

Intertidal Communities Typical of the Monterey Bay

The three aspects of habitat--wave shock, type of bottom, and tidal level--which so tremendously influence the types of plants and animals that occur, have determined this system of classification of the inter-tidal environment. The most unscientific shore visitor will know whether he is observing a surf-swept or a protected shore, and whether the substratum is predominantly rock or sand or mud, although he probably will not know the classification by which zoologists arrange the animals in which he is interested. He will further know, or he can easily find out whether the tide at a given time is high or low; and if or when it is low he can easily visualize the four zones or levels of the bared area to be defined later. The observer possessing this information should, with the aid of the illustrations and descriptions in any handbook, be able to identify most of the animals that he is likely to find and thus to acquire considerable information about each.

Students of our seashore will accordingly find it profitable to fix in mind the following classification of shore habitat:

I. Protected Outer Coast. Under this division we treat the animals of the semi-sheltered coast and open bays where the force of the surf is somewhat dissipated before it can crush the most delicate forms. Such shores, which provide rich collections, are generally concave, and characteristically are protected by a headland or a close-lying island. Todos Santos Bay, Laguna, Santa Barbara, much of Monterey Bay, also Half Moon Bay, and Point Arena are good examples.

Here on the Pacific we have only two types of shore within this division. They are:

A. Rocky shores. B. Sandy beaches.

II. Open Coast. Entirely unprotected, surf-swept shores, while by no means as rich in animals as the partially protected shores of Division I, support a distinctive and characteristic assemblage of animals that either require surf or have learned to tolerate it. This type of shore is generally convex, varying from bold headlands to gently outswEEPing stretches, and there will be fairly deep water close offshore. Obviously there are no muddy shores in this division; so again we have only: A. Rocky shores. B. Sandy beaches.

III. Bay and Estuary. Animals of the sloughs, enclosed bays, sounds, and estuaries, where the rise and fall of the tides is not complicated by surf, enjoy the ultimate in wave protection and commonly differ correspondingly in species from the animals inhabiting the open coast and the protected outer coast. Where the same species occur they frequently differ in habit and in habitat. The shores embraced in this division are sharply concave; that is, they have great protected area with a relatively small and often indirect opening to the sea. San Quintin Bay in Lower California is an example, and moving northward we find other such areas in San Diego, Newport, Morro, San Francisco, Tomales, and Coos bays, and in Elkhorn Slough along the Monterey Bay. This time we have a greater variety of types of shore, including: A. Rocky shores B. Sand flats, found in quiet waterways throughout the entire coast line. C. Eelgrass, growing on many types of completely protected shore along the entire range of coast herein considered. D. Mud Flats, found in nearly all protected waterways.

IV. Wharf Pilings. In addition to many animals which will be found elsewhere, wooden pilings support numerous species, such as the infamous Teredo, which will seldom or never be found in any other environment. The nature of piling fauna justifies its division into: A. Exposed. B. Protected.

Each of the above habitats is subdivided into zones by tidal exposure, thus:

Zone 1. Uppermost beach: from the highest reach of spray and storm waves to about the mean of all high tides, plus 5' at Monterey. Within this infrequently wetted zone, only such forms as the land-aspiring periwinkles and pill bugs occur.

Zone 2. High-tide region, or upper horizon: from mean high water to about the mean flood of the higher of the two daily lows, a bit below mean sea level. This is the home of barnacles and other animals accustomed to tolerating more air than water. Along with Zone 1, this is the equivalent of Murray and Hjort's (1912) "Bare Rock Area" and the "Upper Beach" of Davenport and others. On the central California coast, this comprises the 5' to 2 1/2' belt.

Zone 3. Mid-tide region, or middle horizon: from about mean higher low water to mean lower low water--the zero of the tide tables. Typically covered and uncovered twice each day, this belt extends from plus 2 1/2' to 0 on the California coast, and is the equivalent of Murray and Hjort's "Furoid Zone" in part at least and of the "Lower Beach" of Davenport and others. The animals found here are adapted to, and often require, the rhythm of the tides.

Zone 4. Low-tide region or lower horizon: normally uncovered by "minus" tides only, extending from 0 to -1.8' or so at Pacific Grove, corresponding to the upper part of the "Laminarian Zone" of Murray and Hjort, the "Submerged Beach" of Davenport, and the "Sublittoral" of others. This zone is available for examination during only a few hours in each month, and is peopled by animals working up as far as possible from deep water. Most of them remain in this zone, foregoing the advantages of the less crowded conditions higher up, because they are unable to stand more than the minimum of exposure incident to minus tides.