entertaining and uplifting motion picture. Like all war propaganda films, it did not provide a faithful representation of the historical facts. The heroic and exaggerated narrative of the battle that ended in a surrender to the Japanese forces shows the United States Navy fighting until the last man. It became one of the biggest box office hits of 1942 and received four Academy Award nominations in the 1943 award season. Upon the theatrical release of *Wake Island*, the *Piru News* praised it as a masterpiece which depicted the historic accuracy of the battle: "Completely devoid of romance, it is basically a day by day factual record of the terrible onslaught of Japanese sea and air forces, vastly superior in number, upon the garrison."[290]

In fact, the United States surrendered earlier than pictured in *Wake Island*. But the film treasured the symbolic value more than historical correctness, and it was not only the plot that was inaccurate. Filipino actors talking with Chinese accents portrayed the Japanese soldiers, and the production design hardly resembled the actual setting. Wake Island is a coral atoll of Micronesia in the Pacific Ocean, and it looks nothing like the Salton Sea. The mesquite bushes and other desert plants do not resemble the thick grass of Wake Island. But since the movie was shot in black-and-white, the dark blue waters of the Salton Sea could easily be used to portray the azure blue waters of Micronesia.[291]

Paramount Pictures chose the southwestern shore of the Salton Sea to be the main location for the production of *Wake Island*. Army tents and barbed wire fences were constructed, and dozens of extras in U.S. Marine costumes participated in the re-enactment of the battle of Wake Island. For the

[289] "Men Must Be Trained for Delicate Jobs," *San Bernardino (CA) Sun*, April 26, 1942, https://cdnc.ucr. edu.
[290] "At the Theater," *Piru (CA) News*, October 8, 1942, https://cdnc.ucr.edu.
[291] "Production Notes on Picture 'Wake Island,'" *Marine Corps Gazette* 26, no.3 (September 1942): 17;
"The Screen: 'Wake Island,'" *New York Times*, September 2, 1942; "The Voice of Filmland," *Healdsburg (CA) Tribune, Enterprise and Scimitar*, April 23, 1942, https://cdnc.ucr.edu.

airplane landing scenes that could not be filmed with miniatures, Paramount constructed an expensive four thousand foot airstrip on the Sea's shoreline. But the tough desert conditions slowed down the shooting. The film crew had to face extreme sandstorms, and strong winds and heat, which disturbed the filming on a regular basis.[292]

Frank Albertson, who would later be seen as a supporting actor in Alfred Hitchcock's 1960 thriller *Psycho* or the 1963 musical comedy *Bye Bye Birdie*, played one of the soldiers in *Wake Island*. A year after the film was released, he described the experience of playing war on the film set of *Wake Island* as having been tougher than his war-training experience. During his voluntary work as an officer candidate in training at the Western Signal Corps Replacement Center, he remembered the filming process of *Wake Island*:

> We lived in tents. We got up at 5:30 a.m., had breakfast at 6 a.m., combed the sand out of our hair and went to work. We soldiered with real Marines. We had no place to go – you couldn't get out of the desert or off the military reservation. We had to be fingerprinted and investigated by the FBI. We had to carry identification cards. In fact, we were more restricted than I am here.[293]

[292] "Production Notes" *Marine Corps Gazette,* 17; "The Screen: "Wake Island," *New York Times*, September 2, 1942; Paolo E. Coletta, *United States Navy and Marine Corps Bases, Domestic* (Westport, CT: Greenwood, 1985), 648-649.
[293] "We Had Preview of Army Life, Actor Had Part in Wake Island Film," *Madera (CA) Tribune*, March 8, 1943, https://cdnc.ucr.edu.

FIGURE 4.1. *Left*, Filming of *Wake Island* at the Salton Sea. (Photograph courtesy of *The Desert Sun,* Goolsby, "'Wake Island' movie set," August 22, 2015.)
FIGURE 4.2. *Right*, A still from the movie *Wake Island.* (*Wake Island,* directed by John Farrow, written by W.R Burnett and Frank Butler, produced by Paramount Pictures, released August 11, 1942.)

Barnacle Bombs

The expensive film set built for the production of *Wake Island* was never to be used by the Hollywood film studio again. Instead, the real war arrived at the Salton Sea. With an increased need for army training and testing sites, the navy grew interested in the Salton Sea. But the few buoys installed at Gus Eilers's property in the northern part of the Sea were not enough to satisfy the emerging large-scale warfare demand.

In 1942, the command of the United States Navy was searching for new test bases, as American wartime activities were heavily expanding. The United States was preparing for an active participation in the battlegrounds of World War II, and the Salton Sea was expected to play a part in winning the war. Initially, the goal was to extend only the basic navy emergency unit at the Sea. But its southwestern shore appeared highly suitable for testing purposes as well. The site was very remote but well connected to the highway and a railroad. The Santa Rosa mountains protected the area from strong winds, creating friendly places for seaplane landing. Those qualities of the terrain encouraged the navy to place a test site right at the shores of the

Salton Sea. Interestingly, the quality of water was one of the main reasons for the navy to set foot at the Salton Sea.[294]

A 1945 navy document reveals the process by which the Salton Sea was selected for a test base, confirming that the particular features of the Salton Sea water were the primary reason that made the Sea suitable for navy tests. Firstly, the Sea was deep enough. Since the Sea's level had begun to rise in the late 1920s, the depth allowed for bombs to be dropped into the water. Secondly, the Sea was salty enough. The water tests conducted by the navy demonstrated that the corrosion of the Salton Sea waters was only slightly less than that of "regular sea water." This was highly relevant to seaplane landing tests and for testing sea targets. In 1942, the construction of the new base began.[295]

In late 1942, the U.S. Navy's aerial maps were printed with a new test base. A few miles northwest from the Wildlife Refuge, a dark square of fifty-one thousand acres of land was marked as *Site-No. J09CA102700* or the *Salton Sea Test Base (Naval)*. The site was officially dedicated as a U.S. Naval Air Facility in October 1942, with Lieutenant Frank A. Robinson as officer in charge. It was a fulltime base used for military training, research development testing, and evaluation of weapons. In the center of the site, a sophisticated number of buildings stretched right alongside a runway for seaplanes. The concrete barracks provided space for 72 officers and 566 men. The navy took advantage of the runway constructed by Paramount Pictures as it was only one mile south from the seaplane base. It was expanded and adjusted so that the naval base could serve "real" military purposes. The personnel grew from 100 men stationed in the summer of 1942 to almost 600 men several months later. In 1944, it became part of the Naval Auxiliary Air Station within the NAS San Diego (later NAS North Island). The site was

[294] "Salton Sea Test Base," Greetings from the Salton Sea (website), accessed March 3, 2018, http://www. greetingsfromsaltonsea.com/military.html; US Army Air Forces Director of Airfields (January 1945), NAF (Seaplane), Salton Sea Test Base, (Westmorland), Facilities, 194; "Historic California Posts: Naval Auxiliary Air Station, Salton Sea," California State Military Museums, California Military Department, accessed March 7, 2018, http://www.militarymuseum.org /NAASSaltonSea.html.
[295] Roger F. Yankoupe, Brigadier General of the U.S. Army, "Site-No.: J09CA102700," *NAF Salton Sea, Imperial Valley, California, Findings of Facts,* September 4, 1992.

in charge of ambulance planes, rescue amphibians, and a dozen crash boats.[296]

In addition to the major test base, a smaller army facility was developed at the southeastern shore of the Sea. *Camp Dunlap* was used in World War II as part of Patton's Third Army Desert Training Center (DTC). On 650 acres close to Niland, the DTC trained hundreds of United States Army and Army Air Corps soldiers to live and fight in the desert. Between 1942 and 1944, the soldiers learned to adjust equipment and develop fighting techniques in these extreme conditions. In June of 1942, the Imperial Irrigation District proudly announced its role in the emergence of the new site. The IID booked an advertisement in the *Calexico Chronicle* which stated that the power from the All-American Canal was "helping to win the war."[297] The power plants operated by the IID supplied the construction and operation of Camp Dunlap with water and electricity. Moreover, the IID claimed that thanks to the water it provided to the two thousand farms in the Imperial Valley, they were "more efficient in producing vital food for the nation."[298]

The presence of the military became noticeable in the Salton Sea region. Two months after the dedication of the site, a navy patrol bomber crashed into the Sea. On December 31, 1942, the *San Bernardino Sun* reported on the crash, listing seven members of the crew as dead and the other two members as heavily injured. The article continued to state that the Eleventh Naval District confirmed the crash as a result of battleground training: "The navy said the bomber was on a routine training flight when it crashed Sunday afternoon in the north end of Salton Sea, which is 250 feet below sea level in

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[296] Jim Bremner, "Salton Sea Test Base," DesertUSA (website), accessed March 16, 2018, https://www.desertusa. com/salton/salton-sea-test-base.html; Terp, *Nuclear Weapons Production*, 119;
U.S. Department of the Navy, *Fact Sheet No. 17, Salton Sea Test Base Fact Sheet*, Southwest Division Naval Facilities Engineering Command, April 1997; "Historic California Posts," California State Military Museums; Goolsby, "Military"; US Army Corps of Engineers, *Site Survey Summary Sheet for DERP-FUDS Site, No. J09CA102700 - NAF Salton Sea*, May 20, 1992.
[297] "All American Canal Power Is Helping to Win the War," *Calexico (CA) Chronicle*, June 18, 1942, https://cdnc.ucr.edu.
[298] "The Salton Sea," Lost America (website), accessed February 4, 2018, http://lostamerica.com/photo-items/the-salton-sea/#; "All American Canal Power Is Helping to Win the War," *Calexico (CA) Chronicle*, June 18, 1942.

a semidesert area. All bodies were recovered. No other details were made public."[299]

But on rare occasions, the navy lifted the veil of secrecy, revealing selected information about the test site. It included information about new men drafted at the station and about free-time activities of the stationed soldiers, including swimming in the Salton Sea and participating in local events. In October of 1943, the United Service Organizations (USO), an organization responsible for providing entertainment to the United States Armed Forces, invited the navy sailors from the Salton Sea Test Base to Palm Springs for the Navy Day celebrations. "Whoever heard of sailors being happy on a sea of sand!"[300] the *Desert Sun* reported, describing the warm welcome that the soldiers received during their excursion to Palm Springs.[301] In another article, the *Sun* wrote about the increased activity in local households:

> Local ladies start whipping up cakes, tossing salads together, and preparing heaping mountains of spaghetti – all in readiness for welcoming 50 sailors from Salton Sea to the USO Club in honor of Navy Day. These seamen on a "sea of sand" are going to find themselves being given the kind of a royal welcome only Palm Springs people can give.[302]

It was a rare occurrence for the navy to disclose details about any ongoing military operations, but on occasions, the local press reported on the introduction of new equipment. The launch of a rocket combat project at the Salton Sea test site was mentioned by the *San Bernardino Sun* in February

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[299] "Seven Dead in Salton Crash," *San Bernardino (CA) Sun*, December 31, 1942, https://cdnc.ucr.edu.
[300] "Yo Ho, Boys, and A Barrel of Fun! It Was Navy Day," *Desert Sun* (Palm Springs, CA), October 29, 1943, https://cdnc.ucr.edu.
[301] "Mrs. Cowan to Visit Family in Sacramento," *San Bernardino (CA) Sun*, December 7, 1943, https:// cdnc.ucr.edu; "Our Men in Service," *Santa Cruz (CA) Sentinel*, July 4, 1943, https://cdnc.ucr.edu;
"Yo Ho, Boys, and A Barrel of Fun! It Was Navy Day," *Desert Sun* (Palm Springs, CA), October 29, 1943;
"Sailors from Salton Sea to Be Feted Here," *Desert Sun* (Palm Springs, CA), October 22, 1943, https://cdnc.ucr.edu.
[302] "Sailors from Salton Sea to Be Feted Here," *Desert Sun* (Palm Springs, CA), October 22, 1943.

of 1945, but the information was scarce. Meanwhile, as the intensive training of seaplane landing remained the main part of the site's activities, various aircraft from all over the country arrived at the Salton Sea. However, the heavy bombers, transport aircrafts, attack bombers, and amphibian flying boats, along with the infrastructure they needed for landing and maintenance, brought an unexpected visitor to the waters of the Salton Sea. Known as barnacles, these little shell creatures transformed the Sea more than any navy test ever did.[303]

One of the main military bodies involved in providing infrastructure for the test bases at the Salton Sea was the Coast Guard. They were responsible for delivering a variety of resources and equipment from San Diego. According to the agreement, the Coast Guard had to deliver the buoys and wharves from their San Diego base, and the development of the new site at the Salton Sea demanded a large-scale delivery of these naval resources. As buoys and wharves were being packed for transport at the San Diego Bay, so too were these little organisms, the barnacles, clinging to the submerged surfaces. In addition, the airplanes which came to the Salton Sea from the Pacific Ocean carried tons of barnacles.[304]

As the buoys, wharves, and seaplanes were submerged in the waters of the Salton Sea, these little creatures did not loosen their grip to release themselves into their new habitat. Instead, they began to release large numbers of eggs into the Sea. Those eggs transformed into nauplii, little larvae, which attached themselves to the rocky bottom of the Sea and began to populate its waters. Some of those larvae also arrived at the Sea with ocean water, water that was released from planes during bomb dropping tests.

[303] "Navy to Give Rocket Training in Valley," *San Bernardino (CA) Sun*, February 16, 1945, https://cdnc.ucr.edu.
[304] "Salton Sea Test Base," Greetings from The Salton Sea (website); "Historic California Posts," California State Military Museums.

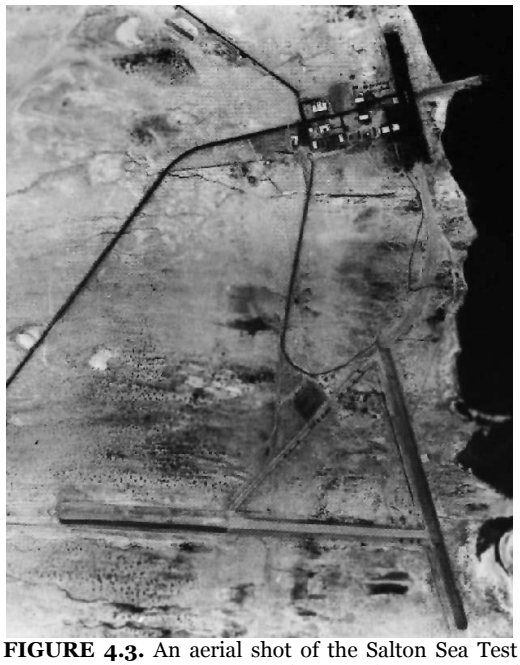

FIGURE 4.3. An aerial shot of the Salton Sea Test Base (Naval), ca. 1944. (Photograph courtesy of California Military Department, "Historic California Posts," http://www.militarymuseum.org /NAASSaltonSea.html.)

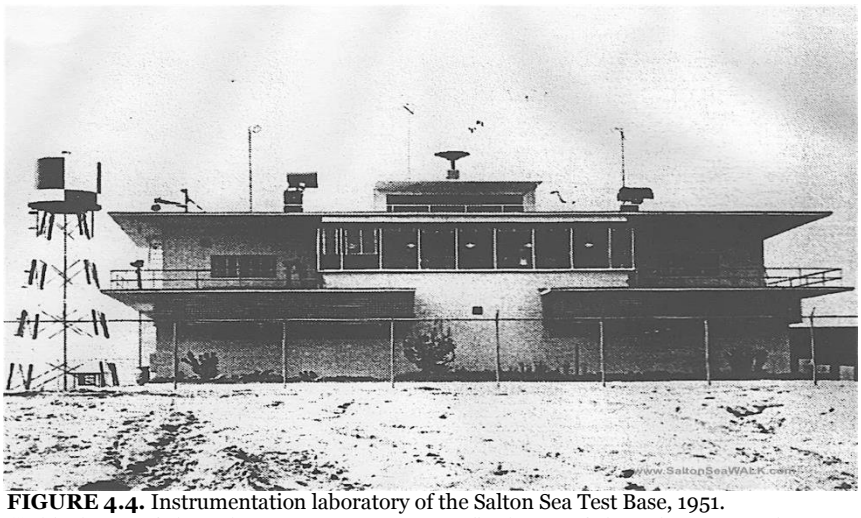

FIGURE 4.4. Instrumentation laboratory of the Salton Sea Test Base, 1951.
("Old Photos of the Salton Sea Navy Test Base," History of the Salton Sea, Salton Sea Walk, https://www.saltonseawalk.com/old-photos-of-the-salton-sea-navy-test-base/.)

FIGURE 4.5. The entrance to Camp Dunlap, 1940. ("Abandoned Places, Niland, California: Historic Camp Dunlap," Ghost Town AZ, http://www.ghosttownaz.info/.)

The Hitchhiking Barnacle

The limey acorn barnacles became the most numerous inhabitants of the Sea among those which are visible to the human eye. The acorn barnacles are one among a thousand different kinds of barnacles and one of the most populous ones. Their name derives from their resemblance to acorns that grow on oak trees. The famous scholar of barnacles, or "thoracic cirripedes," Arnold Ross described their outer shell as being similar to a volcano or a tepee, where "the opening at the top leads into the body chamber, which is guarded by four limy, movable plates."[305] The animal's body lies underneath these protective plates head-down, opening and closing the shell whenever it wants to feed.[306]

The barnacles are fascinating creatures and so too is their past. They are only found in marine environments, which made their arrival at the Salton Sea suspicious. They are the remote relatives of lobsters, crabs, and water fleas. They evolved more than four hundred million years ago, before dinosaurs appeared on the Earth. Needless to say, they survived when dinosaurs became extinct, and became "one of the most successful denizens of the

[305] Arnold Ross and William K. Emerson, *Wonders of Barnacles* (New York, NY: Dodd, Mead & Company, 1974), 15.
[306] Ross and Emerson, 15.

seven seas."[307] The primary characteristic of the barnacle is that it does not mind an environment which is inhospitable to virtually any other species. The rocky shores of seas and oceans, known as the "splash zones," are some of the barnacles' favorite habitats. This is where waves crash with the strongest force, smashing crab shells into pieces and detaching sea snails from their shelters. In those dramatic circumstances, barnacles remain glued to the rocks, floating their feathery legs in a casual manner. Two things are enough for acorn barnacles to create incredibly large populations. Firstly, they need a hard surface to attach themselves to, and secondly, salty water needs to protect them from the dryness of the shore. The saline waters of the Salton Sea and its hard, rocky bottom provided the right conditions for acorn barnacles to multiply into hundreds of billions within just a few years.[308]

In certain areas, two billion barnacles can be counted in just one yard of shore rock. Their adaptability and abundance have led marine biologists to refer to our current times as "the Age of Barnacles."[309] The acorn barnacles do not have a particularly rich color palette, appearing plain and often indistinguishable from the rock with their ash-white, limy shells. They are rather small with an average size of one-eighth to one-half inch in diameter, with rare exceptions of larger ones. One of their most special features is that they can attach themselves to virtually any surface that is exposed to marine waters.[310]

An incredible abundance of barnacle larvae float on the surface, searching for a spot where they can permanently cement themselves. Aside from rocks, acorn barnacles choose among ships, wharf pilings, fish, turtles, whales, and shellfish. Other barnacles favor floating logs and wood. "Barnacle adhesive can stick to almost anything, including glass, metal, concrete, and plastic, as well as natural objects,"[311] Ross states, emphasizing that their cement is much stronger than any man-made adhesive. Scientists have attempted to

[307] Ross and Emerson, 9-10, 16; Rachel Carson, *Under the Sea-Wind* (New York, NY: Penguin Books, 1996), 164.
[308] Ross and Emerson, *Wonders of Barnacles*, 9-10, 16; Carson, *Under the Sea-Wind*, 164.
[309] Ross and Emerson, *Wonders of Barnacles*, 9.
[310] Ross and Emerson, 9-11, 22; Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 15.
[311] Ross and Emerson, *Wonders of Barnacles*, 13.

recreate the "superglue" secreted by barnacles, assuming its potential value for dental purposes. This ability for a lifelong attachment has made the acorn barnacles into "the hitchhiking barnacles,"[312] as Ross calls them. A typical behavior among these creatures is to attach themselves to a ship and then travel wherever the journey takes them. But the one ability the acorn barnacles do not have is to let go of a surface. Once they are attached, they remain in the same spot for the rest of their lives.[313]

The way their shells work reveals another special feature. When they are not feeding, they close their shells tightly, able to produce a loud clicking sound in the process. When they feed, they open the shells, revealing six pairs of appendages which resemble bird's feathers. Some of the appendages serve to catch food, while others pass it forward to the opening. Dining, while lying on their backs, barnacles feed on dead organic matter. This feeding process amused the naturalist Louis Agassiz, who described the acorn barnacle as "nothing more than a little shrimp-like animal, standing on its head in a limestone house and kicking food into its mouth."[314]

Their reproductive system allows them to produce astronomical numbers of eggs, which then turn into nauplii. Barnacles are a monoecious species, meaning that they have both male and female reproductive organs. They fertilize each other, and in the rare cases when there are no neighbors around, they are able to fertilize themselves as well. The tiny nauplii are shell-free until they attach themselves to a surface.[315]

At the Salton Sea, acorn barnacles were first recorded in 1944, which led scientists to believe that the landing gear of seaplanes introduced them to the Sea. But the navy surely did not agree to take those passengers aboard. Ed Yong describes the barnacles as the enemy of the United States Navy that

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[312] Ross and Emerson, 46.
[313] Ross and Emerson, 13, 46; Rachel Carson, *The Edge of the Sea* (New York, NY: Mariner Books, 1998), 184-185; Gary H. Dickenson et al., "Barnacle cement: a polymerization model based on evolutionary concepts," Journal of Experimental Biology, 212 (2009): 3499-3510, accessed December 2, 2018, http://jeb.biologists.org/content/212/21/3499.
[314] Ross and Emerson, *Wonders of Barnacles*, 12; Carson, *The Edge of the Sea,* 184-185; Ross and Emerson, *Wonders of Barnacles*, 32; Carson, *Under the Sea-Wind*, 164.
[315] Ross and Emerson, *Wonders of Barnacles*, 26, 32; Carson, *The Edge of the Sea*, 183-184.

does not attack from the sky, but from the sea. Barnacles have the ability to cover any scrap of submerged metal within hours, joined by algae and bacteria. Their tiny tubes cover the surface, making it look "like a frozen shag pile rug."[316] A large ship can carry as much as three hundred tons of barnacles, which slow it down and speed up the rusting process. Aircraft, parked in seawater, have barnacles amass their tubes in layers several inches deep, attaching themselves in a process called biofouling.[317]

In the training facilities of World War II, acorn barnacles became the quiet victors, conquering the rocky seashores of the Salton Sea and spreading to other surfaces as well. In 1946, the Desert Museum in Palm Springs displayed a surprising finding. "The roots of a plant, almost completely encrusted with the small shells of barnacles, were brought to the museum last week by Miss Edith Ludewig."[318] Miss Ludewig had collected the "interesting specimens" at the shores of the Salton Sea. While to humans they were nothing more than a curiosity, the acorn barnacles became a valuable source of food for some bird species. Their shells are too protective for most birds to break, but many shorebirds managed to satisfy their appetite with the abundance of barnacles. [319]

Since the beginning of the 1940s, barnacles have remained one of the most dominant species at the Salton Sea. But the dominance of acorn barnacles in the Salton Sea goes beyond the waters of the Sea. On many shores, especially at the Sea's north end, the beaches are covered in small, snow white shells. Numerous spits and islets at Salton City, and various other spots, are formed from this material as well. This white, gravelly material is composed of the shells of dead barnacles which were washed ashore from the Sea.[320]

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[316] Yong, *I Contain Multitudes*, 58; Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 15; Ross and Emerson, *Wonders of Barnacles*, 14; "Photos Taken," *Desert Sun* (Palm Springs, CA), December 20, 1946, https://cdnc.ucr.edu.
[317] Yong, *I Contain Multitudes*, 58-59; Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 15; Ross and Emerson, *Wonders of Barnacles*, 14; "Photos Taken," *Desert Sun* (Palm Springs, CA), December 20, 1946.
[318] "Desert Museum Notes - Desert Barnacles Found," *Desert Sun* (Palm Springs, CA), December 3, 1946, https://cdnc.ucr.edu.
[319] "Desert Museum Notes - Desert Barnacles Found," *Desert Sun* (Palm Springs, CA), December 3, 1946, https://cdnc.ucr.edu.
[320] Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 15.

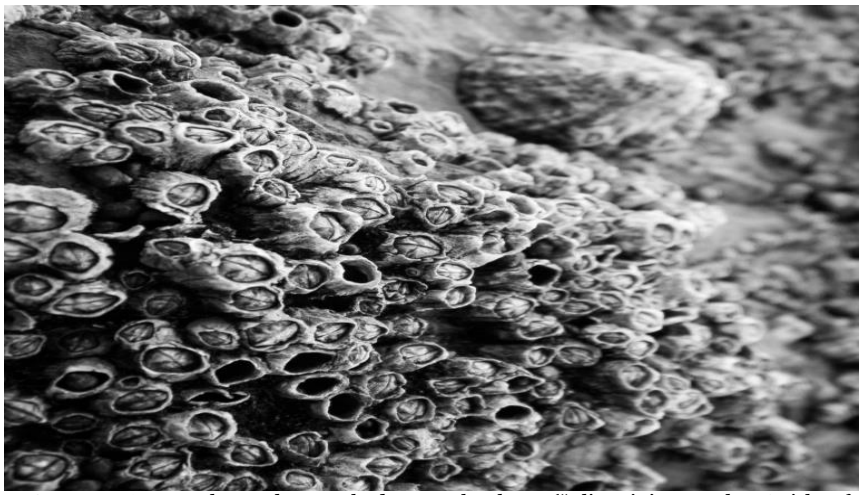

FIGURE 4.6. Acorn barnacles attached to a rocky shore. ("Blisterin' Barnacles, Quirks of Nature, September 10, 2014, https://nikhubbard.wordpress.com/2014/09/10/blisterin-barnacles/.)

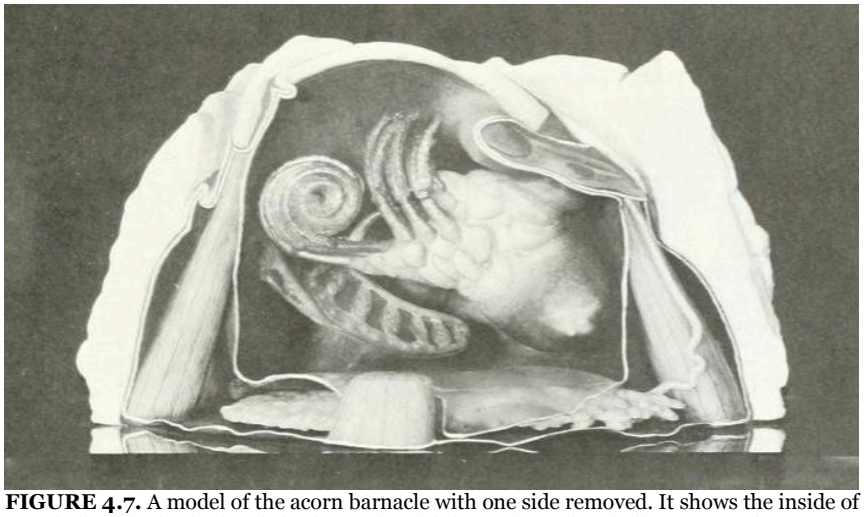

FIGURE 4.7. A model of the acorn barnacle with one side removed. It shows the inside of the shell with the body of the barnacle withdrawn into the shell. (Ross and Emerson, *Wonders of Barnacles*, 13.)

FIGURE 4.8. Shores of the Salton Sea covered by the remains of dead barnacles, 2018. (Photographs by Sasha Gora)

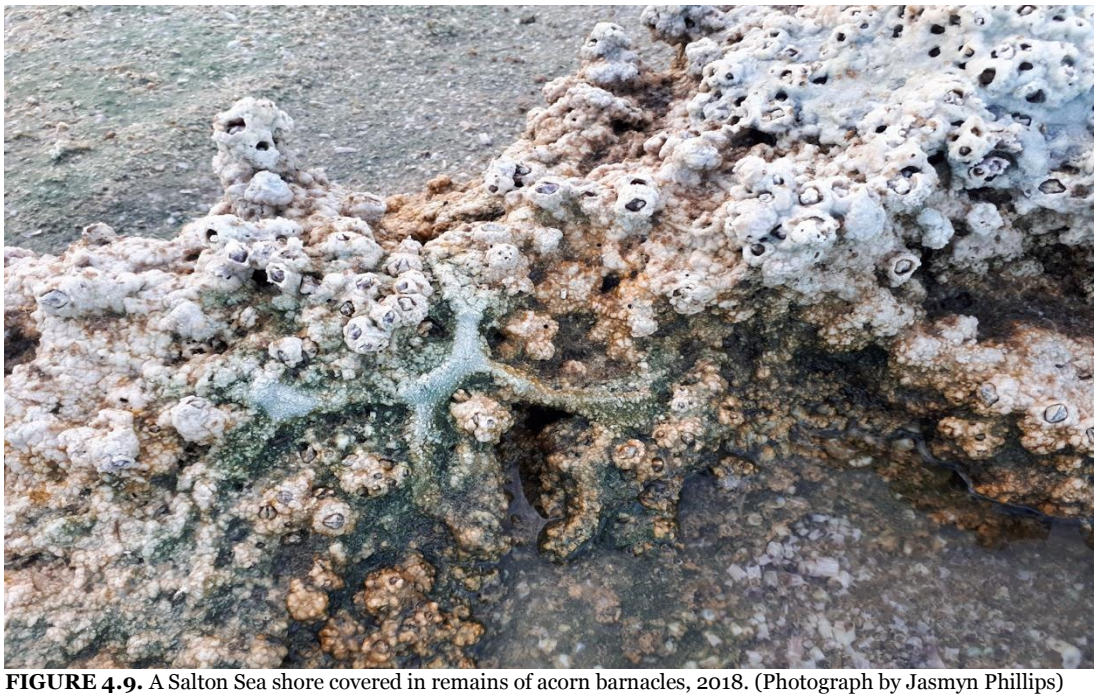

FIGURE 4.9. A Salton Sea shore covered in remains of acorn barnacles, 2018. (Photograph by Jasmyn Phillips)

A Dummy Target

Until 1944, non-nuclear bombs and rockets, such as the jet-assisted takeoff rockets, were tested at the Salton Sea Test Base. But in 1944, those tests were extended to nuclear warfare testing. The Manhattan Project, the nuclear development project launched in 1942 by the United States government, used the Salton Sea Base extensively between 1944 and 1945. During that time, the B-29s from the U.S. Army's 393rd Heavy Bombardment Squadron and the 509th Composite Squadron ran a series of top-secret test flights from the Wendover Air Base in Utah, dropping dummy atomic bombs into the Salton Sea.[321]

The Air Force pilot appointed for the test runs was Paul Tibbets, a brigadier general, who later became known as the pilot of Enola Gay. In an article published after Tibbets's death in 2007, the *Los Angeles Times* mentions the risky, dangerous, and highly confidential test runs which took place at the Salton Sea. The crew practiced runs with test bombs that were full-sized

[321] "Historic California Posts," California State Military Museums; Coletta, *United States Navy*, 648-649. Yankoupe, *NAF Salton Sea*.

mock-ups of both of the real bombs later used in Japan. The uranium-based Little Boy was almost 4,5 tons heavy and had the power of 15,000 tons of TNT, while the bulkier and heavier plutonium bomb Fat Man released 21,000 tons of TNT. Tibbets dropped the full-size mockups hundreds of times, always aiming to hit floating white rafts or other dummy targets spread across the Sea. Most of the mock-up bombs were filled with concrete, but for testing purposes, many of them contained all the parts of a bomb except for the nuclear content. Thus, the mock-ups exploded just like the atomic bombs would, without releasing the nuclear content.[322]

During one of the tests, a consulting engineer made a mistake in calculating the release time of the bomb. As a result, Tibbets dropped one of the Fat Man mock-ups too soon, almost bombing the town of Calipatria. This dummy included all explosive non-nuclear parts, and was heading towards the town and its two thousand inhabitants. But to the relief of the Air Force command, the dummy did not explode. The bomb fell into the sand ten feet deep and remained buried there until bulldozers rushed to the site, removed it, and erased any evidence of the bomb ever having been dropped there.[323]

On August 6, 1945, Tibbets led the Enola Gay crew to drop the first bomb, Little Boy, over Hiroshima. Three days later, Fat Man was released over Nagasaki. Causing the death of 130,000 victims, and followed by decades of radioactive contamination, the bombs were the only nuclear warfare used in history. Until this day, hundreds of their mock-ups remain submerged in the waters of the Salton Sea.

There are more remains of World War II resting on the bottom of the Salton Sea. During the war, many navy aircraft crashed into the Sea. More than twenty-four crashes were documented, during which thirty-eight men lost their lives. But a 1999 discovery showed that some of the lost and undocumented war planes might be buried in the Sea, too. For the purpose

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[322] "Pilot launched Atomic Age over Hiroshima," *Los Angeles Times*, November 2, 2007, https://www. latimes.com/lat-archives/; Terp, *Nuclear Weapons Production*, 119; U.S. Department of the Navy, *Fact Sheet No. 17.*
[323] "Pilot launched Atomic Age over Hiroshima," *Los Angeles Times*, November 2, 2007.

of an unrelated police investigation, the Riverside County sheriff commissioned an underwater scuba diving search of the Salton Sea. But the divers encountered a surprising remain. A wreck, covered in barnacles and silt, rested on the bottom of the northern part of the Sea. As the wreck was removed from the water, it became clear that it was in remarkably good shape. Its windows were broken, which meant that the pilot might have escaped. The navy experts identified the plane as an Avenger, the major attack plane of World War II. The *Los Angeles Times* assumed that the aircraft was one of many planes that went missing during night flights. Thousands of night flights were sent from Yuma, Holtville, and San Diego to the Salton Sea to train pilots in locating, illuminating, and attacking water targets during night flights. Ten of those crashed and were among the documented twenty-four Salton Sea crashes, but there were definitely more.[324]

The Evolution Game

As the bomb tests echoed at the Salton Sea, the California Department of Fish and Game was conducting its own experiments in the depths of the Sea's waters. The sole goal was to stock the Sea with new fish species in order to transform it into a successful sports fishery. The desired species belonged to game fish, a category which includes all fishes pursued by anglers for recreational purposes and not for their nutritional or commercial value. While some of the game fish species, such as salmon, tuna, or bass, are suitable for eating, others, such as sharks, serve merely as prey, just for the fun of the sport.

A rapid rotation of species had already been taking place in the Sea before the Department began its activities. By 1929, carp and bonytail chub were extinct, but the numbers of mullet continued to increase until the 1940s. The Department of Fish and Game, established in 1909, responded to the increased interest in game fish by stocking large reservoirs with those fish species, hoping to attract fishing enthusiasts to these fishing spots. At the

[324] "Divers Examine Wreck of Plane in Salton Sea," *Los Angeles Times*, June 15, 1999.

Salton Sea, the practice began in the 1920s. The Department engaged dozens of biologists and conservationists who conducted large-scale experiments in transplanting aquatic species from the Pacific Ocean to the Sea.

In order to make the Sea more attractive to the new species, the Department introduced pile worms into its waters, bringing them from the San Diego Mission Bay in 1930. The population of pile worms rapidly expanded, and they became the so-called *keystone species* of the Salton Sea ecosystem. *The Salton Sea Atlas* describes pile worms as one of the most important species in the Sea, if not the most important one as a keystone species: "Like a house of cards, a keystone species is one that, if removed from the ecosystem, would result in the collapse of many other species."[325] Pile worms provided an abundance of nutrition for the fishes and became their primary source of food, emerging as the critical link between the seafloor and higher organisms.[326]

But to many fishes, pile worms were not enough to guarantee a successful relocation. The Department initially introduced one fish species at a time, but this strategy was failing. The largest of those undertakings included the 1929 stocking of striped bass and the 1934 introduction of silver salmon into the Salton Sea. However, neither of those species survived in their new habitat.[327]

With each of the attempts, the Sea became a cemetery for thousands of dead fishes. The water was either too hot or too salty for the newly relocated fishes, who were confused and undernourished. In the early 1940s, the Department biologists determined the fishes needed more food to survive. The amounts of pile worm in the Sea indicated that there was not enough of it for the fish to thrive, which led the scientists to believe that the food chains of the transplanted fish had collapsed due to a lack of sufficient nutrition. Thus, a large amount of pile worms, mudsuckers, and various species of

[325] Redlands Institute, *Salton Sea Atlas*, 50.
[326] Redlands Institute, 50-51.
[327] Mildred de Stanley, *The Salton Sea - Yesterday and Today* (Los Angeles, CA: Triumph Press, 1966), 51-54; "Fish and Game Commission to Survey Imperial," *Calexico (CA) Chronicle*, September 12, 1934, https://cdnc.ucr.edu.

baitfish were again transported from the San Diego Bay and introduced to the Salton Sea. However, instead of helping the fish population grow, worms and mudsuckers began to thrive in the Sea, stronger than ever before.[328]

In May 1950, the Department came up with a more elaborate idea of introducing a large number of species at once. Tons of fishes were captured in the Gulf of California and transported from the Mexican town of San Felipe to the Salton Sea, with the exception of species that did not fit the image of a friendly fishing spot. Thus, before the trucks drove off from the Gulf towards the Sea, all sharks were left behind to avoid a dangerous predator with a taste for human flesh from hunting in the waters of the Salton Sea. As a result of this undertaking, an estimated seven thousand fishes from the bay of San Felipe were introduced to the Salton Sea. Over thirty species, including predators not harmful to humans, were dumped into the Sea with water from the ocean, with its barnacles and ocean plankton. The hope was for one species to adapt. But this time, the success was bigger than expected. Corvina, sargo, and gulf croaker survived this relocation best and settled in the Sea. The rest died off or were hardly noticeable. And meanwhile, another fish landed in the Sea by accident rather than as part of a plan. Tilapia, which swam through the irrigation canals into the Sea, grew strong and attracted sportfishing enthusiasts.[329]

With time, the practice of replanting became more common and involved large amounts of fish, amounting to at least thirty-five different species. According to the *San Bernardino Sun*, "Between 1948 and 1956, the Department transplanted some 35,000 ocean fish from the Gulf of California to the Salton Sea."[330] The Department experimented with various species constellations, mixing them up and turning them against each other to determine which species were the strongest. This resulted in some odd

[328] William A. Dill and Almo J. Cordone, *History and Status of Introduced Fishes in California*, 1871-1996 (Sacramento, CA: California Department of Fish and Game, 1997), 291-292; Stanley, *The Salton Sea*, 51-61.
[329] Neal Mathews, "The Old Woman and the Sea," California Magazine, March 1982, http://www.sci.sdsu.edu/salton/TheOldWomanand%20theSea.html; Dill and Cordone, *Status of Introduced Fishes*, 291-292; "Salton Sea Fish Report - Corvina Seek Smaller Schools," *Desert Sun* (Palm Springs, CA), February 23, 1966, https://cdnc.ucr.edu.
[330] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963, https://cdnc.ucr.edu.

phenomena. For instance, minnows grew extremely large in the Salton Sea. Those fishes are usually just a few inches long and able to survive only in freshwater. In the Salton Sea, many minnows grew five feet long and weighed 100 pounds. Instances of those gigantic minnows did not last long. Due to the ongoing increase in salinity, they disappeared from the Sea forever.[331]

The victor of those experiments was the orangemouth corvina. This man-made evolutionary experiment indicated that the corvinas adapted well to the saline desert waters. One single introduction of several hundred of those predator fishes guaranteed a successful fishery for many years to come. A later state survey proclaimed this process a tremendous success and credited the California Department of Fish and Game with creating an "excellent sports fishery."[332]

The migratory birds welcomed this abundance of fish, and as a result, frequented the Salton Sea shores. As the population of California was growing, vast parts of the Pacific Coast were being developed into urban developments, pushing out birds from their natural habitats. Masses of birds, seeking new places to nest, arrived at the Sea. Depending on the time of year, the Sea had as many as fifty-one islands to host these birds and their breeding nests. The grounds to forage were thus enormous. The birds were drawn to the generous amounts of gulf croakers, smaller bait fish, but also to tilapia, corvina, and sargo.

The dominance of corvinas contributed to the golden years of leisure at the Salton Sea, which began in the 1950s. Together with sargos, they pushed out mullets. Corvina fishing was one of the most popular leisure activities at the

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[331] California State Government, Milton Marks "Little Hoover" Commission on California State Government Organization and Economy, *Averting Disaster: Action Now for the Salton Sea*, *Report #228* (Sacramento, California, September 2015), 4. http://op.bna.com.s3.amazonaws.com/env.nsf/r%3FOpen%3Dsbra-a2ss8x.

[332] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation of the Beneficial Water Uses of Salton Sea in California*, by Arthur Swajian, Executive Director (Palm Desert, CA, December 12, 1963), http://www.sci.sdsu.edu/salton/ConsBenH2OusesSS.html); "Five Foot Minnows," *Imperial Valley (CA) Press*, October 22, 1910, https://cdnc.ucr.edu; California State Government, "Little Hoover" Commission, *Averting Disaster*, 4-7.

Salton Sea throughout the 1950s and 60s. The Department of Fish and Game continued to restock the Sea with new fish until the early 1960s, when a worrying phenomenon of fish die-offs began on a large scale. Those aspects will be further discussed in the following chapters.

The Returning Pelicans

While predator fish from the Pacific Ocean were driving out other fish species from the Salton Sea, the increasing numbers of leisure-seekers drove away the pelicans. There was a strong correlation between the numbers of breeding American white pelicans at the Salton Sea and the density of leisure spots. In 1908, when Joseph Grinnell had conducted his ornithological expedition to the Sea, he counted 980 occupied pelican nests and more in the process of construction, estimating the total number of the birds present at the Sea to be several thousand. The numbers remained high for the following decade, but by the end of the 1920s, as the summer recreation at the Sea increased, the pelicans departed. In 1932, ornithologists counted only fifty breeding pairs at the shores of the Salton Sea. The Great Depression, however, led to a decrease in visitors as widespread poverty did not allow the American people to spend money on leisure activities.[333]

The Sea continued to attract hunting enthusiasts as dove hunting became the most popular sport in the Imperial Valley in the 1930s. But by the mid-1930s, the numbers of hunters began to decrease. It was not a relaxing pastime and often a dangerous activity. The press often reported about men gone missing or shot dead during hunting trips. On one occasion, seven men were drowned due to faulty boats provided by their hunting club. Following that incident, persecutions of negligence and enhanced controls of private hunting clubs were pursued. But as the numbers of hunters and visitors dropped at the Salton Sea shores, the pelicans began to return to breed. When the navy took over the southwestern shore of the Sea in 1941, several

[333] Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 83; Redlands Institute, *Salton Sea Atlas*, 33.

dozen nests were observed. In April of 1949, three hundred nests were counted.[334]

While the influence of human presence on the flighty pelicans is not surprising, it is worth noticing that it was warfare that invited the pelicans back to the Salton Sea. When the Sea became quiet again, they returned to breed. Interestingly, the loud seaplanes and bomb tests did not discourage the birds, who felt more comfortable surrounded by the nuclear warfare tests than around people spreading blankets on the shores of the Sea.

A "battle" between a man and a pelican described by *La Habra Star* in October of 1941 demonstrates how difficult it was for pelicans to share the shores with humans. The encounter happened at Laguna Beach, a spot that provided foraging grounds for pelicans and which was becoming increasingly popular for summer recreation. At a crowded beach, a pelican attacked a swimming couple:

> After slapping viciously at Mrs. Fahey with his powerful wings the long-billed bird abruptly turned on Mr. Fahey when he swam to her rescue. Fahey attempted to scare off the bird but at each thrust of his arm the pelican countered with his impressively long, sharp bill, scoring several painful pecks. [...] At no time during the tussle did the pelican give ground – or water – and always seemed to be edging in within range for a peck at one of his eyes, Fahey said. [...] This professional fighter of the briny deep was plainly out to drive his foes from the ocean, and apparently no amount of mystic maneuvering could outwit him or scare him off. Fahey defended himself admirably, according to the spectators, but obviously was no match for a feathered adversary with such a foul disposition.[335]

[334] Patten, McCaskie and Unitt, *Birds of the Salton Sea,* 83.
[335] "Pelican Routes Bathers with Dive-Bomb Tactics," *La Habra (CA) Star*, October 10, 1941. https:// cdnc.ucr.edu.

The article concluded that giving these "ordinarily good-natured birds a wide berth"[336] would be advisable so that both species could coexist. Throughout the 1940s, birds fled from places like Laguna Beach to the more remote Salton Sea. But the post-war prosperity drew astronomic numbers of visitors to the Sea. As a result, numbers of breeding pelicans decreased sharply in the early 1950s. "Increased human activity, erosion of nesting islands, and fluctuating water levels forced nesters to abandon the area," note Patten, McCaskie and Unitt.[337] The last breeding couples of the American white pelican were observed at the Salton Sea in 1956 and 1957. Thousands of pelicans continued to come, especially throughout the summer months. However, those birds were non-breeders and only seasonal visitors to the Sea.[338]

As the pelicans' preference for remote breeding grounds clashed with the increasing numbers of leisure-seekers, so too did the bomb tests, clashing with these same Salton Sea visitors. In 1945, World War II ended, but the warfare tests continued. At the same time, more visitors arrived at the shores of the Salton Sea. Many of them were drawn to the Sea by exactly the same thing that increased the value of the Sea as a warfare testing site for the navy. The properties of the sea water were favorable not only for seaplane landing but also for motorboat racing. As the sport gained popularity among vacationers, the Sea gained a favorable reputation: It was termed by racing officials the "fastest water in the world".[339] The word was spreading, and in 1942, the first annual motorboat championship took place at the Salton Sea. The race was moved from the coastal city of Newport Beach, which had become overcrowded with wartime vessels. With almost each event at the Sea, new world speedboat-racing marks were being set, with an unprecedented twenty-one world records set in the following two decades. But after the war ended, the development of nuclear weapons continued in

[336] "Pelican Routes Bathers with Dive-Bomb Tactics," *La Habra (CA) Star*, October 10, 1941.
[337] Patten, McCaskie, Unitt, *Birds of the Salton Sea*, 83.
[338] Patten, McCaskie, Unitt, *Birds of the Salton Sea*, 83.
[339] "Thousands Attracted to Races," *Calexico (CA) Chronicle*, February 10, 1936. https://cdnc.ucr.edu.

California on an even larger scale. As warfare and leisure came into conflict, a new chapter began at the Salton Sea.[340]

[340] Redlands Institute, *Salton Sea Atlas*, 32-33.

Chapter Five
BEACHES OF LEISURE

The Booming Oasis

Until the 1940s, the number of visitors at the Salton Sea did not exceed a few thousand per year. But by the mid-1960s, the numbers increased to an astounding five hundred thousand. In less than two decades, the Salton Sea transformed from a remote and unknown spot to a booming riviera. What caused this dramatic transformation? This chapter explores the emergence of large-scale tourism at the Salton Sea in the 1950s and 1960s. Firstly, the curious co-existence of nuclear warfare tests and the leisure industry, and the population shift toward the Sunbelt states, set the stage for tourism at the Salton Sea in the 1950s. Secondly, this chapter draws a picture of popular vacation landmarks where days of carefree fun in the sun were possible due to the growing prosperity of post-war California.[341]

After World War II ended, the number of residents and visitors boomed in the developing communities of the Sea, including Salton Sea Beach, Desert Shores, North Shore Beach Estates, Salton City, Mecca Beach, and Bombay Beach. This chapter discusses two communities in the northern part of the Salton Sea: Salton Sea Beach and North Shore Beach, while the following chapter focuses on Salton City and Desert Shores. In Salton Sea Beach, leisure seekers enjoyed themselves waterskiing and attending parties hosted by Helen Burns on her famous marina dancefloor. At North Shore Beach, a members-only yacht club hosted the rich and famous guests from Los Angeles on their weekend getaways.

Press articles from the 1950s and 1960s serve as the primary source for this chapter. In addition, surveys commissioned by the State of California draw a picture of visitor's expectations regarding the Salton Sea. Lastly, several

[341] Redlands Institute, Salton Sea Atlas, 32-33.

interviews conducted by the author in 2018 with those who witnessed the tourist boom, provide anecdotal accounts based on individual memories.

The main secondary source, which focuses on the emergence of tourism in Southern California, is Lawrence Culver's *The Frontier of Leisure*. This study provides a detailed account of the enormous success of Palm Springs, the famous "predecessor" of the Salton Riviera, as a leisure oasis. *Queen of the Salton Sea. Helen Burns and Me,* the biography of Helen Burns by Donna Burns Kennedy, serves as an account of both the general developments of mid-century Salton Sea and the emergence of Salton Sea Beach as a popular vacationing spot.

A considerable part of this chapter is dedicated to Helen Burns, a woman who made great efforts to turn the hostile terrain of Salton Sea Beach into a thriving leisure spot. Helen owned the most popular marina in the area and initiated many activities at the Sea, including the most memorable dance parties. For the half century she lived at the Sea, Helen continued to take notes, write diaries, and keep detailed accounts of events at the Sea. Her daughter and biographer called her the unofficial historian of the Salton Sea, and included a selection of Helen's notes in *Queen of the Salton Sea*.

Until today, the memory of Helen remains vivid in the Salton Sea area. "Helen… She *was* the Sea," remembers Sara, whose family worked at the Sea in the early resort days. The title of a 1982 *California Magazine* article about Helen Burns written by Neal Matthews, *The Old Woman and the Sea*, conveys the close relationship she had with the Salton Sea. Portraying the changing audience of the dancefloor at Helen's marina, Matthews shows how the Salton Sea transformed throughout the years, providing valuable insights for this and the following chapter.

In 1949, the Salton Sea was not quite yet a popular tourist destination. The only events at the Sea were the speedboat races and regattas at North Shore. Just like duck hunting, the early boat racing was a dangerous sport. At the Salton Sea, even more so, since the strong winds often disturbed the events. During a 1942 race, the wind "whipped the water so rough, officials said, that Charles Connover of Long Beach, California, was found unconscious in his boat, drifting in the middle of the course after a trial run."[342]

Rising water levels were a threat to local businesses. By the end of the 1940s, Captain Davis's life's work vanished under the Sea's surface, and the elderly Captain departed from the Salton Sea to seek new adventures. But soon, "the king of the Salton Sea" had a successor. Her name was Helen Burns, and she had relocated to the Salton Sea from Indio with her two small children. She moved to the property acquired by her father and "hauled ice in from Indio, 28 miles to the north. She trucked in her own well water. There was no electricity or telephone. She scrubbed her two daughters' diapers at the flowing well behind Travertine Rock, up the road a piece."[343]

Her lifelong commitment to the Salton Sea, and her perseverance, strong personality, and optimism made the visitors of the Sea remember her as "the queen of the Salton Sea." She was one of the first people who found a way to bring leisure to the Sea and make it fully feasible. Helen was committed to providing the visitors of the Sea with soothing relaxation during the day and evenings full of music, dancing, and laughter. But this dream was not easy to fulfill.

It remains a mystery as to why Helen considered that opening a kiosk at the shores of the Salton Sea would be a good idea. In the late 1940s, the Salton

[342] "Valley May Have Salton Yacht Club," *Calexico (CA) Chronicle*, May 28, 1930, https://cdnc.ucr.edu;
"New Speedboat Marks Set at Salton Sea," *San Bernardino (CA) Sun*, October 14, 1942, https://cdnc.ucr.edu.
[343] Mathews, "The Old Woman and the Sea."

Sea was far from being a place where one could simply relax and sip cocktails at the beach. At first glance, the beaches of the Salton Sea did not seem inviting. The area was rough and covered with sharp mesquite clumps. The heavy wind bothered the leisure-seekers, but it was the heat that was more irritating than anything else.[344]

Helen opened the kiosk in 1947 at the northwestern part of the shore with a hand-written sign "241 Feet Below Sea Level" standing next to it. She started with a soda and souvenir stand, selling fruit, smoked mullet, and drinks to illegal immigrants from Mexico. Due to the fluctuating levels of the Sea, she had to constantly move it higher. Her shop became a long-awaited stop for those who were on their underground journey through the border between Mexico and the United States. Next, local farmers began to visit. The kiosk became a place to rest, socialize, and dance. The weekly dance parties began in 1949. Each Friday, Helen welcomed the visitors from both sides of the border, including workers, road workers, and landowners, to dance together.[345]

FIGURE 5.1. Helen Burns' first stand at the Salton Sea, 1949. (Kennedy and Linehan, *Queen of the Salton Sea*, 48.)

[344] "More Water Wanted for Salton Sea," *Riverside (CA) Daily Press*, August 11, 1917, https://cdnc.ucr.edu.
[345] Mathews, "The Old Woman and the Sea"; Donna Burns Kennedy and William Linehan, *Queen of the Salton Sea. Helen Burns and Me* (Morongo Valley, CA: Sagebrush Press, 2018), 80-83.

As the 1950s began, Helen's little fruit stand grew bigger. The number of visitors was booming, and new business opportunities arose. Helen decided to open a marina in Salton Sea Beach, on the western shore of the Sea. The marina included a restaurant, a bar, and a dancefloor by the beach where guests could share dances native to the countries from which they came. In the first years of the marina, Mexican and Filipino guests from the local farming communities dominated the dancefloor, dancing the mambo and salsa. In the mid-1950s, another group joined the dancefloor. They were the water-skiers who had just discovered the Salton Sea as a great watersports spot. A series of clashes between these groups disturbed the carefree evenings. On several occasions, members of the farming community were offended when newcomers wanted to dance with the women from their group. This resulted in fights and eventually, the guests of Mexican and Filipino descent stopped coming altogether. Nevertheless, they were replaced by other local guests. Many families from towns in Coachella and Imperial valleys began to visit the Salton Sea each weekend. Soon, people arrived from the whole state of California, seeking outdoor fun.[346]

But dangers were lurking in the waters of the Salton Sea. An ecological collapse was approaching from the depths of the Sea, where wastewater was feeding the Sea and increasing its volume. Throughout the 1950s, Helen had to move the Beach House on several occasions, as it was endangered by flooding. Today, her property is destroyed and covered by water. If we sail out a few yards away from the shore of the Salton Sea Beach, we will encounter two light poles that used to illuminate the marina. One of the light poles used to be a favorite forage spot of a certain pelican, which had developed a very special connection to Helen. It returned each year to hunt from the pole, which served as its watchtower. Diving underneath the surface, we would find rusty remains of the marina, where countless guests found a place to have carefree fun in the outdoors, enjoying long fishing trips and sleeping under the desert sky. But in the 1950s, nobody anticipated the disasters that were yet to come. In the decade of prosperity and consumerism, the nation's attention was steered toward the developments of

[346] Kennedy and Linehan, 83-84.

the Cold War, and a major part of those developments took place in the emerging Sunbelt states.

The Cool Sunbelt

The 1950s were a time of rapid transformation throughout the United States, especially in the south of the country. In order to understand the sudden boom of the Salton Sea, it is crucial to recognize the changes that took place in California in the 1950s.

The US economy, severely damaged during the Great Depression of the early 1930s, recovered with Roosevelt's economic recovery plan, the New Deal, and throughout World War II. The United States entered the 1950s with optimism and stability, which guaranteed prosperity and population growth. These changes were particularly noticeable in California, one of the Sunbelt states. The Sunbelt extended over the warm areas of the United States, which drew large numbers from other parts of the country. Thousands of families from the northern states relocated to the Sunbelt, drawn to lower taxes, a growing job market, inexpensive land and housing, and the warm weather. Mass federal government funding supported an expansion of suburbia across the country, and especially in the Sunbelt. Moreover, in the Sunbelt states, the military and electronics industries offered hundreds of thousands of new jobs and promised an economy that was transforming towards even greater stability.[347]

A transformation from a manufacturing-based economy towards a service-based economy was evident throughout the whole Sunbelt, expanding between Florida and Texas, and throughout all the southern States all the way to California. The vastly expanding electronics industries offered service and sales jobs. But in addition to that, the growth of the military industry generated jobs on a mass scale. World War II had ended in 1945 when the

[347] Lawrence Culver, *The Frontier of Leisure. Southern California and the Shaping of Modern America* (New York, NY: Oxford University Press, 2012), 200-203.

Western Allies, together with the Soviet Union, invaded Germany. But in 1947, an era of hostility between the western powers and the Soviet Union began, marking the beginning of the Cold War. While the territory of the United States did not become the battlefield of military actions, it was where the weapons of warfare were built and tested, to be later used in conflicts in Vietnam, Korea, Laos, Congo, Chile, and Argentina.

Major new army facilities were spreading across California, Nevada, New Mexico, Texas and Florida. In California, the Fort Irwin National Training Center constructed in 1940 was reopened in 1951 to train troops for the Korean War. That same year, the Nevada Test Site was dedicated and witnessed an atomic bomb explosion in its very first year. Along the West Coast, the navy was constructing dozens of training sites. One of the most impressive examples of this expansion was the Naval Training Center San Diego, which expanded to over three million square feet of space and employed thousands of servicemen and civilians.

The Salton Sea Test Base was among the hundreds of smaller facilities used during WW II, but it also became reactivated after World War II. The gigantic federal budgets allowed the construction and maintenance of the test sites, and those sites needed a proper infrastructure to function efficiently. The expansion of local roads and highways and the growth of the electricity grid allowed new urban developments to thrive. Spreading across the whole country, the Interstate Highway System funded by the federal government was the largest public works program in the history of the United States. With the new roads, a dynamic exchange among the densely distributed army bases began. Tens of thousands of soldiers, scientists, and administrative workers were relocating on a regular basis among the sites in California, Nevada, and New Mexico. While the purpose of the new infrastructure was to serve the defense industry, it had a massive social impact, popularizing automobiles rather than trains, making the citizens more mobile and speeding up suburban growth.[348]

[348] Culver, *The Frontier of Leisure,* 201.

In California, other industries were expanding too. The growth of the electronics industry attracted a new workforce with their growing families. The population growth boomed beyond any expectations. Between 1945 and 1975, the Sunbelt states doubled their population, and of all the Sunbelt states, the largest population influx took place in the Golden State. By 1950, California had reached a population of ten million, an impressive population five times greater than in 1910. By the mid-1960s, California had the largest population among all U. S. states. Between 1940 and 1968, California tripled its population. By 1970, it had reached twenty million. At the same time, the population in the northeastern states was decreasing.[349]

The main cause of population growth was the "baby boom." This unparalleled growth in birthrate in American history began in the post-war period, peaked in 1957, and ended in the mid-1960s. It added fifty million babies to the US population and strengthened the suburban expansion throughout the country.[350]

The growing population of California brought an unprecedented number of leisure-seekers to the Salton Sea. Helen was prepared to welcome the crowds. For years, she had dreamed for her house to become an "entertainment extravaganza"[351] of the Salton Sea, and she considered the dream to have come true in 1956. She offered a different show each night, from October through May. She turned the Beach House into the imaginary "mythical cruise ship," *S. S. Saltonia*, which docked at a different location each night. One night it was Hawaii; another night it was Italy. It even docked into the Seine river in Paris. "With her charisma, she'd half convince the tipsy bar crowd they were weekending in some exotic place," her daughter remembers.[352]

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[349] Halbert L. Dunn, *Vital Statistics of the United States, 1957 - Volume 1* (Washington, D.C.: Government Printing Office, 1959), CXII, accessed on November 24, 2018, https://www.cdc.gov/nchs/data /vsus/VSUS_1957_1.pdf.
[350] Dunn, *Vital Statistics*, CXII.
[351] Kennedy and Linehan, *Queen of the Salton Sea*, 97.
[352] Kennedy and Linehan, 97-101, 134.

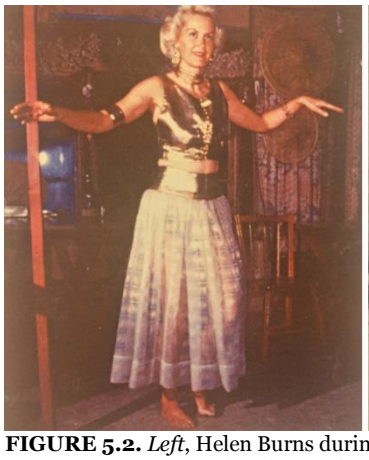

FIGURE 5.2. *Left*, Helen Burns during one of the events at the Beach House, late 1950s.
FIGURE 5.3. *Right*, The winner of a swim contest receives a trophy, 1955.
(Kennedy and Linehan, *Queen of the Salton Sea*, 67 and 69.)

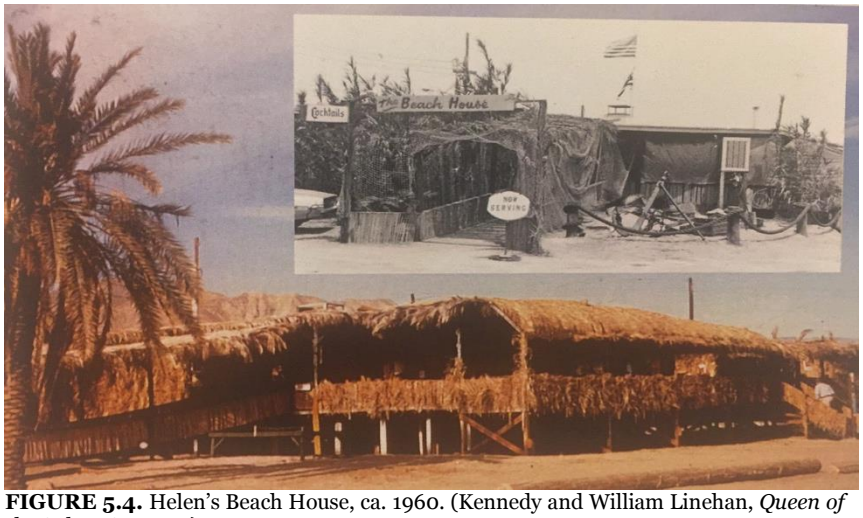

FIGURE 5.4. Helen's Beach House, ca. 1960. (Kennedy and William Linehan, *Queen of the Salton Sea*, 107.)

The events at Helen's Beach House were themed to entertain and draw the attention of her guests away from the worries of everyday life. Tina, who participated in many of them as a teenager, remembers the schedule quite vividly. Each Friday night, there was a fish fry, and dancing took place in almost every corner of the marina: at the beach, on the porch, on the dancefloor. There were Miss Salton Sea contests, Easter eggs hunts, Santa ski-ins, and Christmas parades, and all age groups were welcome to join. The marina was full of children, running around, playing pool or ping pong. "I'm proud to be a Sea Kid," says Tina, who remembers Helen as the "lady of the people" and recalls the carefree years at the Salton Sea as the best time of her life. Marlene, proud to call herself a "Sea Kid," remembers dressing up as a cowgirl for the "Howdy Neighbors Day," where the best-dressed cowboys and cowgirls competed to win the grand prize. The parties were never modest; it

was always a big festival, whether it was a baking contest, longest beard contest, or a poker run. Many of Helen's ideas were tongue-in-cheek. A 1960 Mother's Day "special ski race only for women" invited hundreds of guests and obliged the husbands to "play the babysitting role"[353] while the women raced.[354]

Helen invested a large part of what she earned into expanding the marina. Over the years, she enlarged the harbor, added gas pumps, docking posts, and an island. The island, where games and dance parties seemed to have no end, was illuminated by night, and a little steel bridge connected the island to the rest of the property. She transformed the shore, planting hundreds of Washingtonia palms and placing over one hundred thatched huts across the beaches that belonged to her property. The holiday business was booming not only in Helen's Beach House but also in the close by Desert Shores and in the northern part of the Sea. But twenty miles south, the shores of the Salton Sea continued to serve as a testing ground for the warfare industry.[355]

Clean Nukes

While the population of the Sunbelt states was growing, warfare tests in remote locations continued. In February of 1950, a mysterious explosion struck the Salton Sea area. A blast echoed from miles away, where a cloud of dust was set into the air. It seemed to emerge from the dry lakebed of Frenchman Flat, located eighty miles to the North in Nevada. Nuclear warfare tests were being conducted there, but no information was released to explain what had happened. And then, the explosions came nearer. On an autumn Sunday of 1951, residents from El Centro and Riverside noticed a mysterious fire. Towering higher than four thousand feet, it could be seen from forty miles away. The smoke pointed to Sandy Beach where a corporation named Sandia was conducting atomic energy tests. Trying to

353 "Mothers Stage Special Event at Salton Sea," *San Bernardino (CA) Sun*, May 12, 1960, https://cdnc.ucr.edu.
354 Mathews, "The Old Woman and the Sea"; Kennedy and Linehan, *Queen of the Salton Sea*, 80-83, 154.
355 Kennedy and Linehan, *Queen of the Salton Sea*, 97-101, 134; Mathews, "The Old Woman and the Sea."

locate the fire, one of the witnesses drove towards the smoke and confirmed that it came from a few miles south, from the test base and close to the shore of the Salton Sea. But Sandia employees did not notice any "flames and a pillar of smoke" that local residents reported. The Station Manager of the nuclear research laboratory, T. A. Sprink, denied having seen any smoke or fire near the area and reported that none of the employees worked on that day.[356]

The top-secret operations had begun in 1946. After World War II ended, the Manhattan Project was shut down, but nuclear weapons production continued. As a continuation of the Manhattan Project, the United States Atomic Energy Commission (AEC) was established in 1946.[357]

Continuing its predecessor's mission, the AEC was the central governing body of the nuclear weapons industry. But this time, contractors were assigned the execution of nuclear projects. An enterprise of such grave importance, controversy, and confidentiality required a strong partner. Thus, the Sandia Corporation seemed like the right choice.[358]

As Necah Stewart Furman notes in his history of the Sandia Corporation, it is a difficult task to "unravel the history of any corporate identity, and the history of Sandia Laboratories more so because of the nature of its product (nuclear ordnance) and its wartime genesis."[359] Headquartered in Albuquerque, Sandia was deeply involved in nuclear warfare production from the beginning when it was established as the Z Division of the Los Alamos National Laboratory in 1945. Under the motto of an *Exceptional Service in the National Interest,* the Z Division was renamed as Sandia in 1948. Directly responsible to the Department of Energy and the Atomic

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[356] "Probe Mystery Fire in the Salton Sea Area," *Madera (CA) Tribune*, October 15, 1951, https://cdnc.ucr.edu; "First Details of Atom Base at Salton Sea," *San Bernardino (CA) Sun*, September 14, 1951, https://cdnc.ucr.edu.
[357] U.S. Department of the Navy, *Fact Sheet No. 17.*
[358] Terp, *Nuclear Weapons*, 119; Frederick J. Shaw, *Locating Air Force Base Sites: History's Legacy* (Washington, DC: Air Force History and Museums Program, United States Air Force, 2004), 182.
[359] Necah Stewart Furman, *Sandia National Laboratories: The Postwar Decade* (Albuquerque, NM: University of New Mexico Press, 1990), 114.

Energy Commission, Sandia was in charge of engineering, training, and the development and testing of nuclear weapons. Under the leadership of Robert Henderson and Paul J. Larsen, it emerged in its first years as a Western Electric company, responsible for laboratory work for all nuclear warfare projects. Furthermore, Sandia used its facilities for research in versatile fields such as medicine, geology, transportation, or agriculture, and has remained a major corporate technological conglomerate even today.[360]

Sandia found the Salton Sea area suitable as a remote testing site. In 1946, the AEC and Sandia acquired the Salton Sea Test Base on the Sea's southwestern edge from the United States Navy. In January 1949, the AEC leased a further 18,024 acres at the southern part of the Sea, naming it *The Sandia Laboratory Salton Sea Base*.[361]

The area became one of ninety test sites in the United States and a highly sophisticated bombing range. Its remoteness guaranteed a great range of testing opportunities, and the AEC was not shy to invest in rebuilding and expanding the site. It renovated the temporary housing structures, added control and instrumentation stations, a laboratory, and a site for aerodynamic testing of vehicles used for bomb deliveries. A major part of the equipment installed in the buildings came from Germany, where it had been seized after World War II. A variety of tests were conducted at the Salton Sea, but the focus was on high altitude drops of bomb components. Highly detailed examinations of equipment, from space capsule parachutes to drone planes and missile tests, are documented as having been carried out at the Salton Sea.[362]

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[360] Furman, 114-116; "About Sandia: History," Sandia National Laboratories (website), accessed March 28, 2018, http://www.sandia.gov/about/history/index.html.
[361] Bremner, "Salton Sea Test Base"; Terp, *Nuclear Weapons*, 119; U.S. Department of the Navy, *Fact Sheet No. 17.*
[362] "Sandia Laboratory Salton Sea Base, Imperial County," Energy Employees Claimant Assistance Project (EECAP, website), accessed April 14, 2018, http://www.eecap.org/Covered_Facilities/California /Sandia_Salton.htm; Terp, *Nuclear Weapons*, 119; Johnson, *Sandia National Laboratories*, 18, 27, 94-98; U.S. Department of the Navy, *Fact Sheet No. 17.*

The residents of the Salton Sea region had been aware of the tests since 1949 when the "veil of secrecy"[363] had been lifted, and it was officially announced that the Salton Sea Base at Sandy Beach was being used for mechanical testing of atomic bomb designs. The AEC reassured residents that the project posed no radiological hazards since no atomic explosives were tested in the area.[364]

In 1951, the AEC invited a group of journalists for a tour of the 640-square-mile Frenchman Flat facilities in Nevada and disclosed further details of the operations at the Salton Sea. Journalists from *the San Bernardino Sun* were interested in the newly renovated site, which cost three million dollars, but they were more eager to find out about two things. Firstly, were the weapons tested at the Sea equipped with atomic warheads? And secondly, what caused the mysterious explosions in 1950?[365]

None of their questions were answered. But the AEC, for the first time, officially confirmed that the Salton Sea site had been included in the atomic weapons program since December 1944. The journalists were told that the site was being used for determining the ordnance characteristics of weapons, which meant how a bomb acted after having been fired. Moreover, the AEC disclosed that in 1947 it had become apparent that substantial improvements were needed for the site to function and that a major investment was channeled to improve the site. It also became official that Sandia kept staff on site and that other staff from Albuquerque were joining the site temporarily. In the following years, the corporation provided jobs for the local residents, too. Dozens of vacancies during those years can be found in the press, advertising openings for laborers, drivers, painters, firefighters, or security guards.[366]

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[363] "Atomic Designs Being Tested at Salton Sea Base," *Desert Sun* (Palm Springs, CA), July 8, 1949, https://cdnc.ucr.edu.
[364] "Atomic Designs Being Tested at Salton Sea Base," *Desert Sun* (Palm Springs, CA), July 8, 1949.
[365] "First Details of Atom Base at Salton Sea," *San Bernardino (CA) Sun*, September 14, 1951.
[366] "First Details of Atom Base at Salton Sea," *San Bernardino (CA) Sun*, September 14, 1951;
"Sandia Corporation Now Accepting Applications," *Desert Sun* (Palm Springs, CA), March 9, 1951, https://cdnc.ucr.edu; "Sandia Corporation Now Accepting Applications," *Desert Sun* (Palm Springs, CA), September 25, 1952.

Sandia documented over 1,100 missile tests at the Salton Sea between 1946 and 1961. In 1952, the amount peaked with 223 drops. A large share of the tests carried out at the Salton Sea were a part of the Nike Project conducted by Bell Laboratories. The Nike Project developed a line-of-sight anti-aircraft missile system, including the Nike Ajax, Nike X, Nike Hercules, and Nike Zeus missiles.[367]

Sandia developed mobile cameras, which were used at the Salton Sea base. They were dropped alongside parachute prototypes in bomb-like structures and were used to photograph the deployment of various parachute designs. The cameras were used for high-speed photography and were dropped simultaneously with parachutes and bomb dummies. These photos enabled the Sandia engineers to uncover faults in the bomb and parachute design. Moreover, stationary cameras were used at the site. Three camera stations were installed on two islands of the Salton Sea, in its northern and its southern parts, and they became a crucial part of the Sandia operations. Used for aerodynamic measurements and evaluation purposes, the stations were equipped with state-of-the-art cameras, lenses, and development facilities. The high-maintenance buildings, where the equipment was stored, were submerged in the rising waters of the Salton Sea shortly after the operations ended.[368]

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[367] Bremner, "Salton Sea Test Base"; Terp, *Nuclear Weapons*, 119; Michael Ann Sullivan, "Establishment of Sandia National Laboratory, 1945," New Mexico Office of the State Historian (website), accessed May 6, 2018, http://dev.newmexicohistory.org/filedetails.php?fileID=458; California Council on Science and Technology (CCST), "Sandia National Laboratories California" in *Federal Labs & Research Centers Benefiting California; 2017 Impact Report for State Leaders*, 30-31, CCST (website), accessed May 7, 2018, https://ccst.us/federal/labs-overview/sandia/.
[368] Leland Johnson, *Sandia National Laboratories: A History of Exceptional Service in The National Interest* (Albuquerque, NM: Sandia National Laboratories, 1997), 65-66, 96-97.

FIGURE 5.5. Facilities of the Sandia Laboratory, with the Salton Sea in the background, ca. 1960. (Stephens & Stephens, Attorneys at Law, "EEOICPA Covered Facilities: Sandia Laboratory, Salton Sea Base, Imperial County," Areas of Practice, EEOICPA Claims Assistance, https://www.stephensstephens.com/.)

Exploring the Great Outdoors

While in the south of the Salton Sea Sandia was conducting bomb tests, the holiday industry was expanding in the north. Leisure activities became an integral part of family life in suburban California of the 1950s. An expansion of the "frontier of leisure," as environmental historian Lawrence Culver calls the booming holiday industry, was possible due to newly acquired prosperity. The new generation had enough time and money to explore their surroundings. While settlers in the 1920s and 30s had suffered from poverty and the hardships of sickness and malnutrition, the new Californians brought prosperity, supported by the growing confidence in the post-war booming American economy.[369]

Work and family structure transformed greatly in the post-war period. In the new suburban settlements, husbands were often the only working family members, and they, too, were able to find time for leisure activities. With people having more time and money to spend, post-war prosperity strengthened consumer culture and changed the habits of Americans. Among the many ways to spend free time, outdoor activities became increasingly popular. In Southern California, escaping the hustle of the big

[369] Culver, *The Frontier of Leisure*, 2-3.

cities was possible in recreation parks, such as the Salton Sea State Park dedicated in 1955. Furthermore, fishing, hiking, and water skiing became increasingly popular.

The automotive industry was developing rapidly, allowing car owners to drive faster and more conveniently to remote locations. In the 1930s, a journey from Los Angeles to Palm Springs had been a logistical challenge. In the 1950s, it was a pleasurable experience to spend three hours on the road heading for a weekend getaway. California became the most mobile American state. For instance, the city of Los Angeles has had the highest per capita automobile ownership in the whole country since 1910. Furthermore, the technological improvements were applied to the motorboat industry. Faster and safer boats were developed, and soon, in many household garages, a motorboat was parked next to the family Chevrolet. Thus, a suburban family was not only equipped to explore the surrounding lands but also the surrounding waters.[370]

A postcard from the Salton Sea from the 1950s depicts a Chevrolet releasing a boat into the Sea straight from the shore. Next to the boat, several family members are waiting to begin the adventure on the waters of the Salton Sea. Another postcard shows a group of relaxed vacationers gazing on the calm waters of the Salton Sea. In the background, several water-skiers casually cruise through the surface of the Sea. The success of the waterskiing industry at the Sea was rather unprecedented throughout the 1950s, with thousands of enthusiasts arriving each weekend. The state of California recognized this trend as a long-term opportunity to attract visitors to the region, announcing that the Salton Sea was unquestionably suitable for the development of the tourism industry on an even larger scale. The astronomical number of visitors at the Sea supported this assumption.[371]

[370] Culver, 59-60, 178.
[371] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation*.

FIGURE 5.6. A postcard from the Salton Sea, date unknown (Photograph courtesy of Salton Sea History Museum, online Historic Photo Gallery, https://www.saltonseamuseum.com/.)

The Sea gained an entirely new role, becoming an object of widespread attention. Cherished for its quiescence, it became the background for lifelong vacation memories. A description of a first-time visit at the "Mysterious Sea," published in the *Santa Cruz Sentinel,* shows that the Salton Sea impressed its visitors:

> Thirty-six miles long and up to 16 miles wide, the Salton Sea is breathtaking when viewed for the first time. Rimmed by rugged mountains, reflecting the bright blue of the desert sky, the sea seems out of place in its vast cactus-littered valley.[372]

In the 1950s, the Salton Sea found itself in proximity to an emerging metropolitan complex, a "triangle" of ten million people living between Los Angeles, San Diego, and San Bernardino. As those cities were strongly associated with the production of various sporting goods, such as boats and trailers, the equipment to explore the outdoors was easily available. The major population centers of Southern California were within 90 to 140 miles from the Sea, making it possible to plan a day trip to the shores of the Salton Sea. In addition, the Sea was surrounded by major highways with U. S. Route 99 running along the southwest shoreline between Los Angeles and El

[372] "Mysterious Salton Sea Rises, Damage Mounts into Millions," *Santa Cruz (CA) Sentinel*, April 22, 1964, https://cdnc.ucr.edu.

Centro, Route 111 crossing the northeast shoreline between Palm Springs and El Centro, and Route 80 connecting San Diego to El Centro.[373]

In 1955, the California Department of Parks and Recreation dedicated the Salton Sea State Park at the northeastern side of the Sea. It was the second largest park in the state, after the Anza-Borrego Desert State Park, and throughout the 1950s and 1960s, it drew more visitors than the Yosemite National Park. The recreation area extended for over fifteen miles throughout the shore, between the communities of North Shore and Bombay Beach. Having paid a small fee, the visitors were invited to park their vehicles and use all amenities provided in the area. A long wharf allowed an easy access to the Sea for motorboats, and there were dozens of barbecue spots, camping tables, and mobile home spots. All was coordinated from an air-conditioned visitors' center at the park's northern entrance.

While the coastal cities of California continued to grow, the desert regions became more populated as well. At the same time, they began to draw an increasing number of leisure-seekers. Interestingly, the increase in population growth and the mass development of tourism in the Sunbelt were enabled by a rather mundane item: The air conditioner. Willis Carrier, an engineer from New York, had invented the device in 1902 and patented it as an "Apparatus for Treating Air." The main principle of the device was to collect hot air from a closed space and cool it down. The heat collected in the process was treated inside of the device with a set of coils and a refrigerant. The cool air was then released back to the closed space and the superfluous heat was released via an outside tube. It took a few decades to improve the system of temperature and humidity control, and by the 1950s, the Carrier Air Conditioning Company of America sold the devices on a mass-scale.[374]

Until the 1950s, only the period between October and March was considered bearable to enjoy the outdoors. But the availability of air conditioning attracted the American middle class to visit the warmest parts of the country

[373] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation*.
[374] Culver, *The Frontier of Leisure*, 178, 186.

even in the hottest summer months. This development drew astronomical numbers of visitors to the Salton Sea in the 1950s. But how was it possible to vacation in an area where the Sandia Laboratories were conducting warfare tests? Throughout the 1950s and 1960s, the Salton Sea was a place of contrast between the quiet enjoyment of the outdoors and the extensive testing of nuclear weapons tests.[375]

If the 1930s had been quiet and pessimistic, both at the Salton Sea and across the United States, the 1950s roared with laughter and positive social sentiments. While the nuclear scare and the fear of the USSR persisted throughout the decade, the confidence in American superiority remained strong. This conviction was driven by the announcements of the Atomic Energy Commission and the federal agency NASA, constantly assuring the American population that the United States was winning the Space Race or the nuclear arms race with the Soviet Union.

In the 1950s and 60s, the warfare tests in the United States were perceived as demonstrations of patriotism. In many cases, they became a public spectacle. The case of the Nevada Test Site demonstrates that U. S. citizens did not fear warfare, mostly due to insufficient knowledge about the harmful consequences of exposure to nuclear waste. A few hundred miles to the north from the Salton Sea, atomic bomb tests at the Nevada Test Site drew thousands of visitors, who applauded the ongoing explosions. Those tests were taking place on a regular basis throughout the 1950s. The spectators cheered the yellow substance swirling from the place of detonation, unaware that what was covering their skin and clothes in colorful dust was radioactive nuclear waste. In the close-by city of Las Vegas, lavish atomic bomb parties were held at the city's casinos, which celebrated nuclear warfare as a means of protection from a hostile power. On the nights when the bombs were tested, guests left the dark gambling rooms to cheer the brightening desert sky, where explosions of detonation were carried by the wind from the Nevada Test Site. Bartenders created "atomic bomb cocktails," adding a fizzy

[375] Kevin Blake, *Salton Sea Resort: Death in the Desert* (New York, NY: Bearport Publishing, 2015), 11.

vitamin tablet to gin or vodka and serving it in beakers, which made it look like a fizzing chemical sample.

At the Salton Sea, visitors did not have the opportunity to celebrate nuclear warfare as much as the visitors of Las Vegas did. The Sandia Laboratory had a duty to keep virtually all of its activities confidential, and the tests it conducted were not as spectacular as the atomic bomb tests at the Nevada Test Site.

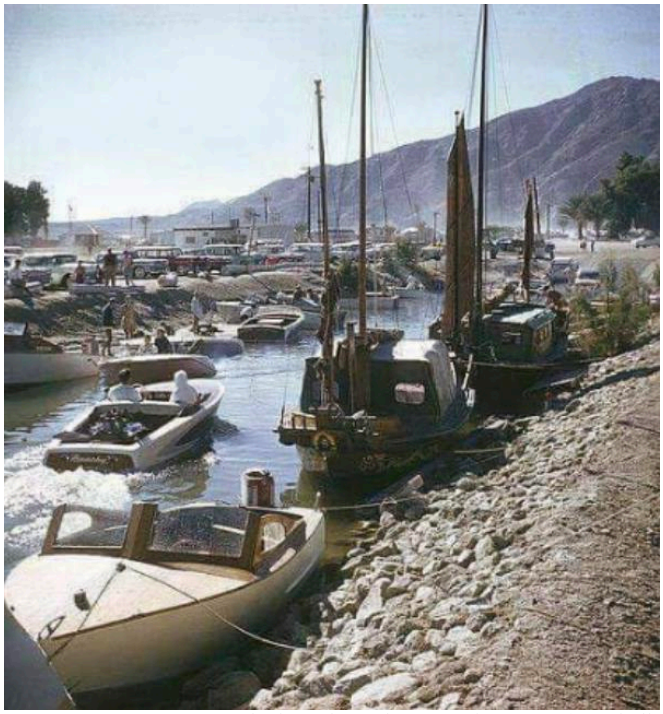

FIGURE 5.7. Boats parked at the Salton Sea in 1962. (Coachella Valley Media Group, https://www.facebook.com/TheCoachellaValley/.)

FIGURE 5.8. Pier at Desert Beach before it became North Shore, date unknown. (Photograph courtesy of the Salton Sea History Museum, online Historic Photo Gallery, https://www.saltonseamuseum.com/.)

Fifty miles north from the nuclear laboratory, the northeastern tip of the Salton Sea experienced two failed attempts to create a successful holiday resort. Gus Eilers, whose venture was discussed in the last chapter, never managed to finish the Egyptian-themed Date Palm Beach. In 1946, he sold the estate to C. Roy Hunter, who had a grand vision for a resort city at the same spot. Hunter renamed the place "Desert Beach" and commenced the planning procedures. But in 1948, the Sea began to swell due to increased agricultural runoff, and by 1953, Hunter's estate was submerged. He sued the Coachella Valley County Water District and the Imperial Irrigation District but died before the court's ruling.

Ray Ryan arrived in 1957 in the same area where Gus Eilers and C. Roy Hunter had lost their fortunes. But Ryan did not mind the risk. Originally from Wisconsin, the developer-financier, with a few decades' worth of experience in oil investments, found his home in Southern California where he became a land developer. Not only did he not mind the risk, but he also enjoyed it. Described by his biographers as a "professional gambler," Ryan was friends with Las Vegas mobsters and Kentucky oilmen, and he took pleasure in risky investments. Together with his business partner, Trav Rogers, they envisioned the future resort at Salton Sea while horseback riding through the vast beaches of the Sea's northern shore.[376]

They found the location at present-day North Shore ideal as it was just one mile north from the State Park and located right next to U. S. Route 111. Compared to the rest of the northern shore, this spot had moderate temperatures and less wind, and the land was not as rough as the surrounding area. A *Desert Sun* article enthused about the project:

[376] Russell Rathbun, *The Great Wall of China and the Salton Sea: Monuments, Missteps, and the Audacity of Ambition* (Grand Rapids, MI: Eerdmans Publishing, 2017), 117; "North Shore Beach - How Is a City Born?" *Desert Sun (Palm Springs, CA)*, April 13, 1962, https://cdnc.ucr.edu.

> The topography of this site is the answer to a land engineer's dream. It is so designed by nature—the land slopes upward from the beach to the foothills of the Chocolate Mountains, that a striking panoramic view of the sea and the surrounding mountains is sharply in focus from any point on the property.[377]

The construction began with laying out water pipelines that transported freshwater from Mecca, nine miles to the north of Desert Beach.[378]

Ryan commissioned the renowned architect Albert Frey to design the North Shore Beach and Yacht Club. Frey, whose name is most often associated with the mid-century architecture of Palm Springs, was a Swiss architect famously known as the father of Desert Modernism, a minimalistic style of angular structures and usage of glass, stone, and concrete. He had left Europe in the 1930s and became the first follower of Le Corbusier, the pioneer of modern architecture, to work in the United States. Frey's design stood for openness, spatiality, and light. He transformed Palm Springs into the mecca of modern architecture, designing not only villas for the rich and famous but also the public buildings, gas stations, and department stores of Palm Springs.[379]

FIGURE 5.9. *Left,* Frey House I, at 1150 Paseo El Mirador in Palm Springs, ca. 1960. ("A Modern Minimalist," *Palm Springs Life*, November 26, 2014, https://www.palmspringslife.com/.)
FIGURE 5.10. *Right,* Tramway Gas Station in Palm Springs, designed by Albert Frey. (Photograph courtesy of the Palm Springs Historical Society, "A Modern Minimalist," *Palm Springs Life*.)

[377] "North Shore Beach - How Is a City Born?" *Desert Sun (Palm Springs, CA)*, April 13, 1962.
[378] "North Shore Beach - How Is a City Born?" *Desert Sun (Palm Springs, CA)*, April 13, 1962.
[379] Culver, *The Frontier of Leisure*, 182, 187.

In 1959, he finalized the design of the members-only Yacht Club at the Salton Sea. Frey's design, considered to be modern, sophisticated, and in fashion, attracted a new audience to the Salton Sea. It became a favorite spot of the wealthy leisure-seekers who expected their vacationing spot to be luxurious and glamorous. The white-and-yellow structure welcomed the guests with a rounded and extravagant roof, which resembled that of a ship nose. On the side of the shoreline, the building resembled a ship parked at the Salton Sea shore.[380]

While at Helen's marina anyone could join the joyful crowd, parties at the Yacht Club were by invitation only. Throughout the 1960s, North Shore was a popular destination for the rich people from Los Angeles. By 1963, at least one hundred people entertained themselves in the Club each day, and it had over 2,500 regular members. People came to socialize with celebrities from the entertainment industry: Jerry Lewis, Frank Sinatra and the Rat Pack, the Beach Boys, Sonny Bono, and the Marx Brothers all kept boats at North Shore Beach and frequently visited the Yacht Club. The Club became a symbol of fun, carefree times, and endless speedboat races. In 1962, Ryan and Rogers rebuilt the club. This expansion made it the largest marina in Southern California. In addition to the yacht club, the North Shore Beach Estates included a marina with 87 boat slips, 150 spaces for dry boat storage, 50 moorings, and a luxurious hotel and airport.[381]

But this was not enough. Ryan and Rogers extended their vision from a holiday resort to an all-year enterprise and decided to build a city at North Shore. They began to sell lots, which hardly needed any promotional campaign as the names of visitors from the entertainment industry attracted potential buyers. On April 13, 1962, the headlines of the *Desert Sun* featured a photo of three gentlemen leaning over a big-sheeted construction plan. The photograph portrayed the general manager and chief engineer of Coachella Valley County Water District, joined by a civil engineer and a land surveyor.

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[380] Culver, 182, 187.
[381] Redlands Institute, *Salton Sea Atlas*, 32-33; Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation*.

"How is a City Born?"[382] the article asked. The investors Ryan and Rogers are missing in the picture but are featured in the article as "friends of long standing," who had the "romantic" idea to create a residential community at North Shore. "Many homes are now under construction in the rapidly burgeoning community," the article stated. The plan was to build 3,500 homes for a population of ten thousand residents. As soon as water pipes were extended, 1,000 lots were developed and sold instantaneously. By 1963, a total of 2,500 subdivided lots extended over the North Shore Beach Estates.[383]

But the investors ignored the fact that the Salton Sea was a reservoir for agricultural waste. Ninety percent of the water that entered the Sea came from agricultural runoff, which was potentially harmful for the leisure-seekers and for the future residents of the Sea. The remaining ten percent of the inflow consisted of natural precipitation, ground water, and urban waste. It was the latter that caused the first contamination crisis at the Salton Sea. The case of the raw sewage contamination in the 1950s indicated that planning a community at the Sea could be rendered useless by the stench of human waste.[384]

FIGURE 5.11. *Left*, The North Shore Yacht Club, date unknown. (Photograph courtesy of Salton Sea History Museum, published by the *Desert Sun,* February 12, 2016, https://desertsun.com/.)
FIGURE 5.12. *Right*, North Shore Yacht Club, ca. 1958. (Photograph courtesy of the Palm Springs Historical Society, published by *Palm Springs Life*, "Most Endangered Modernism," January 31, 2013, https://www.palmspringslife.com/.)

[382] "North Shore Beach - How Is a City Born?" *Desert Sun (Palm Springs, CA)*, April 13, 1962.
[383] Rathbun, *The Great Wall of China*, 117; "North Shore Beach - How Is a City Born?" *Desert Sun* (Palm Springs, CA), April 13, 1962.
[384] Redlands Institute, *Salton Sea Atlas*, 38.

FIGURE 5.13. The entrance to the North Shore Yacht Club, October 2018. (Photograph by author)

Odoriferous Outdoors

If the Salton Sea of the 1950s was a leisure oasis, it certainly was a stinky one. The influx of population caused a heavier volume of sewage to be released into the Salton Sea. A closer look at the press coverage shows that many carefree days at the Salton Sea must have been overshadowed by an unbearable smell. Interestingly, none of the historical studies of the Salton Sea, including DeBuys' *Salt Dreams* and Laflin's *The Salton Sea: California's Overlooked Treasure*, mention the full-blown sewage crisis that began in the late 1940s and continued until the early 1960s.

One of the first signs that something was not right came on a summer night in 1947 when residents of Cathedral City, Palm Springs, and Indio were irritated by a repugnant smell. Strong winds must have brought it, but a source for the smell was not yet clear. Was it sewage gas? Was it sulfur? Whatever it was, "it stunk!" and the Salton Sea became the main suspect of the stench.[385]

In the decades after the flood, raw sewage remained the second largest source of water in the Salton Sea. But the practice of sewage-dumping was not exclusive to the Sea. At the end of the 1940s, a sewage crisis emerged

[385] "Odorifous," *Desert Sun (Palm Springs, CA)*, August 8, 1947, https://cdnc.ucr.edu.

throughout the entire Colorado River Delta. Many houses lacked a plumbing system, and hardly any town had a sewage disposal system. Thus, private houses, farms, businesses, and factories often released their sewage into the closest bodies of water. The waste from factories rose as the wartime industry increased. The heavy population growth of the 1950s and 1960s and the lack of waste regulations brought about a heavy sewage pollution problem across the whole state of California, and it did not spare Mexico. At the Salton Sea, sewage reached the area at both of the narrowest edges of the Sea. In the north, Whitewater River carried sewage from Calexico and Mecca. In the south, the New River entered with sewage from El Centro, Brawley, Calipatria, and from the Mexican town of Mexicali.[386]

Severe outbreaks of water-borne diseases and the destruction of fishing grounds, as well as wildlife refuges, called for better regulation of water pollution control in California. At the same time, it became clear that a rapid population growth was exhausting the water resources. In 1949, in an attempt to tackle the crisis, the California Legislature passed the Dickey Water Pollution Act. It established the Water Pollution Control Board consisting of nine regional water pollution control boards, one for each of the watersheds. The goal was to create a water pollution control policy and to supervise its enactment through other state agencies. The Salton Sea belonged to Board No. 7, also known as the Colorado River Basin Regional Water Pollution Control Board. Board No. 7 was responsible for the very southeastern corner of the state of California, and bordered with three other boards responsible for the regions of Lahontan, Santa Ana, and San Diego.[387]

In order to ensure an efficient execution of new legislations, the board officials decided to establish the presence of the Board No. 7 in its most affected regions. Thus, it was headquartered next to the spot where the

[386] "Great Outdoors," *La Habra (CA) Star*, July 5, 1963, https://cdnc.ucr.edu.
[387] "History of the Water Boards," Water Board's Structure, California State Water Resources Control Board (website), revised January 31, 2019, accessed June 5, 2018, https://www.waterboards.ca.gov/about_us/water_boards_structure/history_water_pollution.html; California State Water Resources Control Board, "About the Water Boards," 4-6, accessed June 5, 2018, https://www.waterboards.ca.gov/board_reference/2009spring/tab13/about_the_waterboards.pdf.

Whitewater River entered the Salton Sea, in a region particularly endangered by sewage disposal.[388]

The first decade was rough for Board No. 7 and its executive directors. Hardly any towns in the Colorado watershed used sewage disposal systems. In 1953, the Board recommended that all settlements install sewage plants, and a deadline of January 1, 1957 was set. But only El Centro proceeded with an investment. All other towns of the Board saw it as a suggestion rather than an order, and they failed to execute the recommendation. After the deadline passed, the Board began an investigation. But there was not much the Board could do as disposing of sewage into the Salton Sea was not prohibited.[389]

The hazards escalated in 1955 when Mexicali was struck by a flood. The settlement on the U.S.–Mexican border dumped sewage into the New River, which then carried it into the Salton Sea. But the first week of January brought a heavy rain of almost two inches, resulting in the river overflowing the town of Mexicali. Eight thousand people lost their homes, and typhoid fever broke out in the areas flooded with sewage-filled waters.[390]

In spite of the obvious risk posed by the sewage, the authorities of Brawley and Calexico ridiculed the potential hazards facing the Salton Sea. In 1957, as the Board investigated the cases of negligence for failing to follow the recommendations, Brawley's mayor stood in complete opposition. The mayor, who claimed to be a "former bacteriologist,"[391] refused to "throw out" $350,000 to build a sewage disposal plant. The state figures, which indicated strong pollution, seemed "silly" to him, and he stated that Brawley would continue dropping sewage into the Salton Sea. In a heated discussion, one of the Board members responded to the mayor's claims, calling them

[388] "Hopes for More Use in Salton Sea Raised," *Desert Sun (Palm Springs, CA)*, December 5, 1962, https://cdnc.ucr.edu.
[389] "Cities May Defy State on Salton Sea Order," *San Bernardino (CA) Sun*, December 17, 1957, https://cdnc.ucr.edu.
[390] "Typhoid Threat Faces Mexicali," *San Bernardino (CA) Sun*, January 10, 1955, https://cdnc.ucr.edu.
[391] "Cities May Defy State on Salton Sea Order," *San Bernardino (CA) Sun*, December 17, 1957.

"belligerent" and "appalling." But in response to that, the Brawley City Clerk responded that he was an appalled taxpayer, refusing to pay $350,000 for what he considered a senseless enterprise.[392]

But a few months later, the Sea reacted to the tons of waste that were being dumped into its waters. The smell became unbearable, and its shores and water were clearly polluted. In 1958, the Water Pollution Control Board suggested to the State Health Department that a detailed bacteriological survey of the Salton Sea be done. The executive officer of the Board said: "Raw sewage is impeding, if not actually threatening the recreational value of the Salton Sea in both Riverside and Imperial counties."[393]

In order to end the pollution, it was critically important to pass legislation that would prohibit dumping of the sewage into the Sea. But such legislation was still not in sight, and sewage continued to flow into the Salton Sea from both sides of the border. By 1959, the layers of excrement on the Salton Sea beaches thickened, and the situation worsened. A survey commissioned by the Health Department confirmed that pollution levels were radically harmful to people. In March of 1959, the Board No. 7 declared a fifteen-mile stretch of the lower east shoreline of the Salton Sea unfit for watersports. The area began at a point three miles south of Bombay Beach and continued southeast along the shoreline to where the New River entered the Sea. But it was not only the water and beaches that were contaminated. In addition, an area of land that ranged from one to three miles away from the shoreline was also contaminated with raw sewage. And bacteriological testing indicated that another area in the north of the Salton Sea was contaminated, as well. Therefore, for the time-being, the Board closed two beaches in the northern part of the Sea.[394]

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[392] "Cities May Defy State on Salton Sea Order," *San Bernardino (CA) Sun*, December 17, 1957.
[393] "Salton Sea Survey on Bacteriology To Be Decided Soon," *San Bernardino (CA) Sun*, January 15, 1958, https://cdnc.ucr.edu.
[394] "Health Officials Say Salton Sea Strip Unfit for Swimming," *San Bernardino (CA) Sun*, March 14, 1959, https://cdnc.ucr.edu; "Hopes for More Use in Salton Sea Raised," *Desert Sun (Palm Springs, CA)*, December 5, 1962.

Somewhat paradoxically, the Board No. 7 seemed concerned with the future of the Salton Sea but, at the same time, remained dedicated to the Sea's leisure aspect exclusively. The Board acknowledged the Sea's value as a wildlife refuge but did not commission any surveys on the flora or fauna of the Sea. Instead of investigating the imbalance in the homeostasis of the Salton Sea ecosystem, the members of the Board were concerned with any potential disruptions that would prevent taking advantage of the Sea as a spot for fishing and waterskiing enthusiasts. The sole focus of this approach was to deal only with the short-term symptoms of the pollution crisis and not its underlying root cause.

But the crisis led to a stronger action, and in March of 1959, the State Division of Parks and Beaches addressed the Board of Supervisors of Riverside County, proposing that the dumping of sewage should be prohibited completely. The Division determined that the settlements that had begun to use sewage systems had neglected to manage them properly. Many cases of poor planning were observed in the towns of the Imperial and Coachella Valleys. As a result, the majority of communities continued to dump the sewage directly into the Sea. An investigation conducted by the Board No. 7, following the Division's request to the Riverside Board to prohibit dumping, revealed a "shock" about the extent and toxicity of the sewage to the scientists commissioned to survey the quality of the Salton Sea water.[395]

An employee of the State Division of Parks and Beaches delivered a passionate statement, demanding that stronger measures be taken in preventing a further inflow of raw sewage. "Members of the commission have been shocked to learn of the ineffectiveness of present laws and regulations in protecting the waters of the Salton Sea which should be one of the great scenic recreational and economic resources of the county and the state,"[396] he stated. Furthermore, he strongly suggested that "every means

[395] "Monday Meeting Board to Revive Sewage Problem," *Desert Sun (Palm Springs, CA)*, May 16, 1959, https://cdnc.ucr.edu.
[396] "Ordinance Ordered Board Starts Action on Salton Sea Sewage," *Desert Sun (Palm Springs, CA)*, April 29, 1959, https://cdnc.ucr.edu.

possible should be used to end present pollution and contamination of the water of the sea." The argumentation convinced the Riverside Board of the urgency of the matter, who proceeded to inform the Imperial County authorities that the issue was critically relevant to the entire region. In addition, the State Division suggested that the only way to "save the Salton Sea" would be to bring in fresh water from twelve miles away. In 1960, Board No. 7 officially prohibited the release of sewage into the Salton Sea. However, the freshwater restoration plan was not implemented.[397]

Unable to release sewage into the sea, the communities began constructing sewage systems. San Bernardino constructed a site in 1962, and Mecca Beach, the community which operated the highly popular Salton Sea Park, also followed in 1962. By 1964, all communities were equipped with sewage systems. But the Water Pollution Control Board continued to have its hands full: Half a million people visited the area each year, the local population kept growing, and the amounts of sewage steadily increased. Throughout the 1960s, the press continued to report on alarming cases of sewage pollution.[398]

It is difficult to imagine that as those bacteriological disasters were taking place, tourism continued to develop on a mass scale. The press played a major role in spreading awareness about the sewage pollution. But the sewage crises did not affect the numbers of visitors to the Sea. They continued to fish, and to sunbathe and socialize, at the Sea, regardless of the potential hazards. In addition, two large-scale real estate projects were being developed in the northern and western parts of the Sea. The estates in North Shore and Salton City, which will be discussed in the following chapter, were expected to attract tens of thousands of new residents.

But the problems of the Salton Sea were more profound as another source of stench began to emerge from the depths of the Sea. The organic matter,

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[397] "Ordinance Ordered Board Starts Action on Salton Sea Sewage," *Desert Sun (Palm Springs, CA)*, April 29, 1959, https://cdnc.ucr.edu.
[398] "Mysterious Salton Sea Rises, Damage Mounts into Millions," *Santa Cruz (CA) Sentinel*, April 22, 1964, https://cdnc.ucr.edu; "Sewage Plants," *San Bernardino (CA) Sun*, April 15, 1960, https://cdnc.ucr.edu.

stirred by the turbulent winds at the Sea's surface and decomposing in the oxygen-deprived lower layers of the Sea water, accelerated frequent and large-scale fish die-offs. This was especially noticeable in the hottest summer months when the dead fishes decomposed on the surface of the Sea and on its beaches. This aspect will be further discussed in the following chapters of this study.

A Day on the Water

The widespread ignorance of the sewage crisis at the Salton Sea confirms the rather unflattering picture of the 1950s vacationing rituals. Nature became popular, "gaining new meaning as a source of health and a place of recreation,"[399] as Lawrence Culver points out, and the way to "reconnect to nature and tradition was through leisure and consumption." For earlier generations in Southern California, spending time in nature was an obligation as this was one of the only ways to make a living. But now, prosperous, middle-class Americans spent time in nature willingly, with the sole purpose to relax. Outdoor recreation was about playing in nature, which often resulted in harming wildlife or leaving an area trashed. The outdoor experience was a superficial one, and it included interacting only with selected elements of nature: The beautiful landscapes, the pleasant weather conditions, or the fish species suitable for sports fishing. The inconvenient phenomena present in the outdoors, such as decay or chemical hazards, were simply ignored.[400]

At the Salton Sea, all of the popular outdoor activities were related to its water. Throughout the 1950s and 60s, the Sea was referred to as the Salton Riviera or the California Riviera, and it was a popular spot for enthusiasts of all water activities. The water was pleasantly warm for the swimmers, abundant in fish for the anglers, and the strong winds guaranteed fantastic sailing experiences. But it was the motorboats that attracted most attention. The favorable water density and barometric pressure enabled the boat racers

[399] Culver, *The Frontier of Leisure*, 10.
[400] Culver, *The Frontier of Leisure*, 10.

to frequently break world records at the Sea. The news about the Salton Sea having the fastest water in the country was spreading fast, attracting those who were eager to test the limits of their boats.[401]

The shoreline of the Sea was considered to be extremely favorable for the watersports business for two reasons. Firstly, a major part of the shoreline was owned by public agencies which allowed for public use. Secondly, the parts owned by private investors were being largely developed for community purposes. Interestingly, a 1963 assessment of the leisure value of the Salton Sea, conducted by the Regional Water Pollution Control Board, considered the waters of the Salton Sea to be quiet enough for small boats. It did not mention the strong winds and occasional turbulent waves, but focused instead on the favorable turbidity of the waters, encouraging visitors to spend a day cruising through the Sea.[402]

Perhaps because of the widespread reputation of the Sea as a friendly motorboating spot, some visitors approached the activity without much concern about the difficult conditions. In April of 1964, three men almost drowned in the Sea. They constructed their own motorboat by attaching a five-and-a-half horse power motor to a homemade vessel. Suddenly, it became windy and cloudy, and the men found themselves surrounded by choppy, raging waters. Without any knowledge or experience, and unable to swim, the vacationers were saved miraculously by a boat that was passing by. "I guess we kind of overshot our mark," one of the survivors concluded.[403]

Boat racing events became an almost daily entertainment option, attracting contestants from the whole country. *The Salton Sea 500*, a 500-mile powerboat endurance race began in the early 1950s, welcoming hundreds of participants and thousands of visitors for many years. The local press boasted that the Salton Sea drew so many visitors that the Pacific Coast was at risk of becoming deserted. "More boating enthusiasts go to the Salton Sea

[401] Kennedy and Linehan, *Queen of the Salton Sea*, 21; "500 Miler Boat Race at Salton Sea," *Desert Sun (Palm Springs, CA)*, November 8, 1966, https://cdnc.ucr.edu.
[402] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation*.
[403] "Man Who Saved 3 Wins Medal," *San Bernardino (CA) Sun*, April 15, 1964, https://cdnc.ucr.edu.

and the Colorado River than to the ocean as it appears any weekend when you travel the highways across the desert," the *San Bernardino Sun* reported.[404]

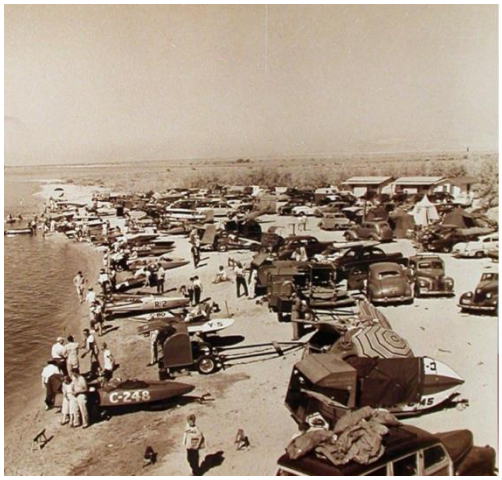

FIGURE 5.14. *Left*, Salton Sea 500, a record-breaking motorboat racing event, year ca. 1950. (Photograph courtesy of the Salton Sea History Museum, online Historic Photo Gallery, https://www.saltonseamuseum.com/.)
FIGURE 5.15. *Right*, "Early Days of Marathon Inboard Racing: Salton Sea 500," date unknown. (Boat Racing Facts, http://www.boatracingfacts.com/forums/showthread.php?17984-Early-Days-of-Marathon-Inboard-Racing-Salton-Sea-500.)

FIGURE 5.16. Waterskiing at the Salton Sea, 1966. (Kennedy and Linehan, *Queen of the Salton Sea*, 108 and 126.)

A system of ropes and handles enabled any motorboat to pull a water-skier, and many visitors of the Salton Sea took advantage of it. Water-skiing became the most popular water sport at the Salton Sea, attracting all age groups. The surface of the Sea was hardly ever empty. From dusk to dawn, dozens of motorboats were cruising across the Sea, often pulling a delighted water-skier in the back. The Sea carried the echoing sounds of the running

[404] "They Tell Me," *San Bernardino (CA) Sun*, June 6, 1963, https://cdnc.ucr.edu.

motors and the laughing vacationers. The wind carried the smell of gasoline, and every now and then, it robbed the boaters of sun hats, scarves, or beach towels.[405]

In an attempt to seize the opportunity of the increasing popularity of boating and sailing at the Salton Sea, the Imperial County Board of Supervisors proposed a project to organize cruises across the Sea waters. The Board drafted a budget for the construction of a flat-bottom vessel, two hundred feet long and eighty feet wide. It was planned to carry as many as two thousand passengers through the Sea for days at a time. However, the vessel was never constructed, and motorboats remained the main vehicles of the Sea.[406]

Leisure and warfare continued to coexist at the Sea for several decades. However, the Sandia Corporation had selected the Salton Sea as its testing ground due to its remoteness. As the visitor numbers of the Sea reached a half million people per year, the Sea lost its value to the warfare industry. In the beginning of 1961, the Atomic Energy Commission decided that all operations at the Salton Sea would be put on standby until further tests would be required. The plan changed on May 25, 1961 when the AEC released a statement confirming that the test base would be "disposed of" completely.[407] The AEC decided that the previous plan was "impractical and uneconomical," and swiftly closed all its operations at the Salton Sea, justifying the change by the increase in the commercial air traffic and the atmospheric haze from California cities. Sandia moved all Salton Sea operations to the Tonopah Test Range in Nevada, and by end of June, the base was closed.[408]

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[405] "They Tell Me," *San Bernardino (CA) Sun*, June 6, 1963; Kennedy and Linehan, *Queen of the Salton Sea,* 21; "500 Miler Boat Race at Salton Sea," *Desert Sun (Palm Springs, CA)*, November 8, 1966.

[406] Denise Goolsby, "Off-beat Salton Sea stories," *Desert Sun*, accessed October 28, 2018, https://eu.desertsun.com/story/news/2015/05/14/salton-sea-alligator-islands-graves/27331021/.

[407] "AEC Will Dispose of Test Facility at Salton Sea," *San Bernardino (CA) Sun*, May 25, 1961, https://cdnc.ucr.edu.

[408] Terp, *Nuclear Weapons*, 119-120; U.S. Department of the Navy, *Fact Sheet No. 17.*

There remains a controversy regarding the use of radioactive materials at the Salton Sea. Sandia claims that fissionable materials were never used, but local experts assume that depleted uranium was used in several tests. In 1997, the United States Navy, who owns the site, released a "Fact Sheet" addressing controversies regarding a possible radioactive contamination of the site. It refers to an investigation of the site carried out by the navy in which seven hundred samples were taken from the area. According to the navy, none of the samples contained radioactive material.[409]

In the 1950s, the Salton Sea underwent a major transformation from a quiet agricultural sump and a warfare testing site to a booming tourist destination. On its shores, crowds gathered to relax and to witness watersport spectacles. Boats of various shapes and sizes cruised across its surface. And deep underneath, the fish population was growing beyond any expectations. The Salton Sea corvinas grew to an unprecedented size, some reaching the record weight of twenty pounds. Fishing enthusiasts welcomed the presence of this "fish with a fight"[410] as an invitation to participate in a spectacular outdoor adventure.

[409] Terp, *Nuclear Weapons*, 119; U.S. Department of the Navy, *Fact Sheet No. 17*, 119; Johnson, *Sandia National Laboratories*, 96-97.
[410] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963, https://cdnc.ucr.edu.

Chapter Six
BIG FISH–BIG BUSINESS

The Great American Heritage

Throughout the 1950s, the Salton Sea suffered from several symptoms of imbalance, caused by the increasing salinity and raw sewage contamination. In addition, the volume of the Sea continued to rise as the amount of agricultural runoff released to the Sea increased, particularly in the winter months. The local businesses and communities were endangered by the hazardous substances and remained under risk of flooding. But in spite of these risks, the tourist business continued to boom. "The right to an outdoor living" perceived as "the great American heritage"[411] was heavily promoted by the State of California, in particularly by the Department of Fish and Game and the Department of Water Resources.[412]

This chapter reflects on two aspects of the booming leisure industry of the Salton Sea between the late 1950s and the 1960s. Firstly, it gazes into the mouth of a predator fish, the orangemouth corvina. Corvina fishing attracted great numbers of visitors to the Salton Sea, transforming the community of Desert Shores into the Sea's fishing capital. Secondly, this chapter investigates the case of Salton City, a multi-million-dollar real estate scam mastered by the developer M. Penn Phillips. Salton City was the largest residential development in the history of the Salton Sea, and one that failed most spectacularly.

The main primary sources selected for this chapter include a corvina fishing guide published in 1963 by the *San Bernardino Sun* titled "A Fish with a Fight" and the 1963 report *Conservation of the Beneficial Water Uses of*

[411] *Miracle in the Desert and the Salton Sea,* 1960s promotional film, produced by Holly Corporation, available as YouTube video, https://www.youtube.com/watch?v=M__eyylXfK4.
[412] Colorado River Basin Water Pollution Control Board, *Report on Conservation.*

Salton Sea in California conducted by the Colorado River Basin Regional Water Pollution Control Board. In addition, a promotional film about the Salton Sea, produced in the early 1960s by the Holly Corporation, provides an insight into the sales practices of the large-scale developments of residential communities in Salton City. This thirteen-minute-long video titled *Miracle in the Desert and the Salton Sea* presents footage from both the Salton Sea and Palm Springs, accompanied by a high-spirited narration. The film begins by introducing the Sea as a setting for an exceptional business opportunity:

> You are looking at a remarkable idea. An idea that has intrigued and attracted, literally thrilled thousands upon thousands of men, women and children. And you, my friends, are about to witness this idea become a reality. For this is the story of the miracle sea in the desert. The Salton Sea.[413]

The major secondary source used in this chapter is DeBuys's *Salt Dreams*. In the chapter dedicated to Salton City, DeBuys provides an in-depth analysis of the Salton Sea real estate boom. He depicts M. Penn Phillips as a greedy fraudster who claimed to plan to develop a thriving community similar to Palm Springs but who, in reality, had no intentions to implement the plan.

Fisherman's Fight

In the mid-1950s, when the corvinas began to dominate the underwater habitat, the California Department of Fish and Game assessed as a success its efforts to transform the Salton Sea into a sports fishery. Stocking the Sea with new fish continued, but none of the species gained as much popularity as the corvina. The Sea was suddenly something more than a place to catch a fish or two. In the bars and restaurants at the Salton Sea shores, new items were appearing on the menu. The regular special dish of smoked mullet was replaced by "the Salton Sea fried corvina".[414] But the corvina became more

[413] *Miracle in the Desert and the Salton Sea,* 1960s promotional film.
[414] "Corvina Prizes," *San Bernardino (CA) Sun*, August 23, 1963, https://cdnc.ucr.edu.

than a snack. The *San Bernardino Sun* stated that "the Salton Sea desert people don't bow to Mecca. They bow to the corvina." The Sea hence became the new home to the celebrity fish, and the popularity of corvina fishing peaked between the late 1950s and the mid-1960s.[415]

At the Salton Sea, corvina fishing was exciting, exhausting, and rewarding. The fishermen came equipped in the newest gear, carrying customized bait. They often brought their own motorboats with which they were able to access the remote and quiet spots where the fishes were plentiful. The special gear was necessary, as corvinas were fierce fighters.

In the 1950s and 1960s, the Salton Sea became known as a fishing paradise in the desert. As the sports fishery grew, the Department of Fish and Game introduced daily limits on certain species. Interestingly, the success of the sport fishing industry seemed unaffected by the sewage crisis. Hardly any mention of sewage pollution can be found in the variety of press reports concerned with corvina fishing.

Corvina is a saltwater predator that feeds predominantly on smaller fish and worms. A 1963 *San Bernardino Sun* article titled "Salton Sea's Big Word: Corvina – A Fish with a Fight" provided a detailed introduction into the history of the orangemouth corvina at the Salton Sea, its habits, and the most efficient corvina fishing methods. "Corvina are bottom running school fish and chances are a school will find you," the article stated, adding that "until you've sunk your hook into a fighting corvina you haven't lived fishing-wise."[416] They are silver, with a blue stripe on their back, and grow to an average of thirty-two inches long. The orange coloring of their mouths inspired the name *orangemouth corvina*. They move in large schools, hunting with their very sharp, canine teeth. These predator teeth often injure

[415] "More Water Wanted for Salton Sea," *Riverside (CA) Daily Press*, August 11, 1917; "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963; "Corvina Prizes," *San Bernardino (CA) Sun*, August 23, 1963;
Redlands Institute, *Salton Sea Atlas*, 32-33.
[416] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963.

the fingers of fishing enthusiasts, who remove hooks not carefully enough from the corvina they've caught.[417]

After the Department of Fish and Game had planted corvinas in the Sea, the fishes quickly began to grow extremely fat and strong, pushing out the mullet population. Corvinas managed to survive in the new conditions by forming a new food chain, in which the smallest fishes and pile worms became their prey. Their immense size gained them popularity among the fishing enthusiasts at the Salton Sea. In the ocean, a six-pound corvina was an average catch. In the Salton Sea, fifteen- or even twenty-pound corvinas were common.

The fact that corvinas have a strong fighting spirit puts them among some of the most popular sportfish species. A special technique of lowering the rod is necessary to complete the battle with these fishes, and the fight is often a spectacular one, involving strong and heavy twisting of the fishes as they hit against the water's surface, turning the seawater into foam. An ability to catch a large corvina is an indication of the strong skills and the expert level of knowledge of a fishing enthusiast. The heavier the corvinas are, the easier it is to lose them from the hook since their mouths are tender and tend to easily release the hooks.

"A Fish with a Fight" described the aggressive attitude of the corvina, and their high reproduction rate:

> Sargo are not too much to catch. They lack fighting quality. The corvina is a different story. He's a fighter and he grows big. He has a vicious set of teeth that can tear an ordinary monofilament line to shreds, so your corvina fishing equipment must include wire leaders like ocean anglers use for barracuda. The comparatively few corvina stocked in Salton Sea have thrived and multiplied beyond the fondest

[417] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963; Paxton and Eschmeyer, *Encyclopedia of Fishes*, 182.

> dreams of the Department of Fish and Game, which estimates there are 3,000,000 of them in the sea today.[418]

A *San Bernardino Sun* 1965 article stated that corvinas were "well scattered all over the sea, with no single area better than another." It instructed that fishing was particularly good between 3 a.m. and 10 a.m. in the Salton Sea, "a fact which is helpful, considering the high temperature of the area."[419] "A Fish with a Fight" featured an interview with the local corvina fishing expert, Wilda Bennett. Presumably lacking a better expression, the *San Bernardino Sun* described Miss Bennett as "a fisherman." She gave the readers specific guidelines on Salton Sea corvina fishing, reassuring them that it was great at any time of the year. She had noticed that there was a slight decrease in the corvina population in the winter months when the water cooled down. But considering the overall immense population, it was hardly noticeable. Bennett stated that "the corvina don't seem to care whether it's day or night when they bite," but advised fishing in the early morning hours, before the temperatures became unbearable for the anglers. She considered boat fishing to be the best as this was how the biggest fishes were caught. But fishes were plentiful even close to the shoreline, as well as next to the docks and jetties of the Salton Sea.[420]

Once the bait was in the water, the angler had to keep it moving. "Anglers work their bait to simulate live fish action in the water," Bennett explained. Her fellow fishing expert recommended to remain patient throughout this process. "Let 'em run and tire out" was his motto, enthusiastically supported by Wilda Bennett.[421] The article continued to describe the fight:

> Corvina take a bait or lure and mouth it. If they feel tension, they let go. So give them a free spool and let them run 50 or 60 feet. Often they will take bait, let go and take it again. Generally, the fish will make an initial strike and move away on a fast run. You may find your

[418] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963.
[419] "Corvina Fishing Good at Salton Sea," *San Bernardino (CA) Sun*, August 13, 1965, https://cdnc.ucr.edu.
[420] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963.
[421] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963.

> line slack and think you have lost him. Chances are, though, he is coming toward you. If this happens, reel in fast and prepare for another run. Here's something else. Don't attempt to horse in a corvina. It's a fighting fish and should be played. Don't horse it, many are lost that way. And if you hook one that's big enough, look for him to break water, twist and whirl in his fight against you.[422]

"Of course if you catch one you'll want to eat it," the article stated. Corvina tastes similar to mullet, rather sweet and tender, and at the Salton Sea of the 1950s and 1960s, it was most commonly prepared as a simple fried dish served with chips, coleslaw, and dipping sauces. But in the local households and restaurants, many creative ways to prepare corvina emerged. Housewives and chefs served it filleted and grilled, broiled whole, baked, or steamed. Many visitors of the Salton Sea associated their vacation with the flavor of corvina flesh, and the local press frequently shared the most popular recipes. A simple steak with lemon and seasoning was one of the most popular ways to prepare corvina, but it was often featured in more elaborate recipes.[423]

The *Desert Sun* claimed that consuming corvina should not be reserved exclusively to fishermen: "A zesty fisherman's meal need not be limited to the adventuresome. Angle an over-the-coals recipe for fish, hook it to some freshly caught Salton Sea corvina, and catch the flavor of all outdoors right on your own patio." The featured recipe included stuffing the corvina with bread, dill, and butter. To accompany the grilled fish, a salad of cucumber slices marinated in vinegar mixture was served alongside a loaf of Vienna bread, with the suggestion to "cut into diamond-shaped wedges, coat with a whipped cheddar-butter spread, sprinkled with caraway seed, and grilled in foil right beside the fish."[424]

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[422] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963.
[423] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963.
[424] "Grilled Fish for Dilly of a Dinner," *Desert Sun* (Palm Springs, CA), October 15, 1962, https://cdnc.ucr.edu.

Josephine Di Filippo, whose recipes were featured in another *Desert Sun* article, enjoyed the abundance of fresh corvina as she and her husband took frequent fishing trips to the Salton Sea. "By noon they are back home, and if luck has been with them, they will spend the next few hours cleaning corvina to be stocked in their freezer until Josephine can make corvina in minestrone." Her "Italian minestrone" corvina recipe called for cooking the fish in sautéed vegetables and herbs. She served the minestrone with potatoes and salad, followed by peaches in wine for dessert.[425]

The Di Filippos were among the many who experienced the adventure of corvina fishing at the Salton Sea. On a particular August morning, they found the conditions to be very difficult. The heavy wind stirred the water and made navigation difficult: "Waves were even breaking over the breakwater on the upper east side of Salton Sea,"[426] they revealed to the *Desert Sun*. A *San Bernardino Sun* article stated that "about the only thing that disrupts corvina fishing at the Salton Sea is the wind. And hell, they say, hath no fury like the winds of Coachella and Imperial Valleys."[427]

But on most days, corvina fishing at the Salton Sea was a delightful experience. The limit of corvina was six to fourteen per day, depending on the time of the year, and it was reached almost every time an angler spent a morning at the Sea. The local press printed reports about wonderful corvina fishing experiences at the Salton Sea on a regular basis. For instance, in April of 1963, the *San Bernardino Sun* featured a report on a couple who had spent a weekend fishing at the eastern shore of the Salton Sea, close to the community of Bombay Beach. They enjoyed the excellent fishing conditions, successfully picking up five-pound corvinas with mudsuckers as bait: "They reported beautiful weather at Salton Sea over the weekend, with only one brief spell of wind Saturday."[428]

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[425] "She Loves to Cook Corvina Dishes - Ala Italy," *Desert Sun* (Palm Springs, CA), August 29, 1963, https://cdnc.ucr.edu.
[426] "She Loves to Cook Corvina Dishes - Ala Italy," *Desert Sun* (Palm Springs, CA), August 29, 1963.
[427] "Wind at the Salton," *San Bernardino (CA) Sun*, April 19, 1963, https://cdnc.ucr.edu.
[428] "Salton Sea Corvina Fishing," *San Bernardino (CA) Sun*, April 30, 1963, https://cdnc.ucr.edu.

Providing tasty meat was only a secondary goal of corvina fishing. It was primarily a trophy fishing sport, and there was strong competition among the fishing enthusiasts in catching the largest fish. Reports of anglers catching record-sized fishes were common in the local press throughout the 1950s. By 1963, the largest corvina registered was nineteen pounds heavy, and fifteen pounders were considered to be common. The average size of the seasonal catches determined how the press described the fishing conditions. If the fishes were smaller (between two and ten pounds), the conditions were considered "fair to good." Larger catches meant that the conditions were described as "excellent."[429]


Sun-Telegram photo

HERE IT IS—John B. Johnston of San Bernardino proudly displays the 18-pound corvina he boated while fishing at the Salton Sea. Read With the Sportsmen in the adjacent column for details.

FIGURE 6.1. A record-sized corvina caught in the Salton Sea, 1965. (Photograph courtesy of the *San Bernardino (CA) Sun*, "With the Sportsmen," July 1, 1965.)

The anglers involved other species in the fishing of corvinas as well. When the winds were strong, the surface was not clear enough for the anglers to spot the moving corvina schools. In those cases, they relied on the fishing

[429] "Fishing at Salton Sea on Increase," *Desert Sun* (Palm Springs, CA), October 30, 1962, https://cdnc.ucr.edu; "Outdoors - Play Days Ahead," *Calexico (CA) Chronicle*, June 27, 1963, https://cdnc.ucr.edu.

birds: "The wheeling, diving birds are the best guide,"[430] the *Desert Sun* stated, claiming that the desert was "great for seagulls." Thus, the anglers hoped for a marked increase in the migration of seagulls from the coast.[431]

At the Salton Sea, catching the large predator fish became a task easier than the anglers often claimed. The corvina's reputation of being a fierce fighter stands in conflict with many newspaper reports of children and individuals with no fishing experience catching exceptionally large fishes. In June of 1963, an eight-year-old boy from Palm Springs caught an eleven-pound, thirty-four-inch corvina off Mecca Beach.[432] In October 1965, the *Calexico Chronicle* reported on an inexperienced angler catching a forty-one-inch fish. Headlined "23 Pound Corvina Caught by Woman," the article described how Daisy Kadoun from Long Beach managed to catch the "largest of the year and one of the biggest fish ever reported from the Salton Sea." She beat the record established just four months earlier by John Bell, a gentleman from Mecca, who had caught a twenty-pound, thirty-six-inch fish, and whose achievement had been widely reported in the press. Those "record-breaking" trophy fishes were often placed on display at the famous Mike's Tackle Box in the community of Desert Shores, which became the landmark for sportfishing at the Salton Sea.[433]

The Fishing Capital of the World

While the article "A Fish with a Fight" is largely dedicated to the recreational value of corvina fishing, it also focuses on the economic aspect of this fashionable pastime:

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[430] "Desert is Great for Sea Gulls," *Desert Sun* (Palm Springs, CA), October 13, 1966, https://cdnc.ucr.edu.
[431] "Desert is Great for Sea Gulls," *Desert Sun* (Palm Springs, CA), October 13, 1966; "There Are Several Ways to Find Fish," *Desert Sun* (Palm Springs, CA), March 31, 1966, https://cdnc.ucr.edu.
[432] "A Big Catch," *Desert Sun* (Palm Springs, CA), June 4, 1963, https://cdnc.ucr.edu.
[433] "23 Pound Corvina Caught by Woman," *Calexico (CA) Chronicle*, October 14, 1965, https://cdnc.ucr.edu; "Salton Sea Yields 20 Pound Corvina," *Calexico (CA) Chronicle*, June 17, 1965, https://cdnc.ucr.edu; "Here It Is," *San Bernardino (CA) Sun*, July 1, 1965, https://cdnc.ucr.edu.

> Salton Sea business people, like business people everywhere, like to hear the cash register ring. So way down there, at 235 feet below sea level, they've set the corvina up on a little pedestal and worship it. It's money in their pockets as well as a great sport.[434]

The increasing popularity of sportfishing at the Salton Sea created a new demand in the tourist business. Numerous bait and tackle shops opened in the Salton Sea area throughout the 1950s. Some of them were just small mobile stands selling bait and hooks, but there were also large highly specialized stores, open twenty-four hours a day, seven days a week. The most famous of those stores was Mudsucker's in Indio. It offered fishing equipment for fish of any size: fishing rods, reels, sinkers, baits, lures, and tackle. Furthermore, its employees supported the anglers with expert advice and with information about the weather conditions. A scale in front of the shop allowed the Mudsucker's clients to weigh their catch, and the store sponsored the major annual fishing contests at the Salton Sea.[435]

The name of the store originated from the most popular bait used for corvina fishing. The "ugly, big-headed"[436] mudsuckers were a crucial part of the fishing experience as they were the most likely to succeed in catching a corvina. These small fishes had originally been imported from Mexico, but they began to thrive in the Salton Sea in the 1940s, where they could be found in the shallow areas. The *San Bernardino Sun* corvina fishing guide described the mudsuckers in a satirical manner, depicting them as animals with a low IQ:

> Strangely, mudsuckers, unlike live ocean fishing bait, do not need running, aerated water to stay alive. They're kept in a wooden vat containing a bare two inches of still water. Every so often they poke their unglamourous heads above the surface for a gulp of air. Miss Bennett recommends hooking mudsuckers through both lips, from

[434] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963.
[435] "Everything Needed for Fishing at Salton Sea," *San Bernardino (CA) Sun*, November 19, 1964, https://cdnc.ucr.edu; "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963.
[436] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963.

> the bottom up. This keeps their mouths shut and prevents them from drowning when they breathe. Mudsuckers don't have a high I.Q.[437]

The sarcastic tone of the above-mentioned article demonstrates the cruel attitude that anglers had towards the animals. But the damage was far greater than offending the fishes' intellectual capabilities. Corvina fishing was not a gentle business, neither towards the corvinas, which were teased and tricked into a fight, nor to the mudsuckers, which were killed, frozen, and slaughtered to serve as bait.

While the fishing was recreational, there was nothing benign about it, as demonstrated by Jonathan Balcombe in his study on fishes. Those fishes that caught the hook but were lucky to escape were often severely injured for the rest of their lives. Using hooks with barbs created severe damage to fishes' faces, often resulting in a loss of their eyes, as the barb was forcefully removed by the escaping fish. With recreational fishing being one the nation's most popular outdoor activities, popular lakes were full of wounded and scarred fishes. At the Salton Sea, corvinas were among the most wounded fish as their soft-fleshed mouths often released the hooks before the anglers were able to pull them out of the water. Mudsuckers did not have the chance to survive the process as they went straight to the hooks or to the freezers.[438]

Balcombe notes that the cruelty of sportfishing is overshadowed by the fact that it is a "big business."[439] This was the case at the Salton Sea as well, where fishing became a source of income for many people. "One fellow, at least, makes a living trapping them [mudsuckers] and selling them to the bait shops," stated "A Fish with a Fight."[440]

A large-scale fishing business at the Salton Sea was concentrated around the small community of Desert Shores. Formerly called Fish Springs, Desert

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[437] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963.
[438] Balcombe, *What a Fish Knows*, 224-225.
[439] Balcombe, 225.
[440] "A Fish with a Fight," *San Bernardino (CA) Sun*, April 18, 1963.

Shores was a small community located on the northwestern edge of the Sea, three miles north from Salton Sea Beach. Interestingly, Fish Springs had been established in the Salton Sink before the 1905–1907 floods. In the early 1950s, Harry Pons from the San Gabriel Valley began to buy up property in Fish Springs and renamed the spot to Desert Shores. He was an investor with a lot of experience in real estate development business and Helen's competitor, but also her friend and a frequent guest at her Beach House. She remembered him as "dapper man, well-dressed, and with a certain charm who brought life and color to the Beach House."[441] In the 1950s, Pons subdivided his Desert Shores property and built a restaurant and four motels.[442]

Like many other communities at the Salton Sea, Desert Shores expanded during the 1950s, and fishing became the main source of income for its residents. The town was flooded with visitors, who stayed in the local motels or in mobile home parks. On the shore, Pons' *Marina Mobile Estates* welcomed mobile home owners to park their vehicles directly at the water. Concrete fingers were built into the water with the purpose to host the mobile homes. Thus, the guests could fish straight from their vehicles. Next to the mobile home park, Pons built a marina, which included the Desert Shores Yacht Club and a large fishing barge.[443]

Several small businesses emerged in the area as well. For example, a family named Beastons, who had spent many holidays at the Salton Sea, became fascinated with the area and bought property, where they opened a motel. Alongside numerous other families, they settled in Desert Shores long-term, playing a part in transforming the area into a thriving residential community. In 1955, the town began to host large waterskiing events. There

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[441] Kennedy and Linehan, *Queen of the Salton Sea*, 85.
[442] Kennedy and Linehan, 85-86.
[443] "Water Ski Meet at Salton Sea," *Desert Sun* (Palm Springs, CA), March 31, 1955, https://cdnc.ucr.edu;
"Water Ski Race Program April 3," *Desert Sun* (Palm Springs, CA), March 28, 1955, https://cdnc.ucr.edu;
"Desert Shores Plans Regatta," *Desert Sun* (Palm Springs, CA), March 22, 1956, https://cdnc.ucr.edu; Colorado River Basin Water Pollution Control Board, *Report on Conservation*.

were professional water ski races, but also family events, such as the spring regatta. The regatta was first hosted in 1956 and began the annual tradition of the family event, where participating in parties and barbecues became just as important as admiring the water-skiers. But while waterskiing and boat racing were popular at Desert Shores, as much as in any other part of the Salton Sea, it was the fishing that popularized the town.[444]

While the human population of the Salton Sea was growing on its shores, under the surface of the Salton Sea, the population of sargos was growing as well. Next to corvinas, the smaller sargo attracted the fishing enthusiasts, but the opinions about sargos among the experts were divided. Sargos are less competitive than corvinas and thus, less attractive for the adventure-seekers. Most fishing enthusiasts sought the large and strong fighting corvina and not the peaceful sargo. Others preferred to fish for sargos as they were "much more numerous and easier to catch."[445] The average size of a sargo was between a half and three-quarters of a pound, but two-and-a-half pounders, which was exceptionally large for this fish, were usual in the Salton Sea as well. The sargo limit of fifteen to twenty-five per day, depending on the time of the year, were higher compared to the six to fourteen limit required for the corvina. Furthermore, the sargo meat was very tasty: "Their flavor after frying is not too much different from the favorite corvina,"[446] stated an article promoting sargo fishing.[447]

The oval-shaped sargos have several brown, vertical stripes above their lateral line, and one of the stripes is usually thicker and longer than the others. They feed on seaweed, small crabs, and barnacles, able to crush even the hardest shells with their strong jaws. Sargos belong to the rare group of protandrous hermaphrodites, meaning that all fishes begin their life as males, and some of them change sex later on to become female. Furthermore, sargos are known for protecting the homogeneity of their schools. In the Salton Sea, this habit caused the sargos to develop an odd

444 Kennedy and Linehan*, Queen of the Salton Sea*, 85-86.
445 "A Mess of Sargo," *Desert Sun* (Palm Springs, CA), April 5, 1966, https://cdnc.ucr.edu.
446 "A Mess of Sargo," *Desert Sun* (Palm Springs, CA), April 5, 1966.
447 "A Mess of Sargo," *Desert Sun* (Palm Springs, CA), April 5, 1966; "Desert is Great for Sea Gulls," *Desert Sun* (Palm Springs, CA), October 13, 1966.

relationship with the gulf croakers. Next to sargos and corvinas, gulf croakers were the most plentiful fish in the Salton Sea in the 1950s and 1960s, and sargos made every effort to avoid mixing their schools with those of the gulf croakers. Under no circumstances did sargos allow themselves to mix with other fishes, even if it meant remaining underneath a larger group of gulf croakers for an extended period of time. Only after the gulf croakers moved to another spot would the schools of sargo begin to move around freely. Another group with little interest in the gulf croaker population were those anglers, who found these small fishes to be the least attractive in the sportfishing hierarchy of the Salton Sea. To avoid catching the gulf croakers, they laid bait on the bottom, hoping to attract the bottom-feeding sargos.[448]

While the leisure-seekers enjoyed days spent on the water, in the depths of the Salton Sea, a worrying series of fish die-offs began. The paradox of the sargo population was that while it was large, it was not healthy. Throughout the 1950s and 60s, sargos went through cycles of multiplying, on an unprecedented scale, and dying off.

In 1958, the local press recorded the first mass die-off of sargos, but little was done to investigate why thousands of dead fishes could be found strewn across the Sea's beaches. At the same time in Helen's marina, another sign of the upcoming apocalypse could be observed. It was related to the upcoming rise and fall of Salton City. New guests arrived at the Beach House in late 1958, and they stood out from the holiday crowd. Rather than wearing bermuda shorts and patterned shirts, these new guests wore suits and carried briefcases full of sales materials. Why did they arrive so suddenly? And what were they hoping to sell?[449]

[448] "Population Boom at Salton Sea," *Desert Sun* (Palm Springs, CA), September 8, 1966, https://cdnc.ucr.edu; "Desert Sportsmen Have It Made," *Desert Sun,* (Palm Springs, CA), December 1, 1967, https://cdnc.ucr.edu.
[449] "Corvina Eating Sargo Instead of Bait," *Desert Sun* (Palm Springs, CA), July 18, 1964, https://cdnc.ucr.edu.

Fun in the Sun

As the resort towns were emerging, centered around water activities and sportfishing, a "Big Fish" arrived at the shores of the Salton Sea. His name was M. Penn Phillips, a businessman and a real estate developer with predatory business instincts.[450]

It was not until M. Penn Phillips set foot at the Salton Sea that the area experienced big business. While Helen Burns had a great impact on the spirit and atmosphere of the Salton Sea, she never aspired to strive for mass profit. She had started with no electricity, humble financial resources, and a vision to bring liveliness to the Sea, and slowly, she worked her way into a good financial situation. Many businesses around the Sea were doing well, but they did not aim to profit on a mass-scale. Ray Ryan sold lots at the North Shore, but compared to Phillips' plan, even this enterprise was rather small.[451]

The real estate developer M. Penn Phillips was called many names: California dreamer, "a charlatan," "a financial shark," and "dean of American land developers."[452] In the 1920s, he had established the M. Penn Phillips Company, which was responsible for large-scale developments of residential communities. "He was successful *because* he was successful,"[453] DeBuys notes. He had built the M. Penn Phillips Company into what he claimed to be "the world's largest land development and building organization." Phillips did not experience a business failure for almost four decades, and as a result, he enjoyed high public trust. He became a man well known to the press, which often celebrated his good reputation and his successful projects in the United States and Mexico. The main source of Phillips' astronomical revenue was selling lots of land in upcoming areas. Among others, he developed the communities of Hesperia and Palm Springs in California and Christmas

[450] "Corvina Eating Sargo Instead of Bait," *Desert Sun* (Palm Springs, CA), July 18, 1964.
[451] Kennedy and Linehan, *Queen of the Salton Sea*, 21-23.
[452] Russell Rathbun, *Great Wall of China,* 119.
[453] DeBuys, *Salt Dreams*, 206.

Valley in Oregon. In the late 1950s, Phillips went on a buying spree, in the "growth-mad, dirt-moving California of the fifties."[454] The western shore of the Salton Sea drew his attention as a potential real estate oasis.[455]

Phillips had been observing the developments in Southern California for several years and witnessed the town of Palm Springs swell with prosperity as its real estate market boomed. When he arrived at the Salton Sea, he envisioned the same success that Palm Springs had, the only difference being that the new community would be placed on the shores of a magnificent body of water. He recognized that the growing numbers of visitors could be monetized in a new way, on an unprecedented scale. The ambitious vision to copy the Palm Springs lifestyle at the Salton Sea was supposed to begin a new chapter of the desert's glory.

What was it that made Palm Springs different from other desert communities? Located forty miles to the north of the Salton Sea and at the foot of a massive mountain range, San Jacinto Mountains, Palm Springs was just a small settlement with a population of one thousand in 1940. Hit by the population growth of the 1950s, the population grew to ten thousand by 1953 and seventeen thousand by 1960. In addition, hundreds of thousands of leisure seekers chose Palm Springs for their weekend getaways.[456]

Among the perks and pleasures of the desert resort city, there was something that Palm Springs was not able to offer, and it was the access to water reservoirs suited for recreational use. There were no lakes or rivers in the area, and the Pacific Ocean was several hours away. Moreover, the native flora was rather minimal with the prickly pears, the golden barrel cacti, and the Joshua trees as the main botanical attractions.

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[454] DeBuys, 208.
[455] David Streitfeld, "Salton City: A Land of Dreams and Dead Fish," *Los Angeles Times*, online collections, July 1, 2007, http://articles.latimes.com/2007/jul/01/business/fi-salton1/2; "Penn Phillips: Developer, Government Official, Charlatan," *San Bernardino County (CA) Sentinel*, July 25, 2015, http://sbcsentinel.com.
[456] Culver, *The Frontier of Leisure*, 178.

But the city emerged as an artificial oasis of relaxation and fun. Palm Springs became a phenomenon, a symbol of the carefree, healthy lifestyle of the wealthiest Californians. The most important component of Palm Springs life was the "fun in the sun."[457] There were countless outdoor recreational opportunities, including sunbathing, tennis, and golf, and the luxurious restaurants and cafes invited the crowds to socialize. The aesthetically pleasing architecture provided a suitable setting for the summer activities of the rich and famous. In Palm Springs, the resorts, the villas, and the public buildings were designed by the renowned mid-century architects, including the previously mentioned Albert Frey, but also Frank Lloyd Wright and Richard Neutra. [458]

Palm Springs was booming in spite of its disadvantages. It proved that people from the Pacific coast preferred the hot desert winds to the ocean breeze. While this choice seemed irrational, it accelerated the boom of the real estate market. M. Penn Phillips developed several communities in Palm Springs, and he was certain that its success could be extended further south.

While the triumph of Palm Springs was initiated by the high numbers of vacationers interested in spending a few days in the town's resorts, it soon began to draw large numbers of people willing to invest in property. Palm Springs hence became the first community to popularize residential developments concentrated around outdoor facilities, predominantly tennis and golf. The residential golf communities of the Thunderbird Clubhouse and the Thunderbird Ranch were among the most popular ones. These gated communities were intended to house thousands of residents. They included large housing developments which were concentrated around country clubs, golf courses, swimming pools, and large-roofed areas suitable for entertainment during the day and night. Spreading across vast areas, they had their own road, sewage, and watering systems, the latter developed to maintain the acres of fresh grass necessary for the golf enthusiasts.[459]

[457] Culver, 189.
[458] Culver, 189-190.
[459] Culver, 189-190.

The average Palm Springs' visitor differed greatly from the less wealthy, family-oriented leisure-seekers at the Salton Sea. While the Salton Sea visitors came from the small suburban communities in Southern California, the clientele of Palm Springs was extremely rich, arriving mostly from Los Angeles. Wealthy businessmen, Hollywood stars, and famous artists socialized with other rich folks in the atmosphere of vanity and the cult of health. Just as the modern desert architecture was open and transparent, the social norms of Palm Springs were characterized by an openness. The guests of the city enjoyed lavish parties and adventurous sexual encounters. Revealing a naked or semi-naked body was welcomed by the "resort atmosphere"[460] of the town, where everyone wanted to soak up the sun. The Palm Springs' lifestyle greatly contributed to popularizing sunbathing as a leisure activity. The vacationers sunbathed at modern swimming pools constructed in a fancy manner among impressive desert boulders, showing off their tanned bodies in revealing attire.[461]

Palm Springs with Water

At the Salton Sea, Phillips bought land just a few miles from Helen's Beach House. Helen remembered when one day in 1957 Harry Pons, who developed the Desert Shores community, "...flamboyantly flew open the door of the Beach House and with a hoot, a holler and a big smile, he shouted the good news. He had sold his property at Desert Shores and also acreage in what is now Salton City to the M. Pen Phillips Co."[462]

Phillips, who had just turned seventy years old, acquired vast amounts of land from the State of California and from several local land developers, including Harry Pons. The property added up to thirty square miles, including six miles of seafront, starting four miles south from Salton Sea Beach. There, he envisioned the new American Riviera, which he called Salton City. It remains unclear how much he paid for the land. One record

[460] Culver, 160.
[461] Culver, 159-160.
[462] Kennedy and Linehan, *Queen of the Salton Sea*, 86.

quoted him as saying that it cost him a total of $2 million while other sources suggest that he paid between five and ten dollars per acre, which added up to a few hundred thousand dollars. According to DeBuys, it is certain that his investment was immensely below the market price of the land.[463]

With vast financial resources and a strategized system of profit extraction, Phillips continued with the planning. He wanted Salton City to spread over 19,600 acres of the land, but more than anything, he wanted for it to become a copy of Palm Springs. However, he did not intend for the copy to be a valuable, long-term asset. He only wanted to replicate the facades, never intending to reach the prosperity level of Palm Springs. The prognoses of the local press supported his bold vision, predicting that Salton City would become the most popular sea resort in all of Southern California. But in reality, Phillips' version of Palm Springs at the Salton Riviera was similar to the copies of iconic structures in Las Vegas. The Eiffel Tower, the Venetian bridges, or the Egyptian pyramids replicated in Las Vegas have a shape similar to the original structures, but they are nothing more than façades constructed from cheap, low-quality building material.[464]

In spite of the fact that Salton City would have little in common with Palm Springs, the comparisons between the two remained for years to come. The Sea was advertised as "Palm Springs with water." A promotional video of the Salton City residential development described Palm Springs as the predecessor of the Salton Sea:

> If anyone had told you three decades ago that this vast, newly deserted land, would be worth 2 thousand to 3 thousand dollars upon foot, you would have probably laughed at such a fantastic idea. [...] A motel rises in value from 1,500 to 3,200 in just 3 years. [...] No waterfront. Nor even particularly beautiful scenery. But the need was there. More room! A place to play in the sun! Free of metropolitan population pressures. Of its smog and fog. 80 unimproved acres on

[463] Kennedy and Linehan, 87; DeBuys, *Salt Dreams*, 211.
[464] Blake, *Salton Sea Resort*, 11-12.

> Highway 111 east of Palm Springs were reported to have been sold for 15,000 dollars per acre. A one million two hundred dollars transaction. Today that process of expansion is continuing, even accelerating.[465]

Phillips referred to the Salton City project as a spectacular birth of a new city and commented that "Without any question, Salton Riviera is the most important development in our history. It is what we have been building toward for 35 years. In the days ahead, we shall see the fruits of all our labors grow the city, the family of communities we have dreamed of so long and so fervently".[466] While the Palm Springs residential communities were designed around the golf courses and tennis courts, Phillips wished for the Salton City developments to become an integral part of the Sea itself. The later video commercial proclaimed the Salton Sea as an oasis of "recreation water":

> Now the flood is moving beyond Palm Springs and into the Coachella and Imperial Valleys, where we find the second key that has opened up the desert: Water. Water has changed the face of the desert and has made the land so fertile that anything grows here. [...] Naturally, in the golf capital of the world [Palm Springs], there has to be water for the golf courses. [...] And another kind of water has been added to the desert that was never planned, never dreamed of. Recreation water. The vast Salton Sea. 385 square miles of water formed by accident back in 1905 when the Colorado River ran wild over man-made dikes. A sea in the desert with its wide, sandy beaches. No tides or dangerous undercurrents. And with literally millions of fish waiting for the taking.

Phillips set aside $20 million to cover the urban infrastructure of Salton City. Within a few months, his company laid out roads, telephone lines, and built sewage treatment plants. Street signs were put up with street names themed after Latin American countries and solar bodies. Buyers could choose among

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[465] *Miracle in the Desert and the Salton Sea,* 1960s promotional film.
[466] DeBuys*, Salt Dreams*, 206.

lots located on Paraguay Avenue, Uranus Avenue, Bolivia Avenue, Big Dipper Drive or Mars Avenue. The rest of the infrastructure remained only hypothetical, with signs and banners pointing to future amenities. Thus, the landscape looked rather odd, with nothing but dirt roads, street signs, and electricity poles spreading across the sandy shores of the Salton Sea. Phillips promised for this to change soon. In interviews with the press, he boasted about a team of city planners and two "electronic brains" (early computers) working non-stop on a city, which would include not only thousands of stunning houses but also modern hotels, marinas, yacht clubs, a private airstrip, several golf courses, a country club, shopping centers, and a school. The cherry on top of all the grand promises was the name of the architect Albert Frey, whom Phillips hired as the head urban planner of Salton City.[467]

The 1963 survey of leisure qualities of the Salton Sea conducted by the State of California assessed the Sea as "a playground for the average man who is 35 years old."[468] DeBuys describes Salton City in a similar manner: as a resort planned for "any Joe from Hoboken or Alice from Anaheim."[469] Phillips did not target rich clientele, but he used the images of Palm Springs to sell a similar experience to a poorer audience. He gave the impression, with apparent sincerity and long-term vision, of providing high-quality housing developments. To DeBuys, the professional impression Phillips made was a superficial cover for his greed and vanity. The envisioned Salton City was a low-quality imitation of Palm Springs: "The Phillips company's promotion of Salton City sang a love song to the ego of every Joe and Alice in America: they were important, and they deserved the best," DeBuys writes.[470] In addition to Palm Springs comparisons, Phillips compared Salton City to Capri, Monaco, and Palm Beach, and made a prognosis that Salton City would become "the most valuable piece of resort property on earth."[471]

In early 1958, Salton City was still nothing more than a vast field of dirt. But lots were already divided into an average half-acre size and were put on the

[467] DeBuys, 207; Rathbun, *The Great Wall of China*, 120; Blake, *Salton Sea Resort*, 11.
[468] Colorado River Basin Water Pollution Control Board, *Report on Conservation*.
[469] DeBuys, *Salt Dreams*, 207.
[470] DeBuys, 207.
[471] DeBuys, 207.

market for an average price of $3,500 per lot. With fifteen thousand planned lots, this meant a $52 million profit for Phillips. After deducting the land and infrastructure costs, he was anticipating a great profit. But what the future buyers did not know was that all the hotels, restaurants, schools, and marinas that Phillips promised were never to be built. All they knew was that an upscale sales event was about to take place in the future Salton City. The event was scheduled for March. The lack of progress in the construction process was overshadowed by rumors of the many celebrities who had confirmed their attendance.[472]

A City That Never Existed

The presence of large-scale investment became noticeable at Helen's Beach House as new clients began to arrive. They were the developers, the architects, the construction workers, and the sales representatives. Curiously, there was a large disproportion in numbers between construction workers, of whom there were very few to be seen, and sales representatives, who could be counted in hundreds. Those new guests did not enjoy the cheeseburgers and fries, the favorites of Helen's guests. To adjust to the gourmet crowd, Helen's chef changed the menu of the Beach House. Burgers and fries were replaced by filet mignon and elaborate French food.[473]

Phillips promised a "birth of a city," but this city was never born. And even though he did not plan to build Salton City, the wealthy investor still anticipated that he would sell the land. DeBuys describes this sales process as the "circus of Salton Sea promotion, illusion, and salesmanship"[474] with the evil Phillips in charge of his vicious plan.

The fleet of salesmen commissioned to work across the towns and cities of California played a significant part in the process. Trained directly by Phillips, they spread the rumor of the Salton Riviera oasis where lots were

[472] DeBuys, 207.
[473] Kennedy and Linehan, Queen of the Salton Sea, 101-102; Mathews, "The Old Woman and the Sea."
[474] DeBuys, *Salt Dreams*, 208.

available to purchase. The sales pitch included a strong claim that buying a lot at the Salton Sea would be the best thing ever to happen for the buyers. The salesmen invited the potential buyers to participate in the sales events planned for the spring of 1958, to gain an idea of the future Salton City. Three hundred sales representatives gathered at the Salton Sea in March to prepare for the event. Planning to sell all the lots within two months, Phillips prepared them for an aggressive sales campaign. Large tents were installed in Salton City to prepare for the arrival of the potential buyers.[475]

As part of the preparations for the big event, Phillips created an impression of ongoing construction works. Several bulldozers were placed around the area where the street signs had already been placed. Next to the bulldozers, there were holes in the ground with building materials scattered around, indicating an ongoing progress. On many corners, large colorful banners pointed to the future amenities. They promised schools, hotels, banks, restaurants, and shopping centers. Many of those banners indicated where "houses with green grass" would later stand. In addition, nine thousand fan palms were planted for the occasion, drawing attention away from the empty lots.[476]

After two months of preparations, more tents were set up, and the sales campaign began. The potential buyers arrived in Salton City in hundreds of sedans from all parts of the country. But before they had a chance to look around, they were instantaneously greeted at the tents by salesmen and celebrities. The salesmen invited them inside, shouting into their ears about the golden opportunity. And the salesmen literally had to shout: music was playing at very high volumes from the loudest speakers available, ones that Phillips had installed in all the tents. They streamed the invitations to various tents where presentations were held to promote the future Salton City. However, there were no chairs to sit on and there was no time to think. It was now or never, a once-in-a-lifetime opportunity, and thus the buyers were encouraged to make a decision on the spot. The celebrities at the event

[475] DeBuys, 208.
[476] DeBuys, 208; Rathbun, *Great Wall of China*, 131-133.

were little known, but here and there a familiar face from a Hollywood movie promoted the lots with an inviting smile. After the presentations in the tents, the salesmen invited the guests to tour the area. They pointed to banners, describing what the future city would look like, and ended the tour with a quick visit to the motel and clubhouse, the only buildings in Salton City that had been completed. But then they hurried the guests back to the tents in time for M. Penn Phillips' sales speech[477]

Phillips arrived at the event with Jack Dempsey. Dempsey was a former professional boxer, and one of the most popular boxing champions in history. He was a legend from boxing championships in the 1920s, when boxing became more than just a martial art and became a source of amusement, a time when famous boxers became Hollywood celebrities. But in addition to being a celebrity, Dempsey was also Phillips' business partner. Together, they developed a community of Hesperia in San Bernardino County where a museum dedicated exclusively to Jack Dempsey was constructed to encourage potential buyers.[478]

Finally, it was time for Phillips' speech. He compared Salton City to an iceberg where only one seventh of the investment opportunity could be seen on the surface, yet there was so much more profit hidden underneath. The sales scheme he proposed was rather difficult to understand. The contracts were structured under a deferred payment agreement, which denied the buyers equity in the property unless the contract was entirely paid off. The price of entry was a $250 down payment (at $29 per month) for the smallest lots, but entities in all locations were selling like hotcakes. In just one day of the sales campaign, Phillips sold land for $4.25 million.[479]

Soon after the sales campaign ended, the developers, construction workers, sales representatives, and architects disappeared from Salton City. Banners and tents were taken down, and at Helen's Beach House, burgers and fries appeared back on the menu. And an even more sudden change occurred as

[477] DeBuys, *Salt Dreams*, 209-211.
[478] DeBuys, 209-211; Rathbun, *Great Wall of China*, 131-133.
[479] DeBuys, *Salt Dreams*, 207-211.

M. Penn Phillips himself took off from Salton City never again to come back.[480]

The Holly Corporation

It took the press several years to uncover the real-estate scam, but it was too late for the thousands of buyers who had invested in squares of dirt in the semi-developed desert settlement. Even as late as 1961, of the fifteen thousand lots sold by Phillips, only a few dozen houses were built in Salton City.

Phillips withdrew from the project in November 1960. He gave no reason for his abrupt decision, offering all his interest in Salton City and Desert Shores for sale. In October 1961, the development was acquired by the Holly Corporation. Holly was a large conglomerate from Dallas, active mostly in gas and oil investments. It was never revealed how much the Holly Corporation paid Phillips. The estimated value of Phillips' Salton City assets had greatly increased since the 1958 sales campaign. Those assets added up to $95 million, including $25 million worth of real estate contracts and $70 million worth of unsold lots.[481]

According to DeBuys, it is difficult to say when this land development undertaking first became visible as a scam. Until 1963, the land sale business was still growing. In a manner similar to Phillips', the Holly Corporation wanted to continue selling property, and it thus invested in the Salton City project. It constructed a golf course and continued to divide land into lots. Moreover, it heavily invested in promotional measures. It produced a promotional video to promote the Salton Riviera and began to organize large-scale sporting events in order to draw new visitors to Salton City. The first "Boat World's Indy," a 500-mile speed race around the Salton Sea, took place in 1961. Thousands of spectators arrived to watch the race, and the

[480] Kennedy and Linehan, *Queen of the Salton Sea*, 102; "Mysterious Salton Sea Rises, Damage Mounts into Millions," *Santa Cruz Sentinel*, April 22, 1964, https://cdnc.ucr.edu.
[481] DeBuys, *Salt Dreams*, 210-211.

land sales agents were instructed to mix with the crowd to find potential buyers. But slowly, the bubble began to let out air. By 1963, the buyers were becoming suspicious. The press uncovered Phillips' scamming techniques in Christmas Valley, the community he had developed in Oregon. His Christmas Valley sales strategy was similar to that in Salton City. Through aggressive marketing campaigns, he was able to sell thousands of lots, but hardly any of the buyers moved there, discouraged by the arid terrain and lack of basic amenities.[482]

Phillips had envisioned Salton City as a semi-resort community, but it was never his main goal to sell it primarily as a residential community. As it became clear that clients did not wish to buy land to build holiday homes, the Holly Corporation began to promote the permanent residential potential of Salton City. And to prove that service and manufacturing jobs could be created at the Sea, Holly invited the Atlas Plastic Corporation, "one of the nation's largest producers of sheet plastic for advertising signs"[483] to move its production to Salton City. In 1964, Atlas Plastic agreed, becoming the first manufacturing company to open a branch at the Salton Sea. However, the construction of the electricity grid in Salton City was so poor that the machines did not work, which forced the company to move away. By 1968, Atlas Plastic shut down all production at the Salton City branch.[484]

In 1967, the *Desert Sun* announced that a second "light manufacturing plant," Traub-O-Matic, had relocated to Salton City. The plant manufactured automatic machine screws and machine parts for various electronic and research industries. According to the *Desert Sun*, "The owners relocated their plant from North Hollywood to escape metropolitan congestion and to take advantage of the desert climate."[485] No further mention of the plant's

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[482] DeBuys, 211-212; Jim Springhetti, "Up in the High Desert, a '60s Development That Didn't Develop," Oregon Travel News, *The Oregonian* (Portland, OR), online, updated September 29, 2008, accessed January 3, 2019, https://www.oregonlive.com/travel/index.ssf/2008/09/up_in_the_high_desert_a_60s_de.html.
[483] "Salton City Gets Second Manufacturer," *Desert Sun* (Palm Springs, CA), March 9, 1967, https://cdnc.ucr.edu.
[484] DeBuys, *Salt Dreams*, 211-212.
[485] "Salton City Gets Second Manufacturer," *Desert Sun* (Palm Springs, CA), March 9, 1967.

developments could be found in the local press, indicating that Traub-O-Matic did not succeed in production at the Salton Sea. But the mere presence of a manufacturing industry was enough for the Holly Corporation to use it as a promotional measure. The Atlas Plastic Corporation was featured in the promotional materials of Salton City, promising the availability of jobs at the Salton Sea.[486]

The Holly Corporation increased the number of lots in Salton City to thirty thousand. But the developers could not provide houses. Furthermore, an overwhelming majority of the people who had bought the lots did not plan to move there, but rather were keeping them for future investments. By the mid-1960s, it became clear that in order to sell more lots, the corporation needed to draw more permanent residents to Salton City. The general tendency in California was promising, as fifteen thousand people were arriving in California every day in 1962 with the goal of staying permanently.[487]

The Holly Corporation struggled to create a reputation of Salton City as a place friendly for families and as a potential community for retirement. It opened a large restaurant named *The Hofbrau* and organized sport events, but these efforts did not encourage property owners to permanently move to the Salton Sea. In 1965, the Corporation moved its offices to the Desert Garden Motel in Salton City, which it renamed to "Holly House." It focused the promotional measures on golf, advertising the golf course and upcoming tournaments.[488] The golf course was featured in the promotional video of Salton City produced by the Holly Corporation:

> Here too, you can view one of the Southern California's more popular PGA-sponsored pro-amateur golf tournaments. The Salton City golf course is one of the desert's more picturesque. It is 160 acres of wide

[486] "Salton City Gets Second Manufacturer," *Desert Sun* (Palm Springs, CA), March 9, 1967; *Miracle in the Desert and the Salton Sea,* 1960s promotional film.
[487] "Nordland in Realtor Talk," *Desert Sun* (Palm Springs, CA), January 19, 1962, https://cdnc.ucr.edu;
DeBuys, *Salt Dreams,* 212; Mathews, "The Old Woman and the Sea."
[488] Kennedy and Linehan, *Queen of the Salton Sea*, 128.

> all grass fairways and velvet smooth greens. It truly deserves the honor of being the greenest gem on the desert, nestled between the Salton Sea and the Santa Rosa Mountains. Many among the nation's finest professional golfers have competed in the Salton City Pro-Am.[489]

There was a certain restlessness in Holly Corporation's undertakings to sell the land and to draw permanent residents to the area. But the Corporation did not succeed. By the end of the 1960s, only two hundred houses would be built in Salton City. The residents struggled with a lack of either medical services or a schooling system. Moreover, the sewage system was malfunctioning as the pressure was too low to let sewage push through the pipes.

The 1960s witnessed both the successes and failures of many businesses at the Salton Sea. While the resort community of Salton City was failing, Helen's Beach House continued to thrive. While the North Shore lots remained unoccupied, the fishing business was booming in the community of Desert Shores.

But the Sea was becoming sick. It was not just well-nourished but over nourished. The increasing salinity and the agricultural contamination were harmful to the fishes and the birds of the Sea. Furthermore, the growing volume of the water endangered the communities that had settled at the Sea shores. The Salton Sea had been multitasking as a leisure oasis and as an agricultural sump, and the combination proved to be disastrous. The Sea was about to experience a series of tragic events and dire consequences, both underneath its surface and on its shores. The Salton Sea, an oasis of leisure, was about to witness an apocalypse. And the dreams on the shores of the Sea would begin to turn into nightmares.

[489] *Miracle in the Desert and the Salton Sea*, 1960s promotional film.

Chapter Seven
TOXIC LANDS

The Clash of Leisure and Agriculture

Astounding numbers of visitors continued to flood the Salton Sea throughout the 1960s. In 1960, three million visitor-days were registered in the area, with the Salton Sea State Park receiving over one million of them. The Sea was expected to remain a successful spot for vacationers for decades to come. But at the same time, curious biochemical processes were accelerating in its depths, causing a series of crises. The 1960s brought together a heavy collision of agriculture and leisure that put the ecosystem under pressure. In the decade that followed, the crises escalated.[490]

This chapter discusses the major aspects that became hazardous both for the Salton Sea ecosystem and for the communities located on its shores. Focusing on the time period between the early 1960s and the mid-1970s, it includes the perspectives of the scientific community and of the general public. Helen Burns' business continues to serve as the main example for how Salton Sea residents were affected by the worrisome developments.

The crises during those two decades were many and varied. The Water Pollution Control Board continued to struggle with enormous amounts of raw sewage released into the Sea. In addition, the increasing salinity caused concern as the Sea became unable to sustain many of its aquatic species. Fish die-offs and algal blooms posed a threat to wildlife and were a source of foul stench. Large amounts of chemical pollutants entered the Sea with agricultural runoff as the local farmers began to apply fertilizers and pesticides to their fields, including the infamous poisonous substance known as DDT. Furthermore, the first geothermal energy plant was launched in

[490] Redlands Institute, *Salton Sea Atlas*, p. 32-33.

Niland in 1964, after a decade-long series of test drills. But the disposal of brine, a highly saline byproduct of geothermal energy extraction, posed a threat to the already skyrocketing salinity of the Salton Sea. At the same time, the numbers of visitors continued to grow.

The unregulated water orders placed by the Imperial Valley farms resulted in a series of unpredictable fluctuations in the water level of the Salton Sea. The increasing water level caused damage to houses and businesses located in the shore communities. A legal battle between the property owners and the Imperial Irrigation District (IID) began in 1976 but was disturbed by a series of natural disasters that severely damaged the entire region in 1976 and 1977.

As those legal battles were being waged, the Salton Sea ecosystem remained under severe pressure. As a eutrophic lake, it had a natural tendency to overfeed its inhabitants. This created an abundance of fish and continued to attract breeding and non-breeding avian visitors to the Sea. To demonstrate the avian diversity of the Salton Sea, this chapter pictures three species of shorebirds whose numbers at the Sea increased during the 1950s and 1960s. In addition, it discusses the correlation between exposure to pesticide-contaminated food sources and reproductive failures in birds.

The Toxic Discharge

The practice of releasing hazardous substances into the Salton Sea continued throughout the 1960s. The sewage problem, tackled by the Water Pollution Control Board, remained largely unsolved. While on the U.S. side of the border the sewage dumping stopped by mid-1960s, in Mexico it continued. As a result, the discharge from the New and Alamo Rivers into the Salton Sea was increasing. Mexicali continued to dispose waste into the Sea via the New River. The discharge included raw sewage from 260,000 inhabitants and industrial waste from several factories, including a large brewery. In February 1962, Thomas H. Kuchel, a Republican Senator from California, called for a joint US-Mexican program to curb sewage disposal into the Salton Sea. Kuchel predicted a decrease of the Sea's recreational value if

dumping practices continued, but Mexican authorities did not respond to his call. An international treaty was the only option to regulate this issue. With toxic compounds increasing, in 1963 the issue went to Congress as a resolution requesting the "fullest interest and cooperation"[491] of Congress for emergency relief from water pollution in the Salton Sea.[492]

In 1962, the Water Pollution Control Board carried out a further bacteriological survey to determine whether the beaches could be reopened. Interestingly, the Sandia Corporation, commissioned by the Atomic Energy Commission as a testing laboratory for nuclear weapons, was involved in the process of surveying the waters. In 1962, a year after Sandia's testing equipment was removed from the Salton Sea Test Base, a mobile laboratory of Sandia Corporation remained on site. The Board commissioned Sandia to conduct bacteriological tests in various parts of the Sea. The purpose of those tests was to "determine exactly where, the boundary between pollution and non-pollution area should be localized."[493]

Based on the results of the survey, the Water Pollution Control Board published the *Report on Conservation of the Beneficial Water Uses of Salton Sea in California* in 1963. It concluded that the beaches were unpolluted, and it encouraged visitors to return to the previously closed areas to swim and fish. The local press spread the satisfactory results of the survey. *The Great Outdoors* column of the *La Habra Star* stated in mid-May 1963 that the sewage levels were safe in the entire Salton Sea area and that no fishing grounds were under risk of being closed. The *Desert Sun* proclaimed that "new hopes for more use in Salton Sea" were in sight, and new investments followed immediately.[494]

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[491] "U.S.-Mexico Study of Pollution in Salton Sea Urged," *San Bernardino (CA) Sun*, February 20, 1962, https://cdnc.ucr.edu.
[492] "U.S.-Mexico Study of Pollution in Salton Sea Urged," *San Bernardino (CA) Sun*, February 20, 1962;
Redlands Institute, *Salton Sea Atlas*, 39.
[493] "Hopes for More Use in Salton Sea Raised," *Desert Sun* (Palm Springs, CA), December 5, 1962;
Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation*.
[494] "Great Outdoors," *La Habra (CA) Star*, May 17, 1963; "Water Treatment Plant at Salton Sea," *Santa Cruz (CA) Sentinel*, February 8, 1963, https://cdnc.ucr.edu; "Hopes for More

A $585,000 campsite for 150 campers and a sewage disposal system planned to be built on the northwestern shore of the Sea were signed off in the spring of 1963. In July 1963, a further trailer park and campsite investment received a permit. Two miles south of Highway 111 and three miles southeast of Mecca, a 103-acre development was soon ready to welcome eighty-one trailer sites and included a launching ramp, a beach, a restaurant, and a sewage treatment plant. The construction of the campsite had been delayed since the sewage crisis of 1957 when local authorities denied the approval of more visitors at the Sea. Ironically, this was roughly at the same time that M. Penn Phillips effortlessly obtained an approval for the development of Salton City, which was planned to host at least twenty thousand visitors at once.[495]

In January of 1965, the County Planning Commission of the Coachella Valley approved a $10 million marina at the Salton Sea. The "elaborate marina patterned after coastal developments in the Newport Beach area" was planned to spread across sixty acres, beginning a quarter mile from Mecca, close to Highway 111. In 1966, the County Planning Commission signed off on a large fishing pier. "If it works on the Southern California ocean front it should work at Salton Sea," the *San Bernardino Sun* stated. The fishing pier was planned to reach one thousand feet into the Sea on its western shore. The goal was to extend it to the point where water was ten feet deep, which would enable an exciting fishing experience without having to use a boat. However, neither of the projects came to life due to insufficient funding and lack of approval from the California Wildlife Conservation Board.[496]

In the southeastern part of the Salton Sea, a much larger investment was signed off in the early 1960s, and it was unrelated to the leisure business. In

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Use in Salton Sea Raised," *Desert Sun* (Palm Springs, CA), December 5, 1962; Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation*.

[495] "Trailer Park Gets OK," *Desert Sun* (Palm Springs, CA), July 19, 1963, https://cdnc.ucr.edu; "Salton Sea Trailer Park Permit Action Again Delayed," *Desert Sun* (Palm Springs, CA), September 25, 1958, https://cdnc.ucr.edu; "Water Treatment Plant at Salton Sea," *Santa Cruz (CA) Sentinel*, February 8, 1963.

[496] "New Sea Marina Okayed," *Desert Sun* (Palm Springs, CA), January 1, 1965, https://cdnc.ucr.edu; "Fishing Pier at Salton Sea Planned," *San Bernardino (CA) Sun*, April 29, 1966, https://cdnc.ucr.edu.

1964, the first geothermal plant in the region was launched in the town of Niland. However, as geothermal energy is extracted, vast amounts of brine are released to the surface. About three billion acre-feet of interstitial brine underlie the Imperial Valley, and each attempt to power electricity turbines with geothermal energy results in releasing large amounts of the highly saline substance.[497]

It was clear that geothermal energy had great potential in the area as the accessible surface was vast, very porous, and remote. The investors and engineers had been attempting to extract energy from the mud geysers since the 1920s. The underground aid in generating electricity, which would be useful in irrigating and pumping water, sounded promising, but the technology was insufficient to operate turbines. In 1927, Harry Siegfried of the Frontier Development Company initiated the first geothermal experiment at the Salton Sea. He carried out several drills in the southeastern parts of the Sea, reaching between 700 and 1,500 feet beneath the surface. However, an efficient extraction of the steam was impossible as the pressure was too strong to install turbines. In addition, the process was highly dangerous, resulting in injuries to workers and damage to the equipment. Some drills caused the craters to explode or shake, others clogged them, and in some cases, there was a lack of dry steam or any pressure. Siegfried abandoned the efforts and withdrew from further investments.[498]

Twenty years later, another series of geothermal testing began again, carried out by the United States Department of Energy. But the large-scale extraction of geothermal energy created a problem due to the difficult disposal of great amounts of brine. Brine is a byproduct of energy extraction,

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[497] Brown, *Water-Supply Paper 497*, 63; California Department of Water Resources, *Geothermal Wastes and the Water Resources of the Salton Sea Area: No.143-7* (Sacramento, Ca: 1970), 8, http://wdl.water.ca.gov/waterdatalibrary/docs/historic/Bulletins/Bulletin_143/Bulletin_143-7__1970.pdf; Farr, *History of Imperial County*, 291-292.

[498] Laflin, *The Salton Sea*, Chapter 8; Brown, *Water-Supply Paper 497*, 63; California Department of Water Resources, *Geothermal Wastes,* 8; "Salton Sea Is Shrinking Fast," *Sacramento (CA) Union*, December 2, 1919; "Los Angeles Purchaser Plans New Subdivision," *San Bernardino (CA) Sun*, June 18, 1943, https://cdnc.ucr.edu; Farr, *History of Imperial County,* 291-292.

obtained from the cleaning process of the steam, which has to be cleaned in order to power the turbines. Brine is water with a highly concentrated amount of salts, mostly with sodium chloride. In addition to salts, it carries an active ore solution soaked in salts and metals, such as copper, lithium, or silver. At the Salton Sea, the brine released from the porous surface contains water released by the cooling magma underground, mixed with the surface waters of the Colorado River. And while the average salt content of brine is very high, at the Salton Sea, it is twice as salty and is thus considered hypersaline.[499] Moreover, the sheer volume of brine released by an average geothermal well is extremely high. The total amount depends on the size of the well, but the average daily volume of release from one well can be counted in millions of gallons, or several acre-feet.[500]

The main disposal practice was to transfer the brine to evaporation ponds, where the liquid evaporated in large, shallow containers. Those, however, are considered to create an environmental hazard if not managed properly. The threat lies in the dry matter that is left behind in the evaporation process as its high concentration of metals and minerals is toxic. If the dry, toxic layer were to be carried away by the wind, it would pose a health hazard to the local communities and could poison the surrounding agricultural fields. Thus, the engineers from the Department of Energy approached this solution with caution at the Salton Sea. In the Niland drilling tests, the practice of dumping the brine directly into the Salton Sea became common because it was difficult to construct evaporation ponds in the area. Moreover, the supervisors of those first drills were unaware of the potential hazards of dumping the hot and hypersaline brine into the Sea. It was not until the

[499] The salt content of geothermal brine at the Salton Sea is 2% compared to 1-1.2% average for average brine salt content.
[500] Alan E. William, "A Brine Interface in the Salton Sea Geothermal System, California: Fluid Geochemical and Isotopic Characteristics," *Geochimica et Cosmochimica Acta* 53, no. 8 (1989): 1906-1908, https://www.sciencedirect.com/science/article/pii/0016703789903128; Laflin, *The Salton Sea*, Chapter 8; "Imperial Valley Geothermal Area," Geothermal, Renewables. Office of Energy Efficiency & Renewable Energy, U.S. Department of Energy, accessed January 23, 2019, https://www.energy.gov/eere/geothermal/imperial-valley-geothermal-area.

1970s that the practice was officially criticized by the Department of Water Resources.[501]

In the 1950s, in a series of drilling tests at the Salton Sea, as many as thirty-five thousand tons of salt were added to the Sea on a monthly basis. Those tests ended after several months, but if they had continued, the salt content of the Salton Sea would have increased by a tremendous amount of 1 percent on an annual basis. Amid the increasing numbers of visitors to the Salton Sea and the increasing population density in the Imperial Valley, the Department of Energy ceased to dump brine into the Salton Sea. In its decision, the Department took into account wildlife protection for the Sea had become widely recognized as a refuge for rare bird species. In 1962, the Regional Water Quality Control Board conducted a series of tests at the Salton Sea which concluded that releasing the hot brine into the Sea heavily disturbed its chemical components and brought the ecosystem out of balance. As a result, brine dumping into the Sea was prohibited entirely.[502]

By the late 1960s, the U.S. Department of Energy launched seven geothermal sites between Niland and Calipatria, known as the Imperial Valley Geothermal Area. When the first geothermal well was launched in 1964 in Niland, brine was disposed of in evaporation ponds, and this practice was carried out in further sites as well. While it carried a risk of hazards, it was not as harmful as dumping the brine into the Sea. The disposal of brine waste remained a disputed issue with a myriad of studies and surveys conducted by state and federal agencies on the issue throughout the 1960s and 1970s. All of the surveys concluded that the Salton Sea waters should not come in contact with brine. For instance, a 1966 survey conducted by the United States Geological Survey (USGS) stressed the dangers of brine disposal directly into the Sea. The survey noted that when the water from the Sea was mixed with brine, it left behind a layer of toxic playa, of dry alkali flats, after evaporating. Moreover, it stressed the importance of a safe disposal of minerals and brine that could only be efficient if fully separated

[501] Martin Goldsmith, "Geothermal Development and the Salton Sea," *Energy* 1, no. 4 (1976): 371; California Department of Water Resources, *Geothermal Wastes, 6-8.*
[502] Goldsmith, "Geothermal Development,"367-371.

from the Sea. However, several isolated cases of geothermal plants dumping brine into the Salton Sea were recorded throughout the next decades.[503]

The Skyrocketing Salinity

The Salton Sea was becoming hypersaline, even without the additional inflow of brine. There were several reasons for the increased salinity. Firstly, the evaporation continued at an estimated 7.2 feet per year, leaving the concentration of salts in the Sea stronger. Secondly, the salts from the soil underneath the Sea continued to leach. Lastly, the inflow of agricultural runoff increased with each year. The water flushed out large amounts of minerals from the fields of the Imperial and Coachella Valleys, collecting salt from the sediment and from the fertilizers, and fed the Sea with even more salt through the mouths of the New River and Alamo River. While the Colorado River water carried approximately 1 part per thousand (ppt) of salt, after passing through the irrigation canal system, the water's salt content increased to 5ppt. But the river itself was already highly saline. The *Salton Sea Atlas* pictures the extent of the minerals carried by the Colorado River, demonstrating that the river drains 17 percent of U.S. lands, accumulating vast amounts of minerals. And in spite of the decreased salinity caused by the damming of the river, the amount of salts in the river remained enormous.[504] Furthermore, as a result of the irrigation practices of the Imperial Valley, a vast amount of salt gathered from the fields was dumped into the Salton Sea. A 1955 report concerned with the increased salinity of the Salton Sea described this process:

> The Colorado River water contains approximately one ton of salts per acre-foot. The average annual depth of irrigation water applied to crops in Imperial Valley ranges from about 1.6 ft for barley to 4.7 ft for alfalfa; thus, 4.7 tons of salt per acre is added to alfalfa land annually. Most of this salt is removed by drainage systems and passed on to the

[503] Goldsmith, 367-371; Allen G. Hely, G. H. Hughes and Burdge Irelan, *Geological Survey Professional Paper 486-C. Hydrologic Regimen of Salton Sea, California* (Washington, D.C.: Government Printing Office, 1966), 31, https://pubs.usgs.gov/pp/0486c/report.pdf.
[504] Redlands Institute, *Salton Sea Atlas*, 38-39.

> Salton Sea in order to maintain a salt balance; otherwise, the lands would become so waterlogged and impregnated with salts as to become unprofitable for agriculture.[505]

In every body of water, even the smallest fluctuations in salt content have potentially catastrophic consequences for the ecosystem, and at the Salton Sea, the increase was dramatic. By the 1950s, a salinity crisis emerged as the Sea was approaching the salt content of the oceans.[506] Between the 1920s and 1963, the salinity level increased from 32 to 34 parts per thousand. The year 1963 was thus a landmark in which the salt content of the Sea reached the amount equal to the salt content of the ocean. It was throughout the 1950s that the most dramatic increase took place. The computed tonnage of salt increased from 226 million tons in 1951 to 261 million tons in 1961. A 15 percent increase in just one decade triggered a shock in the ecosystem. And the ecosystem had already been under pressure due to the strenuous task of absorbing agricultural waste, as well as the intentional and unintentional introduction of marine species, including corvinas and acorn barnacles.[507]

As the increasing salinity became a threat to the fish and bird population of the Salton Sea, it was the barnacle population that suffered in the most immediate and severe manner. The acorn barnacle, a substantial species to the shoreline habitat, is very sensitive to fluctuations in mineral content. The increasing salinity killed the barnacles by billions. Even today, beaches on the western shores of the Salton Sea are covered in millions of empty barnacle shells, which were washed ashore after the large-scale die-offs. After each die-off, the demise of barnacles affected the entire ecosystem since birds and fishes relied on it as a source of nutrition. And nutrition became even more scarce. As the waters became hypersaline, the shoal grass lost its ability to grow at the Salton Sea shores. Furthermore, the high mineral content was favorable to parasite growth, which attacked the tissues

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[505] Harry F. Blaney, "Evaporation from and Stabilization of Salton Sea Water Surface," *American Geophysical Union* 36, no 4 (1955): 639. https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/TR036i004p00633
[506] The ocean salinity varies between 34 ppt and 36 ppt.
[507] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation;* Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 9-11, 15.

of fishes, barnacles, and underwater plants. There was only one solution to stop the process: A steady and substantial supply of fresh, clean water.[508]

Alerted by the warning signs, the Department of Fish and Game conducted a survey in 1961 which concluded with the grim prediction that the Salton Sea was doomed to die between 1980 and 1990 due to the skyrocketing salinity levels. The survey determined that any further introduction of fish species to the Salton Sea should be discontinued. Instead, it suggested that the Department should focus on maintaining those species which had already adapted to the Salton Sea ecosystem. As a result, the Salton Sea Advisory Planning Committee was appointed in 1961 to monitor the salinity and contamination levels of the Sea. It included representatives from the California State Department of Water Resources, California State Department of Fish and Game, California State Division of Beaches and Parks, as well as the local water districts, the Imperial Irrigation District and Coachella Valley County Water District.[509]

In the 1963 General Session, the California Legislature adopted the "Assembly Concurrent Resolution No. 49 – Relative to Water Quality of the Salton Sea." In the Resolution, the State Water Control Board and the Colorado River Basin Regional Water Pollution Control Board were ordered to undertake careful precautions in order to avoid further pollution of the Salton Sea. The goal was to preserve the vital area of the Sea "as an attractive recreational and residential community; giving due regard."[510] However, the resolution was not feasible as the primary purpose of the Sea was to continue to swallow agricultural waste. As a compromise, the bodies of both Boards involved in the resolution agreed to cooperate on a water quality control plan. The goal was to establish and retain a salinity level that would be "conducive to propagation of saline water type aquatic and wildlife resources, and to the enjoyment of water-contact sports activities."[511]

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[508] Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 8; Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation*.
[509] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation*.
[510] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation*.
[511] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation*.

Throughout the 1950s and 1960s, twenty state and federal agencies carried out salt control studies of the Salton Sea, including the USGS, the Department of Agriculture, the California Department of Fish and Game, and the California State Water Resources Control Board. The reports, which all made it clear that drastic measures were needed in order to save the Sea's ecosystem, conveyed three observations. Firstly, it was the increased use of the Sea for recreational purposes that led the authorities of the state of California to consider proposals for controlling salinity levels. Secondly, that the salinity and mineral content were increasing towards a dangerous and potentially fatal tendency. Thirdly, that a long-term increase in salinity would be avoided only by removing the superfluous minerals and by supplying the Sea with freshwater. A 1966 USGS report suggested the use of a water removal system made feasible with a system of pumps. This was the cheapest technology, which required an additional influx of freshwater. However, while it was clear that a freshwater inflow was necessary to prevent further ecological decline, none of the suggested plans was implemented.[512]

The fishes of the Salton Sea included the species most robust when it came to tolerating high salinity levels. Corvinas and sargos maintained a high population, and in the mid- 1960s, the freshwater fish tilapia was first observed in the Salton Sea. The California Department of Fish and Game stocked tilapias in the All-American Canal so that they would eat up the aquatic plants, which clogged the canal system. The Department was aware that those fishes were a very invasive species, but it did not expect the tilapia to survive in the hypersaline waters of the Salton Sea. However, the freshwater tilapia adapted to the salty water, where they soon began to thrive. Ironically, they abandoned the All-American Canal completely, choosing the Salton Sea as a more hospitable environment.[513]

The Department of Fish and Game attempted to eradicate the tilapia population by poisoning it with rotenone, a substance widely used in the production of pesticides. However, the attempt failed, and within the

[512] Hely, Hughes and Irelan, *Geological Survey*, 30.
[513] Rathbun, *Great Wall of China*, 133-134.

following ten years, tilapia established itself as one of the most dominant species of the Sea. By the end of the 1970s, it wiped out the very small and endangered population of the desert pupfish and greatly reduced the populations of corvina and sargo.[514]

Nature Fights Back?

In 1964, the Salton Sea experienced a decrease in both the size of corvinas and their numbers. The fishes seemed to have lost their ability to reproduce. The anglers accused the growing sargo population of pushing out the treasured corvina. However, the sargo population had not been doing well either since the late 1950s when several major die-offs had been observed. The paradox of the situation was that the ecosystem was still so productive that for years even a massive die-off was hardly noticeable as there were still plenty of sargos to catch. However, by the 1960s, the scale of the die-offs exploded. Dead fishes were washed ashore on the Salton Sea beaches, creating an unpleasant smell. The main cause of the die-offs was the decreased oxygen level in the bottom layer of the Sea that killed predominantly the small fishes. This decrease took place in the hottest months and was caused by the decaying organic matter. Throughout the summer, dead fishes could be found on the beaches of the North Shore, in the State Park area, and across the entire eastern side of the Sea.[515]

But the sargo population continued to grow in spite of the die-offs and in spite of the thriving fishing business. In 1967, a group of fishermen fishing at the Desert Shores marina caught sixty-two sargos in just one hour. The *Desert Sun* reported on the record catch, noting that sargos had experienced "a population explosion in Salton Sea that few observed or realized." Dozens of tons of fishes were caught at the Salton Sea each week. The legendary

[514] Milton Friend, "The Salton Sea—What Is the Big Deal?" (paper presented at the U.S. Geological Survey, Salton Sea Science Subcommittee, National Headquarters, Reston, Va., 1999); "Tilapia," Explore the Salton Sea, Greetings from the Salton Sea (website), accessed November 2, 2019, http://www.greetingsfromsaltonsea.com/tilapia.html; Mathews, "The Old Woman and the Sea."
[515] "Report from the Salton Sea: Corvina Eating Sargo Instead of Bait," *Desert Sun* (Palm Springs, CA), July 18, 1964, https://cdnc.ucr.edu; Rathbun, *Great Wall of China*, 113-114.

Mike's Tackle Shop located in Desert Shores was one of many spots where anglers checked and cleaned their fishes. In the mid-1960s, as many as two tons of fishes were checked just in this one spot on a weekly basis. Mike, the owner of the shop, offered expert advice on fishing in the Sea. A great advocate of sargo fishing, he estimated that anyone who used proper bait was able to catch a fish within about just fifteen minutes.[516]

While the sargo population growth exceeded any expectations, the corvina population continued to decline. In a 1966 *Desert Sun* article titled "Corvina Seek Smaller Schools," a local fishing expert suggested that corvinas were being deprived of their main source of nutrition as the numbers of small threadfin shad had decreased in the Sea. "The planktons upon death sink to the bottom and become food for the (Neanthes) pile worm, which in turn is food for the (Bairdiella) gulf croaker, which is food for the corvina," he explained, wondering whether it could have been a lack of plankton that deprived corvina of nutrition.[517]

The biologists of the Department of Fish and Game confirmed that corvinas suffered from the die-offs as much as any other underwater organism of the Salton Sea. However, while all fish species and barnacles were affected, dead sargos were most visible as they constituted the largest part of the aquatic population of the Sea. In the *Great Outdoors* section of the *La Habra Star*, an article titled "Winds Kill Fish" quoted the Department's experts who blamed the strong desert winds for the phenomenon. They had found that the wind "stirred up decaying matter on the shallow bottom of the Salton Sea" causing the fishes to die. The decomposed material, according to the Department, released the toxic hydrogen sulfide which, in turn, robbed the water of much of its oxygen, suffocating the fishes. However, the Department officials estimated the number of dead fishes as "relatively low," counting the average die-off at one thousand dead fishes. Moreover, it assumed that the stirred matter was mostly sewage released from the local settlements,

[516] "Population Boom at Salton Sea," *Desert Sun* (Palm Springs, CA), September 8, 1966; "Desert Sportsmen Have It Made," *Desert Sun* (Palm Springs, CA), December 1, 1967.
[517] "Salton Sea Fish Report: Corvina Seek Smaller Schools," *Desert Sun* (Palm Springs, CA), February 23, 1966; "With the Sportsmen: Salton Sea," *San Bernardino (CA) Sun*, April 30, 1963, https://cdnc.ucr.edu.

ignoring the fact that the agricultural runoff included minerals and toxic chemical compounds that deprived the water of oxygen.[518]

The Department concluded that corvinas were not deprived of nutrition, but rather, that they were being forced to abandon their favored bottom layer of the Sea. A *Desert Sun* article explained this phenomenon, quoting a Department of Fish and Game biologist: "Wind, exerting influence on the surface of the sea, stirs up decaying material on the bottom. This in turn releases the oxygen, forcing corvina up to the top, where they feed voraciously on the tremendous numbers of young sargo."[519]

While it was the winds that triggered the die-offs, the winds were merely one part in the complex decay process which was intensifying underneath the surface of the Sea. The *Salton Sea Atlas* explains this process as an interplay between stratification and eutrophication. Stratification is a system of formation of water layers, based on their salinity and temperature. Cooler, saltier, and less oxygenated water remains in the bottom layer, while warm and oxygenated water is pushed to the surface of water reservoirs. In the case of the Salton Sea, the stratification differs between the northern and southern basins of the Sea. In the northern basin, where the Sea is deeper, the water temperature is cooler than in the southern part. And in the northern basin, where erratic currents occur frequently, the stratification persists throughout spring and summer. The surface and bottom waters float in different directions, often influenced by the currents of the southern basin. In the southern basin of the Sea, the water is much more shallow and significantly warmer, and both layers move in the same direction. This basin is strongly influenced by the winds which frequently stir the water between the layers, combining them into a well-mixed fluid. As a result of these conditions, it is the southern basin where the fish die-offs are most likely to occur.[520]

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[518] "Great Outdoors: Winds Kill Fish," *La Habra Star*, March 1, 1963, https://cdnc.ucr.edu.
[519] "Salton Sea Fish Report: Corvina Seek Smaller Schools," *Desert Sun* (Palm Springs, CA), February 23, 1966.
[520] Redlands Institute, *Salton Sea Atlas*, 42-43.

Eutrophication is a process related to the phenomenon of the Salton Sea being a eutrophic lake, which was discussed in the second chapter of this study. The increased biological productivity of the Sea is accelerated by rapid evaporation increasing mineral concentrations and by the abundance of species. The *Salton Sea Atlas* depicts the natural processes of eutrophic ecosystems as fragile and unstable: "While highly productive, eutrophic lakes often exhibit rapid and extreme environmental changes, the cumulative impact of these changes can stress wildlife, leading to disease and even death."[521]

What makes the Salton Sea so productive is the constantly increasing growth of all its aquatic species, the ongoing decomposition, and the high nutrient levels. Algae, plankton, and pile worms all thrive in the Sea, providing an overabundance of nutrition for the fishes. The fishes are thus supplied with a superfluous amount of energy which drives their reproduction cycles into an imbalance, causing them to multiply beyond their usual scope. When the fishes die, their tissues are decomposed, recycling the nutrients back to the system, which continues to feed on them. This vicious cycle of energy overproduction causes an instability in the Salton Sea ecosystem. As a result, populations of all species exceed capacity, which causes a bacterial overgrowth related to the frequent algal blooms: "Nourished by the nutrient-rich broth, populations of algae and plankton explode in summer months, covering the Sea with carpets of algal bloom."[522]

As a result of the overabundance of algae, the bacteria that break them down use up astronomical amounts of oxygen. In the summer months when the temperatures rise, the oxygen deprivation increases even more, causing a tremendous stress to the fish population. In addition, a high concentration of sulfide and ammonia, accelerated by the agricultural runoff, is mixed into the surface of the Sea. Consequently, catastrophic fish die-offs occur.[523]

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[521] Redlands Institute, *Salton Sea Atlas*, 45.
[522] Redlands Institute, *Salton Sea Atlas*, 45.
[523] Redlands Institute, *Salton Sea Atlas*, 45; Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 7-8.

The human role in this process is unquestionable as the release of agricultural runoff into the Sea increases the nutrient input. The stench, which often resembles the smell of rotten eggs, differs throughout the year, depending on the amount of oxygen in the water. It comes not only from decaying fishes but is primarily caused by hydrogen sulfide produced by bacteria. Bad smells are also a result of decaying plants and agriculture fertilizers.[524]

The Beachcombing Birds

As the overgrowth of aquatic species was leading the Salton Sea towards a hazardous imbalance, thousands of birds continued to enjoy the abundance of nutrition that the Sea had to offer. Some of the most numerous and fastest multiplying populations were the various shorebird species. Their population increased greatly throughout the 1950s and 60s. A typical feature of shorebirds, also referred to as beach birds, is their characteristic body shape. They have round heads, very thin and long legs, and long beaks which allow them to dig through the mud and water to find food. Shorebirds are commonly seen in low water, including beaches, mud, and shores, where they feed on insects, worms, larvae, and tadpoles. At the Salton Sea, three species developed the largest populations. The western sandpipers, the black-necked stilts, and the American avocets thrived in the marshes of the Sea.[525]

The western sandpiper is the most abundant shoreline bird in North America, and the most abundant one at the Salton Sea. At any given time, there are many hundreds or even several thousands of sandpipers at the Sea. They are small and delicate creatures, with white bellies and rusty scapulars, and an appetite for insects and mollusks. Patten, McCaskie and Unitt describe them as “denizens of open mudflats”[526] as they are extremely fond of large freshwater lakes and abundant in low-water ponds and marshes. At

[524] Redlands Institute, *Salton Sea Atlas*, 44-45.
[525] Jennifer Ackerman, *The Genius of Birds* (London: Corsair/Penguin Press, 2016), 94.
[526] Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 160.

the Salton Sea, they avoid the irrigation canals and smaller reservoirs, choosing the vast shores of the Sea as breeding and feeding grounds.[527]

Next to the sandpipers, the black-necked stilts accommodated themselves at the Salton Sea in a rather dominant manner. Those birds are nicknamed as "Marsh Poodles" due to their aggressive yipping at the passers-by. Patten, McCaskie and Unitt describe them as birds "vying with the Killdeer for the title of the noisiest and most aggressive shorebird in the West."[528] At the Salton Sea, they became abundant breeders, building nests in colonies close to water. They populated many of the unpopular parts of the Sea, including the shores covered in barnacle shells and sand. Black-necked stilts are fairly easy to recognize. Their crown, nape, and back are black, and so is their beak. They have a white spot above each eye, and both their belly and the lower part of the head are white as well. Their coral red legs are much longer than the light body, and whenever the birds need to provide shelter for their young, they bend their legs backwards, which enables them to create a comfortable nook.[529]

Contrary to the western sandpipers and the black-necked stilts, the American avocets do not breed at the Salton Sea. But the Sea has gained fame as the area with the highest concentration of these birds in the American West. Drawn to the long shoreline of the Salton Sea, they were first observed at the Sea in the 1960s, and their population has remained strong ever since. They have a black-and-white lower body, a rusty head and neck, and light blue legs. But their most distinctive feature is the thin beak, which is curved upwards. Equipped with this mini shovel, they dig through gravel and brackish waters with ease, searching for tadpoles and worms.[530]

Hosting the abundance of hundreds of species, the Salton Sea became a "crown jewel of avian biodiversity and one of the crown jewels of North American avian biodiversity," as concluded by a major hydrobiology study of

[527] Patten, McCaskie and Unitt, 160.
[528] Patten, McCaskie and Unitt, 147.
[529] Patten, McCaskie and Unitt, 147-148.
[530] Patten, McCaskie and Unitt, 148.

the Sea in 2002.[531] The Sea successfully provided an abundance of nutrition for its birds. There was enough food for the elegant pelicans and cormorants, for the common ducks and geese, and for the beachcombing shorebirds. But behind these seemingly life-giving foraging grounds, a sad truth revealed itself. The fishes, seeds, worms, and barnacles that the birds fed on were soaked in a liquid which carried poisonous traces of pesticides and fertilizers.

The Man-Made Agents

The water quality surveys conducted in the 1950s and 60s focused on the mineral content of the Sea, leaving the issue of pesticide traces untouched. This was not unusual at the time and was caused by a widespread lack of knowledge about the potentially harmful consequences of pesticide use. At the Salton Sea, the increased salinity and contamination went hand-in-hand, damaging the ecosystem from different angles. While the salinity increase disrupted the chemical balance of the Sea water, the traces of pesticides and heavy metals aggravated the severity of wildlife reactions to the imbalance.[532]

The algal blooms were sustained by the increasing amounts of fertilizing chemicals used on the fields of the Imperial and Coachella Valleys. In addition, the high summer temperatures increased the size of the decaying matter, which changed the color of vast parts of the Salton Sea. But the "red tides" of algal bloom happened throughout the year. In March of 1968, the *Desert Sun* reported on an algal bloom, stating that it had been triggered by strong winds: "A windstorm stirred up the algae and in causing it to rot, the oxygen in the water was consumed and more than a million fish died." The article stated that the Department of Fish and Game determined that the bloom caused "the largest number of Salton Sea fish lost in a single storm."[533]

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[531] Douglas A. Barnum, John F. Elder, Doyle Stephens, and Milton Friend, *The Salton Sea: Developments in Hydrobiology* (New York, NY: Springer Publishing, 2002), 10.
[532] Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 9-11.
[533] "Salton Sea's Red Tide Gone," *Desert Sun (Palm Springs, CA)*, March 7, 1968, https://cdnc.ucr.edu.

Chemical contamination played a significant role in the fish die-offs at the Salton Sea. Hydrogen sulfide, the toxic gas produced by decomposing algae, withdraws oxygen from water. This chemical compound can be identified by its characteristic smell of rotten eggs and is highly poisonous to humans and to wildlife. In addition to accelerating the formation of hydrogen sulfide, the agricultural runoff carried heavy metals into the Salton Sea. As a result, fishes soaked up the pesticides and the heavy metals. Then, traces of those substances were transferred from fish tissues to the birds that fed on the fishes.[534]

The consequences of the algal blooms were severe for the entire ecosystem. The red layer of rotten algae carried large amounts of decaying matter, including bodies of dead fishes which attracted birds. In many cases, birds that fed on the rotten fishes became infected with deadly diseases, including avian botulism. But there was an even deadlier, long-term outcome for feeding on pesticide-contaminated fish.

The agricultural runoff carried with it increased concentrations of boron, chlorine, and sodium that affected the breeding abilities of those birds that fed on the fishes from the Salton Sea. Moreover, selenium amounts increased over the years, reaching alarmingly high levels by the 1970s. Large traces of selenium pose a deadly threat to invertebrates, fish, and birds. However, this dangerous heavy metal is difficult to trace in short-term studies as it accumulates in tissues of birds and fishes throughout decades. Patten, McCaskie and Unitt hence emphasize that the catastrophic consequences of substances such as chlorine or selenium on wildlife health are often unsupported by the contamination measurements.[535]

DDT (dichlorodiphenyltrichloroethane) is a further substance which is highly toxic but difficult to detect in short-term studies. In 1945, this insecticide was introduced to the U.S markets, both for agricultural and private use. Praised for being a harmless and extremely effective substance,

[534] Rathbun, *Great Wall of China*, 106; Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 7-8.
[535] Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 8-9.

DDT eradicated virtually all pests. By 1957, a wide range of products was available for both households and for agricultural use. For almost three decades, farms, businesses, and families used DDT to eradicate unwanted insects. As a result, in the Imperial and Coachella Valleys, the produce grew insect-free but soaked in the hazardous substance. DDT was a poison to wildlife, and vast amounts of it were flushed to the Salton Sea for several decades, until the agricultural use of DDT was banned due to its toxicity in 1972.[536]

The substance most commonly sprayed in the agricultural industry was a mixture of DDT and two metabolites: DDE and DDD. There were no immediate consequences in the use of DDT, and the long-term effects were not known to the general public. Many scientists who tested the substance worked for the Department of Agriculture and emphasized the lack of acute toxicity of DDT. But the substance continued to devastate the wildlife. The wildlife biologist and nature writer Rachel Carson famously attracted widespread attention to the deadly consequences of DDT with her book *Silent Spring*, published in 1962. The best-selling publication provided strong evidence that DDT poisoned fish, killed birds, and had severe consequences on human health. With a strong scientific foundation and a narrative grace, Carson generated widespread attention to the topic of pesticide use. She demonstrated that traces of pesticides accumulated in tissues of virtually all organisms exposed to the substances, and that these traces became concentrated as they moved up the food chain. Carson examined tissues of birds, fishes, and plants exposed to pesticides. In one of her most famous findings, she demonstrated that when birds were fed DDT daily, the fertility and survival rate of their young declined dramatically.[537]

Carson told the story from a scientific standpoint, but she was not shy of conveying an emotional message of the risks that the use of pesticides caused. The ultimate price of long-term use of DDT, according to Carson, would be the extinction of all living species, including the human race. “For

[536] Thomas R. Dunlap, *DDT: Scientists, Citizens, and Public Policy* (Princeton, CA: Princeton University Press, 1981), 3-10, https://www.jstor.org/stable/j.ctt7zvcnd.
[537] Carson, *Silent Spring*, 115-117, 184-186; Dunlap, *DDT*, 76-97.

mankind as a whole, a possession infinitely more valuable than individual life is our genetic heritage, our link with past and future. [...] Yet genetic deterioration through man-made agents is the menace of our time," Carson argued.[538] Her publication began a wave of widespread protests and increased federal interest in the potential harmful consequences of DDT, which led to banning the substance in the United States in 1972.

In addition to DDT, the Salton Sea was exposed to a myriad of other harmful substances. In the 1960s, three major groups of insecticides were used most heavily in agriculture, including organochlorine compounds similar to DDT and aldrin, which breaks down in the environment to dieldrin, a persistent organic pollutant (POPs). POPs are the hazardous chemical substances which have been proven to be toxic to humans and wildlife. POPs accumulate in tissues of organisms that have been exposed to them and are easily distributed in vast areas through natural processes, involving air, water, and soil. Water is especially prone to absorbing the compounds found in pesticides and passing them along to fish and tissues. In addition, the harmful substances penetrate the sediment bed where they are absorbed by plant tissues.[539]

The consequences of exposing wildlife to pesticides at the Salton Sea proved to be severe. The pesticide content of the Sea increased as the substances were "largely washed away with irrigation runoff and carried to the Salton Sea," according to Patten, McCaskie and Unitt. As a result, birds that had spent time at the Salton Sea had higher levels of DDT than birds in other areas of the United States. The authors of *Birds of the Salton Sea* provide evidence that as a result of the DDE contamination of food sources, those birds that fed on fish from the Salton Sea often suffered from reproductive impairment. After a seasonal voyage to the Salton Sea, countless birds

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[538] Carson, *Silent Spring*, 185.
[539] "What Are POPs?" Stockholm Convention, Secretariat of the Stockholm Convention (website), accessed October 3, 2018, http://chm.pops.int/TheConvention/ThePOPs/tabid/673/Default.aspx;
U.S Department of the Interior, United States Geological Survey, "Pesticides" in *The Quality of Our Nation's Water—Nutrients and Pesticides*, Circular 1225, 60-61, https://pubs.usgs.gov/circ/circ1225/pdf/pest.pdf.

continued their journey to further areas where they suffered from reproductive failures. Thus, pelicans or cormorants that foraged in the waters of the Salton Sea failed to lay eggs once they arrived in the Great Basin and in other areas. However, since both the pesticide traces and the cases of reproductive impairment are extremely difficult to trace, this aspect of pesticide contamination is largely neglected at the Salton Sea by the state and federal wildlife protection agencies. In 1988, an American Society of Civil Engineers' study confirmed an elevated level of potentially toxic trace elements and pesticides in the Salton Sea waters. As a result, the Imperial County Health Department strongly advised humans to abstain from consuming fish and water from the Sea.[540]

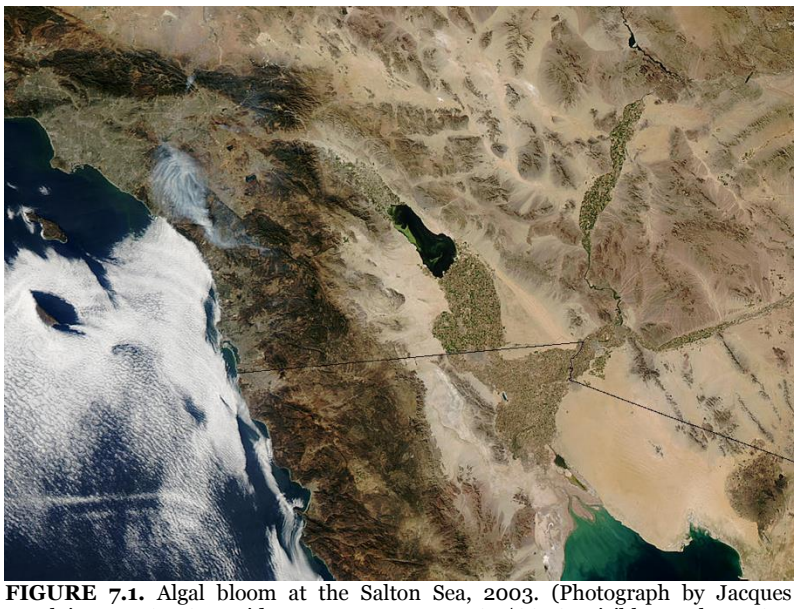

FIGURE 7.1. Algal bloom at the Salton Sea, 2003. (Photograph by Jacques Descloitres, MODIS Rapid Response Team, NASA/GSFC, Visible Earth, NASA, https://visibleearth.nasa.gov/view.php?id=69143.)

Keeping Up Appearances

The fish die-offs, the skyrocketing salinity, and the increasing water level of the Salton Sea posed severe threats to the residential communities of the Sea

[540] Patten, McCaskie and Unitt, *Birds of the Salton Sea*, 8; Roy A. Schroeder, James G. Setmire, and John C. Wolfe, "Trace elements and pesticides in Salton Sea area, California," (paper presented at the *Conference on Planning Now for Irrigation and Drainage in the 21st Century,* American Society of Civil Engineers, Lincoln, NE, July 18-21, 1988), https://pubs.er.usgs.gov/publication/70014322.

and to the local businesses. Considering the severity of the problems at the Sea, the question arises whether there was any awareness regarding the underlying issues. The responsible authorities were certainly well informed by the myriad of scientific surveys and reports. But what was the perception of scientific facts among the authorities? Furthermore, how much information was available to the general public?

Materials available to the general public in the 1960s conveyed a promise of prosperity and endless leisure. While they broached the problematic issues, they transmitted a confidence in the success of sustainable leisure industry at the Salton Sea. Moreover, they failed to address the apparent lack of communication between farmers, water districts, and inhabitants of the Sea. While the press frequently reported on the fish die-offs and algal blooms and on the increasing volume of the Sea, the tone of the reports was mild. The previously mentioned article published in 1968 in the *Desert Sun* titled "Salton Sea's Red Tide Gone…" confirmed that over one million fishes had died during the algae outbreak, but it concluded by reassuring the readers that the red tide at the Salton Sea was "almost gone and fishing for corvina and sargo should be great within 60 days."[541]

The Salton City promotional materials produced by the Holly Corporation clearly omitted the uncomfortable truth. The promotional video praised the future potential of the Salton Sea, promising its long-lasting success. Holly Corporation assured potential property buyers: "With your own vision, you can enjoy such things now in the present, and also be part of the future." The video stressed the future potential of the investment:

> In the article appearing in the *Los Angeles Times* April 17, 1966, Salton City was chosen by a group of planners, architects, administrative officers, politicians, professors and associated thinkers as one of the 24 major cities in Southern California in the year 2000.

[541] "Salton Sea's Red Tide Gone," *Desert Sun (Palm Springs, CA)*, March 7, 1968.

> Already this miracle city is developing the comfort luxuries and necessities of a planned growth city.[542]

But the above-mentioned issue of the *Los Angeles Times* contained no such prediction, revealing the Holly Corporation materials not only to be questionable but simply untrue.

The 1966 publication *The Salton Sea – Yesterday and Today*, a hundred-page guide to the Salton Sea region, succeeded in omitting the worrying tendencies at the Salton Sea. The guide offers suggestions for excursions, including a cruise around the Salton Sea, and an extensive guide to corvina fishing. However, there is virtually no sentence dedicated to the increasing salinity, the dangerous water levels, or the potential contamination. The chapter titled "Salton Sea Today" begins with an optimistic statement: "If the history of the Salton Sea has been an exciting one, the future promises even more."[543]

While the previously discussed 1963 *Report on Conservation of the Beneficial Water Uses of Salton Sea in California* was not available to the general public, it was distributed among the numerous state departments, the Colorado River Regional Water Quality Control Board, and the Imperial Irrigation District. The advantage of the survey was that it systematized the issues related to the Salton Sea, summarizing them in an accessible language. Thus, one did not need to be familiar with any scientific terminology in order to understand it. The report prepared by Arthur Swajian stated: "Unless water quality control measures are employed, after a few decades the water will become too salty to support a sports fishery, or to be useful for water-contact sports." However, while it conveyed the severity of the issues and the urgency to act upon them, it failed to provide a solution to the problems.[544]

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[542] *Miracle in the Desert and the Salton Sea,* 1960s promotional film.
[543] De Stanley, *The Salton Sea*, 62, 72-83, 51-63.
[544] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation;* Blaney, "Salton Sea Water Surface," 633-637.

The main concern of the report was to assure a permanent recreational use of the Sea. It emphasizes the recreational and residential features, focusing on sports fishing, water-contact sport activities and boating. While Swajian acknowledges the problematic increase in salinity, he focuses the influence of salinity on the turbidity of water. Much to the dissatisfaction of motorboat racing enthusiasts, the turbidity was affected by the increasing amount of silt and by the changing nutrient content of the Salton Sea water. And while Swajian mentions the devastating influence of salinity on the fish population, he fails to discuss the recurring fish die-offs. In addition, he conveys his skepticism towards the acuteness of the increasing salinity and its influence on the health of the fish population:

> Predictions as to the effect of salinity increase upon the fishery of Salton Sea are based upon scattered, diverse, and not very direct information. However, it seems possible that under the present rate of salt inflow, the Sea's game fish and the food chain which supports it could be seriously affected, and possibly destroyed in the next 20 to 40 years. This time estimate is obviously subject to considerable variation. The present fish life in the Salton Sea consists largely of species which are tolerant to salinity changes, and so it is probable that it can exist about as long as any combination which might be considered.[545]

In addition, the report declares a decrease in the aesthetic value of the Sea caused by the algal blooms. It acknowledges the danger of the increase in the danger of increasing water levels, stating as a logical measure the need to employ a "consulting civil engineering firm with industrial experience" to implement a solution to this pressing issue. Swajian continues with an assumption that an efficient engineering plan would make it feasible to maintain the Sea both as an agricultural sump and as a leisure oasis. He describes a potential plan in which a part of the Sea would receive wastewater, while another part would be made available for "recreation, fishing, wild life preservation and related esthetic values." The report

[545] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation.*

suggests that the plan would be feasible if salt mining measures were to be applied at the same time. Using specially dedicated disposal areas, salt and minerals would be removed from water while the part dedicated to leisure would be separated from the disposal areas.[546]

The report acknowledges the decreasing water quality of the Salton Sea and states that in order to preserve the sports fishery and water-contact sports, it would be necessary to implement water quality control measures "at the earliest possible date, consistent with the fact that any such program must be based upon carefully planned studies." At the same time, it mentions that "the proposal of water quality control in Salton Sea is presently in its infancy." Unfortunately, the suggestions presented in the report are rather vague. Due to a lack of funding and the inadequate management of water control measures, no practical plans based on the assumptions derived from the survey were implemented.[547]

The Overlooked Dangers

An integral part of the annual cycle of the Salton Sea ecosystem was that in the winter months, the water level increased. But it was only partly due to the increased seasonal rainfall; the majority of the water came from the Imperial Valley farmlands. Farmers placed water orders for the whole year in advance, and at the end of the year, before the order for the upcoming year was delivered, they simply released the remaining water from the previous year into the canals, which carried it into the Salton Sea. Because farmers tended to order significantly more water than they needed, the excessive water dumping added a great volume of water to the Salton Sea on an annual basis. The Sea's increasing water levels posed no threat to wildlife, but it was a worrying tendency for the residents and business owners at the Sea. The Imperial Irrigation District was aware of the practice, but neglected to keep

[546] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation.*
[547] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation.*

the shore communities of the Salton Sea informed about potential fluctuations.[548]

A wide range of sources published between the 1950s and 1970s allow us to conclude that while the issue was known, it was widely ignored. The insufficient supervision of water orders placed by Imperial Valley landowners and the faulty communication between the water district and the Salton Sea communities led to the destruction of homes and businesses. Two scientific reports appear to be particularly relevant to this study. The 1955 *Evaporation from and Stabilization of Salton Sea Water Surface* and the *Geological Survey Professional paper 486-C* published in 1966 both present the wider context of the problem and sketch the possible outcomes for the future.

The Salton Sea's increasing water volume had been a longstanding issue. In fact, the Sea had been steadily growing since 1905, and the phenomenon was widely known among the local residents, the agencies of the state of California, and the federally managed USGS. The most noticeable changes in the Sea's elevation dated back to the 1940s as an aftermath of the dedication of the Hoover Dam. A dramatic increase in irrigated land caused the Sea to rise almost two feet between 1948 and 1953. As a result, several buildings on the Desert Beach shore were washed away. In spite of the apparent unpredictability of future water levels, communities continued to sprout around the Sea, often just a few yards from the shore.[549]

When the major increase in water levels began, Helen Burns had just opened her soda and souvenir stand close to Salton Sea Beach. The increasing level of the Sea pushed her away from the shore in 1951. She asked the illegal immigrants, who frequented her mobile shop, to help her move it to higher ground. This happened on a regular basis until 1952 when she opened a larger shop close to Brawley, naming it *Waves*. But the elevation of the Salton Sea continued to increase, and within just a few years, Helen had to

[548] Rathbun, *Great Wall of China*, 156-162; DeBuys, *Salt Dreams*, 129-132.
[549] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation.*

move her shop five more times. But one of the floods destroyed *Waves* completely, which inspired her to open another shop named *Beach Combers*. This time, however, the flooding episodes were so frequent that she stopped keeping record of how many times her shop had to be moved. In 1953, when the Sea level seemed to have settled, the construction of Helen's famous Beach House began. But this establishment was to share the fate of its predecessors.[550]

As a result of the sudden increase in water level, the Imperial Irrigation District and the Division of Irrigation and Water Conservation of the Soil Conservation Service of the Department of Agriculture initiated a data collection at the Salton Sea. Three evaporation stations were established along the shores of the Sea, "for the purpose of obtaining data to estimate future elevations of Salton Sea surface and at what level it might be stabilized."[551] The findings of the eight-year long survey were gathered in the report titled *Evaporation from and Stabilization of Salton Sea Water Surface*, published by the American Geophysical Union in 1955. The report confirmed that "in recent years the rising water level in Salton Sea has resulted in encroachment and damage on adjoining lands, causing some concern to Federal, State, and local agencies."[552] It assumed that the increase had been steady since the damming of the Colorado River.[553]

The distinguished water conservation engineer Harry F. Blaney, who conducted the studies and authored the final report, exposed several false assumptions regarding the increase. According to him, many scientists sought the explanation in unrelated causes, for instance, by attributing the rise to seepage from the Gulf of California through cracks in the delta. Another theory stated that "the building processes in the delta might become reversed, thus permitting the tidal bore at the mouth of the Colorado River in Mexico to erode its way through the delta and inundate these highly-

[550] Mathews, "The Old Woman and the Sea"; Kennedy and Linehan, *Queen of the Salton Sea*, 33-34.
[551] Blaney, "Salton Sea Water Surface," 635.
[552] Blaney, 633.
[553] Blaney, 633-635.

developed areas in the United States." Blaney proclaimed those theories as unworthy of any attention.[554]

Instead, Blaney found a partial explanation in the sudden increase and change of crops grown in the region. In 1951, cotton had been planted in the Imperial Valley for the first time in twenty years. This water-consuming crop increased the amount of water released into the Sea. But the majority of water was a result of seasonal rainfall and the increasing acreage of the Imperial and Coachella Valleys:

> There is nothing unprecedented about the rapid rise in the last several years. Whenever inflow from local rain storms and return flow from irrigation exceed evaporation, the Sea rises. [...] Summer storms followed by a cool, wet fall and winter were a decided factor in the 1.5 feet rise of 1951. Other factors are the 100,000 acres increase in irrigated area, and the increase in efficiency of drainage in Imperial Valley, with consequent increase in return flow from irrigation to Salton Sea.[555]

In another section of the report, Blaney again states: "There is nothing mysterious about the rapid rise of Salton Sea."[556] Rather than providing a clear prediction about the future levels of the Sea, the report strongly suggests reconsidering any potential increase in irrigation: "No doubt as the irrigated area increases, there will be a further rise in the sea level,"[557] Blaney states. He then adds:

> The question 'At what elevation is it anticipated that the level of Salton Sea will be stabilized?' is one which deeply concerns Federal and State agencies, Imperial Irrigation District, Coachella Valley County Water District and owners of private land and resorts bordering the shores of the sea. A definite answer at this time is

[554] Blaney, 635.
[555] Blaney, 635-636.
[556] Blaney, 635.
[557] Blaney, 636.

> difficult to make since there are a number of unknown factors which will affect its future elevation. For instance, to date there has been virtually no attempt to provide drainage for the 150,000 acres in Baja California, Mexico, which are part of the drainage area of Salton Sea.[558]

Just a few years after the report was published, Helen was the proud owner of her own establishment in Salton Sea Beach. North Shore, Desert Shores, Salton City, and other communities continued to expand, and there were several thousand permanent residents at the Sea. At the same time, the authorities of the Imperial Irrigation District were aware of the uncertain outlook regarding the stability of the water level.

In 1964, another sudden increase in the Sea's level surprised the shore communities. On April 22, the *San Bernardino Sun* reported that "Damage estimated at millions of dollars has been caused by mysteriously rising water in the land locked Salton Sea."[559] The process was described as "puzzling" and "mysterious," and the Sea was accused of lapping at shore communities. Homes, resorts, military installations, thousands of acres of farmland were affected by the "slowly rising" Sea. The article investigated the source of rising water, explaining that it could not have been the rainfall as the last year's fall had measured only four inches. It assured readers that the sewage from Mexicali could not have added to the rise in elevation as the volume of sewage was much smaller than the volume added to the Sea. Finally, the article stated:

> Probably a principal source although no one wants to admit it is excess Irrigation water from vast Imperial Valley vegetable and cotton fields. California has been fighting with Arizona for years for the lion's share of Colorado River water and any hint that California is getting more than it needs would be ammunition for Arizona's legal guns.[560]

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[558] Blaney, 638-639.
[559] "Puzzling Salton Sea Laps at Shore Homes," *San Bernardino (CA) Sun*, April 21, 1964, https://cdnc.ucr.edu.
[560] "Puzzling Salton Sea Laps at Shore Homes," *San Bernardino (CA) Sun*, April 21, 1964.

"Legal guns" referred to the legal dispute between Arizona and California regarding water rights. The conflict began in the early 1930s and continued for the following seven decades as Arizona accused California of receiving more water than it was entitled to. In a series of cases known as *Arizona v. California*, the United States Supreme Court attempted to solve the conflict between the two states regarding the distribution of water from the Colorado River. The *San Bernardino Sun* article revealed how the Salton Sea, caught within this larger conflict, was affected. The article implied that the water district officials denied or hid the truth about excess irrigation, anxious that if the true amounts of water orders were to be revealed, they would lose the legal battle against their neighboring state.[561]

The press did not hesitate to reveal the facts. Other newspapers reprinted the *San Bernardino Sun* article, including the *Santa Cruz Sentinel* which headlined it as "Mysterious Salton Sea Rises, Damage Mounts into Millions." But in spite of the alarming headlines, the local communities did not undertake any measures to protect their properties from flooding. The very same year the Salton Sea faced a major fish die-off, previously discussed, but the local businesses welcomed an enormous number of visitors. The Atlas Plastics Corporation had just relocated to the Sea, and the developers continued to sell land both in North Shore and in Salton City.[562]

The Sea was increasing in elevation one quarter of an inch each week. This meant that the amount of waste released to the Sea was enormous as the water was evaporating at the same time. In order to understand the changes in the elevation level of the Salton Sea, it is crucial to reflect on the mechanism and the extent of evaporation at the Sea. The *Professional Paper 486-C,* published by the United States Geological Survey in 1966, provides a

[561] Reisner, *Cadillac Desert*, 260-262.
[562] "Mysterious Salton Sea Rises, Damage Mounts into Millions," *Santa Cruz (CA) Sentinel*, April 22, 1964, https://cdnc.ucr.edu.

useful insight into both the rising elevation level and the evaporation of the Sea.[563]

The authors of the *Salton Sea Atlas* estimated the annual evaporation as 1.3 million acre-feet of water, which added up to 15 percent of the entire Sea evaporating each year. In 1966, the scientific community was aware of the immense amount of evaporated water, but it was not able to draw specific conclusions about the future. At the Salton Sea, the USGS gathered data not only from the fields of geology and hydrology but also from the agricultural developments, attempting to utilize it for an evaporation estimate. Authored by A.G. Hely, G.H. Hughes, and Burdge Irelan, the survey underlined the difficulty in estimating evaporation of the Salton Sea. This difficulty was caused in part by the varying climatic conditions throughout the year, but it was mostly the dramatic scarcity of available data that made the estimate so difficult.[564]

The USGS determined that throughout the 1950s and 60s, the annual evaporation of the Salton Sea amounted to six feet per year while its elevation level continued to slightly increase. Between 1957 and 1962, the Sea level increased by one and a half feet. Between 1961 and 1964, the Sea level rose by two feet, which meant the Salton Sea's elevation level sat at 234 feet below sea level. While those numbers can serve as an orientation for long-term analysis, they merely demonstrate an average of large and varying fluctuations in the Sea's level. The report emphasized that the elevation level of the Sea was different each month. It stated that the evaporation maximums occurred in May and August and the minimums in January and June. But the varying inflow statistics made it impossible to make any predictions for the future. The Imperial Irrigation District was only able to provide estimated numbers, failing to deliver specific data. This rendered any estimates for the future elevation levels useless. In spite of the data shortage, the USGS attempted to provide an estimate, carefully suggesting that the evaporation should remain roughly the same as the inflow. In

[563] Redlands Institute, *Salton Sea Atlas*, 38; "Puzzling Salton Sea Laps at Shore Homes," *San Bernardino (CA) Sun*, April 21, 1964.
[564] Redlands Institute, *Salton Sea Atlas*, 38; Blaney, "Salton Sea Water Surface," 636.

addition, the study pointed out that salty water evaporates slower than sweet water. A 2 percent decrease in annual evaporation was thus expected, due to the increasing salinity of the Sea.[565]

The survey stressed the fact that the inflow of agricultural waste was increasing, which created a potential risk of flooding. According to the estimates provided by the Imperial Irrigation District, between 1961 and 1964 the total inflow from the Coachella and Imperial Valleys increased by 20 percent. This increase was indeed dramatic, but businesses continued to thrive at the Sea. Until the late 1960s, the level of the Sea remained stable. By 1970, Helen's business was expanding. In addition to the Beach House, she opened numerous other businesses in the area, including a motel and the Salton Sea Beach Marina. But the days and nights filled with boating, skiing, dining, and entertainment were about to end.[566]

The Cruel Sea

At the beginning of the 1970s, the numbers of vacationers at the Salton Sea suddenly dropped. Throughout the 1960s, Lake Havasu on the border of California and Arizona was becoming the new mecca of water ski sports, and the majority of water sports enthusiasts left the Sea for the more attractive and fashionable destination. As fewer spectators came to the motorboat races at the Sea, many of the events were moved to Lake Havasu City. Helen's Beach House, alongside other leisure businesses of the Salton Sea, was emptying out. Over thirty thousand lots had been sold in North Shore and in Salton City. But most of the property owners waited for the bright future to come. As the interest in the area continued to decrease, many

[565] Colorado River Basin Regional Water Pollution Control Board, *Report on Conservation;* Alex M. Sturrock, *Water-Supply Paper 2053: Evaporation and radiation measurements at Salton Sea, California*. (Washington, D.C.: Government Printing Office, 1978), 24-25, https://pubs.er.usgs.gov/publication/wsp2053; Hely, Hughes and Irelan, *Geological Survey*, C1, 1-9, 29.
[566] Kennedy and Linehan, *Queen of the Salton Sea*, 136-137; Hely, Hughes and Irelan, *Geological Survey,* 1-9.

permanent residents of Desert Shores or Salton Sea Beach moved away. By 1970, the 125 miles of shoreline was home to only 1,500 people.[567]

Then, at the beginning of the 1970s, the Sea began to swell rapidly. Helen's marina was partly damaged and so were the remaining twelve marinas around the Sea. Over the next few years, the majority of local businesses went bankrupt, and most buildings became submerged. The regular visitors removed their boats from the harbors and marinas, and the golf course was abandoned. Hardly any guests checked in at the local motels. In just four years, the rising water resulted in claims of local residents seeking $30 million in damages.[568]

In June of 1973, the Sea reached a level of 230 feet below sea level, which meant that it had risen by two feet in just ten years and an extraordinary twelve feet since 1949. The local press was monitoring the fluctuating level of the Sea, reporting on the data provided by the Imperial Irrigation District (IID). Once the Sea began to threaten the settlements, the IID provided considerably more information than in the previous decades. In the summer of 1973, the *Calexico Chronicle* informed the public that the IID committed itself to reading the elevation levels at least once a week at a gage in the northwestern part of the Sea. The *Chronicle* quoted Don A. Twogood, the chief civil engineer of the IID, who had determined that May of 1973 had seen no increase in elevation. However, the article stated: "Although it is 'gratifying' to see that the elevation of Salton Sea did not rise further, District officials still called the elevation 'dangerous' and expressed the hope that water users would try their best to restrict water consumption to 'beneficial use without waste.'"[569]

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[567] Mathews, "The Old Woman and the Sea"; Blake, *Salton Sea Resort*, 20-23, 29.
[568] Mathews, "The Old Woman and the Sea"; DeBuys, *Salt Dreams*, 129-132; "Salton Sea Reaches Its Highest Level," *Desert Sun (Palm Springs, CA)*, April 26, 1984, https://cdnc.ucr.edu.
[569] "Elevation Salton Sea Unchanged," *Calexico (CA) Chronicle*, June 21, 1973, https://cdnc.ucr.edu;
"Salton Sea's Perilous Rise Come to Stop - Elevation Remains," *Calexico (CA) Chronicle*, June 14, 1973, https://cdnc.ucr.edu; Kennedy and Linehan, *Queen of the Salton Sea*, 177.

The *Calexico Chronicle* emphasized the fact that the IID was particularly concerned about the level of the Salton Sea as it could be held accountable "for any property damage which occurs around the sea due to a rise." The IID confirmed that it had asked farmers to cut down on agricultural water use, and changed their approach "to enforce stricter regulations to stop the excessive flow of waste water into the sea." In order to further control the water level, the IID reduced water orders for those farmers who had wasted earlier water deliveries by releasing them to the Sea.[570]

An official of the IID explained the increased elevation of the Sea as a result of several phenomena. Firstly, he admitted that it was the growing agricultural runoff that caused the water to rise. Secondly, he blamed the cold weather which had caused a delayed planting of many crops in the spring. Thirdly, he named the strong winds and the unseasonal rain as the causes of the rise. Lastly, he pointed out that many farms in the Imperial Valley had begun to cultivate wheat instead of barley. As wheat required more water and had a longer growing period, its increased acreage contributed to the rising elevation of the Salton Sea. However, the claims of the IID were not supported by any scientific survey. Based on the available scientific reports, it can be safely assumed that it was primarily the agricultural runoff that contributed to the increase in water levels.[571]

The *Chronicle* revealed that the IID had neglected to successfully communicate with the farmers. In order to tackle this problem, several employees of the District were temporarily reassigned new positions in which they were responsible "for improving communication between the district and farmers."[572] But the water level continued to rise, and numerous property owners around the Salton Sea commenced taking legal steps against the Imperial Irrigation District.[573]

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[570] "Salton Sea's Perilous Rise Come to Stop - Elevation Remains," *Calexico (CA) Chronicle*, June 14, 1973.
[571] "Salton Sea's Perilous Rise Come to Stop – Elevation Remains," *Calexico (CA) Chronicle*, June 14, 1973.
[572] "Salton Sea's Perilous Rise Come to Stop – Elevation Remains," *Calexico (CA) Chronicle*, June 14, 1973.
[573] "Salton Sea's Perilous Rise Come to Stop – Elevation Remains," *Calexico (CA) Chronicle*, June 14, 1973.

Meanwhile, two local politicians took up the cause of the Salton Sea, which was under heavy strain due to increasing salinity. The republican Congressman Victor Vesey became known as a fierce proponent of desalination projects of the Sea. Vesey managed to push several bills calling for further salinity studies and salinity monitoring projects. He put much effort into drafting a proposal for an elaborate desalinating evaporation system. At the same time, the republican Congressman Jerry Pettis proposed the construction of a diking system to allow removal of salt from the area. But in a series of unfortunate events, hopes for any further improvements were lost. Victor Vesey did not manage to secure the $58 million that was needed for the evaporation ponds before his term ended in 1974. In 1975, Jerry Pettis, who had just begun to generate interest about these issues in Washington, died in a plane crash when returning from a meeting about the Salton Sea in North Shore.[574]

Pettis' widow, Congresswoman Shirley N. Pettis, took up the responsibility of introducing the bill drafted by her late husband to Congress. But due to the 1973-75 economic recession, President Ford introduced a halt on federal spending. Awareness about the critical state of the Salton Sea had been generated in Washington, but the project died. The Department of the Interior officially acknowledged the need for desalination but denied any federal funds. In his article about the Salton Sea, Neal Matthews claims that the reasoning behind the decision was the harsh assumption that the Sea would die anyway. The Department thus concluded that it was better to let it die instead of proceeding with unnecessary investments.[575]

Discouraged by the increasing salinity and the fluctuating sea level, the Holly Corporation abandoned the development of Salton City altogether. Hundreds of miles of streets remained uninhabited. In the next few years, the increase in the water level continued on an unprecedented scale,

[574] Mathews, "The Old Woman and the Sea"; "Nationwide Messages Note Loss of Pettis," *Desert Sun (Palm Springs, CA)*, February 15, 1975, https://cdnc.ucr.edu.
[575] Mathews, "The Old Woman and the Sea"; "Biography of Pettis Finished," *Desert Sun (Palm Springs, CA*), September 19, 1977, https://cdnc.ucr.edu.

reaching between ten and twenty inches per year. By 1976, further facilities on the shores of the Salton Sea were completely covered by water. At Helen's marina, even the light poles, which had hosted the befriended pelican, were becoming submerged.[576]

Helen organized a group of residents affected by the increasing elevation levels of the Sea. As the Salton Sea Property Owners Association, they filed a series of lawsuits against the IID. At the same time, they continued to urge the authorities to cease the increasing water levels. In addition to their individual cases, Helen and thirty-six other property owners filed a class-action lawsuit against the Imperial Irrigation District in early 1976. Their major allegation concerned the gross negligence of the IID in managing and maintaining the water orders. The IID's long-standing practice of dumping excessive amounts of water into the Sea constituted the material evidence in the case. Lowell Sutherland, the attorney representing the residents, calculated that roughly half of the water ordered by the farmers was used for irrigation purposes. The other half, which constituted over 500,000 acre-feet of water per year, was dumped into the Sea without ever having touched the fields. However, the IID denied this allegation and claimed that it was based on insufficient data.[577]

Among the three main sources of the Salton Sea drainage, the Imperial Valley produced the largest part, while Mexicali and Coachella Valley together contributed roughly 15 percent of the entire inflow. In May of 1976, the Salton Sea Property Owners Association reached out to the Coachella Valley County Water District (CVCWD) Board of Directors, expressing concern about the rising level of the Sea. The *Desert Sun* reported on this encounter, stating that the CVCWD statement proved that Coachella Valley could not have been responsible for the increased elevation of the Sea. The article stated that "Coachella, unlike other irrigation districts, has very few

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[576] Mathews, "The Old Woman and the Sea"; Kennedy and Linehan, *Queen of the Salton Sea*, 134-135.
"Sea Level Affects Property Owners," *Desert Sun* (Palm Springs, Ca), May 1, 1976, https://cdnc.ucr.edu.
[577] Mathews, "The Old Woman and the Sea"; "Sea Level Affects Property Owners," *Desert Sun* (Palm Springs, Ca), May 1, 1976.

open drains so farmers here cannot easily get rid of excess water. Water taken must soak through the field and into the tile drainage system." Thus, the IID remained the sole object of investigation in the search for the cause of the increase.[578]

What followed was a severe embarrassment for the IID. Sutherland asked dozens of local high school students to monitor the spillage from over twenty canals of the Imperial Irrigation District. The students documented the spillage for three months, photographing the changes. Their investigation demonstrated that 61 percent of the water was dumped without ever having been used. Thanks to their observations, Sutherland succeeded in proving his previous claim that roughly 500,000 acre-feet had been dumped into the Sea unnecessarily on an annual basis. Over the twelve-year period, the volume of water dumped reached over one million acre-feet, more water than the city of Los Angeles had used in 1976. This volume roughly corresponds to today's size of Lake Ontario located between the border of the U.S. and Canada.[579]

The *Calexico Chronicle* was deeply engaged in the attempts to keep the level of the Salton Sea steady. In mid-1976, it urged farmers to reduce their water usage. "At the present time, the best means of reducing the inflow into the Salton Sea is by reducing surface drainage or tail-water run-off. We strongly encourage all growers to help out and reduce their surface run-off as much as possible," the *Chronicle* recommended.[580] The struggle to protect the businesses and communities from flooding continued. But soon, a series of disasters struck. In 1976 and 1977, two tropical storms caused major damage to the entire Salton Sea region.

[578] "Sea Level Affects Property Owners," *Desert Sun* (Palm Springs, Ca), May 1, 1976.
[579] Mathews, "The Old Woman and the Sea."
[580] "Sea Level Affects Property Owners," *Desert Sun (Palm Springs, CA)*, May 1, 1976.

Tropical cyclones are rare meteorological events. Warm climate and high humidity allow them to form, and depending on their severity and the region where they occur, they are called hurricanes, tropical depressions, cyclonic storms, or tropical storms. In order to easily identify these occurrences, each cyclone receives a human name. The federal scientific agency National Oceanic and Atmospheric Administration (NOAA) describes a tropical storm as "[a]n organized system of strong thunderstorms with a well-defined circulation and maximum sustained winds of 39 to 73 mph (34-63 knots)."[581]

On September 10, 1976, the tropical storm named Kathleen made landfall on the northern Baja Peninsula in Mexico and on parts of Southern California. It brought record rainfall, extensive flooding in the Colorado Desert, destruction to hundreds of homes, and agricultural damage. It quickly gained the status of a storm of the century, which was confirmed by NOAA, describing it as a "160+ year event."[582]

On U.S. territory, the storm was most destructive in the Imperial and Coachella Valleys. It lasted for just a few hours, but within this short time, it brought the heaviest rainfall recorded in the history of the area. In the Coachella Valley, a rainfall of three inches was recorded, while the San Jacinto Mountains experienced a rainfall of ten inches. The enormous amount of rainwater then entered the valleys and rushed towards the depression of the Salton Sink.[583]

Kathleen killed six people, caused severe property damage in Southern California, and damaged highways and urban infrastructure. After it passed,

[581] U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, *Hurricanes - Unleashing Nature's Fury. A Preparedness Guide*, revised August 2001, 2, http://www.cert-la.com/downloads/education/english/Hurricanes-UnleashingNaturesFury.pdf.
[582] U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), *A History of Significant Weather Events in Southern California*, updated February, 2010, 31, https://www.wrh.noaa.gov/sgx/document/weatherhistory.pdf.
[583] U.S. Department of Commerce, NOAA, *A History*, 31; "$4 Million is Damage Estimate After Worst Storm in 40 Years," *Desert Sun (Palm Springs, CA)*, September 11, 1976, https://cdnc.ucr.edu.

record floods began. The streams of rivers that had formed in the mountains north of the Coachella Valley affected the Imperial Valley most severely. In the Salton Sea area, the water flooded the farming grounds, destroyed the shore resorts and communities, and increased the water level of the Sea by six inches in two days.[584]

The community of Ocotillo, close to El Centro, suffered the greatest damage. Six of the residents lost their lives as the rushing waters ripped houses out from their foundations. Within minutes, seventy percent of the town was destroyed. Shocked residents were seeking shelter on rooftops or climbing telegraph poles to avoid being swallowed by thousands upon thousands of tons of moving clay, sand, and water.[585]

Within one day, the rescue service managed to evacuate all the communities surrounding the Salton Sea. Surfaces of buildings, fields, and beaches looked like they were covered in cement. Over the course of the following weeks, the clay dried, spreading through the area in the form of sand and dust. In the weeks following the storm, chaos emerged. There was debris everywhere, and there was no electricity or water; schools remained closed for months. In addition, large pools of mud threatened to swallow people and cars. On the surface of the Salton Sea, debris from many miles away was floating next to the remains of the local harbors. Beaches were covered in the trashed belongings of local residents, as well as in local produce which had been ripped from the fields of the Imperial Valley. The North Shore Yacht Club was devastated, and so were the establishments in Desert Shores, Salton Sea Beach and Bombay Beach.[586]

Not even a year had passed, with the destruction caused by Kathleen barely tackled, when a second storm struck. On August 18, 1977, a tropical cyclone named Doreen tracked north and northwest along the western coast of Baja

[584] Rathbun, *Great Wall of China*, 171.
[585] "$4 Million is Damage Estimate After Worst Storm in 40 Years," *Desert Sun* (Palm Springs, CA), September 11, 1976.
[586] Denise Goolsby, "Coachella Valley has history of strong storms," *Desert Sun* (Palm Springs, CA), September 14, 2014, accessed September 13, 2018, https://eu.desertsun.com/story/news/local/2014/09/20/flooding-in-the-coachella-valley/15832857/.

California to then dissolve itself in the coastal waters. It was the second "storm of the century"[587] in two years to occur in Southern California. Eight inches of rainfall were recorded in the mountain regions, while the lowlands received at least two inches. At the Salton Sea, the record rainfall of four and a half inches was recorded in just a few hours, making it the wettest August day on record.[588]

Four people were killed in the United States as a result of storm Doreen. Severe property damage affected the whole of Southern California, and the damage was just slightly lower than the damage caused by the previous storm. The communities located close to the shores of the Salton Sea were so severely damaged during Kathleen that there was not much left to destroy. But Doreen destroyed almost everything that had been left untouched by Kathleen. Five-feet-deep mudflows swept through the area. Half of the Salton Sea shore community of Bombay Beach was under water, and the entire area experienced massive floods and crop damage.[589]

The grim aftermath of Kathleen and Doreen included a combined total of twenty-one deaths in the United States and Mexico, thousands of homes destroyed, and $750 million dollars in agricultural damage. The leisure business at the Salton Sea was devastated. Places like Desert Shores and Salton Sea Beach that once attracted fishing, waterskiing, and motorboating enthusiasts became landmarks of post-apocalyptic destruction, frightening visitors away. Helen's Beach House was severely damaged. All that was left from her marina were two poles that had once served as the harbor entry lights, and the stumps of three palm trees that Helen had planted in her establishment.[590]

The tropical storms were the final strike to the already vulnerable leisure industry. In his study of the Salton Sea, DeBuys claims that it was doomed to fail from the very beginning. He observes that since the beginning of the

[587] U.S. Department of Commerce, NOAA, *A History*, 32.
[588] U.S. Department of Commerce, NOAA, *A History*, 32.
[589] U.S. Department of Commerce, NOAA, *A History*, 32; Rathbun, *Great Wall of China*, 171.
[590] Rathbun, *Great Wall of China*, 171; Kennedy and Linehan, *Queen of the Salton Sea*, 134-135.

twentieth century, people continually failed to acknowledge that the Salton Sea was just "not a good place to live."[591] According to DeBuys, a place as hot, polluted, isolated, and hostile as the Salton Sea was obviously not able to accommodate cities and resorts. For those who came to this realization, the Sea was the one to blame.

> Whenever the Salton Sea rose and drowned waterfront property, whenever it suffered a foul-smelling algae bloom or an even more odiferous fish die-off, the boosters of the Salton Riviera complained about the sea, the liquid mirror of all their fantasies, had turned against them.[592]

For years to come, Helen waited for the sea to return her property, but it remained several miles offshore. Did Helen blame the Sea, as well? Her daughter implies that the long-standing experience of flooding and the final destruction brought by Kathleen and Doreen, left a bitter aftertaste.

> Mom helped to make the sea a popular recreation destination. In return, the sea flooded her land, destroyed her buildings, killed thousands of fish and soaked the air with stench. In this respect, the sea was a competitor [...], who had a different plan for her Beach House. And despite years of trying, Mom failed to persuade the sea otherwise.[593]

After the emergency procedures had ended, the legal battle between the property owners from the Salton Sea region and the Imperial Irrigation District continued. The attorney, who represented the suing party, succeeded in proving that a great part of the water provided by the IID for irrigation was wasted. In 1985, Helen shared in a multimillion-dollar settlement paid by the IID to over thirty Salton Sea businesses. Unfortunately, the amount

[591] DeBuys, *Salt Dreams*, 213.
[592] DeBuys, 212-213.
[593] Kennedy and Linehan, *Queen of the Salton Sea*, 1.

received by the affected parties was not satisfactory to most of them—it simply was not enough to cover the costs of damage.[594]

Ironically, the storms that caused enormous losses to the local communities brought a recovery to the Salton Sea ecosystem. The hypersaline Sea received a long-needed inflow of fresh water, and the desert floods reduced the Sea's salinity. Even after its journey through the alkaline desert valleys, the water that entered the Sea had a significantly lower mineral content than the agricultural wastewater. This provided a relief to the entire ecosystem as the usual heavy strain placed upon fishes and other aquatic organisms was temporarily lifted.[595]

FIGURE 7.2. Damage caused by the tropical storm Kathleen in the Coachella Valley, 1976. (Photograph courtesy of *Desert Sun* (Palm Springs, CA), "$4 Million is Damage Estimate After Worst Storm in 40 Years," September 11, 1976.)

[594] Kennedy and Linehan, 179.
[595] "Salton Sea reaches Its Highest Level," *Desert Sun* (Palm Springs, CA), April 26, 1984.

Outlook
SALT IN A WOUND

In his study of water in the American West, James Lawrence Powell reflects on the inevitable decline of ambitious irrigation projects. "Nature had decreed that the West was different and there was only so much that the man could do about it,"[596] he states, paraphrasing John Wesley Powell's *Report on the Lands of the Arid Region of the United States*, an 1878 scientific survey and policy recommendation focusing on a sustainable way to populate the American West. In the *Report*, John Wesley Powell attempted to overturn the myths, the legends, and the denial related to the Westward migration; he urged that irrigating the West was not feasible on a mass-scale and that irrigation projects should be initiated with appropriate caution. But, as mentioned in the introductory remarks of this study, his ideas did not gather sufficient support, and the aggressive irrigation of the West continued in full swing for decades to come. The Salton Sea became an integral part of this system, serving as the waste reservoir for one of the most productive agricultural regions in the world.[597]

In the late 1970s, the Salton Sink looked strikingly similar to what it looked like in 1907 when the modern Salton Sea was created by a series of floods. A thick layer of soft mud once again covered the area, destroying the hopes and dreams of success that human actors had envisioned for the Sea. One hundred years after John Wesley Powell first warned about mass-scale irrigation, the Sea became an example of the failures of the American West. The West failed to heed the warnings about mass-scale irrigation, and the consequences were severe, both ecologically and economically.

[596] Powell, *Dead Pool*, 41.
[597] Powell, 41-42.

From the moment of the Sea's birth up until the late 1970s, the Sea had experienced a great number of fast-paced transformations, yet it was barely seventy years old. One of the key reasons for these accelerated phenomena was the various ways in which humans had misinterpreted natural processes. This misinterpretation began with irrigation pioneers whose simplistic assumptions severely underestimated the feasibility of irrigating the desert of Southern California, as for example, Charles Rockwood's private enterprise, the California Development Company.

The faulty logic regarding natural processes was also apparent both in the federal agencies and in the governing bodies of the state of California. As this study demonstrated, the construction of the Hoover Dam conducted by the federal Bureau of Reclamation greatly transformed the Salton Sea. In addition, a notable example of state intervention was the initiative by the California Department of Fish and Game to transplant aquatic species from the Pacific Ocean to the Salton Sea. Focusing on the fact that both the Ocean and the Salton Sea were saline, the Department ignored other climatic and biochemical conditions of the Sea, which in turn led to an imbalance in the ecosystem.

As a result of those simplified assumptions, the Sea was expected to multitask in a myriad of ways. Attempts throughout the 1950s and 60s to establish a successful tourist industry in an area which was designated as a major outlet for highly saline and contaminated water is one of the most notable examples of the conflict between human expectations and ecological reality.

In addition, the continuous misinformation and lack of communication between the Imperial Irrigation District, the governing bodies, and the local communities contributed to a lack of awareness regarding the Sea's fluctuating elevation levels. Lastly, the Sea was transformed, as well, by fortuitous events, demonstrated through the example of the accidental transplantation of acorn barnacles by the United States Navy to the Salton Sea during World War II.

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The salinity crisis was barely influenced by tropical storms Kathleen and Doreen in 1976 and 1977. While the influx of fresh water brought temporary relief to the Sea, the salinity levels still grew. Between 1907 and the late 1970s, the total increase in the salinity level was astronomical. By the 1980s, it reached 44 ppt, exceeding the average salt content of the ocean water by 9 ppt. Thus, the Salton Sea became 25% saltier than the ocean and underwent a forty-fold increase in salt content in just over seventy years. As a result, the Sea became an ecological time bomb. There has been a long-standing controversy regarding the restoration of the Sea with a continuous supply of fresh water, but no such project has been implemented so far. As of 2018, the salinity of the Sea is estimated to have reached 50 ppt.[598]

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The hypersalinity and contamination of the Sea accelerated the decomposition process of organic matter. Due to the recurring algal blooms, the Sea became unable to sustain its inhabitants, and it was the aquatic population that suffered the greatest losses. The transformations that affected the fish population of the Salton Sea between 1905 and the 1970s were immense. By the 1930s, the mullet population became the dominant fish species while carps and trouts vanished from the Sea. Within just two decades, the orangemouth corvina and the sargo pushed out the mullet. Overfed on the abundance of decaying matter, the bodies of all these fishes developed into an abnormally large size, a sign of an imbalance in the ecosystem. This imbalance produced large-scale fish die-offs, which deprived the Sea of oxygen. Those die-offs became an annual event, escalating between the 1950s and the 1970s.

In the 1980s, as the die-offs continued, the corvina and sargo populations were overtaken by the tilapia, which today are the most abundant fishes in

[598] Redlands Institute, *Salton Sea Atlas*, 38-39; ch2m /Jacobs Engineering Group, *Salton Sea Hydrological Modeling and Results*, Report prepared for the Imperial Irrigation District, October 2018, 4-2. https://www.iid.com/home/showdocument?id=17299.

the Sea. The Salton Sea tilapia emerged as a hybrid between two species, the Southern-African native Mozambique tilapia (*Oreochromis mossambicus*) and the Tanzanian *Oreochromis urolepis hornorum*. By the late 1990s, the Sea became the most productive tilapia ecosystem worldwide. Today, four fish species continue to maintain a population in the Salton Sea. The hybrid tilapia is followed by the sargo, corvina, and bairdiella. Carcasses of all these fishes are spread across the beaches of the Salton Sea today. As the tilapia is the most common, it is also most vulnerable to the annual mass die-offs.[599]

The Sea remains an overly productive ecosystem. The cycles of algal blooms and fish die-offs persist, triggered by the eutrophication processes of the Salton Sea. The more algae there is, the stronger are the reproductive cycles of the fish. Each year, the fishes die by the millions, only to increase their population in each year that follows. Patten, McCaskie and Unitt emphasize the fact that the recurring wildlife die-offs are the result of major ecological issues at the Sea. As the die-offs became more alarming, more frequent and severe for both the fishes and birds in the 1990s, the authors noted that these die-offs were "perhaps heralding a collapse of the ecosystem."[600]

The 1990s saw the most severe series of wildlife die-offs in the history of the Salton Sea. At the same time, the Sea became one of the few wetlands in California unaffected by urbanization or agriculture. One of the deadliest bird die-offs on record at the Salton Sea occurred in 1996 when thousands of birds contracted botulism from eating decaying fish whose tissues became breeding grounds for deadly bacteria. Avian botulism is a very serious paralytic illness and almost always fatal for the infected birds. During the 1996 Salton Sea die-off, pelicans were most affected by the deadly disease. Between 7,500 and 10,000 of the rare brown pelicans and the American white pelicans died at the Sea that year in spite of a large-scale rescue response initiated by a number of environmental organizations.[601]

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[599] Rathbun, *Great Wall of China*, 133-136.
[600] Patten, McCaskie, Unitt, *Birds of the Salton Sea*, 7-8.
[601] Patten, McCaskie, Unitt, 7-15. U.S. Department of the Interior, U.S. Geological Survey, *Avian botulism. Information and Technology Report 1999-0001,* by T.E. Rocke and Milton Friend, (Reston, VA: USGS, 1999), 2-4, https://pubs.er.usgs.gov/publication/2001150; Tonie Rock, Kathryn Converse, Carol Meteyer, and Bob McLean, "The Impact of Disease in

The American white pelican has been selected for this study as a species which best represents the embattled state of the Salton Sea. In addition, the fluctuating numbers of breeding and non-breeding American white pelicans showed a correlation between the numbers of birds and the distribution of human developments at the Sea. The period between the late 1930s and the 1950s, especially, demonstrated that the pelican population abandoned the Sea as soon as the emergence of large-scale tourism began.

While further outbreaks of avian diseases, including avian cholera, Newcastle's disease, or avian botulism have been recorded at the Salton Sea since the late 1990s, the Sea endures as a shelter to numerous species of birds. Cormorants and pelicans are today the most prominent visitors of the Sea, but they do not breed there anymore. Between one third and half of the entire population of the American white pelican continue to winter at the Salton Sea. Sadly, the shores and marshes of the Sea still expose corpses of dead birds who have died in recent months or years from eating toxic fish. Due to the high risk of wildlife disease, Milton Friend, the director of the USGS National Wildlife Health Center and the author of one of the most prominent recent studies on the Salton Sea, proclaimed the Salton Sea as "an ecosystem under severe stress."[602]

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the American White Pelican," *Waterbirds: The International Journal of Waterbird Biology* 28 (Special Publication 1, 2005): 88-90, https://www.jstor.org/stable/pdf/4132653.pdf?seq=1#page_scan_tab_contents.

[602] Milton Friend, "Avian Disease at the Salton Sea," 2000, 1, file:///C:/Users/Owner/Downloads /friend_disease_2000symposium.pdf; Patten, McCaskie, Unitt, *Birds of the Salton Sea*, 7-8, 83; Rathbun, *Great Wall of China*, 165.

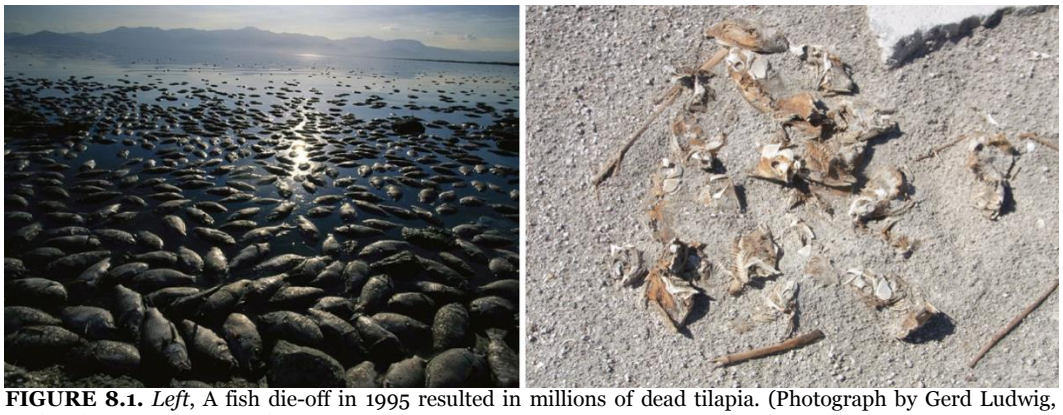

FIGURE 8.1. *Left*, A fish die-off in 1995 resulted in millions of dead tilapia. (Photograph by Gerd Ludwig, National Geographic Magazine.)
FIGURE 8.2. *Right*, Decomposing fishes at the shore of the Salton Sea. Next to fishes, a piece of exposed ruin from a previously submerged building. Desert Shores, October 2018. (Photograph by author)

The recent history of the birds of the Salton Sea cannot be told without mentioning the congressman and popstar Salvatore Phillip Bono, known as Sonny Bono. In the 1990s, Bono brought the issues of the Salton Sea to national attention. He raised awareness about the severity of the Salton Sea crises, emphasizing the importance of the Sea as a bird refuge. In 1998, Sonny Bono died in a skiing accident, and his efforts are commemorated at the former "Salton Sea Wild Life Tract" (established in 1930) at the southern tip of the Sea. The Tract, renamed in 1998 as the Sonny Bono Salton Sea National Wildlife Refuge, remains one of the most diverse national wild refuges in the West.

While the Sonny Bono Refuge is overseen by the United States Fish and Wildlife Service, an agency of the U.S. federal government, the California Department of Parks and Recreation is in charge of the park in the northeastern tip of the Sea. But the booming visitor numbers of the Salton Sea State Park, known today as the Salton Sea State Recreation Area, now belong in the past. In the 1960s, the park welcomed as many as half a million visitors per year. Those numbers began to decline in the beginning of the 1970s. By 1995, the visitor numbers dropped to their lowest point in fifty

years, when only 87,000 people visited the park. In the following two decades, the visitor numbers dropped dramatically.[603]

The fluctuations in water level depicted in this study consisted of the constantly rising level of the Salton Sea, which was dependent upon the volume of water released by the farms in the Imperial and Coachella Valleys. Between 1907 and 1920, the level of the Sea went through extreme phases of sudden increases and decreases. In the 1940s, the sink began to fill faster than ever before; the water overflowed the islands, including Captain Davis' Mullet Island. Between the 1940s and the 1970s, the Sea's level continually rose. This resulted in the escalation of legal conflicts in the mid-1970s between the local property owners and the Imperial Irrigation District.

The legal dispute exposed the negligence in the water management system of the IID, but the water level coming from the grossly overestimated water orders continued to increase until the end of the 1980s. In 1984, the level of the Sea was higher than ever before, sitting at 226 feet below sea level. By the 1990s, the inflow from the Imperial Valley decreased dramatically, and the elevation stayed steady. But then another crisis emerged as the six-feet-per-year evaporation rate along with decreased inflow caused the Sea level to decrease. Each year, the evaporating water has been leaving behind several inches of thick, dried seabed.[604] Russell Rathbun describes the hazards concealed in this dried layer, known as toxic playa:

> As the Salton Sea evaporates, it will expose acres and acres of playa – the dried seabed filled with highly concentrated levels of salt and agricultural chemical residue. Dust storms will pick up this toxic mix,

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[603] Redlands Institute, *Salton Sea Atlas*, 33; California Department of Parks and Recreation, "Salton Sea State Recreation Area," accessed January 14, 2019, http://www.parks.ca.gov/?page_id=639;
U.S. Fish and Wildlife Service, "Sonny Bono Salton Sea National Wildlife Refuge," accessed January 14, 2019, https://www.fws.gov/refuge/sonny_bono_salton_sea/.
[604] "Salton Sea reaches Its Highest Level," *Desert Sun* (Palm Springs, CA), April 26, 1984; "USGS 10254005 Salton Sea NR Westmorland CA," USGS Current Conditions for California, U.S. Geological Survey, U.S. Department of the Interior, accessed February 5, 2019, https://waterdata.usgs.gov/ca/nwis/uv?site_no=10254005.

> which will singe the leaves of the much-desired baby spinach. And if nothing is done, this man-made natural disaster could destroy farming in Imperial Valley, drive countless species of birds to extinction, and have serious effects on the health of scores of people as they regularly breathe in the noxious dust.[605]

The scenario described by Rathbun has already begun to take place. The strong desert winds carry the dust to houses, schools, and to the surrounding fields, spreading pesticides, heavy metals, and other hazardous substances. The poor air quality has affected many residents from the Salton Sea region, most notably children, who suffer from chronic respiratory issues. Almost one-fifth of children from the local schools, including the Westmorland Union Elementary School, suffer from asthma. The problem is so severe that a local advocacy group initiated a special air-quality monitoring system. If the air quality is bad, the schools advise the sick children to stay at home. But there are days when the toxic dust is so thick that entire schools are closed.[606]

As of January 2018, the level of the Salton Sea was 236 feet below sea level. At the beginning of 2019, the elevation is estimated to be even lower, however the measurements for this year have yet to be conducted. While the health of local residents deteriorates, nothing is being done aside from maintaining the air-quality monitoring program. At the same time, the Imperial County remains among the poorest of regions in California. A 2017 *Desert Sun* article points to the core problem of the toxic dust crisis: "At the heart of the issue are groups of competing stakeholders: farmers fighting for less regulation, public officials constrained by budgets and constituencies and the 180,000 primarily poor and Latino residents of Imperial County."[607]

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[605] Rathbun, *Great Wall of China*, 160.
[606] Zara Abrams, "Salton Sea communities 'no longer a good place to live' for those with respiratory issues," *Desert Sun*, October 26, 2017, accessed February 1, 2019, https://eu.desertsun.com/story/salton-sea/2017/10/25/salton-sea-communities-no-longer-good-place-live-those-respiratory-issues/769970001/.
[607] "USGS 10254005 Salton Sea NR Westmorland CA," USGS, U.S. Department of the Interior; Abrams, "Salton Sea communities"; Luke Reidenbach, "A County-by-County Look at Poverty in California," California Budget & Policy Center, January 8, 2014, accessed February 6, 2019, https://calbudgetcenter.org/blog/a-county-by-county-look-at-poverty-in-california/.

Perhaps the most striking example of the poverty and decreasing economic potential of the region is the squatters' community of Slab City. Slab City emerged on the eastern shore of the Sea in the abandoned military facility of Camp Dunlap. Camp Dunlap was completely abandoned after World War II ended, and the 650 acres of unused military grounds became home to thousands of squatters. This "renegade desert community"[608] can host up to ten thousand people, who live there in trailers and tents. Thanks to the artistic and hippie flair of Slab City, the spot has become a popular tourist destination. Numerous cabins and trailers in Slab City are listed on the hospitality service Airbnb, while at the same time, the area is affected by extremely high crime rates.[609]

Those who come to the Sea to find the site where the United States Navy and the Sandia Corporation conducted military tests will not be able to reach it, or even to find it. The site, closed in 1961, was taken over by the NAF El Centro, which used it as a marine training site and seal training ground. In addition, parachute tests for the space program continued there until the 1970s. In the 1980s and 90s, highly-specialized units of the U.S. Army used the facilities as a munitions training site, most notably for the Gulf War warfare tests. During those trainings, the ballistic exercises destroyed most of the military buildings. Today, the facilities are buried under sand dunes and not accessible without a special car. The U.S. Army Corps of Engineers and the U.S. Navy Department, in charge of managing the remains of the site, have placed numerous signs in the area warning of unexploded bombs buried in the sand.[610]

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[608] Ruth Fowler, "Slab City: Inside California's Renegade Desert Community," *The Independent (UK)*, October 12, 2017, accessed January 28, 2019, https://www.independent.co.uk/travel/americas/slab-city-california-desert-community-salvation-mountain-where-how-to-visit-sonoran-desert-coachella-a7994431.html.
[609] Fowler, "Slab City."
[610] "Sandia Laboratory Salton Sea Base, Imperial County," Energy Employees Claimant Assistance Project (EECAP website), accessed January 4, 2019, http://www.eecap.org/Covered_Facilities/California /Sandia_Salton.htm; Bremner, "Salton Sea Test Base."

But the Salton Sea Test Base is not the only place that became deserted. The once luxurious Holly House Motel was rebuilt as a casino by a private investor. After a few years, however, the business failed, and the investor abandoned the building, which soon burned down. Dozens of marinas and buildings, once filled with leisure seekers, were flooded during the rising elevation crisis of the 1970s. For years, a motel and a clubhouse remained submerged on the eastern shore of the Sea, and the anglers who passed by referred to it as "Sunken City." The North Shore Yacht Club has maintained some of its livelihood as it has been renovated and now serves as a local community center.[611]

But the North Shore lots sold by Ray Ryan have hardly any inhabitants. The property value of lots decreased dramatically in all shore communities of the Salton Sea after the elevation crisis and the devastation caused by the tropical storms. In 1979, Carol Hines a resident of Brawley visited the Salton Sea, encouraged by a land developer to buy land. He remembered the encounter with the Sea: "I looked around at the dead birds and the dead fish and said, 'I'm kind of sorry I'm even visiting.'"[612] Both in North Shore and in Salton City, the solitary street signs and electricity poles still exist, creating an odd landscape. Salton City became entirely abandoned by 1980.[613]

Helen's Beach House was never to host parties again. After her property was destroyed, she rented a bar north of Desert Shores, but it burned in 1979. Helen never read the *California Magazine* article "The Old Woman and the Sea," where she and the Salton Sea were so prominently featured. Offended by the title, she refused to read it. She passed away in 1994.[614]

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[611] Kennedy and Linehan, *Queen of the Salton Sea*, 128, 141-143; Mathews, "The Old Woman and the Sea."
[612] David Streitfeld, "Salton City: A Land of Dreams and Dead Fish," *Los Angeles Times*, online collections, July 1, 2007.
[613] Streitfeld, "Salton City."
[614] Kennedy and Linehan, *Queen of the Salton Sea*, 179-182.

FIGURE 8.3. Light poles and street signs left behind at Salton City where most of the lots are available for sale, 2018. (Photograph by author)

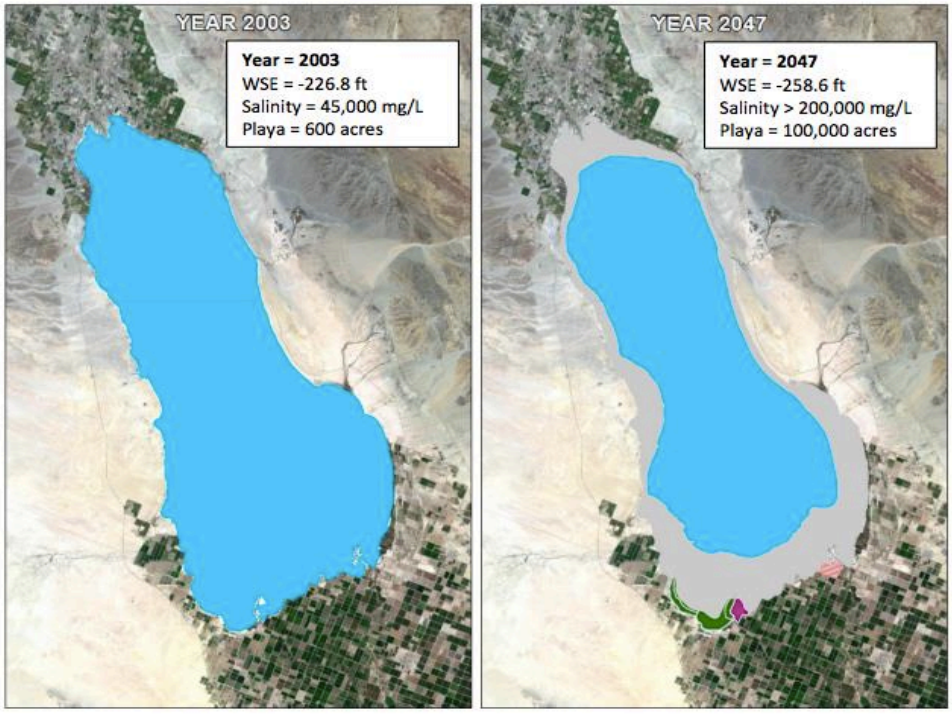

Figure 28. Initial (2003) and Projected (2047) Salton Sea Conditions under the Future No Action Simulation

FIGURE 8.4. An assessment of the future dimensions of the Salton Sea if the current inflow remains and no restoration project is undertaken. By 2047, the salinity could increase to 200 ppt and the size of playa will increase by 170 times. (*Salton Sea Hydrological Modeling and Results*, Report prepared for the Imperial Irrigation District by ch2m /Jacobs Engineering Group, October 2018, Figure 28, 44, https://www.iid.com/home/showdocument?id=17299.)

FIGURE 8.5. Close to Desert Shores, a vast surface of playa is left behind by the evaporating Sea, October 2018. (Photograph by author)

While the leisure and warfare industry and the real estate business vanished from the Salton Sea, agriculture is, as ever, so strong. The Imperial Valley emerged as the leading producer of fresh fruit and vegetables in the first decade of the twentieth century. In 1910, 3,500 farms were under cultivation in the Imperial Valley, spreading over 350,000 acres of land, while 100,000 acres were cultivated in the Coachella Valley. By 1980, the farmland in the Imperial Valley increased to over 600,000 acres and the acreage has remained steady ever since. The acreage of the Coachella Valley has remained considerably lower, with 60,000 acres under cultivation today.[615]

The billion-dollar farming industry of Southern California has been feeding the Salton Sea with agricultural runoff for over a century. Even today, the Sea swallows the drain water where minerals, fertilizers, pesticides and heavy metals accumulate. Suggestions to relieve the Sea's highly alkaline fluid with a supply of fresh water have persisted: The Quantification Settlement Agreement of 2003 has secured California water supplies for the next four decades and provided a plan for the restoration of the environmentally sensitive Sea. The controversial agreement between the Imperial Irrigation District, the San Diego County Water Authority, and other local water agencies was an attempt to regulate the fragile irrigation system. One of its main goals was to provide a possibility for the State of California to restore the Salton Sea with fresh water. However, the agreement has resulted in little action as it was followed with a series of protests and legal battles carried out by environmental groups and local farmers.[616]

The 1990s brought a series of worrying wildlife die-offs, and the Sea achieved considerable attention from the scientific community, which determined the need for immediate action in this troubled ecosystem. Most notably, Redlands University and the Pacific Institute carried out large-scale interdisciplinary studies of the Sea. But the ongoing lack of funding has

[615] Redlands Institute, *Salton Sea Atlas*, 32.
[616] Redlands Institute, *Salton Sea Atlas*, 39; Friend, "Avian Disease at the Salton Sea."

rendered the restoration plans unfeasible. It is certain that implementing a restoration plan would bring the Sea out of its imbalance. [617]

Marc Reisner observes that the American West has been utterly slow in recognizing the faulty mechanisms and the voices that call for radical reform. At the same time, he states hopefully that "at some point, [...] the American West will go back to the future rather than forward to the past."[618] These tensions between past and future in the American West to which Reisner points are reflected in the ecological crisis of the Salton Sea. Will the patrons of the Sea look to voices of radical caution, like John Wesley Powell who viewed the future through the lens of sustainability? Or, will they move forward by ignoring the lessons of nature, recreating their mistakes of the past?

FIGURE 8.6. The Salton Sea, May 2018. In the middle of the picture, a foraging American white pelican is landing on the Sea's surface. (Photograph by Sasha Gora)

[617] "Issues We Work On: Salton Sea," Pacific Institute, accessed January 27, 2019, https://pacinst.org/issues/sustainable-water-management-local-to-global/salton-sea/.
[618] Reisner, *Cadillac Desert*, 516-518.

Bibliography

Abrams, Zara. "Salton Sea communities 'no longer a good place to live' for those with respiratory issues." *Desert Sun* (website). October 26, 2017. Accessed February 1, 2019. https://eu.desertsun.com/story/salton-sea/2017/10/25/salton-sea-communities-no-longer-good-place-live-those-respiratory-issues/769970001/.

Ackerman, Diane. *A Natural History of the Senses*. New York, NY: Vintage Books, 1991.

Ackerman, Jennifer. *The Genius of Birds*. London: Corsair/Penguin Press, 2016.

Adler, Robert W. *Restoring Colorado River Ecosystems: A Troubled Sense of Immensity*. Washington, DC: Island Press, 2007.

Agapakis, Christina. "Bacterial Encounters at the Salton Sea." *Scientific American* (online). May 28, 2013. Accessed February 14, 2019. https://blogs.scientificamerican.com /oscillator/bacterial-encounters-at-the-salton-sea/.

Aldo Leopold Foundation (website). "A Sand County Almanac." Accessed February 20 and March 13, 2018. https://www.aldoleopold.org/about/aldo-leopold/sand-county-almanac/.

American Society of Civil Engineers. "James Dix Schuyler." Accessed September 21, 2015. http://www.asce.org/uploadedFiles/About_Civil_Engineering /Engineering_Projects/Sweetwater%20Bio-Sec5.pdf.

Anderson, Karl. *The Salton Sea (Postcard History Edition)*. Mount Pleasant, CA: Arcadia Publishing, 2011.

Andrés, Benny J. and Sterling Evans. *Power and Control in the Imperial Valley: Nature, Agribusiness, and Workers on the California Borderland, 1900-1940*. College Station, TX: Texas A&M University Press, 2016.

Balcombe, Jonathan P. *What a Fish Knows: The Inner Lives of Our Underwater Cousins*. New York, NY: Scientific American/Farrar, Straus, and Giroux, 2017.

Barnum, Douglas A., John F. Elder, Doyle Stephens, and Milton Friend. *The Salton Sea: Developments in Hydrobiology*. New York, NY: Springer Publishing, 2002.

Beal, Carl H. "The Earthquake in the Imperial Valley, California, June 22, 1915." *Bulletin of the Seismological Society of America* 5, no. 3 (September 1915): 130-149. https://pubs.geoscienceworld.org/bssa/issue/5/3.

Billington, David P. and Donald C. Jackson. *Big Dams of the New Deal Era: A Confluence of Engineering and Politics*. Norman, OK: University of Oklahoma Press, 2017.

Blake, Kevin. *Salton Sea Resort: Death in the Desert*. New York, NY: Bearport Publishing, 2015.

Blaney, Harry F. "Evaporation from and Stabilization of Salton Sea Water Surface." *American Geophysical Union* 36, no. 4 (1955). https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/TR036i004p00633.

Botkin, B. A. and Alvin F. Harlow, eds., *A Treasury of Railroad Folklore: The Stories, Tall Tales, Traditions, Ballads and Songs of the American Railroad Man*. New York, NY: Crown Publishers, 1953. See "Harriman and the Runaway River."

Boulder Canyon Project Act of 1928, 70th Cong. US Code § 642, December 21, 1928.

Bowers, Janice E. "A Debt to the Future: Achievement of the Desert Laboratory, Tumamoc Hill, Tucson, Arizona." *Desert Plants* 26, no. 1 (2010): 25-40. https:// repository.arizona.edu/bitstream/ handle/10150/556672/dp_26_01-025-040.pdf?sequence=1&isAllowed=y.

Brannon, Melvin A. *The Salton Sea: The Action of Salton Sea Water on Vegetable Tissues*. Chicago, IL: Kessinger Publishing, 1914. https://catalog.hathitrust.org /Record/005566762.

Bremner, Jim. "Salton Sea Test Base." DesertUSA (website). Accessed March 16, 2018. https://www.desertusa.com/salton/salton-sea-test-base.html.

Brown, John S. *Water-Supply Paper 490 A: Routes to Desert Watering Places in the Salton Sea Region, California*. Washington, D.C.: Government Printing Office, 1920.

———. *Water-Supply Paper 497: The Salton Sea Region, California. A Geographic, Geologic, and Hydrologic Reconnaissance with a Guide to Desert Watering Places*. Washington, D.C.: Government Printing Office, 1923.

Calexico (CA) Chronicle. "Valley May Have Salton Yacht Club." May 28, 1930. https://cdnc.ucr.edu.

———. "Fish and Game Commission to Survey Imperial." September 12, 1934. https://cdnc.ucr.edu.

———. "Thousands Attracted to Races." February 10, 1936. https:// cdnc.ucr.edu.

———. "All American Canal Power Is Helping to Win the War." June 18, 1942. https://cdnc.ucr.edu.

———. "Outdoors - Play Days Ahead." June 27, 1963. https://cdnc.ucr.edu.

———. "Salton Sea Yields 20 Pound Corvina." June 17, 1965. https://cdnc.ucr.edu.

———. “23 Pound Corvina Caught by Woman.” October 14, 1965. https://cdnc.ucr.edu.
———. “Salton Sea’s Perilous Rise Come to Stop - Elevation Remains.” June 14, 1973. https://cdnc.ucr.edu.
———. “Elevation Salton Sea Unchanged.” June 21, 1973. https://cdnc.ucr.edu.
California Council on Science and Technology (CCST). “Sandia National Laboratories California” in *Federal Labs & Research Centers Benefiting California; 2017 Impact Report for State Leaders*. CCST (website). Accessed May 7, 2018. https://ccst.us/federal/labs-overview/sandia/.
California Department of Parks and Recreation. “Salton Sea State Recreation Area.” Accessed January 14, 2019. http://www.parks.ca.gov/?page_id=639.
California Department of Water Resources. *Geothermal Wastes and the Water Resources of the Salton Sea Area: No.143-7*. Sacramento, Ca: 1970. http://wdl.water.ca.gov/waterdatalibrary/docs/historic/Bulletins/Bulletin_143 Bulletin_143-7__1970.pdf.
California Military Department. “Historic California Posts: Naval Auxiliary Air Station, Salton Sea.” California State Military Museums. Accessed March 7, 2018. http://www.militarymuseum.org /NAASSaltonSea.html.
California State Government, Milton Marks “Little Hoover” Commission on California State Government Organization and Economy. *Averting Disaster: Action Now for the Salton Sea*, *Report #228*. Sacramento, California, September 2015. http://op.bna.com.s3.amazonaws.com/env.nsf/r%3FOpen%3Dsbra-a2ss8x.
California State Water Resources Control Board. “About the Water Boards.” Accessed June 5, 2018. https://www.waterboards.ca.gov/board_reference /2009spring/tab13/about_the_waterboards.pdf.
———. “History Of The Water Boards.” Water Board’s Structure. Revised January 30, 2018. Accessed June 5, 2018. https://www.waterboards.ca.gov/about_us/water_boards_structure/history_water_pollution.html.
Carson, Rachel. *The Edge of the Sea*. New York, NY: Mariner Books, 1998.
———. *Under the Sea-Wind*. New York, NY: Penguin Books, 1996.
Chase, Joseph Smeaton. *California Desert Trails*. New York, NY: Houghton Mifflin Company, 1919. https://archive.org/details/californiadeser01chasgoog.

ch2m/Jacobs Engineering Group. *Salton Sea Hydrological Modeling and Results*. Report prepared for the Imperial Irrigation District. October 2018. https://www.iid.com/home/showdocument?id=17299.
Cioc, Mark. *The Rhine: An Eco-Biography, 1815-2000*. Seattle, WA: University of Washington Press, 2002.
Coachella Valley County Water District. *Coachella Valley's Golden Years*. rev. ed. Indio, CA: Coachella Valley County Water District, 1978. https://www.cvwd.org/. DocumentCenter View/812/Coachella-Valleys-Golden-Years-PDF?bidId=.
Coletta, Paolo E. *United States Navy and Marine Corps Bases, Domestic*. Westport, CT: Greenwood, 1985.
Colley, Charles C. *The Century of Robert H. Forbes*. Tempe, AZ: Arizona Historical Society, 1977.
Colorado River Basin Regional Water Pollution Control Board. *Report on the Conservation of the Beneficial Water Uses of Salton Sea in California*. By Arthur Swajian, Executive Director. Palm Desert, CA, December 12, 1963. http://www.sci.sdsu.edu/salton/ConsBenH2OusesSS.html).
Coronado (CA) Journal. "Duck Hunters Fail to Bag Limits in Valley." October 11, 1924. https://cdnc.ucr.edu.
———. "California News Review." August 12, 1931. https://cdnc.ucr.edu.
———. "Graphic Air View Shows Progress on Hoover Dam." May 18, 1932. https://cdnc.ucr.edu.
Cory, Harry Thomas. *Report on the Financial Condition of the California Development Company and its Subsidiary Company, La Sociedad de Riego y Terrenos de la Baja California*. Washington DC: Government Printing Office, 1906.
Cory, Harry Thomas and William Phipps Bake. *The Imperial Valley and the Salton Sink*. San Francisco, CA: J.J. Newbegin, 1915. https://archive.org/details /imperialvalleya00blakgoog/page/n8.
Culver, Lawrence. *The Frontier of Leisure. Southern California and the Shaping of Modern America*. New York, NY: Oxford University Press, 2012.
Daily Public Ledger (San Francisco, CA). "Nature's Packing Plant." April 19, 1906. https:// cdnc.ucr.edu.
Daniel, Cletus E. *Bitter Harvest, a History of California Farmworkers, 1870-1941*. Berkeley, CA: University of California Press, 1982.
Deal, Laura. "Hazardous Time-Scapes: How to Make Sense of Toxic Landscapes from Multiple Timed, Spaced, And Embodied Perspectives?" Seeing the Woods, A Blog by the Rachel Carson Center. January 24, 2018. Accessed February 15, 2019. https://seeingthewoods.org/2018/01/24 /hazardous-time-scapes-how-to-make-sense-of-toxic-landscapes-from-multiple-timed-spaced-and-embodied-perspectives/.

DeBuys, William. *Salt Dreams: Land & Water in Low-Down California*. Albuquerque, AZ: University of New Mexico Press, 1999.
Desert Sun (Palm Springs, CA). "All Is Quiet in the Strike Area of Imperial Valley." March 8, 1935. https://cdnc.ucr.edu.
———. "On the Social Merry-Go-Round with Evelyn." December 30, 1938. https://cdnc.ucr.edu.
———. "Sailors from Salton Sea to Be Feted Here." October 22, 1943. https://cdnc.ucr.edu.
———. "Yo Ho, Boys, and A Barrel of Fun! It Was Navy Day." October 29, 1943. https://cdnc.ucr.edu.
———. "Desert Museum Notes - Desert Barnacles Found." December 3, 1946. https://cdnc.ucr.edu.
———. "Photos Taken." December 20, 1946. https://cdnc.ucr.edu.
———. "Odorifous." August 8, 1947. https://cdnc.ucr.edu.
———. "Atomic Designs Being Tested at Salton Sea Base." July 8, 1949. https://cdnc.ucr.edu.
———. "Sandia Corporation Now Accepting Applications." March 9, 1951. https://cdnc.ucr.edu.
———. "Water Ski Race Program April 3." March 28, 1955. https://cdnc.ucr.edu.
———. "Water Ski Meet at Salton Sea." March 31, 1955. https://cdnc.ucr.edu.
———. "Desert Shores Plans Regatta." March 22, 1956. https://cdnc.ucr.edu.
———. "Salton Sea Trailer Park Permit Action Again Delayed." September 25, 1958. https://cdnc.ucr.edu.
———. "Ordinance Ordered Board Starts Action on Salton Sea Sewage." April 29, 1959. https://cdnc.ucr.edu.
———. "Monday Meeting Board to Revive Sewage Problem." May 16, 1959. https://cdnc.ucr.edu.
———. "Nordland in Realtor Talk." January 19, 1962. https://cdnc.ucr.edu.
———. "North Shore Beach - How Is a City Born?" April 13, 1962. https://cdnc.ucr.edu.
———. "Grilled Fish for Dilly of a Dinner." October 15, 1962. https://cdnc.ucr.edu.
———. "Fishing at Salton Sea on Increase." October 30, 1962. https://cdnc.ucr.edu.
———. "Hopes for More Use in Salton Sea Raised." December 5, 1962. https://cdnc.ucr.edu.
———. "A Big Catch." June 4, 1963. https://cdnc.ucr.edu.
———. "Trailer Park Gets OK." July 19, 1963. https://cdnc.ucr.edu.
———. "She Loves to Cook Corvina Dishes - Ala Italy." August 29, 1963. https://cdnc.ucr.edu.

———. “Report from the Salton Sea: Corvina Eating Sargo Instead of Bait.” July 18, 1964. https://cdnc.ucr.edu.
———. “New Sea Marina Okayed.” January 1, 1965. https://cdnc.ucr.edu.
———. “Salton Sea Fish Report - Corvina Seek Smaller Schools.” February 23, 1966. https://cdnc.ucr.edu.
———. “There Are Several Ways to Find Fish.” March 31, 1966. https://cdnc.ucr.edu.
———. “A Mess of Sargo.” April 5, 1966. https://cdnc.ucr.edu.
———. “Population Boom at Salton Sea.” September 8, 1966. https://cdnc.ucr.edu.
———.“Desert is Great for Sea Gulls.” October 13, 1966. https://cdnc.ucr.edu.
———. “500 Miler Boat Race at Salton Sea.” November 8, 1966. https://cdnc.ucr.edu.
———. “Salton City Gets Second Manufacturer.” March 9, 1967. https://cdnc.ucr.edu.
———. “Desert Sportsmen Have It Made.” December 1, 1967. https://cdnc.ucr.edu.
———. “Salton Sea’s Red Tide Gone.” March 7, 1968. https://cdnc.ucr.edu.
———. “Nationwide Messages Note Loss of Pettis.” February 15, 1975. https://cdnc.ucr.edu.
———. “Sea Level Affects Property Owners.” May 1, 1976. https://cdnc.ucr.edu.
———. “$4 Million is Damage Estimate After Worst Storm in 40 Years.” September 11, 1976. https://cdnc.ucr.edu.
———. “Biography of Pettis Finished.” September 19, 1977. https://cdnc.ucr.edu.
———. “Salton Sea reaches Its Highest Level.” April 26, 1984. https://cdnc.ucr.edu.
De Stanley, Mildred. *The Salton Sea – Yesterday and Today*. Los Angeles, CA: Triumph Press, 1966.
Dickenson, Gary H. and Irving E. Vega, Kathryn J. Wahl, Beatrice Oriheula, Veronica Beyley, Eva N. Rodriguez, Richard K. Everett, Joseph Bonaventura, Daniel Rittschoff. “Barnacle cement: a polymerization model based on evolutionary concepts.” *Journal of Experimental Biology* 212 (2009): 3499-3510. Accessed December 2, 2018. http://jeb.biologists.org/content /212/21/3499.
Dill, William A. and Almo J. Cordone. *History and Status of Introduced Fishes in California*, 1871-1996. Sacramento, CA: California Department of Fish and Game, 1997.
Dolnick, Edward. *Down the Great Unknown: John Wesley Powell's 1869 Journey of Discovery and Tragedy Through the Grand Canyon*. New York, NY: HarperCollins, 2002.

Dudle, Stacia. “Agriculture in the Imperial Valley: A Tale of Two Seas.” Agriculture, Economy, History. Salton Sea Sense (website). April 29, 2015. Accessed March 3, 2018. https://saltonseasense.com /2015/04/29/agriculture-in-the-imperial-valley-a-tale-of-two-seas/.

Dunar, Andrew J. and Dennis McBride. *Building Hoover Dam: An Oral History of the Great Depression.* Reno, NV: University of Nevada Press, 2001.

Dunlap, Thomas R. *DDT: Scientists, Citizens, and Public Policy*. Princeton, CA: Princeton University Press, 1981. https://www.jstor.org/stable/j.ctt7zvcnd.

Dunn, Halbert L. *Vital Statistics of the United States, 1957 - Volume 1*. Washington, D.C.: Government Printing Office, 1959. Accessed on November 24, 2018. https://www.cdc.gov/nchs/data /vsus/VSUS_1957_1.pdf.

Energy Employees Claimant Assistance Project (EECAP, website). “Sandia Laboratory Salton Sea Base, Imperial County.” Accessed April 14, 2018 and January 4, 2019. http://www.eecap.org/Covered_Facilities/California /Sandia_Salton.htm.

Evermann, Barton Warren. “Fishes of the Salton Sea.” *Copeia,* no. 34 (August 1916): 61-63. https://www.jstor.org/stable/1436917.

Farmer, Jared. *Trees in Paradise: A California History*. New York, NY: Norton, 2013.

Farr, Finis C. *The History of Imperial County, California*. Berkeley, CA: Elms and Frank, 1918. https://archive.org/details/historyofimperia00farr.

Forbes, Robert H. “The Gasoline Torch Treatment of Date Palm Scales.” *Journal of Economic Entomology* 6, no. 5 (October 1913): 415-416. https://doi.org/10.1093 /jee/6.5.415.

Fowler, Ruth. “Slab City: Inside California’s Renegade Desert Community.” *The Independent (UK)*. October 12, 2017. Accessed January 28, 2019. https://www.independent.co.uk/travel/americas/slab-city-california-desert-community-salvation-mountain-where-how-to-visit-sonoran-desert-coachella-a7994431.html.

Friend, Milton. “Avian Disease at the Salton Sea,” 2000, 1. file:///C:/Users/Owner/Downloads/friend_disease_2000symposium .pdf.

———. “The Salton Sea—What Is the Big Deal?” Paper presented at the U.S. Geological Survey, Salton Sea Science Subcommittee, National Headquarters, Reston, Va., 1999.

Furman, Necah Stewart. *Sandia National Laboratories: The Postwar Decade*. Albuquerque, NM: University of New Mexico Press, 1990.

Gavin, Christy and Garth Milam. “A ‘Flat Tired People’: The Health of California's Okies During the 1930s.” California Odyssey: Dust Bowl

Migration Archives, Special Topic Series. Bakersfield, CA: University of California, January 12, 2017. http://hdl.handle.net/10211.3/183557.
Geisseler, Daniel and William R. Horwath. "Cotton Production in California." Within the project *Assessment of Plant Fertility and Fertilizer Requirements for Agricultural Crops in California*. University of California, Davis, June 2016, 1-4. https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Cotton_Production_CA.pdf.
Gleason, Sterling. "Digging the World's Biggest Ditch." *Popular Science* 129, no. 4 (October 1936): 11-13.
Goldsmith, Martin. "Geothermal Development and the Salton Sea." *Energy* 1, no. 4 (1976).
Goolsby, Denise. "Coachella Valley has history of strong storms." Desert Sun (website). September 14, 2014. Accessed September 13, 2018. https://eu.desertsun.com/story/news/local/2014/09/20/flooding-in-the-coachella-valley/15832857/.
———. "Military: Salton Sea was used as 'Wake Island' movie set." *Desert Sun* (website). August 22, 2015. Accessed May 5, 2018. https://eu.desertsun.com/story/news/2015/08/21/military-salton-sea-part/32128649/.
———. "Off-Beat Salton Sea Stories." *Desert Sun* (website). May 14, 2015. Accessed May 17 and October 28, 2018. https://eu.desertsun.com/story/news/2015/05/14/ salton-sea-alligator-islands-graves/27331021/.
Greetings from the Salton Sea (website). "Salton Sea Test Base." Accessed March 3, 2018. http://www.greetingsfromsaltonsea.com/military.html.
———."Tilapia." Explore the Salton Sea, Accessed November 2, 2019. http://www.greetingsfromsaltonsea.com/tilapia.html.
Grinnell, Joseph. "Birds of a Voyage on Salton Sea." *The Condor* 10, no. 5 (September-October 1908): 188-191. https://sora.unm.edu/sites/default/files/ journals/condor/ v010n05/p0185-p0191.pdf.
Harriman, E. H. Letter to John Muir. February 20, 1907. John Muir Papers. Holt-Atherton Special Collections, University of the Pacific Library, https://www.pacific.edu/university-libraries/find/holt-atherton-special-collections/john-muir-papers.html.
Healdsburg (CA) Enterprise. "Peculiar Mud Geysers." October 30, 1920. https:// cdnc.ucr.edu.
———. "Duck Season Is in the Offing." September 28, 1929. https://cdnc.ucr.edu.
———. "Of Interest to All Sportsmen." October 5, 1929. https://cdnc.ucr.edu.

———. “Violence Flares in Tense Imperial Valley Strike.” February 20, 1935. https://cdnc.ucr.edu.
Healdsburg (Ca) Tribune, Enterprise and Scimitar. “The Voice of Filmland.” April 23, 1942. https://cdnc.ucr.edu.
Hely, Allen G., G. H. Hughes and Burdge Irelan. *Geological Survey Professional Paper 486-C. Hydrologic Regimen of Salton Sea, California*. Washington, D.C.: Government Printing Office, 1966. https://pubs.usgs.gov/pp/0486c/report.pdf.
Hiltzik, Michael. *Colossus: The Turbulent, Thrilling Saga of the Building of Hoover Dam*. New York, NY: Free Press, 2010.
———. “The False Promise of Hoover Dam.” *Los Angeles Times*, online Collections. July 5, 2010. Accessed on March 14, 2018. http://articles.latimes.com/2010 /jul/05/opinion/la-oe-hiltzik-hoover-dam-20100705/2.
Holly Corporation. *Miracle in the Desert and the Salton Sea*. A 1960s promotional film, available as YouTube video. https://www.youtube.com/watch?v=M__eyylXfK4.
Horvitz, Steve. “A Bit of Eden.” Salton Sea State Recreation Area, CA, 1998.
Howe, Edgar F. and Wilbur Jay Hall. *The Story of the First Decade in Imperial Valley, California*. Imperial, CA: Edgar F. Howe & Sons, 1910. https://archive.org /details/storyoffirstdeca00howe.
Hughes, Jonathan. *The Vital Few: The Entrepreneur and American Economic Progress*. New York, NY: Oxford University Press, 1986.
Hundley, Norris. *The Great Thirst: Californians and Water, 1770s-1990s*. Berkeley, CA: University of California Press, 1992.
Imperial Valley Press (El Centro, CA). “The Damages.” December 1, 1906. https:// cdnc.ucr.edu.
———. “Will Look to Congress.” December 22, 1906. https://cdnc.ucr.edu.
———. “The President’s Message: Message to Congress by President Roosevelt Regarding Situation on the Lower Colorado.” January 19, 1907. https://cdnc.ucr.edu.
———. “Desert Fantasies.” March 16, 1907. https:// cdnc.ucr.edu.
———. “Dates in California.” October 19, 1907. https://cdnc.ucr.edu.
———. “Recession of Salton Sea.” December 7, 1907. https://cdnc.ucr.edu.
———. “Salton Sea Facts.” December 28, 1907. https://cdnc.ucr.edu.
———. “Cruise of the Chuckawalla.” February 1, 1908. https://cdnc.ucr.edu.
———. “Another Date Experiment.” April 25, 1908. https://cdnc.ucr.edu.
———. “Main Street Scott’s Grocery in El Centro.” Advertisement. June 13, 1908. https://cdnc.ucr.edu.
———. “Water Company Affairs.” June 13, 1908. https://cdnc.ucr.edu.
———. “Irwin’s Fruit Stand” and “Cantaloupe Trucks.” Advertisements. June 20, 1908. https://cdnc.ucr.edu.
———. “Metamorphosis of the Desert.” June 20, 1908. https://cdnc.ucr.edu.

———. “No Subsidence of the Salton Sea.” June 20, 1908. https://cdnc.ucr.edu.
———. “Evaporation from the Salton Sea.” September 12, 1908. https://cdnc.ucr.edu.
———. “Imperial Valley Cotton Fields.” October 31, 1908. https://cdnc.ucr.edu.
———. “Valley Gunners and Valley Ducks.” January 2, 1909. https://cdnc.ucr.edu.
———. “Eight Years Old.” April 10, 1909. https:// cdnc.ucr.edu.
———. “Why Land was Withdrawn.” May 1, 1909. https://cdnc.ucr.edu.
———. “Freaky Colorado’s Erratic Course.” July 17, 1909. https://cdnc.ucr.edu.
———. “Southern Pacific Wins.” November 20, 1909. https://cdnc.ucr.edu.
———. “Appeal to Congress for Square Deal.” February 5, 1910. https://cdnc.ucr.edu.
———. “Salton Sea Alligators.” July 9, 1910. https:// cdnc.ucr.edu.
———. “Cruise on Salton Sea.” September 17, 1910. https://cdnc.ucr.edu.
———. “Imperial Valley Dates.” October 1, 1910. https://cdnc.ucr.edu.
———. “Ripe Deglet Noors.” October 8, 1910. https://cdnc.ucr.edu.
———. “Five Foot Minnows.” October 22, 1910. https://cdnc.ucr.edu.
———. “Inspection of Canal System by Receiver and Engineers.” November 19, 1910. https://cdnc.ucr.edu.
———. “Evaporation Test Ended.” November 26, 1910. https://cdnc.ucr.edu.
———. “Dates Doing Well.” December 17, 1910. https://cdnc.ucr.edu.
———. “Theory and Fact about Salton Sea.” December 17, 1910. https://cdnc.ucr.edu.
———. “Contraband Chinese.” January 28, 1911. https://cdnc.ucr.edu.
James, George Wharton. *The Wonders of the Colorado Desert.* Boston, MA.: Little, Brown, and Company, 1906. https://archive.org/details /wondersofcolorad01jame/page/n11.
Janick, Jules. "Fruits of the Bibles." *HortScience* 42, no. 5 (August 2007): 1072-1076. https://hort.purdue.edu/newcrop/janick-papers/fruits-bible.pdf.
Johnson, Leland. *Sandia National Laboratories: A History of Exceptional Service in The National Interest.* Albuquerque, NM: Sandia National Laboratories, 1997.
Johnson, Michael L. *Hunger for the Wild: America’s Obsession with the Untamed West.* Lawrence, KS: University Press of Kansas, 2007.
Kennan, George. *The Salton Sea. An Account of Harriman's Fight with the Colorado River.* Imperial Valley, CA: Macmillan, 1917. https://archive.org/details /saltonseaanacco00kenngoog.
Kennedy, Donna Burns and William Linehan. *Queen of the Salton Sea. Helen Burns and Me.* Morongo Valley, CA: Sagebrush Press, 2018.

Klein, Maury Klein. *The Life and Legend of E. H. Harriman*. Chapel Hill, NC: University of North Carolina Press, 2000.
Laflin, Pat. *The Salton Sea: California's Overlooked Treasure*. Indio, CA: The Periscope, Coachella Valley Historical Society, 1995.
La Habra (CA) Star. "Pelican Routes Bathers with Dive-Bomb Tactics." October 10, 1941. https:// cdnc.ucr.edu.
———. "Great Outdoors: Winds Kill Fish." March 1, 1963. https://cdnc.ucr.edu.
———. "Great Outdoors." July 5, 1963. https://cdnc.ucr.edu.
Lekan, Thomas. "Lekan on Cioc, 'The Rhine: An Eco-Biography, 1815-2000.'" H-German, H-Net Reviews. July 2003. Accessed January 14, 2019. https://networks.h-net.org/node/35008/reviews/43707 /lekan-cioc-rhine-eco-biography-1815-2000.
Leopold, Aldo. *A Sand County Almanac. With Other Essays on Conservation from Round River*. New York, NY: Oxford University Press, 1966.
Linsdale, Jean M. "In Memoriam: Joseph Grinnell." *The Auk* 59, no. 2 (April 1942): 269-285. https://www.jstor.org/stable/4079557.
Lompoc (CA) Journal. "According to Government Experts." February 5, 1910. https:// cdnc.ucr.edu.
———. "Imperial Valley Flooded." May 27, 1911. https://cdnc.ucr.edu.
Los Angeles Herald. "Salton Sea is Still Rising." October 30, 1905. https://cdnc.ucr.edu.
———. "Government Should Help." December 12, 1906. https://cdnc.ucr.edu.
———. "Shuts Off Colorado's Break." February 12, 1907. https://cdnc.ucr.edu.
———. "Waves of Salton Sea Beat Over S.P. Tracks." February 27, 1907. https://cdnc.ucr.edu.
———. "Railroad News." December 18, 1907. https://cdnc.ucr.edu.
———. "Beach Fishing Cannot Hold a Candle to This." June 1, 1908. https://cdnc.ucr.edu.
———. "Held on Charge of Smuggling Chinese." September 24, 1908. https://cdnc.ucr.edu.
———. "Never Eat Unwashed Fruit." November 27, 1910. https://cdnc.ucr.edu.
———. "Fish Dynamited." June 7, 1912. https://cdnc.ucr.edu.
———. "Globe A1 Flour." Advertisement. August 14, 1913. https://cdnc.ucr.edu.
———. "Smuggler Risks 2 Years in Jail to Make $70." July 23, 1914. https://cdnc.ucr.edu.
———. "Damages to Canal Only $3000." June 24, 1915. https://cdnc.ucr.edu.

———. “Two Chinese Are Held as Contraband.” August 2, 1915. https://cdnc.ucr.edu.
———. “Engineers Working to Prevent Flood of Colorado River.” June 26, 1917. https://cdnc.ucr.edu.
———. “Now for the Pickles.” August 10, 1918. https://cdnc.ucr.edu.
———. “Syndicate to Raise Dates in California.” July 18, 1919. https://cdnc.ucr.edu.
———. “Tested Recipes for Tasty Dishes.” September 19, 1919. https://cdnc.ucr.edu.
———. “Making a Garden out of a Desert.” February 20, 1920. https://cdnc.ucr.edu.
———. “L.A. Hunters off for Moreno Dam.” December 11, 1920. https://cdnc.ucr.edu.
———. “Find Two Smuggled Chinese Near Death.” May 28, 1921. https://cdnc.ucr.edu.
———. “To Place 102 Aliens on Armored Train for Deportation.” July 22, 1921. https://cdnc.ucr.edu.
———. “Famous Dodge Climbs Over Rocks to Top of Volcano.” August 20, 1921. https://cdnc.ucr.edu.
———. “Believe Huge Animal Is Elephant.” September 23, 1921. https://cdnc.ucr.edu.
———. “Big Increase in Lettuce Growing.” October 15, 1921. https://cdnc.ucr.edu.
———. “Two Local Goose Hunters Bag Limit in Record Time.” November 26, 1921. https://cdnc.ucr.edu.
Los Angeles Times. “Divers Examine Wreck of Plane in Salton Sea.” June 15, 1999. https://www. latimes.com/lat-archives/.
———. “Pilot launched Atomic Age over Hiroshima.” November 2, 2007. https://www. latimes.com/lat-archives/.
Lost America (website). “The Salton Sea.” Accessed February 4, 2018. http://lostamerica.com/photo-items/the-salton-sea/#.
MacDougal, Daniel Trembly. *The Salton Sea: A Study of the Geography, the Geology, the Floristics, and the Ecology of a Desert Basin*. Washington, D.C: The Carnegie Institution of Washington, 1914. https://archive.org/details saltonseaanaccoookenngoog.
———. “A Decade of the Salton Sea.” *Geographical Review* 3, no. 6 (1917): 457-473. https://www.jstor.org/stable/207690.
Madera (CA) Tribune. “Hint Settlement Imperial Strike.” February 3, 1934. https://cdnc.ucr.edu.
———. “Imperial Fears Strike Rioting.” February 16, 1934. https://cdnc.ucr.edu.
———. “Strike in Imperial Is Fast Crumbling.” February 20, 1934. https://cdnc.ucr.edu.

———. “Imperial Valley’s Lettuce Workers Strike Stalemate.” March 1, 1935. https://cdnc.ucr.edu.
———. “We Had Preview of Army Life, Actor Had Part in Wake Island Film.” March 8, 1943. https://cdnc.ucr.edu.
———. “Probe Mystery Fire in the Salton Sea Area.” October 15, 1951. https://cdnc.ucr.edu.
Marine Corps Gazette. “Production Notes on Picture ‘Wake Island.’” Vol. 26, no.3 (September 1942).
Mariposa (CA) Gazette. “Colorado River Drops into Sink.” September 16, 1911. https:// cdnc.ucr.edu.
———. “Salton Sea Is Disappearing.” November 27, 1920. https://cdnc.ucr.edu.
Mathews, Neal. “The Old Woman and the Sea.” California Magazine, March 1982. http://www.sci.sdsu.edu/salton/TheOldWomanand%20theSea.html.
Maven’s Photoblog. “The mud volcanoes of the Salton Sea.” January 8, 2012. Accessed May 3, 2018. http://mavensphotoblog.com/2012/01/08/the-mud-volcanoes-of-the-salton-sea/.
Merchant, Carolyn, ed. *Major Problems in American Environmental History*. Boston, MA: Houghton Mifflin Company, 1993.
Morning Press (Santa Barbara, CA). “Mud Geysers Sprout Along Salton Sea.” September 28, 1919. https://cdnc.ucr.edu.
Muir, John. *Edward Henry Harriman*. New York, NY: Doubleday, Page and Company, 1912.
NASA Visible Earth. “Algal Bloom in the Salton Sea, California.” October 22, 2003. Accessed June 14, 2018. https://visibleearth.nasa.gov/view.php?id=69143.
New York Times. “Director Beatty Accused of Fraud, Application for Temporary Receivers for the Colorado River Irrigation Company.” September 11, 1894. https://www.nytimes.com/search/.
———. “Nature’s Packing Plant: Salton Sea Freezes Salt Gathers - And There You Are.” March 31, 1906. https://www.nytimes.com/search/.
———. “The Screen: ‘Wake Island,’ a Stirring Tribute to the United States Marines, With Brian Donlevy in the Cast, at the Rivoli Theatre.” September 2, 1942. https://www.nytimes.com/search/.
———. “To Irrigate Arid Lands: Incorporation of the Colorado River Company.” May 13, 1983. https://www.nytimes.com/search/.
Pacific Institute. “Issues We Work On: Salton Sea.” Accessed January 27, 2019. https://pacinst.org/issues/sustainable-water-management-local-to-global/salton-sea/.
Pacific Rural Press (San Francisco). “California Vegetables in Garden and Field.” May 14, 1910. https://cdnc.ucr.edu.
———. “Tasty Salad.” February 1, 1919. https://cdnc.ucr.edu.

———. “Biggest American Irrigation Plan.” March 8, 1919. https://cdnc.ucr.edu.
———. “Timing Early Vegetables.” August 26, 1922. https://cdnc.ucr.edu.
———. “A South African Salad.” November 11, 1922. https://cdnc.ucr.edu.
Patten, Michael A., Guy McCaskie, and Philip Unitt, eds., *Birds of the Salton Sea: Status, Biogeography, and Ecology*. Berkeley, CA: University of California Press, 2004.
Paxton, John R. and William N. Eschmeyer. *Encyclopedia of Fishes*. San Diego, CA: Academic Press, 1998.
Piru (CA) News. “At the Theater.” October 8, 1942. https://cdnc.ucr.edu.
Pollan, Michael. *The Botany of Desire: A Plant’s Eye View of the World*. New York, NY: Random House, 2008.
Powell, James Lawrence. *Dead Pool: Lake Powell, Global Warming, and the Future of Water in the West*. Berkeley, CA: University of California Press, 2010.
Rathbun, Russell. *The Great Wall of China and the Salton Sea: Monuments, Missteps, and the Audacity of Ambition*. Grand Rapids, MI: Eerdmans Publishing, 2017.
Redlands Institute. *Salton Sea Atlas*. Redlands, CA: Esri Press, 2002.
Reidenbach, Luke. “A County-by-County Look at Poverty in California.” California Budget & Policy Center. January 8, 2014. Accessed February 6, 2019. https://calbudgetcenter.org/blog/a-county-by-county-look-at-poverty-in-california/.
Reisner, Marc. *Cadillac Desert: The American West and Its Disappearing Water*. New York, NY: Viking, 1986.
Rice, Virginia E. "The Arizona Agricultural Experiment Station: A History to 1917." *Arizona and the West* 20, no. 2 (Summer 1978): 123-140, https://www.jstor.org /stable/40168703.
Richardson, John, William Swainson, and William Kirby. *Fauna Boreali-Americana: Or the Zoology of the Northern Parts of British America*. London: John Murray, 1829. https://archive.org/details/faunaborealiamer01rich.
Riverside (CA) Daily Press. “More Water Wanted for Salton Sea.” August 11, 1917. https://cdnc.ucr.edu.
———. “Coyotes Are Numerous.” January 29, 1918. https:// cdnc.ucr.edu.
———. “Geysers at Salton Sea.” City and Valley News. June 30, 1919. https://cdnc.ucr.edu.
———. “Mud Volcanoes Dangerous.” City and Valley News. February 6, 1920. https://cdnc.ucr.edu.
———. “Paint Springs at Salton Sea.” City and Valley News. February 24, 1921. https://cdnc.ucr.edu.
———. “Mullet from the Salton Sea.” City and Valley News. June 24, 1921. https://cdnc.ucr.edu.

Rock, Tonie, Kathryn Converse, Carol Meteyer, and Bob McLean. “The Impact of Disease in the American White Pelican.” *Waterbirds: The International Journal of Waterbird Biology* 28 (Special Publication 1, 2005): 87-94. https://www.jstor.org/stable/pdf/4132653.pdf?seq=1#page_scan_tab_contents.

Rockwood, Charles. *Born of the Desert*. Calexico, CA: Calexico Chronicle, 1930.

Romer, Margaret. *A History of Calexic*o. Los Angeles, CA: Historical Society of Southern California, 1922. https://archive.org/details/historyofcalexic00rome/page/n5.

Rondilla, Joanne L., Rudy P. Guevarra Jr. and Paul Spickard. R*ed and Yellow, Black and Brown: Decentering Whiteness in Mixed Race Studies*. New Brunswick, NJ: Rutgers University Press, 2017.

Ross, Arnold and William K. Emerson. *Wonders of Barnacles*. New York, NY: Dodd, Mead & Company, 1974.

Sackman, Douglas C. *Orange Empire: California and The Fruits of Eden*. Berkeley, CA: University of California Press, 2009.

Sacramento (CA) Union. “Is Mexico to Blame?” December 12, 1906. https://cdnc.ucr.edu.

———. “The Colorado River No Longer Pours into Imperial Valley—Salton Sea Will Disappear in About Ten Years.” February 12, 1907. https://cdnc.ucr.edu.

———. “A Delicious Luncheon Salad.” August 15, 1909. https://cdnc.ucr.edu.

———. “Colorado River is again Amuck.” October 23, 1909. https://cdnc.ucr.edu.

———. “Flood Threatens Imperial Valley.” July 2, 1917. https://cdnc.ucr.edu.

———. “2000 Chinese Are Wanted in Imperial Valley.” July 13, 1917. https://cdnc.ucr.edu.

———. “Salton Sea Is Shrinking Fast.” December 2, 1919. https://cdnc.ucr.edu.

San Bernardino County (CA) Sentinel. “Duck Club Will Build New Home.” September 2, 1921. https://cdnc.ucr.edu.

———. “Cantaloupe Crop of Five Million Crates in Imperial Is Seen.” May 10, 1928. https://cdnc.ucr.edu.

———. “Duck Hunters Await Oct. 1.” September 28, 1928. https://cdnc.ucr.edu.

———. “Salton Sea Area to Be Bird Refuge.” December 7, 1930. https://cdnc.ucr.edu.

———. “Fishing and Hunting.” December 14, 1930. https://cdnc.ucr.edu.

———. “Reclamation Bureau’s Engineer Declares Boulder Dam Project Six Months Ahead of Schedule.” April 14, 1931. https://cdnc.ucr.edu.

———. “Today’s Recipes.” August 11, 1933. https://cdnc.ucr.edu.
———. “Arizona, Imperial Valley Will Get River Benefits.” January 13, 1935. https://cdnc.ucr.edu.
———. “Men Must Be Trained for Delicate Jobs.” April 26, 1942. https://cdnc.ucr.edu.
———. “New Speedboat Marks Set at Salton Sea.” October 14, 1942. https://cdnc.ucr.edu.
———. “Seven Dead in Salton Crash.” December 31, 1942. https://cdnc.ucr.edu.
———. “Los Angeles Purchaser Plans New Subdivision.” June 18, 1943. https://cdnc.ucr.edu.
———. “Mrs. Cowan to Visit Family in Sacramento.” December 7, 1943. https://cdnc.ucr.edu.
———. “Navy to Give Rocket Training in Valley.” February 16, 1945. https://cdnc.ucr.edu.
———. “First Details of Atom Base at Salton Sea.” September 14, 1951. https://cdnc.ucr.edu.
———. “Typhoid Threat Faces Mexicali.” January 10, 1955. https://cdnc.ucr.edu.
———. “Cities May Defy State on Salton Sea Order.” December 17, 1957. https://cdnc.ucr.edu.
———. “Salton Sea Survey on Bacteriology To Be Decided Soon.” January 15, 1958. https://cdnc.ucr.edu.
———. “Health Officials Say Salton Sea Strip Unfit for Swimming.” March 14, 1959. https://cdnc.ucr.edu.
———. “Sewage Plants.” April 15, 1960. https://cdnc.ucr.edu.
———.“Mothers Stage Special Event at Salton Sea.” May 12, 1960. https://cdnc.ucr.edu.
———. “AEC Will Dispose of Test Facility at Salton Sea.” May 25, 1961. https://cdnc.ucr.edu.
———. “U.S.-Mexico Study of Pollution in Salton Sea Urged.” February 20, 1962. https://cdnc.ucr.edu.
———. “A Fish with a Fight.” April 18, 1963. https://cdnc.ucr.edu.
———. “Wind at the Salton.” April 19, 1963. https://cdnc.ucr.edu.
———. Salton Sea Corvina Fishing.” April 30, 1963. https://cdnc.ucr.edu.
———. “With the Sportsmen: Salton Sea.” April 30, 1963. https://cdnc.ucr.edu.
———. “They Tell Me.” June 6, 1963. https://cdnc.ucr.edu.
———. “Corvina Prizes.” August 23, 1963. https://cdnc.ucr.edu.
———. “Man Who Saved 3 Wins Medal.” April 15, 1964. https://cdnc.ucr.edu.
———. “Puzzling Salton Sea Laps at Shore Homes.” April 21, 1964. https://cdnc.ucr.edu.

———. “Everything Needed for Fishing at Salton Sea.” November 19, 1964. https://cdnc.ucr.edu.
———. “Here It Is.” July 1, 1965. https://cdnc.ucr.edu.
———. “Corvina Fishing Good at Salton Sea.” August 13, 1965. https://cdnc.ucr.edu
———. “Fishing Pier at Salton Sea Planned.” April 29, 1966. https://cdnc.ucr.edu.
———. “Penn Phillips: Developer, Government Official, Charlatan.” July 25, 2015. http://sbcsentinel.com.
Sandia National Laboratories (website).“About Sandia: History.” Accessed March 28, 2018. http://www.sandia.gov/about/history/index.html.
San Francisco Call. “Calexico Menaced by River Flood.” December 9, 1906. https://cdnc.ucr.edu.
———. “Will Wait Until River Falls.” December 12, 1906. https:// cdnc.ucr.edu.
———. “Ask Federal Aid for Imperial: State’s Representatives at Washington to Urge Appropriation by Congress – Must Curb River.” December 14, 1906. https://cdnc.ucr.edu.
———. “Gossip in Railway Circles.” January 25, 1907. https:// cdnc.ucr.edu.
———. “Laguna Dam May Be Destroyed.” January 28, 1907. https:// cdnc.ucr.edu.
———. “Barriers of Rock Washed Away: Colorado River Makes More Work for the Engineers Who Are Fighting Flood.” February 3, 1907. https:// cdnc.ucr.edu.
———. “Colorado River Feared No More.” February 7, 1912. https:// cdnc.ucr.edu.
———. “Soft Drinks That Are Hard to Eat.” August 18, 1912. https://cdnc.ucr.edu.
Santa Cruz (CA) Sentinel. “Our Men in Service.” July 4, 1943. https://cdnc.ucr.edu.
———. “Water Treatment Plant at Salton Sea.” February 8, 1963. https://cdnc.ucr.edu.
———. “Mysterious Salton Sea Rises, Damage Mounts into Millions.” April 22, 1964. https://cdnc.ucr.edu.
Sausalito (CA) News. “Lettuce Soup Is Excellent.” June 30, 1923. https://cdnc.ucr.edu.
Schroeder, Roy A., James G. Setmire and John C. Wolfe. “Trace elements and pesticides in Salton Sea area, California.” Paper presented at the *Conference on Planning Now for Irrigation and Drainage in the 21st Century,* American Society of Civil Engineers, Lincoln, NE, July 18-21, 1988. https://pubs.er.usgs.gov/publication/70014322.
Schuyler, James D. *Report on Irrigation from the Colorado River Below Yuma, Arizona by Pumping Vs. Gravity Canals*. Los Angeles, CA:

James D. Schuyler, Consulting Engineer, 1901. https://calisphere.org/item/ark:/86086/n2df6q21/.
Secretariat of the Stockholm Convention (website). “What Are POPs?” Stockholm Convention. Accessed October 3, 2018. http://chm.pops.int/TheConvention/ThePOPs/tabid/673/Default.aspx.
Sharp, Jay W. “Mesquite Tree.” DesertUSA. Accessed June 28, 2018. https://www. desertusa.com/flora/mesquite-tree.html.
Shaw, Frederick J. *Locating Air Force Base Sites: History's Legacy*. Washington, DC: Air Force History and Museums Program, United States Air Force, 2004.
Shreve, Forrest. “Daniel Trembly MacDougal: Pioneer Plant Physiologist.” *Plant Physiology* 14, no. 2 (April 1939): 191-202. https://doi.org/10.1104 /pp.14.2.191.
Smith, Suzanne. “Use Lessons from Technology Innovation to Build Change Elsewhere.” Chicago Tribune, online. December 14, 2015. Accessed February 23, 2018. http://www.chicagotribune.com/bluesky/hub/ct-bc-technology-lessons-bsi-hub-20151214-story.html.
Sotoyome Scimitar (Healdsburg, CA). “California County Nomenclature Interesting Historic High-Lights.” September 26, 1935. https://cdnc.ucr.edu.
Springhetti, Jim. “Up in the High Desert, a '60s Development That Didn't Develop.” Oregon Travel News, *The Oregonian* (Portland, OR), online. Updated September 29, 2008. Accessed January 3, 2019. https://www.oregonlive.com/travel /index.ssf/2008/09/up_in_the_high_desert _a_60s_de.html.
Starrs, Paul F. and Peter Goin. *Field Guide to California Agriculture*. Berkeley, CA: University of California Press, 2010.
Stegner, Wallace. “Striking the Rock-Water and the Arid West.” In *Major Problems in the History of the American West*, edited by Clyde A. Milner III, 398-405. Boston, MA: Cengage Learning, 1997.
Steinbeck, John. *The Grapes of Wrath*. New York, NY: Penguin Books, 2006.
Streitfeld, David. “Salton City: A Land of Dreams and Dead Fish.” *Los Angeles Times*, online Collections. July 1, 2007. Accessed March 1, 2018. http://articles.latimes.com/2007/jul/01 /business/fi-salton1/2.
Sturrock, Alex M. *Water-Supply Paper 2053: Evaporation and radiation measurements at Salton Sea, California*. (Washington, D.C.: Government Printing Office, 1978). https://pubs.er.usgs.gov/publication/wsp2053.
Sullivan, Michael Ann. “Establishment of Sandia National Laboratory, 1945.” New Mexico Office of the State Historian (website). Accessed May 6, 2018. http://dev.newmexicohistory.org/filedetails.php?fileID=458.
Terp, Holger. *Nuclear Weapons Production in the US 1941-2011*. Copenhagen, Denmark: Danish Peace Academy, 2004.

Thompson, Gabriel. *Chasing the Harvest: Migrant Workers in California Agriculture*. London: Verso, 2017.
Tout, Otis B. *The First Thirty Years: Being an Account of the Principal Events in the History of Imperial Valley, Southern California, U.S.A.* Imperial, CA: Imperial County Historical Society, 1931.
UCLA Art Sci (website). "Christina Agapakis 'Bacterial Encounters' Exhibition." Accessed February 14, 2019. http://artsci.ucla.edu/?q=events/christina-agapakis-%E2%80%9Cinside-out-body%E2%80%9D.
U.S. Army Air Forces Director of Airfields (January 1945). NAF (Seaplane). Salton Sea Test Base (Westmorland), Salton Sea.
U.S. Army Corps of Engineers. *Site Survey Summary Sheet for DERP-FUDS Site, No. J09CA102700 - NAF Salton Sea*. May 20, 1992.
U.S. Congress, House of Representatives. Southern Pacific Imperial Valley Claim. 61st Cong., 3d sess., March 1910. HR Rep. 1936, 153-157.
U.S. Department of Commerce, National Oceanic and Atmospheric Administration. *A History of Significant Weather Events in Southern California*. Updated February 2010. https://www.wrh.noaa.gov/sgx/document/weatherhistory.pdf.
———, National Oceanic and Atmospheric Administration, National Weather Service. *Hurricanes - Unleashing Nature's Fury. A Preparedness Guide*. Revised August 2001. http://www.cert-la.com/downloads/education/english/Hurricanes-UnleashingNaturesFury.pdf.
U.S. Department of Energy. "Imperial Valley Geothermal Area." Geothermal, Renewables. Office of Energy Efficiency & Renewable Energy. Accessed January 23, 2019. https://www.energy.gov/eere/geothermal/imperial-valley-geothermal-area.
U.S. Department of the Interior, Bureau of Reclamation. *The Bureau of Reclamation. Managing the Water in the West. Origins and Growth to 1945,* by Rowley, William D. and Andrew H. Gahan. Denver, CO, 2006. https://www.usbr.gov /history OriginsandGrowths/Volume1.pdf.
———, Bureau of Reclamation. "The Colorado River and Hoover Dam Facts and Figures." Lower Colorado Region. Updated February 7, 2017. Accessed April 4, 2018. https://www.usbr.gov/lc/region/pao/faq.html.
———, Bureau of Reclamation. "Laguna Diversion Dam." Projects and Facilities. Accessed March 15, 2018. https://www.usbr.gov/projects/index.php?id=297.
———, Bureau of Reclamation. *Restoration of the Salton Sea, Volume 1: Evaluation of the Alternatives.* December 2007. https://www.usbr.gov/lc/region/saltnsea/finalreport/Vol1/Chp1.pdf.

———, National Park Service. “Bureau of Reclamation Historic Dams and Water Projects—Managing Water in the West.” Accessed March 11, 2018. https://www.nps.gov/nr/testing/ReclamationDamsAndWaterProjects/Water_In_The_West.html.

———, National Park Service. “The Greatest Dam in the World: Building Hoover Dam.” Accessed March 19, 2018. https://www.nps.gov/nr/twhp/wwwlps/lessons/140hooverdam/140hooverdam.html.

———, U.S. Geological Survey. *Avian botulism. Information and Technology, Report 1999-0001*. By T.E. Rocke and Milton Friend. Reston, VA: USGS, 1999. https://pubs.er.usgs.gov/publication/2001150.

———, U.S. Geological Survey. “Pesticides” in *The Quality of Our Nation’s Water—Nutrients and Pesticides*, Circular 1225, 60-61. https://pubs.usgs.gov/circ/circ1225/pdf/pest.pdf.

———, U.S. Geological Survey. *State of the Salton Sea: A Science and Monitoring Meeting of Scientists for the Salton Sea*, *Open-File Report 2017–1005*. By Douglas A. Barnum, Timothy Bradley, Michael Cohen, Bruce Wilcox, and Gregor Yanega. Reston, VA: U.S. Geological Survey, 2017. https://pubs.usgs.gov/of/2017/1005/ofr20171005.pdf.

———, U.S. Geological Survey. “USGS 10254005 Salton Sea NR Westmorland CA.” USGS Current Conditions for California. Accessed February 5, 2019. https://waterdata.usgs.gov/ca/nwis/uv?site_no=10254005.

U.S. Department of the Navy. *Fact Sheet No. 17, Salton Sea Test Base Fact Sheet*. Southwest Division Naval Facilities Engineering Command, April 1997.

U.S. Fish and Wildlife Service. “Sonny Bono Salton Sea National Wildlife Refuge.” Accessed January 14, 2019. https://www.fws.gov/refuge/sonny_bono_salton_sea/.

William, Alan E. “A Brine Interface in the Salton Sea Geothermal System, California: Fluid Geochemical and Isotopic Characteristics.” *Geochimica et Cosmochimica Acta* 53, no. 8 (1989): 1906-1908. https://www.sciencedirect.com/science/article/pii/0016703789903128.

Wollenberg, Charles. “Huelga, 1928 Style: The Imperial Valley Cantaloupe Workers' Strike.” *Pacific Historical Review* 38, no. 1 (1969): 45-58. http://phr.ucpress.edu/content/38/1/45.

Worster, Donald. “Appendix: Doing Environmental History.” In *The Ends of the Earth: Perspectives on Modern Environmental History*, edited by Donald Worster and Alfred W. Crosby, 2-9. Cambridge: Cambridge University Press, 1988.

———. *Rivers of Empire: Water, Aridity and the Growth of the American West*. New York, NY: Oxford University Press, 1985.

———. *Under Western Skies: Nature and History in the American West*. New York, NY: Oxford University Press, 1992.
Yankoupe, Roger F., Brigadier General of the U.S. Army. *Site-No.: J09CA102700. NAF Salton Sea, Imperial Valley, California, Findings of Facts*. September 4, 1992.
Yong, Ed. *I Contain Multitudes: The Microbes Within Us and a Grander View of Life*. New York, NY: Ecco, 2018.

Deutsche Zusammenfassung der Dissertation
"Die Öko-Biografie des Saltonsees"

(Englischer Titel: The Salton Sea. An Eco-Biography of California's Largest Lake)

Heutzutage gehört der Saltonsee (englisch *Salton Sea*) zu den wenig bekannten Sehenswürdigkeiten Kaliforniens und verfügt über eine geringe Besucherzahl. Aber diejenigen, die den See kennen, werden oft fasziniert von dieser außergewöhnlichen Landschaft. Der Saltonsee ruht in einer Senke, welche einst von dem prähistorischen Cahuilla-See gefüllt wurde. Nach der Verdunstung dieses Sees, wurde die Salton-Senke zum Teil der Colorado-Wüste.

Der heutige See entstand künstlich, als ein Versuch, einen Überlauf vom Colorado River zum Kanal zu transformieren, gescheitert ist. Eine Reihe von Hochwassern zwischen den Jahren 1905 und 1907 führten dazu, dass die verwüstete Salton-Senke wieder gefüllt wurde. Seitdem durchlebte der See eine Reihe von Veränderungen. Der See bleibt, dank des landwirtschaftlichen Abflusses der lokalen Agrarindustrie, in der Wüste. Zwar verhindert dies das Verdampfen des Sees, allerdings sammeln sich so gleichzeitig hohe Mengen an Mineralien im Wasser. Infolgedessen ist der Saltonsee viel salziger, als die Ozeane, geworden.[619]

Diese Dissertation ist eine Öko-Biographie (englisch *eco-biography*) des Saltonsees. Das Konzept der Öko-Biografie stammt von dem Umwelthistoriker Mark Cioc und seiner 2006 veröffentlichten Studie *The Rhine: An Eco-biography, 1815-2000*.

Diese Studie bleibt Ciocs Ansatz der Öko-Biografie treu und liefert einen Überblick über das Dasein des Sees, wobei sich hier auf einen bestimmten

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619 U. S. Department of the Interior, U.S Geological Survey, *State of the Salton Sea: A Science and Monitoring Meeting of Scientists for the Salton Sea*, Open-File Report 2017–1005, by Douglas A. Barnum, Timothy Bradley, Michael Cohen, Bruce Wilcox, and Gregor Yanega, (Reston, VA: U.S. Geological Survey 2017), 1-3, https://pubs.usgs.gov/of/2017/1005/ofr20171005.pdf; U.S Department of the Interior, Bureau of Reclamation, Restoration of the Salton Sea, Volume 1: Evaluation of the Alternatives, December 2007, 1-3, https://www.usbr.gov/lc/region/saltnsea/finalreport/Vol1/Chp1.pdf.

Lebensabschnitt konzentriert wird. Der Fokus wird dem Zeitraum zwischen 1905 und 1977 gewidmet. 1905 begann die zweijährige Flut, welche den modernen Saltonsee schaffte, und im Jahre 1977 endete die zweijährige Saison der Tropenstürme, die die Region verwüsteten.

Das von Mark Cioc eingeführte Konzept der Öko-Biografie beruht darauf, die Menschen als Hauptakteure zu betrachten, deren Handlungen die Veränderungen in einem Ökosystem bestimmen. In ähnlicher Weise teilt diese Studie die menschlichen Akteure (*human actors*) in verschiedene Interessengruppen ein, um deren Motivationen und Interessen zu erfassen. Zu diesen Gruppen zählen Landwirte, lokale und föderale Verwaltungsbehörden, Wissenschaftler, Eigentümer von Freizeitunternehmen und das Militär.[620]

Der Saltonsee ist ein Ort voller Geheimnisse. Es ist ein Ort, in dem sich ein höchst interessantes Zusammenspiel zwischen den aquatischen Arten und der Vielfalt des mikrobiellen Wachstums entwickelte. An seiner Südküste befinden sich unterirdische Vulkane und Geysire, und im Südwesten entstand ein Testfeld für die amerikanische Armee, in dem geheime militärische Experimente zur Entwicklung der Atombombe sich ereignet haben. In den weiteren Teilen des Sees befinden sich Orte, wo die Landschaft eine Erinnerung der Enttäuschungen in sich trägt. Ein Beispiel ist der Ort Salton City, am Westufer des Sees, wo der Versuch, den Ferienort Palm Springs zu kopieren, gescheitert ist.

Die Bedeutung dieser Studie liegt in der großen Beschleunigung der Transformationen, die den Saltonsee geprägt haben. Innerhalb dieser relativ kurzen Zeit fand eine Vielzahl der Phänomene statt, die oft plötzlich auftraten und das gesamte Ökosystem stark beeinflusst haben.

Während sich diese Studie den unbeabsichtigten Folgen der kulturellen Transformation der Landschaft widmet, bleiben die Elemente des

620 Mark Cioc, *The Rhine: An Eco-Biography, 1815-2000* (Seattle, Wash.: University of Washington Press, 2006), 4-18.

Ökosystems ebenfalls im Fokus. Der Nashornpelikan (*Pelecanus erythrorhynchos*) gehört zu den am prominentesten diskutierten Vögeln. Darüber hinaus zählen auch Rankenfußkrebse, verschiedene Fischarten sowie Mikroorganismen zu den ökologischen Protagonisten.

In jedem Kapitel wird ein besonderer Schwerpunkt dargelegt. Das erste Kapitel enthält eine Analyse der Machtverhältnisse in der Salton-Senke, in Bezug auf die Wasserrechte. Es erzählt von Konflikten zwischen mächtigen privaten Unternehmen, und von den Umständen, die zu der Entstehung des Sees im frühen 20. Jahrhundert geführt haben. Am Ende des 19. Jahrhunderts begann das Unternehmen California Development Company (CDC), geleitet von dem Ingenieur Charles Rockwood, den Colorado River in die Colorado-Wüste umzuleiten. Das von der CDC gebaute System der Kanäle brach aber im Jahre 1905, was zu der Entstehung des Saltonsees führte. Die zweijährigen Versuche, die Überflutung anzuhalten, wurden von Edward Harriman geführt. Harriman, der Präsident der Southern Pacific Railroad, schlug den Bau einer speziellen Eisenbahnlinie vor, die über das Wasser gebaut wurde. Nachdem die Flut 1907 endete, wurde die bankrotte CDC in das Imperial Irrigation District (IID) umstrukturiert. Das IID baute und betreute das Bewässerungssystem, welches das landwirtschaftliche Gebiet Imperial Valley mit Wasser versorgte. Der See wurde 1924 vom Präsidenten Coolidge offiziell als "landwirtschaftlicher Sumpf" (*agricultural sump*) genannt.

Das zweite Kapitel zeigt die frühen wissenschaftlichen Wahrnehmungen des Sees, einschließlich der Erkenntnisse aus der Botanik, der Geologie, der Ornithologie und anderen wissenschaftlichen Bereichen. Daniel Trembly MacDougal war einer den prominentesten Wissenschaftlern, die dem See eine starke Aufmerksamkeit gewidmet haben. 1907 begann der berühmte Botaniker die Salton-Senke zu untersuchen und aus seiner Arbeit ist eine umfassende Studie entstanden. Das 1914 erschienene Buch *The Salton Sea: A Study of the Geography, the Geology, the Floristics, and the Ecology of a Desert Basin* ist ein Bericht über die ersten wissenschaftlichen Begegnungen mit dem Saltonsee. Darüber hinaus wird in diesem Kapitel Melvin Brannons

Studie diskutiert. Seine Untersuchung der Mesquite-Bäume führte zu der Entdeckung einer starken chemischen Aktivität im Saltonsee. Außerdem werden in diesem Kapitel die Beobachtungen des Ornithologen Joseph Grinnell und des Ichthyologen Warren Evermann über die Vielfalt der Arten im Saltonsee dargestellt.

Das dritte Kapitel bietet eine Auswahl jener Aspekte der ersten dreißig Jahre der Landwirtschaft in der Imperial Valley, die den Saltonsee geprägt haben. Im ersten Teil wird das in dem Gebiet geerntete Obst und Gemüse dargestellt. Anhand von drei Fallbeispielen (Datteln, Cantaloupe-Melonen und verschiedene Salatsorten) werden die Wandlungen in der Ernährung in der amerikanischen Bevölkerung diskutiert. Die Auswirkung der Popularität dieser Lebensmittel auf den Saltonsee wird ebenfalls besprochen. Darüber hinaus werden die schwierigen sozialen Verhältnisse im Süden Kaliforniens dargestellt. Das mühselige Leben der Arbeiter sowie die wichtigsten Streiks der 1930er Jahre werden in dem Kapitel angesprochen. Im letzten Teil wird die Baugeschichte der Talsperre Hoover Dam und des All-American Canal diskutiert, wobei die Auswirkung der Entstehung dieses Bewässerungssystems auf den Saltonsee im Mittelpunkt steht.

Das vierte Kapitel konzentriert sich auf den Zeitraum zwischen 1939 und 1945. Im Frühling von 1942 wurde der See als Kulisse für den Dreh von dem Kriegsfilm *Wake Island* genutzt. Kurz danach wählte die U.S. Navy den südwestlichen Teil des Saltonsees als Standort für das neue militärische Testareal. Somit wurde der See zur Kulisse von einer Reihe von Tests, inklusive der Atombombentests. Die Tätigkeiten der Kriegsmarine am Saltonsee führten zu einer unbeabsichtigten Einführung der Balanus glandula, einer Art der Rankenfußkrebse, die sich im See schnell vermehrt haben und in wenigen Jahren zu einer der wichtigsten Arten des Sees wurden.

Das fünfte Kapitel befasst sich mit dem Aufschwung der Freizeitindustrie am Saltonsee in den 1950er und 1960er Jahren. Die boomende Nachkriegswirtschaft in den USA führte zu einer hohen Geburtenrate, die als

baby boom bekannt wurde. Außerdem gehörten die südlichen Staaten der USA zu dem sogenannten *Sunbelt*, welches in den ersten Jahren des Kalten Krieges zu Stande kam. Sunbelt bezog sich auf die Gebiete, die, aufgrund der erhöhten militärischen Aktivität, besonders stark gefördert wurden und ein starkes wirtschaftliches Wachstum erlebten. Das Aufkommen der wohlhabenden Mittelklasse schuf ein neues Phänomen der Freizeitbeschäftigung. Outdoor-Aktivitäten wurden zunehmend populär, und somit wurde der Saltonsee zu einem bekannten und gut besuchten Freizeitort. Dieses Kapitel präsentiert zwei Fallbeispiele aus diesem Zeitraum. Erstens wird die Geschichte von Helen Burns erzählt. Ihre Ferienanlage Helen's Beach House, welche sie in Desert Shores führte, wurde zu einem der bekanntesten Orte am ganzen See. Als zweites Beispiel dient die Entwicklung des luxuriösen Yacht Clubs am nördlichen Ufer des Saltonsees. Der Klub wurde von dem berühmten Architekten Albert Frey entworfen und zählte ebenfalls zu den beliebtesten Erholungsorten. Die populärsten Freizeitsportarten am Saltonsee (Motorboot fahren und Wasserski fahren) stehen im weiteren Fokus dieses Kapitels. Gleichzeitig werden weitere Aktivitäten des Militärs am Saltonsee dargestellt, da der See bis in die 60er Jahre als Ort der Entwicklung der Nuklearwaffen diente.

Im sechsten Kapitel werden weitere Aspekte der Tourismusindustrie besprochen. Das kalifornische Department of Fish and Game führte zwischen den 1930ern und 1950ern eine Reihe von Experimenten durch, mit dem Ziel, neue Fische in den See einzuführen. Das Department bemühte sich somit, den Saltonsee in eine beliebte Sportfischerei umzuwandeln. Infolgedessen wurde der Raubfisch Orangemouth Corvina zu der dominierenden Spezies im Saltonsee. Als der "kämpfende Fisch" war Corvina besonders unter den Anglern beliebt, auch aufgrund der außergewöhnlichen Größe. Der zweite Teil dieses Kapitels beschäftigt sich mit der Geschichte der Stadt Salton City, die Ende der 1950ern an der westlichen Küste des Saltonsees gegründet wurde. Die Hauptrolle in dieser Episode spielte der Investor M. Penn Phillips. Phillips hatte eine Vision, den Erfolg von Palm Springs nach Salton City zu übertragen und in der Wüstenlandschaft eine

Stadt mit 20,000 Einwohnern zu errichten. Seine grandiosen Pläne haben sich allerdings als Betrug herausgestellt.

Das siebte Kapitel befasst sich mit der Verschärfung der ökologischen Krisen am Saltonsee, die in den 1960ern und 70ern eskalierten. Dazu gehören die zunehmende Versalzung des Sees, die Verschmutzung des Wassers mit Pestiziden und Schwermetallen sowie der stetig steigende Wasserspiegel. Den Ursprung dieser ökologischen Nebenwirkungen findet man in der lokalen Agrarindustrie, die über die Jahrzehnte den Saltonsee mit landwirtschaftlichem Dränagewasser speiste. Der steigende Wasserspiegel verursachte Überschwemmungen in den Freizeitorten, was wiederum zu dem Zerfall der Tourismusindustrie am Saltonsee führte. 1976 und 1977 wurde die Region Opfer von Tropenstürmen, was das unausgewogene Ökosystem kurzfristig entlastet hat.

Der letzte Teil bietet eine kurze Zusammenfassung dieser Studie sowie eine Prognose der Zukunftsaussichten, die den Saltonsee erwarten.

BIBLOIGRAFIE

Cioc, Mark. *The Rhine: An Eco-Biography, 1815-2000*. Seattle, WA: University of Washington Press, 2002.

U.S. Department of the Interior, Bureau of Reclamation. *Restoration of the Salton Sea, Volume 1: Evaluation of the Alternatives*. December 2007. https://www.usbr.gov/lc/region/saltnsea/finalreport/Vol1/Chp1.pdf.

———, U.S. Geological Survey. *State of the Salton Sea: A Science and Monitoring Meeting of Scientists for the Salton Sea*, *Open-File Report 2017–1005*. By Douglas A. Barnum, Timothy Bradley, Michael Cohen, Bruce Wilcox, and Gregor Yanega. Reston, VA: U.S. Geological Survey, 2017. https://pubs.usgs.gov/of/2017/1005/ofr20171005.pdf.