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How Open is Open? How Closed is Closed? Classification of Estuarine Mouth Closure Patterns; Implications for Restoration and Management

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Abstract

Determining the appropriate design template is critical to coastal wetland restoration. In seasonally wet and semi-arid regions of the world coastal wetlands tend to close off from the sea seasonally or episodically, and decisions regarding estuarine mouth closure have far reaching implications for cost, management, and ultimate success of coastal wetland restoration. To help inform restoration decisions, we developed a conceptual model that classifies estuarine mouth closure patterns using information on geologic origin, exposure to littoral process, and watershed size and runoff characteristics. Application of the classification model suggests that under natural conditions, the vast majority of California estuaries experience some degree of closure, and most spend a preponderance of time completely isolated from the sea or with a limited or muted tidal connection. In this state, stream flow rather than tidal influence is the most critical variable controlling mouth opening. Individual estuaries exist in a variety of closure states over multi-year to multi-decadal time frames. An estuary may exist in a given closure state for periods of time ranging from days to years. The distribution of closure states for an estuary influences its biological condition and habitats and should be used to guide management decisions.