

VEGETATION OF AMERICAN MEMORIAL PARK
SAIPAN, MARIANA ISLANDS

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INTRODUCTION

American Memorial Park is an affiliated status subunit of War in the Pacific National Historical Park located on the island of Saipan, Northern Marianas. The park, established in 1978, commemorates American soldiers who lost their lives in the campaign on Saipan during the Second World War.

The park is a small area, 133 acres. It is a coastal area located just north of Garapan on a raised reef (Fig. 1). The focus of the Park is the modest memorial which is surrounded by a substantial recreational area. There is a small wetland within the Park's boundaries which has been manipulated over the years. Since the war, bulldozing and use of the area as a dump continued until 1978. The waste material was covered over and the area left untouched since then. A dense vegetation has taken over the area which is now the habitat of the endangered Marianas gallinule and a large number of other birds.

In 1982, the Northern Marianas government requested the U. S. Army Corps of Engineers to develop a flood control program for Garapan. Three of the options presented would directly affect the wetland area. The National Park Service became concerned about the impact of the preferred flood control option on the stability of the endangered gallinule habitat. They requested an inventory of the botanical resources of the park with some detailed quantitative measurements of the vegetation within the wetland area.

METHODS AND MATERIALS

General plant survey. Plants were collected from all areas of the site during the initial survey of the wetland park in 1986, the subsequent surveys in 1988 and early 1989. Voucher specimens were collected for each plant species and have been curated at the University of Guam Herbarium. Some duplicates are deposited at Bishop Museum, Honolulu, and the National Museum of Natural History (Smithsonian Institute), Washington, D.C. Species are shown in table 1.

Transect. Quantitative measurements of the vegetation were collected using the line intercept method along four transects in the wetland area (Mueller-Dombois and Ellenberg 1974, Brower and Zar 1984). The locations of the transects are indicated on the map (Fig. 2). The importance value data are presented in Table 2; raw data can be seen in Appendix 1.

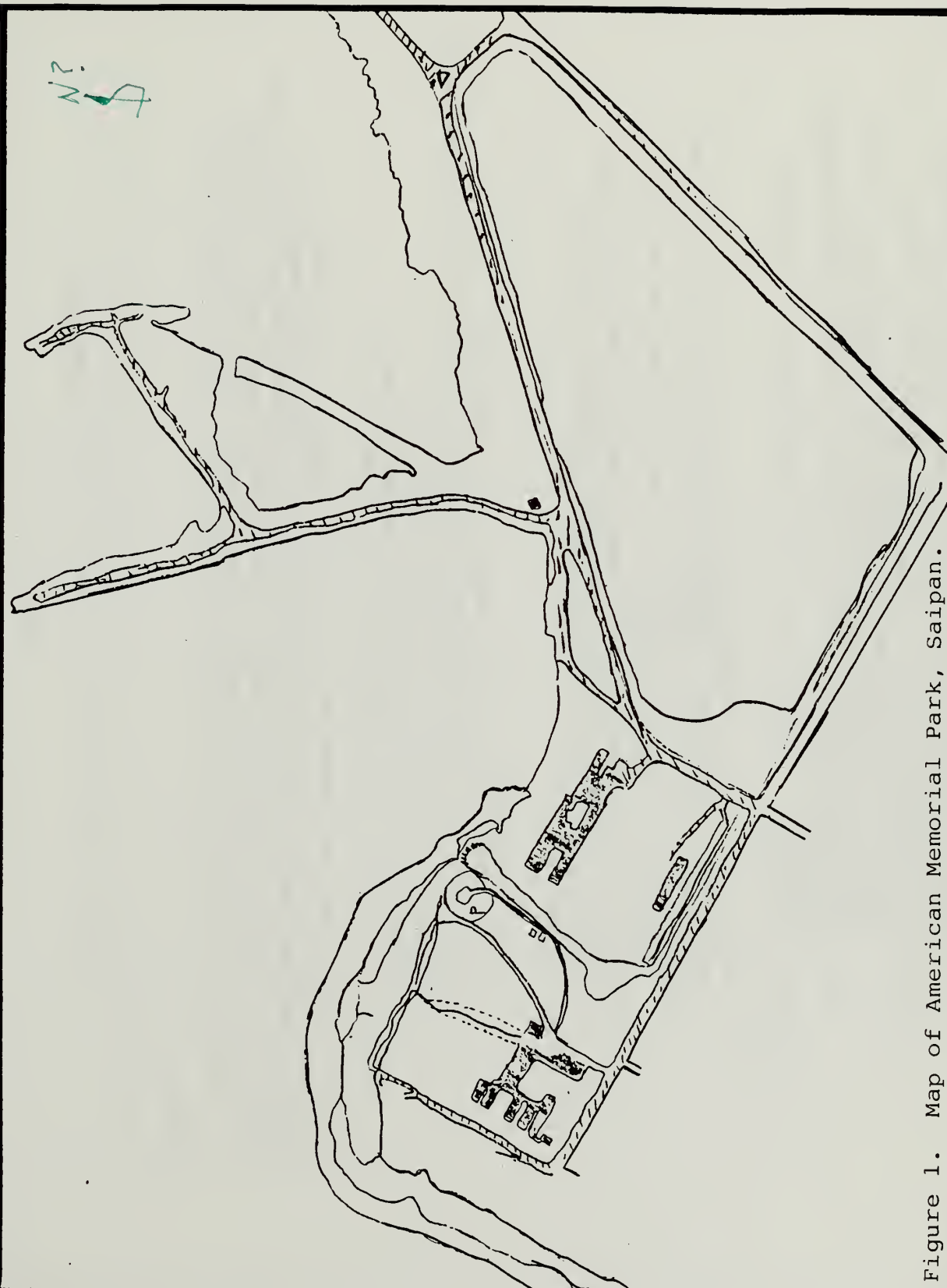


TABLE 1

Vascular Plants of American Memorial Park, Saipan CNMI

Legend:

I. Information relates to classification of the plant. Words in caps show categories as large as FAMILY, or larger. Family names typically end in -CEAE. Capitalized, underlined words are genera (genus names); lower case, underlined words are species names. The scientific names are the genus-species combinations. Names/abbreviations after scientific names are the person(s) who named the species. Other names are common names, including Chamorro local names.

II. Growth form refers to the appearance of the plants.

- H= herbaceous; plants with little or no woody growth.
- S= shrubs; woody plants with several major trunk.
- T= trees; woody plants with one major trunk.
- V= vines; woody or non-woody plants which can not stand free by themselves, but variously crawl, creep, sprawl, and climb over other vegetation.

III. Place in community.

- T= terrestrial; rooted in relatively dry soil.
- A= aquatic; rooted, floating or emergent in watery situations.
- E= epiphytic; attached to the surface of another plant, and using that plant for support, only.
- P= parasitic; unrooted but attached to another plant and utilizing its food as well as its support.
- S= saprophytic; nutrition is gained from dead and decaying vegetable matter, and not by photosynthesis.

IV. Status. The relation of the plant to the site.

- Nd= indigenous - native to the site; evolved there, or arrived by natural transport.
- Nd/E= indigenous/endemic - native to the site, and not found elsewhere unless so specified (Nd/Eo*= Saipan; Mariana Is., etc.)
- Nt= introduced - brought in, accidentally or deliberately, by man or his agents (planes, canoes, dogs, etc.).
- Nt/N= introduced/naturalized - behaves as an indigenous species; prospers without the assistance of man.
- Nt/X= introduced/exotic - survives or spreads only if man assists.

Legend for Table 1

V. Relative abundance. Comparative numbers in the communities which the species occur(s). /C= Clumped - a modifier used to indicate very uneven spacing species like grasses, etc. A species may occur only one place in a site, but several plants will be close together (R/C).

R= Rare - less than 5 plants per 100 m² in sites where they occur.

U= Uncommon - more than 5 but less than 20 plants per 100 m² in sites where they occur.

C= Common - more than 20 but less than 50 plants per 100 m² in sites where they occur.

A= Abundant - more than 50 plants per 100 m²

TABLE 1

Vascular Plants of American Memorial Park, Saipan, CNMI

I.	II.	III.	IV.	V.
FERNS - OPHIOGLOSSACEAE				
<u>Ophioglossum nudicaule</u> L.f.	H	T	Nd	R
FERNS - POLYPODIACEAE				
<u>Acrostichum aureum</u> L.	H	A	Nd	U/C
Langayao; Giant swamp fern				
<u>Antrophyum plantagineum</u> (Cav.) Kaulf.	H	E	Nd	R/U
<u>Davallia solida</u> (Forst. f.) Sw.	H	T, E	Nd	U
Pugua machena				
<u>Nephrolepis hirsutula</u> (Forst.) Presl.	H	T, E	Nd	C
<u>Polypodium punctatum</u> (L.) Sw.	H	E	Nd	U
Bird's nest fern				
<u>Polypodium scolopendria</u> Burm. f.	H	T., E	Nd	C
<u>Pteris vittata</u> L.	H	T	Nt/N	U
<u>Pyrrosia lanceolata</u> (L.) Farw.	H	E	Nd	C
<u>Tectaria crenata</u> Cav.	H	T	Nd	U
<u>Thelypteris opulenta</u> (Kaulf.) Fosb.	H	T	Nd	R
<u>Vittaria incurvata</u> Cav.	H	E	Nd	R/U
Shoestring fern				
FERNS ALLIES - PSILOTACEAE				
<u>Psilotum nudum</u> (L.) Grisebach	H	T, E	Nd	R
Whisk fern				

TABLE 1 continued

I.	II.	III.	IV.	V.
- ARACEAE				
<u>Alocasia macrorrhiza</u> (L.) Schott	H	T/A	Nt	R/U
MONOCOTS - ARECACEAE (PALMAE)				
<u>Cocos nucifera</u> L. Niyog; Coconut	T	T	Nt/N	U
MONOCOTS - CYPERACEAE				
<u>Cyperus brevifolius</u> (Rottb.) Hassk.	H	T	Nt/N	U
<u>Cyperus compressus</u> L.	H	T	Nt/N	U
<u>Cyperus difformis</u> L.	H	A/T	Nt/N	U
<u>Cyperus kyllingia</u> Endl.	H	T,A	Nt/N	U
<u>Cyperus polystachyos</u> Rottb.	H	T,A	Nd	U
<u>Fimbristylis cymosa</u> R. Br.	H	T	Nd	U
MONOCOTS - GRAMINEAE (POACEAE)				
<u>Cenchrus echinatus</u> L. Bur-grass; Sandspur	H	T	Nt/N	U
<u>Chloris inflata</u> Link Fingergrass	H	T	Nt/N	C
<u>Chrysopogon aciculatus</u> (Retz.) Trin. Inifuk; Palaii	H	T	Nd	U
<u>Cynodon dactylon</u> (L.) Pers. Bermuda Grass	H	T	Nt/N	C

TABLE 1 continued

I.	II.	III.	IV.	V.
MONOCOTS - GRAMINEAE (POACEAE) (con't)				
<u>Dactyloctenium aegyptium</u> (L.) Beauv.	H	T	Nt/N	U
<u>Dichanthium blahdii</u> (Retz.) Clayton	H	T	Nt/N	U/C
<u>Echinochloa colonum</u> (L.) Link Chaguan-Agaga; Jungle-Rice	H	T/A	Nd	U
<u>Eleusine indica</u> Gaertn. Umog; Goose Grass	H	T	Nt/N	C
<u>Eragrostis ciliaris</u> (L.) R.Br.	H	T	Nt/N	C
<u>Eragrostis tenella</u> (L.) Beauv. ex Hook. Lovegrass	H	T	Nt/N	C
<u>Eragrostis</u> sp.	H	T	Nt/N	U
<u>Eustachys petraea</u> (Sw.) Desv.	H	T	Nt/N	CU
<u>Imperata conferta</u>	H	T	Nt/N	U
<u>Ischaemum</u> sp.	H	T	Nt	R
<u>Lepturus repens</u> R. Br. Lesaga	H	T	Nd	C
<u>Panicum maximum</u> Jacq. Guinea grass	H	T	Nt/N	C
<u>Panicum muticum</u> Forssk.	H	T	Nt/N	C
<u>Paspalum conjugatum</u> Berg. Hilo grass	H	T	Nt/N	U
<u>Paspalum distichum</u> L. (<u>P. vaginalis</u> Sis.) Saltgrass; Knotgrass; Couchgrass	H	T	Nd	R
<u>Pennisetum polystachion</u> (L.) Schultes	H	T	Nt/N	U
<u>Sporobolus fertilis</u> (Steud.) Clayton Wiregrass	H	T	Nt/N	C

TABLE 1 continued

I.	II.	III.	IV.	V
MONOCOTS - GRAMINEAE (POACEAE) (con't)				
<u>Thuarea involuta</u> (Forst.) R. Br. Ex R. J.S. Las-aga	H	T	Nd	C
<u>Zoysia matrella</u> Var. <u>pacifica</u> Goudsew. Templegrass	H	T	Nd	U
MONOCOTS - LILIACEAE (sensu lato)				
<u>Hymenocallis littoralis</u> (Jacq.) Salisb.	H	T	Nt/N	U
<u>Sansevieria</u> sp. Tigre; Bowstring Hemp	H	T	Nt/N	U/C
MONOCOTS - ORCHIDACEAE				
<u>Spathoglottis plicata</u> Bl.	H	T/E	Nd	U
<u>Taeniophyllum mariannense</u> Schltr. Kamuke-nanofe; Amot-otdon; worm orchid	H	E	Nd	U
<u>Zeuxine fritzii</u> Schltr.	H	T	Nd	U/C
MONOCOTS - PANDANACEAE				
<u>Pandanus dubius</u> Spreng. Pahong; Screw Pine	T	T	Nd	U
<u>Pandanus tectorius</u> Park. Kafu; Screw Pine	T	T	Nd	C
DICOTS - ACANTHACEAE				
<u>Blechnum brownei</u> Juss. var. <u>puberulum</u> Yerbas babui	H	T	Nt/N	U/C

TABLE 1 continued

I	II.	III.	IV.	V
DICOTS - ACANTHACEAE (con't)				
<u>Pseuderanthemum carruthersii</u> (Seem.)Guill. var. <u>carruthersii</u>	S	T	Nt	U
DICOTS - AMARANTHACEAE				
<u>Achyranthes aspera</u> L. Chichitun; Lasogado	H	T	Nt/N	U
<u>Deeringia amaranthoides</u> (Lam.)Merr.	V/S	T	Nd	U/C
DICOTS - ARALIACEAE				
<u>Polyscias fruticosa</u> (L.)Harms Papua	S/T	T	Nd	R
DICOTS - ASTERACEAE (COMPOSITAE)				
<u>Bidens alba</u> (L.) DC Daisy	H	T	Nt/N	C
<u>Eupatorium odoratum</u>	H	T	Nt/N	C
<u>Mikania scandens</u> (L.)Willd. Mile-a-minute	V	T	Nt/N	C
<u>Pluchea indica</u> (L.) Less.	S	T	Nt/N	C/A
<u>Pluchea symphitifolia</u> (Mill.)Gillis	S	T	Nt/N	U/C
<u>Pluchea x fosbergii</u>	S	T	Nt/N	R
<u>Vernonia cinerea</u> (L.)Less. Chaguan Santa Maria	H	T	Nt/N	U

TABLE 1 continued

I.	II.	III.	IV.	V.
DICOTS - BORAGINACEAE				
<u>Heliotropium procumbens</u> var. <u>depressum</u> (Cham) Fosb. & Sachet	H	T	Nt/N	U
Hunig-tasi	T	T	Nd	U
<u>Tournefortia argentea</u> L.f.				
Hunig; Beach Heliotrope				
DICOTS - CARICACEAE				
<u>Carica papaya</u> L.	H, T	T	Nt/N	U
Papaya				
DICOTS - CASUARINACEAE				
<u>Casuarina equisetifolia</u> L.	T	T	Nd	C
Gago; Ironwood; Australian Pine				
DICOTS - CONVULVACEAE				
<u>Ipomoea indica</u> (Burm.) Merr.	V	T	Nt/N	C
Fofgu; Asa-gao; Japanese Morning-glory				
<u>Ipomoea macrantha</u> R. & S.	V	T	Nd	C
Alaihai; Moon Flower				
<u>Ipomoea pes-caprae</u> ssp. <u>brasiliensis</u> (L.) v. Ooststr.	V	T	Nd	C
Alalag-tasi; Beach Morning-glory	V	T	Nt/N	C
<u>Ipomoea triloba</u> L.				
Fofgu-sabana				
<u>Operculina ventricosa</u> (Bert.) Peter	V	T	Nt/N	U/C
Alalag; Wood-rose				
<u>Stictocardia tiliacifolia</u> (Desr.) Hall.f.	V	T	Nt/N	U
Abubo				

TABLE 1 continued

I.	II.	III.	IV.	V.
DICOTS CUCURBITACEAE				
<u>Momordica charantia</u> L. Ahgaga; Bitter-mellon	V	T	Nt/N	U
DICOTS - EUPHORBIACEAE				
<u>Acalypha indica</u> L. Hierba del cancer; Island Catnip	H	T	Nt/N	U
<u>Euphorbia cyathophora</u> Murr. Dwarf Poinsetta	H	T	Nt/N	U
<u>Euphorbia hirta</u> L. Golodrina	H	T	Nt/N	U
<u>Phyllanthus amarus</u> Schum. Maigo-lalo	H	T	Nt/N	U
<u>Phyllanthus marianus</u> Muell.-Arg. Gaogao-uchan	H	T	Nd	U
DICOTS - GOODENIACEAE				
<u>Scaevola sericea</u> Vahl. Nanaso; Half-flower	S	T	Nd	U
DICOTS - HERNANDIACEAE				
<u>Hernandia sonora</u> L. Nonag	T	T	Nd	C
DICOTS - LABIATAE				
<u>Hyptis</u> sp.	H/S	T	Nd	R/u

TABLE 1 continued

I.	II.	III.	IV.	V.
DICOTS - LAURACEAE				
<i>Cassytha filiformis</i> L. Agasi; Magagas	V	P	Nd	U
DICOTS - LEGUMINOSAE-CAESALPINIACEAE				
<i>Delonix regia</i> (Bojer) Raf.	T	T	Nd	U
DICOTS - LEGUMINOSAE-FABACEAE				
<i>Abrus precatorius</i> L. Kolales halomtano; Coral bean	V	T	Nd	U
<i>Alysicarpus vaginalis</i> (L.) DC.	H	T	Nt/N	U
<i>Crotalaria pallida</i> Ait. Pale Rattlebox	H	T	Nt/N	U
<i>Desmodium triflorum</i> (L.) Dc.	H	T	Nt/N	U
<i>Indigofera suffruticosa</i> Mill.	S	T	Nd	U/C
<i>Mucuna gigantea</i> (Willd.) DC. Bayogo dikike; Gayetan	V	T	Nd	U/C
<i>Sesbania cannabina</i> (Retz.) Pers.	H	T	Nt/N	R
DICOTS - LEGUMINOSAE-MIMOSACEAE				
<i>Albizia lebbeck</i> (L.) Benth. Trongkon-mames; Mamis; Woman's tongue	T	T	Nt/N	U
<i>Desmanthus virgatus</i> (L.) Willd.	S	T	Nt/N	U
<i>Leucaena leucocephala</i> (Lam.) de Wit Tangantangan	T	T	Nt/N	A
<i>Mimosa pudica</i> L. Sleeping Grass; Sensitive plant	V	T	Nt/N	C

TABLE 1 continued

I.	II.	III.	IV.	V.
DICOTS - LEGUMINOSAE-MIMOSACEAE (con't)				
<u>Pithecellobium dulce</u> (Roxb.) Benth. Kamachile	T	T	Nt/N	C
DICOTS - LYTHRACEAE				
<u>Pemphis acidula</u> Forst. Nigas	S	T	Nd	U
DICOTS - MALVACEAE				
<u>Hibiscus tiliaceus</u> L. Pago; Sea-hibiscus	T	T	Nd	A
<u>Malvastrum coromandelianum</u> (L.) Garcke	H	T	Nt/N	U
<u>Sida rhombifolia</u> L. var. <u>rhombifolia</u> Escobilla dalili; Dalili apaka	H	T	Nt/N	U
<u>Thespesia populnea</u> (L.) Sol ex Correa Banalo; Kilulu; Kuluk	S	T	Nd	C/A
DICOTS - MORACEAE				
<u>Ficus prolixa</u> var. <u>subcordata</u> Corner Nunu; Taotaomona tree; Strangler Fig	T	T	Nd	R
<u>Ficus tinctoria</u> var <u>neo-ebudarium</u> (Summerh.) Fosb.	T	T	Nd	R
DICOTS - MYRTACEAE				
<u>Eugenia palumbis</u> Merr. Agatelang	T	T	Nd	R

TABLE 1 continued

I.	II.	III.	IV.	V.
DICOTS - OLEACEAE				
<u>Jasminum marianum</u> DC. Banago	V	T	Nd	C
DICOTS - ONAGRACEAE				
<u>Ludwigia octovalis</u> (Jacq.) Raven Titimo	H	A	Nd	U
DICOTS - OXALIDACEAE				
<u>Oxalis corniculata</u> L. Apsom; Agsom; Yellow wood-sorrel	H	T	Nt/N	U/C
DICOTS - PASSIFLORACEAE				
<u>Passiflora foetida</u> var. <u>hispid</u> (DC.) Killip Love-in-a-mist	V	T	Nt/N	U
<u>Passiflora suberosa</u> L.	V	T	Nt/N	U
DICOTS - POLYGALACEAE				
<u>Polygala paniculata</u> L.	H	T	Nt/N	U
DICOTS - POLYGONACEAE				
<u>Portulaca oleracea</u> var. <u>granulato-stellulata</u> v. Poelt Botdolagas, Donkulu	H	T	Nd	U/C

TABLE 1 continued

I.	II.	III.	IV.	V.
DICOTS - RHAMNACEAE				
<i>Colubrina asiatica</i> (L.) Brongn. Gasoso	S	T	Nd	U
DICOTS - RHIZOPHORACEAE				
<i>Bruguiera gymnorhiza</i> (L.) Lam. Mangle lahi	T	A	Nd	A
DICOTS - RUBIACEAE				
<i>Aidia cochinchinensis</i> Lour. Sumac	T	T	Nd	U
<i>Dentaria repens</i> J.R. & G. Forst. Borduegas	H	T	Nt/N	U
<i>Hedyotis strigulosa</i> (Bartl. ex DC.) Fosb.	H	T	Nd	U
<i>Morinda citrifolia</i> L. Lada	T	T	Nd	U
<i>Psychotria mariana</i> Bartl. ex DC.	T	T	Nd	U
<i>Spermacoce assurgens</i> R. & P.	H	T	Nt/N	U
DICOTS - RUTACEAE				
<i>Citrus</i> sp.	T	T	Nt	R
DICOTS - SAPINDACEAE				
<i>Allophylus timorensis</i> (DC.) Bl. Nger	S	T	Nd	R
<i>Dodonea viscosa</i> (L.) Jacq.	T	T	Nt/N	U/C

TABLE 1 continued

I.	II.	III.	IV.	V.
DICOTS - SAPOTACEAE				
<u>Pouteria obovata</u> (R. Br.) Baehni	T	T	Nd	U
DICOTS - SCROPHULARIACEAE				
<u>Bacopa monnieri</u> (L.) Wettst.	H	A	Nt/N	U
<u>Bacopa procumbens</u> (Mill.) Greenm.	H	T	Nt/N	U
DICOTS - SOLANACEAE				
<u>Physalis</u> sp.	H	T	Nt	R
DICOTS - TILIACEAE				
<u>Muntingia calabura</u> L. Manzanita; Panama Cherry	T	T	Nt/N	U
DICOTS - URTICACEAE				
<u>Pilea microphylla</u> (L.) Liebm.	H	T	Nt/N	U
DICOTS - VERBENACEAE				
<u>Lippia nodiflora</u> (L.) Rich.	H	T	Nt/N	U/C
<u>Premna obtusifolia</u> R. Br. Ahgao	T	T	Nd	U
<u>Stachytarpheta jamaicensis</u> (L.) Vahl	H	T	Nt/N	C
<u>Stachytarpheta urticifolia</u> Sims	H	T	Nt/N	U

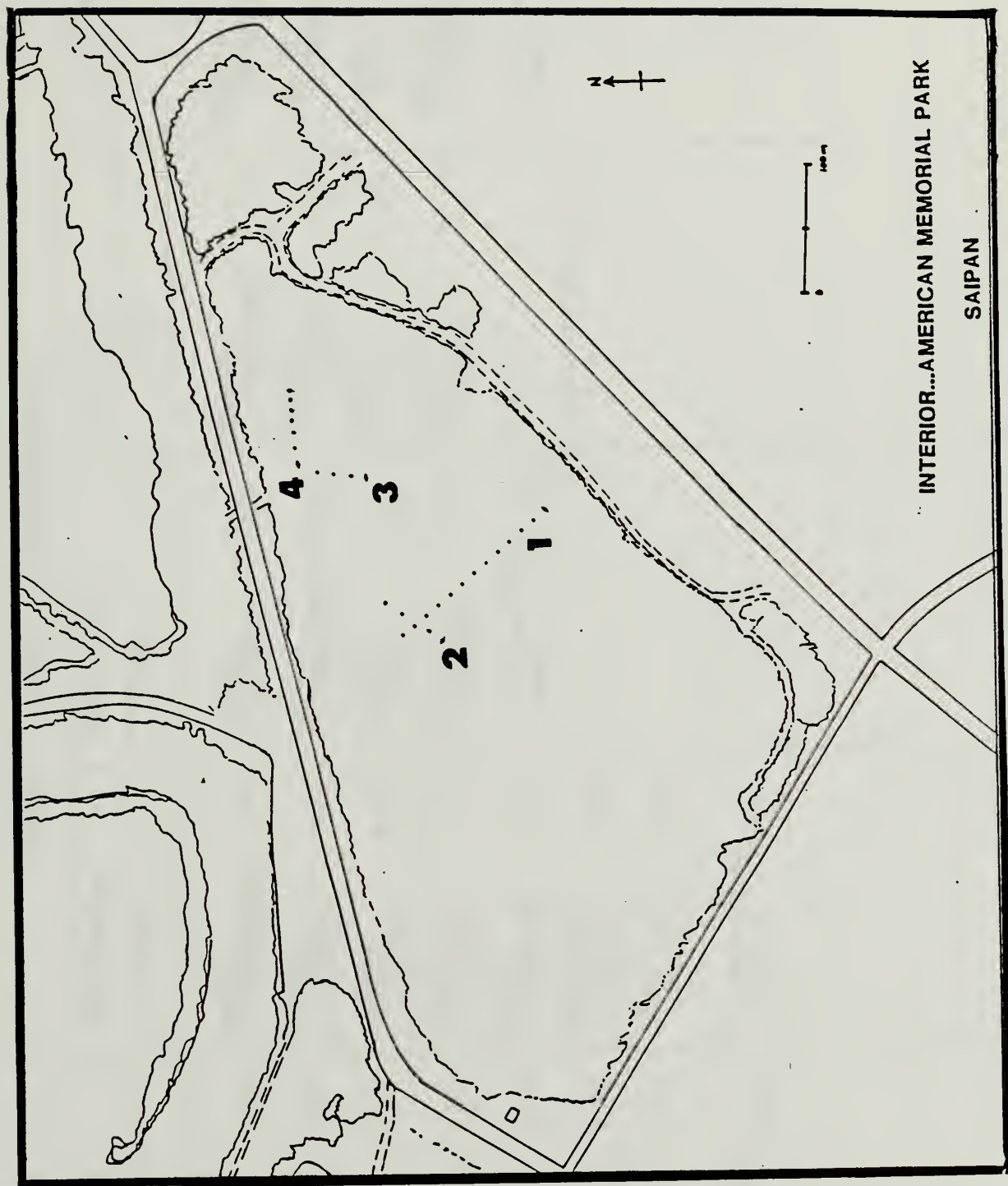


Figure 2. Vegetation Transects

TABLE 2. VEGETATION TRANSECTS
TRANSECT 1. SPECIES and IMPORTANCE VALUES

BOTTON STRATUM	LOWER STRATUM	UPPER STRATUM	TOP STRATUM	ALL STRATA COMBINED
< 1m	1-3m	3-10m	> 10m	
<u>Nephrolepis hirsutula</u> 0.645	<u>Leucaena leucocephala</u> 0.424	<u>Hibiscus tiliaceus</u> 0.901	<u>Leucaena leucocephala</u> 1.019	<u>Hibiscus tiliaceus</u> 1.546
<u>Leucaena leucocephala</u> 0.275	<u>Hibiscus tiliaceus</u> 0.383	<u>Leucaena leucocephala</u> 0.469	<u>Hibiscus tiliaceus</u> 0.391	<u>Leucaena leucocephala</u> 0.528
<u>Eupatorium odoratum</u> 0.223	<u>Ipomoea indica</u> 0.280	<u>Ipomoea indica</u> 0.240	<u>Ipomoea indica</u> 0.205	<u>Ipomoea indica</u> 0.238
<u>Momordica charantia</u> 0.222	<u>Momordica charantia</u> 0.154	<u>Passiflora suberosa</u> 0.133	<u>Mucuna gigantea</u> 0.139	<u>Nephrolepis hirsutula</u> 0.104
<u>Hibiscus tiliaceus</u> 0.168	<u>Ipomoea macrantha</u> 0.149	7 other species, each < 0.100	4 other species, each < 0.100	19 other species, each < 0.100
<u>Polypodium scolopendria</u> 0.139	<u>Eupatorium odoratum</u> 0.130			
<u>Momordica charantia</u> 0.135	<u>Ficus tinctoria</u> 0.103			
5 other species, each < 0.100	7 other species, each < 0.100			

TABLE 2. Continued

TRANSECT 2. SPECIES AND IMPORTANCE VALUES

BOTTOM STRATUM	LOWER STRATUM	UPPER STRATUM	TOP STRATUM	ALL STRATA COMBINED
< 1m	1 - 3m	3 - 10m	> 10m	
<u>Acrostichum aureum</u> 1.011	<u>Ipomoea indica</u> 0.475	<u>Leucaena leucocephala</u> 1.040	<u>Casuarina equisetifolia</u> 1.618	<u>Acrostichum aureum</u> 0.488
<u>Mikania scandens</u> 0.503	<u>Morinda citrifolia</u> 0.346	<u>Jasminum marianum</u> 0.825	<u>Jasminum marianum</u> 0.382	<u>Leucaena leucocephala</u> 0.242
<u>Ipomoea indica</u> 0.113	<u>Eupatorium odoratum</u> 0.247	<u>Ipomoea macrantha</u> 0.136	No other species.	<u>Mikania scandens</u> 0.242
<u>Ipomoea macrantha</u> 0.111	<u>Mucuna gigantea</u> 0.228	No other species.		<u>Jasminum marianum</u> 0.231
<u>Polypodium scolopendria</u> 0.111	<u>Ipomoea macrantha</u> 0.217			<u>Casuarina equisetifolia</u> 0.160
2 other species, <0.100 each	<u>Hibiscus tiliaceus</u> 0.189			<u>Ipomoea indica</u> 0.159
	<u>Leucaena leucocephala</u> 0.169			<u>Ipomoea macrantha</u> 0.129
	<u>Jasminum marianum</u> 0.130			<u>Eupatorium odoratum</u> 0.101
	No other species.			5 other species, <0.100 each

TABLE 2. Continued

TRANSECT 3. SPECIES AND IMPORTANCE VALUES

BOTTOM STRATUM	LOWER STRATUM	UPPER STRATUM	TOP STRATUM	ALL STRATA COMBINED
<1m	1 - 3m	3 - 10m	>10m	
<u>Acrostichum aureum</u> 0.665	<u>Pandanus dubius</u> 0.579	<u>Hernandia sonora</u> 0.642	<u>Thespesia populnea</u> 0.746	<u>Hernandia sonora</u> 0.502
<u>Polypodium scolopendria</u> 0.381	<u>Hernandia sonora</u> 0.324	<u>Pandanus dubius</u> 0.576	<u>Mikania scandens</u> 0.626	<u>Pandanus dubius</u> 0.324
<u>Hernandia sonora</u> 0.276	<u>Polypodium scolopendria</u> 0.274	<u>Morinda citrifolia</u> 0.190	<u>Hernandia sonora</u> 0.621	<u>Thespesia populnea</u> 0.269
<u>Mikania scandens</u> 0.231	<u>Ficus tinctoria</u> 0.230	<u>Mucuna gigantea</u> 0.141	<u>Pithecellobium dulce</u> 0.228	<u>Polypodium scolopendria</u> 0.135
<u>Eupatorium odoratum</u> 0.173	<u>Leucaena leucocephala</u> 0.218	<u>Melanolepis multiglandulosa</u> 0.115	<u>Pandanus dubius</u> 0.217	<u>Acrostichum aureum</u> 0.130
<u>Thelypteris opulenta</u> 0.127	<u>Eupatorium odoratum</u> 0.106	4 other species, each <0.100	1 other species <0.100	<u>Mucuna gigantea</u> 0.104
2 other species, each <0.100	3 other species, each <0.100			12 other species, each <0.100

TABLE 2. Continued

TRANSECT 4. SPECIES and IMPORTANCE VALUES

BOTTOM STRATUM 0-1m	LOWER STRATUM 1-3m	UPPER STRATUM 3-10m	TOP STRATUM >10m	ALL STRATA COMBINED
<u>Acrostichum aureum</u> 0.664	<u>Pandanus dubius</u> 0.734	<u>Pandanus dubius</u> 1.135	<u>Casuarina equisetifolia</u> 1.558	<u>Bruguiera gymnorhiza</u> 0.830
<u>Hymenocallis littoralis</u> 0.491	<u>Hibiscus tiliaceus</u> 0.367	<u>Hibiscus tiliaceus</u> 0.229	<u>Hernandia sonora</u> 0.183	<u>Pandanus dubius</u> 0.498
<u>Nephrolepis hirsutula</u> 0.202	<u>Bruguiera gymnorhiza</u> 0.216	<u>Hernandia sonora</u> 0.221	<u>Bruguiera gymnorhiza</u> 0.174	<u>Casuarina equisetifolia</u> 0.314
<u>Bruguiera gymnorhiza</u> 0.140	<u>Hernandia sonora</u> 0.132	<u>Bruguiera gymnorhiza</u> 0.115	1 other species, <0.100	<u>Acrostichum aureum</u> 0.181
<u>Pandanus dubius</u> 0.112	<u>Passiflora suberosa</u> 0.126	4 other species, each <0.100		<u>Hibiscus tiliaceus</u> 0.147
<u>Polypodium scolopendria</u> 0.107	<u>Phyllanthus marianus</u> 0.126			<u>Hymenocallis littoralis</u> 0.137
<u>Eupatorium odoratum</u> 0.101	4 other species, each <0.100			<u>Hernandia sonora</u> 0.125
2 other species, each <0.100				12 other species, each <0.125

Vegetation Map. The vegetation map (Fig. 3) was constructed from an aerial photograph of the area taken by the U. S. Geological Survey in 1987. The vegetation units were demarcated in the aerial photograph and ground proofed. The vegetation unit identification follows that of Jacobi (1988).

Photo Essay. Appendix 2 describes the uses and abuses of the park at present (January 1989).

THE STUDY AREA

Saipan is the largest island, and also the capital, of the Commonwealth of the Northern Mariana Islands. It is located at 15° 12'N latitude and 145° 37'E longitude. It is approximately 13 miles (21 km) long and averages 4 miles (6 km) in width, occupying 46.6 square miles. It lies within the humid tropics with an average relative humidity of 83%. The average wind velocity is 10.5 mph (17 kph); The NE and ENE trade winds are persistent during the January to May dry season whereas winds from various directions are less strong, and sporadic, during the rainy season (Tenorio and Associates 1979).

Saipan is a part of the Mariana Island arc system, and had its beginning about 42 million years ago in an area to the west called the Palau-Kyushu Ridge. Between that time and the present the island has undergone eastward movement, volcanic activity, uplift and subsidence with attendant reef formation, and erosion by wind, rain and movements of the sea. Contained within the rock formations are three volcanic cores, numerous fault lines, and layered volcanic and calcareous rocks (Cloud et al 1956).

The west coast of Saipan south from Magpi benches consists of an almost continuous lime sand beach backed by a few low limestone ridges and underlain by Tagpochau limestone formed in the early Miocene. The lowest bench and the entire western coastal plain are constructional in origin. The Matansa (Massacre) Fault which runs NNE by SSW and is downfaulted to the west (Cloud et al 1956) passes along the eastern edge of the park.

The Park is located on the northern boundary of the township of Garapan on the west coast of the island of Saipan (Fig. 4). The Park consists of the terrestrial environment only. Coastal waters and islets are not within the Park's jurisdiction. It is bounded by Garapan and Tanapag Lagoons from approximately 100m south of Puntan Muchot to Puntan Flores on the north and west, Beach and Middle Roads on the east, and the road to the Hyatt Hotel on the south (Fig. 1). The area is part of a level elevated reef flat and all of it is less than three meters above

Key to vegetation map symbols

Symbol	Description
C-M: Ll (v)	closed mesic tangantangan scrub with vines.
C-M: ns	closed mesic native shrubs.
C-W: Bg-nt	closed wet mixed forest with mangroves.
C-W: Ht	closed hibiscus forest.
O-M: Ce (v-g)	open mesic ironwood forest with grassland and morning glory vine understory.
O-M: (g)	open dry area with mixed grasses (mown areas).
O-M: (v-g)	open mesic grassland with morning glory vines.
O-W: (Aa)	open wetland with <u>Acrostichum aureum</u> .
O-W: Ce, nt (Aa)	open wet ironwood forest with other native trees and an understory of <u>Acrostichum aureum</u> .
O-W: (h)	open wetland with native herbs.
p	planted ornamentals.

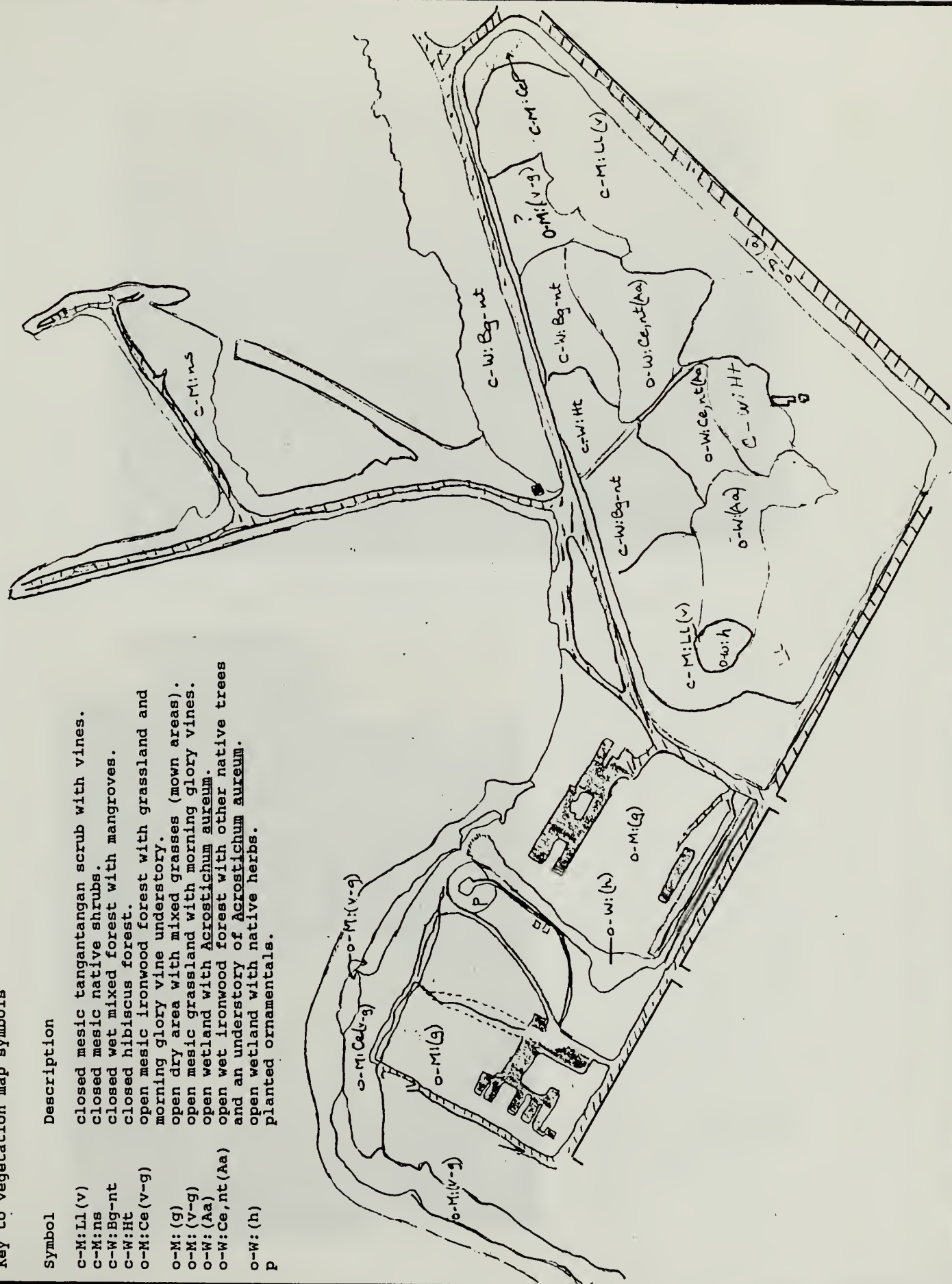


Figure 3. Vegetation Map



Figure 4. Garapan and the barrier reef with Managaha Island from Mt. Topochau.



Figure 5. Dumping area.

sea-level. The whole area has been altered by bulldozing and the construction of roads and buildings. The wetland area, except that which lies between Beach Road and Tanapag Lagoon, is also modified so that there are two containment areas one of which is undrained, the other slightly to its south is associated with a small culvert under Beach Road. An exercise track circled this entire segment of the wetland study site in 1986, but it has been abandoned and overgrown with weeds. The two ponding areas are separated by a dirt road raised about one and one half meters above the surrounding terrain. It is now impassable because of downed vegetation, and bears along its southern margin a large diameter pipe, possibly an old sewage pipe.

The north-western edge of the park abutting Tanapag Lagoon consists of artificial coral-fill jetties. The jetties are vegetated with a considerable amount of scrub on either side of a jeep road. The coastal margin of the Park along Tanapag Lagoon is a continuation of the interior mangrove swamp and coastal forest. It contains several dump-sites which are not only unsightly and unhygienic but also disrupt revegetation of the mangrove swamp (Figs. 5, 6, and 7).

RESULTS AND DISCUSSION

There are 128 species of vascular plants in the Park (Table 1), thirteen (10%) of which are ferns and fern allies. The remainder are flowering plants; there are no conifers present. Fifty-six species (44%) are indigenous, none endemic to the Marianas. Seventy-two species (56%) are introduced, 67 (78%) of which are naturalized.

There are no U. S. Federal endangered species present. There is no list of endangered plants for the Commonwealth. None of the plants is rare by any consideration. However, the orchid Zeuxine fritzii (which was named for a German governor of Saipan) occurs around the swamp edge in the park and has only been found in one other place in recent times, though perhaps is more common and merely overlooked.

None of the plants present is considered noxious.

Vegetation types within the natural area include mangrove swamps, marshes, strand, coastal scrub and weedy scrub.

Mangrove swamps are wetlands dominated by woody mangrove vegetation, in this case, Bruguiera gymnorhiza



Figure 6. Trash, and smoke from the dump.



Figure 7. Trash, smoke from the dump and eroding jetty.

(Fig. 8). It is the dominant and only Pacific mangrove species in the Park (and Saipan) although more species are common to mangrove swamps further south. Hibiscus tiliaceus is always an edge species of almost every ecosystem in the Marianas though it is more abundant around wetland areas. Its abundance results from its ability to take root anywhere along the stem. Therefore, when the tree overextends and falls or when strong winds, such as typhoons, knock it down the tree is not killed, but instead produces a number of new trunks. In a wetland more moisture is available to support these new shoots. Acrostichum aureum is a typical swamp fern. It tolerates a moderate amount of salinity and thus tends to be a feature of mangrove swamps in the Marianas and elsewhere. Casuarina equisetifolia, though present in the swamp, is typically confined to sandy areas above standing water.

A small marsh vegetated with Paspalum distichum and edged by Scirpus littoralis and Acrostichum aureum (Figs. 9 and 10) lies at the southwest portion of the interior. Another grassy area along the north and northwest part of the interior is not a marsh, but does get appreciable moisture; the grasses are Pennisetum purpureum and Panicum maximum, which are large but are not wetland species.

Many of the other species, including Hernandia sonora, Thespesia populnea, Jasminum marianum, Pandanus dubius and the herbs Hymenocallis littoralis, Ipomoea macrantha and Mucuna gigantea are typical strand species as well. The presence of these strand species in the swamp is simply the result of proximity to the shoreline and the sandy substrates which predominate within the study area because of bulldozing.

There are a number of weed species in the area which indicate that the area has been and is still disturbed. Leucaena leucocephala, a dominant woody weed and an important soil stabilizer, has declined significantly now that the psyllid, Heteropsylla cubana, has become established. The vines such as Mikania scandens, Ipomoea indica and Momordica charantia tend to climb and provide a dense shade (Figs. 11 and 12); now that there is dead tangantangan, this will provide suitable support which will have to be accepted until other shading tree species invade the area.

The coastal scrub is a combination of species which are early colonists, and those which will be later climax vegetation. The jetties where this vegetation type occurs are dominated by brushy plants such as Eupatorium odoratum (Fig. 13), Pluchea indica, Pluchea symphitifolia,



Figure 8. Bruguiera gymnorhiza. Only Pacific mangrove species on Saipan.



Figure 9 Scirpus littoralis in small marsh.



Figure 10. Paspalum
distichum, and
Acrostichum aureum.
Casuarina in the
background.



Figure 11. Ipomoea
indica growing
on Leucaena
leucocephala.



Figure 12. Mikania
scandens and Ipomoea
indica growing on
tangantangan.



Figure 13. Eupatorium odoratum.

Tournefortia argentea, Scaevola sericea, Indigofera suffruticosa, Desmanthus virgatus, Jasminum marianum and Colubrina asiatica. There is also an impressive stand of Dodonaea viscosa in a place quite unusual for this species. However, it is extending itself and appears to be a successful colonizer although the storms may be detrimental to its continued survival in the area.

Several of the open areas are being taken over by templegrass, Zoysia matrella (Fig. 14). This species stabilizes the sand yet it is tolerant of such an exposed salty habitat. It should be encouraged and planted in the picnic areas.

Weedy scrubland vegetation occurs on scraped limestone over which there is a veneer of "soil." It is dominated by a variety of grasses, the sedge Fimbristylis cymosa (nutgrass) and various herbs such as Desmodium spp., Polygala paniculata, and Heliotropium procumbens. This is a highly artificial man-induced environment.

The Park has one of the only three mangrove sites on Saipan; The other two are at Salt Spring, also called Starch Factory Spring / Sadog Tasi, and along the western edge of Haggi. Susupe (Lake Susupe) where the Japanese-built canal brought in sea water. Mangroves are important land holding systems that buffer the effects of storms from the sea and hold erosion products moving off the land. Thus, they actually increase the size of areas in which they are found. Secondly, they are important nurseries of the young of many marine fishes and provide a sheltered, nutrient rich environment for species such as edible crabs and birdlife in general. As with all wetlands man should encroach with great caution. Any further disturbance to the area is potentially disastrous.

Although the area has obviously been a dump and a dumping site and has had much modification by bulldozing, it nevertheless has a long history of being a wetland and is so indicated on old maps and early references. There are many large structural units within the area. Decisions regarding the removal of smaller structures and concrete foundations will have to be evaluated in the light of the damage that might occur to the system. There are some concrete bunkers that could be left in situ. There are some metal structures that are deteriorating rapidly. If the Park wants to preserve them they will have to be protected in the very near future.

The old roadway could be cleaned up and made into a short nature trail for schools and visitors. A short transect aligned along the axis of transect 2 would provide a good example of wetland communities. At least



Figure 14. Temple grass
on the jetty.



Figure 15. Trash
from the municipal
dump.

four families of the yellow honeyeater and at least an equal number of the cardinal honeyeaters were seen. Other birds including the white-faced dove and rufous-fronted fantail use the area and were readily observable; near sunset over 100 white-eyes flew in and settled down.

Transect 4 area has large Bruguiera, Casuarina and Acrostichum (Fig.2; Table 1). On the ground there are orchid species and a variety of species which would be expected in a climax forest. The diversity of species in this area makes it a particularly valuable area.

Botanically, the park comprises areas of weedy shrubs, strand and mangrove species. The jetty areas are still in a successional stage and have yet to develop into a mature climax ecosystem.

The mangrove swamp should not be allowed to dry out. If the proposed drainage canal results in loss of water from the system then mitigation must be planned to ensure that the swamp remains a swamp. The swamp is probably a balanced ecosystem of salt and fresh water. If the proposed canal is going to upset that balance then some mitigation must be planned. A prominent fault of the west coast of Saipan, the Matansas (Massacre) Fault occurs along the west coastal plain. Its exact location relative to the swamp and the proposed drainage cannal should be ascertained because of the impact of the fault on drainage patterns. It is important to understand that the canal will probably interrupt the sheet water flow that is an important source of fresh water to the swamp.

RECOMMENDATIONS

Stop the dumping of trash along the coastal margin of Tanapag Lagoon. This will allow the mangrove to serve as a buffer between the sea and the main road preventing storm damage to the road and the rest of the park.

Negotiate the closure or proper management of the dump on Puntan Flores. Not only is the garbage which blows into the park unsightly (Fig. 15) and probably unhygienic; it also is an impediment to the establishment of many plants. The smoke is thoroughly obnoxious (Fig. 16). The value of the recreational areas developed on the jetties is being inpaired.

The Park should consider the possibility of planting Calophyllum inophyllum along the jetty area, especially in areas where it is wide enough to make picnic areas. This tree will tolerate salt water and spray and is also a common strand inhabitant in most of the Pacific. This



Figure 16. Smoke from the dump.



Figure 17. Harvested turf.

tree species will provide good shade for the picnickers. The root system will stabilize the shoreline yet the trees are very resistant to high winds.

Zoysia matrella should be transplanted from the areas it now occupies to other picnic areas. It is tolerant of trampling and will serve to stabilize the substratum. It is best transplanted by removing strips from healthy colonies and planting firmly in the desired area during the rainy season. The Park staff should do everything they can to discourage local residents from their current practice of removing segments of the turf for their own use (Fig. 17).

Encouraging the further establishment of Casuarina equisetifolia along the jetties will also help to stabilize the substratum, but more active intervention will be required to shore up the jetties which are now in a precarious state (Fig. 14).

The development of roads on the ocean side of Beach Road should be discouraged. These roads can be a focus for storm activity which will be concentrated through these gaps and damage the road. Fishing and other activities in the area are acceptable as long as they not result in opening the coastal forest.

ACKNOWLEDGMENTS

The assistance of the park staff is appreciated.

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APPENDIXES

APPENDIX 1

DATA USED TO CALCULATE IMPORTANCE VALUES

APPENDIX 2

PHOTO ESSAY

APPENDIX 1. DATA USED TO CALCULATE IMPORTANCE VALUES

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 7 Aug. 1986 Observers _____

Habitat and stratum _____

Locality Amer. Mem. Park - Transect #1 - Totals of all strata

Total transect length (L) 600m

Total number of transect intervals 120

Species (i)	Number of individuals (n)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j) [*]	Frequency (f _i)	Relative frequency (Rf _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Hibiscus filiceus</i>				39	0.325	0.209	137.6m	0.229	0.337	1.546
<i>Leucaena leucochala</i>				42	0.350	0.225	123.7m	0.206	0.303	0.528
<i>Fougea indica</i>				27	0.225	0.145	38.1m	0.064	0.093	0.238
<i>Pouteria obovata</i>				3	0.025	0.016	2.6m	0.004	0.006	0.022
<i>Poly scolopendria</i>				5	0.042	0.027	7.5m	0.013	0.018	0.045
<i>Homordia charantia</i>				12	0.100	0.064	9.9m	0.017	0.024	0.088
<i>Acalypha indica</i>				1	0.008	0.005	0.2m	0.0003	0.001	0.006
<i>Eupatorium obovatum</i>				8	0.067	0.043	10.4m	0.017	0.026	0.069
<i>Carica papaya</i>				1	0.008	0.005	1.0m	0.002	0.003	0.008
<i>Passiflora suberosa</i>				7	0.058	0.037	11.0m	0.018	0.027	0.064
<i>Desmanthus virgatus</i>				1	0.008	0.005	0.4m	0.001	0.001	0.006
<i>Tasmannia maritimum</i>				7	0.058	0.037	11.2m	0.019	0.028	0.065
<i>Ficus tincaria</i>				2	0.017	0.011	4.5m	0.008	0.011	0.022

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 2 Aug. 1986 Observers _____

Habitat and stratum _____

Locality Amer. Mem. Park - Transect #1 Bottom stratumTotal transect length (L) 150 mTotal number of transect intervals 30

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j) [*]	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>H. hirsutus</i>				4	0.133	0.103	3.7 m	0.025	0.065	0.168
<i>L. leucoccephala</i>				4	0.133	0.103	9.8 m	0.065	0.172	0.275
<i>T. indica</i>				5	0.167	0.129	5.3 m	0.035	0.093	0.222
<i>Pouteria</i>				1	0.033	0.025	1.2 m	0.008	0.021	0.046
<i>Momordica</i>				4	0.133	0.103	1.8 m	0.012	0.032	0.135
<i>Polystichum</i>				3	0.100	0.077	3.5 m	0.023	0.062	0.139
<i>Acetypha</i>				1	0.033	0.025	0.2 m	0.001	0.004	0.029
<i>Eupatorium</i>				6	0.200	0.154	3.9 m	0.026	0.069	0.223
<i>Phosyflora</i>				1	0.033	0.025	0.3 m	0.002	0.005	0.030
<i>Stictocaulis</i>				1	0.033	0.025	0.2 m	0.001	0.004	0.029
<i>Mikania</i>				1	0.033	0.025	2 m	0.013	0.035	0.060
<i>Nepenthes</i>				8	0.267	0.204	25 m	0.167	0.439	0.645
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$		$\Sigma f = 1.298$	$\Sigma ff = 1.0$	$\Sigma l = 56.9$	$\Sigma IC = 0.603$	$\Sigma RC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 7 August 1984 Observers _____

Habitat and stratum _____

Locality Amer. Mem. Park - Transect #1 - lower stratumTotal transect length (L) 150 mTotal number of transect intervals 30

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (I _i) [*]	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>H. hiliacus</i>				7	0.233	0.140	17.5 m	0.117	0.243	0.383
<i>Leucaena</i>				8	0.267	0.160	19.0 m	0.127	0.264	0.424
<i>Ipomoea</i>				9	0.300	0.180	7.2 m	0.048	0.160	0.280
<i>Boerhaavia</i>				2	0.067	0.040	1.4 m	0.009	0.020	0.040
<i>Polypodium</i>				2	0.067	0.040	4.0 m	0.027	0.056	0.096
<i>Homordia</i>				5	0.167	0.100	3.9 m	0.024	0.054	0.154
<i>Eupatorium</i>				2	0.067	0.040	6.5 m	0.043	0.090	0.130
<i>Passiflora</i>				1	0.033	0.020	0.3 m	0.002	0.004	0.024
<i>Desmanthus</i>				1	0.033	0.020	0.4 m	0.003	0.006	0.026
<i>Jasminum</i>				2	0.067	0.040	3.0 m	0.020	0.042	0.082
<i>Ficus</i>				2	0.067	0.040	4.5 m	0.030	0.063	0.103
<i>Psychotria</i>				2	0.067	0.040	1.7 m	0.011	0.024	0.064
<i>Melanthera</i>				1	0.033	0.020	0.4 m	0.003	0.006	0.026
<i>Ipomoea</i>				6	0.200	0.120	2.1 m	0.014	0.029	0.149
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$		$\Sigma f = 1.668$	$\Sigma ff = 1.0$	$\Sigma l = 71.9$	$\Sigma IC = 0.48$	$\Sigma RC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 7 August 1986 Observers _____

Habitat and stratum _____

Locality Amer. Mem. Park - Transect #1 - Upper stratumTotal transect length (L) 150 mTotal number of transect intervals 30

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j) [*]	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
Hibiscus				23	0.767	0.354	92.9m	0.619	0.547	0.901
Leucaena				15	0.500	0.231	40.4m	0.269	0.238	0.469
Ipom. indica				10	0.333	0.154	14.6m	0.097	0.086	0.240
Homordia				2	0.067	0.031	0.5m	0.003	0.003	0.034
Cauca				1	0.033	0.015	1.0m	0.007	0.006	0.021
Passiflora				4	0.133	0.061	6.4m	0.043	0.038	0.133
Jasminum				2	0.067	0.031	3.0m	0.020	0.018	0.049
Mucuna				4	0.133	0.061	4.5m	0.030	0.027	0.089
Mikania				2	0.067	0.031	40m	0.027	0.024	0.055
Horiuda				1	0.033	0.015	2.0m	0.013	0.012	0.027
Pithecollob				1	0.033	0.015	0.4m	0.003	0.002	0.017
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$		$\Sigma f = 2.166$	$\Sigma RF = 1.0$	$\Sigma l = 169.7$	$\Sigma IC = 1.131$	$\Sigma RC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 7 Aug. 1984 Observers _____

Habitat and stratum _____

Locality Amer. Mem. Park - Transect #1 Top stratumTotal transect length (L) 150 mTotal number of transect intervals 30

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (i _i) [*]	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
Hibiscus				5	0.167	0.167	23.5 m	0.157	0.224	0.391
Leucaena				15	0.500	0.500	54.5 m	0.363	0.519	1.019
Ipomoea indica				3	0.100	0.100	11.0 m	0.073	0.105	0.205
Homorodica				1	0.033	0.033	4.5 m	0.030	0.043	0.076
Passiflora				1	0.033	0.033	4.0 m	0.027	0.038	0.071
Stictocarpus				1	0.033	0.033	3.0 m	0.020	0.029	0.062
Mucuna				3	0.100	0.100	4.1 m	0.027	0.039	0.139
Pithecellobium				1	0.033	0.033	0.4 m	0.003	0.004	0.037
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$		$\Sigma f = 0.999$	$\Sigma ff = 1.0$	$\Sigma l = 105$	$\Sigma IC = 0.7$	$\Sigma RC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 7 August 1986 Observers _____

Habitat and stratum _____

Locality Inner New Park - Transect # 2 - total for all strataTotal transect length (L) 220 mTotal number of transect intervals 44

Species (i)	Number of indi- viduals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j _i) [*]	Frequency (f _i)	Relative frequency (Rf _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage value (RC _i)	Importance value (IV _i)
<i>Hibiscus</i>				1	0.023	0.022	2.5 m	0.011	0.020	0.042
<i>Aerostich.</i> <i>aurum</i>				9	0.205	0.195	36 m	0.164	0.293	0.488
<i>Casuarina</i> <i>equisetif.</i>				4	0.091	0.087	9 m	0.041	0.073	0.160
<i>Mikania</i> <i>scandens</i>				5	0.114	0.109	16.3 m	0.074	0.133	0.242
<i>Peuceana</i> <i>uncocophala</i>				4	0.134	0.130	13.8 m	0.063	0.112	0.242
<i>Ipomoea</i> <i>indica?</i>				3	0.068	0.065	11.5 m	0.052	0.094	0.159
<i>Polypod.</i> <i>scolopend.</i>				2	0.044	0.044	0.9 m	0.004	0.007	0.051
<i>Jasminum</i> <i>marianum</i>				5	0.114	0.109	15 m	0.068	0.122	0.231
<i>Mucuna</i> <i>argentea</i>				1	0.023	0.022	3.5 m	0.016	0.029	0.051
<i>Passif.</i> <i>suberosa</i>				1	0.023	0.022	0.8 m	0.004	0.007	0.029
<i>Morinda</i> <i>citrifolia</i>				2	0.044	0.044	4.2 m	0.019	0.034	0.078
<i>Ipomoea</i> <i>maritima</i>				5	0.114	0.109	2.4 m	0.011	0.020	0.129

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Date 7 Aug. 1986 Observers _____

Habitat and stratum

Locality Amer. Mem Park - Transect #2 - to tal for all strata

Total transect length (L) 220m

Total number of transect intervals 44

Species (i)	Number of indi- viduals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j) [*]	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Chromolaena</i> <i>odorata</i>				2	0.046	0.044	7m	0.032	0.057	0.101
Totals	Σn =	ΣID =	ΣRD = 1.0		Σf = 1.046	ΣRf = 1.0	Σl = 122.9	ΣIC = 0.589	ΣRC = 1.0	

9 Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

* does not include RD;

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 7 Aug. 1986 Observers _____

Habitat and stratum _____

Locality Amer. Memorial Park - Transect #2 - bottom stratumTotal transect length (L) 55 mTotal number of transect intervals 11

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j _i) [*]	Frequency (f _i)	Relative frequency (Rf _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Acrostichum aureum</i>				9	0.818	0.431	36 m	0.655	0.58	1.011
<i>Mikania laevis</i>				5	0.455	0.240	16.5 m	0.296	0.263	0.503
<i>Ipomoea indica?</i>				1	0.091	0.048	4 m	0.073	0.065	0.113
<i>Polypodium scolopendria</i>				2	0.182	0.096	0.9 m	0.016	0.015	0.111
<i>Paspalum suberosa</i>				1	0.091	0.048	0.8 m	0.015	0.013	0.061
<i>Ipomoea mettiana?</i>				2	0.182	0.096	0.9 m	0.016	0.015	0.111
<i>Chromolaena odorata</i>				1	0.091	0.048	3 m	0.055	0.049	0.097
Totals	Σ n =	Σ ID =	Σ RD = 1.0		Σ f = 1.900	Σ Rf = 1.0	Σ l = 61.9 m	Σ IC = 1.126	Σ RC = 1.0	

* Data collected in these columns are from the totals on data sheet 3B 2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 7 August 1986 Observers _____

Habitat and stratum _____

Locality Amer Mem. Park - Trausect #2 - lower stratumTotal transect length (L) 55 mTotal number of transect intervals 11

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j) [*]	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Hibiscus</i>				1	0.091	0.091	2.5 m	0.046	0.098	0.189
<i>Lilacys</i>										
<i>Leucaena</i>				1	0.091	0.091	2 m	0.036	0.078	0.169
<i>Leucocophala</i>										
<i>Ipo. moe</i>				2	0.182	0.182	7.5 m	0.136	0.293	0.475
<i>Indica?</i>										
<i>Tasmannia</i>				1	0.091	0.091	1 m	0.018	0.039	0.130
<i>massarum</i>										
<i>Mucuna</i>				1	0.091	0.091	3.5 m	0.064	0.137	0.228
<i>guiltea</i>										
<i>monilda</i>				2	0.182	0.182	4.2 m	0.076	0.164	0.346
<i>citrophe</i>										
<i>Iporhea</i>				2	0.182	0.182	0.9 m	0.016	0.035	0.217
<i>mentum?</i>										
<i>Chromolaena</i>				1	0.091	0.091	4 m	0.073	0.156	0.247
<i>edrahe</i>										
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$		$\Sigma f = 1.001$	$\Sigma ff = 1.0$	$\Sigma l = 25.6 m$	$\Sigma IC = 0.465$	$\Sigma RC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 7 August 1986 Observers _____

Habitat and stratum _____

Locality Amer. Men. Park - Transect # 2 - upper stratumTotal transect length (L) 55 mTotal number of transect intervals 11

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j)*	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i)*	Linear coverage index (IC _i)	Relative coverage (ffc _i)	Importance value (IV _i)
<i>Lonicera</i>				5	0.455	0.554	11.8 m	0.215	0.484	1.04
<i>Leucocoryph.</i>				3	0.273	0.333	12 m	0.218	0.492	0.825
<i>Tasmanian</i>				1	0.091	0.111	0.6 m	0.011	0.025	0.136
<i>mananum</i>										
<i>Ipomoea</i>										
<i>maritima</i>										
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$		$\Sigma f = 0.819$	$\Sigma ff = 1.0$	$\Sigma l = 24.4$	$\Sigma IC = 0.444$	$\Sigma fRC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 7 August 1984 Observers _____

Habitat and stratum _____

Locality Amer. Menor. Park - Transect #2 top stratum

Total transect length (L) 55m

Total number of transect intervals 11

Species (i)	Number of individuals (n _i)	Linear density index (LD _i)	Relative density (RD _i)	Present in how many transect intervals? (j _i)*	Frequency (f _i)	Relative frequency (Rf _i)	Intercept length (l _i)*	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Casuarina</i>										
<i>eguisetifolia</i>				4	0.364	0.800	9m	0.164	0.818	1.118
<i>Tidestromia</i>				1	0.091	0.200	2m	0.036	0.182	0.382
<i>parviflora</i>										
Totals	Σn =	ΣLD =	ΣRD = 1.0		Σf = 0.455	ΣRf = 1.0	Σl = 11 m	ΣIC = 0.2	ΣRC = 1.0	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 8 August 1984 Observers _____

Habitat and stratum _____

Locality Transect #3 Am. New Park 4 strata Totals for all strataTotal transect length (L) 200 mTotal number of transect intervals 40

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j _i) [*]	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Ficus thichoria</i>				2	0.050	0.033	3.5 m	0.018	0.026	0.059
<i>Hernandia sonora</i>				12	0.300	0.197	40.5 m	0.203	0.305	6.502
<i>Leucaena leucocephala</i>				2	0.050	0.033	1.1 m	0.006	0.008	0.041
<i>Passiflora suberosa</i>				1	0.025	0.016	0.1 m	0.001	0.001	0.017
<i>Thebapt. opuntia</i>				1	0.025	0.016	1.5 m	0.008	0.011	0.027
<i>Melantheris multiflora</i>				1	0.025	0.016	2 m	0.01	0.015	0.031
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$		$\Sigma f = 1.525$	$\Sigma ff = 1.0$	$\Sigma l = 132.8$	$\Sigma IC = 0.469$	$\Sigma RC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 8 August 1986 Observers L. Paulson & A. Rinehart

Habitat and stratum _____

Locality Amer. Memorial Park Transect #3; 50 m sampled at 4 strata every 5 m Totals
Total transect length (L) 200 m for all strataTotal number of transect intervals 40

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j) [*]	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (ffc _i)	Importance value (IV _i)
<i>Acrostich. aureum</i>				3	0.075	0.049	10.8 m	0.054	0.081	0.130
<i>Pyrrosia laucelata</i>				1	0.025	0.016	1.0 m	0.005	0.008	0.024
<i>Thespesia populnea</i>				5	0.125	0.082	24.8 m	0.124	0.187	0.269
<i>Polypodium scolopendria</i>				6	0.150	0.098	4.9 m	0.025	0.037	0.135
<i>Morinda citrifolia</i>				3	0.075	0.049	2.8 m	0.014	0.021	0.070
<i>Mikania scandens</i>				2	0.050	0.033	6.5 m	0.033	0.049	0.082
<i>Hucuna gigantea</i>				4	0.100	0.066	5.0 m	0.025	0.038	0.104
<i>Eupatorium odoratum</i>				3	0.075	0.049	1.5 m	0.008	0.011	0.060
<i>Pithecolobium dulce</i>				3	0.075	0.049	2 m	0.010	0.015	0.064
<i>Hibiscus flavicus</i>				1	0.025	0.016	1 m	0.005	0.008	0.024
<i>Ipomoea</i>				2	0.050	0.033	0.5 m	0.003	0.004	0.037
<i>Pandanus</i>				9	0.225	0.148	23.3 m	0.117	0.176	0.324

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 8 August 1984 Observers _____

Habitat and stratum _____

Locality Am. Mem. Park Transect #3 Bottom stratumTotal transect length (L) 50 mTotal number of transect intervals 10

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j _i) [*]	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Acrostichum aureum</i>				3	0.333	0.217	10.8 m	0.216	0.448	0.665
<i>Polypodium scolopendria</i>				4	0.40	0.261	2.9 m	0.058	0.120	0.381
<i>Mikania scandens</i>				1	0.10	0.065	4.0 m	0.080	0.166	0.231
<i>Mucuna gigantea</i>				1	0.10	0.065	0.2 m	0.004	0.008	0.073
<i>Elephantopus scaber</i>				2	0.20	0.131	1.0 m	0.020	0.042	0.173
<i>Sporobolus</i>				1	0.10	0.065	0.2 m	0.004	0.008	0.073
<i>Hemantia sonora</i>				2	0.20	0.131	3.5 m	0.070	0.145	0.276
<i>Thelypodium opulenta</i>				1	0.10	0.065	1.5 m	0.030	0.062	0.127
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$		$\Sigma f = 1.533$	$\Sigma Rf = 1.0$	$\Sigma l = 24.1$	$\Sigma IC =$	$\Sigma RC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date _____ Observers _____

Habitat and stratum _____

Locality Amer. Men. Park Transect #3 Lower stratumTotal transect length (L) 50 mTotal number of transect intervals 10

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j) [*]	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Polygodium scolopendria</i>				2	0.2	0.150	2 m	0.04	0.124	0.274
<i>Morinda citrifolia</i>				1	0.1	0.075	0.3 m	0.006	0.019	0.094
<i>Mucuna gigantea</i>				1	0.1	0.075	0.3 m	0.006	0.019	0.094
<i>Eupatorium odoratum</i>				1	0.1	0.075	0.5 m	0.010	0.031	0.104
<i>Pandanus</i>				3	0.333	0.250	5.3 m	0.104	0.329	0.579
<i>Ficus tinctorius</i>				1	0.1	0.075	2.5 m	0.050	0.155	0.230
<i>Hernandia sonora</i>				1	0.1	0.075	4 m	0.080	0.249	0.324
<i>Leucaena leucophala</i>				2	0.2	0.150	1.1 m	0.022	0.068	0.218
<i>Passiflora suberosa</i>				1	0.1	0.075	0.1 m	0.002	0.006	0.081
Totals	Σn =	ΣID =	ΣRD = 1.0		Σf = 1.333	Σff = 1.0	Σl = 16.1	ΣIC = 0.375	ΣRC = 1.0	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date _____ Observers _____

Habitat and stratum _____

Locality Amer. Mem. Park Trausect #3 upper stratumTotal transect length (L) 50 mTotal number of transect intervals 10

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j _i) [*]	Frequency (f _i)	Relative frequency (Rf _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Pyrosia laevis</i>				1	0.1	0.063	1.0 m	0.020	0.026	0.089
<i>Morinda citrifolia</i>				2	0.2	0.125	2.5 m	0.050	0.065	0.190
<i>Mucuna gigantea</i>				1	0.1	0.063	3.0 m	0.060	0.078	0.141
<i>Hibiscus tiliaceus</i>				1	0.1	0.063	1.0 m	0.020	0.026	0.089
<i>Iponoea</i>				1	0.1	0.063	0.3 m	0.006	0.008	0.071
<i>Pandanus</i>				4	0.4	0.250	12.5 m	0.250	0.326	0.576
<i>Ficus tinctoria</i>				1	0.1	0.063	1 m	0.020	0.026	0.089
<i>Hernandia Sonora</i>				4	0.4	0.250	15.0 m	0.300	0.392	0.642
<i>Melastomys multiflorus</i>				1	0.1	0.063	2 m	0.040	0.052	0.115
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$		$\Sigma f = 1.40$	$\Sigma Rf = 1.0$	$\Sigma l = 38.3$	$\Sigma IC = 0.766$	$\Sigma RC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date _____ Observers _____

Habitat and stratum _____

Locality Amer. Mem. Park Trauseet #3 Top stratumTotal transect length (L) 50 mTotal number of transect intervals 10

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j _i)*	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (l _i)*	Linear coverage index (IC _i)	Relative coverage (ffc _i)	Importance value (IV _i)
<i>Thaapsia populina</i>				5	0.5	0.289	24.8 m	0.496	0.457	0.746
<i>Mikania scandens</i>				1	0.1	0.058	2.5 m	0.050	0.046	0.626
<i>Mucuna gigantea</i>				1	0.1	0.058	1.5 m	0.030	0.028	0.086
<i>Pithecollobium dulce</i>				3	0.33	0.191	2.0 m	0.040	0.037	0.228
<i>Bougainvillea</i>				2	0.2	0.116	5.5 m	0.110	0.101	0.217
<i>Hernandia sonora</i>				5	0.5	0.289	18.0 m	0.360	0.332	0.621
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$		$\Sigma f = 1.73$	$\Sigma Rf = 1.0$	$\Sigma l = 54.3 m$	$\Sigma IC = 1.086$	$\Sigma RfC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 8 August 1984 Observers Rinehart & Rawlerson
 Habitat and stratum swamp, swamp forest, & associates; total of all 4 strata
 Locality American Memorial Park, transect #4
 Total transect length (L) 60m x 4 levels = 240m
 Total number of transect intervals 12 x 4 levels = 48

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j) [*]	Frequency (f _j)	Relative frequency (ff _j)	Intercept length (l _j) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	* Importance value (IV _i)
<i>Carica papaya</i>				3	0.063	0.038	3.3m	0.014	0.017	0.055
<i>Inga latifolia</i>				2	0.042	0.025	0.8m	0.003	0.004	0.029
<i>Phyllanthus manauus</i>				2	0.042	0.025	1.1m	0.006	0.007	0.032
<i>Hernandia sonora</i>				4	0.083	0.050	15m	0.0625	0.075	0.125
<i>Polygodium scolopend</i>				3	0.063	0.038	2.2m	0.009	0.011	0.049
<i>Leucaea leucocarpa</i>				2	0.042	0.025	1.3m	0.005	0.007	0.032
<i>Casuarina equisetif</i>				9	0.188	0.113	40m	0.167	0.201	0.314
<i>Pandanus dubus</i>				16	0.333	0.199	59.5m	0.248	0.299	0.498
<i>Mucuna gigantea</i>				4	0.083	0.050	4.1m	0.017	0.021	0.071
<i>Hymenocallis littoralis</i>				6	0.125	0.075	12.3m	0.051	0.062	0.137
<i>Acrostichum aureum</i>				7	0.146	0.087	18.7m	0.078	0.094	0.181
<i>Morinda citrifolia</i>				1	0.021	0.013	0.5m	0.002	0.003	0.014

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them

* does not include RDI

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 8 Aug 1984

Observers _____

Habitat and stratum _____

total of all strataLocality Ames. Mem. Park, transect #4Total transect length (L) 60m x 4 levels = 240mTotal number of transect intervals 12 x 4 levels = 48

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (i _i) [*]	Frequency (f _i)	Relative frequency (Rf _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Hickory scandens</i>				2	0.042	0.025	0.9m	0.004	0.005	0.050
<i>Quercus bicolor</i>				1	0.021	0.013	3m	0.013	0.015	0.028
<i>Aster sp.</i>				6	0.125	0.075	14.4m	0.060	0.072	0.147
<i>Prunella virginiana</i>				6	0.125	0.075	14.4m	0.067	0.080	0.830
<i>Nepeta</i>				3	0.063	0.038	4.1m	0.017	0.021	0.059
<i>Pyrola</i>				1	0.021	0.013	0.4m	0.002	0.002	0.015
<i>Salix</i>				2	0.042	0.025	1.4m	0.006	0.007	0.032
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$	(40)	$\Sigma f = 1.670$	$\Sigma Rf = 1.0$	$\Sigma l = 199.3$	$\Sigma IC =$	$\Sigma RC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 8 August 1986 Observers _____Habitat and stratum swamp, swamp forest & associates; bottom (0-1m) stratumLocality Am. Mek. Park, transect #4Total transect length (L) 60mTotal number of transect intervals 12

Species (i)	Number of individuals (n _i)	Linear density index (LD _i)	Relative intensity (RD _i)	Present in how many transect intervals? (i) _i *	Frequency (f _i)	Relative frequency (ff _i)	Intercept length (d _i)*	Linear coverage index (LC _i)	Relative coverage (RC _i)	* does not include RD _i importance value (IV _i)
<i>Impatiens conferta</i>				2	0.167	.077	6.8m	0.01	0.017	0.094
<i>Polypodium scolopend.</i>				2	0.167	.077	1.4m	0.02	0.030	0.107
<i>Mucuna gigantea</i>				1	0.083	.038	0.6m	0.01	0.017	0.055
<i>Hydnocallis littoralis</i>				6	0.5	.231	12.3m	0.205	0.260	0.491
<i>Acrostichum aureum</i>				7	0.583	.269	18.7m	0.312	0.395	0.664
<i>Chromolaena odorata</i>				1	0.083	.038	3m	0.05	0.063	0.101
<i>Boerhaavia gymnorhiza</i>				2	0.167	.077	3m	0.05	0.063	0.140
<i>Nephrolepis bisulcata</i>				3	0.25	.115	4.1m	0.068	0.087	0.202
<i>Pandanus dubius</i>				1	0.083	.038	3.5m	0.058	0.074	0.112
Totals	Σn =	ΣLD =	ΣRD = 1.0		Σf = 2.166	ΣRf = 1.0	Σl = 47.4	ΣLC = 0.783	ΣRC = 1.0	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 8 August 1986 Observers _____Habitat and stratum Swamp, swamp forest & associates; lower stratum (1-3 m.)Locality Amer. Menor. Park, transect #4Total transect length (L) 60 mTotal number of transect intervals 12

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (i _i) [*]	Frequency (f _i)	Relative frequency (Rf _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i) [*]
<i>Couca</i>				2	0.167	0.091	1.3 m	0.022	0.032	0.123
<i>Papaya</i>				2	0.167	0.091	1.4 m	0.023	0.035	0.126
<i>Phyllanthus marianus</i>				1	0.083	0.045	3.5 m	0.058	0.087	0.132
<i>Nermandia Sonora</i>				1	0.083	0.045	0.3 m	0.005	0.008	0.053
<i>Leucaena leucocephala</i>				6	0.5	0.273	18.5 m	0.308	0.461	0.734
<i>Pandanus dubius</i>				1	0.083	0.045	0.5 m	0.008	0.012	0.057
<i>Morinda citrifolia</i>				1	0.083	0.045	0.8 m	0.013	0.020	0.065
<i>Mikania scandens</i>				4	0.333	0.182	7.4 m	0.123	0.185	0.367
<i>Hibiscus filiceus</i>				2	0.167	0.091	5 m	0.083	0.125	0.216
<i>Bougainvillea gymnanthera</i>				2	0.167	0.091	1.4 m	0.023	0.035	0.126
<i>Passiflora suberosa</i>										
Totals	Σ n =	Σ ID =	Σ RD = 1.0		Σ f = 1.833	Σ Rf = 1.0	Σ l = 40.1	Σ IC = 0.666	Σ RC = 1.0	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

* does not include

RD:

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 8 August 1986 Observers _____

Habitat and stratum _____

upper stratum (3-10 m)Locality Am. Hem. Park, Transect #4Total transect length (L) 60 mTotal number of transect intervals 12

Species (i)	Number of indi- viduals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j _i)*	Frequency (f _i)	Relative frequency (Rf _i)	Intercept length (l _i)*	Linear coverage index (IC _i)	Relative coverage (RIC _i)	Importance value (IV _i) *
<i>Couca</i>				1	0.083	0.055	2 m	0.033	0.034	0.089
<i>Papaya</i>										
<i>Hemantia</i>				2	0.167	0.111	6.5 m	0.108	0.110	0.221
<i>Sonora</i>										
<i>Polypod,</i>				1	0.083	0.055	0.8 m	0.013	0.014	0.069
<i>Sceloporus</i>										
<i>Leucaena</i>				1	0.083	0.055	1 m	0.017	0.017	0.072
<i>Guacoath</i>										
<i>Pandanus</i>				9	0.750	0.500	37.5 m	0.625	0.635	1.135
<i>dubius</i>										
<i>Myrcina</i>				1	0.083	0.055	0.8 m	0.013	0.014	0.069
<i>Gigantea</i>										
<i>Hibiscus</i>				2	0.167	0.111	7 m	0.117	0.118	0.229
<i>Filicallis</i>										
<i>Bougainvillea</i>				1	0.083	0.055	3.5	0.058	0.060	0.115
<i>Gynoxylon</i>										
Totals	$\Sigma n =$	$\Sigma ID =$	$\Sigma RD = 1.0$		$\Sigma f = 1.499$	$\Sigma Rf = 1.0$	$\Sigma l = 59.1$	$\Sigma IC = 984$	$\Sigma RIC = 1.0$	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

* does not include

Data Sheet 3B.3. Class Summary of Data from Line-Intercept Plant Sampling

Date 8 August 1986 Observers _____

Habitat and stratum top stratum (>10m)

Locality Amer. Mem. Park Transect #4

Total transect length (L) 60 m

Total number of transect intervals 12

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j _i) [*]	Frequency (f _i)	Relative frequency (Rf _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Hernandia sonora</i>				1	0.083	0.083	5m	0.083	0.100	0.183
<i>Casuarina equisetifolia</i>				9	0.75	0.751	40m	0.667	0.807	1.558
<i>Hikoria scandens</i>				1	0.083	0.083	0.1m	0.002	0.002	0.085
<i>Bruguiera gymnorhiza</i>				1	0.083	0.083	4.5m	0.075	0.091	0.174
Totals	Σn =	ΣID =	ΣRD = 1.0		Σf = 0.999	ΣRf = 1.0	Σl = 49.6m	ΣIC = 0.827	ΣRC = 1.0	

* Data collected in these columns are from the totals on data sheet 3B.2. Data in the other columns are calculated from them.

APPENDIX 2. PHOTO ESSAY

In December 1986 Typhoon Kim struck Saipan. Erosion of the jetties, fallen trees and other debris changed the face of the park. During fall 1988 the explosion of an old bomb in the municipal dump caused a death and prompted the temporary closing of the dump. People looked for alternate, though unsanctioned dumping sites; some sections of the park were close to the dump and were used.

During 1-3 January, 1989, Lynn Raulerson and Agnes Rinehart visited the park to assess storm damage and conditions in the park. The photographs which follow are the result of that visit.

STORM DAMAGE



Figures A1 and A2. The roots of many trees such as Casuarina equisetifolia are exposed and the trees fall as storms erode the unprotected parts of the jetties within the park. Garbage has washed or blown in from the nearby municipal dump.



Figure A3. An old sewer pipe is exposed, (far left) as a section of the jetty washed away. Roads and picnic areas are threatened. The general disrepair of the area is an eyesore viewed by tourists and all who use the waterway on the extreme right.



Figure A4. Casuarina trees standing alone and taller than the other vegetation in the mangrove area of the park fell victim to the winds of Typhoon Kim. Fallen trees rendered some sections of the park almost impassable.

USES

That portion of the park which adjoins the tourist hotels and popular Micro Beach is well kept and receives a lot of use.



Figures A5 and A6. Saipan residents enjoy an afternoon softball game in American Memorial Park.



Figure A7. The corner of the park between the road and the mangrove swamp is a popular meeting place.



Figure A8. Buildings within the park boundaries are used for Judo and other activities.



Figure A9. Boats are docked along the park boundaries and tourists embark for a day at nearby Managaha Island or to go deep-sea fishing.



Figure A10. The Marianas gallinule was seen emerging from this scirpus marsh near the hotels.



Figures A11 and A12.
Caulerpa, an algae which
is eaten locally, is
collected in the water
in front of the
American Memorial Park
obelisk. Managaha
Island can be seen
in the background.





Figures A13 and A14. The mangrove and marsh areas receive less human use than other sections of the park. They are important habitats for birds, lizards, crabs and other small animals and they provide accessible examples of unique vegetation. The mangroves together with the rest of the forested area have potential as a nature study area.

HISTORICAL RELICTS



Figure A15. The park's historical resources include a small outdoor museum of WWII artifacts which will need some attention if items are to be preserved.



Figure A16. Across Beach Road from the manicured section of the park and near the mangroves, an old bomb and 21 smaller explosive devices can be seen with more modern beverage cans. The artifacts were reported; and hopefully, these potential threats to unwary hikers and curious children have been removed.

AMERICAN
MEMORIAL
PARK

The logo is an arrowhead-shaped emblem with a red background. It features a black silhouette of a sequoia tree on the left and a white silhouette of a mountain range on the right. The text "NATIONAL PARK SERVICE" is written in black, sans-serif capital letters in the upper right portion of the arrowhead. Below the mountain range, the words "Department of the Interior" are written in a smaller, black, sans-serif font.

A photograph of a bird's nest, which is a messy pile of sticks and twigs. Instead of eggs, the nest is filled with various pieces of trash. A prominent yellow paper with the word 'Tide' is visible. There is also a white paper with the words 'I love you' written on it. Other debris includes a blue object, a small black box, and various pieces of white and brown paper. The nest is situated in a grassy area with some small white flowers.



Figures A19 and A20. Thickets of Hibiscus tiliaceus (pago or wild hibiscus) make the wooded area of the park almost impassable. Evidence of a long history of poor stewardsmanship and abuse of the land is everywhere. Piles of roofing material, old tires, and metal objects decompose at the edge of the swamp. Old sewer pipes and other objects litter the area.



Figure A21. Old dump sites and unclean areas invite more dumping. Paths and roadways which once formed the exercise trail are used as dumping areas.



Figure A22. The edge of the park which fronts Middle Road is a dry area. Leucaena leucocephala is covered with Eupatorium and other weeds which burn readily during the dry season.



Figure A23. The inscription on the marble monument reads:
 "THIS MEMORIAL HAS BEEN
 ERECTED BY THE UNITED
 STATES OF AMERICA
 IN HUMBLE TRIBUTE TO
 ITS SONS WHO PAID THE
 ULTIMATE SACRIFICE
 FOR THE LIBERATION
 OF THE MARIANAS 1941-
 1945."



Figure A24. Less than one half mile south of the monument piles of garbage litter the area. Tribute?

