

An Intertidal Algal Turf Community

The Community

Turf algal communities are comprised of a variety of algal species, cyanobacteria, diatoms, detritus and micrograzers. Turfs not only influence large-scale habitats but are habitats in and of themselves. The dominant algae are often covered by many species of smaller algae (epiphytes) and provide protection for micrograzers and diatoms, trap sediments, and are one of the most productive habitats on coral reefs.

Algal species most commonly found in turf communities are compact or prostrate forms of algae, 2 to 5 cm tall. These small plants act as anchors, providing structure and climate control by being compact, and have the ability to retain moisture and provide shade. Algal turfs vary in diversity, ranging from monospecific stands with diminutive epiphytic species to communities with 100+ algal species.

Algal turfs have been described as the most productive habitat on coral reefs. The detritus and nitrogen fixing cyanobacteria located among the tightly packed thalli of the turf species deliver additional nutrients directly to the understory of the turf community where nutrients and photosynthesis would otherwise be limited.



Close up picture of a high intertidal turf at Ka'alawai on O'ahu. Algal species include *Laurencia yamadana*, *Chaetomorpha antennina*, *Ulva fasciata*, *Gelidium sp.* and *Acanthophora spicifera*.

The Intertidal Environment

The intertidal zone is an area of extremes. This zone is subjected to high wave energy at high tide and extreme sun and weather exposure at low tide. It also experiences high temperatures, evaporation, and fluxes of fresh water from terrestrial runoff. Constant change is characteristic of this zone: twice a day the intertidal environment changes from submersion to varying degrees of exposure.

The changing physical environment governs this community. Only species adapted to harsh environmental conditions are able to survive. The successful algal species present have developed the ability to withstand extremes in temperature, irradiance, salinity and desiccation, using strategies like shading by larger plants, living under ledges, colonizing in pools where they will always remain wet, and having thick walls.



Ka'alawai, O'ahu. Intertidal algal turf community exposed at low tide. Mats of *Laurencia yamadana* and *Chaetomorpha antennina*.



Puako, Hawaii. Turf community exposed at low tide. Mats of *Chaetomorpha antennina* are surrounded by the macroalga *Sargassum echinocarpum*.

Microenvironments

Microenvironments add to the diversity of the intertidal turf community. Microenvironments are created by changes in temperature, evaporation, and irradiance that can occur with the slightest topographical changes in the intertidal zone. Topographical variety, such as crevices or holes in a bench, provide enough of a change that the microenvironment can support a larger variety of turf species that are adapted to different environments.

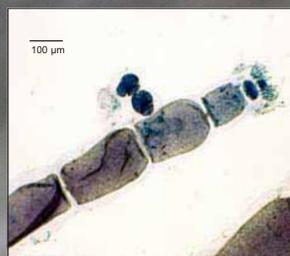
Community Diversity

Species composition of turf communities can vary greatly. Across an intertidal zone, one may find highly diverse communities with up to 100+ species or monospecific stands of different species neighboring one another on flat, unchanging benches in the intertidal (horizontal zonation). The successfulness of propagule delivery, availability of substrate, and the lack of disturbance are all factors in the diversity of these communities.



Ceramium sp.

Anotrichium secundum



Below is a sampling of the genera and species from the communities above:

Red Algae:
Acanthophora spicifera
Anotrichium tenue
Centroceras clavulatum
Ceramium sp.
Gelidium sp.
Herposiphonia sp.
Jania adhaerens

Laurencia yamadana
Polysiphonia sp.
Pterocliadiella sp.

Green Algae:
Chaetomorpha antennina
Cladophora sp.
Ulva fasciata



Jania adhaerens



Chaetomorpha antennina



Laurencia yamadana