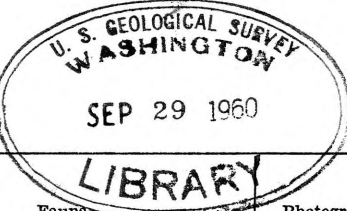


TABLE 6.—Classification and distinctive features of the shoal marine habitats of Saipan

[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: VG=1 to 1.3, G=1.3 to 1.8, F=1.8 to 2.5, P=2.5 to 3.5] \*Field estimate only.



Principal habitat subdivisions	Biotope	Facies No.	Prevailing depth of water, in feet	Location	Substrate (exclusively CaCO <sub>3</sub> except as noted differently)				Special notes	Macroflora (See also appendix)	Fauna (See also appendix)	Photograph plate and figure	
					Rock	Gravel	Sand						
							Grain size	Sorting					
Lagoon proper and marginal limesand shelves	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 relative thickness of limesand cover inferred from same.	Sparse to thick cover of angiosperms and green algae.	Annelids, holothurians, starfish, echinoids, stromboid gastropods and sponges vary with density of vegetation. Browsing and detritus-feeding gastropods <i>Tricola</i> and <i>Cerithium</i> abundant, and Foraminifera <i>Textularia</i> and <i>Heterostegina</i> rare.	123, 124B, 125B, C, 126A, B.	
		1	<6	Alongshore in port area.	None observed.	do	F+C	F+	Much organic matter and relatively large fine fraction in sands of port.	Sparse noncoralline algae and thin angiosperm growth in foul-water area of port.	do	123, 124B.	
		2	<13	Nearshore in port area.	Cavernous under thin limesand.	Broken <i>Acropora</i> locally.	F-M	VG-F	Sands thin over rock.	Sparse to moderately dense cover of angiosperms, especially <i>Zostera</i> , and noncoralline algae.	As above, with small fish, ophiuroids, and such in locally cavernous rock bottom, and even scattered <i>Porites lutea</i> , <i>Pocillopora</i> , and <i>Helipora</i> in very murky nearshore water.	123, 124B.	
		3	<13	Widespread nearshore and shallow lagoon.	do	None observed.	M-C	G-F	do	Abundant, principally <i>Zostera</i> , <i>Enhalus</i> , <i>Caulerpa</i> and <i>Halimeda</i> . Local coralline algae.	do	123B, 125B, C.	
		4	<15	Nearshore and offshore, lagoon and most margins.	None observed.	do	F-C	G-F	Sands relatively thick, no rock floor observed.	do	Like biotope I in general.	123, 124A, 126A, 128A, E, 126B.	
	II. Shallow area of gravel trains with scattered living coral and algae.	6	3-13	Midlagoon south of Muchot point.	do	Much present, pebbles and cobbles.	C-VC	G-F	Gravel oriented in strips parallel to current movement and reef.	Retarded or absent.	Occasional staghorn <i>Acropora</i> and faviid corals on more stable gravel ridges. Gravel-dwelling organisms of various sorts. Holothurians rare.	125B.	
		III. Staghorn <i>Acropora</i> zone of outer lagoon shelf.	7-9	4-13	Outer lagoon shelf.	do	Occasional small patches of broken <i>Acropora</i> .	O	G	Bottom mainly even in facies 7-8, highly irregular in facies 9.	Mainly absent.	Scattered to abundant staghorn <i>Acropora</i> is distinctive, plumose sand-dwelling annelids numerous.	123, 124A, 125C-E, 127A.
			7	6-11	Scattered on outer lagoon shelf.	do	do	O	G	Limesand bottom on almost level plain.	do	Scattered growth of staghorn <i>Acropora</i> ( <i>A. arbuscula</i> ) locally common.	123, 126D.
			8	4-10	Outer lagoon shelf north-east of Managaha Islet.	do	do	O	G	do	do	Abundant staghorn <i>Acropora</i> ( <i>A. nobilis</i> ) locally preponderant.	123, 126C, E, 127A, 129A, E, D, E, 124A.
			9	20+ away from reefs.	East end of outer lagoon shelf.	do	do	O+	G+	Markedly irregular bottom, mounds and ridges of sand with several feet of relief.	do	Abundant staghorn <i>Acropora</i> of species <i>A. arbuscula</i> .	do
	IV. Interspersed reef patches and limesand of lagoon proper.	10-13	10-40+ with reefs awash.	In and adjacent to Tanapag harbor area.	Dead and living coral-algal rock of reef patches and rocky patches on lagoon floor.	Patches of broken coral and some reef talus.	F-VO	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, abundant and varied borers and crevice dwellers. Sands with plumose tube-building annelids.	123, 124B, 127B.	
		10	10-32 with reefs awash.	Margins of Tanapag harbor area.	do	Thin patches of coral-algal rubble.	F-C	VG-G	Reef patches rare, of dead coral-algal rock and dull-colored pavement algae.	do	As above, with occasional strikingly large individual <i>Lobophyllia</i> heads that spill off to algal-coated gravel on the sides.	123, 124B.	
		11	10-32 away from reefs.	West and middle parts Tanapag harbor area.	do	do	M-C	VG-G	Reef patches common, mainly dead coral-algal rock with extensive local encrustation of living coralline algae.	do	As above, <i>Lobophyllia</i> heads near transition to facies 10 at north side of harbor.	123, 124B.	
		12	10-40+ away from reefs.	West and southwest fringes of Tanapag harbor area.	do	Local heaps of coral-algal rubble, as from disintegrated small reef patches.	M-VO	G	Reef patches abundant with mainly dead or algal- or detritus-veneered surfaces.	As above, except that reef patches at south side of main lagoon pass are conspicuously veneered with living coralline algae.	Generally sparse living coral increases toward main lagoon pass.	123A, 127B.	
		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 <i>Acropora palifera</i> , <i>Porites lutea</i> , <i>Goniastrea</i> and other favids, and encrusting <i>Montipora</i> .	123A, 124B.	
	V. Dredged areas, mainly of lagoon proper.	14, 15	25-45 (with range from 4-50+).	Tanapag harbor proper and various boat channels.	Scattered low mounds of coral rock.	do	M-C	F	Bottom seen only locally owing to general murkiness of this current-swept area.	Probably sparse.	Sand-burrowing mollusks nearshore. Foraminifera abundant. Living coral scarce.	123, 124B, 125B.	
		14	25-45	Tanapag harbor proper and entrance channel.	do	do	M-C	F	do	do	do	123, 124B.	
		15	4-10	Various boat channels.	None observed.	do	M+C	F+	Includes only small boat channels.	Much <i>Halimeda</i> locally.	Sparse.	123, 124B, 125B.	
The contiguous moats	VI. Outer moat floor of coral-algal bosses with gravel and sand.	16, 17	<6	Offshore in northern moat.	Many dead and living coral and algal bosses and much rock floor.	Preponderant over sand.	M+VC+	G-F+	Sand and gravel surrounding or within rocky areas.	Scattered coralline algae, <i>Halimeda</i> , <i>Padina</i> , etc.	<i>Pocillopora damicornis caespitosa</i> is most abundant, <i>Acropora palifera</i> common.	123A, 124A, 127C.	
		16	<6	Southwestern part of northern moat.	Large areas of dead coral-algal rock, with crusts of 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 <i>Acropora</i> cf. <i>A. humilis</i> , <i>Montipora tuberculosa</i> , <i>Porites lutea</i> , <i>Favia stelligera</i> , <i>Goniastrea pectinata</i> , <i>Leptoria phrygia</i> , <i>Platygyra sinensis</i> , and <i>Helopora coerules</i> .	123A, 124A.	
		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	Some of above corals are common here, also <i>Stylophora</i> , <i>Psammocora</i> , and <i>Leptastrea</i> . <i>Pocillopora</i> is relatively more abundant and <i>Acropora palifera</i> relatively less abundant than in facies 16.	123A, 127C.	
	VII. Bottom matted with living coralline algae.	18, 19	1-3	Southern moat and one small patch on lagoon shelf.	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> and other seaweed.	Crevice-dwelling ophiuroids, annelids, and fish.	125D.	
		18	1-3	do	do	do	F+C	F+	do	Nearly continuous mat of coralline algae, with sparse to patchy growth of green seaweed.	do	125D.	
		19	1-3	Southern moat.	do	None observed.	do	do	Almost detritus-free algal floor.	Mat of coralline algae, with numerous small but dense patches of green seaweed.	do	125D.	
	VIII. Clean limesand with little or no seaweed.	20-22	<8	Inner and outer moat margins.	Cavernous under thin limesand locally.	Rare patches of broken-up coral.	F-C+	VG-F	Sands are the cleanest and most nearly lifeless observed.	Sparse to moderate, locally.	<i>Holothuria atra</i> ; <i>Linkia laevigata</i> , hermit crabs, and plumose annelids.	123, 124A, 125B.	
		20	<8	do	Absent.	Small amounts locally.	F-M	F	Weak wave action and sediment source accounts for sparseness of gravel in occurrences at outer lagoon fringe.	Absent.	do	123, 124A, 125B.	
		21	<6	do	Cavernous under thin limesand locally.	Absent.	F+C	G+	Limesand thinly mantles cavernous substrate of intermediate dead coralline algae and broken branching coral.	Sparse to moderate toward shore. Approaches, have characteristics of facies 2.	<i>Holothuria atra</i> abundant.	123A.	
		22	Intertidal.	Longshore bars of southern moat.	Absent.	do	F-M	VG	Bar sands.	Absent.	Almost devoid of macrofauna except occasional hermit crabs.	123.	
		23, 24	<5	Outer part of shoal lagoon or moat, southern third of western reef complex.	Cavernous under thin gravel and sand.	Pebble and cobble gravel conspicuous.	C-VO	F	Coralliferous and algal gravel with only weak linear orientation.	Patches of <i>Halimeda</i> and other green seaweed locally.	Scattered to locally abundant living coral, mainly staghorn <i>Acropora</i> and <i>Pocillopora damicornis caespitosa</i> .	125B-D, 129C.	
	IX. Mixed limesand and calcareous gravel at reef fringe of very shallow lagoon or moat.	23	<5	do	None observed.	Pebble and cobble gravel in about equal proportion with sand.	C-VO	F	Bottom sediments finer than those of facies 24, and with more living coral.	Uncommon.	As above; also <i>Porites lutea</i> , <i>Astropora myriophylla</i> , <i>Montipora lobulata</i> , and species of <i>Favia</i> , <i>Leptostrea</i> and <i>Stylocentella</i> . Also various alpheids, ophiuroids, and gastropods.	125B, 129C.	
		24	<5	Outer part of shoal lagoon or moat, southern fourth 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.	
		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 pockets or films on coral-algal reef patches and sands between reef patches.	Crustose coralline algae important reef builders at many places.	<i>Helopora</i> , <i>Lobophyllia</i> , and <i>Porites</i> are important reef builders. Usual borers and crevice nestlers present.	123, 124, 125B, 126B.	
Minor reef structures	X. Larger reef patches and reef clusters of lagoon and offshore shelf.	25	do	Offshore between Flores and Dogas points, Tanapag lagoon.	do	do	O	G	Lagoonal reef clusters mainly living, with coarse sand between appressed reef patches.	Branching <i>Lithophyllum</i> an important reef builder.	<i>Lobophyllia</i> (with <i>Lithophyllum</i> ) important reef builder. Also conspicuous are scattering of reef-dwelling mollusks, alpheid shrimp, and ophiuroids.	123A, 124A.	
		26	do	Off Dogas point, Tanapag lagoon.	do	do	C+VC	G+P+	As above marginally, but grades to <i>Helipora</i> platform with only local patches and pockets of limesand.	Uncommon except for encrusting coralline algae locally.	<i>Helopora coerules</i> principal reef builder.	123A, 124A.	
		27	do	Offshore from Flores point, Tanapag lagoon.	do	do	C+	G+P+	Clustered lagoonal mounds and platforms of massive coral with minor coarse limesand between.	do	Common reef builders are <i>Porites lutea</i> , <i>Helopora coerules</i> , <i>Montipora lobulata</i> , and <i>Platygyra</i> .	123B.	
	28	do	Off Muchot point at South harbor entrance.	Living and partly dead coralline algal rock.	do	O	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 reef patches consisting mainly or wholly of branching <i>Lithophyllum moluccense</i> . Varied green algae also common.	Inconspicuous.	123, 128B.		
	29	do	Near Managaha Islet.	Dead coral-algal rock patchily encrusted by living coralline algae.	do	C+	G+P+	Lagoonal reef patches or encrusted by reef clusters with very minor amount of limesand.	Laminar coralline algae patchily encrust mainly dead coral-algal rock.	Boring and crevice-nesting organisms.	123, 124B.		
	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 <i>Pavona cleane</i> and <i>Psammocora topanensis</i> common. Also many boring and crevice-nesting organisms.	125B (lower left).		
	Peripheral reef surfaces	XI. Lagoon fringe of northern barrier reef.	31, 32	5-8 between numerous coral-algal bosses.	Landward side of barrier reef east from Managaha Islet.	Irregular bosses and small local patches of broken coral gravel with much living material at surface.	Small patches locally.	O	G-F	Mostly coarse limesand and small local patches of broken coral gravel between coral-algal bosses.	Encrusting coralline algae common but subordinate reef-building organisms.	Biotope XI includes the most abundant and varied coral growth around Saipan, its dominating characteristics being those of facies 31 described below.	123, 124, 127D.
31			do	do	do	do	O	G-F	do	do	Zone of <i>Acropora palifera</i> and <i>Porites lutea</i> in small irregular bosses and hemispherical mounds associated with coralline crinoids and a great variety of other organisms.	123, 124A, 127D.	
XII. Reef flat of barrier reef and contiguous fringing reef.		32	Partially exposes at low tide.	At transition from barrier reef lagoon to fringing reef moat.	Living coral thicket rises above limesand bottom.	Minor amount.	C+	F+	Limesand bottom 3 to 5 feet deep beneath <i>Acropora</i> thicket.	Local encrusting coralline algae on dead coral branches.	Staghorn <i>Acropora</i> thicket, harboring innumerable colorful small fish and a number of large synaptid holothurians.	124.	
		33-37	Intertidal.	Western periphery of island.	Dead coral-algal rock beneath thin mantle of living 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 algae and fleshy and filamentous red, green, and brown algae of several sorts.	Stubby branching and encrusting corals, Foraminifera of several sorts, thick-shelled gastropods, abundant ophiuroids, and other crustacean dwelling organisms.	123-125.	
		33	Intertidal.	Northwestern periphery of island.	do	do	C+VC+	P+	Veneering organisms mainly stubby-branched <i>Acropora</i> such as <i>A. humilis</i> and crustose coralline algae.	Stoutly branched <i>Pocillopora</i> like <i>P. elegans</i> is common locally in surf from outer edge of reef flat to upper slopes of reef front. Grades to facies 34.	123, 124B, 125A.		
		34	Intertidal.	do	do	do	C+VC+	P+	Veneering organisms mainly astreiform corals and crustose coralline algae, with stubby-branched <i>Acropora</i> and <i>Pocillopora</i> markedly subordinate. Grades to facies 33.	do	124A.		
		35	Intertidal.	Southwestern periphery of island.	do	do	C+VC+	P+	Surface of reef flat dominated by encrusting coralline algae, but with stubby-branched <i>Acropora</i> such as <i>A. humilis</i> common.	do	125B.		
		36	Intertidal.	do	do	do	C+VC+	P+	Grades to facies 36 and 37.	do	125C, D.		
XIII. Narrow fringing reef of east, north, and south coasts.		37	Intertidal.	Southwest from Muchot-point.	do	do	C+VC+	P+	Reef flat intensively encrusted with coralline algae. Corals uncommon. Grades to facies 35.	do	125B		
		38-43	<5 ranging to somewhat above high tide.	East, North, and South coasts.	Truncated old rock surface under thin mantle of living organisms.	Thin and local depression fillings and scattered pieces.	M+VC+	G+P+	Rich to moderate growth of fleshy and filamentous red, brown, and green algae and articulate and crustose corallines. No angiosperms.	As above, with branching crustose coralline algal <i>Lithophyllum moluccense</i> locally abundant. Algal ridge present at Fafunichulyan.	Coral growth sparse and little varied except in rich and distinctive intertidal and shoal water gastropod fauna as shown in appendix.	132-139.	
Reef front	XIV. Reef front of barrier and fringing reefs.	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-algal gravel in moats locally.	M+VC+	G+P+	Depressed reef surfaces are eroded most areas with mixed patches of rock, gravel, and sand. Gradational to facies 39 and 40.	As above, with branching crustose coralline algal <i>Lithophyllum moluccense</i> locally abundant. Algal ridge present at Fafunichulyan.	Living coral more varied and abundant than on other fringing reef surfaces. Most common are branching <i>Acropora</i> and <i>Porites</i> , stubby branched <i>Pocillopora elegans</i> , and encrusting <i>Montipora</i> . Many gastropods and borers.	132	
		39	<3 to intertidal.	Eastern and Southern coasts.	Truncated old limestone surface under thin mantle of living organisms.	Patches of gravel and sand in holes and channels on bench surface.	M+VC+	G+P+	Facies consists of nearly flat erosional limestone benches with very thin organic veneer and a number of deeper holes.	Extensively matted with <i>Sargassum</i> , <i>Turbinaria</i> , <i>Padina</i> , <i>Galaxaura</i> , <i>Laurencia</i> , <i>Cladophora</i> , and other soft algae, and subordinate coralline algae.	Local concentrations of <i>Petalocochus</i> and other vermetid gastropods especially at rims of solution pools. Sparse to locally abundant living <i>Porites</i> and occasional <i>Pocillopora</i> , <i>Acropora</i> , and faviid corals in local holes.	133, 134, 138A, B, 139A-B.	
		40	Upper intertidal with deeper local holes.	Eastern coast.	Truncated old surface of pyroclastic rocks under thin mantle of living organisms.	do	M+VC+	G+P+	As above except erosional surfaces cut across pyroclastic sediments, instead of limestone.	Somewhat less rich than biotope in general.	<i>Pocillopora elegans</i> and other corals grow vigorously along beveled outer bench edge, and <i>Porites lutea</i>		