Science Foundation Chapter 4
Appendix 4.3
The Importance of SZ2 in Marsh-Upland Transitions

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Overview

Sub-zone 2 (SZ2) refers to the wildlife refuge habitat function of the Estuarine-Terrestrial Transition Zone (T-zone). It is the sub-zone located between the uppermost elevation of tidal marsh (slightly above local MHHW) and the highest observed tidal effects in rivers and streams (HOT; SFEI 2014) or the highest observed tidal flooding on land (Harvey et al 1978, NOS 1978, Thomson 2013, Fulfrost and Thomson 2014). Using these elevations to demarcate the boundaries of SZ2 can facilitate its mapping. As sea level rises, SZ2 will migrate upstream and inland, but it will remain bounded by these same elevations relative to the tides.

SZ2 is given special consideration for several basic reasons: 1) it is especially significant as high tide refuge for many endangered tidal marsh animals; 2) its ecological diversity per unit area is especially high relative to the broader or generally more homogeneous sub-zones; and 3) this is the subzone into which tidal marshes will initially migrate, and that will therefore become increasingly important as sea level rises.

Based on these technical considerations, the area defined as SZ2 has previously been equated to the entire transition zone. A contingent of the T-zone workgroup prefers this T-zone definition. The workgroup elected the less restrictive definition provided in the Science Foundation Chapter 4 because it incorporates the full gamut of ecosystem functions ascribed to the T-zone by the prevailing conceptual models. However, the workgroup as a whole recognizes the value of emphasizing the importance of SZ2.

Composition and Significance

SZ2 is the area of the T-zone that encompasses the direct physical and ecological effects of extreme high tides. These effects involve the delivery of debris, sediment, nutrients, salts, and other materials carried by the tides to places above the zone of regular flooding. The result is a unique combination of soils and hydrological conditions that supports unique assemblages of plant and animal species. These assemblages vary in composition around the Estuary in relation to tidal salinity and other local factors. In the most saline regions of the Estuary, some dominant plant species of the SZ2 actually require saline conditions (i.e., they are halophytic), and others are salt-tolerant. Where the Estuary has migrated over ancient vernal pool systems, the plant assemblages of SZ2 include both estuarine species as well as vernal pool endemic species. These two examples illustrate the broad range in unique local floras supported by SZ2. Furthermore, SZ2 supports dozens of rare, threatened, or endangered plant species (Goals Project 1999 and 2000, U.S. Fish and Wildlife Service 2013).

The botanical importance SZ2 is at least matched by its importance as refuge and feeding habitat for estuarine and terrestrial vertebrate wildlife. Many birds and small mammals that reside in tidal marshes use

SZ2 as a refuge from the highest tides. Wide-ranging predators, including birds of prey, coyotes, foxes, and bobcats are known to frequent the SZ2 to prey on macro-invertebrates, amphibians, reptiles, small mammals, and migratory and residential songbirds. The role of SZ2 as a corridor that enables wildlife to move between patches of tidal marsh is also gaining recognition. However, little is known about the resident fauna of the SZ2, in part because of the relative abundance of macro-invertebrate species, especially insects and spiders that for a variety of reasons have received little attention. It is broadly expected that many of these species play significant roles in the life cycles of other organisms in the T-zone as pollinators, herbivores, scavengers, predators, and prey (Goals Project 2000). Indeed, invertebrates are significant components of any habitat type or ecosystem.

Threats

Much of the historical T-zone including SZ2 has been developed or otherwise converted to land uses that are not compatible with natural T-zone functions. Furthermore, since the SZ2 plant community is mostly a mixture of high tidal marsh and upland species (Kent et al. 1997), it requires adjacent marsh and upland habitats of adequate quality to persist and function properly. Where present, high marsh habitat is generally of good quality, but the adjoining upland habitats are largely characterized by non-native vegetation (Shellhammer 1982).

In areas of naturally gentle topography, SZ2 was historically hundreds to thousands of feet wide (Collins and Grossinger 2004). Much of these broad historical areas of SZ2 as well as narrower natural areas have been replaced by the much narrower outboard faces of artificial levees (Baye, 2012). For many reasons, artificial levee slopes provide minimal high tide refuge for marsh wildlife. The levees are often mostly bare or covered by sparse non-native vegetation, and therefore do not provide high-quality wildlife refuge. They are also used as pathways for terrestrial predators, granting them easy access to sensitive marsh wildlife that aggregate along the levees during high tides. For example, reduced survival of adult Ridgeway rail is associated with levee faces covered by weedy plants that senesce during winter and thus provide poor cover from predators (Overton, et al. 2014).

The loss of historical SZ2 might exceed 90% (Shellhammer 1982). The scant areas of remnant natural SZ2 are unable to provide the historical ecological functions of the T-zone (Baye 2004). In the current landscape, the T-zone area corresponding to SZ2 is "one of the most threatened features of Pacific coast salt marshes" (Traut 2005).

FOR MORE INFORMATION, SEE LINKED MATERIALS (CLICKING HERE WILL OPEN THAT DOCUMENT):

"Management of Marsh-Upland Transitional Habitats" - Brian Fulfrost (BKF & Associates), Meg Marriott (USFWS), Christina Sloop (Birds Eye View), David Thomson (SFBBO), and Laura Valoppi (USGS)

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