

## Table 6.—Classification and distinctive features of the shoal marine habitats of Saipan [symbols of grain size; F=median diameter <0.25 mm, M=0.25 to 0.5 mm, C=0.5 to 1.0 mm, VC=1.0 to 2.0 mm; median diameter greater than 2.0 mm is gravel. [symbols of coefficient of sorting: VC=1.3 to 1.8, F=1.8 to 2.5, P=>2.5]

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| pal             |  | Part.                                      | Dromiti 1  |  |   | Substrate (exclusively Ca   | aCO3 except as noted different |                      | <b>y</b> )   | Manuel   | LIBRAR  | Photograp                                      |
|-----------------|--|--|--|--|---|---|--------------------------------|----------------------|--|--|---|--|
| at<br>vi-<br>s  | Biotope  | Facies<br>No.                              | Prevailing depth of<br>water, in feet              | Location   | Rock  | Gravel  | Sa.<br>Grain size              | Sorting              | Special notes  | Macroflora<br>(See also appendix)  | Fauna<br>(See also appendix)  | Photogr<br>plate a<br>figur                    |
|                 | I. Mainly limesand bottom with seaweed.  | 1-5  | <18  | Nearshore and offshore   | Locally cavernous limestone under thin limesand cover.  | None observed   | F-C                            | VG-F                 | Differences are in occurrence of hard bottom patches and rela-   | Sparse to thick cover of angio-<br>sperms and green algae.   | Annelids, holothurians, starfish, echinoids, strombid gastropods and sponges vary with  | 123, 124 <i>B</i> ,<br><i>C</i> , 126 <i>A</i> |
|                 | with seaweed.  |  |  |  | under with inflessated oo voir  |   |                                |                      | tive thickness of limesand cover inferred from same.   | oponio ma groun diguor   | density of vegetation. Browsing and detritus-<br>feeding gastropods <i>Tricolia</i> and <i>Cerithium</i><br>abundant, and <i>Foraminifera Textularia</i> and<br><i>Heterostegina</i> rare.  |  |
|                 |  | 1  | <6   | Alongshore in port area  |   | do  | F+-C+                          | F+                   | Much organic matter and relatively large fine fraction in sands.   | angiosperm growth in foul-water area of port.  | do  |  |
|                 |  | 2  | <13  | Nearshore in port area   | Cavernous under thin limesand.  | Broken Acropora locally   | F-M                            | VG-F                 | Sands thin over rock   | Sparse to moderately dense cover angiosperms, especially Zostera, and noncoralline algae.  | As above, with small fish, ophiuroids, and such in locally cavernous rock bottom, and even-scattered Porites lutea, Pocillopora, and Heliopora in very murky nearshore water.   |  |
|                 |  | 3  | <13  | shallow lagoon.  | None observed   |   | M-C<br>F-C                     | G-F                  | Sands relatively thick, no rock  | Abundant, principally Zostera,<br>Enhalus, Caulerpa and Hali-<br>meda. Local coralline algae.<br>do  | Like biotope I in general   |  |
| SS              |  | 5  | 4-18   | lagoon and moat margins.  Mostly offshore, some small patches nearshore.   |   | do  | M-C                            | G-F                  | floor observed.  |  | Like biotope I in general, except for sparse Acro- pora growth locally.   | 126A, 1  |
| nd shelves      | II. Shallow area of gravel trains with scattered living coral and algae.                           | 6  | 3-13   |  | do  | Much present, pebbles and cobbles.  | o-vo                           | G-F                  | Gravel oriented in strips parallel to current movement and reef.   | mon. Retarded or absent  | Occasional staghorn Acropora and faviid corals<br>on more stable gravel ridges. Gravel-dwelling<br>organisms of various sorts. Holothurians   |  |
| limesa          | III. Staghorn Acropora zone of outer lagoon shelf.   | 79   | 4-13   | Outer lagoon shelf   | do  | Occasional small patches of broken Acropora.  | σ                              | G                    | Bottom mainly even in facies 7-8, highly irregular in facies 9.  | Mainly absent  | scattered to abundant staghorn Acropora is distinctive, plumose sand-dwelling annelids numerous.  | 123, 124A                                      |
| narginal        |  | 7<br>8                                     | 6-114-10   | shelf.   |   | do  | o<br>o                         | G<br>G               | Limesand bottom on almost level plain.   | do   | Scattered growth of staghorn Acropora (A. arbu-<br>scula) locally common.  Abundant staghorn Acropora (A. nobilis) locally<br>preponderant.   | 123, 126 <i>C</i>                              |
| er and r        |  | 9  | 20+ away from reefs                                |  | do  | do  | C+                             | G+                   | Markedly irregular bottom,<br>mounds and ridges of sand with<br>several feet of relief.  | do   | Abundant staghorn Acropora of species A. arbuscula.   | 127A, 1<br>B, D, 1<br>124A.                    |
| oon prop        | IV. Interspersed reef patches<br>and limesand of lagoon<br>proper.                                 | 10-13                                      | 10-40+ with reefs awash.                           | In and adjacent to Tanapag harbor area.  | Dead and living coral-algal<br>rock of reef patches and<br>rocky patches on lagoon  | Patches of broken coral and some reef talus.  | F-VC                           | VG-G                 | Ripple marked sands surround rocky reef patches.   | Sparse and local on sands, mainly coralline algae on reef patches.   | Reef patches with impoverished coral fauna,<br>abundant and varied borers and crevice<br>dwellers. Sands with plumose tube-building   | 127B.  |
| Lago            |  | 10   | 10-32 with reefs awash                             | bor area.  | floor.  | Thin patches of coral-algal rubble.   | F-C                            | VG-G                 | Reef patches rare, of dead coral-<br>algal rock and dull-colored pave-<br>ment algae.  | do   | annelids.  As above, with occasional strikingly large individual Lobophyllia heads that spall off to algalcoated gravel on the sides.   | 1  |
|                 |  | 11   | 10-32 away from reefs                              | Tanapag harbor area.   | do  | do  | M-C                            | VG-G                 | Reef patches common, mainly<br>dead coral-algal rock with ex-<br>tensive local encrustation of liv-<br>ing coralline algae.  | do   | As above, Lobophyllia heads near transition to factes 10 at north side of harbor.   |  |
|                 |  | 12   | 10-40+ away from reefs.                            | West and southwest fringes of Tanapag harbor area.   | do  | Local heaps of coral-algal<br>rubble, as from disinte-<br>grated small reef patches.  | M-VC                           | G                    | Reef patches abundant with<br>mainly dead or algal- or de-<br>tritus-veneered surfaces.  | As above, except that reef patches<br>at south side of main lagoon<br>pass are conspicuously veneered<br>with living coralline algae.  | Generally sparse living coral increases toward main lagoon pass.  | 123A, 127                                      |
|                 |  | 13   | 10-15 with reefs awash.                            | Northwest margin of Tanapag harbor area.   | do  | None observed   | M-C                            | G                    | Reef patches scattered to abundant, with much living coral and algae on surfaces.  | Sparse and local on sands, mainly coralline algae on reef patches.   | Relatively abundant living coral on reef patches especially Acropora palifera, Porites lutea, Goniastrea and other faviids, and encrusting  |  |
|                 | V. Dredged areas, mainly of lagoon proper.   | 14, 15                                     | 4-50+).  | and various boat chan-<br>nels.  | Scattered low mounds of coral rock.   | do  | M-O                            | F                    | Bottom seen only locally owing to general murkiness of this current-swept area.  | Probably sparse  | Montipora. Sand-burrowing mollusks nearshore. Foraminifera abundant. Living coral scarce.   | 123, 124B<br>125B.                             |
|                 |  | 14<br>15                                   | 25-45<br>4-10                                      | Tanapag harbor proper<br>and entrance channel.<br>Various boat channels  | None observed   |   | M-C<br>M+-C+                   | F<br>F+              |  | Much Halimeda locally  | Sparse  | 123, 124B,<br>123, 124B,<br>125B,              |
|                 | VI. Outer moat floor of coral-<br>algal bosses with gravel<br>and sand.                            | 16, 17                                     | <6   | Offshore in northern moat.   | Many dead and living coral and algal bosses and much rock floor.  |   | M+-VC+                         | G-F+                 | Sand and gravel surrounding or within rocky areas.   | meda, Padina, etc.   | Pocillopora damicornis caespitosa is most abundant, Acropora palifera common.   | 123A, 124<br>127C.                             |
| ats             | 1 2000   | 16   | <6   | Southwestern part of northern moat.  | Large areas of dead coral-<br>algal rock, with crusts of<br>living material locally.  | Greatly preponderant over sand.   | do                             | do                   | Sand mostly as tongues, irregular patches, or as gravel and hole fillings in the rocky areas.  | do   | Common corals besides above include Acropora<br>cf. A. humilis, Montipora tuberculosa, Porites<br>lutea, Faria stelligra, Goniastrea pectinata,<br>Leptoria phyrqia, Platygyra sinensis, and  |  |
| ш               |  | 17   | <6   | Northeastern part of northern moat.  | Thin patches and irregular bosses of living and dead coral and coralline algae.   | Abundant  | do                             | do                   | Sand and gravel surround the rocky areas.  | do   | Heliopora coerulea.  Some of above corals are common here, also Sty- lophora, Psammocora, and Leptastrea. Pocil- lopora is relatively more abundant and Acro-   |  |
| contiguous      | VII. Bottom matted with living coralline algae.  | 18, 19                                     | 1-3  | Southern moat and one small patch on lagoon  | Present under thin mantle of living coral.  | Pebbles and cobbles locally   | F+-C+                          | F+                   | Little detritus present  | Matted with living coralline algae, as well as abundant <i>Halimeda</i>  | pora palifera relatively less abundant than in<br>facies 16.<br>Crevice-dwelling ophiuroids, annelids, and fish   | 125 <i>D</i> .                                 |
| The             |  | 18   | 1-3  | shelf.   | do  | do  | F+-C+                          | F+                   | do   | and other seaweed.  Nearly continuous mat of coralline algae, with sparse to patchy growth of green seaweed.   | do  | 125D.  |
|                 |  | 19   | 1-3  | Southern moat  | do  | None observed   |                                |                      | Almost detritus-free algal floor   | Mat of coralline algae, with numerous small but dense patches of green seaweed.  | do  |  |
| moat            | VIII. Clean limesand with little or no seaweed.  | 20-22                                      | <8<  | Inner and outer moat margins.  | Carvernous under thin lime-<br>sand locally.<br>Absent  | Rare patches of broken-up coral. Small amounts locally  | F-C+<br>F-M                    | VG-F<br>F            | Sands are the cleanest and most<br>nearly lifeless observed.<br>Weak wave action and sediment<br>source accounts for spareness of  | Sparse to moderate, locally  | Holothuria atra; Linkia laevigata, hermit crabs, and plumose annelids.  | 125 B.   |
| and             |  | 21   | <6   | do   | Cavernous under thin lime-<br>sand locally.   | Absent  | F+-C+                          | G+                   | gravel in occurrences at outer<br>lagoon fringe.<br>Limesand thinly mantles carvern-<br>ous substrate of internatted   | Sparse to moderate toward shore. Approaches, have characteristics  | Holothuria atra abundant  | 123A.  |
| to lagoon       |  | 22   | Intertidal   | Longshore bars of southern moat.   | Absent  | do  | F-M                            | VG                   | dead coralline algae and broken<br>branching coral.<br>Bar sands   | of facies 2. Absent  | Almost devoid of macrofauna except occasional hermit crabs.   |  |
| mmon            | IX. Mixed limesand and cal-<br>careous gravel at reef fringe<br>of very shallow lagoon or<br>moat. | 23, 24                                     | <5   | Outer part of shoal lagoon<br>or moat, southern third<br>of western reef complex.  | Cavernous under thin gravel and sand.   | conspicuous.  | c-vc                           | F                    | Coraliferous and algal gravel with only weak linear orientation.   | Patches of Halimeda and other green seaweed locally.   | mainly staghorn Acropora and Pocillopora damicornis caespitosa.   |  |
| Habitats co     |  | 23   | <5   | do   | None observed   | Pebble and cobble gravel in about equal proportion with sand.   | C-VO                           | F                    | Bottom sediments finer than those of faces 24, and with more living coral.   | Uncommon   | As above; also Porites lutea, Astreopora myriop-<br>thalma, Montipora lobulata, and species of<br>Favia, Leptoseris? and Stylocoeniella. Also<br>various alpheids, ophiuroids, and gastropods.  |  |
| Hal             |  | 24   | <5   | Outer part of shoal lagoon<br>or moat, southern fourth<br>of western reef complex.   | Cavernous algal and branching coral substrate under thin gravel and sand cover.   | Cobble to pebble gravel preponderates over coarse limesand.   | C+-VC+                         | F+                   | Bottom sediments coarser than those of facies 23, and with less living coral.  | Patches of <i>Halimeda</i> and other green seaweed locally.  | More sparse coral fauna than above  | 125C, D.                                       |
|                 | X. Larger reef patches and<br>reef clusters of lagoon and<br>offshore shelf.                       | 25-30                                      | Wave-breaking to intertidal.                       | Margins of main lagoon and offshore shelf.   | Preponderantly of living and lesser dead coral-algal rock.  | Minor   | M+-VC                          | VG-F+                | Sediment restricted to minor local<br>pockets or films on coral-algal<br>reef patches and sands between  | Crustose coralline algae important reef builders at many places.   | Heliopora, Lobophyllia, and Porites are important reef builders. Usual borers and crevice nestlers present.   | 123, 124, 1<br>128 <i>B</i> .                  |
|                 |  | 25   | do   | Offshore between Flores and Dogas points, Tanapag lagoon.  | do  | do  | o                              | G                    | reef patches. Lagoonal reef clusters mainly living, with coarse sand between appressed reef patches.   | Branching Lithophyllum an important reef builder.  | Lobophyllia (with Lithopyllum) important reef<br>builder. Also conspicious are scattering of<br>reef-dwelling mollusks, alpheid shrimp, and   |  |
| tures           |  | 26   | do   | Off Dogas point, Tanapag<br>lagoon.  | do  | do  | C+-VC                          | G+-F+                | As above marginally, but grades to <i>Helipora</i> platform with only local patches and pockets of   | Uncommon except for encrusting coralline algae locally.  | ophiurioids.  Heliopora coerulea principal reef builder   | 123A, 124                                      |
| eef struc       |  | 27   | do   | Offshore from Flores point, Tanapag lagoon.  |   |   | C+                             | G+-F+                | limesand. Clustered lagoonal mounds and platforms of massive coral with minor coarse limesand between.   | do   | Common reef builders are Porites lutes, Helio-<br>pora coerulea, Montipora, Goniastrea, and<br>Plutygyra.   |  |
| Minor r         |  | 28   | do   | Off Muchot point at South harbor entrance.   | Living and partly dead coralline algal rock.  | do  | . 0                            | VG                   | The algal reef patches of this facies take the place of the barrier reef off Muchot point, perhaps because of protected location.  | Facies is an association of algal<br>reef patches consisting mainly<br>or wholly of branching <i>Litho-</i><br>phyllum moluccense. Varied  | Inconspicuous   | 123, 128 <i>B</i> .                            |
|                 |  | 29   | do   | Near Mañagaha islet  | Dead coral-algal rock patchily encrusted by living coralline algae.   | do  | O+                             | G+-F+                | Lagoonal reef patches or circum-<br>scribed reef clusters with very<br>minor amount of limesand.   | green algae also common.  Laminar coralline algae patchily enerust mainly dead coral-algal rock.   | Boring and crevice-nestling organisms   | 123, 124 <i>B</i>                              |
|                 |  | 30   | do   | Seaward from northern part of southern barrier reef.   | As above, with scattered living coral.  | do  | M+-C+                          | G+                   | Mostly like facies 29, but seaward from barrier reef instead of within lagoon.   | do   | Corals are accessory reef builders, with Pavona clavus and Psummocora togianensis common.  Also many boring and crevice-nestling organisms.   | left).   |
|                 | XI. Lagoon fringe of north-<br>ern barrier reef.   | 31, 32                                     | 5-8 between numer-<br>ous coral-algal<br>bosses.   | Landward side of barrier<br>reef east from Managaha<br>Islet.  | domes of coral-algal rock<br>with much living material  | Small patches locally   | С                              | G-F                  | Mostly coarse limesand and small local patches of broken coral gravel between coral-algal  | Encrusting coralline algae common but subordinate reef-building organisms.   | Biotope XI includes the most abundant and<br>varied coral growth around Saipan, its domi-<br>nating characteristics being those of facies 31  |  |
|                 |  | 31   | do   | do   | at surface.   | do  | O                              | G-F                  | bosses.  | do   | described below.  Zone of Acropora palifera and Porites lutea in small irregular bosses and hemispherical mounds associated with comatulid crinoids   | 123, 124 <i>A</i><br>127 <i>D</i> .            |
|                 |  | 32   | Partially exposes at low tide.                     | At transition from barrier<br>reef lagoon to fringing<br>reef moat.  | above limesand bottom.  |   | C+                             | F+                   | Limesand bottom 3 to 5 feet deep beneath Acropora thicket.   | Local encrusting coralline algae on dead coral branches.   | and a great variety of other organisms.  Staghorn Acropora thicket, harboring innumerable colorful small fish and a number of large synaptid holothurians.  | 124.   |
|                 | XII. Reef flat of barrier reef<br>and contiguous fringing<br>reef.                                 | 33-37                                      | Intertidal   | Western periphery of island.   | Dead coral-algal rock be-<br>neath thin mantle of liv-<br>ing organisms.  | Thin and local pocket fillings and scattered pieces.  | C+-VC+                         | P+                   | A truncated reef surface which is subdivided on the basis of the dominant veneering organisms.   | Crustose and articulate coralline<br>algae and fleshy and filamentous<br>red, green, and brown algae of<br>several sorts.  | Stubby branching and encrusting corals, Foram-<br>inifera of several sorts, thick-shelled gastro-<br>pods, abundant ophiuroids, and other cranny<br>dwelling organisms.   |  |
|                 |  | 33<br>34                                   | Intertidal   | Northwestern periphery of island.  | do  | dodo  | C+-VC+                         | P+                   | facies 34.   | mon locally in surf from outer edge of   | its and crustose coralline algae. Stoutly branched of reef flat to upper slopes of reef front. Grades to gae, with stubby-branched Acropora and Pocillo-  |  |
|                 |  | 35<br>36                                   | Intertidal   | Southwestern periphery of island.  | dodo  | do  | C+-VC+                         | P+<br>P+             | pora markedly subordinate. Gr. Surface of reef flat dominated by end Grades to facies 36 and 37.   | ndes to facies 33.<br>crusting coralline algae, but with stub  | by-branched Acropora such as A. humilis common.   | 125B.  |
| faces           |  | 37<br>38–43                                | Intertidal   | Southwest from Muchot-<br>point.   | do  | . do  | C+-VC+<br>M+-VC+               | P+<br>G+-P+          | 1 northward so as to grade toward  | characteristics of facing 98 Algel on  | Grades to facies 35.  es of branched crustose coralline algae increasing rowth at seaward face advances abruptly over sea   Coral growth sparse and little varied except in   |  |
| Ireef surf      | XIII. Narrow fringing reef<br>of east, north, and south<br>coasts.                                 | 30-43                                      | what above high tide.                              | coasts.  | under thin mantle of living organisms.  | fillings and scattered pieces.  | MI-VO.                         | QF.                  | in kinds and proportions of veneering organisms and rock beneath.  | and green algae and articulate<br>and crustose corallines. No an-  | parts of facies 38. Biotope characterized by rich and distinctive intertidal and shoal water gastropod fauna as shown in appendix.  |  |
| Periphera Ireef |  | 38   | <5 to intertidal                                   | South and Northeastern coasts.   | Bosses and low patches of dead and living coralline algae and coral in moats.   | Considerable angular coral-<br>algal gravel in moats<br>locally.  | M+-VC+                         | G+-P+                | Depressed reef surfaces are eroded<br>moat areas with mixed patches<br>of rock, gravel, and sand. Gra-<br>dational to facies 39 and 40.  | giosperms. As above, with branching crustose coralline alga <i>Lithophyllum mollucense</i> locally abundant. Algal   | Living coral more varied and abundant than on<br>other fringing reef surfaces. Most common are<br>branching Acropora and Porites, stubby,<br>branched Pocillopora elegans, and encrusting   |  |
| Per             |  | 39   | <3 to intertidal                                   | Eastern and Southern coasts.   | surface under thin mantle   | in holes and channels on  | M+-VC+                         | G+-P+                | Facies consists of nearly flat ero-<br>sional limestone benches with   | ridge present at Fañunchuluyan.  Extensively matted with Sargas- sum, Turbinaria, Padina, Ga-  | Montipora. Many gastropods and borers.  Local concentrations of Petaloconchus and other vermetid gastropods especially at rims of solu-   | 133, 134, 1<br>139 <i>A</i> - <i>E</i>         |
|                 |  | 40   | Upper intertidal with                              | Eastern coast  | of living organisms.  Truncated old surface of  | do  | M+-VC+                         | G+-P+                | very thin organic veneer and a<br>number of deeper holes.  As above except erosional surfaces  | laxaura, Laurencia, Cladophora,<br>and other soft algae, and sub-<br>ordinate coralline algae.<br>Somewhat less rich than biotope  | tion pools Sparse to locally abundant living Porites and occasional Pocillopora, Acropora, and faviid corals in local holes. Pocillopora elegans and other corals grow vigor-   |  |
|                 |  | 41   | deeper local holes.  Upper intertidal              |  | pyroclastic rocks under<br>thin mantle of living or-<br>ganisms.  Truncated old limestone sur-  | None observed   |                                |                      | cut across pyroclastic sediments, instead of limestone.  Facies consists of very narrow, flet creational limestone beacher.  | in general.  As biotope in general, but with much higher percentage of ar-   | Pocillopora elegans and other corals grow vigorously along beveled outer bench edge, and Porites lutea is found in pools on bench surface.  The vermetid Petaloconchus forms a dense mat  | 136, 137                                       |
|                 |  |  |  |  | face under thin mantle of living organisms.   |   |                                |                      | flat, erosional limestone beaches,<br>with different preponderance of<br>veneering organisms and fewer<br>holes than facies 39.  | ticulate coralline algae than facies 38–40.  | of intertwining brown tubes 1 to 1.5 mm in<br>diameter, especially along the rims of shallow<br>paddylike depressions.  | 139 <i>C</i> -1                                |
|                 |  | 42   | Upper intertidal with many deep holes.             | Northwestern coast   | Old karsted (?) bench under<br>thin organic mantle.   | do  |                                |                      | Distinctive topography of deep<br>holes and narrow pinnacles that<br>rise well above high tide.  | Extensively matted with rich growth of fleshy and filamentous algae.   | None observed from distant point of inspection.<br>Quite possibly corals such as Porites and per<br>haps Pocillepora are locally abundant, in holes,<br>and a rich fauna of vagrant benthos is to be  |  |
|                 |  | 43   | Intertidal to upper<br>reach of abundant<br>splash |  | Truncated old limestone surface under thin mantle of living organisms.  | do  |                                |                      | Solution of rock basins concurrent<br>with building of rims produces<br>paddylike or sinterlike micro-   | Petaloconchus and other vermetid<br>pools that are undergoing bottom<br>abrasion by organisms that brow  | expected. gastropods and algae build up rims of basins and and side reduction through solution and organic se on algae coating rock surfaces.   |  |
|                 |  | 44-48                                      | <60  | Island periphery   |   | Gravel and coarse sand in grooves.  |                                |                      | topography.  | Crustose coralline algae common to preponderant.   | Coral sporadic, uncommon at many places, but locally abundant. Groove-forming echino-   |  |
|                 | XIV. Reef front of barrier and fringing reefs.   |  | do   | Western barrier reef   |   | Small amounts in few grooves.   | ļ                              |                      | and encrusting organisms.  Distinctive radial grooves rare, irregular, and commonly shal-  | Locally vigorous growth of crus-<br>tose coralline algae partially   | derms and boring organisms common.  Coral rare, burrowing echinoids common, boring organisms probably abundant.   | 123 <i>B</i> .                                 |
|                 |  | 44   |  |  | do  | Present in grooves  |                                |                      | low and narrow.  Grooves sparsely scattered  | obliterates some grooves and<br>may have completely obliter-<br>ated others.<br>Groove sides locally overhung by   | masses of crustose coralline algae which, supple-   | 124A (le                                       |
| ont             |  |  | do   | do   | <ul> <li>Control of the control of the control</li></ul> |   |                                |                      | Grooves long and abundant, separated by algal-capped spurs   | mented by sparse coral growth,<br>building them upward and outw  | veneers the intergrove areas or spurs, at places<br>ard.<br>ordinate coral growth in the spur areas masks the   | B, 1250  |
| Reef front      |  |  | do   | Northeast, northwest, and southwest coasts.  | Old rock surface extensively<br>veneered with algal growth  | in grooves.   | I .                            |                      | forming comb-tooth pattern. Numerous short irregular grooves   |  |   |  |
| sef front       |  | 45   |  | Northeast, northwest,  |   | in grooves.   |                                |                      | separate stubby and commonly broad spurs.  | observed under water, it is not po   | d with crustose coralline algae. As they were not assible to say whether they are primarily constructed features.   | 133, 134.                                      |
| Reef front      | and fringing reefs.  | 45<br>46<br>47<br>48                       | do   | Northeast, northwest, and southwest coasts.  South and East coasts  East and northeast coasts (Hagman and Fafiunchuluyan).                                       | veneered with algal growth<br>on spur surfaces.<br>Living algal crust, as far as<br>observed.<br>Andesite conglomerate ven-<br>eered with living algal<br>mat or crust.   | in grooves.  Presumed present in groove bottoms but not observed.   |                                |                      | separate stubby and commonly<br>broad spurs.  Spurs and grooves begin at beach<br>or bench edge in andesite con-<br>glomerate.   | observed under water, it is not po<br>tional or heavily veneered erosion<br>Nature and extent of organic venee<br>could equally well be largely co<br>algal-capped remnants between e  | ossible to say whether they are primarily construc-<br>nal features.  r on offshore spurs unknown. The offshore spurs<br>naturational over intervening volcanic surface or<br>resional grooves.   | 135.   |
| Reef front      |  | 45<br>46<br>47                             | do   | Northeast, northwest, and southwest coasts.  South and East coasts.  East and northeast coasts (Hagman and Fafiunchuluyan).  Seaward from southern barrier reef. | veneered with algal growth<br>on spur surfaces.<br>Living algal crust, as far as<br>observed.<br>Andesite conglomerate ven-<br>eered with living algal<br>mat or crust.   | in grooves.  Presumed present in groove bottoms but not observed.   |                                |                      | separate stubby and commonly<br>broad spurs.<br>Spurs and grooves begin at beach<br>or bench edge in andesite con-   | observed under water, it is not pt<br>tional or heavily veneered erosion<br>Nature and extent of organic venee<br>could equally well be largely co-<br>algal-capped remnants between e<br>An area of sparse and little-varied<br>ished coral growth, plumose anne-<br>ree patches.   | ossible to say whether they are primarily construc-<br>nal features.  r on offshore spurs unknown. The offshore spurs<br>nstructional over intervening volcanic surface or<br>rosional grooves.  life including local coralline algal crusts, impover-<br>lids in the sand, and boring organisms in the local  Plumose sedentary annelids and pelagic fish the  | 135,<br>125 <i>B</i> .                         |
| Reef front      | and fringing reefs.  | 45<br>46<br>47<br>48<br>49, 50             | do   | Northeast, northwest, and southwest coasts.  South and East coasts  East and northeast coasts (Hagman and Fañunchuluyan).  Seaward from southern barrier reef.   | veneered with algal growth on spur surfaces. Living algal crust, as far as observed.  Andesite conglomerate ven- eered with living algal mat or crust.  Occasional low patches and mounds of mostly dead coral-algal rock.  | in grooves.  Presumed present in groove bottoms but not observed. do  | F-M+<br>F-M+<br>F-M+           | VG-G+                | separate stubby and commonly broad spurs.  Spurs and grooves begin at beach or bench edge in andesite conglomerate.  Limesand bottom with locally interspersed reef patches.   | observed under water, it is not ptotional or heavily veneered erosion. Nature and extent of organic venee could equally well be largely or algal-capped remnants between each area of sparse and little-varied ished coral growth, plumose anner reef patches.  None observed  | ossible to say whether they are primarily construc-<br>al features.  r on offshore spurs unknown. The offshore spurs<br>astructional over intervening volcanic surface or<br>rosional grooves.  life including local coralline algal crusts, impover-<br>lids in the sand, and boring organisms in the local  | 135.<br>125B.                                  |
| Reef front      | and fringing reefs.  | 45<br>46<br>47<br>48<br>49, 50<br>49<br>50 | do   | Northeast, northwest, and southwest coasts.  South and East coasts.  East and northeast coasts (Hagman and Fafiunchuluyan).  Seaward from southern barrier reef. | veneered with algal growth on spur surfaces. Living algal crust, as far as observed.  Andesite conglomerate ven- eered with living algal mat or crust.  Occasional low patches and mounds of mostly dead coral-algal rock.  None observed.  Occasional low patches and mounds of mostly dead  | in grooves.  Presumed present in groove bottoms but not observed.  Local patches of coral-algal gravel.  None observed.  Local patches of coral-algal gravel. | F-M+                           | VG-G+                | separate stubby and commonly broad spurs.  Spurs and grooves begin at beach or bench edge in andesite conglomerate.  Limesand bottom with locally interspersed reef patches.  An almost pure limesand bottom.  Limesand bottom with occasional reef patches and gravel.  Characterized by coral-algal reef patches interspersed on limesand, some of these patches | observed under water, it is not ptotional or heavily veneered erosion. Nature and extent of organic venee could equally well be largely or algal-capped remnants between each area of sparse and little-varied ished coral growth, plumose anner reef patches.  None observed  | ossible to say whether they are primarily construc- al features.  r on offshore spurs unknown. The offshore spurs astructional over intervening volcanic surface or rosional grooves.  life including local coralline algal crusts, impover- lids in the sand, and boring organisms in the local  Plumose sedentary annelids and pelagic fish the only organisms observed.  biotope XV in general  Occasional living coral, and, in dead coral-algal rock, a fauna of boring and cranny-nestling mollusks, sipunculoids, annelids, crustaceans, | 135.  125B.  125B.  125B (left tom).           |
| Reef front      | XV. Limesand bottom  | 45<br>46<br>47<br>48<br>49, 50<br>49<br>50 | do   | Northeast, northwest, and southwest coasts.  South and East coasts.  East and northeast coasts (Hagman and Fafiunchuluyan).  Seaward from southern barrier reef. | veneered with algal growth on spur surfaces. Living algal crust, as far as observed.  Andesite conglomerate ven- eered with living algal mat or crust.  Occasional low patches and mounds of mostly dead coral-algal rocks. None observed.  Occasional low patches and mounds of mostly dead coral-algal rocks. Reef patches of mostly dead   | in grooves.  Presumed present in groove bottoms but not observed.  Local patches of coral-algal gravel.  None observed.  Local patches of coral-algal gravel. | F-M+<br>F-M+<br>F-M+           | VG-G+<br>VG-G+<br>G+ | separate stubby and commonly broad spurs.  Spurs and grooves begin at beach or bench edge in andesite conglomerate.  Limesand bottom with locally interspersed reef patches.  An almost pure limesand bottom.  Limesand bottom with occasional reef patches and gravel.  Characterized by coral-algal reef patches interspersed on lime-                           | observed under water, it is not ptotonal or heavily veneered erosion.  Nature and extent of organic venee could equally well be largely capped remnants between each of the state of sparse and little-varied ished coral growth, plumose annered patches.  None observed  Like  Crustose coralline algal and scattered green algae coat reef patch- | ossible to say whether they are primarily construc- al features.  r on offshore spurs unknown. The offshore spurs astructional over intervening volcanic surface or rosional grooves.  life including local coralline algal crusts, impover- lids in the sand, and boring organisms in the local  Plumose sedentary annelids and pelagic fish the only organisms observed.  biotope XV in general  Occasional living coral, and, in dead coral-algal rock, a fauna of boring and cranny-nestling  | 135.  125B.  125B.  125B (left tom).           |