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NEARSHORE HABITATS

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(with one table and two text-figures)

Nearshore macrohabitats are broadly classified into three distinct types: sedimentary (soft-bottom), reef (hard-bottom) and pelagic (open water) habitats. In addition to substrate type, their biotic compositions are controlled by environmental factors such as depth and wave exposure. These habitats are distributed in a distinctive pattern around Tasman Peninsula: the deep, exposed reef habitats along the eastern and southern coasts; the shallow, sheltered, soft-bottom habitats along the northern coast; and embayments of variable depths, exposures and substrate types. Eleven subtidal communities or groups of communities are identified from these habitats and their general features are described.
Key Words: Tasman Peninsula, Tasmania, nearshore habitats, subtidal habitats, benthic fish.
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INTRODUCTION

The coastal zone of Tasmania contains a diverse array of habitat types which vary geographically within the region (Last 1983). The nearshore zone around Tasman Peninsula is equally complex and the extreme variation in geomorphology exhibited above the tide mark is also obvious subtidally. Last (1983) provided information on soft-bottom fishes of the nearshore zone and Edgar (1984) described the general features of subtidal rocky shore communities, but subtidal habitats and their associated communities have been the focus of few other studies locally. Only Bryan (1984), who conducted an ecological investigation of an assemblage of animals living in a network of submarine caves at Waterfall Bay, has made a thorough study of a subtidal community of Tasman Peninsula.

The following account represents an attempt to classify these habitats and to describe the main structural characteristics of their communities.

PHYSICAL FEATURES

Several physical characteristics, such as wave and tidal exposure, coastal geomorphology, bathymetry and climate, are important in determining the structure, diversity and distribution of habitats and their associated communities within the nearshore zone. The effects of these environmental characteristics in relation to habitats of Tasman Peninsula are discussed below.

Coastal Geomorphology

The peninsula is connected to the greater part of Tasmania by a very narrow tombolo. The geomorphology of its coast is diverse and complex. Four of the features that are obvious above the tide mark, exposed rocky platforms and cliffs, sheltered beaches and embayments, can also be used to characterise subtidal communities.

The terrestrial topography is dominated by huge seacliffs (fig. 1), formed mainly of dolerite or sedimentary rocks, and these are also evident subtidally. The rock type is important beneath the sea because sedimentary rocks generally erode more readily than igneous rocks, producing more complex habitats.

Beaches are concentrated along the northern coastline and in the primary embayments, such as Fortescue, Pirates and Parsons Bays, and Port Arthur.

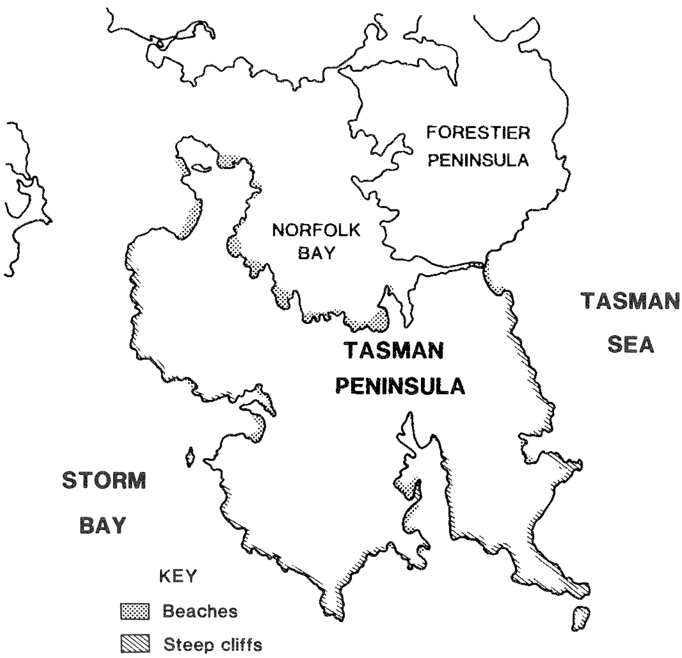


FIG. 1 — Distribution of beaches and cliffs along the Tasman Peninsula coast.

Bathymetry

Depth, apart from affecting light penetration and the subsequent position of the photic boundary, can also affect the distribution of animal communities. The nearshore zone of the peninsula has three distinct depth-related features: the deep eastern and southern coasts, often to 40 m below the tide mark; the shallow northwestern and northern coasts, sloping gently down to 10 m; and the primary embayments which have both shallow areas and deep areas with steep bottom profiles.

The continental shelf off southeastern Tasmania is narrow. The shelf break, defined by the 200 m contour, is situated only 20 km from the peninsula's southeastern tip (fig. 2). Furthermore a deep trench is located less than 5 km from Tasman Island.

Wave and Tidal Exposure

The strengths of wave-generated surge and tidal streams are major factors in determining the distribution of inshore epifauna and flora. The peninsula's coastline and its adjacent subtidal habitats are exposed in varying degrees to weather from all directions. The eastern and southern coasts are directly exposed to wave action from either southeasterlies or the prevailing southwesterly winds. Fetches are relatively shorter in Norfolk and Frederick Henry Bays; consequently, habitats in these areas are much more sheltered.

Tides are semidiurnal, of low amplitude and generally with low flow rates. Although not well understood, their direction and strength appear to be largely related to meteorological factors. Current speeds are typically slower in sheltered areas than along the exposed open coast.

Climatic Factors

Weather has a strong influence on the environments of the nearshore zone. Winds and pressure gradients affect wave climates, tidal patterns, turbidities, water temperatures and the distribution and quantity of

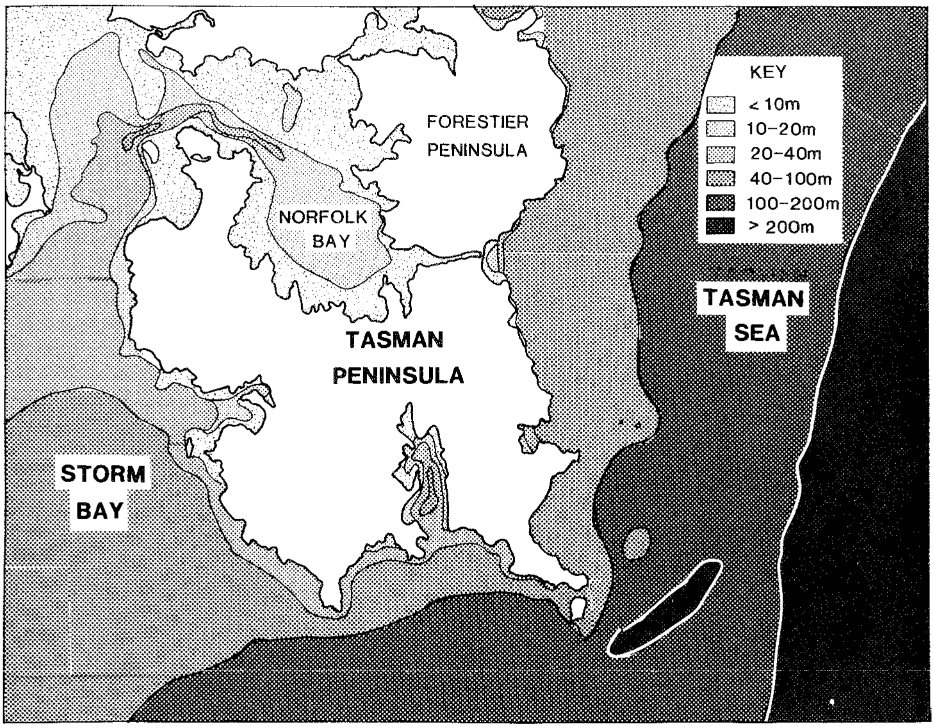


FIG. 2 — Bathymetry of southeastern Tasmania.

freshwater runoff. Average precipitation, which ranges between 750 and 1250 mm annually (Langford 1965), is close to that of eastern, and less than that of western, Tasmania. As there are no large rivers on the peninsula, runoff into the sea is not concentrated in any particular area.

DESCRIPTIONS OF SUBTIDAL HABITATS

Macrohabitats of the nearshore zone are frequently classified by ecologists into three broad types: sedimentary (soft-bottom), reef (hard-bottom) and pelagic (open water) (e.g. Peres 1982). Major types of subtidal habitats within the infralittoral and circalittoral zones of the peninsula are discussed separately.

1. Soft-bottom Habitats

Sheltered Infralittoral (seagrass communities)

The subtidal bottom profiles in these areas are typically flat, with up to 3 km intertidal zones on the adjacent sheltered beaches.

Bare sand/mud substrates

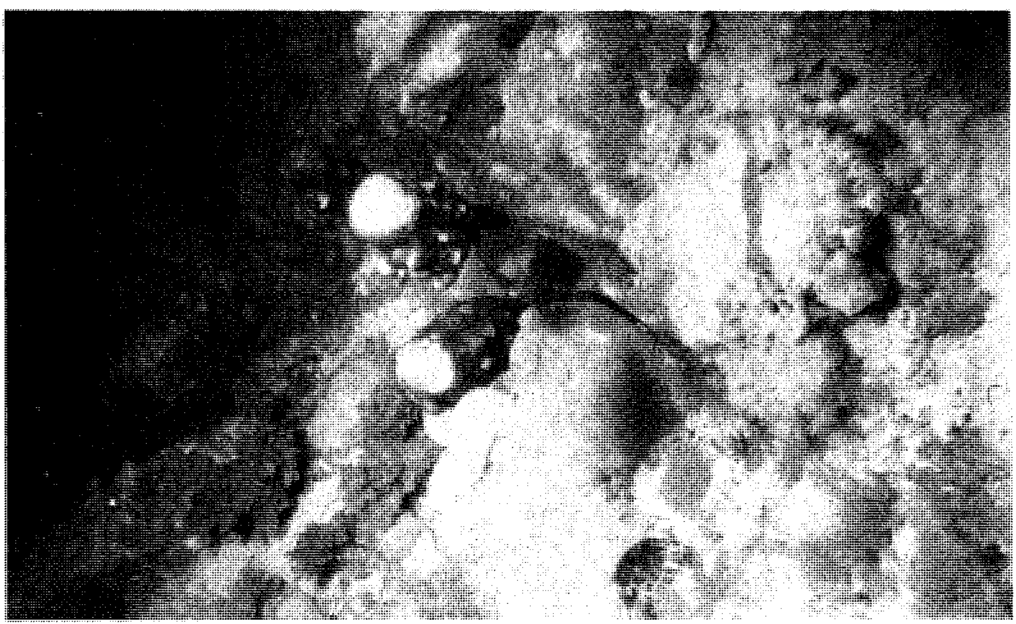
These range from fine sands to mud, generally becoming finer in grain size with depth or in areas where turbulence is minimal. In the highly protected Eaglehawk and Little Norfolk Bays, much of the substrate is barren, muddy clay with occasional sponges or with sparsely distributed macrophytes covered with *Electrona*. Off the more exposed Sloping Main shoreline, the substrate is largely bare sand but more commonly these sediments grade into seagrass beds or appear as small, bare patches within stands. The ecotone between them is narrow.

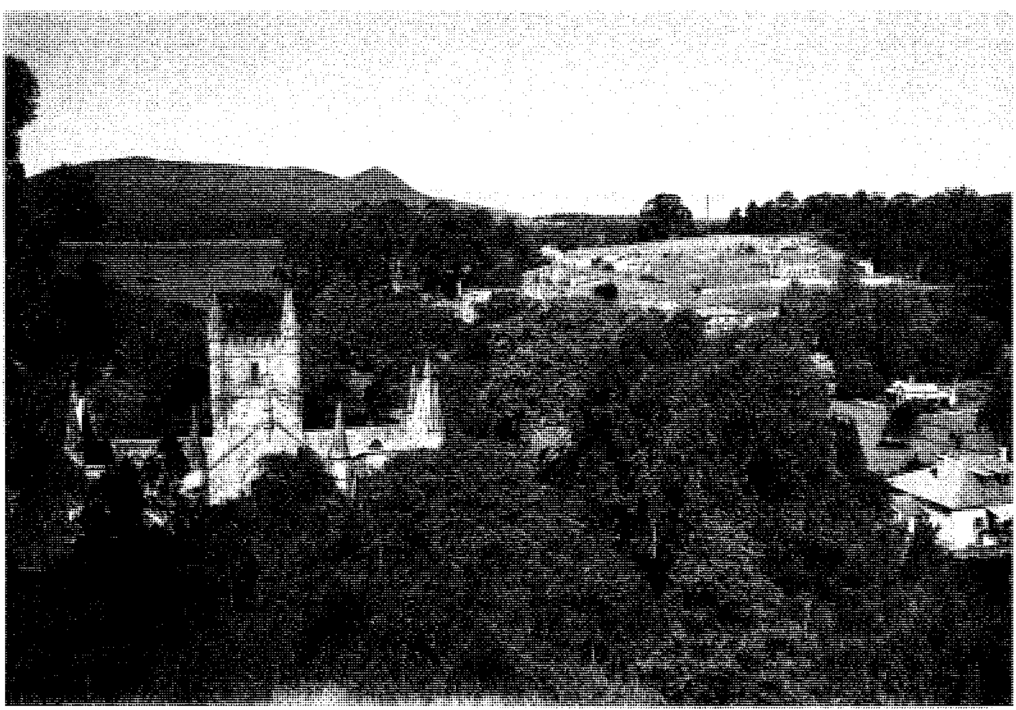
ABOVE: Dense stand of the towering kelp Macrocystis pyrifera. *Plants attached by holdfasts to the rocky substrate, extend up to 25 m to the surface along exposed parts of the coast. (Photo A. McGeary-Brown)*

OPPOSITE ABOVE: Panoramic view of Port Arthur ca late 1860s. (Courtesy of the Archives Office of Tasmania)

OPPOSITE BELOW: Similar view showing Port Arthur today. (Photo Wilf Elvey, Tasmap Photographics, Dept of Lands, Parks & Wildlife, Tasmania)

BELOW: Surface of a shaded rock wall on the exposed coast. Kelps are replaced by colourful encrusting invertebrates such as tunicates, bryozoans and bright yellow zooanthids. (Photo P. Last)





Seagrass stands

The seagrass *Heterozostera tasmanica* (Martens ex Aschers.) den Hartog dominates these habitats. It forms dense stands in the shallows throughout most of Norfolk Bay and in large parts of Wedge and Parsons Bays and Port Arthur. Smaller areas occur in sheltered parts of Pirates and Fortescue Bays. A second seagrass, *Halophila ovalis* (R. Br.) Hook. f., is present on deeper sandy substrates with strong current flow; the two species that dominate similar areas of Bass Strait, *Amphibolis antarctica* (Labill.) Sonder & Aschers. ex Aschers. and *Posidonia australis* Hook. f., do not occur in this area. The algal component consists of a number of small red and green macophytes and red epiphytes.

Sheltered Circalittoral (muddy-bottom communities)

This habitat is concentrated in the deeper parts of Norfolk Bay. Because of poor average transparencies in this bay, the aphotic zone often begins near the 15 m contour. The very soft, muddy clay substrate is typified by a smooth surface, with a poorly developed, sessile macroinvertebrate assemblage. Towards the more exposed entrance of the bay, the substrate is generally of coarser grain and the hydroid, *Sertularella*, is moderately abundant.

Exposed Infralittoral (sandy bottom/drift algae communities)

Sandy substrates

Compared to the sheltered infralittoral, this habitat has a steeper gradient and a coarser grain structure, with no attached vegetation and rarely any attached epibenthic invertebrates. Constant or severe intermittent wave action has eroded and modified the substrate, preventing attachment of epibenthos. An assemblage of cryptic infaunal invertebrates and burying fishes (flounder and sandfishes), which are not found in sheltered habitats, have adapted to life in this harsh environment.

Drift algae

After heavy storms, patches of detached kelps and seagrasses drift in the infralittoral fringe, where they are grazed upon or eventually rot. They support a unique assemblage of invertebrate grazers, dominated by amphipods and mysids (Robertson & Lenanton 1984), and predatory fish such as juvenile *Sillago bassensis* Cuvier, *Contusus richei* (Freminville) and *Syngnathus tuckeri* Scott.

Exposed Circalittoral (silt-bottom communities)

Medium-grain sand substrates extend into depths of more than 30 m. At greater depths, and sometimes shallower, the bottom consists mainly of finer grain silts. The substrate surface is generally bare, however, small isolated sponge patches may occur in some areas.

2. Hard-bottom Habitats

Sheltered Infralittoral (sheltered "photophilic algae" communities)

Habitats in this zone are dominated by algal species that are generally confined to depths shallower than 10 m because of poor light penetration through water of high turbidity.

Facies of *Cystophora torulosa*

Forms a narrow band in the eulittoral zone, frequently in association with *Hormosira*.

Sargassum assemblage

Dominated by the fucoid algae *Sargassum bracteolosum* J. Ag., *S. verrucolosum* (Mert.) J.Ag., *Cystophora retroflexa* (Labill.) J. Ag. and *Caulocystis cephalornithos* (Labill.) Aresch. Other smaller, less obvious plants, such as *Zonaria* spp. and *Carpoglossum* sp., occur in high densities below the main canopy. Laminarians are typically absent from this zone. In some areas the grazing activities of the urchin *Heliocidaris erythrogramma* (Valenciennes) have denuded algae from small patches of reef, leaving bare rock flats covered with crustose coralline algae, bryozoans and a few encrusting sponges.

Facies of *Caulerpa trifaria*

The green alga *Caulerpa trifaria* Harv. often forms part of the above assemblage but becomes singularly dominant at greater depths. It also forms an ecotone with benthic invertebrates of the circalittoral zone.

Sheltered Circalittoral (sponge communities)

This zone is characterised by its depauperate fauna consisting mainly of sponges, the dominant species being *Phyllospongia calciformis* Carter. These sponge beds, which in some areas begin in 6 m depth, are generally densest in the upper circalittoral. Where the bottom is covered with a coat of fine sediment, such as in the deep channels near Slopen Island, few sponges are attached.

Exposed Infralittoral (exposed "photophilic algae" communities)

Facies of *Durvillea*

The uppermost part of this zone is dominated by the large fucoid kelp *Durvillea potatorum* (Labill.) Aresch. Narrow bands of *Xiphophora gladiata* (Labill) Mont. ex Kjell may occur above and below the *Durvillea* belt, but kelps are generally absent from the frond-swept area between. On steep slopes this belt is often narrow, extending to only a few metres below the surface, however, on more gently sloping gradients, such as those in Crescent Bay, *Durvillea* may extend to about 15 m.

Facies of *Lessonia/Phyllospora*

The substrate below the *Durvillea* belt is dominated by either *Lessonia corrugata* Lucas or *Phyllospora comosa* C. Ag. The competitive interactions and the reason for dominance by one or other of these species are unclear, but different physical requirements might be responsible (Edgar 1984). *Lessonia* seems to prefer shallower, cooler water and steeper bottom profiles than does *Phyllospora.* This band, although generally much shallower, may extend to about 20 m.

Ecklonia/mixed algal communities

On all but the steepest substrate gradient, this belt is the most botanically diverse and most productive of the infralittoral assemblages. Its zonation patterns are also more difficult to interpret. In parts of southeastern Tasmania, where exposure is greatest and transparencies are high, this assemblage may extend to almost 30 m. In deeper, more exposed, areas the dominant kelp is *Ecklonia radiata* (C. Ag.) J. Ag.. The green alga *Caulerpa flexilis* Lamaroux, a fucoid *Cystophora platylobium* (Mert.) J. Ag., and a suite of red algae, particularly *Phacelocarpus*, are also abundant. *Ecklonia* also commonly occurs in middle parts of this belt but plants generally have shorter stipes and are more densely spaced than at the deeper limits of their distribution. In shallower, less exposed areas, it is a minor component of a diverse assemblage of smaller algae (e.g. *Cystophora xiphocarpa* Harv., *C. retorta* (Mert.) J. Ag. and *Carpoglossum confluens* (R. Br.) Kutz).

Macrocystis community

The euryphotic "giant kelp" *Macrocystis pyrifera* (L.) C. Ag. forms stands that extend upwards to the surface in depths exceeding 20 m. Isolated plants are widely distributed along the exposed coastline, however, the greatest concentrations occur in semi-exposed areas. In parts of Port Arthur, and in Pirates and Fortescue Bays, where substrates are horizontal, it may form dense canopies on the surface. In such areas, depending on depth and average turbidity (and consequently the amount of light filtering to the substrate), the bottom assemblages may resemble those of the circalittoral zone.

Exposed Circalittoral (colonial invertebrate/sciaphilic algae communities)

Facies of *Sonderopelta/Thamnoclonium*

The upper circalittoral, or precoralligenous, subzone is typified by the absence of fucoid and laminarian kelps. Small macrophytes are present in the form of sciaphilic rhodophytes such as *Sonderopelta* and *Thamnoclonium.* The substrate is coralline and a broad suite of invertebrates, which includes sponges, hydroids, bryozoans and ascidians, are abundant. The width of this belt depends largely on the substrate gradient and on regional turbidity. In the deep, clear waters off the Hippolyte Rocks, soft red algae occur below 35 m.

Colonial invertebrate communities

The coralligenous assemblages of the middle and lower circalittoral occupy the deepest nearshore habitats. The compositions of these diverse communities, which occur 50 m depth or more, have not been described. Although coralline algae are moderately abundant on the substrate, few soft algal species survive at these depths. Hydrozoans, gorgonians, alcyonarians, sponges, bryozoans and ascidians are dominant elements of these communities. The sizes, densities and species compositions of these assemblages may be correlated to tidal movement. Larger, less fragile, filter feeders, such as the sea fan *Mopsea whiteleggi* Thomson & Mackinnon, the sea whip *Primnoella australasiae* Gray and a suite of large sponges, are most abundant on substrates over which current speeds are greatest. On substrates with low flow rates, smaller sponges and gorgonians (*Acabaria* sp., *Clathraria* sp.), bryozoans and hydrozoans are more abundant.

Submarine Caves and Crevices (cavernicolous communities)

Caves and crevices, and to a lesser extent walls, form a unique, common and randomly distributed habitat within the nearshore zone. Light is either reduced or eliminated, resulting in the absolute or partial removal of plants within the photic zone.

Submarine crevices

The structural complexity of reefs depends largely on their geological composition and on the erosional effects of wave action and tides. Tunnels and crevices have different forms in different rock types. On harder, more resistant, igneous substrates they appear as fissures or as irregularly shaped holes between large boulders. In more friable sedimentary rocks, which erode more easily, narrow horizontal crevices may extend deep into the substrate. In the absence of a protective rock overhang, the normal reef flora usually extends around the entrance of the crevice. Depending on the depth of the cavity and hence the level of light penetration, assemblages on the walls may resemble those of a sciaphilic algal community, a colonial invertebrate community or a specialised cavernicolous community. Generally, short macro-invertebrates predominate.

Submarine caves

Parts of the exposed coast, particularly in the east, contain huge caves over 10 m high and 100 m long. Although species exhibit spatial preferences in these caves, they do not appear to form associations or closed communities (Bryan 1984). The walls of caves near the surface, which are normally exposed to severe scouring from wave-induced surge, are generally bare, with small aggregates of sessile organisms confined to holes or indentations on the walls and roof. At the other extreme, highly protected caves may have a dense cover of colonial invertebrates. In these caverns, of which there are good examples at Waterfall Bay, strong zonation patterns emerge. Sessile cnidarians and bryozoans are major components on the walls in the inner half of these caverns, but further inward they are largely replaced by various species of sponges. On the roofs, however, some species, such as *Clathrozoon wilsoni* (Spencer) and a very conspicuous yellow zooanthid, which on the walls are confined to the cave entrance, spread along the full length of the cave.

Submarine cliffs and overhangs

Along the deep southern and eastern coasts, sea walls may extend vertically from the surface down to 30 m. Their orientation to the sun helps determine their biotic compositions. Because they receive less incident light than those facing north, the algal assemblages on cliffs facing south are displaced towards the surface. The more heavily shaded cliffs and overhangs have faunal compositions resembling those on the roof entrances of caves.

Wrecks and Pier Piles (artificial reef communities)

Artificial habitats in the form of wrecks and piers are rather scarce in this area. Their communities are generally similar to those of adjacent reefs.

Wrecks

The unfortunate 19th-century steamship S.S. *Nord*, resting on the bottom in Munros Bight in 30–40 m, harbours abnormally large populations of fishes that occur in reef habitats of the exposed circalittoral zone. Although other vessels have been wrecked in this area, their whereabouts are not generally known.

Piers

Two main jetties, at Masons Cove (Port Arthur) and at Doo Town (Eaglehawk Neck), are to be found in this area. Although both are small, their piles are shaded and have dense covers of encrusting sponges and bryozoans. The endemic southeastern Tasmanian threefin *Forsterygion gymnotum* Scott, rare through most of its range, is common on piles at Masons Cove.

3. Pelagic Habitats

The habitats of the more mobile communities of the pelagial zone are difficult to classify. Organisms of this major division of the marine environment comprise two main categories, plankton and nekton, according to their locomotory capabilities. The plankton consist of animals (zooplankton), plants (phytoplankton) and bacteria (bacterioplankton) that mostly drift with water currents and tides. More actively swimming animals such as large invertebrates and adult fishes form part of the nekton.

There have been few studies of plankton communities in Tasmanian waters. Taw (1973) studied zooplankton assemblages of southeastern Tasmania; an equivalent account of phytoplankton communities is still being undertaken (Hallegraeff, pers. comm.). As the structures and compositions of pelagic fish assemblages found around Tasman Peninsula are better known, they will be the focus of our attention.

Neritic (coastal pelagic)

This zone is occupied by a small suite of ten species, which are normally found over the continental shelf, occurring rarely in the open ocean. With the exception of *Engraulis*, *Hyporhamphus*, *Trachurus* and *Arripis*, these species are not particularly common in the peninsula area. *Hyporhamphus* is mainly neustonic and, along with *Engraulis*, is more abundant in sheltered habitats. In terms of biomass, *Trachurus* is the most important coastal pelagic species. Juvenile *Arripis* is the most abundant species off exposed beaches. The remaining fishes occur seasonally in exposed habitats.

Oceanic (offshore pelagic)

The ecotone between the oceanic and neritic zones off the eastern peninsula is relatively narrow because of the close proximity of the shelf break and the presence of deep water near the shore. A suite of large teleosts, including tunas, ribbonfishes, sunfishes and the gemfish *Rexea solandri* (Cuvier), and a few large predatory sharks, are reasonably common inshore. The gemfish, which is now caught by commercial trawlers on the continental slope in depths to 700 m (Last & Harris 1981), was once caught in large quantities by trolling on the surface (Johnston 1883).

BENTHIC FISH COMMUNITIES

Of the subtidal fauna, the fish communities are the best known. In addition to the information in Last (1983) and Edgar (1981, 1984), fishing surveys and recreational fishing and spearfishing competitions have provided reliable data on the composition of fish communities in this area. In accordance with other parts of southeastern Tasmania, very few of the 170 species known to occur in marine habitats of the peninsula are confined to only one of the habitats listed above. Most species exhibit preferences for either reef or soft-bottom substrates and for various depths or exposure levels within these environments. The fish fauna has been classified on the basis of apparent habitat preferences as indicated by the centres of abundance of each species (table 1, p.79).

Fish assemblages of soft-bottom habitats are more diverse in deeper areas than in the shallows. Also, the majority of fishes occurring on non-vegetated sediments are benthic forms. For example, on silt and detritic substrates the dominant groups are flounder, flatheads, gurnards, skates and rays. In contrast, in seagrass habitats the dense stands offer protection for a suite dominated by benthopelagic fishes that also occur regularly in shallow reef habitats, such as pipefishes, rock whitings and a leatherjacket *Acanthaluteres spilomelanurus* (Q & G).

Some of the 13 species associated with mud/sand substrates also occur commonly amongst seagrasses but are rarely found over shallow, exposed sands. Gobies are the major group and two species of *Nesogobius* are undescribed. Two estuarine fishes, *Pseudaphritis urvillii* (Valenciennes) and *Favonigobius tamarensis* (Johnston), frequently occur on these substrates. *Dasyatis* and *Myliobatis* are rare visitors during the late summer and autumn.

A small suite of five species is typically found off exposed beaches. Sandfishes (*Crapatalus* spp.) and the flounder *Ammotretis lituratus* (Richardson) bury in the substrate, partly avoiding the pounding surf. Pipefishes *Leptonotus* and *Syngnathus* are always found in association with detached macrophytes.

The compositions of the assemblages from dendritic and silty substrates have considerable overlap. Neither habitat has many resident species. There may be habitat partitioning among species of *Squalus*, *Raja*, *Urolophus* and *Platycephalus*, for the congenerics exhibit preferences for one habitat or the other. Juveniles of several demersal fishes that occur as adults on the outer continental shelf and upper slope are seasonally abundant in Frederick Henry and Norfolk Bays. A similar, but less striking, influx of deepwater species occurs off the deep exposed coast.

Infralittoral reef habitats are the most diverse part of the nearshore, with greater diversities on exposed than on sheltered coasts. Several higher taxa are represented but the main non-cavernicolous benthic groups are weedfishes (*Heteroclinus* spp.) and threefins (*Forsterygion* spp.). The benthopelagic component, consisting mainly of larger teleosts, is equally diverse. Wrasses (*Pseudolabrus* spp.), sweeps (*Scorpis* spp.), and several genera of leatherjackets and trumpeter, are among the dominant elements.

Few species exhibit a clear preference for circalittoral reef habitats. Almost all of the sheltered reef species occur commonly on exposed circalittoral reefs, but the converse does not apply. Most species are benthopelagic, although the benthic scorpionfish *Helicolenus percoides* (Richardson), which occurs frequently on the continental slope in 750 m, is common off the eastern coast.

Many of the species listed as preferring reef habitats also venture into caves and crevices. A mixed suite of 18 species, however, ranging from preferential cave dwellers to obligatory cavernicoles, is clearly identifiable. Whereas benthopelagic elements and some benthic species are highly conspicuous, most of the smaller benthic forms (eg. clingfishes, gobies and an undescribed genus and species of bovichthyid) are highly cryptic, emerging only at night or, in some cases, remaining concealed.

CONCLUSIONS

The nearshore zone of Tasman Peninsula contains a wide array of macrohabitat types, the distributions of which are controlled primarily by geomorphological, hydrological and meteorological factors. Although estuaries, present mainly as tidal creeks, are small and sparsely distributed, the heavily contoured coast contains a number of embayments with varying depth profiles and exposures. These embayments have both the deeper, more exposed habitats that typify much of the eastern and southern coasts, and the shallower, more sheltered habitats found in parts of Norfolk Bay.

The deeper and more exposed eastern and southern coasts are formed mainly of hard substrates. The reef topography is complex and variable, with drop-offs to 40 m. The sublittoral fringe is dominated by large brown algae, notably the bull kelp *Durvillea.* Cavernicolous habitats are well represented subtidally. Further offshore, stands of giant kelp *Macrocystis*, may extend to the surface from depths of 30 m or more. Fortescue and Pirates Bays and Port Arthur have small exposed beaches with loose sediments and no attached vegetation.

Much of the western coastline south of North West Head is shallower, with areas of exposed reef and beaches. In contrast, the northern coastline and Parsons Bay are more sheltered, consisting of extensive tidal flats with dense subtidal stands of the seagrass *Heterozostera.* The few reef areas are covered with a suite of green and brown algae and sponges.

Few fish species have narrow habitat preferences. Most of the 170 species of fish that are known to occur around the peninsula are found frequently throughout a range of habitats. Because of the close proximity of the continental shelf break and the deep water near the shore, subtidal communities are supplemented by a suite of fishes that normally occur further offshore.

The nearshore zone of the peninsula is an important playground for both the local and transient human population. Apart from its value to commercial and recreational fisheries, its underwater scenery is on a scale unrivalled anywhere along Tasmania's coastline. This aspect is only appreciated at present by a handful of divers who have been fortunate enough to look below the surface. In time, these features will be recognised as being among the area's greatest assets.

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REFERENCES

BRYAN, J., 1984: The distribution of sessile organisms in a submarine cave. Unpubl. B.Sc. Hons. thesis, Univ. Tasm.

EDGAR, G. J., 1981: An initial survey of potential marine reserves in Tasmania. *Occ. Pap. Tasm. Natl Pks Wildl. Serv.* 4: 87 pp.

EDGAR, G. J., 1984: General features of the ecology and biogeography of Tasmanian subtidal rocky shore communities. *Pap. Proc. R. Soc. Tasm.* 118: 173–186.

JOHNSTON, R. M., 1883: General and critical observations of the fishes of Tasmania; with a classified catalogue of all the known species. *Pap. Proc. R. Soc. Tasm.* (1882): 53–144.

LANGFORD, J., 1985: Weather and climate. *In* J.L. Davies (Ed): *ATLAS OF TASMANIA.* Lands and Surveys Department, Hobart.

LAST, P. R., 1983: Aspects of the ecology and zoogeography of fishes from soft-bottom habitats. Unpubl. Ph.D. thesis, Univ. Tasm.

LAST, P. R. & HARRIS, J. G. K., 1981: New locality records and preliminary information on demersal fish faunal assemblages in Tasmanian waters. *Pap. Proc. R. Soc. Tasm.* 115: 189–209.

LAST. P. R., SCOTT, E. O. G. & TALBOT, F. H., 1983: *FISHES OF TASMANIA*. Tasmanian Fisheries Development Authority, Hobart.

PERES, J. M., 1982: Zonations. General features of organismic assemblages in pelagial and benthal. Major pelagic assemblages. Major benthic assemblages. *In* Kinne, O. (Ed.): *MARINE BIOLOGY* V(1). John Wiley, Chichester, N.Y.: 9–45, 47–66, 187–311, 373–522.

ROBERTSON, A. I. & LENANTON, R. C. J., 1984: Fish community structure and food chain dynamics in the surf-zone of sandy beaches; the role of detached macrophyte detritus. *J. Exp. Mar. Biol. Ecol.* 84: 265–283.

TAW, N., 1973: Systematics, occurrence and abundance of Tasmanian east coast zooplankton and their value as biological indicators of hydrological conditions. Unpubl. Ph.D. thesis, Univ. Tasm.

TABLE 1

Preferred Habitats of Nearshore Fishes

Letters in parentheses represent important alternative habitats. Abundant species are marked with an asterisk. The nomenclature and order within the groups follow Last *et al.* (1983).

A — Mud/sand substrates (shallow, sheltered)
- *Dasyatis thetidis* (B,F)
- *Myliobatis australis*
- *Muraenichthys breviceps*
- * *Atherinosoma presbyteroides* (B)
- * *Aldrichetta forsteri* (K)
- *Pseudaphritis urvillii*
- *Favonigobius tamarensis*
- *F. lateralis*
- *Nesogobius hinsbyi*
- * *N.* sp.1
- *N.* sp.3
- *Taratretis derwentensis*
- * *Torquigener glaber*

B — Seagrass (shallow, sheltered)
- *Atherinosoma microstoma*
- *Atherinason esox* (A)
- *A.* sp. (A)
- *Stigmatopora argus*
- * *S. nigra*
- *Urocampus carinirostris*
- * *Gymnapistes marmoratus*
- * *Haletta semifasciata* (F)
- *Nesogobius pulchellus* (A)
- *Tasmanogobius* sp.1 (A)
- * *Acanthaluteres spilomelanurus* (F)

C — Detritic substrates (deep, sheltered)
- *Squalus acanthias*
- *Raja lemprieri*
- * *Urolophus cruciatus* (A)
- *Macruronus novaezelandiae*
- *Genypterus blacodes* (E)
- * *Brachionichthys hirsutus*
- *Solegnathus spinosissimus*
- *Hippocampus abdominalis*
- *Paratrigla papilio*
- *Pterygotrigla polyommata*
- *Platycephalus bassensis* (E)
- *Acanthopegasus lancifer*
- * *Sillago bassensis*
- *Seriolella punctata* (E)
- *Foetorepus calauropomus*
- *Arnoglossus andrewsi*
- *Ammotretis macrolepis*
- * *A. rostratus* (A)
- * *Rhombosolea tapirina* (A)

D — Sand substrates (shallow, exposed)
- *Leptonotus semistriatus*
- *Syngnathus tuckeri*
- * *Crapatalus arenarius*
- *C.* sp.
- * *Ammotretis lituratus*

E — Silt substrates (deep, exposed)
- * *Galeorhinus australis* (C)
- *Mustelus antarcticus* (C)
- * *Squalus megalops* (C)
- *Pristiophorus nudipinnis*
- * *Narcine tasmaniensis*
- *Raja whitleyi*
- * *Urolophus paucimaculatus*
- *Callorhynchus milii* (C)
- *Coelorinchus australis*
- *Brachionichthys* sp.3
- *Trichophryne furcipilis*
- *Cyttus australis*
- *Zeus faber*
- *Chelidonichthys kumu*
- *Lepidotrigla mulhalli*
- * *Platycephalus richardsoni*
- * *Parequula melbournensis* (D)
- *Upeneichthys* sp.
- *Kathetostoma laeve* (A)
- *Contusus richei* (C)

F — Reef (shallow, sheltered)
- *Phyllopterys taeniolatus*

Table 1 cont.

* *Scorpaena papillosus* (H)	I — Reef (deep, exposed)
Gnathanacanthus goetzeei	*Parascyllium ferrugineum*
* *Trachinops caudimaculatus* (H)	* *Helicolenus percoides*
Cheilodactylus nigripes	* *Caesioperca lepidoptera*
Dotalabrus aurantiacus	*Callanthias allporti*
* *Pictilabrus laticlavius* (I)	* *Nemadactylus macropterus*
* *Neoodax balteatus* (B)	*Latris lineata*
Siphonognathus beddomei (I)	*Suezichthys* sp.
Forsterygion gymnotum	*Siphonognathus attenuatus*
F. multiradiatum	* *Parika scaber*
* *Cristiceps australis* (B)	*Thamnaconus degeni* (H)
Heteroclinus adelaidae	
* *H. perspicillatus* (B,I)	J — Caves/crevices
Nesogobius sp.3	*Conger verreauxi*
* *Meuschenia freycineti*	*Paratrachichthys trailli*
* *Aracana aurita*	*Maroubra perserrata*
* *Diodon nicthemerus*	* *Apogon conspersus*
	Pempheris multiradiatus
G — Reef (deep, sheltered)	*Girella elevata (H)*
* *Pseudophycis bachus*	*Kyphosus sydneyanus*
Genypterus tigerinus	*Melambaphes zebra* (H)
Neosebastes scorpaenoides (F)	* *Bovichthys variegatus*
* *Caesioperca rasor* (H)	*Bovichthyid* sp.
Brachaluteres jacksonianus (C)	* *Pictiblennius tasmanianus* (H)
	Norfolkia striaticeps
H — Reef (shallow, exposed)	*Ophiclinus gracilis*
Cephaloscyllium laticeps	*Sticharium dorsale* (K)
Lotella rhacinus (J)	*Callogobius mucosus* (H)
* *Pseudophycis barbata* (F)	*Satulinus* sp.
Brachionichthys politus	*Aspasmogaster tasmaniensis*
B. sp.1	*Creocele cardinalis*
Dinolestes lewini	* *Alabes dorsalis*
Scorpis aequipinnis	
S. lineolatus	K — Coastal pelagic
Atypichthys strigatus	*Spratelloides robustus*
* *Pentaceropsis recurvirostris* (J)	* *Engraulis australis*
Parma microlepis (J)	* *Hyporhamphus melanochir*
Chironemus marmoratus (J)	*Atherinason hepsetoides*
* *Dactylosargus arctidens*	*Pseudocaranx dentex*
* *Cheilodactylus spectabilis* (K)	*Seriola lalandi*
* *Latridopsis forsteri*	* *Trachurus declivis*
Mendosoma allporti	*Arripis trutta*
* *Pseudolabrus fucicola*	*Thyrsites atun*
* *P. psittaculus*	*Scomber australasicus*
* *P. tetricus*	
Heteroclinus forsteri	L — Oceanic
H. heptaeolus (F)	*Alopias vulpinus*
H. johnstoni	*Carcharodon carcharias*
H. puellarum (J)	*Isurus oxyrinchus*
H. wilsoni (F)	* *Prionace glauca*
H. sp.2	*Trachipterus arawatae*
Seriolella brama	*Regalecus glesne*
Cochleoceps sp.	*Rexea solandri*
Eubalichthys gunnii (J)	
* *Meuschenia australis*	
* *Penicipelta vittiger* (F)	