

TINIAN MARINE SANCTUARY PRELIMINARY REPORT

FISHERIES RESEARCH PROGRAM,
PROJECT B – REEF FISH STOCK STATUS,
JOB 1 – MONITORING AND ASSESSMENT OF MARINE SANCTUARIES

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INTRODUCTION

Tinian is the second largest island in the Commonwealth of the Northern Marian Islands (CNMI) and is located 4.4km south of Saipan and 128km north of Guam (fig 7). As of 2010 the Tinian Marine Reserve included the area southwest of the island from Carolinas Point to Puntan Diablo (Public Law 15-90). In 2011 the park was cut in half and now exists from Carolinas Point to the Tinian recreational boat harbour (Public Law 17-14) (fig 8). A description of the habitat around the bay has been provided by Trianni (1999), but is mostly protected from the dominant North-eastern winds. The MPA is designed to protect most resource within its boundaries, with the exception of some traditional fishing methods such as cast net fishing. In 2010 a control site was sampled at the South-western end of Goat Island (Aguijan), but was later determined that it may not be comparable to the Tinian MPA. After this reassessment and the halving of the Tinian sanctuary in 2011, Goat Island was not sampled. Alternatively, the northern half of the Tinian sanctuary was sampled again like in 2011. For this report, all 2011 sampling conducted within the 2010 borders are compared to 2010. A report with more detailed analysis, or the analyses of the separated 2011 boundaries, may be provided in the future.

METHODS

Belt transects (BLT) and stationary point counts (SPC) are conducted at the same time. The 25m transect tape is laid by the first diver, who at the end transect, swims to a point ~15m away from the tape and starts the 10 min SPC. At the same time, the remaining diver on the transect starts the 10 min visual survey. The time that it takes the first diver to move away from the belt allows fish to reacclimate to the disturbed belt transect area.

During the BLT survey, a diver swims a constant height over the 25m belt and records all fish and their length within 2.5m on either side of the belt (total 125m²). Fish are allocated on 5cm length groupings. The SPC survey is conducted while the diver hovers and turns over a fixed point collecting information on fish above 20 cm within 10m of the diver's vision. For each BLT a complimentary SPC was performed. In both cases fish are identified to their lowest possible taxonomic level which is often to species. Data from the SPC and BLT provide information on size frequency, species composition and abundances of larger fish species. For the current report, results are provided at the family level to allow for greater sample sizes and stronger comparisons. Data from 2010 Goat Island is included in Fig 1, but must be interpreted conservatively as habitat and sample size may not be comparable.

Surveys for 2010 were completed between May 24th and 28th, and included a sampling of Goat Island between June 7th and 9th. For 2011, sampling was conducted between May 16th and 20th. All sites are resurveyed in subsequent years unless extraneous circumstances exist (bad weather, area being used).

RESULTS

For 2010, a total of 41 individual (41 BLT and 41 SPC) surveys were completed within the Tinian sanctuary and 6 were completed around Goat Island. 2011 had 42 surveys completed in the Tinian sanctuary area.

Belt Transects

For total community composition, there was little difference seen between 2010 and 2011 in size classes (Fig 1). All size classes were similar besides for the 11 to 15cm group that saw an increase in counts in 2011. Surprisingly, the 2010 Goat Island survey had less of the smallest individuals (1 to 5cm) than either of the Tinian surveys. In all other size classes, Goat Island was not different from the other surveys.

When broken into families, the surveys indicate an increase in number of observations for the 11 to 15cm size class for Acanthurids, Chaetodontids, Scarids and Serranids (Fig 2). There was a reduction in Labrids of the 6 to 10cm size class and Serranids 16 to 20cm sizes. Changes in Scarids, Serranids and Chaetodontids must be conservatively interpreted and might be an artefact of their small sample size. Pomacentrids had the highest sample size and did not change in any of the size classes between 2010 and 2011. Their smallest group (1 to 6cm) was the most abundant for both years with nearly 70 individuals seen per transect. All other families (Acanthuridae, Chaetodontidae, Labridae, Scaridae and Serranidae) have most individuals in the 11 to 15 and 16 to 20cm size groupings.

Ctenochaetus striatus was a highly abundant fish for both sampling years and is a regularly fished species. Its individual size frequencies are provided in Fig 3. For 2011 it had increased abundance in the 6 to 10 and 11 to 16cm size groups. All other size groups were not different year on year.

Stationary Point Counts

For total composition of stationary point counts (SPC) communities were dominated by the lowest size grouping (21 to 25cm; Fig 4). For the three smallest groups (21 to 25, 26 to 30 and 31 to 35cm), the 2011 survey had less individuals than the 2010. Groups >35cm made up very few of the overall observations and did not differ between years.

For both years the Acanthurid, Balistid and Labrid families were largely composed of the 21 to 26cm group (Fig 5). The other families (Lethrinids, Lutjanids and Scarids) consisted of a more even spread across the first three size groups (21 to 25, 26 to 30 and 31 to 35) and Lutjanids had similar observations across most size classes. The 21 to 25cm Acanthurid observations declined in 2011 by nearly four times, and all other size classes were nearly zero (Fig 5, Acanthuridae). Labrids were opposite to Acanthurids and saw an increase in the smallest size group observations in 2011. There was a slight decrease in the smallest size class of Lethrinids in 2011 with very little to no change in the other size groups. Lutjanids, like the Labrids increased observations in the smallest size group in 2011 with no change in the other groups. For 2011, Scarid observations were reduced in all groups above the smallest group when compared to 2010.

CONCLUSION

Considering the change in zonation of the Tinian sanctuary park between the 2010 and 2011 surveys, there seems to be little change in observations per transects. Although, this statement is made conservatively as the sampling methodology has many limitations. The differences in specific size classes may be an effect of different people conducting the surveys between years. Furthermore, some fish families such as the Siganids or Ballistids have very low densities or are shy of divers causing a small sample size or underrepresentation in the statistics. Variation between years could be caused by natural variability within populations which could be accounted for with the addition of subsequent years of data. Data collection occurs at the lowest taxonomic level, but analyses often occur at the family level. This allows the greatest size and reliability in the comparison, but loses information about lower taxonomic levels. This can cause problems when the main concern of the program is the main fished species. Lastly, the analysis of Tinian data suffers because suitable comparison sites, or control sites, have not been designated. This is largely because the area lacks comparable habitat, but further investigation will occur in two years when the next survey is conducted.

In conclusion, because of the limited sampling in regards to years, it is hard to elucidate the causes of variability seen between the 2010 and 2011 surveys. Furthermore, very little variability is seen with most of the size classes, but some families/size groupings may be of concern and should be reassessed with the incorporation of additional sampling. For example, there seems to be large discrepancies in the Acanthurid data between years. The differences between the BLT and SPC data may represent the movement of a cohort through the population and represent natural variability. However, because of the value of Acanthurids to the market, it might be in the interest of consumers for further examination of the populations when the next survey is completed.

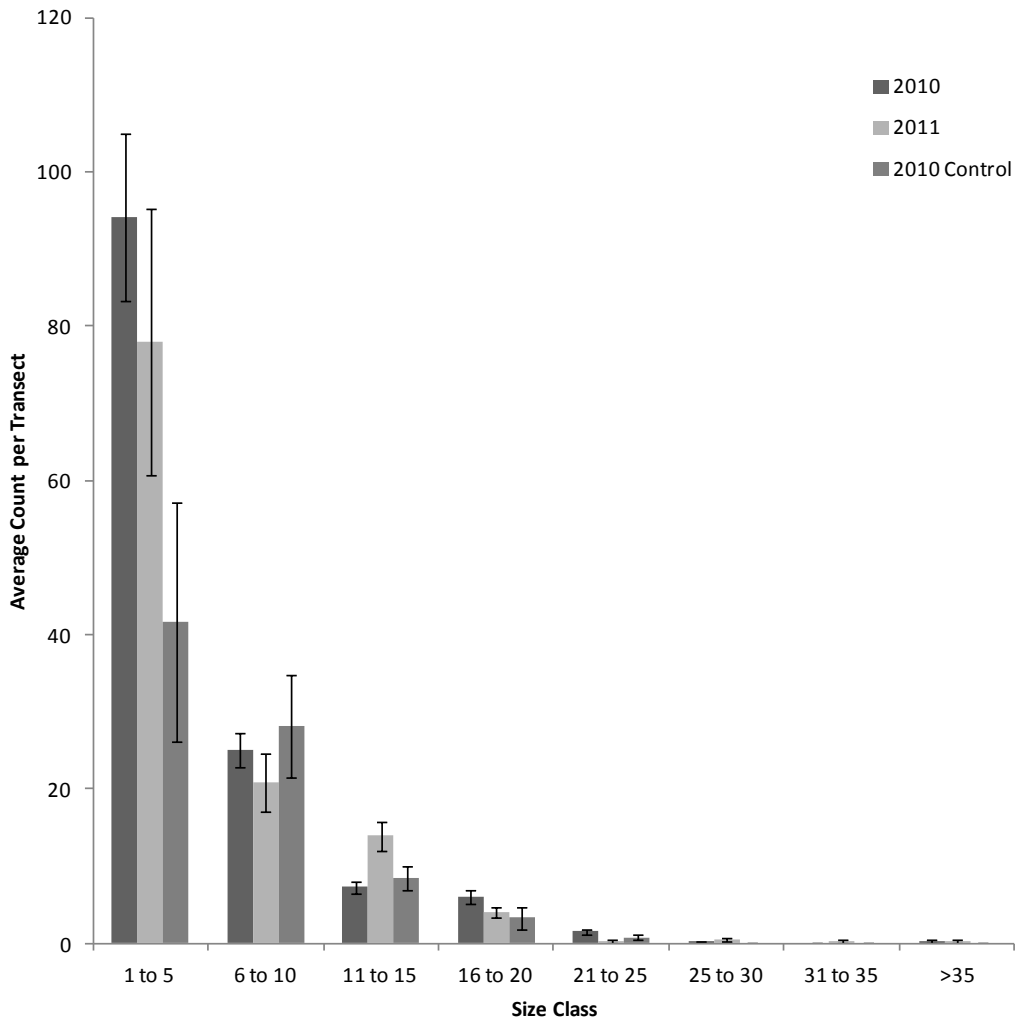
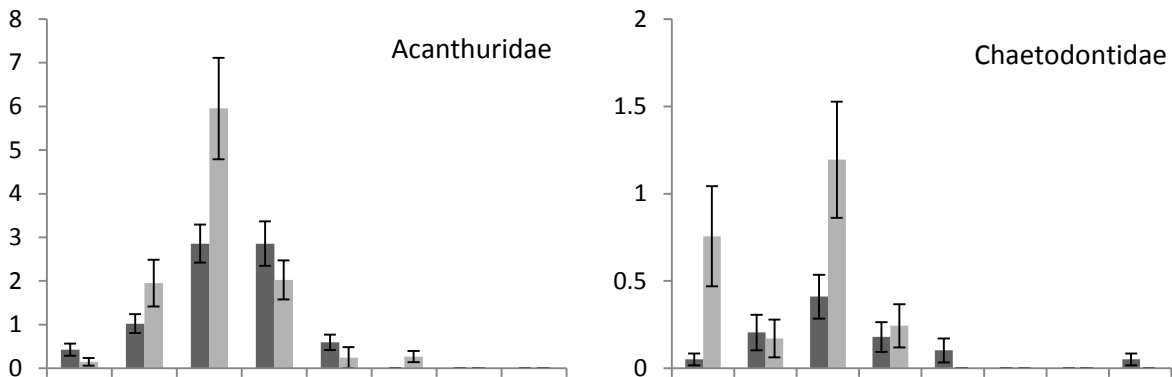


Figure 1. Average (\pm SE) number of fish seen of each size class per 125m² transect within the Tinian marine sanctuary. The 2010 control (medium gray) is Goat Island. Diagram includes all fish counted during sampling.



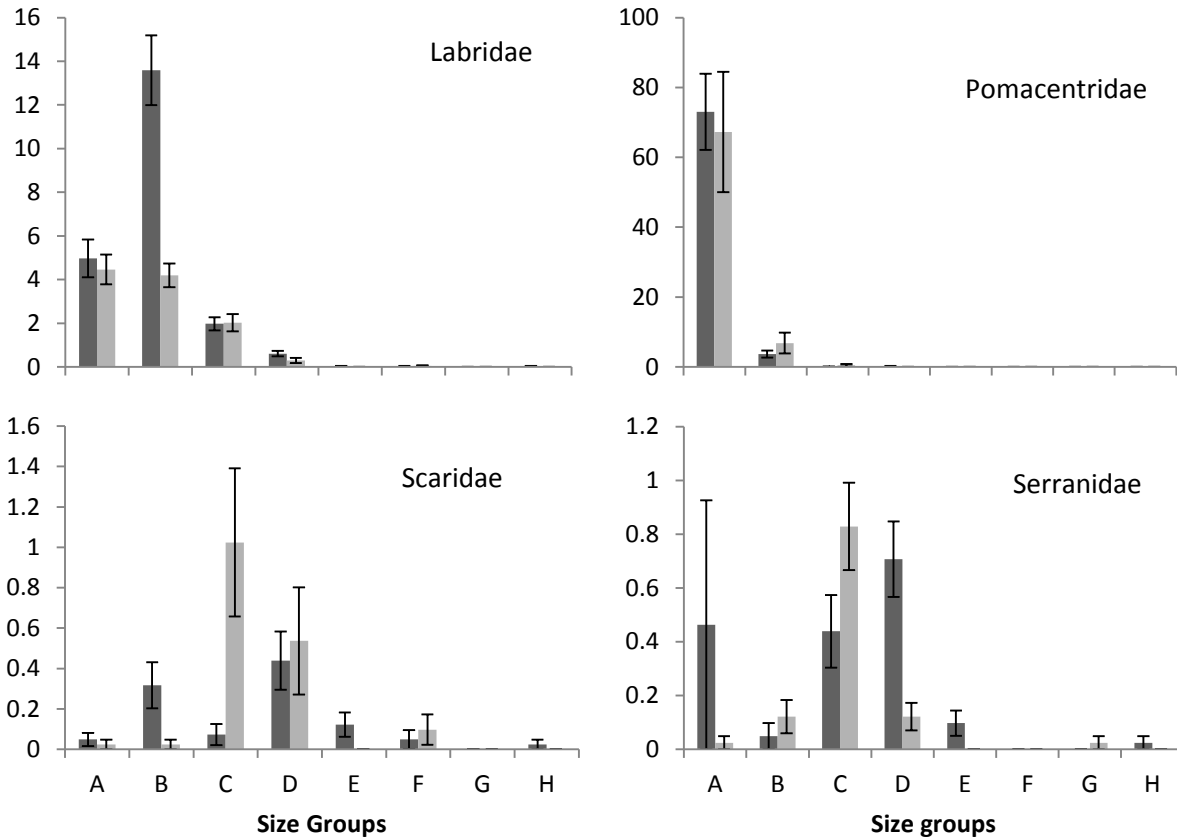


Figure 2. The average (\pm SE) number of observations per 125m² visual transect for important fish families within the Tinian marine sanctuary. Size groupings are left to right, smallest to largest, and are A = 1 - 5cm; B = 6-10cm; C = 11-15cm; D = 16-20cm; E = 21-25cm; F = 26-30cm; G = 31-35cm; H >35cm. Dark gray is 2010 sampling and light gray is 2011 sampling.

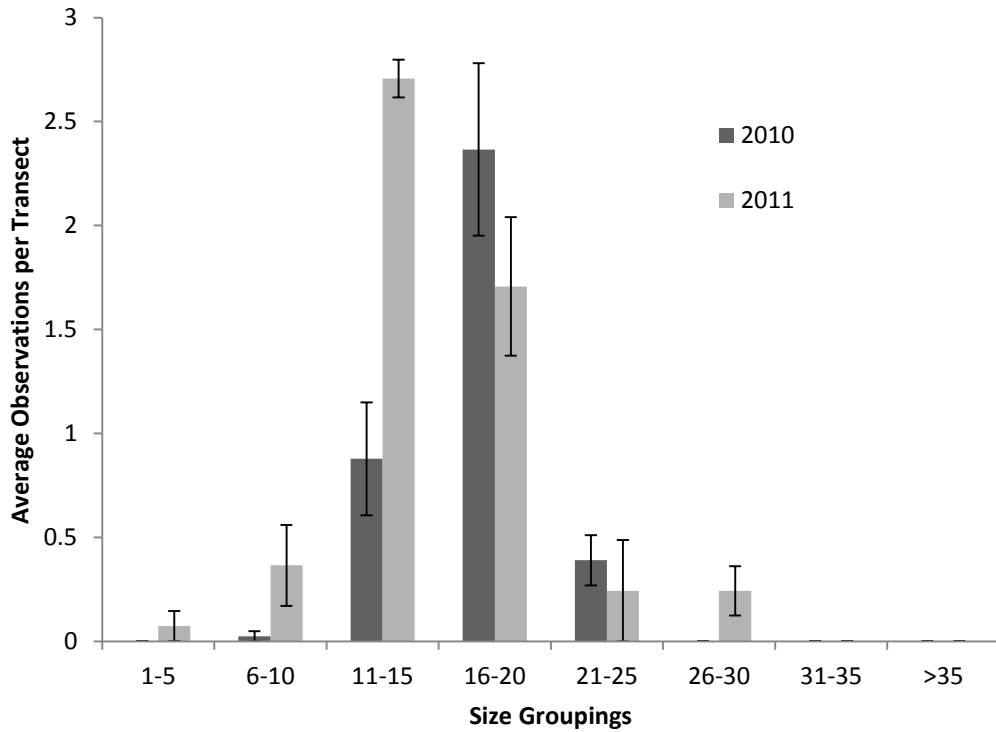


Figure 3. Average (\pm SE) number of *Ctenochaetus striatus* observed per 125 m² transect by size (cm) classification. Years sampled include 2010 (dark gray) and 2011 (light gray).

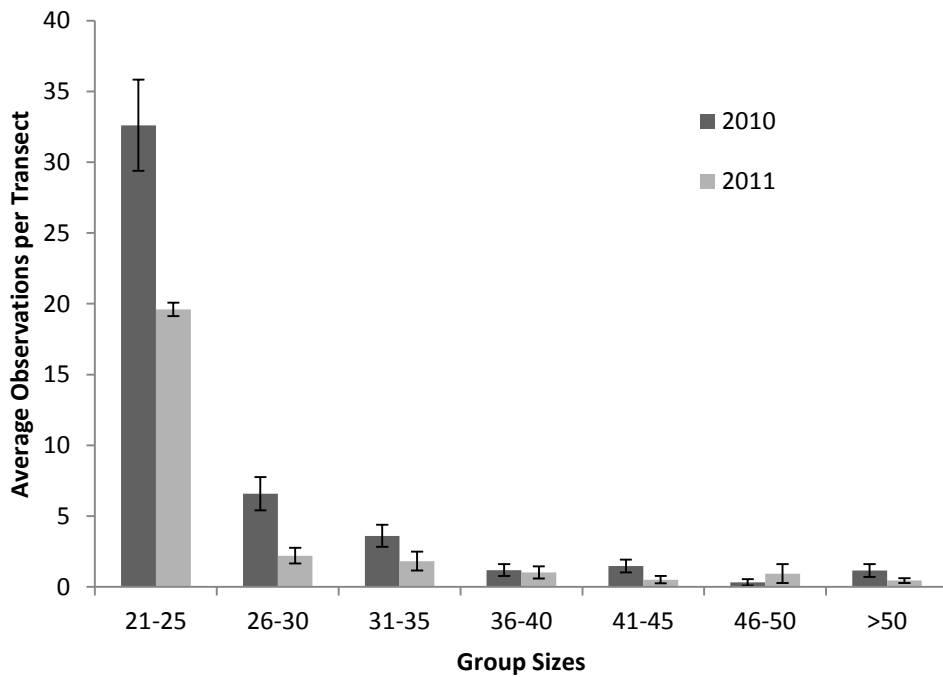


Figure 4. Average (\pm SE) number of observations per 10 minute standing point count (SPC) based on size groups of fish. All teleost occurrences above 20cm, despite family, are included in the plot.

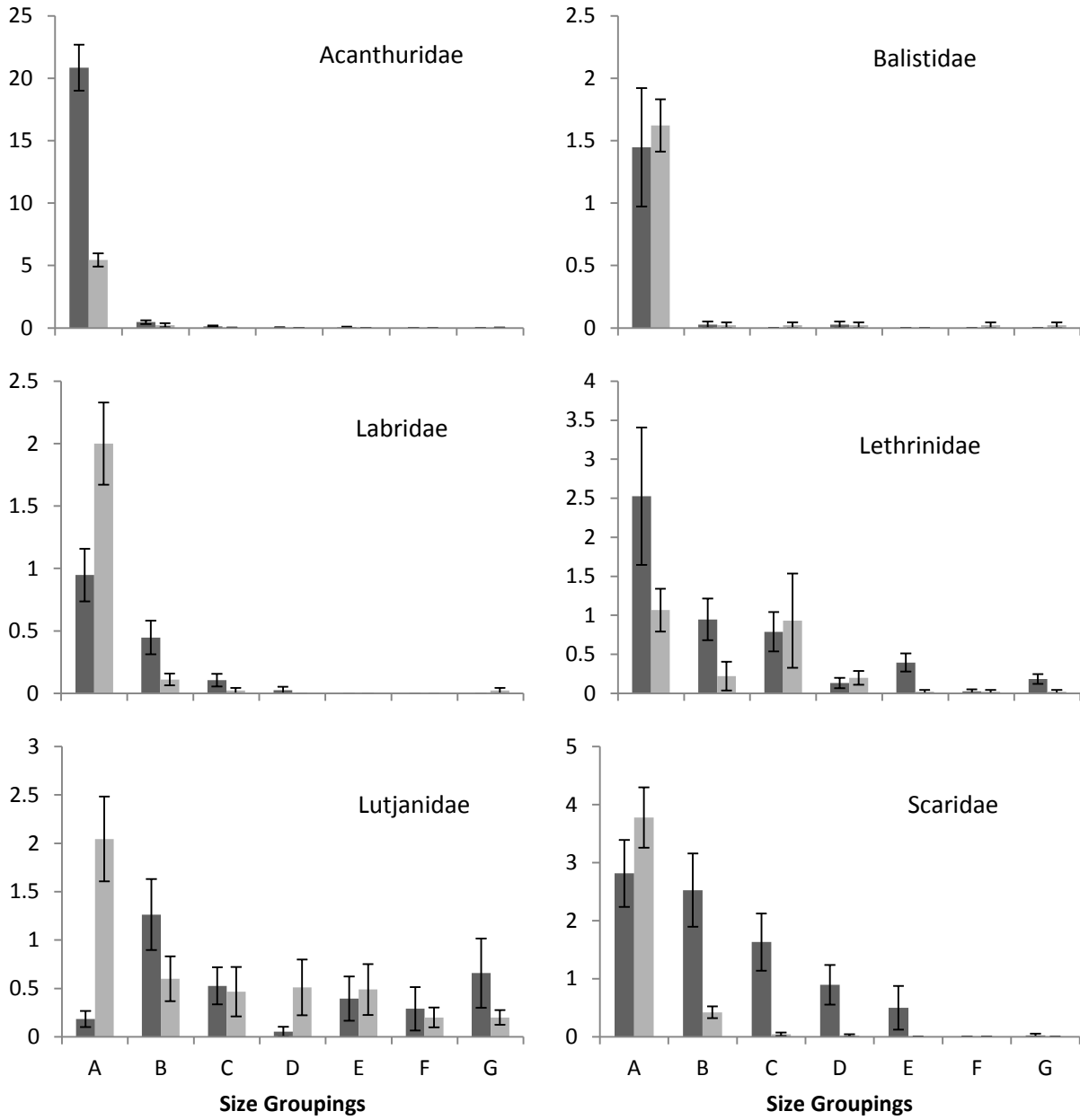


Figure 5. The average (\pm SE) number of observations per 10 minute standing point count (SPC) for important fish families within the Tinian marine sanctuary. Size groupings are left to right, smallest to largest, and are A = 20-25cm; B = 26-30cm; C = 31-35cm; D = 36-40cm; E = 41-45cm; F = 46-50cm; G >50cm. Dark gray is 2010 sampling and light gray is 2011 sampling.

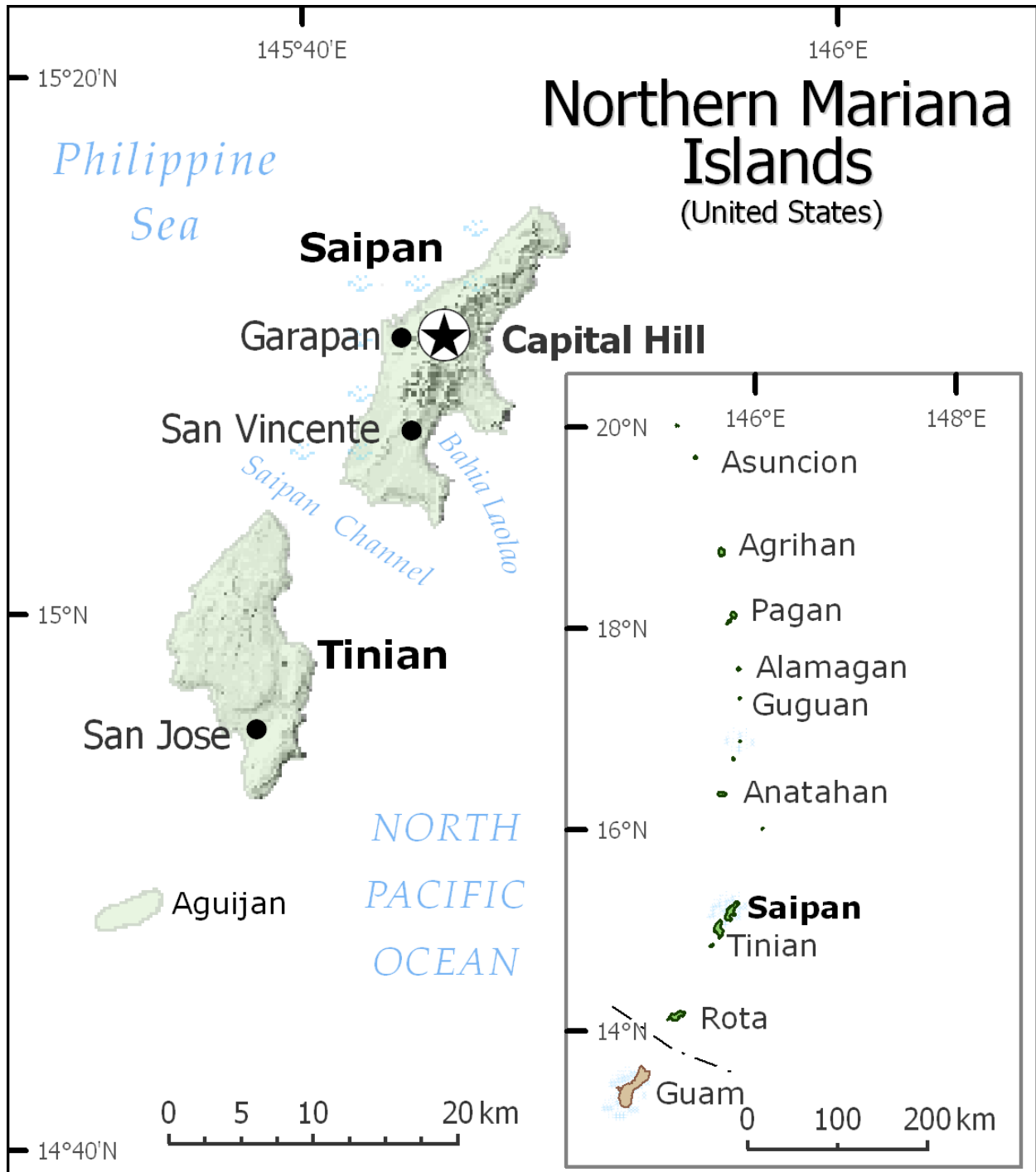


Figure 6. Map of the Commonwealth of the Northern Mariana Islands, inclusive of Tinian.

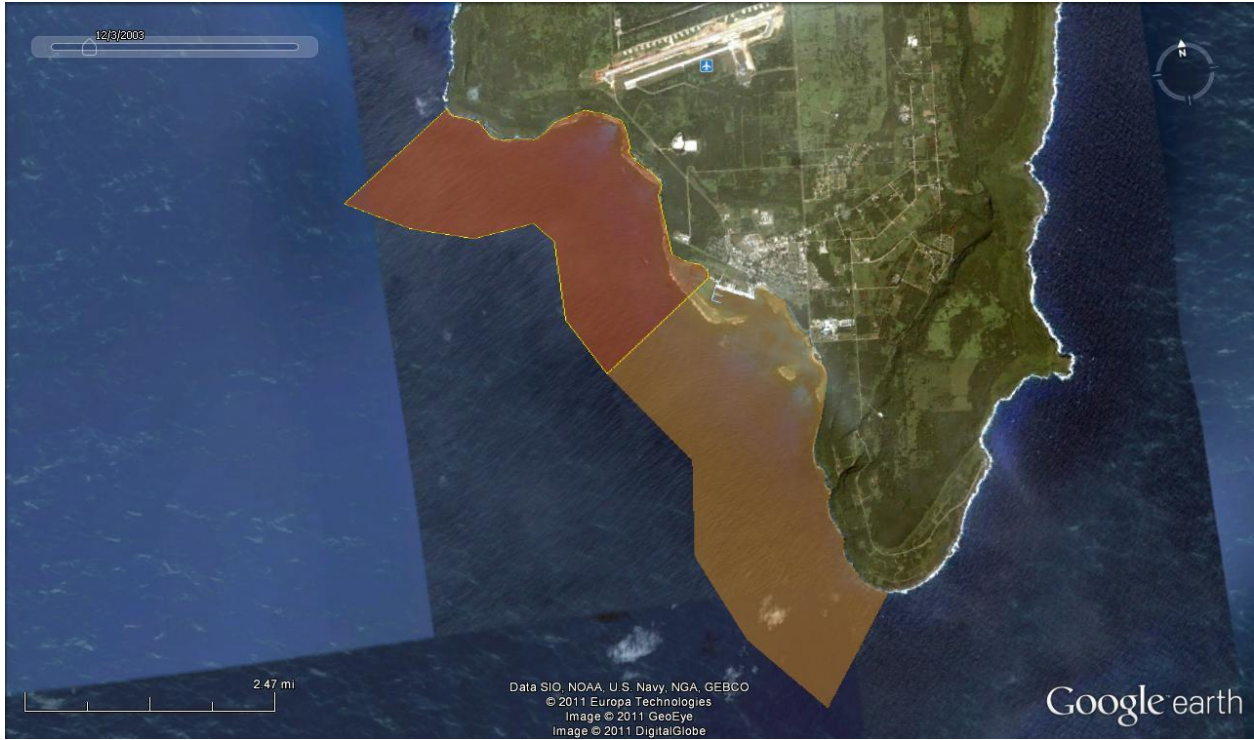


Figure 7. Map of the Tinian Marine Reserve.

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