

Annotated Checklist of the Fringing Islets of Guam, Mariana Islands

by

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SUMMARY

Guam, the southernmost and largest island of the Mariana Islands, Micronesia, includes around its coastline several dozen small islets. They are primarily of consolidated reef-facies limestone, but include volcanic dikes and unconsolidated sandy islets. The largest is the atoll-like and forested Cocos Island (0.33 km²) atop the southern barrier reef. About half, however, are tiny (<1000 m²), low-lying and sparsely vegetated limestone pinnacles. Traditionally, the larger islets have been important as landmarks for nearshore navigation. More recently, they have become of interest as potential preserves of native flora and fauna. In this report, I list Guam's fringing islets as gleaned from recent maps, aerial photography, historical sources, and field surveys. Information is also provided on each islet's geographic coordinates, distance to Guam, maximum elevation, islet area, islet perimeter, vegetation area, and vegetation perimeter.

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INTRODUCTION

Guam, the southernmost and largest island of the Mariana Islands, Micronesia, includes around its coastline several dozen small islets. They are primarily of consolidated reef-facies limestone, but include volcanic dikes and unconsolidated sandy islets. They range in size from the largest, Cocos Island (0.33 km²) atop the southern barrier reef, to numerous small (<1000 m²) islets atop intertidal reef benches. The larger islets have been important as landmarks for nearshore navigation during early exploration (Fig. 1) and military invasion during World War II. Most recently, they are of interest as sanctuaries for native flora and fauna. For example, Cocos now hosts one of two remaining wild populations of the endemic, flightless Guam rail, *Hypotaenidia (=Gallirallus) owstoni* (W. Rothschild), as well as the Mariana endemic scincid lizard, *Emoia slevini* Brown and Falanruw, now extinct over most of its former range (Allison et al. 2013). In this report, I list Guam's fringing islets as gleaned from recent maps, aerial photography, historical sources, and field surveys.

The fringing islets of Guam have seldom received attention in the scientific literature. Randall and Eldredge (1976) reported on their location and geologic composition in an atlas of Guam's coastlines. Perry et al. (1998) performed a biogeographic study of the herpetofauna of Guam's islets. Cocos has been examined most often. Its vegetation was documented by



Figure 1. The earliest map of Guam by Alonzo Lopez (ca. 1671 in Gobien 1700) showing several fringing islets. (Library of Congress.)

Neubauer and Neubauer (1981). Eldredge (2003) records the stranding of a rare leatherback sea turtle, *Dermochelys coriacea* (Vandelli). Lizards have been surveyed by McCoid (1996) before and after two severe typhoons. Wiles et al. (1993) provides an account of new bird records and nesting species. Kerr and Fiedler (2018; 2019) report on snails of two islets, Cocos and Alupat. Botanical surveys of a few other islets around Guam have been performed (Stone 1970; Gardner 1981).

COMPILATION OF DATA

I defined an islet as any supratidally emergent feature, usually reef limestone or unconsolidated sediment, that was separated from Guam's shoreline during high tide.

Islet names were those given and as spelled in the most recent U.S. Geological Survey (2002) topographic sheets. I recognise that a few of these names are *lapsis calami*, e.g., Fofos islet was recorded as Fotos in early U.S. military maps, a mistake that continues in USGS (2002). I removed the words 'Island' or 'Islet(s)' from the names if present, but retained other modifiers such as 'Rock' or 'Point'. Islets that were unnamed or not present on the topographic sheets are labelled by the closest named geographic feature, the term 'Unnamed', and a numerical identifier. For example, the unnamed islet in USGS (2002) nearest and just north of Ylig Point is given in the list as 'Ylig, Unnamed 1' or in the text as 'Unnamed Ylig 1'.

Geographic coordinates, distance to Guam, total perimeter, total area, vegetation area, and vegetation perimeter were measured using Google Earth Pro v 7.1.5.1557 and the most recent imagery in which the islet was unobscured by clouds or long shadows.

Coordinates were estimated at the islet's approximate centroid and recorded to the nearest ± 10 m. For non-extant islets, coordinates and other information were estimated primarily from early U.S. military maps for islets Gaja, Napa, and Santa Cruz; Emory (1962) and Randall & Eldredge (1976) for Unnamed Cocos 1 and 2, or Gardner (1981) for Unnamed Ypao 1.

Distance to Guam was the closest straight-line distance from the islet's current closest point (which can change considerably for unconsolidated sandy islets) to Guam's coast while ignoring any intervening islets.

Height on land is usually given in reference to mean sea level (MSL), but this datum was not always available to me. Hence, the maximum elevations of the 21 islets in Perry et al. (1998) are based on MHW and on MLLW for Cabras Island (USACE 1982). The elevations of the many unnamed, low-lying karstic pinnacles less than 3 m in elevation were estimated from field observation, photographs, or left undetermined.

The unvegetated area of an islet, i.e., the difference between the islet's total area and vegetated area, usually consisted of karstic limestone. However, the islets of Cocos, Cabras, and Hagåtña Water Treatment Plant had considerable built surfaces.

DISCUSSION

Table 1 provides a compilation of the 62 islets considered here (Fig. 2). We were not able to ground-truth another 20 islets that we identified via Google Earth satellite imagery. Of the islets included here, 26 had names, such as those that appear on USGS topographic sheets.

Thus, another 36, mostly small islets are unnamed.

Six of the islets are known only historically. Three of these were unconsolidated sandy atolls or cays removed by typhoons (e.g., Gardener 1981). The remaining three were buried under fill during the post-WWII modification of inner Apra Harbor by the U.S. Navy.

Most islets occurred in the southern half of Guam. They occur from

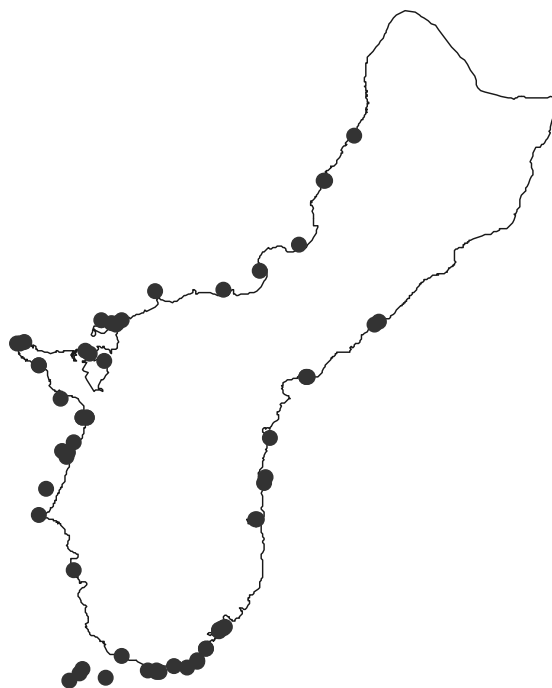


Figure 2. Location of the 62 fringing islets tallied in this report.

within a few meters of Guam's shoreline to a maximum distance of 1.6 km offshore. About half of them are within 100 m of the shore. I was able to obtain data on maximum elevation for 36 islets. This datum ranged from a maximum of 43 m to 1 m. About half of the elevations were below 4 m. Probably all of the remaining islets fall below this elevation, as well. About half of the islets were less than 1000 m² in total area. They ranged in area from a maximum of 0.33 km² to only about 20 m².

It is my hope that this list proves useful for a study of the biogeography of these islets, especially in assessing their suitability as a reserve for native species. Additional planned products include a nomenclator of Chamoru, Spanish, and English names of the islets, as well as an annotated and illustrated catalogue or 'field guide' providing the natural history of each islet.

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TABLE 1. The fringing islets of Guam, Mariana Islands. Names when available from topographic sheets (USGS 2002); coordinates of approximate islet centroids ± 10 m, minimum distances between Guam and islets, areas, and perimeters calculated with Google Earth Pro v 7.1.5.1557. Coordinates for Gaja, Napa, and Santa Cruz estimated from early maps. Maximum elevations of 21 islets in Perry et al. (1998) from MHW, except MLLW for Cabras Island (USACE 1982) and MSL for Lalas Rock (USGS 2000) and Unnamed Ypao 1 (Gardner 1981); remaining elevations, this study; all data for Unnamed Ypao 1 from Gardner (1981) and estimated for Unnamed Cocos 1 and 2 from figs. 13 and 14 in Emory (1962) and Randall & Eldredge (1976) and nearby extant shoal via Google Earth; ND = no data. † = no longer extant. WTP = Wastewater Treatment Plant.

Acho, Unnamed 1	13.2583	144.7369	87	ND	273	96	273	96
Acho, Unnamed 2	13.2581	144.7372	147	ND	62	40	40	28
Agrigan Island	13.2478	144.7172	101	3.0	19085	718	18842	699
Alupat Island	13.4928	144.7704	177	14.0	8901	424	8577	425
Alutom	13.3808	144.6472	560	11.0	12842	611	10158	512
Anae	13.3577	144.6373	859	13.0	29901	960	15437	653
Apaka, Unnamed 1	13.4018	144.6626	17	7	42	24	10	13
Apaka, Unnamed 2	13.4018	144.6628	10	2	1.2	4	0.3	3
Asgadao Island	13.2445	144.7062	161	0.5	5265	365	5072	351
Asgadao, Unnamed 1	13.2439	144.7065	258	1	889	283	889	283
Asgon Point	13.2688	144.7450	128	7.5	1575	207	424	87
Babe Island	13.2401	144.6742	1616	1.5	5920	1020	1079	251
Bangi Island	13.3775	144.6506	41	8.5	8148	400	7530	431
Cabras Island	13.4624	144.6718	248	19.0	909850	6510	327191	7270
Camel Rock	13.4803	144.7055	424	6.0	779	121	0	0
Cocos Island	13.2381	144.6519	2496	5.0	324809	3776	298309	4518
Cocos, Unnamed 1†	13.2431	144.6587	2184	1	3000	500	2500	300
Cocos, Unnamed 2†	13.2458	144.6601	1993	1	1000	100	1	2
Facpi Island	13.3415	144.6328	223	26.0	6817	449	3796	336

TABLE 1. The fringing islets of Guam, Mariana Islands (continued).

Islet	Latitude (°)	Longitude (°)	Distance to Guam (m)	Elevation (m)	Total Area (m ²)	Total Perimeter (m)	Vegetation Area (m ²)	Vegetation Perimeter (m)
Fofos Island	13.2442	144.7084	169	4.6	15439	587	13762	569
Ga'an, Unnamed 1	13.3867	144.6552	74	2	786	152	532	110
Gaja †	13.4368	144.6737	ND	ND	ND	ND	ND	ND
Guijen Rock	13.2503	144.7318	115	2.0	5543	413	5499	362
Guijen, Unnamed 1	13.2512	144.7311	15	ND	1505	200	1505	200
Hagåtña WTP	13.4809	144.7480	285	5	39900	1605	6644	1706
Haputo, Unnamed 1	13.5770	144.8288	10	ND	245	63	105	39
Huchunao, Unnamed 1	13.4598	144.8419	42	ND	267	75	0	0
Huchunao, Unnamed 2	13.4612	144.8446	33	ND	64	32	0	0
Inalahan, Unnamed 1	13.2704	144.7471	96	1	214	88	88	45
Inalahan, Unnamed 2	13.2696	144.7448	58	1	72	48	36	24
Inalahan, Unnamed 3	13.2717	144.7483	8	ND	2407	233	2399	291
Inalahan, Unnamed 4	13.2712	144.7477	11	ND	2402	269	247	1772
Ipan, Unnamed 1	13.3647	144.7741	320	3	2160	211	1054	201
Ipan, Unnamed 2	13.3608	144.7727	113	1	19.2	16.6	17	15
Lalas Rock	13.3069	144.6552	31	15.0	132	50	6	15
Malesso, Unnamed 1	13.2540	144.6842	18	ND	461	98	461	98
Malilog Point	13.2467	144.7256	14	ND	6501	618	4051	531
Napa Island †	13.4432	144.6620	ND	ND	ND	ND	ND	ND
Neye Island	13.4139	144.6470	69	23.0	30582	796	24159	754
Orote Island	13.4475	144.6198	30	43.0	31320	993	24995	858
Orote, Unnamed 1	13.4486	144.6241	42	8.0	604	145	468	120
Orote, Unnamed 2	13.4338	144.6332	19	ND	221	59	0	0

TABLE 1. The fringing islets of Guam, Mariana Islands (continued).

Islet	Latitude (°)	Longitude (°)	Distance to Guam (m)	Elevation (m)	Total Area (m ²)	Total Perimeter (m)	Vegetation Area (m ²)	Vegetation Perimeter (m)
Orote, Unnamed 3	13.4339	144.6334	12	ND	72	34	0	0
Orote, Unnamed 4	13.4474	144.6210	7	ND	868	172	762	167
Piti, Unnamed 1	13.4620	144.6842	52	ND	2252	194	2252	194
Piti, Unnamed 2	13.4592	144.6814	32	ND	34938	1774	34938	1774
Piti, Unnamed 3	13.4607	144.6815	185	ND	1864	307	1864	307
Piti, Unnamed 4	13.4605	144.6780	104	ND	6802	1018	6802	1018
Pelagi Islet, North	13.4020	144.6604	173	6.5	865	119	736	115
Pelagi Islet, South	13.4014	144.6601	217	6.2	650	141	117	42
Santa Cruz†	13.4416	144.6644	ND	ND	ND	ND	ND	ND
Talofoyo, Unnamed 1	13.3386	144.7686	4	ND	86	41	86	41
Talofoyo, Unnamed 2	13.3389	144.7672	7	ND	121	55	121	55
Tangon Rock	13.2450	144.7011	223	ND	411	93	145	57
Tangeson, Unnamed 1	13.5484	144.8106	15	4	101	39	54	29
Tangeson, Unnamed 2	13.5485	144.8104	27	3	70	34	70	34
Taogam, Unnamed 1	13.4270	144.8004	7	ND	175	50	ND	ND
Taogam, Unnamed 2	13.4268	144.7993	75	ND	28	21	0	0
Taogam, Unnamed 3	13.4274	144.7989	20	ND	37	24	0	0
Ylig, Unnamed 1	13.3889	144.7769	53	1	3349	468	2060	484
Yona Island	13.3798	144.6513	130	3.5	933	119	769	109
Ypao, Unnamed 1†	13.5095	144.7947	375	2	1893	214	1556	199

