

Western Ecological Research Center

Publication Brief for Resource Managers

Release:

September 2009

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Spatial and Temporal Patterns of the Salton Sea Terrestrial Ecosystem

Large aquatic bodies influence surrounding terrestrial ecosystems by providing water and nutrient subsidies. The Salton Sea in southern California is a saltwater lake surrounded by a Sonoran Desert ecosystem. During summer, the Salton Sea experiences large algal blooms that create anoxic conditions in large portions of the lake, often associated with massive fish and bird die-offs that contribute to periods of increased nutrient subsidies to the surrounding desert ecosystem. In a study published in the September issue of the *Journal of Arid Environments*, USGS and San Diego State University scientists documented changes in the abundance and composition of terrestrial plants and animals with respect to distance from the sea edge and timing of these large nutrient inputs.

The scientists sampled the relative abundance of multiple taxonomic groups, including vegetation, ants, beetles, flies, birds, reptiles, small mammals, bats, and coyotes, at varying distances from the sea edge. They found that significant effects were most pronounced within 300 m of the shore, but extended 3 km inland as determined from fish remains in coyote scats. The zone within 300 m of the Salton Sea had a higher density of vegetation with a distinctly different plant composition. The input of nutrients, excess water, and salts created a zone of alkaline sink vegetation that was twice as dense as that of the adjacent creosote bush and desert saltbush habitats. The denser vegetation supported higher abundances of birds and reptiles. Coyotes exhibited spatial and temporal responses to marine subsidies of fish, while birds were likely subsidized by aquatic aerial insects. Top-down control as well as dietary and habitat preferences may have resulted in reduced numbers of ants, beetles, and small mammals near the sea.

Management Implications:

- Changes in sea elevation will likely affect the relative abundance of terrestrial species in the current near-shore habitat.
- Since much of the current study took place on the southeastern portion of the lake interface, and effects of nutrient inputs were patchy in both time and space, we cannot reliably predict long-term consequences for the entire lake interface.

Species responses to the habitat edge appeared to be associated with species life history. Near-shore habitat largely favored habitat generalists, while inland desert habitat favored many sand and open desert specialists. The Salton Sea is a relatively young (100 years old) saline lake. Therefore, specialized adaptations of Colorado Desert terrestrial plants and animals to its non-native marine animal inputs have had little time to develop. We expect this explains why positive shoreline responses were largely limited to highly mobile animals (birds and coyotes) and habitat and dietary generalists.

Brehme, C. S., W. I. Boarman, S. A. Hathaway, A. Herring, L. Lyren, M. Mendelsohn, K. Pease, M. Rahn, C. Rochester, D. Stokes, G. Turschak, R. N. Fisher. 2009. Spatial and temporal patterns across an ecological boundary: allochthonous effects of a young saltwater lake on a desert ecosystem. Journal of Arid Environments 73:811–820.