SCCWRP #0754

Reach-scale geomorphic and biological effects of localized streambank armoring

Eric D. Stein[1], Matthew R. Cover[2], A. Elizabeth Fetscher[1], Clare O'Reilly[3], Roxana Guardado[2], and Christopher W. Solek[1]

[1]*Southern California Coastal Water Research Project*

[2]*California State University, Stanislaus*

[3]*California Ocean Protection Council*

ABSTRACT

Armoring of streambanks is a common management response to perceived threats to adjacent infrastructure from flooding or erosion. Despite their pervasiveness, effects of reach-scale bank armoring have received less attention than those of channelization or watershed-scale hydromodification. In this study, we explored mechanistic ecosystem responses to armoring by comparing conditions upstream, within, and downstream of six stream reaches with bank armoring in Southern California. Assessments were based on four common stream-channel assessment methods: (1) traditional geomorphic measures, (2) the California Rapid Assessment Method for wetlands, (3) bioassessment with benthic macroinvertebrates, and (4) bioassessment with stream algae. Although physical responses varied among stream types (mountain, transitional, and lowland), armored segments generally had lower slopes, more and deeper pools and fewer riffles, and increased sediment deposition. Several armored segments exhibited channel incision and bank toe failure. All classes of biological indicators showed subtle, mechanistic responses to physical changes. However, extreme heterogeneity among sites, the presence of catchment-scale disturbances, and low sample size made it difficult to ascribe observed patterns solely to channel armoring. The data suggest that species-level or functional group-level metrics may be more sensitive tools than integrative indices of biotic integrity to localscale effects.