Historical Ecology and the Design of Resilient Landscapes

Over the past 20 years, SFEI has pioneered the field of *Applied Historical Ecology*, reconstructing how California landscapes looked and functioned in the early 19th century, prior to significant Euro-American modification. Historical ecology studies have covered over 2 million acres in more than two dozen regions throughout the state – projects designed in partnership with dozens of agencies and NGOs to provide missing information needed to restore and redesign California landscapes.

California landscapes, even relatively natural-looking or agricultural ones, have been so heavily modified and fragmented that historical ecology has been essential to accurately identifying the habitats and functions that have been lost and what elements might be reestablished or recovered. In many cases this information is quite transformative, changing the way we understand not only the historical landscape but the contemporary and potential future landscape.

Historical ecology has led to re-thinking how lagoons work in Southern California, discovered that long-forgotten sandy beaches were a prominent part of San Francisco Bay, and that stately valley oaks graced many of the state's now-agricultural and suburban valleys. Historical ecology has "changed the paradigm" of the Sacramento-San Joaquin Delta – perhaps the state's most politically sensitive ecosystem – enabling scientists and managers to understand it in new ways and reimagine it as a potentially functional landscape.

Infusing science and management with knowledge of these interconnected, functioning ecosystems of a century and a half ago has led to a wealth of creative integration between the seemingly-lost past and the now-possible future. As California invests in improved ecological health and natural infrastructure, Historical Ecology has led to innovations in the design of resilient landscapes: beaches re-created in San Francisco Bay to protect shores from erosion and recover rare plants; flows of treated wastewater designed to mimic lost freshwater inputs to the Bay's tidal marshes, increasing their biodiversity and resilience; long-forgotten willow groves and oak savannas designed as part of technology campuses to support local and migratory birds while bringing nature to urban workers.

Cumulatively, over several decades, these approaches – at the same time historical and futuristic, rooted in place yet adaptive to climate change – can create the next generation California landscape that reintegrates nature into our lives and that draws on the natural resilience of functioning ecosystems to support local biodiversity and all the services it provides.