Non-Jurisdictional Survey of Andersen AFB for Prospective Wetland Sites

July to 11, August 1995

Department of the Air Force
October 1995

DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES

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Mr. Francis M. Dayton
Chief , Guam Operations Office
U.S. Army Corps of Engineers
238 Archbishop F.C. Flores St. Ste 905
Agana, Guam 96910

Dear Mr. Dayton

We have completed a Non-Jurisdictional Survey of Andersen Air Force Base for Prospective Wetland Sites, August 1995 (Atch 1). As a result we have determined there are no wetlands on Andersen AFB properties. Our field evaluation of potential wetland locations found none to possess characteristics favorable for wetland development. Your 25 Jan 95 letter to us indicated you would like to visit any potential wetlands. We welcome this opportunity in effort to have confirmation of wetland existence or non-existence completed by the end of Oct 95.

We invite you to inspect areas mapped and discussed in the survey, or other relevant sites on Andersen. If you would like to do so, please contact Ms Heidi Hirsh, Natural Resource Planner at 366-2549. Thank you for your assistance.

Sincerely

Roy N. Tsutsui, GM-13
Chief, Environmental Flight

1 Attachment
Wetland Srvy

cc:
Guam BoP
HQPACAF/CEV

Non-Jurisdictional Survey of Andersen AFB
for Prospective Wetland Sites
31 July-11 Aug 95

Objectives: Guidance by the US Army Corps of Engineers provides for jurisdictional delineation's and non-jurisdictional delineation's of potential wetlands (Desk Top Wetlands Management Notebook, US Army Corps of Engineers, June 1993). This report describes a comprehensive non-jurisdictional assessment of Andersen Air Force Base (AAFB) conducted 31 Jul - 11 Aug 95, to locate and examine all sites that could potentially exhibit wetland characteristics, and identify sites that might require detailed investigation for potential wetland delineation.

Methods: From the Corps of Engineer guidelines, we developed specific criteria for screening northern Guam terrain for the occurrence of wetlands, then conducted photo and map surveys of northern Guam to set priorities for field investigation of suspect areas. We then visited the areas in priority order to determine whether at least one of the defining criteria might apply, and whether the site therefore warranted a detailed investigation. Our procedures are summarized below:

<u>Corps of Engineers criteria</u>: Corps of Engineers 1987 guidance defines wetland as an area that meets two of the following three criteria: (1) Presence of hydrophytic (water-loving or water-tolerant) plants (i.e., 50% or more of the plant species must be obligate wetland, facultative wetland, or facultative species), (2) presence of hydric (light-colored or saturated) soils (i.e., soil must be either mottled with chroma less than 2 on the Munsell Soil Color Chart, or unmottled with chroma less than one, or the water table must be within 18 inches of the surface for at least 14 consecutive days during the growing season for more than 50% of years), or (3) occurrence of wetland hydrologic conditions (i.e., surface must be inundated continuously for more than 5% of the growing season for at least 50% of years). Even if hydric or other soil has not developed on the site, a wetland biotic community is presumed to have developed, or be developing, if these hydrologic conditions are present.

The 1975 National Wetlands Survey Inventory, prepared by the Department of the Interior indicates four locations around the AAFB coastline as wetlands. Per conversation with Mr. Frank Dayton, Director of the Guam office U.S. Corps of

Engineers, these areas are the sea grass beds within the Tarague reef margin and are not considered wetlands.

The purpose of this survey is to identify suspect areas for more comprehensive assessment. Thus, we began by establishing screening criteria appropriate for the terrain of AAFB. We then used these specific criteria to narrow our search to areas where the development of wetland conditions was most plausible.

First, wetlands require frequent and persistent saturation of the ground by either surface or groundwater for at least part of the year. For wetland conditions to be generated by the accumulation of surface water requires a local concavity in at least one dimension in the terrain so that the area can collect and store water from a local stream or from precipitation. For wetland conditions to be generated by groundwater requires some process that brings the water table in contact with the soil layer for at least part of the growing season. If surface water drains freely, and if the water table never rises to near the surface, wetland conditions cannot develop. Second, since the wetland concept, by definition, implies the existence of a special biotic community, the area must be vegetated to at least some degree, since primary producers are prerequisite to the development of all biotic communities. Patches of beach where fresh water is perennially seeping out but no vegetation is present would not be wetlands, for instance, even though the water table is at the surface year round. On the other hand, vegetated areas, even with less than 50% hydrophytic species, would qualify as wetlands if the ground were perennially inundated with fresh or brackish water.

These observations mean that where wetlands exist, they will be found in vegetated valleys, closed depressions, or lowlands (of at least local scope) where surface water accumulates or the local water table can rise to at least within 18 inches of the surface at least 2 consecutive weeks during most years. The first level of screening for wetlands is therefore to eliminate areas where these conditions cannot be met. The second step is to asses the hydrogeologic conditions in the remaining areas by examining them for specific wetland indicators. Where suspect areas are identified, the final step is a detailed survey of the site to characterize and delineate the area as outlined in Corps of Engineer guidelines.

<u>Screening criteria for northern Guam:</u> Northern Guam consists of three types of terrain relevant to the search for wetlands (Map 1): (1) a high karst (limestone) plateau, about 60

to 200 meters (200 to +600 feet) above sea level, with sheer cliffs all around, (2) karst in contact with outcropping volcanic rock in the Mt. Santa Rosa area, and (3) a marginal erosional terrace platform surrounding the plateau at the base of the cliffs. Specific criteria for the development of wetlands in each of these terrain's are described below:

a. Karst plateau: Because of the high elevation of the plateau, the water table is everywhere at least about 60 meters (200 feet) below the surface. Variation in the elevation of the water table in this terrain is on the order of no more than a few meters at most, so there can be no contact between the water table and the terrain surface. Moreover, the terrain is highly permeable, and supports no streams or ponds, either natural or artificial. Of all natural terrain, karst uplands, such as the northern Guam plateau, are the least capable of supporting wetlands. To the extent that wetlands might be found, they could exist only in relatively small, closed depressions where stormwater ponding is sufficiently frequent and persistent to produce wetland responses in soil or vegetation. The permeability of natural sinks in karst terrain is generally equilibrated with precipitation so that the sinks can evacuate surface water very rapidly, usually within a few hours of even the heaviest rainfalls. To the extent that wetlands could develop on such terrain, they would therefore most likely be associated with altered depressional features where natural infiltration has been artificially inhibited or local stormwater influx artificially increased to exceed what the natural system is capable of evacuating. An example would be diversion of water from an extensively paved area such as a runway to a nearby sinkhole used as a ponding basin.

There appear to be two styles of natural sink development on the plateau. Most mapped sinks follow lineaments, which may reflect control by fractures or faults along which preferential flow paths have developed. Sinks developed along them, especially the largest, would be very unlikely to support frequent or long-lasting ponding. A second style of sink development on northern Guam is the association of small autonomous or clustered sinks close to the cliff line, generally within a few hundred meters of the periphery. These may be associated with either flank margin caves (formed by mixing of fresh and salt water where the water table meets the coastline) or with incipient extension of linear cave systems extending headward from the coast.

Cavernous zones, to which the sinkholes ultimately connect, may exist at several vertical levels, including the modern sea level, since the island has experienced several still-stands in relative sea level as it has emerged over the last few millions of years. In any case, the sinks developed in response to very high vertical hydraulic gradients, which would promote high conductivity and very well developed local drainage.

b. Mt. Santa Rosa area: In this area, relatively impermeable volcanic basement rock rises up through the limestone, so that there are areas where groundwater is locally much higher and closer to the surface than in the surrounding terrain. Also, soils developed on the outcropping volcanic rock, and perhaps on adjacent limestone terrain are less permeable than the limestone soils. The terrain supports some ephemeral streams (not mapped) but no standing water bodies. Wetlands can develop at the base of the mountain where local conditions such as perched water or restricted drainage exist. At least one wetland is reported to exist (Aguilar, personal communication) in the Mt. Santa Rosa area, but all AAFB property in the Mt. Santa Rosa area is confined to the peak and ridges.

c. Terraced Platform: Sea-level erosion of the plateau of northern Guam has produced a low, flat-lying terraced marginal platform. This contains numerous sinkholes and cavernous zones. Coastal aquifers typically discharge fresh or brackish water to the beach or to an outflow face in the shallow coastal zone. Unconfined groundwater, as in the northern Guam aquifer, can intersect the terrain at or near the surface along the coast.

Geomorphic theory suggests that in a mixed karst terrain, such as northern Guam, areas of significant concentrated discharge of fresh or brackish water into the coastal zone would most likely occur along established or incipient natural conduits, to which the seaward-flowing groundwater converges. Inundated sinkholes (such as Lost Pond, south of AAFB on the west coast, north of Tanguisson) and perennial coastal and submarine springs (such as found near the beach of Tumon Bay, which was reportedly regarded as a "swamp" before development) are well known elsewhere on Guam. Though coastal sinks and springs need not necessarily be associated with wetlands, wetlands on northern Guam, if there were any to be found, would most likely to be associated with such features.

Map and aerial photo analysis: We examined the USGS 7.5 minute quadrangles, high and low altitude color aerial photos of AAFB flown Dec 94/Jan 95, to identify sites for field investigation. In general, we searched for areas that we deemed could be the "wettest" on the base, in terms of the likelihood of frequent and persistent ponding of stormwater or, in the case of the terrace terrain, the possibility of saturation by groundwater.

To manage our field study more effectively, we divided the base in to field areas, and assigned each either high, moderate, or low priority. High priority areas were defined as those for which there was at least one reason to suspect that it might posses attributes favorable to wetland development. Areas likely or known to contain coastal springs and seeps or other features that might be associated with locally wet conditions along the coast, for instance, were assigned highest priority for the field investigation. Moderate priority areas were those for which we could find no reason to suspect wetland conditions, but neither could we find features likely to preclude the existence of wetland conditions. Low priority areas were those with hydrogeologic characteristics that suggested wetland development would be extremely unlikely, and for which we could find no reason to suspect the development of wetland conditions in spite of the adverse hydrogeologic conditions.

Field survey: We visited each of the selected field areas from 7 through 11 Aug 95, beginning with the highest priority areas. The high priority areas were confined to low-lying beaches and adjacent near-shore areas, and sites where wetland conditions might have been inadvertently created by artificial alteration of local drainage. On the low-lying shoreline, we conducted careful field traverses, looking for fresh water near the surface in beach springs and seeps and then examining adjacent vegetated areas for some evidence of hydrophytic vegetation, hydric soil, or inundation. Potential artificially-induced wetland sites visited included landfill sites, borrow pits, the golf course, and areas adjacent to extensive pavement where large amounts of storm water might collect.

For low and moderate priority areas we visited each location to field-check our inferences from the photo and map analyses. For each field area we visited the topographically lowest points for evidence of ponding or restriction to drainage, focusing on those sites for which we could make the best case for potential wetland conditions, however unlikely such conditions might be for the general area.

Field areas are identified on Figure 1 (Map), as follows:

Terraced terrain:	Priority:
1. T1: Tarague Channel and beach west	High
2. T2: Tarague Channel area and nearby abandoned wells	High
3. T3: Tarague Beach to Tagua Point	Moderate
4. T4: Tagua Point to Pati Point	Low

5. T5: Pati Point to Anao Point | Low

Artificial features:

A1: Landfill 5	Moderate
A2: Storm drainage collection pond in family housing	Moderate
A3: Munitions Maintenance Area	High
A4: East side of golf course	Moderate
A5: Borrow pit north of flightline	Moderate

Plateau features:

1. P1: Sinks in Northwest Field, west side (P1-1 to P1-3)	Low
2. P2: Sinks in main portion of Northwest Field (P2-1 & P2-2)	Low
3. P3: Sinks between CSA & Main Base (P3-1)	Low
4. P4: Sinks on main portion of active base (P4-1 to P4-3)	Low
5. P5: Sinks along eastern cliffline (P5-1 to P5-5)	Low

Mt. Santa Rosa and Communications Annex:

SR/CA-1: AF facilities on Mt. Santa Rosa	Low
SR/CA-2: Communications Annex near Mangilao	Low

Features visited and documented are identified with index numbers. The first set of characters is the field area indicator above. The next set is an ID number assigned to the feature in the order visited. For example: "P4-3 indicates that the feature is the third feature that we visited in the "P4" area.

Observations by Field Area:

Terraced terrain:

T1: Tarague Channel and beach west: The lowest area here is a the rocky beach on the elevated, eroded Holocene marginal reef platform that now lies mostly inland of the reef margin and topographically above the modern platform. Locally, the Holocene platform probably forms a confining layer, so that groundwater discharging to the coastline emerges through discrete fissures in the rock on the beach and inter-tidal zone. Atop the Holocene platform, at the bottom of the slope to the beach, abundant vegetation has developed which is conspicuous in aerial photos. We identified this as a high priority area, because the zone in which the vegetation was well developed could possibly have been a zone of groundwater effluence, given its stratigraphic location.

T1. Nigas grows in continuous thicket along Tarague coastline.

T2. Scuba Cut parking area, showing typical grasses.

When we visited the area, however, we found the vegetation to be a succulent xerophytic-type shrub, Nigas, growing atop the rock, apparently collecting and storing superficial water from storms. Nigas (Pemhis acidula) grows in a continuous band on top and parallel with the reef from the Tarague Recreational Beach area, northeasterly, to and around Pati Point, (Fig. 1). The ground above the platform has no soil developed on it; rather the bedrock here is covered with a layer of well-sorted, medium-grained, white to very light yellow (approximately Munsell 10YR 8/2) carbonate sand. The vegetation here has apparently stabilized the beach sand, and the top 10-15 cm contains abundant dark particulate organic matter (est. app. 15%). There is no evidence of surface inundation or extended saturation of the stabilized surficial sand. In fact, the conspicuous aspect of the terrain here is that the "soil" is well drained. We found no hydrophytic species.

T2: Tarague Channel area and nearby abandoned wells: Hydrologic conditions and soil are similar to T1. Some suspect features located on aerial photos near Tarague Channel included dark green vegetation at the base of the slope to the beach. One patch is contiguous with a sink that is intersected by the slope to the beach just above the channel. During the site visit this vegetation was confirmed to be the same xerophytic shrub, Pemphis acidula, growing in the adjacent T1 area. On the terrace just above Scuba Cut, near the parking lot and adjacent areas west and south of Tarague Channel, are abundant patches of Spiderlily (Pancratium littorale, Figures 2 & 3). Dominant plants, grasses, and one sedge found within this stabilized beach sand medium include; Sandbur (Cenchrus echinatus L.), Swollen Fingergrass (Chloris barbata), Beach Wiregrass (Dactyloctenium aegyptium L. Richt.), and Fimbry (Fimbristylis Sp.). The maximum water table elevation here could not rise to higher than about two meters below the surface, and the surface medium was moist but well drained, showing no evidence of saturation or inundation.

We also examined the terrain near known sinkholes from the abandoned Tarague Well #4 to the beach. The water standing in Tarague Well #4 provides positive control on the elevation of the water table locally, which is about 10 m below the surface here. Shoreward are additional sinks which constitute the local low spots, but which are not open all the way to the water table. We found no hydrophytic communities.

T3: Tarague Beach to Tagua Point: This area is currently used by AAFB as an explosive ordinance disposal (EOD) range. The shoreline consists of modern and eroded Holocene reef platform with an extensive beach behind it. Fresh water rises through the platform on the beach in seeps and springs, and small pools of fresh water abound on the

T3. Typical vegetation west of Tarague channel.

T4. Coastal fresh water discharge into the shallow pools at EOD Range on platform.

near-shore platform (Fig. 4). Behind the beach, a well-drained, stabilized sand medium supports a well-developed strand community, as in the T1 and T2 areas.

T4: Tagua Point to Pati Point: Coast is composed of steep cliff wall. Platform is very narrow and supports no beach, and no terrestrial vegetation. Well drained rocky reef shoreline comprised strictly of Pemphis acidula (background, Fig. 1).

T5: Pati Point to Anao Point: In this area shear cliffs descend to narrow platforms that terminate in a rugged, rocky coast without beaches (Fig. 5). The coastal platform is elevated about 1 to 2 meters, so that the terraces are very well drained of surface water and no groundwater intercepts the surface here. An interesting observation here is the presence of the Spiderlily-like plant growing on the cliff face. The plant is known to grow in wet or moist areas but appears capable of growing on this exposed, very well drained, rocky environment as well, (Fig. 6).

Artificial features:

A1: Landfill 5 IRP site. This site is a remediated landfill that has been covered by an impermeable capping material to prevent percolation of water through the landfill. Water shed from the cap is collected by a lined drainage ditch and diverted off the site at the southwest and northeast corners of the structure. The areas into which the water drains support thick stands of Wildcane (Saccharum spontaneum L., Fig. 7). There was some ponding of recent storm water along the nearby unpaved roads, (Fig. 8).

The nature of the thin, silty soil found in the landfill area allows water to pool temporarily, typically less than a few hours depending upon rainfall duration. No area is persistently saturated, and landfill operations constantly alter the vegetation and topography to ensure constant drainage and minimum potential for wetlands establishment.

A2: Storm drainage collection site in family housing. A large natural sink in the family housing area at the SE corner of the main base has been developed to accept storm runoff from the housing area. Inflow is fed to the sink by several concrete flumes, and infiltration has been enhanced by the installation of over a dozen drainage wells at the base of sink (Fig.9). Although inspection of a dry-season aerial photo showed green vegetation at the bottom when the lawns in the housing area were brown, our field visit

T5. Coastline near Anao Pt looking toward Pati Pt, sheer cliffs, rugged coastline, narrow platform.

T5. Spiderlily plant growning on cliff top N. of Lafac Pt.

A1. S.W. corner of Landfill Cap, water diversion, with wildcane grass in background.

A1. Localized ponding on road in Landfill area.

A2. Storm water drainage wells in housing area.

A3. Munitions Maintenance Area showing concrete apron foreground, water diversion and wildcane grass(in background, center.)

confirmed that the sink is sufficiently well drained to preclude colonization by hydrophytic vegetation.

A3: Munitions Maintenance Area: Storm drainage from an extensive paved apron on the north side of the building is diverted through a small ravine (Fig. 10) to an adjacent abandoned borrow pit (Fig. 11). There is no ponding of the water here and where soil, exists, it is well-drained. Thickets of Wildcane grows where the water is diverted from the apron to the borrow pit.

A4: Golf course: A roadside water culvert directs rainwater from the street, across the golf course, and to the edge of the limestone forest where it discharges into the limestone substrate. A stand of Swordgrass (Miscanthus floridulus) grows where the culvert terminates, however the area is well drained and does not support hydrophytic plants, (Fig.12).

Plateau features:

P1: Sinks in Northwest Field, west side: This area is on the highest portion of the karst plateau. The surface topography is formed by extensive, gently-sloping closed depressions, which are filled throughout with limestone forest vegetation. Soil is absent to about 5 cm deep in most places, consisting of reddish-brown to red (Munsell 10R 4/4-4/6) silty sandy carbonate soil (Fig. 13). The area is very well drained in general, with no evidence of ponding, even in areas downslope and adjacent to expansive areas of pavement, which must deposit large concentrations of storm runoff on them. We found no hydrophyitic plants other than scattered individuals in associations typical of the recovering to established limestone forest community that occupies this entire area. The high elevation and extremely good infiltration and drainage of this area combine to preclude the development of wetland conditions (Fig. 14)

P2: CSA area: General topography, hydrology, and soil characteristics of this area are identical to that of the adjacent area in Northwest Field (Figures 13 & 14). The CSA area is characterized by a particularly extensive system of coalescing depressions that follow a mapped brecciated zone trending approximately NW (Tracey and others, 1964). This is probably a solutional sink system controlled by a zone of preferential permeability and high solutional activity along the brecciated zone. The very well drained nature and high elevation of this area preclude the development of wetland conditions, even in smaller scale depressions next to paved areas, of which there are very few.

A3. Well drained Borrow Pit at Munitions Maintenance Area.

A4. Rainwater discharge via culvert on Golf Course.

P1. Typical soil on Karst Plateau: shallow, silty to sandy, red carbonate.

P1. Topographic low spot at NWF, typical (Ref. P1 on Map 1).

P3: Sinks between CSA and main base: Sinks in this area tend to be discrete and localized. In general, they have been heavily exploited as borrow pits, as have many of the other sinks on the base. P3 comprises the past and active landfill areas which have been heavily excavated. These sinks are in the vicinity of a fault zone mapped by Siegrist (personal communication, 1994), which may be a zone of preferential conductivity locally. In any case, the area is high and extremely well drained. Even depressions with bottoms that had been extensively altered by excavation, which might have disrupted natural drainage, showed no evidence of ponding , as shown at P3-1 borrow pit map 1, Fig. 15.

P4: Sinks on main portion of active base. The main portion of the base (i.e., the area including the active flight line, support, and housing areas) is strongly managed. Vegetation is cleared and over 100 stormwater drainage wells have been installed to preclude ponding of water, even from typhoon rainfall. After examining aerial photos, however, we identified a few localized sites that appeared to support especially dense or green vegetation. Results of our field investigations are summarized below.

P4-1: Sink north of runway, mapped as borrow pit on USGS Pati Point quad. Bottom of sink, about 6-8 m below grade and about 150-200 m diameter, is dominated by tall (1.5-2.5 m) grass. Soil is stony, slightly clayey, red (Munsell 10R 4/8) carbonate soil, probably about 10-20 cm deep in general. The extensive distribution of the relatively thick soil here suggests that this sink might be capable of supporting frequent ponding of significant duration, perhaps a few days, following major storms. Nevertheless, the well oxidized nature of the soil and its hydrostratigraphic location of more than 150 m above water table implies that ponding is necessarily ephemeral. The extent of artificial excavation in the sink is not apparent, but it contains an abandoned concrete structure connected to an 8" steel pipe and an out of service electrical source. This was apparently once used to pump water either into or out of the pit. The extensive distribution of the grass suggested that a more definitive assessment of the hydrophyte population might be appropriate. Consultation and field visit by Mr. Marvin Aguilar, Guam Division of Aquatic and Wildlife Resources staff biologist, confirmed that this and similar communities are not hydrophytic. We identified most all species present as post disturbance, opportunistic, non-hydric, highly competitive plants and grasses, to include: False Verbena, (Stachytarpheta jamaicensis), Sandbur (Cenchrus echinatus L.), Indian Mulberry (Morinda citrifolia), Tangantangan (Leucaena leucocephala), Hibiscus (Hibiscus tiliaceus),

P3. Borrow Pit P3-1, location on Map 1.

P4. Borrow Pit P4-1, showing opportunistic vegetation.

P4. Lowest topographic point at SW end of runways, P4-3.

P5. Borrow Pit P5-1 at eastern cliffline, well drained and vegetated completely with Tangintangin.

Wild Bitter-Melon (Momordia charantia L.), Love-in-a-mist (Passiflora foetida), and Wildcane (Saccharum spontaneum L., Fig. 16).

P4-2: Sink at west end of taxiway/parking on north side of flight line. Drainage from this sink has been augmented by installation of a borehole at the base. We examined this sink because it is the lowest-lying ponding basin inside the flight line, and likely the recipient of the largest rate of storm-flow. Vegetation is mowed and the drain is carefully managed, as are all the storm drainage ponding basins on the flight line. Current management of these basins precludes the development of hydrophilic communities.

P4-3: This sink is located at the lowest point at the SW end of the runway, toward which natural stormflow runoff from the runway area would collect, in the absence of the battery of injection wells that have been installed to drain the runway area. There is no evidence that water can collect in sufficient quantity to inundate the area. Vegetation is entirely limestone forest community at the outlet of water diversion directly across perimeter road (Fig. 17).

P5: Sinks along eastern cliff line, P5-1 to P5-5 as indicated on map 1: Eastern cliffline has three marginal sinks and two borrow pits. Cliffline sinks are well vegetated by limestone forest flora. Area is generally well drained, with drainage on the flightline augmenting the natural infiltration. No runoff from runway or undeveloped area around the sink augments drainage. This is probably representative of marginal sinks that have retained natural inflow/discharge conditions. Fig. 18 shows P5-1 borrow pit vegetated strictly with Tangantangan (Leuccaena leucocephala).

Mt. Santa Rosa and Communications Annex

SR/CA-1: AF facilities on Mt. Santa Rosa We visited AAFB facilities on Mt. Santa Rosa to verify our inferences from map and photo analysis. All AAFB properties here are high and very well drained. There are no settings in which artificially-induced wetlands could foreseeably develop (Map 2).

SR/CA-2: Communications Annex near Mangilao. Field inspection of the Communication Annex confirmed that facility is locally high, well drained, and surrounded by limestone forest vegetation (Map 3).

Conclusions and recommendations:

Conclusions: Because Andersen AFB lies entirely on karst terrain, with the only exceptions being dry upland sites on Mt. Santa Rosa, it generally lacks natural prerequisites for wetland development. Field observations suggest that the only locations in which wetland conditions, as defined by US Army Corps of Engineer guidelines, might develop are very localized sites where drainage has been artificially altered to inhibit or overload natural infiltration rates. Although we visited what we deemed, and field inspection verified, to be the wettest sites on AAFB, we found no hydrophytic vegetative communities, no hydric soils, nor any evidence of sufficiently persistent ponding to meet the soil hydrologic criteria for wetlands. The "wettest" of all the sites we examined was the borrow pit north of the flight line (P4-1), but it is clearly not a wetland at this time. The soil is well drained and oxidized (Munsell 10R 4/6-4/8), and there is no evidence of frequent, persistent ponding. Vegetation is predominantly Wildcane, which is listed on the Pacific Science list of noxious weeds. All other sites visited are at least as well drained, and the soils are uniformly similar red, oxidized soils. Since we were careful to identify and visit all the sites most likely to possess characteristics favorable to wetland development, and found them to be non-wetland environments in terms of all three of the Corps of Engineer criteria, we are confident that no wetland communities exist on AAFB at this time.

Recommendations: Of all sites on the base, only artificially altered areas, where natural infiltration rates might be inhibited or overloaded, have potential to develop wetland conditions. However, as evidenced by field inspection, creation of wetlands would be difficult due to the karst terrain.

Management practices, whether inadvertent or intentional, will determine whether wetland conditions develop. Engineers and resource planners should evaluate storm drainage, or similar projects, during planning to determine the potential for wetland development. Increased habitat for water fowl near the flightline would adversely affect base operations. On the other hand, establishment of wetlands at suitable locations might be possible, if desired as a proactive stewardship practice. This survey has identified locations most conducive to wetland development and should serve as a management tool for civil engineers and resource planners at Andersen AFB.

Report Preparation: The Non-Jurisdictional Survey was conducted by the Andersen AFB Environmental Flight staff members.

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