



THE PHOTOGRAPHER'S FRAME

# Restoring *the* Great Cloud Forests of Santa Rosa Island

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### **Drip. Drip. Drop. Drip.**

A natural symphony condenses from the blanket of fog above. As water collects on the lichen-laden branches of the island oaks and pines, it falls and supports the unique ecosystem below. Santa Rosa Island, off the coast of southern California, is one of the few places in the world where these “cloud forests” can be found. Unfortunately, in the 1800s, several disturbances—from ranching to resource exploration—left the island denuded of critical shrubs and grasses. Without the presence of these foundational species, the land quickly eroded, which threatened the sensitive cloud forest ecosystem. In the late 1980s, Channel Islands National Park gained stewardship of the island and worked tirelessly alongside the US Geological Survey (USGS), whose science informs management decisions, to eliminate introduced grazers from the island and restore its landscape. While much of the island flourished, recovery for the cloud forests remained stagnant. This is the story of what has happened since the endeavor began to restore the Great Cloud Forests of Santa Rosa Island.

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### **SEEING THE ISLAND THROUGH THE CLOUDS**

Hidden beneath a thick layer of fog, the distinctly rugged coastline of Santa Rosa Island protrudes from a dark and churning sea. Of the five coastal California islands protected within the boundary of Channel Islands National Park, the consistent cloud cover over Santa Rosa Island performs a particularly essential role in the functioning of the island's ecosystem.





### **A FOREST IN THE SKY**

Expansive stands of island oak trees (*Quercus tomentella*), surrounded by a dense matrix of native chaparral and shrublands, once dominated the highest reaches of this remote island. A rich assortment of flora and fauna flourished beneath this canopy as a result of the consistent fog cover enveloping the landscape—a phenomenon caused by the condensation of moist ocean air. Cloud forests, as they came to be known, persisted on Santa Rosa Island for generations.





### **AN ENTIRE LANDSCAPE FOREVER TRANSFORMED**

While the cloud banks still cover the mountains of Santa Rosa Island today, the ecosystem has changed dramatically. Through the mid-1800s and early 1900s, extensive livestock grazing, military development, and oil exploration reduced the native vegetation by over 75%. During this period of rapid transformation, only the smallest patches of native plants, found in the deepest corners of the island, survived. The once mighty island oak stands were reduced to a small fraction of their previous range, giving way to a desolate and unforgiving landscape.





### **AN UNLIKELY TURN OF EVENTS**

In 1980, Channel Islands National Park was expanded to include Santa Rosa Island, and the nearby sister islands of Santa Cruz and San Miguel. Resource managers with the National Park Service began the long and hard road to restoration, starting with the removal of introduced species like elk, deer, and cattle. Full cessation of ranching occurred in 1998 when the last of the cattle were returned to the mainland. Partners at USGS began working with the park to develop and test techniques for cloud forest ecosystem restoration.





### **THE LONG ROAD TO RESTORATION**

Rebuilding an ecosystem from the ground up is an incredibly difficult process. Despite significant efforts by the National Park Service, partners, and volunteers to remove non-native species and restore decimated vegetation, the cloud forests of Santa Rosa Island were not recovering. Without the structure and protection provided by the giant oaks and their chaparral understory, extreme wind and water erosion stripped and dried the remaining soil, thereby thwarting restoration efforts.





### **THE LIGHT THROUGH THE TREES**

In order to overcome the myriad of barriers to the cloud forest ecosystem's recovery, the National Park Service and USGS teams would need to come at this problem from several different angles. The restoration would require experimentation with different coordinated and innovative restoration techniques focused on improving the soil, restoring the vegetation, and reviving the disrupted hydrological system. Hope for the recovery of these cloud forests persisted.





### **INITIATING AN ECOSYSTEM RESET**

Before the vegetation could be restored, the teams needed to make sure the landscape could support growth. Long fences of both natural fiber and wire were installed to help stabilize the restoration areas by providing protection from harsh winds, preventing further erosion, and catching leaf litter to begin rebuilding the soil. Similar structures covered in fabric were placed, acting as artificial fog catchments to drip water to the ground.





### REBUILDING FROM THE GROUND UP

Stabilizing and protecting the remaining oaks was also a top priority. However, the team quickly realized that stabilization relied upon restoring chaparral understory, whose root systems would hold water and soil in place and provide shade for young oaks to establish. For this purpose, a plant nursery was specially built on Santa Rosa and native seeds collected from around the island were grown and out-planted.

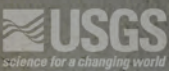




### **HOPE FOR THE FUTURE**

After decades of dedication and perseverance, these extensive efforts are finally paying off. At Soledad Ridge, the initial restoration site, over 3,300 plants from the greenhouse have successfully been placed in the ground with thousands more recovering naturally without the threat of grazing pressure. Techniques developed on Santa Rosa Island will have far-reaching impacts on island and coastal restoration both now and in the future.





### HOW FAR WE HAVE COME

Restorations of this magnitude are an immense undertaking and require hundreds of committed individuals and volunteers contributing to outcomes they may never witness. For years, USGS ecologist Dr. Kathryn McEachern has led the charge to restore the great cloud forests of Santa Rosa Island. Though the work is ongoing, it is with the unwavering support of individuals like Dr. McEachern and an incredible community of partners that this extraordinary ecosystem will once again be enjoyed by future generations.





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“Strength,” a Tarot illustration representing a radiation of power coupled with inner understanding and love. | [HENRY CRAWFORD ADAMS](#)