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Prepared by:

allied pacific environmental consulting

T 670.322.7709 | F 670.322.7708 | [apeccnmi@pticom.com](mailto:apeccnmi@pticom.com)

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## **ACRONYMS**

APEC	Allied Pacific Environmental Consulting
BECQ	Bureau of Environmental and Coastal Quality
CNMI	Commonwealth of the Northern Mariana Islands
DCRM	Division of Coastal Resources Management
GIS	Geographic Information System
MINA	Micronesia Islands Nature Alliance
NOAA	National Oceanic and Atmospheric Administration
PROUA	Pacific Regional Ocean Uses Atlas
SCUBA	Self-Contained Underwater Breathing Apparatus
SLUMP	Saipan Lagoon Use Management Plan
STEER	St. Thomas East End Reserve
SUP	Stand-Up Paddle Board
WWII	World War II

## 1.0 INTRODUCTION

The CNMI Bureau of Environmental and Coastal Quality, Division of Coastal Resources Management (BECQ-DCRM) contracted Allied Pacific Environmental Consulting (APEC) to conduct a survey and participatory mapping workshop to identify and map the recreational, commercial, and extractive uses of the Saipan lagoon.

### 1.1 Purpose

The Saipan Lagoon User Survey and Mapping project was commissioned by BECQ-DCRM in order to assess and map out the many recreational and commercial uses of the Saipan lagoon, identify potential areas of user conflict, and guide BECQ-DCRM in the management of this valuable natural resource. The user survey is also intended to highlight focus areas for the 2016 revision and update of the Saipan Lagoon Use Management Plan (SLUMP), which will be used to identify priority issues and pursue management projects that help DCRM to achieve its mandate to ensure that economic activity and habitat conservation within the lagoon are balanced in a way to most benefit the CNMI public.

## 2.0 SURVEY METHODOLOGY AND ANALYSIS

In order to accomplish the above stated purpose, APEC team researchers employed the participatory mapping techniques as outlined in NOAA Coastal Services Center's "Guidebook to Participatory Mapping of Ocean Resources" and its Appendices. The methodologies were modified to best fit the size and demographic of the CNMI based upon input from BECQ-DCRM staff, staff from Micronesia Island's Nature Alliance (MINA) who have established relationships with lagoon community members, and conversations with NOAA Office of Coastal Management staff who had applied participatory mapping methodologies to other jurisdictions. Researchers took methods and categorizations from the following mapping projects and modified them to fit the context in CNMI and the Saipan lagoon:

- Pacific Regional Ocean Uses Atlas (PROUA), 2015
- American Samoa Coastal Use Mapping Project, 2012
- St. Thomas East End Reserve (STEER) Coastal Use Mapping Project, 2012

All of the above resources can be accessed at <http://marinecadastre.gov/oceanuses/>

Twenty uses within three categories were identified and defined (Table 1, Appendix A).

**TABLE 1: USES OF THE SAIPAN LAGOON**

<b>Recreational Uses</b>	<b>Commercial Uses</b>	<b>Fishing &amp; Collecting Uses</b>
<ul style="list-style-type: none"> <li>• Recreational SCUBA diving</li> <li>• Recreational snorkeling &amp; free diving</li> <li>• Swimming</li> <li>• Paddling</li> <li>• Surface board sports</li> <li>• Recreational motorized boating</li> <li>• Sailing</li> <li>• Beach use</li> </ul>	<ul style="list-style-type: none"> <li>• Commercial SCUBA diving</li> <li>• Commercial snorkel tours</li> <li>• Commercial parasailing</li> <li>• Commercial banana boating &amp; other boat towing activities</li> <li>• Commercial jet ski</li> <li>• Commercial transit &amp; Dinner cruises</li> <li>• Commercial shipping</li> </ul>	<ul style="list-style-type: none"> <li>• Hook &amp; line fishing</li> <li>• Spearfishing</li> <li>• Throw net / talaya fishing</li> <li>• Gillnet / chenchulu / tekken fishing</li> <li>• Harvesting / Gleaning</li> </ul>

A participatory mapping workshop was conducted and facilitated by APEC staff with the support of BECQ-DCRM staff. A total of 22 lagoon users, each with expertise in multiple lagoon uses, attended the participatory mapping workshop and provided survey responses and mapping feedback. Workshop participants provided direction and guidance while APEC staff used an eBeam to mark the "general" and "dominant" use footprints for each of the twenty lagoon uses. The "general" and "dominant" use footprints were defined in accordance with definitions in the NOAA guidance documents as the following:

- *General*: The general use footprint includes all areas in which the use is known to occur with some regularity, regardless of its frequency or intensity.
- *Dominant*: Dominant use areas are defined as ocean areas routinely used by most users most of the time (within the seasonal patterns for that use). Dominant use areas must be drawn within the general use footprint.

Participants were also asked to fill out a two-part survey: Part 1 covering general lagoon use; Part 2 covering each of the individual twenty lagoon uses. Based upon the feedback gathered through the participatory mapping workshop and the surveys, APEC staff conducted follow-up interviews with key stakeholders to validate collected information and fill in data gaps.

## **2.1 Spatial Data Processing and Analysis**

The use areas defined by the stakeholders at the participatory mapping workshop and through follow up interviews were provided to the BECQ-DCRM GIS Specialist for processing. A common analytical unit of 30 meter hexagons was chosen in order to facilitate use pattern comparison across the lagoon. Processing consisted of five steps:

1. Editing the use area polygons to close borders and small artifacts inadvertently created during the data collection process.
2. Editing the use area polygons to incorporate qualitative descriptions and additional input collected during the mapping process and during follow up interviews.
3. Converting each use layer to the 30 meter hexagon grid.
4. Joining the layers for each use category (Recreational, Commercial, and Extractive) to determine the total number of uses for each category across the study area.
5. Producing classified "heat" maps to represent relative high and low use areas throughout the lagoon for each category as well as for all twenty uses.

The hexagon shape was chosen because it has a lower perimeter to area ratio than a square, but can still form a continuous grid without gaps or overlaps. This characteristic helps minimize distortion and aids in the visualization of patterns. The 30 meter resolution was chosen because the area of a hexagon with 30 meter sides (approximately 2338 square meters) was less than the smallest use area identified, thereby minimizing any generalization in the resulting heat maps while allowing for fast processing and ideal visualization of combined use activity. Conversion of the use areas into the hexagon grids was accomplished by creating a 30 meter hexagon fishnet template and then performing a spatial join with the use area layers to produce the output layer where each individual hexagon shows the total number of uses within its borders.

## **3.0 SURVEY DATA RESULTS**

Use maps were created for each of the twenty uses surveyed during this project. Each map contained polygons for both the general and dominant use areas for the selected use. A description of the results for each use is below.

### **3.1 Recreational Uses**

Recreational uses of the Saipan lagoon are likely the most prevalent uses of the lagoon and also the least documented. Recreational uses include any use of the lagoon that is not a commercial enterprise (no payments made) and does not involve the extraction of a lagoon resource. The many varying recreational uses of the lagoon were broken down into eight use categories which are described in more detail below.

Geospatial representations of the general and dominant recreational uses of the Saipan lagoon can be found in APPENDIX B: MAPS OF RECREATIONAL USES. A summation of all recreational general uses and of all recreational dominant uses is described below under section 3.4: Heat Maps & Sum of All Uses. Heat maps depicting these sums can be found in APPENDIX E: HEAT MAPS OF ALL USES.

### **3.1.1 Recreational Scuba Diving**

*Includes boat and shore-based SCUBA diving for recreational purposes. Excludes commercial or charter SCUBA operations, snorkeling, swimming, free-diving, or spear fishing.*

Although recreational diving is very popular on Saipan, recreational SCUBA diving is not prevalent throughout most of the lagoon due to the shallow nature of the lagoon area and the lack of easy access shore dives. The only dominant recreational SCUBA diving site identified by the workshop participants is at Wing Beach. This dive spot is located outside the lagoon, but recreational SCUBA divers access the dive spot from the northern part of Wing Beach by entering the water and exiting the lagoon through a cut in the reef. Because this dive location is outside of the shelter of the lagoon's fringe reef, this dive location is only open for a select few months out of the year when wave conditions allow, typically around June. Recreational divers with access to a boat may sometimes dive the wrecks and reefs just north of the shipping channel that are more popular with commercial SCUBA and snorkel operations.

### **3.1.2 Recreational Snorkeling & Free Diving**

*Includes snorkeling and free diving for recreational purposes. Excludes commercial or charter snorkel operations, snorkeling or free diving for fishing purposes, and swimming without snorkel gear.*

Recreational snorkeling and free diving occurs throughout the Saipan lagoon but is concentrated in areas with reef habitat and easy shore access points. Nearshore areas are more popular for snorkeling, although snorkeling does occur further out towards the fringe reef where deeper waters and better reef habitat attracts fish and other sea life, making for a more interesting snorkel experience. Areas with clean water, abundant marine life, and interesting underwater features attract snorkelers. These include Wing Beach, Paupau Beach Park, the Mañagaha Marine Conservation Area, and the Sherman Tanks off the Oleai shoreline. Recreational snorkeling is also popular in front of popular beach parks with abundant parking and easy shoreline access such as Micro Beach, Susupe Beach, and Pakpak Beach Park. Snorkelers tend to avoid areas close to known outflows and lagoon areas with heavy motorized boat traffic.

### **3.1.3 Swimming**

*Includes swimming, wading, and playing in the water. Excludes water activities reliant on gear such as SCUBA diving, snorkeling, free diving, surface board sports, and any extractive activities.*

Swimming follows a similar use pattern as recreational snorkeling and free diving, with a few notable differences. Swimming occurs closer to shore near all popular beach parks and areas of heavy shoreline use. Because this activity is less reliant on underwater features and marine life and this user group includes people who may be less comfortable in the water than snorkelers, swimming does not tend to occur further away from shore. The popular areas for swimming by tourists are in nearshore waters by the major hotels along the lagoon shorelines, as well as off the shore of Mañagaha. Mañagaha and several hotels also have swimming zones that are marked by floating buoys and ropes.

Swimming for exercise and competitive swimming do also occur within the lagoon by a segment of Saipan's population. In particular, the corridor around the two northern-most Sherman Tanks is used almost daily by swimmers for exercise and training. Swimming for exercise also tends to occur along corridors running parallel to the shoreline offshore at Paupau Beach Park and in the Kilili Beach Park to Oleai Beach lagoon areas. In addition, several competitive swimming events



are held in the lagoon each year. For example, the oldest and longest running swim competition on Saipan is Saipan Swim Club's Ocean Swim, held around the tanks every year. The XTERRA triathlon holds its swim portion off the coast of American Memorial Park, and the Tagaman triathlon and the annual Meek and Mighty Ocean Swim are both held off the coast of Pacific Islands Club in the southern lagoon. The annual Escape From Mañagaha has participants swimming from the southern beach on Mañagaha across the shipping channel to Micro Beach.

#### **3.1.4 Paddling**

*Includes one-man and six-man outrigger paddling, stand-up paddle boarding (SUP), and kayaking. Excludes surface board sports such as surfing, windsurfing, or kite boarding, and any motorized boating activities.*

Outrigger paddling is primarily based around Kilili Beach Park, where the local clubs keep their canoes. Competitive teams training for races tend to concentrate their sprint training in the lagoon areas close to Kilili Beach Park, from Oleai Beach south to Kanoa Resort and the southern-most Sherman Tank. Long distance paddling spans most of the lagoon, with teams embarking from Kilili Beach and either heading south to Pacific Islands Club or north as far as Hyatt Regency or even around Mañagaha. As with swimming, paddlers often use the Sherman Tanks as markers.

Stand-up paddle boarding (SUP) is an increasingly popular sport on Saipan and generally occurs everywhere throughout the lagoon. The popular locations for SUP activities include offshore from the northern shoreline access points and beach parks such as at Wing Beach, Paupau Beach Park, and along the Tanapag shoreline. SUP is also popular at Hyatt Regency and Fiesta hotel from the beach out to the partially submerged wreck about 500 meters off shore. During specific times of year, stand-up paddle boarders may congregate off the shore between Sugar Dock and Aquarius to catch small waves, and if wind conditions are favorable then users may paddle downwind between Paupau and Micro Beach or out to Mañagaha are popular.

#### **3.1.5 Surface Board Sports**

*Includes windsurfing, surfing, and kite boarding. Excludes stand-up paddle boarding (SUP), motorized boating, kayaking, or paddling.*

The use of surface board sports is largely dependent on the availability of favorable wind and swell conditions. The sports of windsurfing and kite boarding occur primarily off the shore of Hyatt Regency and Micro Beach, sometimes as far out as Mañagaha and the reef line. Kite boarding will also often occur in the southern lagoon by Sugar Dock and Aquarius beach, as will small-scale surfing during specific swell directions. Several hotels along the lagoon shoreline teach windsurfing and rent windsurfing equipment, specifically at the Hyatt Regency, around the Sherman Tanks by World and Kanoa Resorts, and in front of Pacific Islands Club.

#### **3.1.6 Recreational Motorized Boating**

*Includes motorized boating and personal watercraft (i.e. jet skis) for recreational purposes, and recreational boat towing activities (ie waterskiing, tubing). Excludes motorized boating and motorized boat towing activities for commercial purposes, boat-based extractive uses, paddling or other non-motorized boating activities, and surface board sports.*

The location and use of recreational motorized boating in the Saipan lagoon is largely dependent on boat ramp access, and therefore is concentrated around the boat ramps in the lagoon shoreline: Sugar Dock, Fishing Base, Smiling Cove, Lower Base, and Tanapag. Much of the recreational motorized boating activity in the lagoon is for transportation purposes to/from Mañagaha, or out through one of the three channels out of the lagoon: the main shipping channel, the lighthouse shipping channel (just south of Fishing Base), and at Sugar Dock. Motorized boat towing activities may occur in the deeper waters in the central lagoon by Mañagaha and the shipping channel, as well as along the deeper corridor running parallel to shore south of Fishing Base. Recreational jet skis may sometimes be used offshore of Oleai and Kilili Beaches in the deeper areas.

### **3.1.7 Sailing**

*Includes recreational sailing, including with Hobie Cats. Excludes windsurfing, motorized boating activities, surface board sports, or paddling.*

Recreational sailing is primarily concentrated in the central part of the lagoon between Smiling Cove and Mañagaha. Recreational sailboats can be kept in slips at Inner Cove, and users will often sail out around Mañagaha or out the shipping channel into open ocean.

Some hotels have smaller Hobie Cats that may be used to take tourists out. This occurs primarily in front of Pacific Islands Club, coming out from Kanoa or World Resort to the area around the three Sherman Tanks, and offshore from Fiesta Resort and Hyatt Regency.

### **3.1.8 Beach Use**

*Includes most shoreline activities such as grilling or BBQs, sunbathing or relaxing, walking, beach sports such as volleyball, and camping. Excludes water-based activities such as surface board sports, swimming, and shore-based extractive uses.*

The nature of the Saipan lagoon shoreline allows for beach use and easy lagoon access along almost the entire lagoon coastline, and beach goers can be found along most areas of the shoreline. The dominant areas of beach use are concentrated at beach parks, in front of hotels, and any location equipped with palapas, grills/fire pits, land-based or water-based recreational opportunities, or parking areas. The entirety of Mañagaha is heavily used by tourists and locals. Heavily used beach areas include Wing Beach, Paupau Beach Park, the shoreline by the Tanapag public boat ramp, the picnic areas in Lower Base, the entire American Memorial Park and Micro Beach shoreline, the beaches in front of Hyatt Regency, Fiesta, and Grandviro hotels, the Beach Road pathway from 13 Fishermen south to Oleai Beach, Kilili Beach Park, the beaches in front of World Resort and Kanoa Resort, Susupe Beach Park, Sugar Dock and Aquarius Beach, the beach in front of Pacific Islands Club, and Pakpak Beach Park.

## **3.2 Commercial Uses**

Almost all of the commercial activity in the lagoon is based around off-island tourists. Commercial uses of the Saipan lagoon include any and all activities that occur within the lagoon where an activity is conducted in exchange for payment. This includes guided SCUBA dives, commercial snorkel tours, jet ski tours, commercial parasailing, commercial motorized boat towing activities, dinner cruises, transit to or from Mañagaha, and commercial shipping.

Geospatial representations of the general and dominant commercial uses of the Saipan lagoon can be found in APPENDIX C: MAPS OF COMMERCIAL USES. A summation of all commercial general uses and of all commercial dominant uses is described below under section 3.4: Heat Maps and Sum of All Uses. Heat maps depicting these sums can be found in APPENDIX E: HEAT MAPS OF ALL USES.

### **3.2.1 Commercial Scuba Diving**

*Includes any commercial SCUBA diving operation, Open Water or other SCUBA certification courses, surface supply diving, Snuba, and Seawalkers tours. Excludes recreational SCUBA diving, snorkeling, free diving, or any extractive activities.*

Commercial SCUBA diving in the Saipan lagoon falls into three categories: commercial SCUBA guided tours to reefs and wrecks within the lagoon, the use of certain sheltered nearshore areas for SCUBA Open Water “pool” classes, and commercial Seawalker tours. Seawalker tours allow guests to wear helmets over their heads and breathe underwater while walking on the seafloor.

Most SCUBA guided tours occur in the north central area of the lagoon between Smiling Cove (from where dive boats primarily depart) and Mañagaha. Dive operators listed four primary locations of dominant use for guided tours in this area including several WWII-era plane wrecks of



Japanese and American origin scattered throughout the area; a WWII-era sunken shipwreck known as the “Chinsen” or “landing craft”; the “Eagle Ray City” and; the “Sea Cucumber City”. Each of these locations is accessible by boat only and are also heavily used by commercial dive Seawalker operators, commercial snorkel tour operators, and boat-based guided tours via glass bottom boat and the Pacific Subsea submarine tour.

Commercial dive operators use several areas of the lagoon for their Open Water “pool” certifications. The most heavily used areas identified by workshop participants were off the northwestern shore of Mañagaha, on Saipan just offshore by 13 Fishermen Memorial, and in the nearshore areas immediately south of Sugar Dock.

Seawalker operations visit sites similar to the commercial SCUBA guided tours in the central lagoon, as well as the area around the lighthouse channel just south of Fishing Base.

### **3.2.2 Commercial Snorkel Tours**

*Includes any commercial operation that includes snorkel tours, including those operating with a DCRM permit as well as those operating without a DCRM permit. Excludes recreational snorkeling and free diving activities, swimming, SCUBA diving, and extractive activities.*

Commercial snorkel tours occur in very specific locations throughout the lagoon, dependent on depth of water, current and wave conditions, and appealing underwater features. One of the most popular areas in the lagoon for commercial snorkel tours is Mañagaha from the pier on the western side out and around to the northern beach area of the island. Workshop participants sited the area as having safe conditions with some of the cleanest waters and best reef and fish diversity in the lagoon. Boat-based snorkel tours may also bring snorkelers to view the WWII-era Japanese Zero plane wreck located approximately 500m south of Mañagaha and other wrecks in the area if conditions allow for a safe snorkel experience. There is also dominant commercial snorkel activity around the staghorn reefs by the lighthouse just offshore from Fishing Base. Several hotels also offer guests the opportunity for snorkel tours in front of their hotels, including Pacific Islands Club, Kanoa Resort, World Resort, Aqua Resort, and Marianas Resort. Tourism operators such as Marianas Trekking that offer island tours will often allow guests to stop at beaches such as Paupau Beach Park or Wing Beach for short snorkel opportunities close to shore.

Although commercial snorkeling is an activity that requires a DCRM permit, participants in the mapping project did mention many unofficial commercial snorkeling activities that occur within the lagoon. Specifically, unpermitted or unofficial taxi drivers will offer tourists guided tours of the island that include stops at beaches along the western shoreline such as Wing Beach and Paupau Beach Park.

### **3.2.3 Commercial Parasailing**

*Includes commercial parasailing activities. Excludes commercial banana boating and other motorized boat-towing activities, as well as recreational boating, personal watercraft, or transit.*

Commercial parasailing is a very popular marine sports activity in the lagoon. Parasailing occurs both inside and outside the lagoon, with operators exiting the lagoon through the main shipping channel. Inside the lagoon parasailing only occurs in the central area of the lagoon between the Smiling Cove and Lower Base boat ramps out to Mañagaha, no further south than the Garapan area. The dominant parasailing areas inside the lagoon are mostly located south and southwest of Mañagaha. Parasailing operations are limited to lagoon areas where depths reach six feet or greater.

Although commercial transit operations were excluded from this use category, and parasailing in and of itself only occurs in the deeper, central areas of the lagoon outside of the Mañagaha Marine Conservation Area, it is important to note that many commercial parasailing operations

occur during transit between Saipan and Mañagaha or vice versa. Participants noted that many banana boating packages include a transfer between the two islands.

### **3.2.4 Commercial Banana Boating & Other Boat Towing Activities**

*This use includes commercial banana boating and other commercial boat towing activities. Excludes commercial parasailing, other commercial motorized boating activities (including jet skis), recreational boating and boat towing activities, and transit.*

Participants in the mapping workshop and other survey respondents identified commercial banana boating and other boat towing activities as occurring both generally and dominantly in the same areas: along a natural track from various access points on Saipan to the pier or beach area on Mañagaha. Pick up points on Saipan are at Smiling Cove as well as several of the major hotels including Hyatt regency, Fiesta, World Resort, and Kanoa Resort. This use occurs in waters at least 5 feet in depth and does not occur further south than Kanoa Resort.

Although commercial transit operations were excluded from this use category, it is important to note that many commercial banana boating and other boat towing activities occur during transit between Saipan and Mañagaha or vice versa. Participants noted that many banana boating packages include a transfer between the two islands.

### **3.2.5 Commercial Jet ski**

*Includes commercial jet ski and other motorized personal watercraft operations. Excludes commercial parasailing and commercial motorized boat towing activities such as banana boating, commercial motorized boating, and recreational jet ski activities.*

Participants in the mapping workshop and other survey respondents identified commercial jet ski activities as occurring both generally and dominantly in the same areas. Commercial jet ski operations are limited to operating around three-buoy courses that operators set up for their customers. Jet skiing occurs only in the central part of the lagoon, no further south than Sugar Dock and no further north than Tanapag, due to the regulatory jet ski exclusion zones.

Several areas throughout the central lagoon were identified by workshop participants as having general and dominant commercial jet ski activity. In Garapan jet ski operations occur in the areas offshore of Hyatt Regency and Fiesta Resort. In the Oleai area, jet ski operations occur offshore of Kanoa Resort and World Resort, in particularly near and around the two northern most Sherman tanks.

### **3.2.6 Commercial Transit and Dinner Cruises**

*Includes commercial transit operations, particularly the large ferries that shuttle guests to and from Mañagaha Island. Also includes dinner cruises, commercial cruise ships, commercial yachts, and commercial submarine tours. Excludes recreational boating and transit or commercial activities such as parasailing and boat towing activities that also include transit.*

Commercial transit operations generally ferry guests from various points along the Saipan coastline out to Mañagaha and back. The most popular pick up points on Saipan are Charlie Dock, Smiling Cove, the Hyatt/Fiesta beach area, the beach by Grandviro Hotel, Fishing Base, and the beach by Kanoa Resort and World Resort.

Commercial dinner cruise activities primarily occur in and around the Smiling Cove to Mañagaha corridor, up through the Tanapag waters where water depth allows. Commercial operators noted that they enjoy the Tanapag lagoon area due to the depth of the water, the calmer waters during certain times of year due to the protection of the fringe reef, and the potential access to Mañagaha to offer transit options to passengers.

Participants noted that the size of the vessels used for these commercial activities limit their operations to areas of the lagoon with a depth of eight feet or greater. It was also noted that captains of these vessels generally avoid the commercial shipping lane when possible.

Commercial cruise ships very rarely visit Saipan, but when they do they are limited to the commercial shipping lane and commercial port due to their size and draft.

### **3.2.7 Commercial Shipping**

*Includes commercial shipping lanes and any mooring/towing/anchoring of large commercial ships. Excludes dinner cruises, yachts, cruise ships, or any other commercial motorized boating.*

Commercial shipping on Saipan is limited to the shipping channel that leads to the commercial port in Lower Base. Tide, wind, and other factors may affect when commercial shipping vessels can enter and exit the lagoon and its port.

## **3.3 Extractive Uses**

Extractive uses of the lagoon include several types of fishing as well as the harvesting of certain marine plants and invertebrates. Most of the fishing and harvesting that occurs within the lagoon is done so for subsistence purposes only; any commercial fishing that occurs in the CNMI generally occurs in open ocean outside the shelter of the lagoon. The extractive uses were categorized based on gear type used and applied to both on-shore and boat based extraction.

Participants noted that all types of fishing and harvesting were very resource based and fluid; that users often would start in one area but would constantly move if they were not successful in finding or catching anything.

Geospatial representations of the general and dominant extractive uses of the Saipan lagoon can be found in APPENDIX D: MAPS OF EXTRACTIVE USES. A summation of all extractive general uses and of all extractive dominant uses is described below under Section 3.4: Heat Maps and Sum of All Uses. Heat maps depicting these sums can be found in APPENDIX E: HEAT MAPS OF ALL USES.

### **3.3.1 Hook & Line Fishing**

*Includes hook and line fishing, both on shore and boat based. Excludes any other type of fishing or marine harvesting.*

Participants identified the entire lagoon area as being generally used for hook and line fishing, with the location of the activity being largely dependent on water depth, environmental conditions, and time of year. The ability to conduct this type of fishing in deeper waters is also dependent on access to a boat, however participants noted that many areas close to shore are too shallow for this type of fishing.

The offshore area from Aqua Resort down past Tanapag to the reef area where the Lady Carolina is grounded was identified as a dominant area for this type of fishing, as was the inside of the reef line running from Aqua out to the buoy marking the Mañagaha Marine Conservation Area. Deeper channels out by the shipwreck in front of the Hyatt are popular, but fishermen are careful to avoid conflict with jet skis or other motorized boats. From Fishing Base out to the lighthouse and in the lighthouse channel was also listed as a popular spot, as was the cut in the reef line offshore from Oleai. In the southern parts of the lagoon participants listed Sugar Dock as a dominant location to cast off from, as well as the cut through the reef by Agingan cliff.

### **3.3.2 Spearfishing**

*Includes all spearfishing, both from on shore and boat based. Excludes any other type of fishing or marine harvesting.*

As with hook and line fishing, participants identified the entire lagoon as being generally used for spearfishing depending on tides, water depth, underwater features, and water quality. Dominant areas were identified along the entire reef line from Paupau south towards the shipping channel and again starting just north of the lighthouse channel south along the reef line to the Sugar Dock channel. Patches of dominant spearfishing areas were also identified throughout the Tanapag lagoon and channel around some of the larger reef patches and deeper areas.

Participants did note that certain areas of potential fishing areas were avoided due to water quality issues and runoff.

### **3.3.3 Throw Net / Talaya Fishing**

*Includes throw net (talaya) fishing, both from on shore and boat based. Excludes any other type of fishing or marine harvesting.*

Workshop participants identified the entire lagoon shoreline as being generally used for talaya fishing, with location largely dependent on seasonal fish runs, tides, and accessibility. Dominant use areas for talaya cover most of the easily accessible shoreline areas and beach parks. Wing Beach was identified as having dominant uses occurring both on shore but also out towards the reef line, sometimes including in the reef cut used by SCUBA divers. Participants identified the entire reef line from offshore Aqua Resort to the Mañagaha Conservation Area buoy markers. Along the shoreline the dominant areas in the north include the entirety of Paupau shoreline, the Tanapag shoreline starting just north of Aqua Resort and extending south to Lower Base, and the beach by the Division of Fish and Wildlife. Dominant use for talaya also include the Micro Beach shoreline, the beaches by Hyatt Regency and Fiesta Resort, the beach areas by Fishing Base, and the entire shoreline along the Beach Road Pathway. In the southern part of the lagoon dominant uses covered Sugar Dock and Aquarius Beach, the beaches by Pakpak Beach Park, as well as the reef line just south of the Sugar Dock reef cut and by the Pakpak channel.

Legally talaya fishing for non-commercial purposes requires a permit from the Division of Fish and Wildlife. In this workshop no distinction was made between talaya fishing with a permit or without.

### **3.3.4 Gillnet / Chenchulu / Tekken Fishing**

*Includes fishing with gillnets / tekken as well as all other types of surround or trap nets (chenchulu) that are prohibited in CNMI by the Division of Fish and Wildlife. Excludes throw net / talaya fishing, scoop or landing net fishing, and all other types of fishing or marine harvesting.*

The use of these types of fishing nets is prohibited in the CNMI by the Division of Fish and Wildlife (DFW). However, special permits for this type of fishing can be issued under certain specific exceptions such as cultural takes, church fiestas, or funerals. These special permits are rare, but when issued will usually include limitations on the size of nets allowed and the total amount of fish allowed to be landed, as well as limitations on location.

Workshop participants noted the rarity of this type of fishing, but identified significant portions of the lagoon shoreline as the usual gillnet fishing areas when it does occur. Dominant locations were noted in the near shore areas by Paupau Beach Park as well as in the Tanapag and San Roque area out to the channel. Representatives from DFW also noted that they do still sometimes find nets spanning reef cuts and channels.

### **3.3.5 Harvesting / Gleaning**

*Includes the collecting or harvesting of marine plants or animals, both on shore and boat based. Excludes any other type of fishing.*

Workshop participants again agreed that harvesting of marine plants or animals generally occurs throughout the entire lagoon depending on the species being targeted. In particular, rocky or reef areas where target species may hide and shallow areas that are easy to access are popular for

this use. The entire northern part of the lagoon at Wing Beach was considered a dominant area, from shore to reef line, due to how shallow the lagoon is in this area and therefore how easy it can be to get to the reef. Other dominant areas were identified along various sections of the reef line including by Tanapag, by the “big rock” along the reef just north of the Mañagaha Marine Conservation Area, the reef just before the shipping channel, in and around the lighthouse channel, and north of the Sugar Dock channel. Each of these locations were listed as dominant for very specific species.

Any harvesting of marine invertebrates requires a permit from DFW.

### **3.4 Heat Maps & Sum of All Uses**

By combining the defined general and dominant layers for each of the different uses it is possible to create “heat” maps that can identify and visualize the areas of the lagoon that are the most heavily used. These heat maps were created for the general and dominant uses for all three use categories: recreational, commercial, and extractive. Additional heat maps that depict the use patterns for all twenty general uses and all twenty dominant uses were also created.

#### **3.4.1 Recreational Uses Heat Maps**

Recreational uses occur throughout the entire Saipan lagoon but seem to be concentrated in front of popular beach parks and the major beachside hotels. General use was identified for most recreational uses throughout the entire lagoon, the only notable exceptions being in the port area from Lower Base through Smiling Cove as well as the stretch of lagoon from Aquarius Beach to just before Pacific Islands Club.

Dominant recreational uses were constrained to slightly more refined areas, although still encompassed much of the lagoon area. The areas identified in the north with the heaviest dominant recreational use were the near shore areas by Wing Beach, Paupau Beach Park, the Tanapag boat ramp area. The near shore areas by Mañagaha and along Micro Beach are also identified as having heavy dominant recreational use, as is the corridor connecting these two shorelines. The lagoon waters around the Sherman Tanks and down by Sugar Dock and Aquarius beach were all identified as being heavily used by many different types of recreational users, as well as the waters immediately in front of Pacific Islands Club and Pakpak Beach.

#### **3.4.2 Commercial Uses Heat Maps**

Given that most commercial uses in the lagoon are restricted to areas of a certain depth, most commercial uses are heavily concentrated in the waters between the boat launch sites of Smiling Cove and Lower Base to out and around Mañagaha. The deeper waters with interesting underwater features such as wrecks and reefs in the Tanapag lagoon also attract heavy commercial use. Commercial use is also concentrated just off shore of several major hotels, specifically Hyatt Regency, Fiesta Resort, the Grandviro Resort, World Resort, and Kanoa Resort.

#### **3.4.3 Extractive Uses Heat Maps**

Most extractive uses occurred “generally” throughout the entire lagoon with the notable exceptions of gillnet fishing, which is illegal except with a special permit, and talaya/throw net fishing, which only occurs in shallow waters. The shoreline areas most frequented by extractive users were in front of Pakpak Beach Park, along the Beach Road Pathway between Oleai and Fishing Base, in and around Micro Beach, along the Tanapag shoreline, and by Paupau Beach. Workshop participants mentioned that the Mañagaha Marine Conservation Area, which is legally a no-take zone, does deter many fishermen from engaging in extractive uses in the area. However, certain fishing practices may still illegally occur in the area.

The most dominant location of fishing and harvesting was along the fringe reef from Tanapag to Mañagaha. The lighthouse channel was also identified as a dominant use for several of the extractive uses.

#### **3.4.4 All Uses Heat Maps**

The heat maps that sum all general uses and sum all dominant uses show concentrations of uses in similar areas. The sum of all general uses shows a heavy concentration of uses in the waters around Mañagaha and in to Micro Beach, as well as the waters around all three Sherman tanks. These locations were marked as being general use areas for as many as sixteen of the twenty uses mapped during this workshop. The near shore area by Pacific Islands Club and Pakpak Beach Park also came out as having a high concentration of general uses present.

The sum of all dominant uses shows a similar pattern with a few additional locations identified as having a high concentration of uses. Popular beach access locations such as Wing Beach, Paupau Beach Park, the Tanapag boat ramp, the Micro Beach to Grandviro Hotel shoreline, and Sugar Dock/Aquarius Beach all contained a high number of uses.

### **3.5 Stakeholder Perceptions and Concerns**

All participatory mapping workshop participants were asked to fill out a general survey where they answered two broad questions about the Saipan lagoon:

1. Why do you use the lagoon rather than other areas around Saipan?
2. What are your top concerns facing the Saipan lagoon?

In addition, the survey packet that was distributed to all participants and respondents included a page of questions for each individual use. Questions covered topics such as "where do you go" to gather descriptive data on use locations for further validation and comparison and "why do you go to these places" to better identify what is driving the use behavior patterns identified in this mapping workshop. Respondents were also offered a list of factors and then asked to mark which factors played a role in use behavior.

Most respondents listed the shelter and safety of the lagoon as their top reason for visiting the Saipan lagoon rather than other shoreline areas on Saipan. The facts that the lagoon waters and shoreline are well sheltered from waves and currents by its fringing reef and in most places is not too deep were important factors for many of the survey respondents. The lagoon's close proximity to population and commercial centers, the readily available and easy shoreline access, and the public amenities available such as boat ramps, palapalas, grills or fire pits, and parking areas were also all mentioned by many respondents.

Workshop participants involved in lagoon uses that included interaction with the underwater environment such as SCUBA divers, snorkelers, fishers, and commercial tour operators also praised the lagoon's clear waters, vibrant reefs, and diverse and beautiful fish. However, many also listed water quality and damaged or dying corals as one of their top concerns.

Water quality was mentioned not only as a top concern, but during the participatory workshop it often came up as a factor that determined where certain uses did or did not occur. Participants mentioned avoiding certain areas like outflows from drainage ditches because the water was "stinky" or murky.

Almost all workshop participants and survey respondents mentioned avoiding conflicts with other users as a major factor in identifying a location to use the lagoon. Many also listed "overcrowding" or "too many commercial boats" as a top concern that not only affects lagoon use and enjoyment, but also potentially impacts the safety of lagoon users.

Linked to overcrowding, many respondents also listed "new" or "too much" shoreline development as an issue facing the lagoon. Other concerns that respondents listed included overfishing, an overall lack of enforcement, and an issue with trash and marine debris.



#### **4.0 DATA GAPS AND NEXT STEPS**

The data collected and maps developed during this project will provide BECQ-DCRM with a solid foundation upon which preliminary management decisions can be based. However, this survey and subsequent report have also served to highlight areas that need further investigation in order to best manage the Saipan lagoon and its resources in a way that balances economic development and resource protection.

##### **4.1 Ground Truthing Data**

Many of the uses that were mapped during this project included dominant usage based on very specific underwater features or bathymetry. During the mapping component of this project, participants and facilitators attempted to best approximate the location of these key features based on shoreline markers and aerial images. For example, commercial SCUBA tours occur in very specific locations centered around wrecks or reefs that offer guests unique experiences and congregates of marine life. These locations were approximated in the use maps created during the participatory mapping workshop, but may not be entirely accurate as to their actual whereabouts in the lagoon. Similarly, many motorized boating activities are limited to specific depths for operations, but these depths were not denoted on either the base maps used in the participatory mapping workshop nor in the final maps included in this report, as bathymetric mapping of the lagoon is not currently available.

With these limitations in mind, it would be useful to further analyze the qualitative data provided by participants and then ground truth the locations of specific underwater features such as wrecks, notable reef heads and habitat boundaries, and even sandbars. If and when bathymetry data is available it would also be useful to compare this data with qualitative descriptions of the uses that were dependent on depth. Incorporating other features such as buoy markers and conservation area perimeters could further help more accurately represent the actual location of the uses in question.

##### **4.2 Additional Data Mapping & Validation**

Due to time and financial limitations of this mapping project, only one participatory workshop was held. Facilitators made every effort to involve a wide range of experts who have a varied and in depth knowledge of lagoon uses, and several follow up interviews were conducted to verify the data collected and answer additional questions that were raised during data collection and analysis. However, it would be beneficial to build upon this project and hold additional participatory mapping workshops to allow additional lagoon user experts to attend and contribute. Doing so would allow the facilitators to both hone and validate the data collected thereby further guaranteeing the accuracy of the data.

##### **4.3 Public Survey & Interviews**

A natural continuation of the additional data mapping and validation workshops mentioned above would be to expand the data collection efforts to include the general public and additional key stakeholders. A broader public survey comprised of intercept surveys targeting various user groups as well as key informant interviews could provide BECQ-DCRM with additional user information regarding use patterns, access points, and concerns and opinions on the condition of the lagoon. This additional data could better inform new management practices or regulations as use and development pressures continue to increase.

#### **5.0 CONCLUSIONS & RECOMMENDATIONS**

The Saipan lagoon is one of Saipan's most valuable natural resources, and the data and perceptions gathered in this mapping project only serve to further emphasize this. The sheltered waters, easy shoreline access, many natural and historical underwater features, and vibrant marine life offer Saipan's residents and visitors a wealth of economic, social, and cultural opportunities. The data collected during this participatory mapping exercise can serve as a guide for BECQ-DCRM and other resource managers to focus management and research efforts in the future. APEC recommends that these focus areas include the following:

**Management to avoid overcrowding and user conflicts:** The heat maps generated from the participatory mapping workshop clearly demonstrate how wide-spread so many of the lagoon uses are, and how concentrated many of them are around specific features or access points. A majority of all three use categories listed two areas of the lagoon in particular as an area of dominant use: the lagoon area between the Smiling Cove to Lower Base shoreline out and around Mañagaha, and the waters around the two northern Sherman tanks. Almost all of the participants mentioned overcrowding or avoiding conflict with other users as top concerns for the lagoon. As CNMI's tourism industry continues to grow and shoreline development along the lagoon's shoreline continues to expand, the user pressures on the lagoon and its resources will increase as well. It is clear that managing for overcrowding and avoiding conflicts between user groups will need to be a priority for BECQ-DCRM moving forward, particularly in the areas that already attract heavy use from a wide variety of user groups.

**Protect priority locations and resources:** Most of the uses that were mapped during this workshop were based around unique biological, cultural, or historical features. These features provide tourism operators with a valuable source of income, extractive users with a valuable source of food, and tourists and recreational users with valuable cultural and psychological enjoyment. As an extension of the ground truthing discussed in Section 4, these unique cultural, historical, and biological features of the lagoon should be prioritized and protected for continued future use and enjoyment.

**Continue to prioritize water quality and erosion control:** Diminishing water quality due to pollutant runoff and sedimentation was frequently mentioned as a growing concern for most of the participants in the mapping workshop. Many commercial operators listed the "clear waters" and "high visibility" as lagoon characteristics that draw customers to their operations and many have noticed a decrease in these qualities in recent memory. Extractive and recreational users who participated in the workshop often times noted that they purposefully avoided areas of the lagoon with outfalls or "stinky" water. BECQ-DCRM is already making progress in addressing these issues, and it is clear that lagoon users would agree that continued prioritization of water quality and sediment runoff would benefit all lagoon users.

**Continued and frequent stakeholder involvement:** The premise behind participatory mapping workshops is designed around the assumption that frequent users of a resource can be regarded as "experts" on the condition of that resource. The wealth of feedback and information gathered from the participants in the Saipan lagoon mapping workshop supported this assumption. The recreational, commercial, and extractive users who are out on the lagoon all day every day know and understand the issues facing the lagoon better than most and should continue to be regarded as a valuable source of information and feedback. Certain lagoon users could even be pulled in as key partners in the gathering of data through citizen science and other initiatives as is being demonstrated in other jurisdictions around the U.S. Frequent and active involvement of lagoon user stakeholders in future management decisions will continue to build trust and partnerships, and will further support BECQ-DCRM's efforts to preserve the Saipan lagoon and its resources for all future users.

**APPENDIX A**  
**SURVEYED USES AND DEFINITIONS**

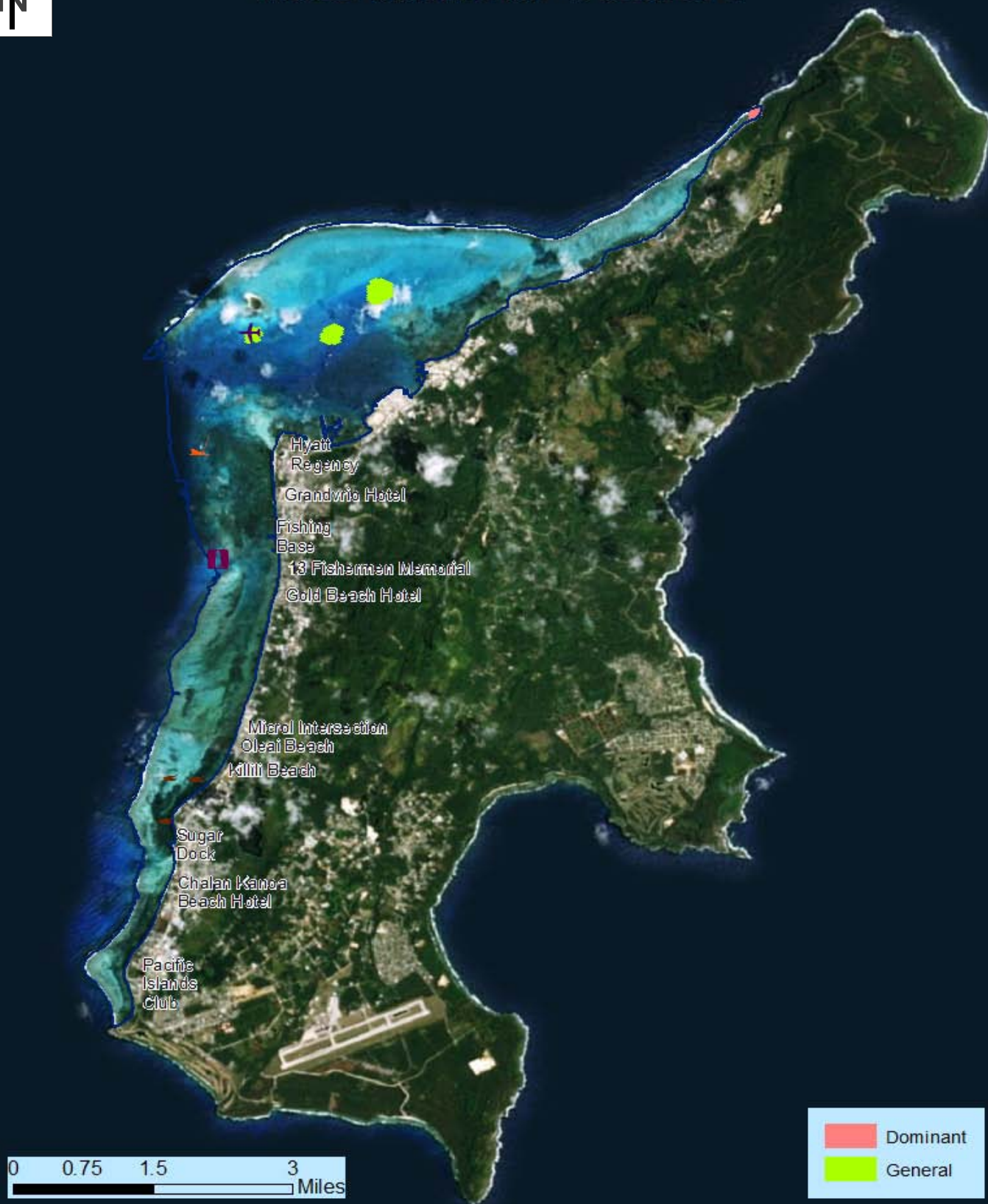
<b>USE</b>	<b>Includes</b>	<b>Excludes</b>
<b>Recreational SCUBA diving</b>	<i>recreational SCUBA diving</i>	<i>swimming, snorkeling, free diving, free dive fishing, any commercial activities</i>
<b>Recreational snorkeling &amp; free diving</b>	<i>recreational snorkeling, free diving</i>	<i>SCUBA diving, commercial snorkel tours, swimming, any kind of fishing</i>
<b>Swimming</b>	<i>swimming, wading, playing in the water</i>	<i>SCUBA diving, snorkeling, free diving, any kind of fishing or gathering, surface boards</i>
<b>Paddling</b>	<i>outrigger paddling, stand-up paddling (SUP), kayaking</i>	<i>motorized boating, surface board sports</i>
<b>Surface board sports</b>	<i>surfing, wind-surfing, kiteboarding</i>	<i>stand-up paddling (SUP), swimming, snorkeling, paddling</i>
<b>Recreational motorized boating</b>	<i>recreational motorized boating, recreational boat towing activities (ie waterskiing), recreational personal watercraft (ie jet skis)</i>	<i>commercial motorized boating, non-motorized boating, surface board sports</i>
<b>Sailing</b>	<i>sailing, recreational sailboats for transit, mooring or anchoring of recreational sailboats</i>	<i>windsurfing, motorized boating, surface board sports, paddling</i>
<b>Beach use</b>	<i>most shoreline activities including BBQs, sunbathing, walking/running, shell collecting, terrestrial wildlife viewing, camping</i>	<i>surface board sports, swimming, fishing or harvesting from shore</i>
<b>Commercial SCUBA diving</b>	<i>commercial SCUBA diving, SCUBA Open Water certification courses, surface supply diving, Snuba, Seawalkers</i>	<i>recreational SCUBA diving, swimming, snorkeling, free diving, fishing</i>
<b>Commercial snorkel tours</b>	<i>commercial snorkeling tours (both permitted and unpermitted)</i>	<i>recreational snorkeling, swimming, SCUBA diving, free diving, fishing</i>
<b>Commercial parasailing</b>	<i>commercial parasailing operations</i>	<i>banana boating, other motorized boat towing activities, recreational boating, personal watercraft, transit</i>
<b>Commercial banana boating &amp; other commercial boat towing activities</b>	<i>commercial banana boating, other commercial motorized boat towing activities</i>	<i>commercial parasailing, recreational motorized boating, recreational motorized boat towing activities, personal watercraft, transit</i>
<b>Commercial jet ski</b>	<i>commercial jet ski operations, commercial motorized personal watercraft</i>	<i>parasailing, banana boating, other motorized boat towing activities, recreational jet skis</i>
<b>Commercial transit &amp; dinner cruises</b>	<i>commercial transit operations, dinner cruises, commercial cruise ships, commercial yachts, commercial submarines</i>	<i>recreational boating and transit, banana boating, parasailing, other motorized boat towing activities</i>
<b>Commercial shipping</b>	<i>commercial shipping lanes, mooring/towing/anchoring of commercial ships or other large commercial vessels</i>	<i>dinner cruises, yachts, cruise ships, commercial motorized boating</i>
<b>Hook &amp; line fishing</b>	<i>hook &amp; line fishing, both on-shore and boat based</i>	<i>all other fishing and collecting</i>
<b>Spearfishing</b>	<i>all spearfishing</i>	<i>all other fishing and collecting</i>
<b>Throw net / talaya fishing</b>	<i>throw net / talaya fishing, both on-shore and boat based</i>	<i>all other fishing and collecting</i>
<b>Gillnet / chenchulu / tekken fishing</b>	<i>gillnet fishing, permitted and unpermitted, both on-shore and boat based</i>	<i>all other fishing and collecting</i>
<b>Harvesting / gleaning</b>	<i>collecting or harvesting of other marine plant or animals, both on-shore and boat based</i>	<i>all other fishing and collecting</i>

**APPENDIX B**  
**MAPS OF RECREATIONAL USES**

- ❖ **Recreational SCUBA diving**
- ❖ **Recreational Snorkeling & Free Diving**
- ❖ **Swimming**
- ❖ **Paddling**
- ❖ **Surface Board Sports**
- ❖ **Recreational Motorized Boating**
- ❖ **Sailing**
- ❖ **Beach Use**



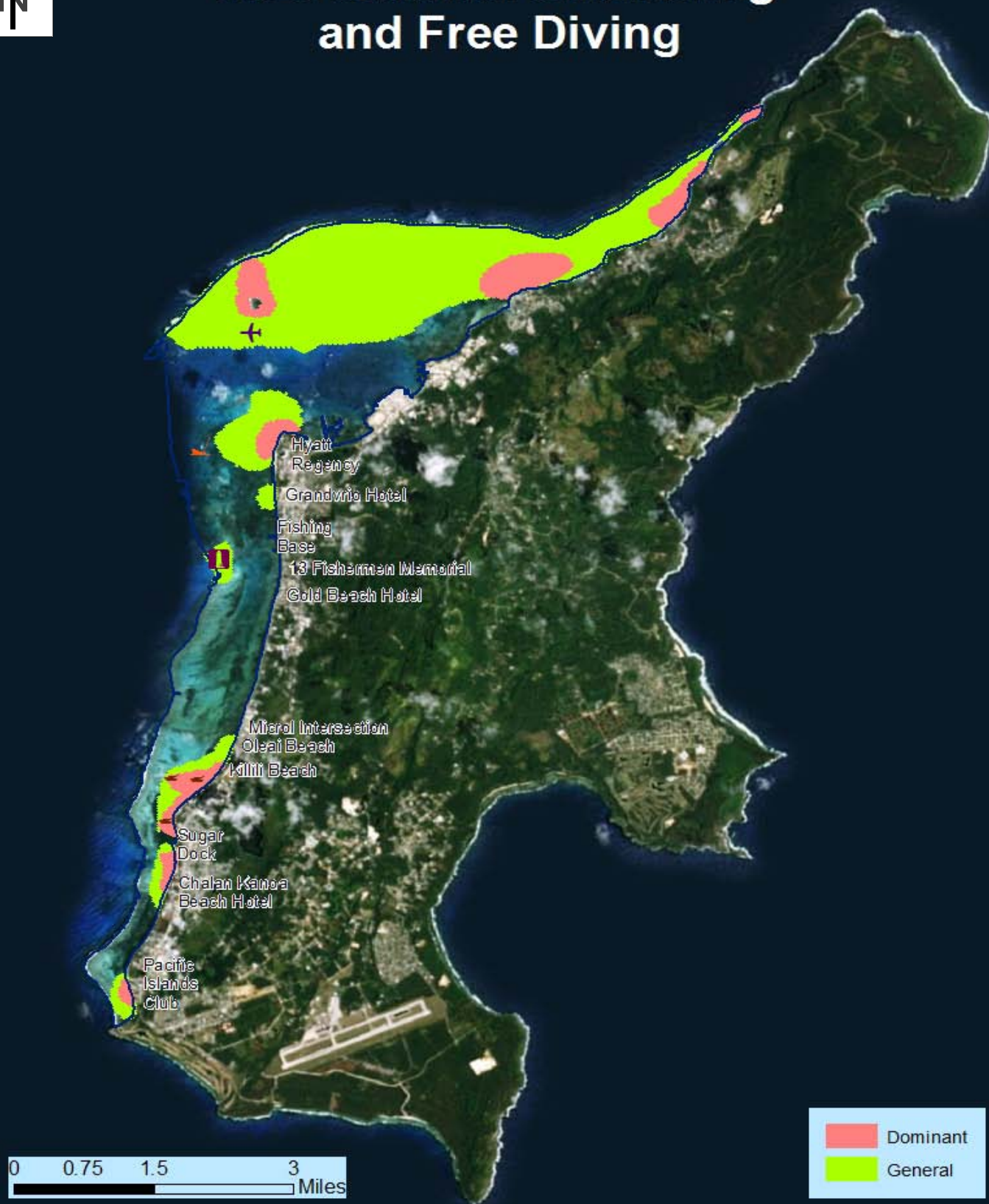
# Recreational SCUBA







# Recreational Snorkeling and Free Diving

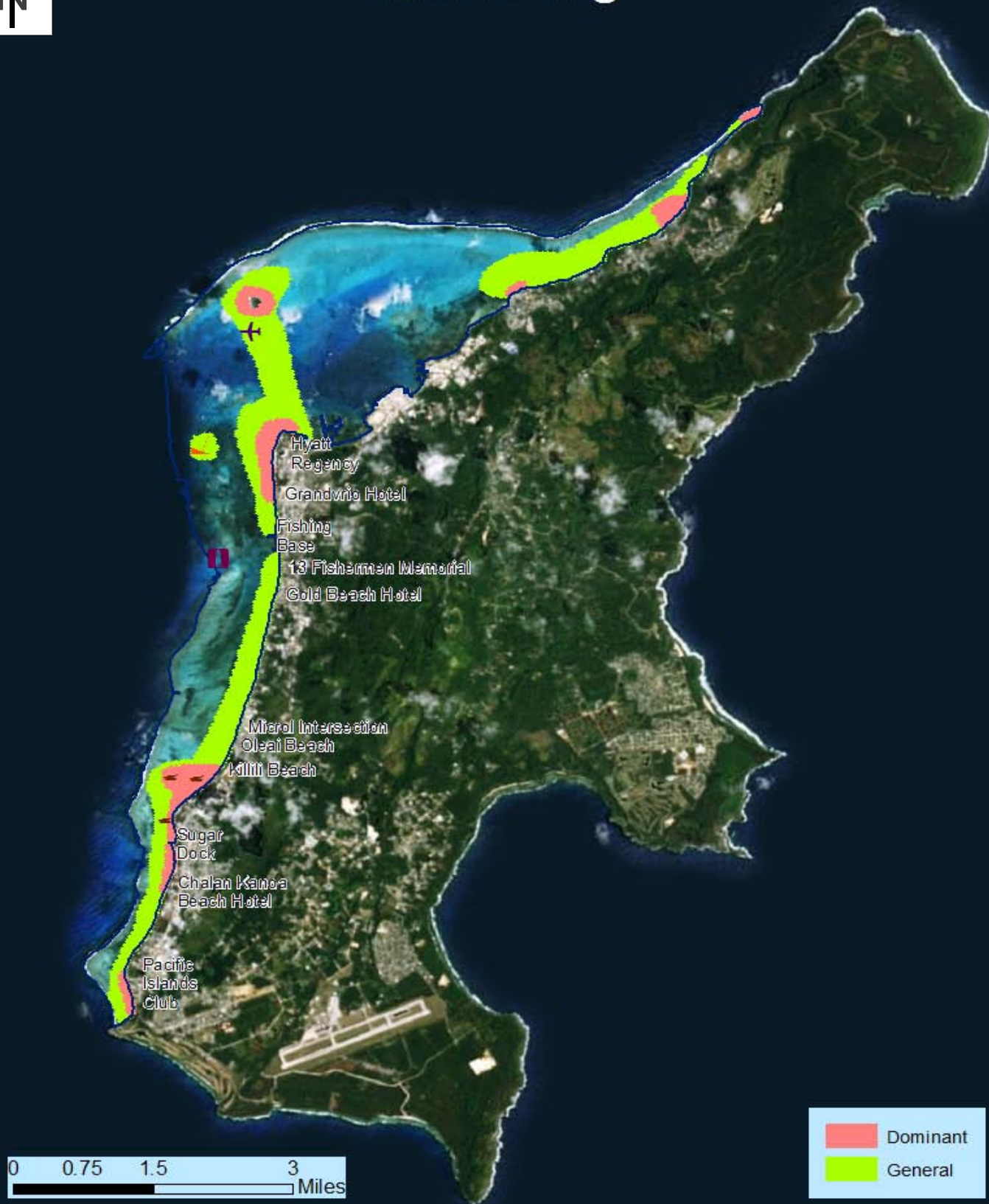


Dominant  
General

0 0.75 1.5 3  
Miles



# Swimming



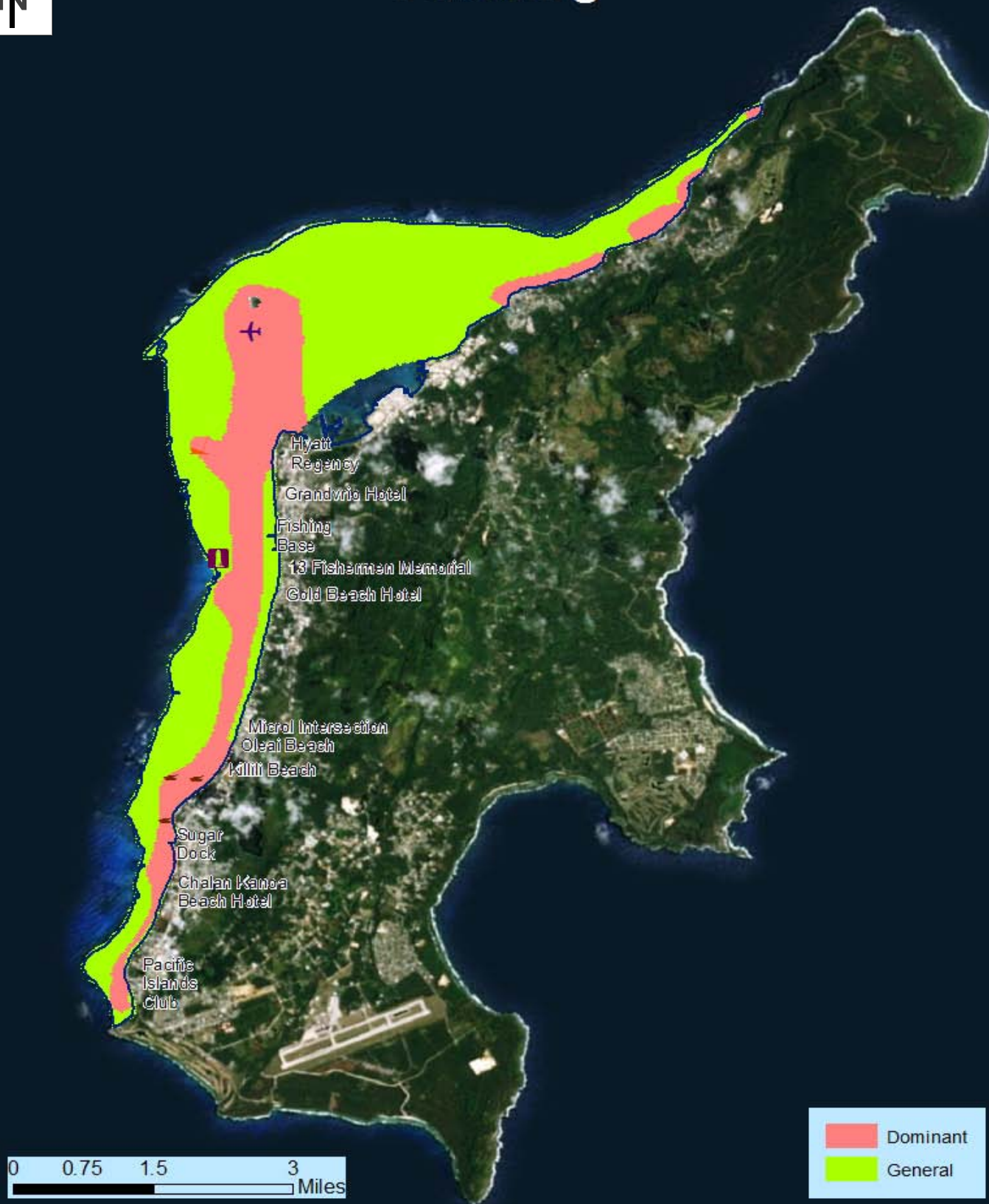
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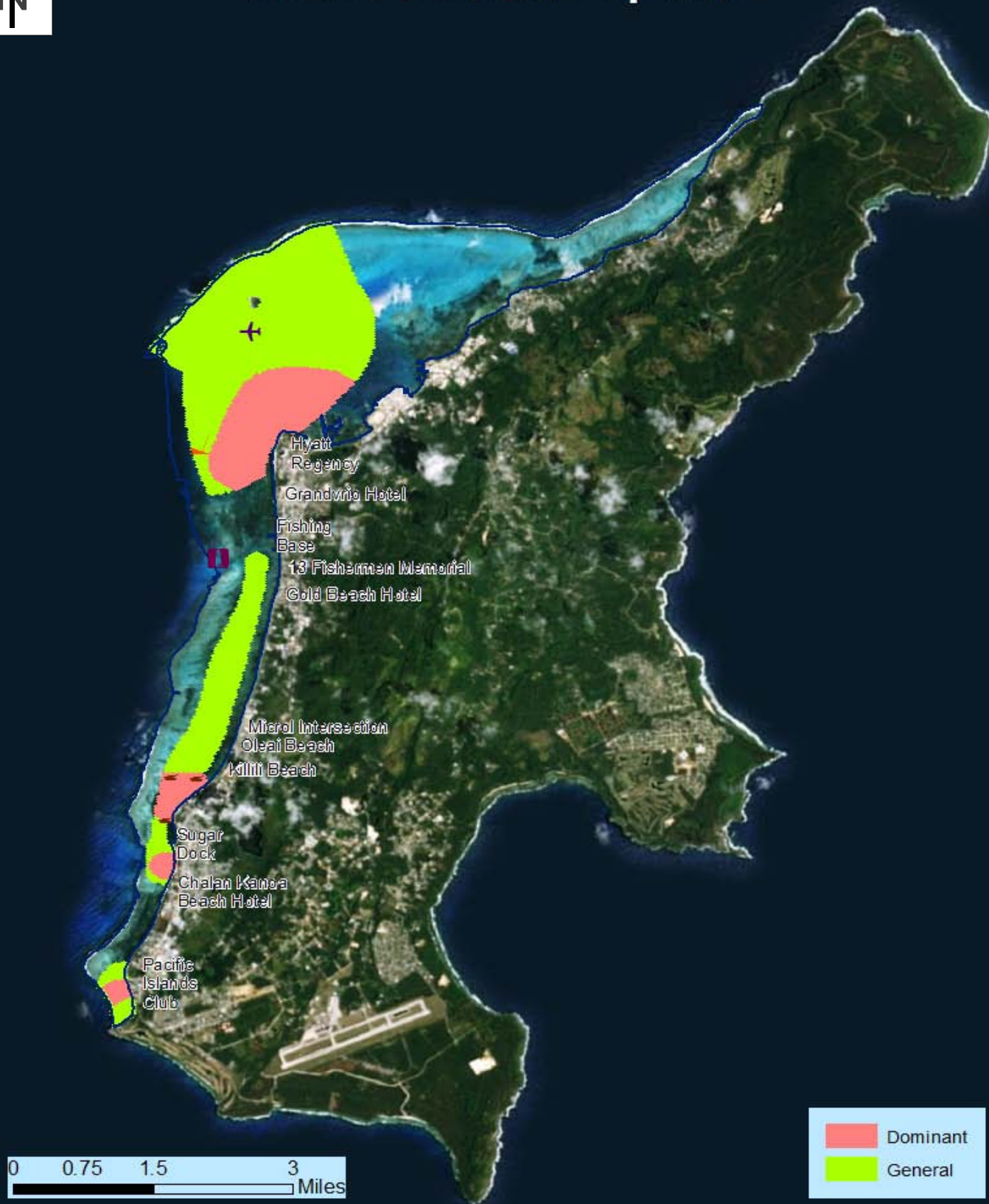


# Paddling





# Surface Board Sports

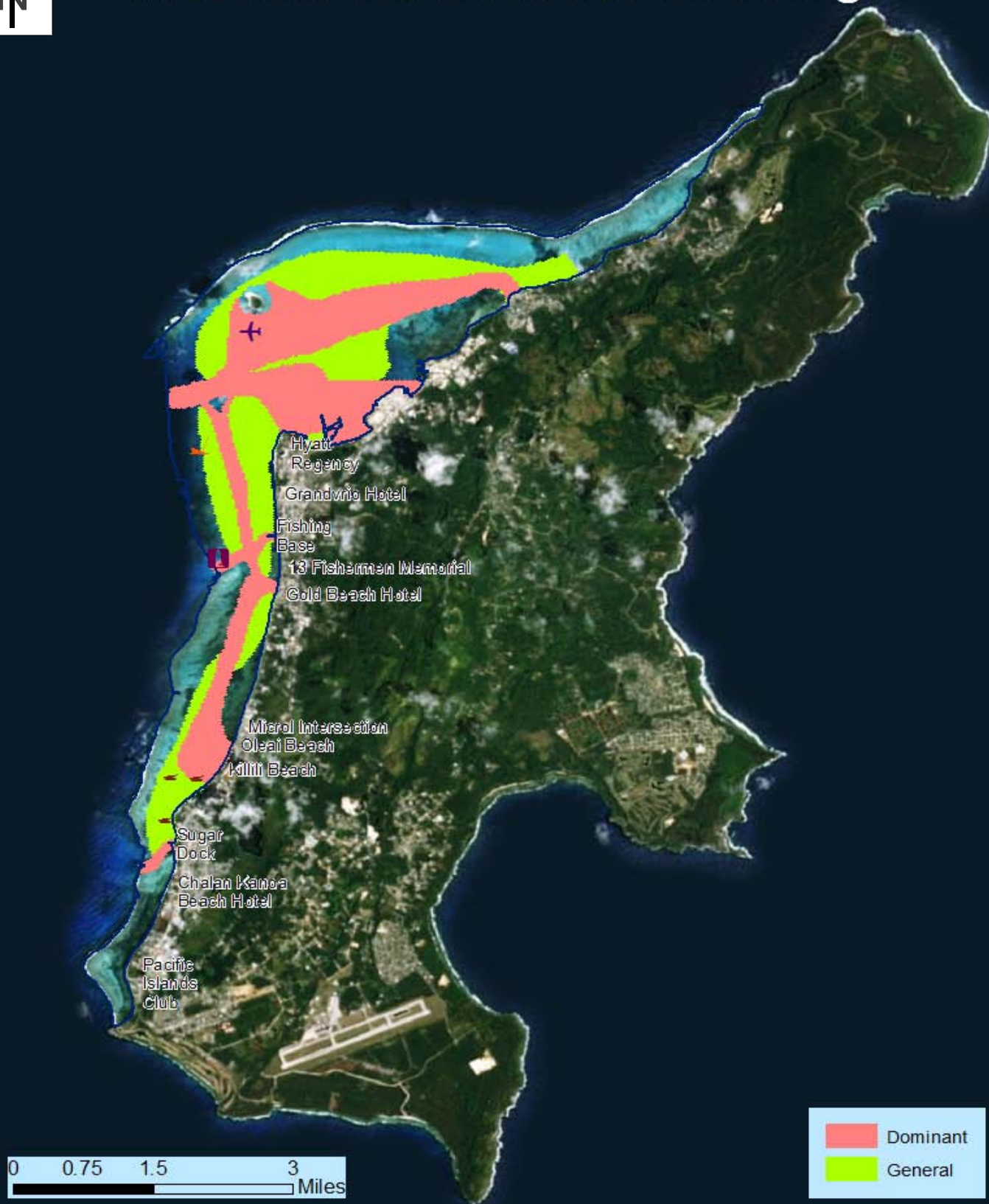


Dominant  
General

0 0.75 1.5 3  
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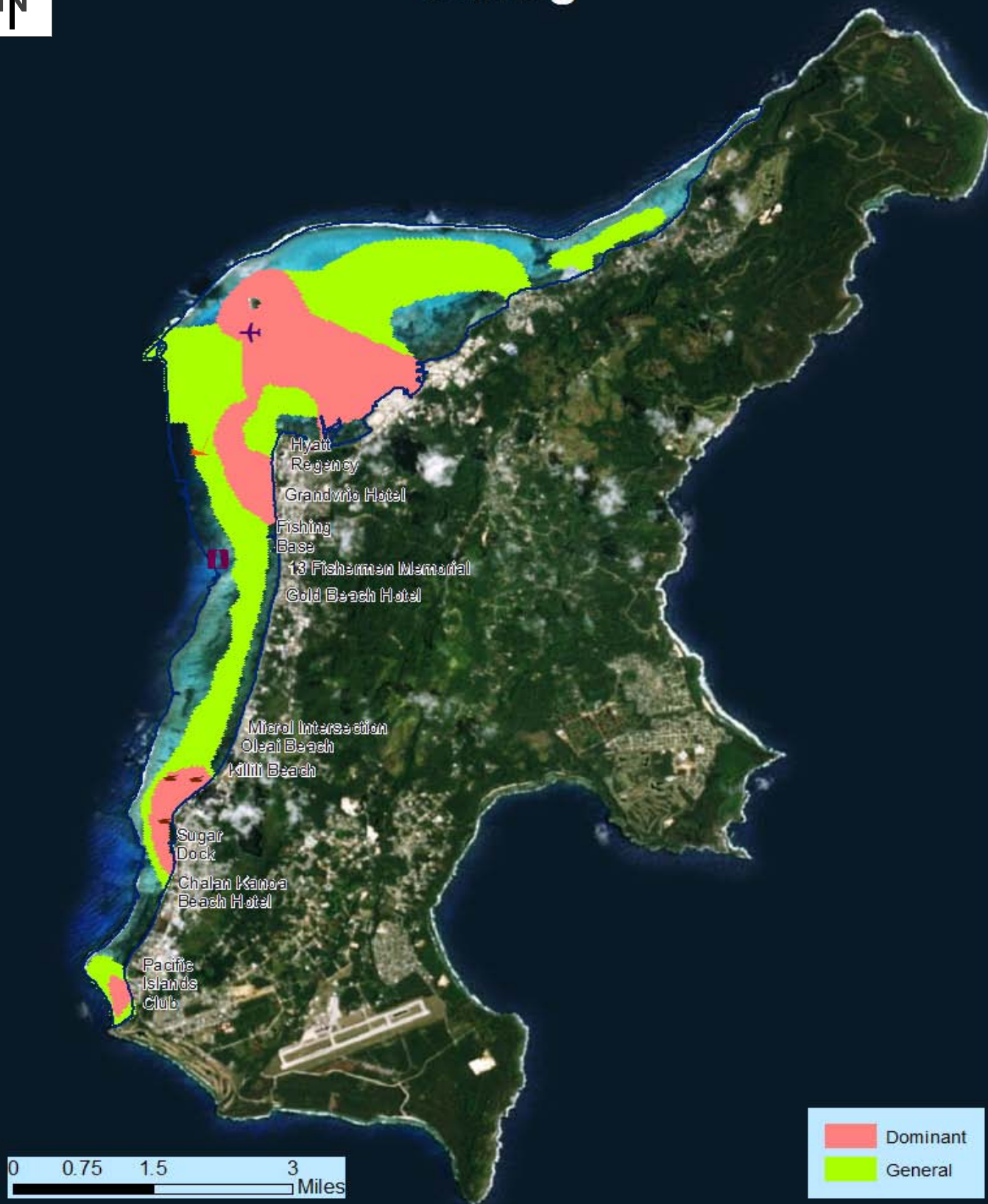


# Recreational Motorized Boating





# Sailing







# Beach Use



**APPENDIX C**  
**MAPS OF COMMERCIAL USES**

- ❖ **Commercial SCUBA Diving**
- ❖ **Commercial Snorkel Tours**
- ❖ **Commercial Parasailing**
- ❖ **Commercial Banana Boating & Other Boat Towing Activities**
- ❖ **Commercial Jet ski**
- ❖ **Commercial Transit & Dinner Cruises**
- ❖ **Commercial Shipping**

# Commercial SCUBA Diving

N

0 0.75 1.5 3 Miles

Dominant  
General

TITLE: COMMERCIAL SCUBA DIVING

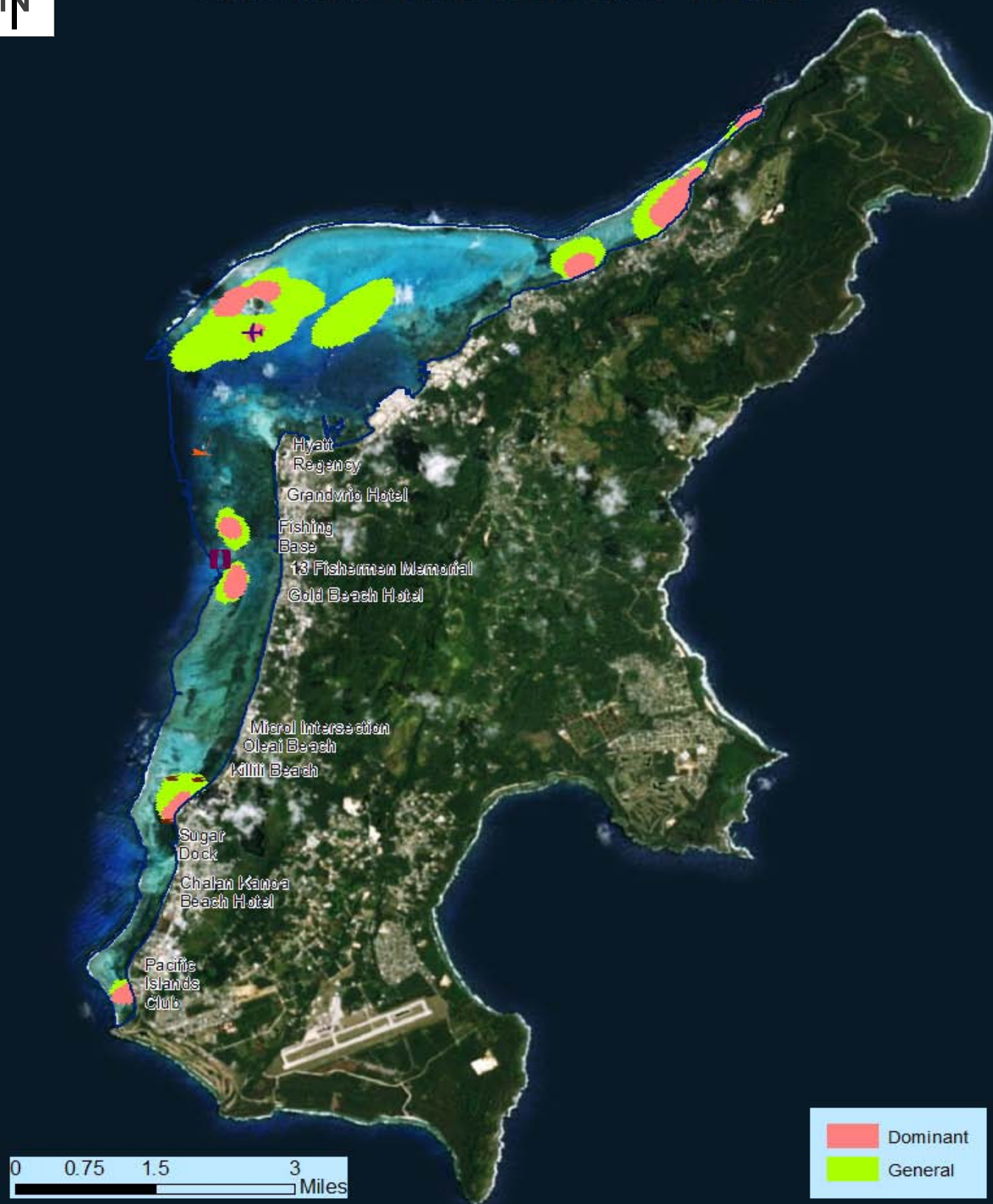
FIGURE: 2.1

PROJECT: CNMI BECQ-DCRM SLUMP User Survey and Mapping Report

2016 CNMI BECQ-DCRM

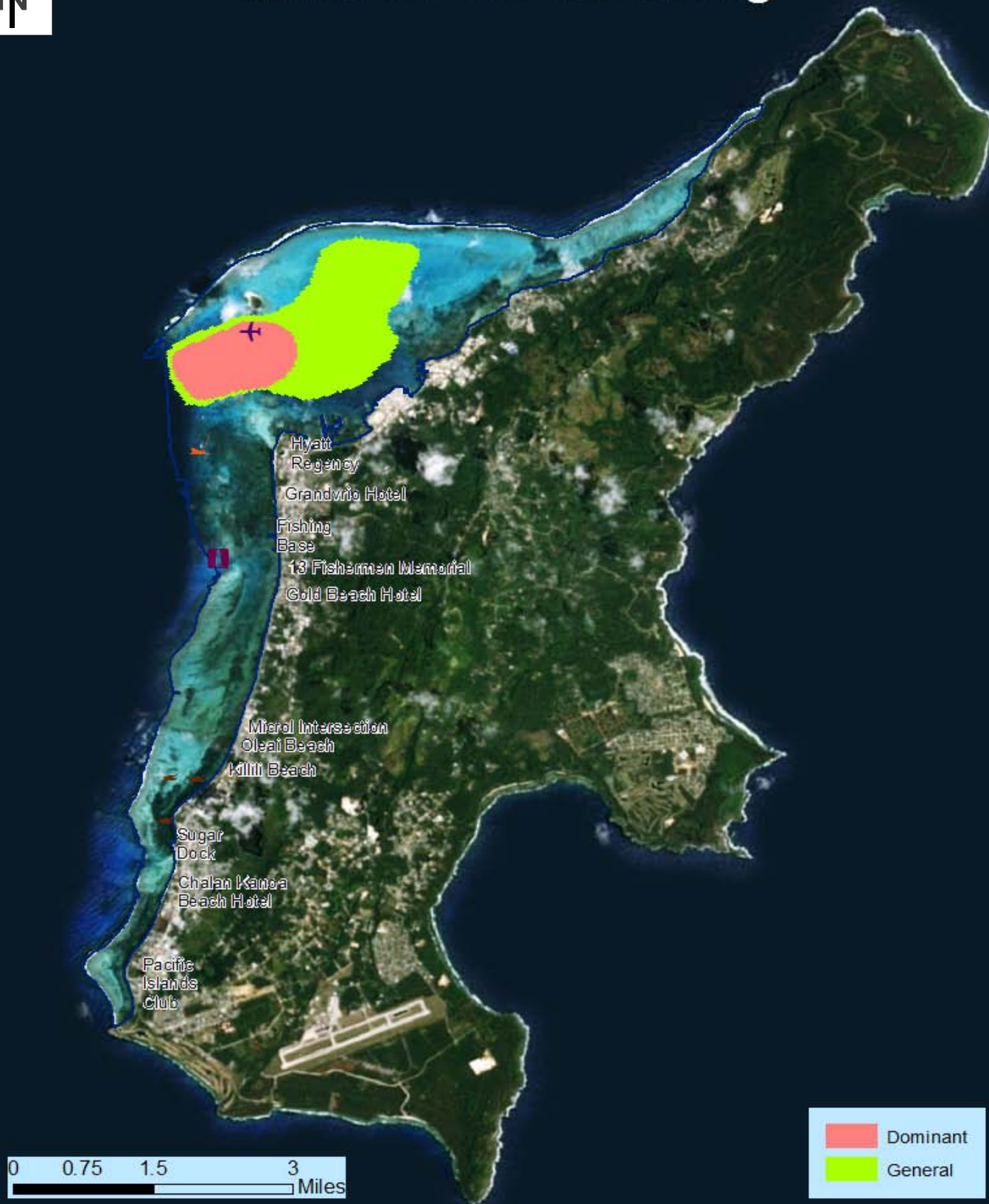


# Commercial Snorkel Tours





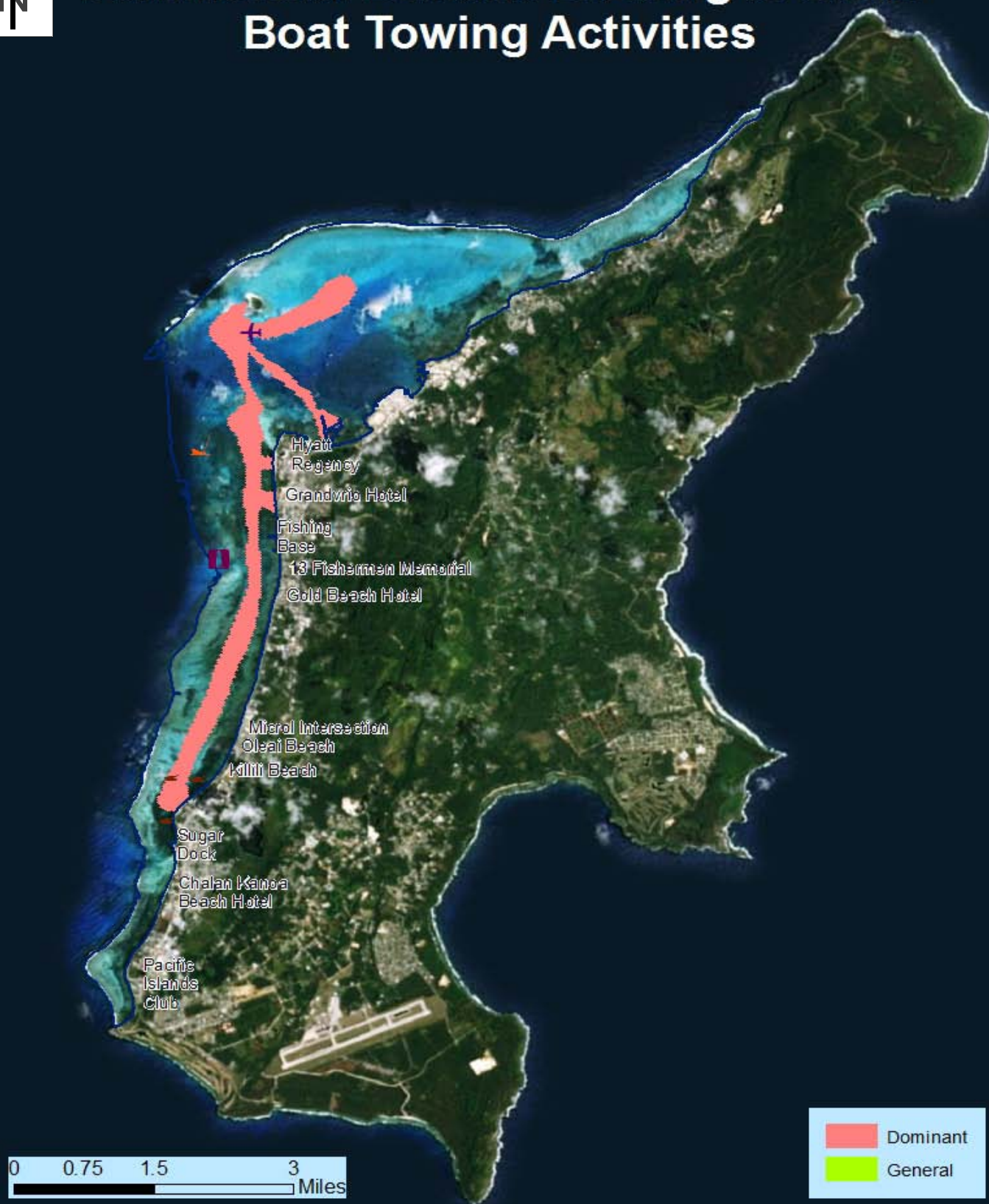
# Commercial Parasailing







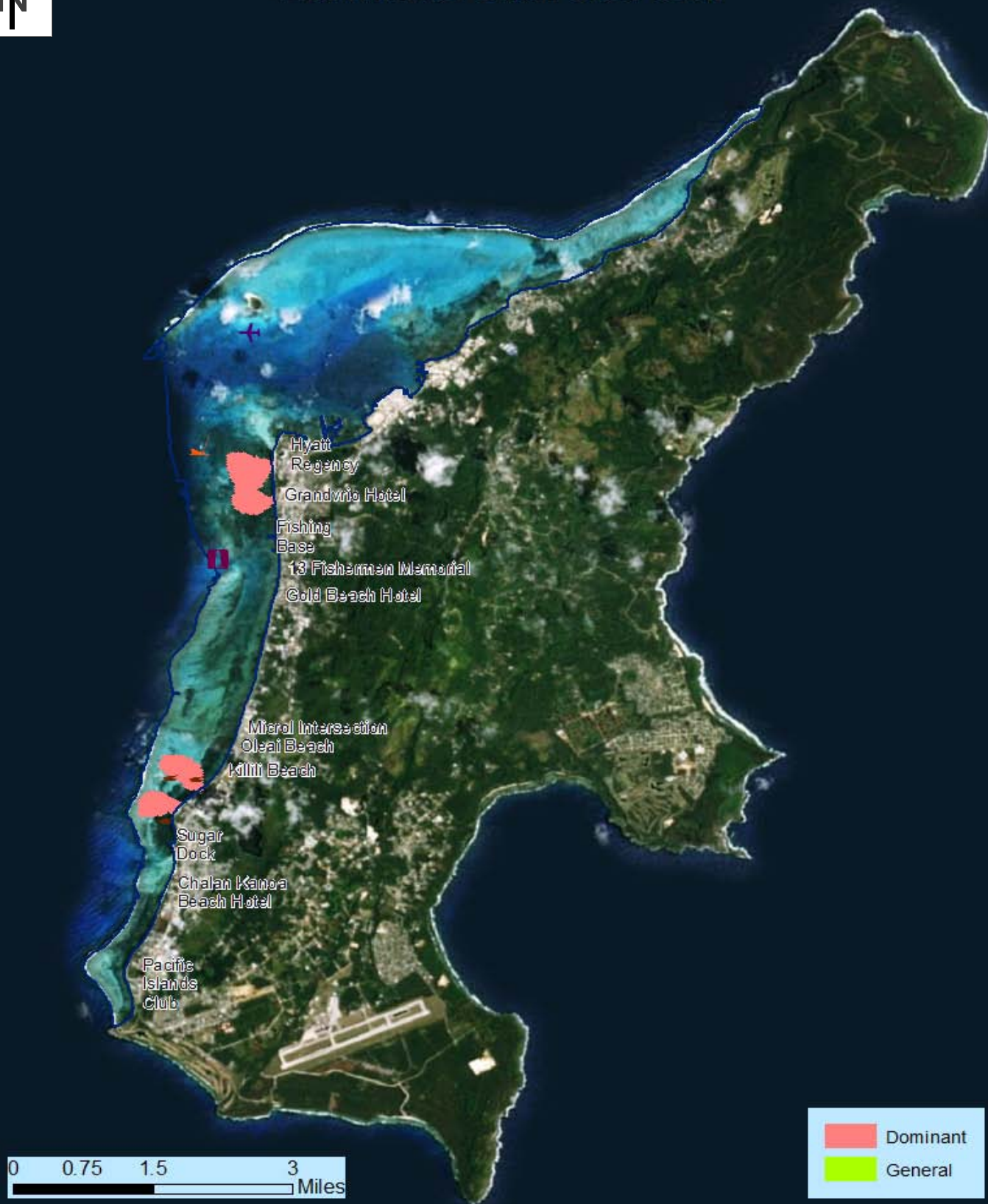
# Commercial Banana Boating & Other Boat Towing Activities





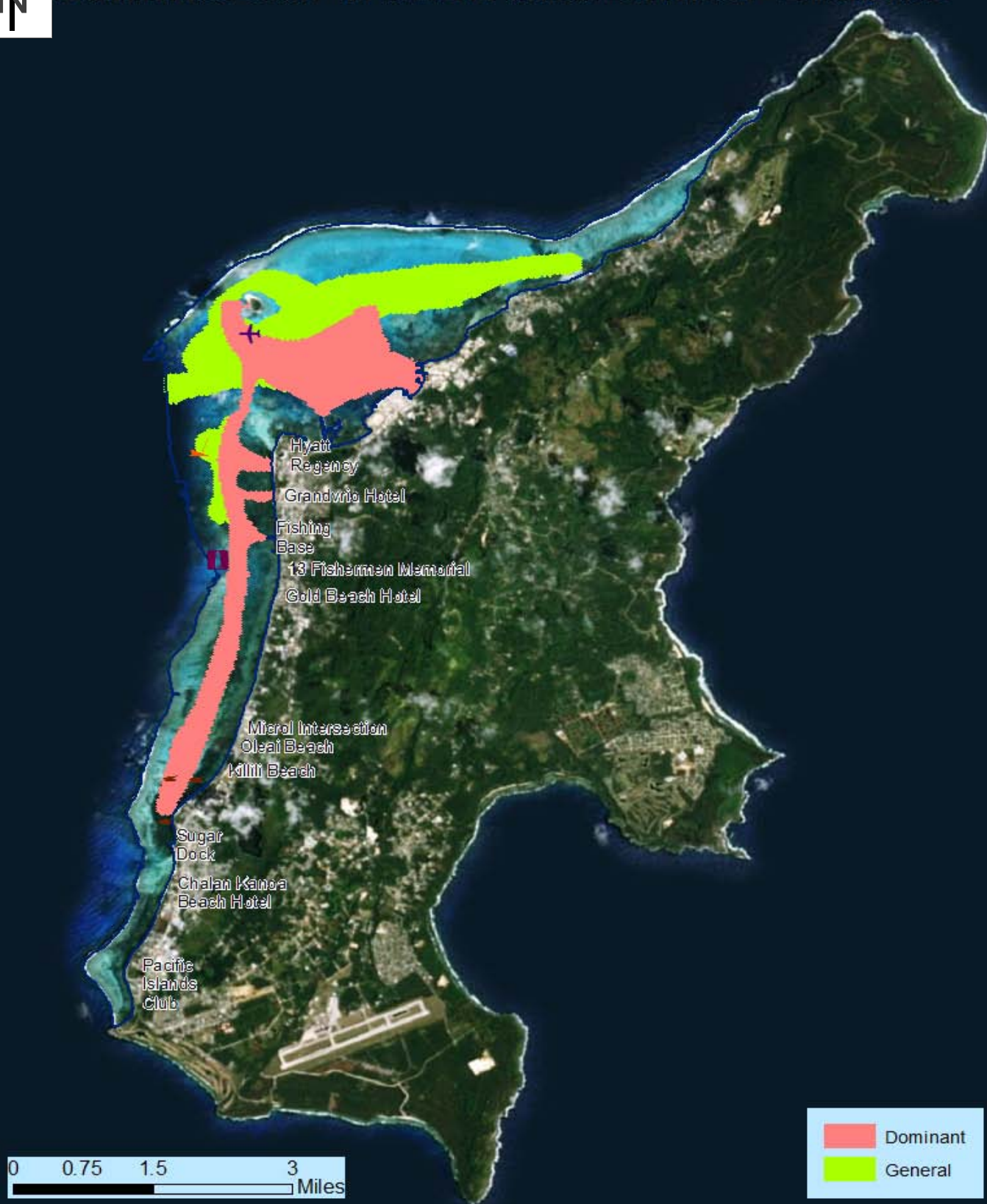


# Commercial Jet Ski





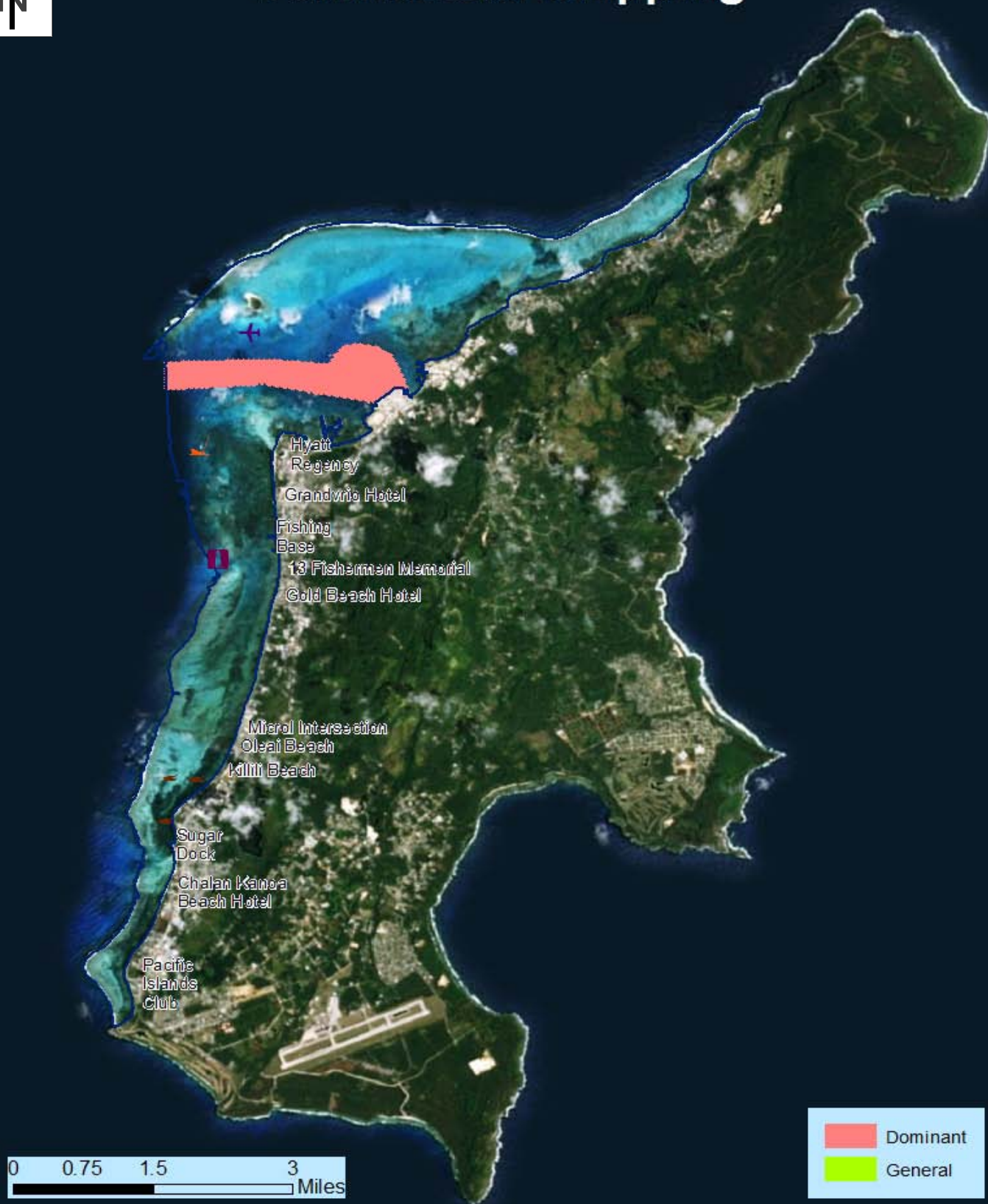
# Commercial Transit and Dinner Cruises







# Commercial Shipping

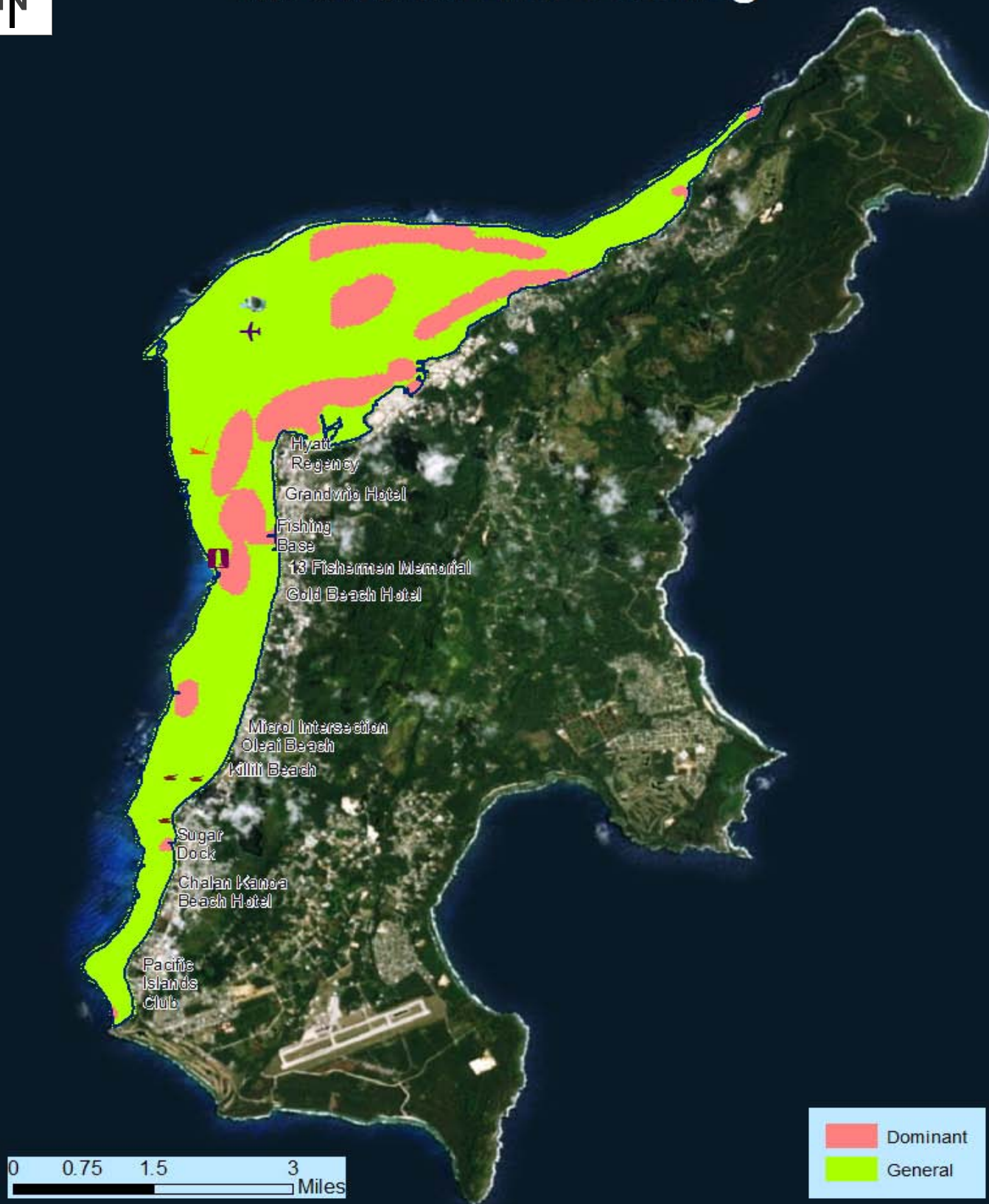


**APPENDIX D**  
**MAPS OF EXTRACTIVE USES**

- ❖ **Hook & Line Fishing**
- ❖ **Spearfishing**
- ❖ **Throw Net / Talaya Fishing**
- ❖ **Gillnet / Chenchulu / Tekken Fishing**
- ❖ **Harvesting / Gleaning**



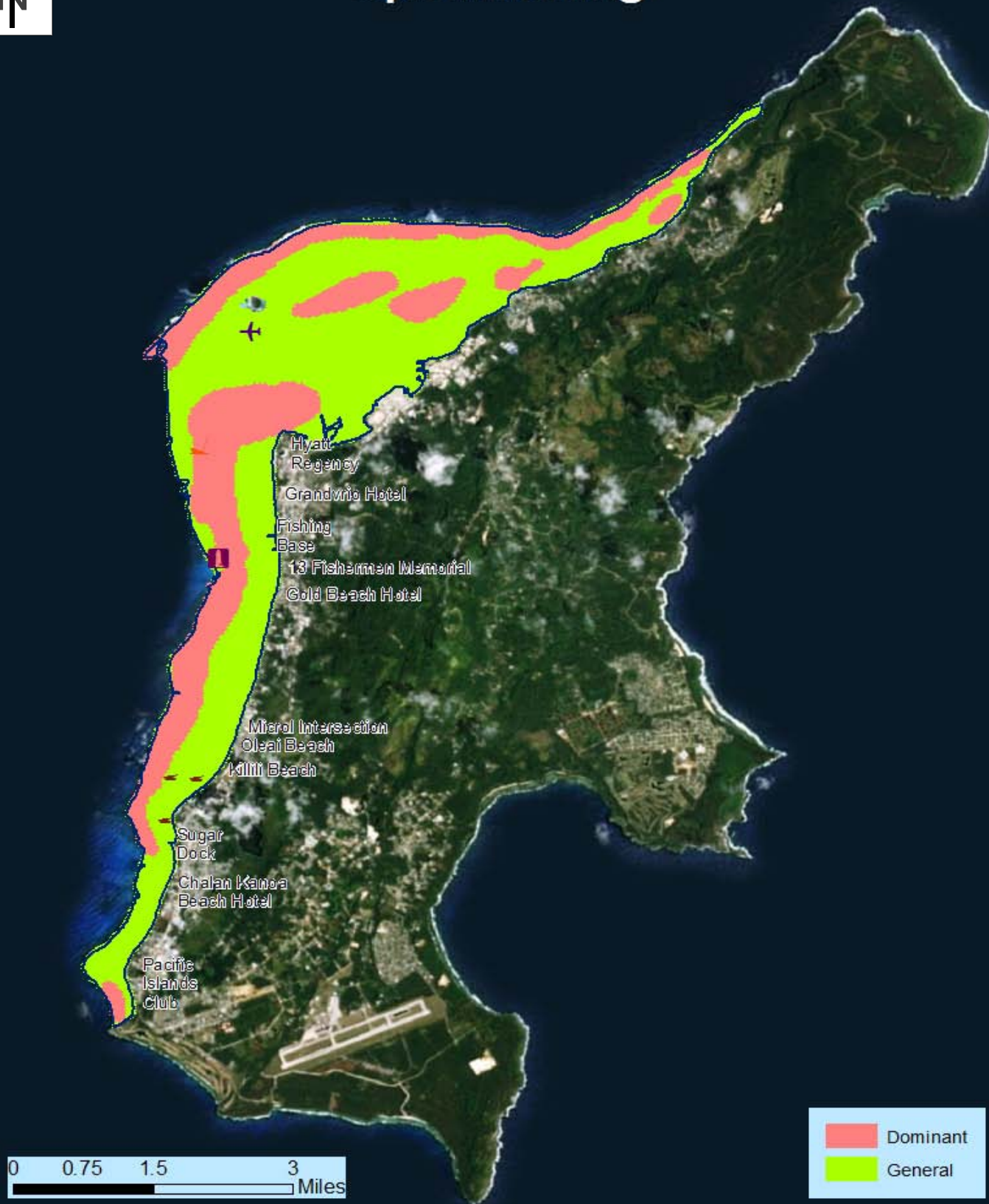
# Hook and Line Fishing







# Spearfishing







# Throw Net / Talaya Fishing





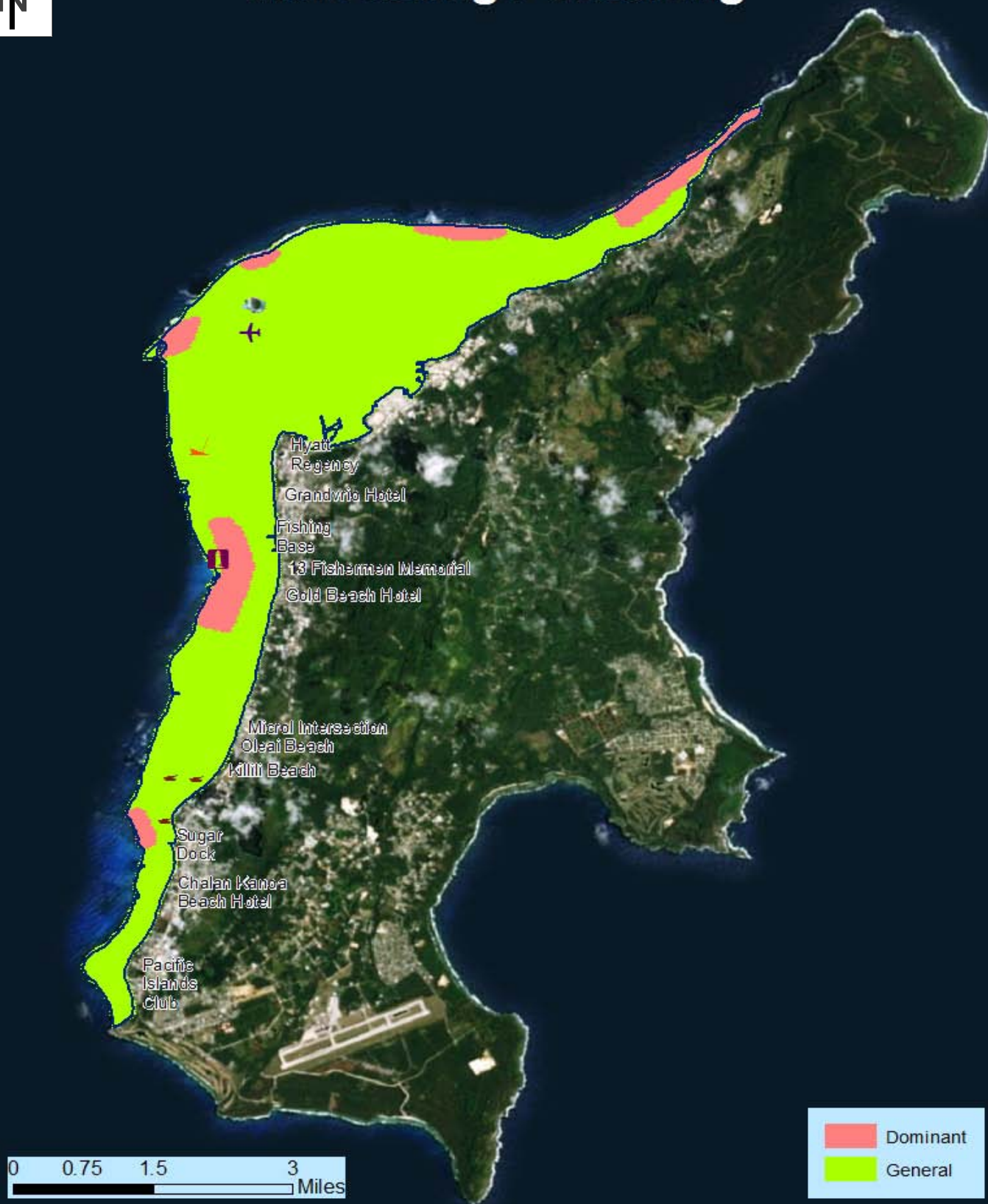
# Gill Net / Chenchulu / Tekken Fishing







# Harvesting / Gleaning

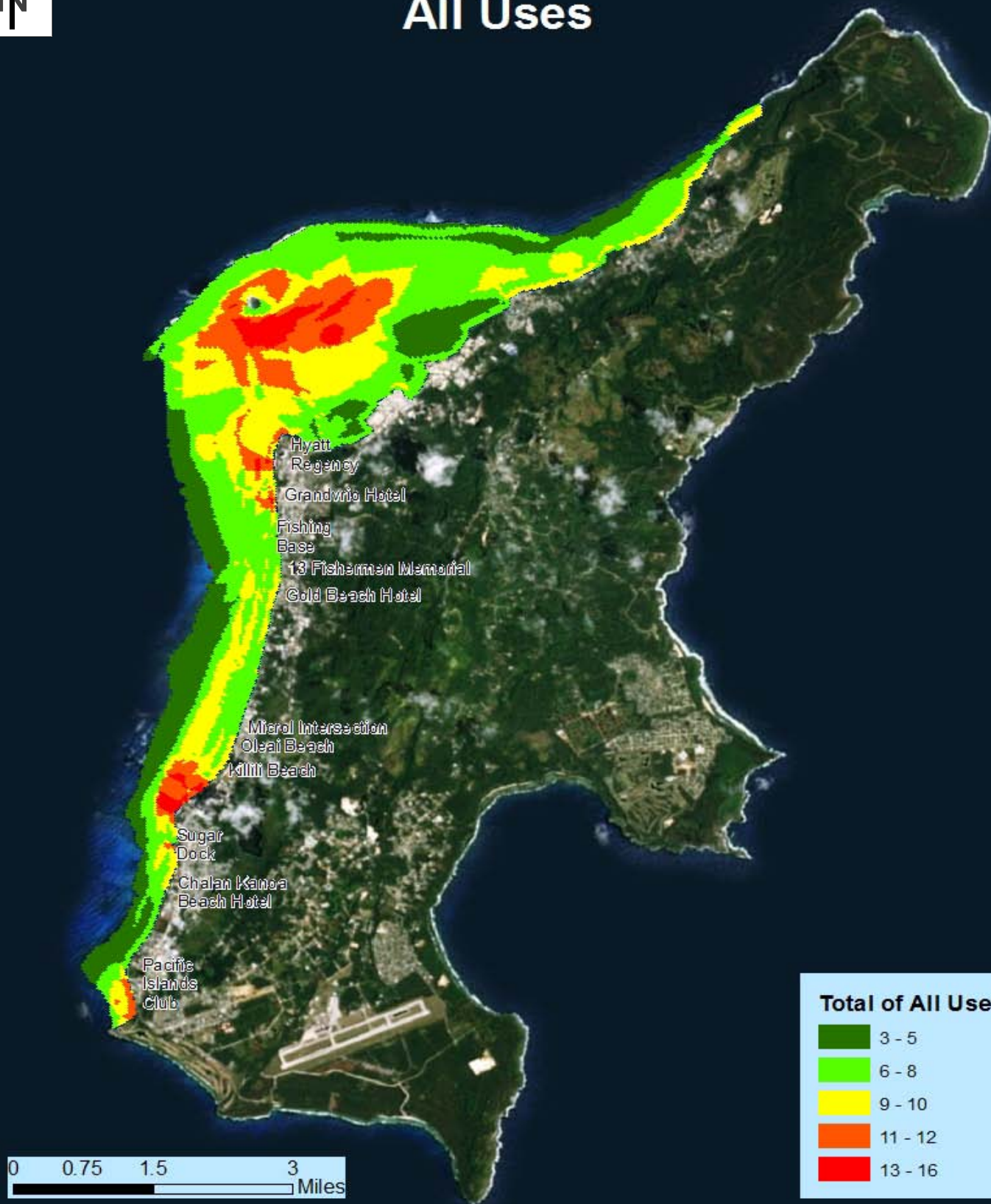


**APPENDIX E**  
**HEAT MAPS OF ALL USES**

- ❖ **Sum of All General Uses**
- ❖ **Sum of All Dominant Uses**
- ❖ **Sum of All Recreational General Uses**
- ❖ **Sum of All Recreational Dominant Uses**
- ❖ **Sum of All Commercial General Uses**
- ❖ **Sum of All Commercial Dominant Uses**
- ❖ **Sum of All Extractive General Uses**
- ❖ **Sum of All Extractive Dominant Uses**



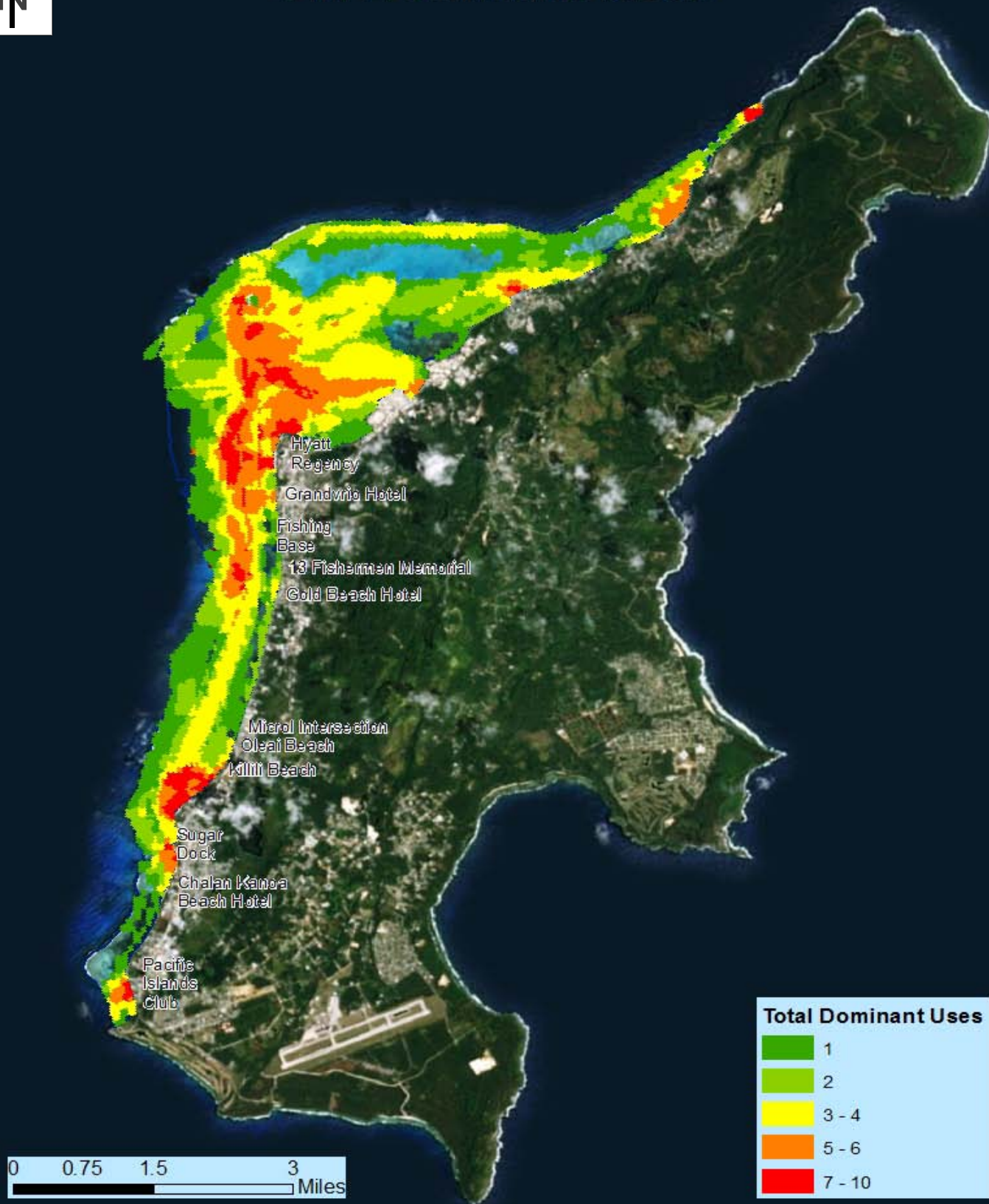
# All Uses







# All Dominant Uses

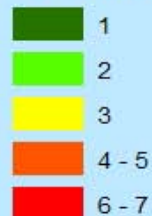




# General Recreational Uses

0 0.75 1.5 3 Miles

## Total Uses



**TITLE:** SUM OF ALL GENERAL RECREATIONAL USES

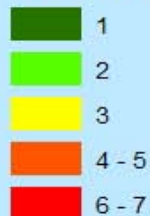
**FIGURE 4.3**

**PROJECT:** CNMI BECQ-DCRM SLUMP User Survey and Mapping Report

# Dominant Recreational Uses

0 0.75 1.5 3 Miles

## Total Uses



**TITLE:** SUM OF ALL DOMINANT RECREATIONAL USES

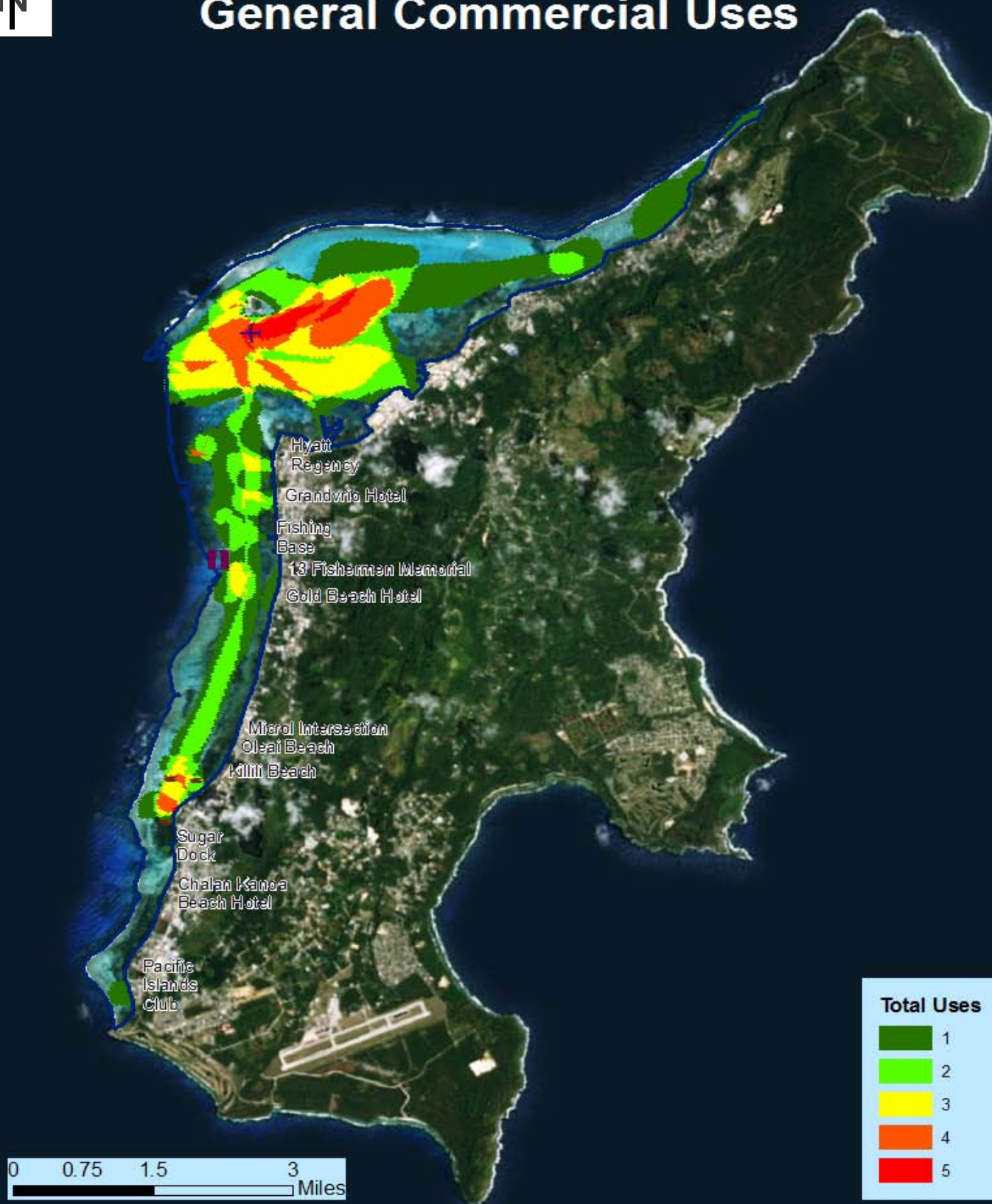
**FIGURE 4.4**

**PROJECT:** CNMI BECQ-DCRM SLUMP User Survey and Mapping Report



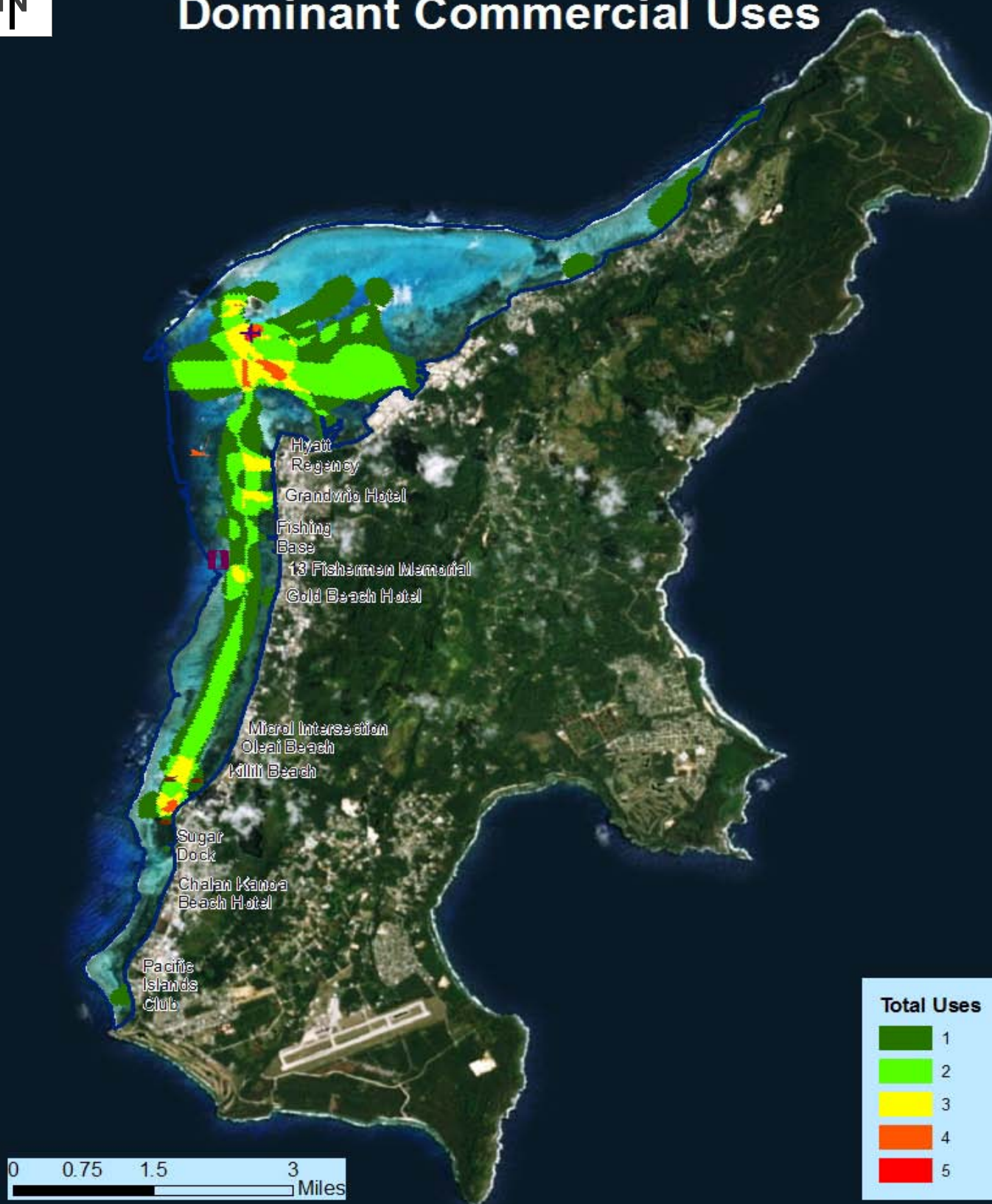


# General Commercial Uses





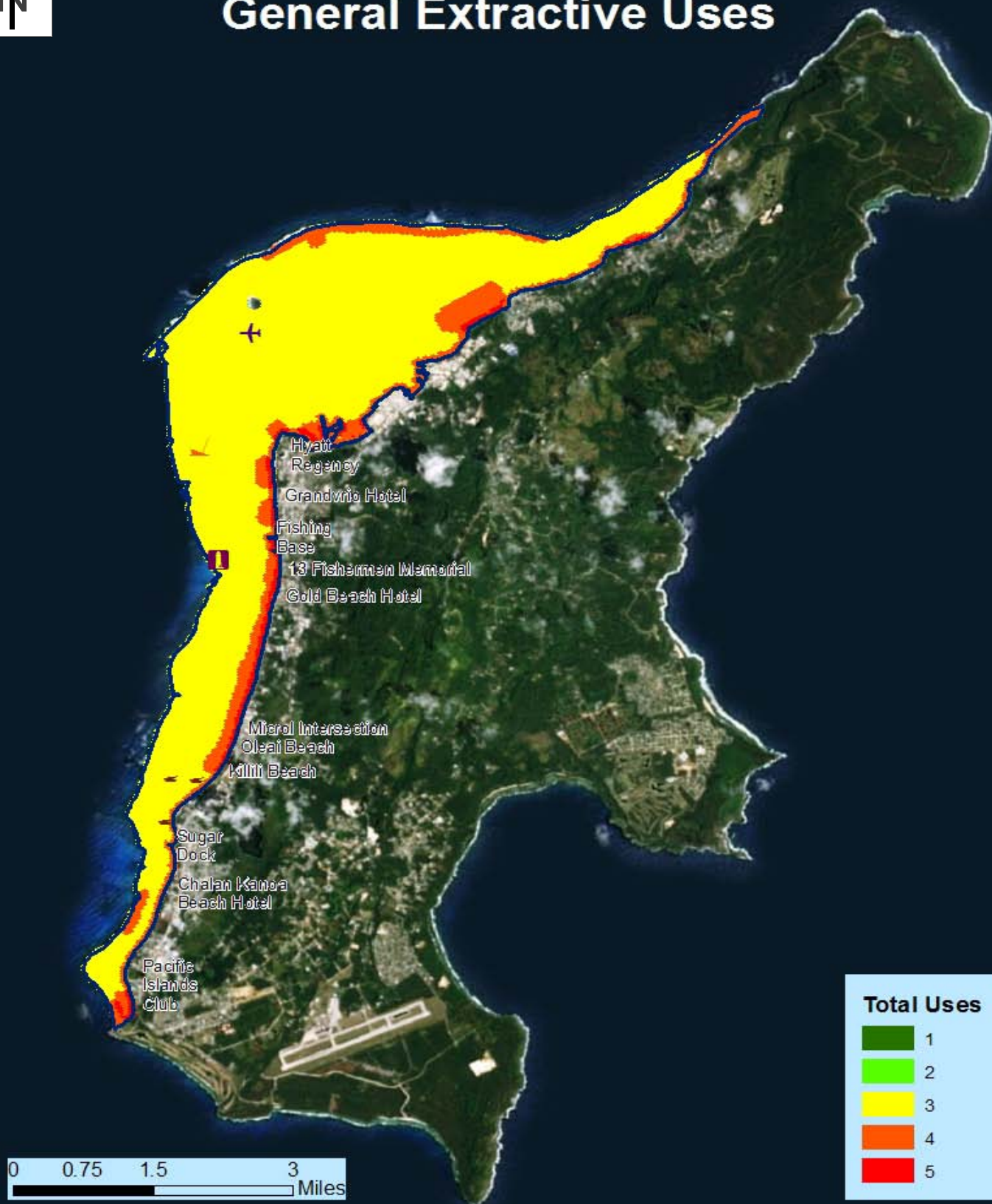
# Dominant Commercial Uses





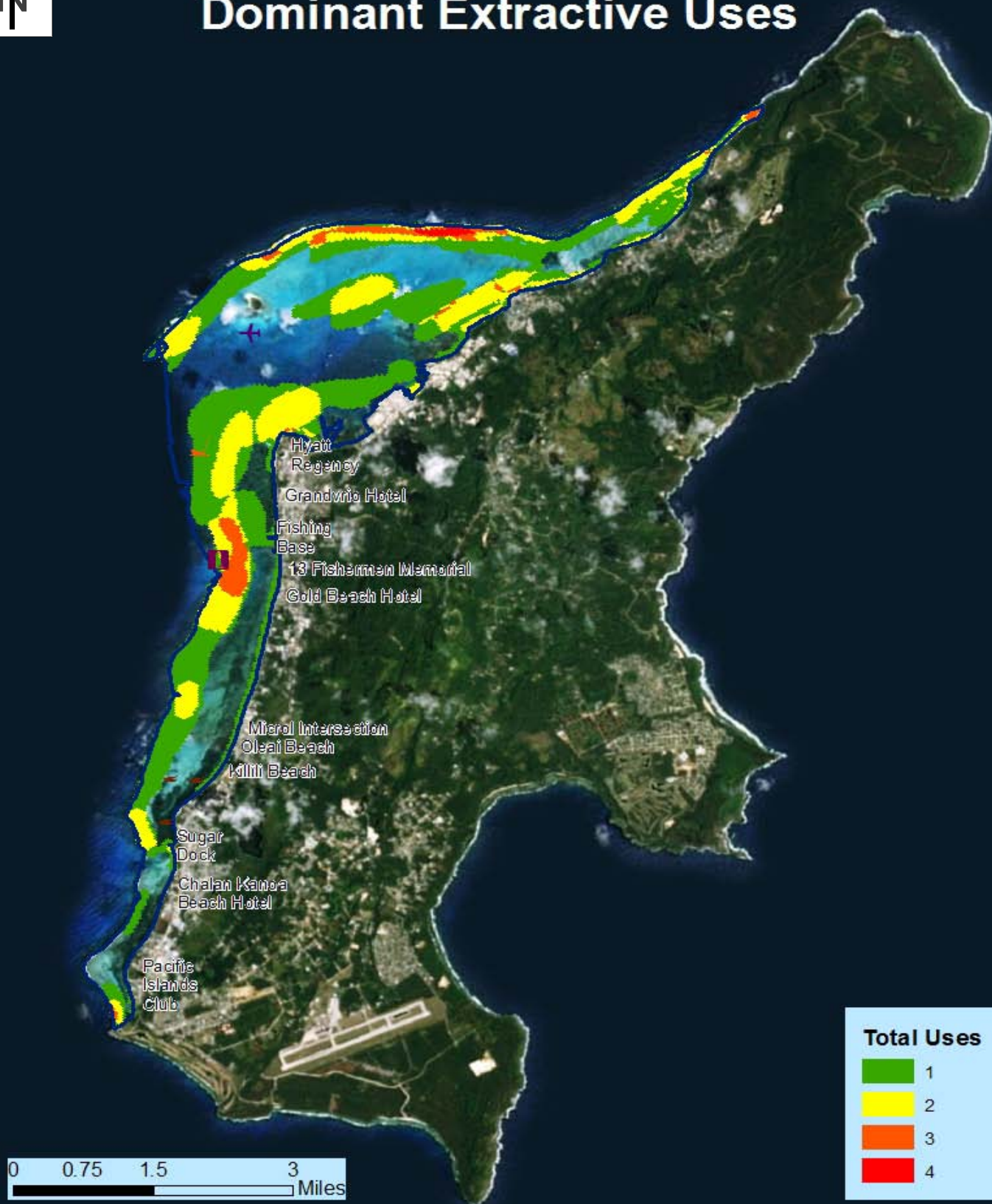


# General Extractive Uses





# Dominant Extractive Uses



**TITLE:** SUM OF ALL DOMINANT EXTRACTIVE USES

**FIGURE 4.8**

**PROJECT:** CNMI BECQ-DCRM SLUMP User Survey and Mapping Report