MONITORING AND INVENTORY OF THE SEABIRDS AND THEIR BREEDING AREAS IN TUBBATAHA REEFS NATURAL PARK & WORLD HERITAGE SITE AND CAWILI, CAGAYANCILLO MAY 2019

Tubbataha Management Office

Field Report:

Monitoring and inventory of the seabirds and their breeding areas in Tubbataha Reefs Natural Park & World Heritage Site and Cawili, Cagayancillo, Palawan, Philippines, May 2019

Produced by the Tubbataha Management Office, Puerto Princesa, Palawan, Philippines

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OBJECTIVES

The objectives of the monitoring and inventory are:

- Review of avifauna field data produced by the Tubbataha Management Office (TMO) Marine Park Rangers (MPRs) since May 2018;
- Assessment of survey methods used by the TMO research team guided by the Consultant;
- On-the-job skills enhancement of the TMO MPRs, staff and partners in seabird monitoring and conduct of inventories;
- Preparation of a monitoring and inventory report on the seabirds and their breeding areas in the Tubbataha Reefs Natural Park (TRNP) and Cawili Island, Cagayancillo.

FIELDWORK

Period: Updates on the inventory methods used in the past years and assignment of tasks for the field work were carried out at the Ranger Station on 14 May. The Marine Park Rangers (MPR) monitoring and inventory reports since May 2018 were also evaluated. Actions taken in response to the 2018 recommendations of the Consultant were also discussed. Field work was conducted from 14 May to 17 May: at the Ranger Station on 14 May, at South Islet on 15 May, Bird Islet on 16 to 17 May, and at Cawili Island from 18 to 19 May.

Weather: The weather was dominated by limited wind coming from a northeasterly direction with wind speed ranging from 1 to 3 meter/second. Daily cloud cover ranged from 2/8 to 5/8. Daytime temperatures peaked at about 33° Celsius.

SEABIRD INVENTORY TEAM

A total of 19 TMO staff, MPRs, representatives from WWF Philippines and volunteers, headed by an ornithological consultant participated in the seabird inventory (Annex 1). The team included six researchers and MPRs from the TMO, three MPRs from the Philippine Coast Guard one from Philippine Navy. In addition two representatives form WWF Philippines and five volunteers representing the Philippines Biodiversity Conservation Foundation, the University of the Philippines-Los Baños and the Wild Bird Club of the Philippines were part of the team. WWF

Philippines, represented by the crew of M/Y Navorca, provided logistical support throughout the field work.

METHODS

The field work followed methods for distance count monitoring and for inventories of breeding seabirds established and used since 2004 (Jensen 2004). For methodologies, see Annex 2 and Annex 3. The team camped overnight at Bird Islet from 16 to 17 May in order to carry out optimal field work. South Islet was only visited in the morning of 15 May, from 8:30am to 11:30am, due to limitations imposed by the tides.

The counts of the breeding bird populations represent a combination of different count methods. These includes direct day-time inventories of adults, immatures, juveniles, pulli, eggs and nests. To determine the total seabird population numbers, an afternoon count of boobies flying in to roost was conducted from 4:30pm to 6:30pm on 15 May at South Islet (Annex 9) and 16 May at Bird Islet (Annex 10). However, all carcasses were already in the advanced stage of decomposition, thus, cause of death was not determined. The field team also removed debris from the islets.

Major equipment used were handheld binoculars (10 x 50), spotting scopes (20-60 x), GPS and cameras.

Taxonomic treatment and sequencing follows Gill F & D Donsker (Eds) 2018. IOC World Bird List (v 7.2).

Calculation of breeding populations

The methods used to calculate the seabird populations followed the previous years' approach:

- day time direct counts of birds, nests and eggs;
- in-flight data of Red-footed Booby *Sula sula,* Brown Booby *Sula leucogaster*, and on South Islet Brown Noddy *Anous stolidus,* and Black Noddy *Anous minutus*;
- early morning (5 am) count of Brown Boobies at the 'Plaza';
- count of Great Crested Tern *Thalasseus bergii* and Brown Noddy along the shoreline at high tide;

The result of the fieldwork is compared with data sets from the second quarter of the previous years carried out by WWF Philippines from 1998 to 2004 and the annual inventory teams from 2004 to 2017 and also data sets gathered by MPRs. The data sets until 2013 were analyzed in detail by Jensen and Songco (2016) and published in the Journal of Asian Ornithology (FORKTAIL 32 (2016): 72–85). Other analyses are found in the 28-year seabird population development report released in 2009 and in the 2004 to 2006 and the 2010 to 2018 seabird field reports (see Jensen 2004 to 2006 and 2009 to 2016, and Jensen *et al* 2017-2018).

Calculation of land area and vegetative cover

Photos of permanent photo documentation sites in Bird Islet and South Islet were taken (Annex 13). These sites were established in 2004 in order to measure changes in land area and in vegetation. GPS readings were taken measuring the land area at high tide of both Bird Islet and South Islet.

Vegetative cover was monitored by conducting a census of the condition of trees on the islets. Trees, mostly *Scaevola taccada* (beach cabbage/sea lettuce/beach naupaka) *Heliotropium foertherianum* (tree heliotrope), and *Pisonia grandis* (bird-catcher tree/lettuce tree/cabbage tree) were classified as either in optimal (good), moderately deteriorating (fair) or severely deteriorating (bad) condition and lastly, as dead. The inventory of 2019 was carried out using the same methodology as all other years, except in 2013, the trend over time is therefore comparable.

Figure 1. Scaevola taccada (beach cabbage/sea lettuce/beach naupaka) in Bird Islet. Photo: Teri Aquino

Figure 2. Heliotropium foertherianum (tree heliotrope) in Bird Islet. Photo: Teri Aquino

RESULTS AND CONCLUSION

Monitoring of Changes in Land Area

Independent sets of measurements were taken using two separate GPS units. The measurements were taken at high tide along the shoreline as the vegetation line previously used as reference has disappeared. Due to this shift in methodology, data sets from 2016 onwards will not be comparable to the previous years.

Figure 3. Pisonia grandis (bird-catcher tree/lettuce tree/cabbage tree). Photo: Teri Aquino

Bird Islet: Overall, the land area has decreased by 4.2%; from 18,760 m² in 1981 (Kennedy 1982) to about 17,987m² in 2019 (Table 1).

The circumference of the islet measured along the high tide line is 574 meters compared to 568 in 2018, or about the same (variation = 1.1%). The land area was measured to be 17,987 m² (average of two measurements) compared to 15,373 m² in 2018 or an increase of 2,614 m² or 17%. As the area expansion was not obvious/visible, the variation may be a human variation factor as the route used to measure the land area annually is not physically demarcated.

The 'Plaza', defined as the central area of the islet dominated by barren soil with limited vegetation, was measured to be 6,202m² or around the same as in 2017 (6,704 m²). It is historically the smallest area ever recorded. Compared to 2018, it increased by 3,630m² caused by the substantial reduction of areas covered in grass.

Table 1. Approximate changes in the land area of Bird Islet from 1911 to 2019. Source: Worcester 1911, Kennedy 1982, Heegaard and Jensen 1992, Manamtam 1996, WWF Philippines 2004 and Tubbataha Management Office 2004 to 2019

Year	Land area (length x width)/circumference (m)	Land area (high tide) (m^2)	Open area ("Plaza") (m^2)	Major sandbars position and condition	Erosion area
1911	400 x 150	60,000	No data	>40,000 m^2 (?)	No data
1981	268 x 70	18,760	18,000	NW, SE	South coast
1991	>220 x 60	> 13,200	>8,000 (est.)	NW, SE	South coast
1995	265 x 82	21,730	8,000 (est.)	NW, SE	South coast
2004	219 x 73	17,000	>1,100 (est.)	NW: Stable SE : Decrease	South coast
2005	No data	15,987	>4,000 (est.)	NW, SE: Stable	South coast
2006	No data	14,694	7,900 (est.)	NW, SE: Stable	South coast
2007	No data	13,341	8,000 (est.)	NW, SE: Stable	South coast
2008	No data	12,211	< 8,000	NW: Decreasing SE : Stable	South coast
2009	No data	10,557	< 7,000	NW: Eroded SE : Decreasing	West coast
2010	No data	11,038	4,367	NW: Eroded SE : Stable	South coast
2011	No data	12,968	4,000 (est.)	NW: Stable SE : Stable	Northeast coast
2012	590	12,494	3,892	NW: Stable SE : Stable	Northeast coast
2013	548	10,955	4,840	NW: Decreasing SE : Stable	Northeast coast
2014	503	>10,220	4,124	NW: Decreasing SE : Stable	Northeast coast
2015 [1]	<561	<13,408	3,279	NW: Stable SE : Stable	Northeast coast

2016 [2]	590	15,649	4,513	NW: Disappeared SE : Decreasing	Northeast coast
2017 [3]	588	15,307	6,704	NW: Disappeared SE : Decreasing	Northeast coast
2018 4	568	15,373	2,572	NW: Two small sandbars off the coast SE : As above	Northeast coast
2019 5	574	17,987	6,202	NW: Two small sandbars off the coast SE : Three sandbars off the coast	None compared to 2018

Note 1: In 2015, new GPS equipment were used. Detailed comparison with previous year's data is therefore not possible.
Note 2: Measurement approach changed from measurement along shore vegetation line to measurement along the high tide line. Data can therefore not be compared.
Note 3: Expansion in area of Plaza is due to inclusion of former forested areas
Note 4: Reduction in area of Plaza is due to expansion in grass areas
Note 5: Expansion in area of Plaza is due to reduction in grass areas. Change in land area may have been caused by the variation in the route walked as this is not physically demarcated.

South Islet: South Islet was originally part of a large sandbar until a circumferential concrete seawall was constructed in the 1980s (Kennedy 1982) to accommodate a lighthouse. Based on photographic evidence, the land area remained the same at least until 1981 (Kennedy 1982). In 1991 about a third of the seawall had collapsed and was partly submerged (Heegaard and Jensen 1992). Since March 2019 an embankment and construction of a new seawall has changed the size of the islet; the circumference of the islet was measured to 292.3 meters compared to 230 meters in 2018, or an increase by 27 %. The land area was measured to be 5,585 m² compared to 2,884 m² in 2018. The 93.5% variation represents reclamation of additional marine areas (Annex 4).

Monitoring of Changes in Habitats

The combined baseline of trees at Bird Islet and South Islet from around 2009 to 2016 of around 354 trees, generally in a very good condition (229 trees on Bird Islet and 125 trees on South Islet). In 2019 a total of only 10 remained (Figure 6 and Annex 5).

Figure 4. Heliotropium foertherianum (tree heliotrope). Photo: Teri Aquino

Beach forest seedlings of the species *Scaevola taccada* (beach cabbage/sea lettuce/beach naupaka), *Heliotropium foertherianum* (tree heliotrope) and *Pisonia grandis* (bird-catcher tree/lettuce tree/cabbage tree) have been planted both in 2017 and 2018 on Bird Islet.

Figure 5. Scaevola taccada (beach cabbage/sea lettuce/beach naupaka). Photo: Teri Aquino

Bird Islet: The baseline was 229 trees recorded in 2006 compared to only five trees in May 2019 (Annex 5). No new seedlings were found, and five seedlings planted in 2018 were in a bad condition. In May 2019 no seedlings were planted.

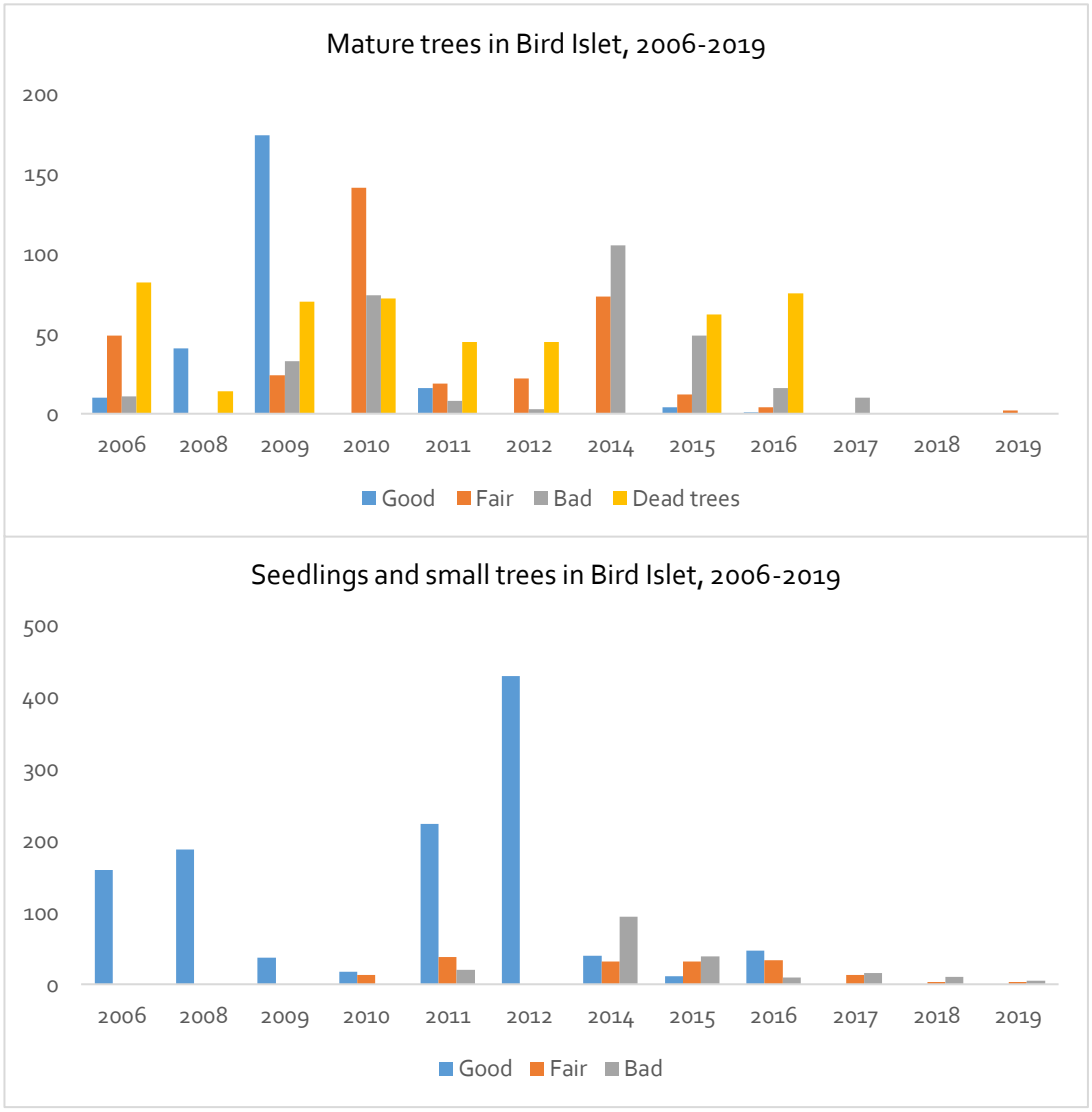

Figure 6. Status of vegetation in Bird Islet from 2006 to 2019.

South Islet: Until 2009, the beach forest comprising of about 125 trees was in optimal condition, with several trees as high as about 30 feet. In 2013, the condition of the vegetation began to deteriorate so that by 2014, trees in bad condition dominated the vegetative cover of the Islet. In 2018, of the 10 trees found in the Islet, only three were found to be in fair condition with 17 already in bad condition.

In 2019, the continued deterioration of the beach forest in combination with the almost complete habitat conversion caused by the construction of a new seawall and a lighthouse, nearly wiped out all vegetation except for five old trees in severe condition (Figure 7, Annex 5). Nearly all lower vegetation such as grass species and flowering plants were covered by a substantial layer of sand taken from sand mounds around the islet as part of the rehabilitation construction of the lighthouse (Annex 4).

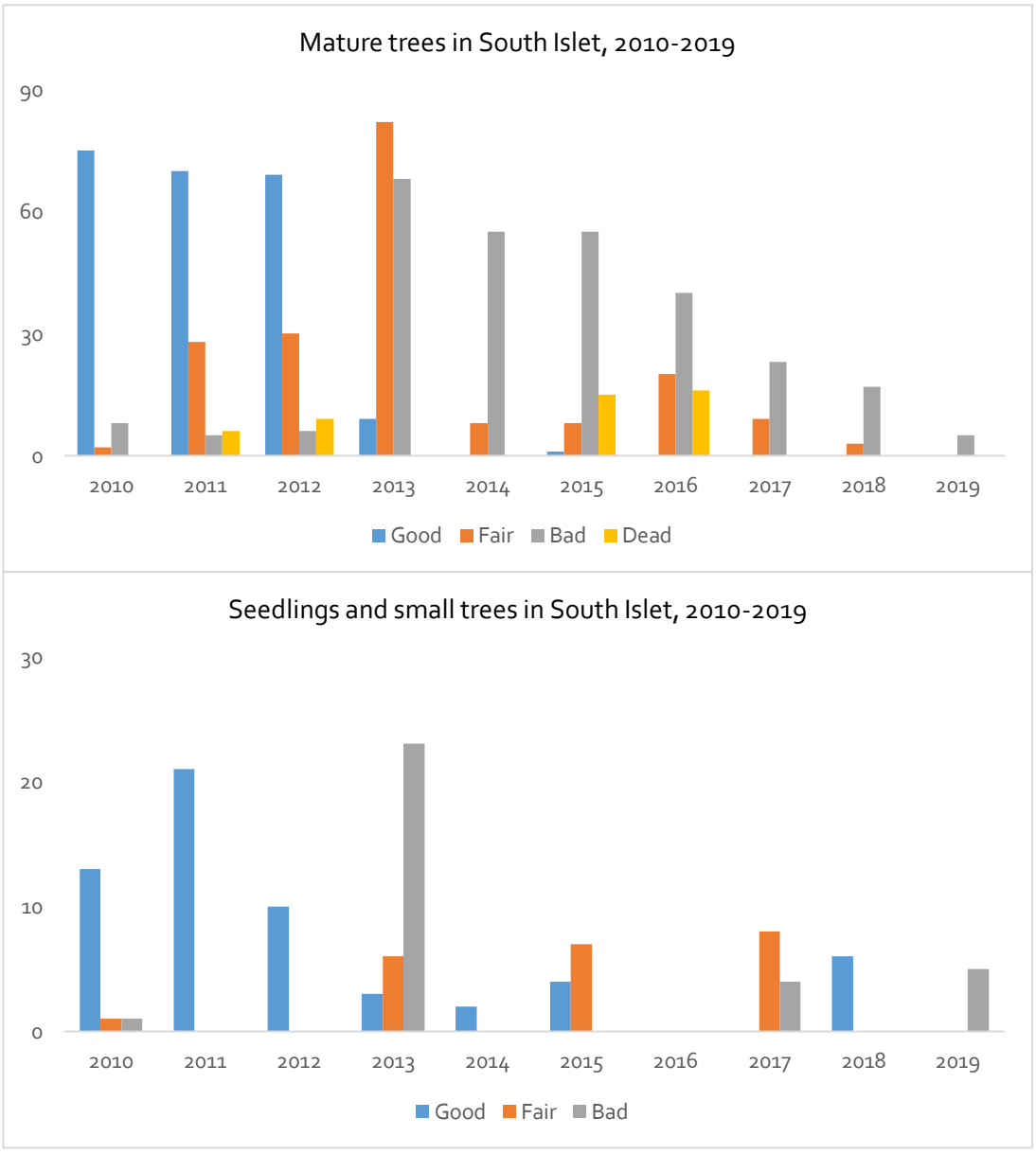

Figure 7. Status of vegetation in South Islet from 2010 to 2019.

Avifauna

Review of MPR Monitoring Data

Since the previous avifauna inventory in May 2018, MPRs made three full avifauna inventories on both Bird Islet and South Islet (Annex 6). The inventory in November 2018 included in-flight counts. The data gathered revealed some important observations (see Table 2).

The MPRs also conducted 11 distance counts, or one count every month on Bird Islet and on South Islet. No distance counts were carried out at Jessie Beazley Reef.

Table 2. Selected results of MPR distance and direct counts from June 2018 to April 2019

Species	Bird Islet	South Islet
Masked Booby	Presence in February 2019.	
Red-footed Booby	Decline in adults and nests from August 2018 to February 2019. In February only 62 active nests	
Brown Booby	On 18 November 2018, similar to November 2017, again a very high number of 1,105 nests (highest nest count), but no eggs and only 138 pulli with 1605 adults present at daytime. Low numbers of adults in February 2019 (528 individuals compared to 1,345 individuals in February 2018).	Two pairs found with nests on 14 February 2019. One nests contained one egg.
Brown Noddy	Similar to 2017/2018 overwintering and in high numbers, e.g. almost 1,700 in December 2018 and nearly 1,500 in January 2019.	Absent from November as is the normal pattern for this species. However, in April it could not start its breeding cycle due to reclamation and lighthouse construction activities that wiped out all of its breeding areas.
Black Noddy	The unusual presence throughout the winter months (December 2017 – February 2018) was repeated from November 2018 (> 360 individuals) to February 2019 (> 800 individuals).	Absent from October 2018 and did not return in April 2019 due to lighthouse construction and reclamation that took away its breeding area.
Great Crested Tern	Absent from October to January. First terns present from February 2019.	No breeding population.
Sooty Tern	Present from November 2018 with > 6,000 individuals and nearly 3,000 eggs and more than 3,000 pulli in February 2019.	No breeding population.

Avifauna Inventory Results, May 2019

A total of 26 species of birds were identified during the inventory (Annex 11). The total number of all avifauna species recorded in TRNP is 116 species.

Fourteen of the species can be classified as pelagic or coastal-living seabirds. Of these, seven species breed or attempt to breed in TRNP: Masked Booby *Sula dactylatra,* Red-footed Booby *Sula sula*, Brown Booby *Sula leucogaster,* Brown Noddy *Anous stolidus,* Black Noddy *Anous minutus, Great* Crested Tern *Thalasseus bergii*, and Sooty Tern *Onychoprion fuscata.* Other breeding species are the Pacific Reef Heron *Egretta sacra* and Eurasian Tree Sparrow *Passer montanus*. Barred Rail *Gallirallus torquatus* was not observed in May 2019.

Among the seabird species, the migrant Christmas Island Frigatebird *Fregata andrewsii* is listed as Critically Endangered (IUCN 2018). Of the breeding species, the Brown Booby and Black Noddy are listed by DENR as Endangered, and Brown Noddy, Great Crested Tern and Sooty Tern as Vulnerable (Gonzalez *et al* 2018). Further, the Black Noddy has been included in Appendix II of the Convention of Migratory Species since October 2017. Appendix II species are those species that will benefit from international protection and management agreements. No such agreement have been made so far.

Overall, the booby species of TRNP breed throughout the year and tern species around nine months annually (Heegaard and Jensen 1992, Manamtam 1996, Kennedy *et al* 2000, Jensen 2009, Jensen and Songco 2016). The inventory result therefore represents only the breeding population present during the time of the inventory.

In May 2019 a total of 27,721 adult individuals of six breeding and one former breeding seabird species were recorded; 27,007 individuals on Bird Islet and 714 individuals on South Islet (Table 3). Bird Islet hosted 97.4% of the breeding population and South Islet just 2.6% of the population. The total of seabirds in May 2019 is the lowest result since 2014 (27,014 individuals). Compared to 2018, the population on Bird Islet decreased by 28.3%. On South Islet, due to disturbances from construction works and massive habitat conversion, the population decreased by more than 82% since 2018.

The total result of the May 2019 count is lower by more than 14,000 individuals or by 33.5% compared to 2018 (Annex 7). However, if the breeding population of Sooty Tern of at least 6,978 individuals found breeding from November 2018 to March 2019 are added, the total would be 34,699 individuals. Hence in comparison with the results from May 2018, the decrease in May 2019 can also be translated as a decrease of only 17%.

The combined population of all breeding seabirds in May 2019 was still higher by 14,000 individuals or 105% compared to the first inventory conducted in 1981 (Kennedy 1982). The low count on May 2019 is mainly due to reduction in the numbers of Brown Noddy, Black Noddy and Great Crested Tern, to a lesser extent in lower numbers of Red-footed Booby and the absence of more than half of the Sooty Tern population in May 2019.

In summary, the count results for 2019 showed:

- Red-footed Booby: Compared to 2018, a population decrease of more than 25%. The population is now 55% lower than in 2004 when the species started to breed in large numbers in TRNP.
- Brown Booby: A stable population, about 17% lower than in the baseline year of 1981 (3,768 adults). The result in May 2019 is 7% lower than in 2018.
- Brown Noddy: The breeding population is at the same level as the baseline year in 1981. However, the result for 2019 show a slight increase on Bird Islet (2,129 individuals) but a

massive decline on Bird Islet; from 1,489 individuals in 2018 to 79 non-breeding individuals in 2019. Overall, the decline is by 48% and caused by disturbance and habitat conversion on South Islet.

- The species again overwintered (> 400 individuals) at Bird Islet but not at South Islet. Again presence of more than 550 actively breeding adults in February 2018. This is only the second extremely early start of the breeding season.
- Black Noddy: From May 2018 to May 2019 a nearly 54% decline to less than 2,100 adults or the lowest number since 2004. On South Islet, habitat conversion and disturbance from reclamation and construction caused the species to disappear (2,028 individuals in 2018). On Bird Islet the establishment of artificial breeding areas maintained the presence of adult birds but at a level 15% lower than in 2018. Despite the species presence at Bird Islet with 1,036 nests, less than 300 nests had eggs or pulli, eventually because of lack of suitable nesting materials. Without further effort on the part of the conservation management, it may not be possible to maintain the species as a breeding species of TRNP; of the original population of 10,656 adult birds, only about 20% remain.
- Great Crested Tern: The previous year's population increase were in May 2019 changed to a decrease by 16%, or to about 15,000 individuals. The number is still very high and among the highest counted.
- Sooty Tern: There were two breeding populations in 2019: Following inventory data of the MPRs 6,978 adults were breeding from November 2018 to March 2019 and another population of more than 4,342 adults (5,594 adults in August 2019) that started breeding in May 2019. Hence, the total 2019 population was about the same level as in 2018, or even the highest breeding result of around 12,572 individuals.

Table 3. Total count numbers of adult resident seabirds present on Bird Islet and South Islet from 15 to 18 May 2019.

Species/ Number	Bird Islet	South Islet	Total	% change 2018 - 2019
Masked Booby ***Sula dactylatra***	1	0	**1**	
Red-footed Booby ***Sula sula***	644	436	**1,080**	-25.2
Brown Booby ***Sula leucogaster***	2,939	199	**3,138**	- 6.8
Brown Noddy ***Anous stolidus***	2,129	79	**2,208**	- 51.9
Black Noddy ***Anous minutus***	2,072	0	**2,072**	- 53.7
Great Crested Tern ***Thalasseus bergii***	14,880	(4)	**14,880**	16.2
Sooty Tern 1) ***Onychoprion fuscata***	4,342 1)	(2)	**4,342**	- 61.5
Total	27,007	714	**27,721**	

Note 1: Or 11,320 individuals, if 6,978 breeding 12 Feb 2019 is added. Or same breeding number as in May 2018

Species Account of Breeding Birds

The combined results of the adult populations and their development over time at Bird Islet and South Islet are shown in Annex 7. Data on the number of immature, juvenile, and pulli populations and on the number of eggs and nests recorded since 2004 on the two islets are presented in Annex 8. Percentages of in-flight populations of Red-footed Booby, Brown Booby, Brown Noddy and Black Noddy are shown in Annex 9 (South Islet) and Annex 10 (Bird Islet). A complete list of avifauna records in May 2019 including all breeding species is found in Annex 11.

Masked Booby (Conservation Status - Philippine Red List: Other Threat Status): The individual presumed to be an adult male, was again found in the colony of Brown Booby at the 'Plaza" on May 2019. However, the bird was only present from dusk to dawn. It is assumed to be the same bird that was recorded during the inventories in May 2016, May 2017 and May 2018. MPR records show the species presence in February 2018. For further details, see Conales and Pagliawan (2017).

Red-footed Booby (Conservation Status - Philippine Red List: Least Concern): The total population in May 2019 was 1,008 adult individuals, down by 25% since May 2018, or half of the breeding population in May 2017 (Figure 8 and Annex 8). Compared to the baseline year for this species (2004: 2,435 adult individuals), the population is lower by about 56%. The declining population is a result of the reduced breeding habitat. Correspondingly, the number of nests, 72 nests, and pulli and of juveniles, were as low as around 2003 or before the baseline year 2004. (Figure 9, Annex 8).

Of the adult population found in May 2019, only about 40% were found on Bird Islet. On South Islet 60% of the adults were found compared to 42% in 2018 (70% in 2016). The species was the only species that continued breeding despite very massive disturbances caused by construction works.

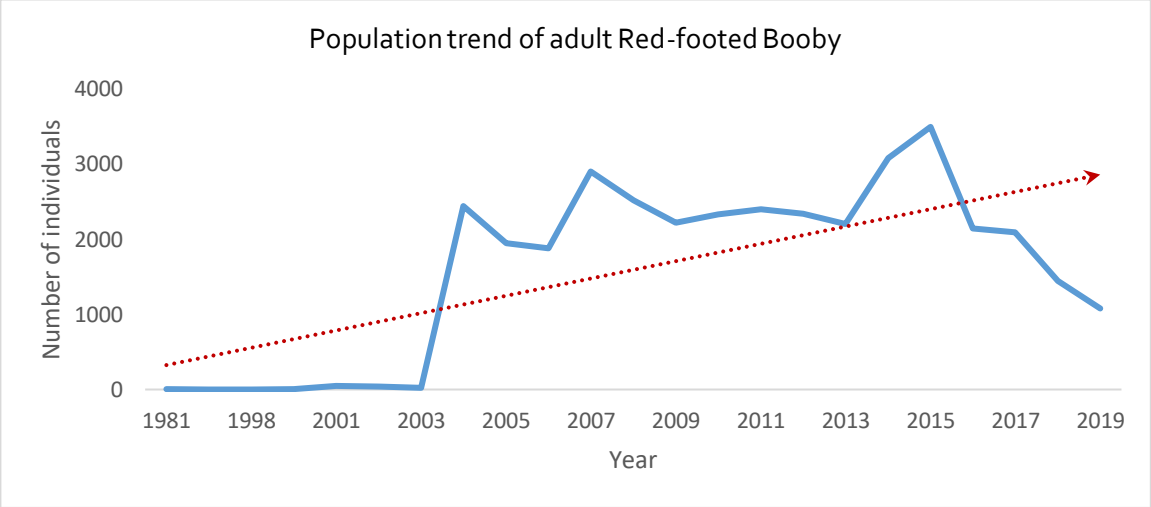

Figure 8. Population trend of adult Red-footed Booby from 1981 to 2019.

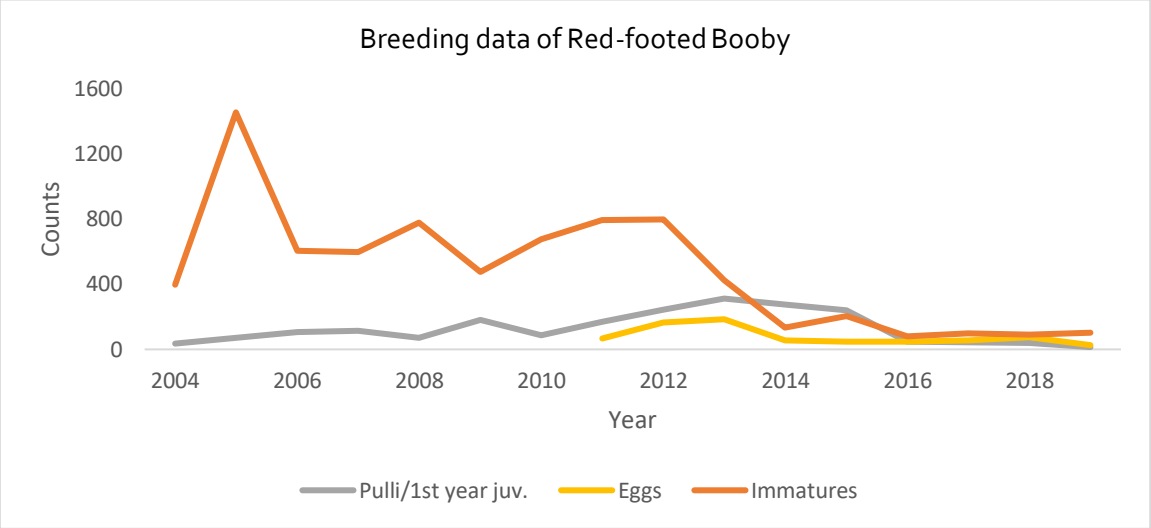

Figure 9. Breeding data of Red-footed Booby from 2004 to 2019.

Brown Booby (Conservation Status - Philippine Red List: Endangered): The May 2019 inventory produced a count result of about 3,367 adults on Bird Islet. Two pairs were breeding at South Islet prior to the start of construction in March 2019. The 2019 result is 11% lower than in 2017 where most birds were counted (3,535 adults). The variance may show a genuine reduction in the May breeding population but a final conclusion should be based on the result of the May 2020 inventory.

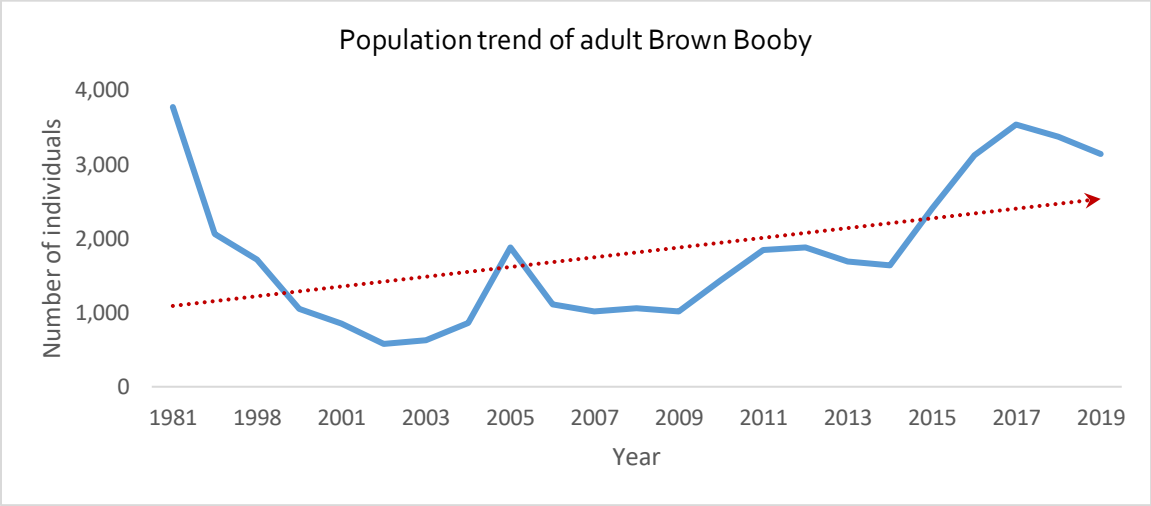

Figure 10. Population trend of adult Brown Booby from 1981 to 2019.

The result in May 2019 continues to be among the highest numbers counted since the baseline year of 1981 (Figure 10 and Annex 7); about 17% lower than the baseline count (Kennedy 1982). A high number of adults, more than 1,100 individuals and almost 2,200 nests were counted in November 2018 by the MPRs. However, the nests contained only 148 pulli and no eggs compared

to similarly low numbers of pulli and eggs in May 2019 (8 pulli and 6 eggs) (Figure 11 and Annex 8).

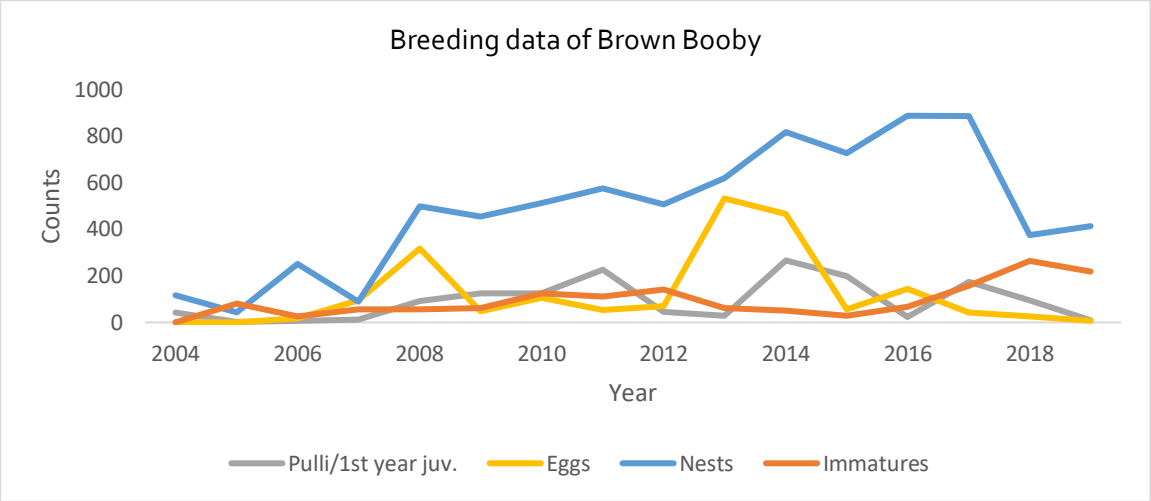

Figure 11. Breeding data of Brown Booby from 2004 to 2019.

Whereas the previous year's assumption that a reduction in the size of the 'Plaza' may play a role in the lower reproduction rate, the increase by 140% in the size of 'Plaza' in 2019 compared to 2018 (Table 1) suggest that other factors may be in play.

In November 2018 and in May 2019, a total of 104 color banded and steel ringed Brown Boobies from 2006 to 2009 were read on Bird Islet. Of these birds, 57 were banded as adults and 47 individuals as pulli, Table 4. The birds banded as pulli are now from 10 to 13 years old, or less than half of the lifespan of the species which can reach an age of 25 years (Hennicke *et al* 2012).

Table 4. Results of ring readings of Brown Booby on Bird Islet in November 2018 and May 2019

Year	Adult	Pulli	Total
2006	6	0	6
2007	13	12	25
2008	1	12	13
2009	9	2	11
Total	29	26	55

Brown Noddy (Conservation Status - Philippine Red List: Vulnerable).

The May 2019 inventory resulted in a total of 2,208 breeding adults (Figure 12, Annex 7). At Bird Islet, where 2,129 individuals were recorded, this represents an increase by 11%. However, on South Islet only 79 non-breeding adults were observed as a result of the conversion of the species' breeding area due to construction of a new lighthouse. Brown Noddy appeared to prefer to build at or near the old lighthouse which was removed and the grassy areas where nests used to be

found were covered with sand. Likewise, it was noted during the in-flight period that 101 adult birds did not land as a result of ongoing construction and reclamation works.

Overall the population is now reduced by about 2,000 adult birds, back to the same level as in the baseline inventory year of 1981 (Kennedy 1982), or by 48% compared to 2017 when the population was at its highest (Annex 7).

The species is normally absent from TRNP from November to February, but on Bird Islet, for the second time, at least 400 birds overwintered. However, none were recorded in South Islet. Similar to February 2019, Brown Noddy were already breeding on 13 February 2019; about 314 nests, pulli, and eggs representing 628 adult birds were counted by the MPRs. In May 2019, 1,065 nests, eggs, pulli and juveniles were recorded on Bird Islet (Figure 13, Annex 8).

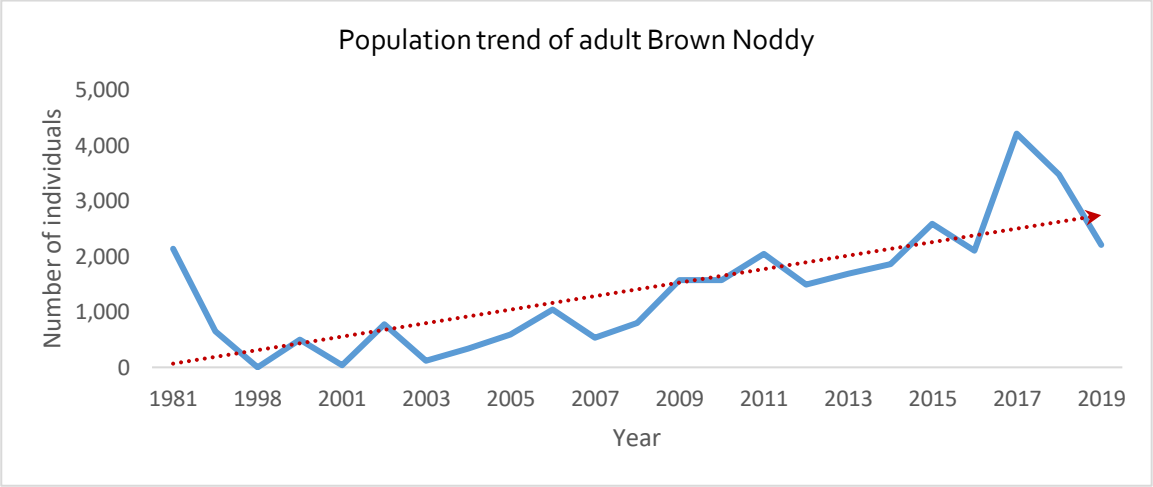

Figure 12. Population trend of adult Brown Noddy from 1981 to 2019.

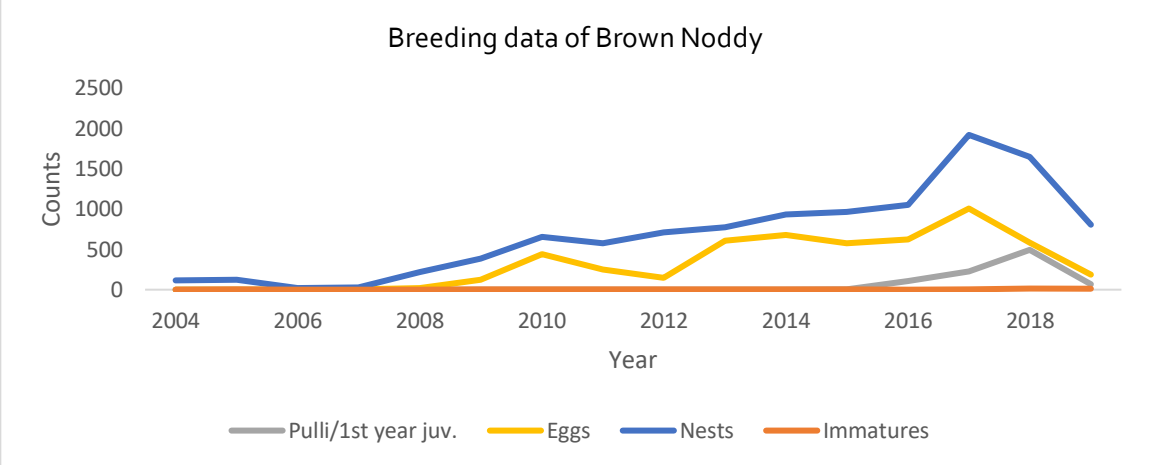

Figure 13. Breeding data of Brown Noddy from 2004 to 2019.

Black Noddy (Conservation Status – Philippine Red List: Endangered)

A total of 2,072 adult birds were counted in May 2019 compared to 4,473 in 2018. It represents a decline by 2,401 birds or 53.7%. Compared to the peak count of 10,656 adults in 2013, less than 20% of the breeding population now remain (Figure 14, Annex 7) and only at Bird Islet. The last record of 44 juvenile birds was noted by the MPRs at South Islet in November 2018.

Similar to the population of Brown Noddy, 417 individuals of the Black Noddy population overwintered in Bird Islet. Early breeding was noted by the MRPs when they counted 640 nests equivalent to 1,280 adult birds on 14 February 2018. The very early presence of the species was also noted in February 2017 and February 2018.

Although the population at South Islet since 2017 declined by more than half because of reduced breeding habitats, an increasing number of Black Noddy (574 birds in 2017) had started to adapt to a change in available breeding habitats and were breeding on the ground in the main colony of Brown Noddy at the old lighthouse. However, reclamation and lighthouse construction since March 2019 wiped out the entire population of Black Noddy and no birds were found in May 2019.

It is the opinion of the main author that more consideration of the requirements of breeding avifauna species should have been taken before the reclamation and lighthouse construction was approved. The TPAMB approved the design and methodology on 17 April 2018 and on 18 May 2018 formally issued a Permit to Construct to carry out the rehabilitation of the lighthouse by the Philippine Coast Guard and its Contractor (TPAMB Resolution 18-15, Annex 4) in the absence of an Environmental Impact Assessment or issuance of a compliance certification that could have saved a great deal of the islet's breeding habitats for Pacific Reef Heron, Brown Noddy, and Black Noddy.

Brown Noddy is classified as Vulnerable and Black Noddy as Endangered by the Department of Environment and Natural Resources (Gonzales *et al* 2018), and importantly, Black Noddy is included as a conservation management dependent Annex II species under the Convention for Migratory Species and further considering that TRNP is a Ramsar Convention and a World Heritage Site.

The complete removal of the old deteriorating lighthouse, the construction of a new lighthouse and the seawall had a severe impact on the breeding birds. However, this may not be the only factor to the loss of the population in the area. The decimation of the vegetation by the Red-footed Booby population, the periods of drought, and the eventual loss of the South Islet due to the collapse of the retaining wall, were real threats that were anticipated to have devastating results on the seabird populations in the area. However, a decision to construct a lighthouse with less environmental and biodiversity impacts, e.g., construction of a smaller islet adjacent to the current one, based on an impact assessment could have been made in the light of TRNP's international and national conservation status.

On Bird Islet six artificial nesting structures made of bamboo were built in 2017 and more were added in 2018. In May 2019 one new structure was constructed. Although relatively poorly maintained in May 2019, 1,036 nests were found. Nearly all of these nest were placed in the artificial nesting structures.

Of the 1,036 nests found in May 2019, only 28% or 293 nests contained eggs or pulli (Figure 15, Annex 8). The pilot establishment of artificial breeding structures in 2017 increased the presence of adult birds, from around 800 in 2017 to 2,445 in 2018 and 2,072 in May 2019. However, of the birds found in 2019, only 28% pairs had either eggs or pulli. The comparative figure from 2018

was 48% and in 2019 nearly 1,500 adult birds were inactive compared to about 1,000 adult birds in 2018, an increase by 50%.

Despite the relative success in using artificial breeding structures there is a very low reproduction rate caused by lack of preferred breeding materials such as a leaves from beach forest tree species. Majority of the breeding populations had no breeding materials due to the absence of trees.

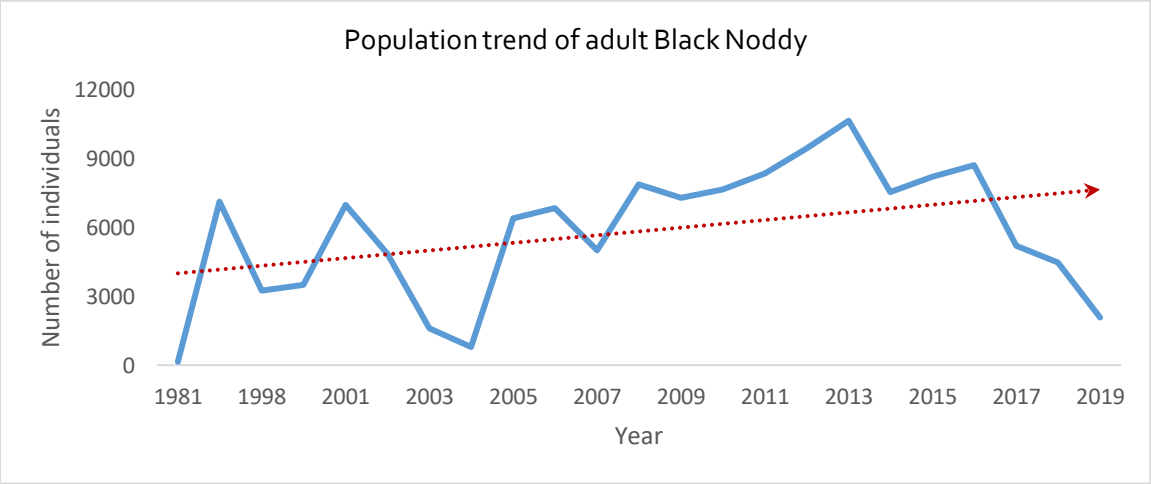

Figure 14. Population trend of adult Black Noddy from 1981 to 2019.

Hence, without providing leaves to the breeding birds it may not possible to maintain a viable population in TRNP. Compared to the peak population of 10,656 adult birds in 2013, only 19.4% of the population are now present at TRNP and the reproduction rate is so low that it is likely that that population will decline to about 5% of the peak population or to about 500 individuals. Unless preferred nesting materials such as leaves are brought to TRNP and ultimately more artificial nesting structures as are constructed and maintained, e.g. at South Islet, the population of the Black Noddy may not on its own be able to breed in TRNP and reproduce in numbers to sustain the population.

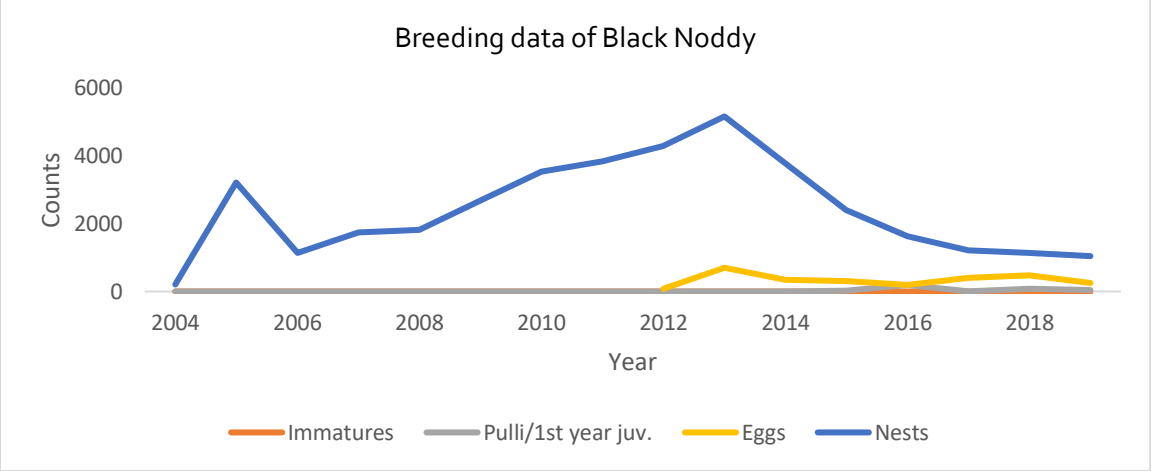

Figure 15. Breeding data of Black Noddy from 2004 to 2019.

The subspecies has status as Endangered and is listed under the CMS Convention with an unfavorable conservation status requiring transboundary conservation management and protection. Hence, the TPAMB and TMO have a special responsibility in trying to mitigate the development on South Islet and find ways, if possible to increase both the population and breeding success in Bird Islet.

Great Crested Tern (Conservation Status - Philippine Red List: Vulnerable)

The breeding population on Bird Islet in May 2019 was 14,880 adults or 16.2% lower than in May 2018. However, this result is the third highest count (Figure 16, Annex 7) and is more than three times higher than in the baseline year of 1981 (Kennedy 1982).

About 3,500 adult birds were present at Bird Islet at the end of March 2019. In May 2019 the majority of the population had either pulli or eggs; 4,830 eggs and 2,610 pulli were counted (Figure 17, Annex 8). No breeding population was found on South Islet.

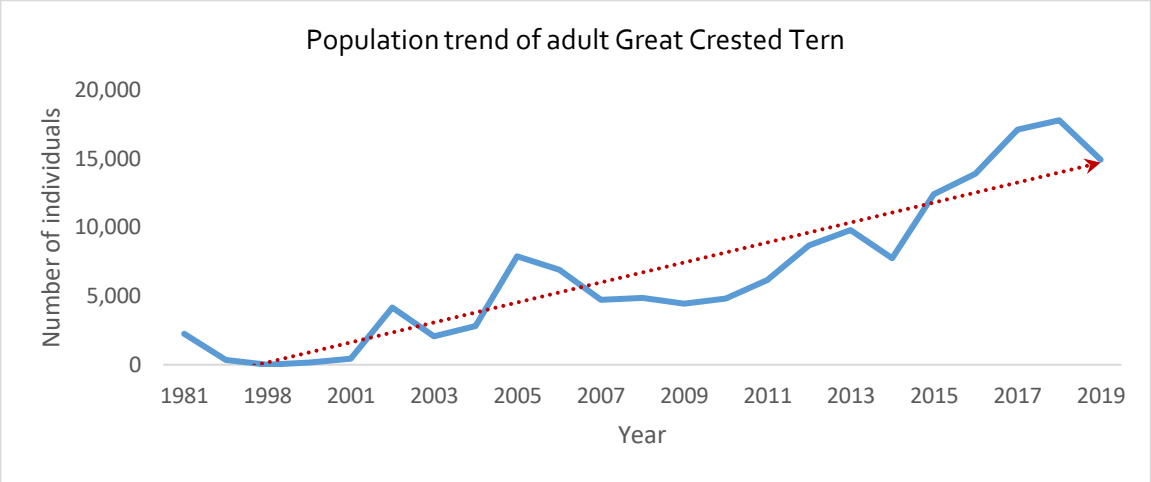

Figure 17. Population trend of adult Great Crested Tern from 1981 to 2019.

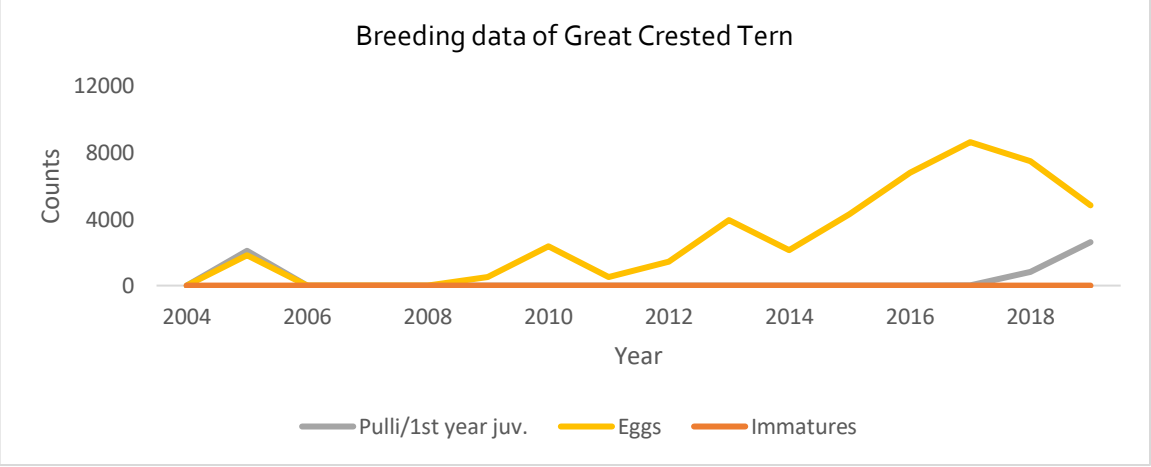

Figure 16. Breeding data of Great Crested Tern from 2004 to 2019.

Sooty Tern (Conservation Status – Philippine Red List: Vulnerable)

Similar to 2017, the species was breeding at Bird Islet from November 2018 where the MPRs found 6,115 adults with 2,593 eggs and 382 pulli. On 13 February 2019, 3,392 pulli and 97 eggs equivalent to 6,978 adults were counted. In April no birds were seen, but in May 2019 4,342 adults were observed (Figure 17, Annex 7). Only 11 pulli and 3 eggs were found. The population was in the first stages of its breeding cycle when the species mainly arrive in large numbers at dusk, are very vocal and active during nighttime, and leave the islet at dawn (Annex 8). No birds were found breeding on South Islet.

If the breeding population of 6,978 individuals from November 2018 to March 2019 is added to the 4,342 individuals recorded on May 2019, the total breeding population is 11,320 individuals. This approximates the population size of 2018, which was 11,288 individuals. However, the data from 15 August 2019 by the MPR's showed a breeding presence of 7,796 adults (Annex 6). Combined, the two populations are equivalent to 14,774 individuals; the highest number ever counted and 31% higher than in 2018. However, for consistency in the way data is analyzed and conclusions reached, we chose only to reflect the May 2019 result while noting that the species continue to have variations in breeding seasonality.

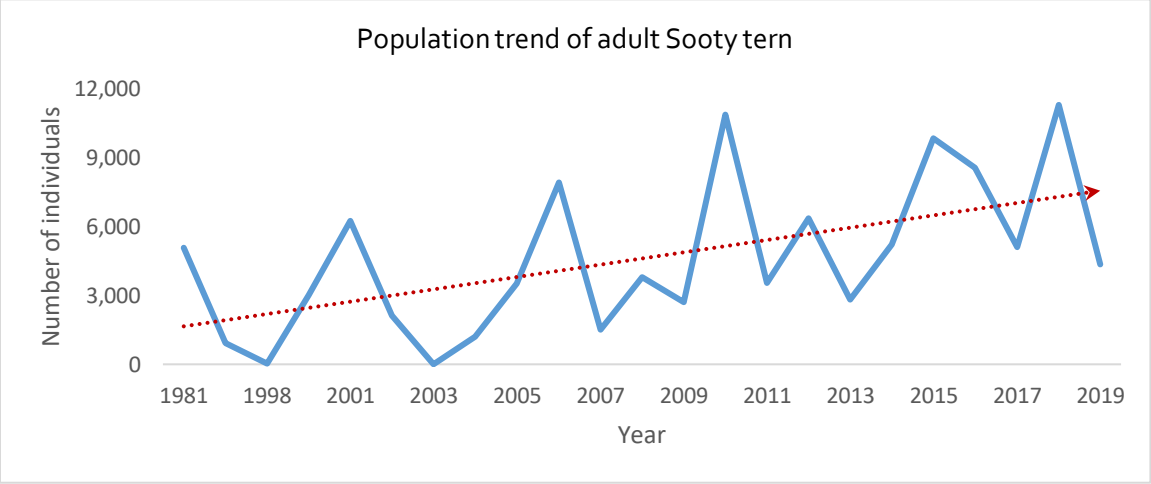

Figure 18. Population trend of adult Sooty Tern from 1981 to 2019.

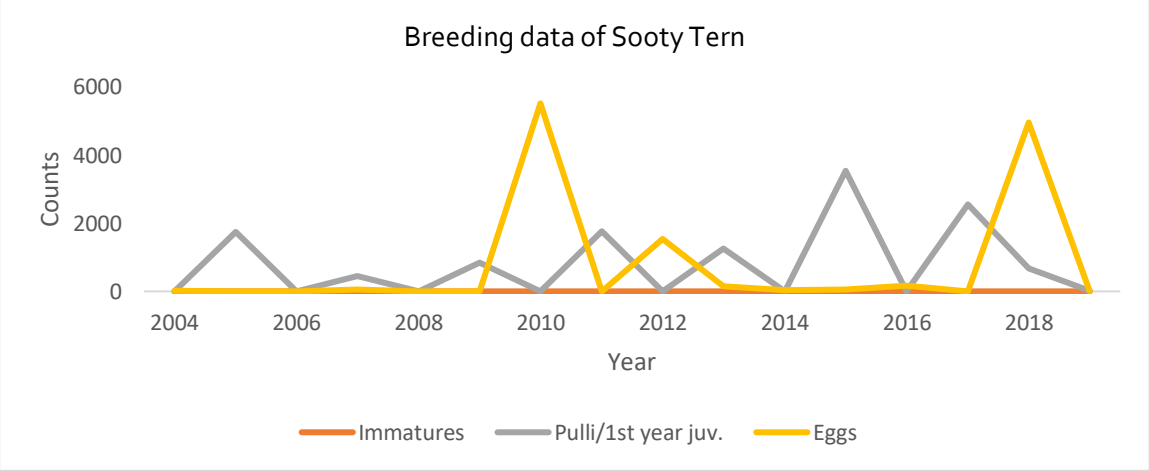

Figure 19. Breeding data of Sooty Tern from 2004 to 2019.

Pacific Reef Heron: The total adult population in May 2019 was 16 adult individuals of the dark phase compared to only 9 birds in 2018, 16 birds in 2017, and 19 individuals in 2016. Ten birds were observed at sandbanks adjacent to the South Islet, four birds at Bird Islet, and two at the Ranger Station. No nests were found.

Barred Rail: The MPRs noted three birds in Bird Islet on 14 December 2018, but none were found during the May 2019 inventory in both islets. This may be due to the absence of vegetation, which attracts rail species.

Eurasian Tree Sparrow: Eight individuals were recorded in South Islet and two individuals in Bird Islet.

Cawili Island

Upon the request from WWF Philippines, the 2019 May inventory was expanded to include a rapid assessment of the occurrence of seabirds in Cawili Island and the status of the beach forest, which is the breeding and roosting habitat for seabirds. The last seabird assessment was carried out in 2006 (Jensen 2009, unpub).

Inventories took place in the late afternoon of 17 May and the morning of 18 May 2019. Low tide prevented landing on 17 May and therefor precise counts of the in-flight population of frigatebirds and of boobies from an optimal land based position was not possible. Consequently, the results presented here, at least of the frigatebirds, are underestimates.

Previous count of seabirds are few and scattered and includes an assessment by Haribon Foundation, Danish Ornithological Society, BirdLife International, DENR (Manamtam 1996 unpub.), WWF Philippines (2003, 2004, unpub.), and Conservation International-Philippines (Jensen 2009, unpub.).

In Jensen (2009, unpub.) it is highlighted that populations of seabirds, e.g. Red-footed Booby and Black Noddy, have suffered severe decline in the past decades but were starting to recover after a local ordinance was issued in the May 31, 1990 in order to prevent collection of young birds for subsistence. A contributing factor to the decline in breeding populations was also thought to be a very substantial reduction in the breeding habitat of old growth beach forest that by 2004 was limited to a narrow belt along the immediate shoreline (Jensen 2004).

Results

Avifauna Species Account

A total of 24 species were observed including six seabird species (Annex 12). Of these 11 were resident breeding species, two species with both resident and migrant populations, and nine were migratory species. One species, the Christmas Island Frigatebird, is Critically Endangered (IUCN 2019), and another, the Great Crested Tern has conservation status of Vulnerable.

Seabird Inventory Results

Red-footed Booby

A total of 5,613 adult Red-footed Boobies were counted (Table 5). Of these less than 13% or 828 individuals were present during daytime and about 300 individuals were breeding (incubating eggs or feeding pulli and juvenile birds). In addition, 2,290 immature birds were counted, 93% of which came to the island to roost at dusk. At least 150 nests were located in the tallest old beach forest trees and 74% of nests were found along the western beach. In comparison, in 2006 only 19 nests were found and all were located along the eastern beach.

Compared to the most recent count in 2006 (Jensen 2009) there has been a very notable increase in the population: from just 448 individuals to more than 6,400 in 2019. As in 2006, a very small percentage of the birds were found breeding; 4.2% and 4.7% respectively.

Table 5. Count results about Red-footed Booby May 2019 compared to previous counts on Cawili Island. Source: Manamtan 1996, WWF 2002 and 2003, Jensen 2004, Jensen 2009 and TMO 2019.

Red-footed Booby	**1995**	**2002**	**2003**	**2004**	**2006**	**2019**		**Total 2019**
	June	15 Jun	2 Jun	8 May	May	17 May (West Beach)	18 May (East Beach)	
Adult								
Daytime	150			20		626	202	828
In-flight				345				5,613
Nesting	33			(4)	(19)			(300)
Sub-Total	150			465	448			6,441
Immature								
Daytime						117	45	152
In-flight				405				2,138
Sub-Total				405	445			2,290
Total	**<150**	**180**	**848**	**870**	**893**			**8,731**
Nests								
Empty/unknown content				2		68	32	100
With pulli	14			2	19	26	7	33
With juvenile	19					17	0	17
Total Nest	**33**			**4**	**19**	111	39	**150**

Frigatebirds

Christmas Island Frigatebird, Great Frigatebird and Lesser Frigatebird were identified during the survey. None of them were breeding or showing breeding behavior, confirming the assumption that frigatebirds do not breed in the Philippines. The results of the inventory shows a minimum total of 289 individuals of three species (Table 6). Of the identified individuals at least 10 were adults, 18 immature, and five were juveniles. Compared to the previous count, there seems to be a significant increase in numbers; from a minimum of 102 individuals in 2002 (WWF Philippines) and 69 individuals in 2006 (Jensen, A.E 2009a) counted by one person. In comparison, the result from the May 2019 count is the outcome of several persons' effort. Further it must be noted that the count in May 2019 was not carried out from an ideal location at land, therefore many more frigatebirds may have escaped observation.

Table 6. Count results of Frigatebird species May 2019 compared to previous counts on Cawili Island.

SPECIES	**1995**	**2002**	**2003**	**2004**	**2006**	**2019**		**Total 2019**
	June	15 Jun	2 Jun	8 May	May	17 May	18 May	
Christmas Island Frigatebird	0	2	2	2-3	2			5-6
Ad Male				1				0
Ad Female				1	1	1	1	2
4th Yr						1	0	1
3rd Yr.					1			1
2nd Y						2	0	2
Juv.				1?		1?		1?
Great Frigatebird		±	37	20	33	>9	50	>59
Ad Male				9	5	2		> 2
Ad Female				8	6	1		> 1
Immature					22	6		> 6
Juvenile	3			3		>3		>3
Lesser Frigatebird				10	34	6	25	>31
Ad Male				3	11			3
Ad Female				2-3	6			>2
Immature					17	5		5
Juvenile				5				5
Frigatebird sp.	<25	100	39	46	0			194
Frigatebirds, Total	< 28	102	78	78	69			289

Developments in the seabird breeding and roosting habitat

Intensive conversion of the beach forest habitat due to increased human population and associated agricultural expansion with coconuts and corn production may have caused the breeding population of Black Noddy to have abandoned the island in the 1980's. It also resulted in the dramatic decline of the breeding population of Red-footed Booby. In May 2004 conversion of the beach forest continued despite a very small percentage remained; many old trees including trees with nests were set on fire or logged for lumber purposes (Jensen 2004). The result of the May 2019 assessment showed no sign of burned or logged trees and more than 1,000 trees were counted (Table 7). The overall impression was that the beach forest had recovered since 2004, a period of 15 years, and is now in good condition. For example, of trees assessed along the western beach, 126 trees had a height of more than 5 meter.

Table 7. Result of rapid inventory of beach forest on Cawili Island 17 to 18 May 2019.

Mature Beach Forest	East Beach	West Beach	Total
Local Name			
Abok-abok	39	46	
Anuling	319	169	
Libo	0	374	
Talisay	0	92	
Unidentified sp.	3		
Total	361	681	**1,042**

MANAGEMENT RECOMMENDATIONS FOR TRNP 2019 AND BEYOND

Habitat

1. Restoration of Beach Forest: Considering that the Philippines hosts the only known breeding population of the subspecies *worcesteri* of Black Noddy, substantial effort needs to be applied to find ways to restore the beach forest in TRNP. It may include transfer of beach forest seedlings from Cawili Island or establishment of a nursery in Puerto Princesa to produce a large number of seedlings of drought-resilient beach forest species and plant these on the islets of TRNP. However, protocols on when best to plant, how to increase survival rates, and monitoring of the survival rate of seedlings needs to be established.

2. Habitat restoration of South Islet

Based on the known habitat development in South Islet as described in Kennedy (1982) and Heegaard and Jensen (1992), it may take more than 10 years for the beach forest to reestablish itself, provided that the population of Red-footed Booby will not hinder it. Further considering that sand has been pumped in and now cover close to the entire islet, there is an urgent need also to restore the islets grass and lower plants habitats to enable populations of Pacific Reef Egret, Brown Noddy and eventually of Black Noddy and Barred Rail to recolonize the islet. This may be done by transferring plant species from Bird Islet to the South Islet.

3. Future Infrastructure Projects

It is recommended that the Philippine Environmental Impact Assessment system be followed and independent environmental advice be sought regardless of the type of biodiversity that will likely be effected by the project, whether marine or terrestrial.

Species

4. Black Noddy: Replenish lost breeding habitats by increasing construction of artificial nesting structures including in South Islet is necessary. Substantial quantities of nesting materials such as beach forest leaves which is the natural nesting material preferred by the species and which need to be provided on a regular basis, whether from Puerto Princesa or from leave vegetation in Bird Islet.

As part of the 2020 inventory, it is recommended to conduct a study of what breeding materials were used by the active breeding pairs and by how many.

Further, where Red-footed Booby is observed to have started nest construction on the artificial nesting structures, that these be removed under the guidance by the Park Manager.

5. Satellite-tracking devices or geolocators, lightweight electronic archival tracking devices, need to be installed on up to eight (8) adult and juvenile Black Noddy and Sooty Tern, or for all breeding seabirds species to gain necessary information for the management of seabird populations. Include in fund-raising activities, a budget for satellite-transmitter or geolocator tracking devices that cost substantially less.

Methodology

6. Bird counts. Continue monthly distance counts, and conduct three direct counts in January/February, August/September and October/November. Include counts of other species such as Pacific Reef Heron, Barred Rail, and of the migratory Ruddy Turnstone and Grey-tailed Tattler.

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ANNEXES

Annex 1. 2019 Seabird Monitoring Team

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Annex 2. Distance count estimate: Objectives and Methods

Objective	Documentation of: a) presence or absence of seabird species, and, b) the relative population trend variation throughout the year.
Method	Distance counts include all species of boobies, frigatebirds, and terns including noddies.
	Distance counts are carried out as a monthly patrol routine at both Bird Islet and South Islet.
	It is carried out from a patrol boat while cruising at very low speed, e.g. 5 knots, interrupted by frequent stops every 80-100 meters parallel to the shoreline. If the birds show signs of being disturbed or start to fly, it may indicate the distance is too close and needs to be adjusted.
	The count is an estimation of the population numbers carried out by using a binocular with magnification 8 x 50 or 10 x 50. The method does not allow for exact count of population numbers.
	Two Park Rangers conducts the count: One counts/estimates the bird population numbers, the other serves as the recorder. At least two independent counts must be made.
Analysis	The average estimated figures are used to determine the population variation trend of the different species throughout the year.
Data storage	The results are reported on a quarterly basis to the TMO in Puerto Princesa. The TMO is responsible for storing and safeguarding the data.

Annex 3. Inventory and population calculation methods per breeding species

Species	Calculation methods
Red-footed Booby	The active adult breeding population size is expressed as the number of nests multiplied by two = the minimum number of active adult breeding birds. This result is compared to the day-time number of adult birds counted. Whichever number is higher represents the daytime population. The in-flight counts of adult birds are added to the day-time results to determine the total minimum population present. Although more adult birds arrive during the night, there is currently no method used to capture this part of the population given that night counts with flashlight is unfeasible and highly disturbing to the birds.
	Reproduction rate is expressed as the number of nests, eggs and/or pulli, juvenile and immature birds recorded. For the immature population the result of the in-flight count is added.
Brown Booby	The active adult breeding population size is expressed as the number of nests multiplied by two = the minimum number of active adult breeding birds. This result is compared to the day-time number of adult birds. Whichever count is higher is used to represent the daytime population. The in-flight result of adult birds is added to the day-time result in order to express the minimum adult population present. Since more adult birds arrive during the night, two to three distance counts of adults present at dawn at 'Plaza' is carried out and the average result is compared with the combined results of the day-count and the inflight-count. Whichever of these two counts is the highest is used to express the maximum adult population present.
	The species only irregularly breeds at South Islet, the count result of adults from this islet is not included in the calculation of the total population of the species.
	Reproduction rate is expressed as the number of nests, eggs and/or pulli, juvenile and immature birds recorded. For the immature population the result of the in-flight count is added.
Pacific Reef Heron	The number of adult birds counted at high tide represents the breeding population. The result from South Islet is added to the result for North Islet in order to express the total population of the species present at TRNP.
	Reproduction rate is expressed as the number of nests, eggs and/or pulli and juveniles found during the inventory of other breeding species.

Barred Rail	The number of adult birds noted during counts of other breeding species represents the breeding population. Nests are difficult to find. If nest is found, one nest represents 2 adult birds
Brown Noddy	The population size is expressed as the number of nests found multiplied by two = minimum number of adult birds. This result is compared to the day-time number of adult birds counted next to the nests, the number of birds roosting along the shoreline and the results of the in-flight count. The total of these three counts is used to express the maximum adult population present.
	At South Islet in-flight counts are normally not carried out and only two data sets are used to determine the population at this islet: the number of nests found compared to the number of adult birds counted next to the nests, and the birds roosting along the shoreline and on the wreck. The results from South Islet are added to the result for North Islet in order to express the total population of TRNP.
	Reproduction rate is expressed as the number of nests, eggs and/or pulli and juveniles found during the inventory.
Black Noddy	The population size is expressed as the average number of nests found during two to three separate counts multiplied by two = the total active breeding population. This result is compared to the average result of two to three daytime counts of birds carried out during nest counts plus the results of the in-flight count. Whichever of the two count results is the highest is used. At South Islet in-flight counts are normally not carried out and only two data sets are used to determine the population at this islet: number of nests and number of adult birds counter. This result from South Islet is added to the result for North Islet in order to express the total population.
	Reproduction rate is expressed as the number of nests, eggs and/or pulli and juveniles found during the inventory. Because the nests mostly are placed at high elevation in the vegetation, total counts of eggs and pulli is only possible at Bird Islet. Identification of immature birds is not possible as they look similar to adults.
Great Crested Tern	Population size is expressed as the number of eggs and/or pulli and juvenile found multiplied by two = the minimum number of active breeding birds. This result is compared to the day-time number of adult birds counted next to the eggs/pulli/juveniles plus the average result of two to three high tide counts along the shoreline. Whichever of these two results is the highest is used to express the maximum breeding population. In years with very high population density, adult birds should be photo-ducmented using structured picture-taking of clearly demarcated and numbered sub-sections of the breeding areas. At South Islet where breeding only occurs

	irregularly, the number of territorial adult birds are counted and added to the figure for North Islet in order to express the total population of species present at TRNP.
	Since the species is not breeding at either Black Rock, Amos Rock or Ranger Station, the count result from these localities are not included in the population calculation.
	Reproduction rate is expressed as the number of eggs and/or pulli and juveniles found.
Sooty Tern	Population size is expressed as the number of eggs and/or pulli and juveniles recorded multiplied by two = minimum number of active breeding birds. This result is compared to the day-time number of adult birds counted next to the eggs/pulli/juveniles and to the average results of two to three late afternoon/evening estimates of the total adult population present at that time. Whichever of these three results is the highest is used to express the breeding population.. In years with very high population density, adult birds should be photo-ducmented using structured picture-taking of clearly demarcated and numbered sub-sections of the breeding areas.
	Since the species is not breeding at South Islet, the count result from this islet is not included in the calculation of the total population.
	Reproduction rate is expressed as the number of eggs and/or pulli and juveniles found during the inventory.

Annex 4. TPAMB Resolution Series of 2018, No. 15. Issuing a Permit to Construct to the Philippines Coast Guard and its Contractor, C'Zarles Construction and Supply, for Rehabilitation of the Lighthouse at the South Atoll, TRNP. And Providing for the Terms and Conditions of the Permit.

Excerpts from the Minutes of the 74th TPAMB Meeting
Governor's Conference Rm., Capitol Bldg, Puerto Princesa City
17 May 2018

Present:

1.	Mr. Zanie Seracarpio, 3rd District	Presiding Officer
2.	Commo Dorvin Jose Legaspi AFP, Wescom	Member
3.	Capt. Carlos Sabarre, Naval Force West	Member
4.	Felizardo Cayatoc, PENRO	Member
5.	Cleofe Favila, Cagayancillo, ENR	Member
6.	Mr. John Sebastian Fabello, 2nd District	Member
7.	Dr. Patrick Regoniel, PSU	Member
8.	Elena Basaya, BFAR	Member
9.	Dr. Roger Dolorosa, WPU	Member
10.	Mr. Romel Carbonell, SAGUDA	Member
11.	Jehu Cayaon, Tambuli ta mga Kagayanen	Member
12.	Marivel Dygico, WWF-Phils	Member

TPAMB Resolution No. 18-15

'Issuing a Permit to Construct to the Philippine Coast Guard and its Contractor, C'Zarles Construction and Supply, for the Rehabilitation of the Lighthouse at the South Atoll, TRNP, and Providing for the Terms and Conditions of the Permit'

WHEREAS, the Tubbataha Reefs Natural Park Act of 2009, also known as Republic Act (RA) No. 10067, which took effect on April 24, 2010, aims to ensure the protection of the globally significant economic and other values of the Tubbataha Reefs;

WHEREAS, the Tubbataha Protected Area Management Board (TPAMB) was established pursuant to Section 10 of RA No. 10067 to be the sole policy-making and permit-granting body for the Tubbataha Reefs;

WHEREAS, the PCG is mandated to enforce laws within Philippine waters, conduct maritime security operations, safeguard life and property at sea, and to protect the marine environment and its resources;

WHEREAS, the PCG is directed under Section 3 (f) of RA 9993 to 'coordinate, develop, establish, maintain and operate aids to navigation .... within the maritime jurisdiction of the Philippines

WHEREAS, the lighthouse in Tubbataha, originally established in 1915 and rehabilitated by the Philippine Coast Guard almost forty (40) years ago, is currently dilapidated and beyond repair, not to mention extremely dangerous to the lives of enforcement personnel who conduct inspection and repairs on the said Lighthouse;

WHEREAS, the PCG has issued a Notice of Award to C'ZARLES Construction and Supply (C'Zarles for brevity) for the undertaking of a civil works contract for the Rehabilitation of Tubbataha Lighthouse under the General Appropriations Act of 2018;

WHEREAS, the TPAMB acknowledges the grave consequence of the absence of an operational lighthouse in the South Atoll to the safety of mariners and of the coral communities in the Park;

WHEREAS, the presence of an operational lighthouse is one of the most basic requisites of the International Maritime Organization for Particularly Sensitive Sea Areas like TRNP;

WHEREAS, the TPAMB approved the design and methodology of the Lighthouse rehabilitation project of the PCG and C'Zarles Construction in Tubbataha during its special meeting held for the purpose on 18 April 2018;

NOW THEREFORE, upon unanimous decision of the Board, the TPAMB is issuing a Permit to Construct to the Philippine Coast Guard and its contractor, C'Zarles Construction and Supply, for the Rehabilitation of the Lighthouse at the South Atoll, TRNP, and providing for the Terms and Conditions of the Permit;

RESOLVED FURTHER, that the Protected Area Superintendent, Angelique M. Songco, is authorized to sign the Permit to Construct issued to the PCG and C'Zarles Construction and Supply.

ADOPTED AND APPROVED this 17th day of May 2018 at Puerto Princesa City.

I hereby certify to the correctness and accuracy of the above – quoted resolution.

Prepared by:

ANGELIQUE M. SONGCO
Secretary

Attested by:

ZANIE SERACARPIO
Presiding Officer

Annex 5. Condition of vegetation on Bird Islet and South Islet

Condition of higher vegetation on Bird Islet, May 2006 (baseline year) and from 2016 to 2019

Trees/ Condition	Good (optimal)				Fair (moderately deteriorating)				Bad (severely deteriorating)				Total (live trees)				Dead trees			
	2006	2016	2018	2019	2006	2016	2018	2019	2006	2016	2018	2019	2006	2016	2018	2019	2006	2016	2018	2019
Dead trees																	82	75	ND	**ND**
Mature,live trees (> 3 feet)	10	1	0	**0**	49	4	0	**2**	11	16	10	**0**	70	21	0	**2**				
Small, live trees (2- 3 feet)	109	33	0	**0**	0	24	3	**3**	0	7	10	**0**	109	64	13	**3**				
Seedlings (< 1 feet)	50	14	0	**0**	0	9	0	**0**	0	2	0	**0**	50	25	0?	**0**				
Total	**169**	**48**	**0**	**0**	**49**	**37**	**3**	**5**	**11**	**25**	**20**	**0**	**229**	**110**	**13**	**5**	**82**	**75**	ND	ND

Note: Coco Palms 2018: 3, 2019 2

Small Trees 2019: Planted in 2019 (*Pisonia grandis* bird-catcher tree/lettuce tree/cabbage tree taken from Cawili)

Condition of vegetation on South Islet May 2011 (baseline year) and from 2016 to 2019

Trees/ Condition	Good (optimal)				Fair (moderately deteriorating)				Bad (severely deteriorating)				Total (live trees)				Dead			
	2011	2016	2018	2019	2011	2016	2018	2019	2011	2016	2018	2019	2011	2016	2018	2019	2011	2016	2018	2019
Dead trees																	6	16	ND	**ND**
Mature, live trees (> 3 feet)	70	0	0	**0**	28	20	3	**0**	5	40	17	**5**	103	60	20	**5**				
Small, live trees (2- 3 feet)	2	0	0	**0**	0	0	0	**0**	0	0	0	**0**	2	0	0	**0**				
Seedlings (< 1 feet)	19	0	6	**0**	0	0	8	**0**	0	0	0	**5**	19	0	6	**5**				
Total	**91**	**0**	**6**	**0**	**28**	**20**	**11**	**0**	**5**	**40**	**17**	**10**	**124**	**60**	**26**	**10**	**6**	**16**	**ND**	**ND**
Notes:	Coco Palms 2011: 13, 2016: 6, 2017:6, 2018:10 2019:6																			

Annex 6. Results of Park Rangers' inventory counts, August and November 2018 and February 2019 at Bird Islet and South Islet

Bird Islet	2018				2019
Species/Date	20 August	18 November			13 February
Red-footed Booby	Day Count	Day Count	Inflight	Total	Day Count
Adult	192	328	182	510	129
Sub-adult	2	5	19	24	2
Pullus/ juvenile	10	9		9	14
Eggs	3	36		36	12
Nests	121	114		114	62
Brown Booby					
Adult	1336	1201	996	2197	528
Sub-adult	5	21	49	70	187
Pullus/ juvenile	10	148		148	270
Eggs	258	0		0	66
Nests	411	1105		1105	348
Masked Booby					
Adult	0	0		0	1
Great Crested Tern					
Adult	199	199		199	80
Sub-adult	0	0		0	0
Pullus/ juvenile	50	50		50	0
Eggs	0	0		0	0
Nests					
Sooty Tern					
Adult	30	6115		6115	3461
Sub-adult	0	0		0	0
Pullus/juvenile	382	382		382	3392
Eggs	0	2593		2593	97
Nests					
Brown Noddy					
Adult	192	490		490	552
Sub-adult	0	0		0	46
Pullus/juvenile	21	21		21	47
Eggs	7	0		0	174

Nests	87	0		0	47
Black Noddy					
Adult	867	363		363	817
Sub-adult	0	0		0	0
Pullus/juvenile	50	0		0	56
Eggs	40	23		23	185
Nests	521	308	-	308	399

South Islet	**2018**		**2019**
Species/Date	24 August	13 November	14 February
	Day Count	Day Count	Day Count
Red-footed Booby			
Adult	**236**	**544**	**158**
Sub-adult	**4**	**10**	**15**
Pullus/ juvenile	**15**	**10**	**35**
Eggs	**10**	**18**	**58**
Nests	**79**	**155**	**151**
Brown Booby			
Adult	**105**	**0**	**3**
Sub-adult	**0**	**0**	**0**
Pullus/ juvenile	**0**	**0**	**0**
Eggs	**0**	**0**	**1**
Nests	**0**	**0**	**2**
Great Crested Tern			
Adult	**8**	**0**	**0**
Sub-adult	**0**	**0**	**0**
Pullus/juvenile	**0**	**0**	**0**
Eggs	**0**	**0**	**0**
Nests	**0**	**0**	**0**
Sooty Tern			
Adult	**0**	**0**	**0**
Sub-adult	**0**	**0**	**0**
Pullus/ juvenile	**0**	**0**	**0**
Eggs	**0**	**0**	**0**

Nests	**0**	**0**	**0**
Brown Noddy			
Adult	**250**	**1**	**1**
Sub-adult	**0**	**0**	**0**
Pullus/ juvenile	**50**	**0**	**0**
Eggs	**17**	**0**	**0**
Nests	59	70	0
Black Noddy			
Adult	**70**	**0**	**0**
Sub-adult	**0**	**0**	**0**
Pullus/juvenile	**2**	**44**	**0**
Eggs	**1**	**0**	**0**
Nests	10	15	0

South Islet	**2017**		**2018**
Species/Date	17 August	17 November	10 February
	Day Count	Day Count	Day Count
Red-footed Booby			
Adult	322	175	458
Sub-adult	6	2	29
Pullus/ juvenile	5	16	20
Eggs	2	25	0
Nests	95	53	207
Brown Booby			
Adult	20	2	24
Sub-adult	0	0	0
Pullus/ juvenile	0	0	0
Eggs	0	0	0
Nests	0	0	0
Great Crested Tern			
Adult	0	0	0
Sub-adult	0	0	0
Pullus/juvenile	1	0	0
Eggs	0	0	0

Nests	0	0	0
Sooty Tern			
Adult	0	0	0
Sub-adult	0	0	0
Pullus/ juvenile	0	0	0
Eggs	0	0	0
Nests	0	0	0
Brown Noddy			
Adult	366	1	0
Sub-adult	17	0	0
Pullus/ juvenile	0	0	0
Eggs	25	0	0
Nests	119	36	0
Black Noddy			
Adult	137	1	0
Sub-adult	4	0	0
Pullus/juvenile	0	0	0
Eggs	16	0	0
Nests	226	0	0

Annex 7. Population results and population trend of breeding seabirds in TRNP April to June 1981 – 2019.

Baseline years are underlined. Source: Kennedy 1982, Manamtam 1996, WWF Philippines 1998-2004 and TMO 2004-2019

Species/ Numbers	1981	1995	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008
Ground-breeders Sub-total	**13,388**	**3,949**	**1,744**	**4,695**	**7,529**	**7,635**	**2,804**	**5,200**	**13,825**	**16,957**	**7,746**	**10,534**
Masked Booby	150	1	0	0	0	0	0	0	0	0	0	0
Brown Booby	3,768	**1)** 2,060	1,716	1,045	850	577	623	856	1,877	1,108	1,016	1,059
Brown Noddy	2,136	643	0	500	37	775	115	336	590	1,035	530	800
Great Crested Tern	2,264	335	0	150	414	4,160	2,064	2,808	7,858	6,894	4,700	4,875
Sooty Tern	5,070	**1)** 910	28	3,000	6,228	2,123	2	1,200	3,500	7,920	>1,500	3,800
Tree-breeders Sub-total	**156**	**7,128**	**3,250**	**3,502**	**7,042**	**5,003**	**1,630**	**3,240**	**8,353**	**8,727**	**7,902**	**10,403**
Red-Footed Booby	9	0	0	2	44	43	20	2,435	1,947	1,877	2,902	2,513
Black Noddy	147	7,128	3,250	3,500	6,998	4,860	1,610	805	6,406	6,850	> 5,000	7,890
TOTAL	**13,544**	**11,077**	**4,994**	**8,197**	**14,571**	**12,638**	**4,434**	**8,440**	**22,178**	**25,684**	**15,648**	**20,937**

Species/ Numbers	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Trend (%)
Ground-breeders Sub-total	**9,721**	**18,669**	**13,592**	**18,383**	**15,988**	**16,448**	**27,193**	**27,654**	**29,940**	**35,878**	**24,569**	**+ 83**
Masked Booby	0	0	0	0	0	0	0	1	1	1	1	**- 99**
Brown Booby	1,018	1,438	1,846	1,879	1,690	1,632	2,403	3,122	3,535	3,367	3,138	**- 17**
Brown Noddy	1,570	1,575	2,042	1,492	1,688	1,862	2,583	2,096	4,209	3,470	2,208	**+ 3**
Great Crested Tern	4,433	4,790	6,160	8,653	9,794	**2)** 7,730	<12,387	3,880	17,097	17,752	14,880	**+ 6474**
Sooty Tern	2,700	10,866	3,544	6,359	2,816	**3)** 5,224	**4)** 9,820	8,555	>5,098	11,288	4,342	**- 14**
Tree-breeders Sub-total	**9,525**	**9,975**	**10,746**	**11,776**	**12,858**	**10,630**	**11,718**	**11,101**	**7,278**	**5,916**	**3,152**	**+ 1940**
Red-Footed Booby	2,220	2,331	2,395	2,340	2,202	3,074	3,492	2,141	2,087	1,443	1,080	**- 55**
Black Noddy	> 7,305	7,644	8,351	9,436	10,656	7,556	8,226	8,716	5,191	4,473	2,072	**- 71**
TOTAL	**19,246**	**28,644**	**24,338**	**30,159**	**28,846**	**27,078**	**38,911**	**38,549**	**37,218**	**41,794**	**27,721**	**+ 104**

Notes:

1) End of March data,

2) Based on Park Rangers distance count 1 June 2014,

3) Based on Park Rangers count 9 August 2014,

4) Based on Park Rangers egg count 14 Feb 2015.

Annex 8. Seabird breeding data from Bird Islet and from South Islet, April to June 2004-2019

Source: WWF Philippines 2004 and TMO 2004 to 2019

Species/Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Red-footed Booby																
Immatures	398	1,455	606	597	780	477	677	795	799	426	134	206	80	97	89	104
Pulli/1st year juv.	> 35	71	105	116	69	180	88	171	243	312	277	240	49	43	39	14
Eggs	+	+	+	+	+	+	+	68	>166	>185	>57	>46	> 49	55	74	26
Nests	279	217	225	404	361	367	451	369	739	848	431	379	315	177	223	72
Brown Booby																
Immatures	0	81	26	55	55	61	126	110	140	62	51	28	66	157	264	218
Pulli/1st year juv.	43	2	7	12	91	126	125	225	46	28	266	200	22	175	95	8
Eggs	1	0	18	95	317	48	106	52	69	532	466	55	144	43	25	6
Nests	117	43	250	89	497	453	513	575	507	618	816	726	887	886	376	412
Brown Noddy																
Immatures	0	2	0	0	0	4	1	1	2	3	5	2	0	2	14	9
Pulli/1st year juv.	0	0	0	0	0	0	0	0	0	0	0	6	109	223	493	68
Eggs	0	0	0	3	17	126	438	253	>147	>607	679	571	620	1,005	581	183
Nests	115	124	20+	25+	218	384	653	571	709	771	931	960	1,048	1,917	1,644	805
Black Noddy																
Immatures	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pulli/1st year juv.	0	0	0	0	0	0	0	0	0	0	0	30	193	8	74	39

Eggs	ND	+	0	+	+	430	+	+	>80	>700	>351	>299	>191	406	468	254
Nests	208	3,203	1,131	1,734	1,824	2,680	3,525	3,827	4,282	5,156	3,778	2,397	1,634	1,205	1131	1036
Great Crested Tern																
Immatures	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pulli/1st year juv.	0	2,100	0	0	0	0	0	0	0	0	0	0	0	29	832	2610
Eggs	0	1,829	0	0	0	515	2,341	498	1,456	3,939	2,120	4,280	6,800	8,620	7,461	4830
Sooty Tern																**Note 1**
Immatures	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Pulli/1st year juv.	0	1,750	0	458	0	846	0	1,764	0	1,258	0	3,538	0	2,549	680	11
Eggs	9	0	0	63	2	3	5,515	2	1,534	146	37	52	166	0	4,964	3

Note 1: By 15 August 2019 MPRs counted 251 juveniles, 371 pulli and 2,175 eggs

Annex 9. In-flight to roost statistics of boobies and noddies on South Islet May 2014 to 2019

Species/ Numbers	2014	2015	2016	2017	2018	2019	2014	2015	2016	2017	2018	2019
	Red-footed Booby						Brown Booby					
	May 8: 16.30 - 17.30	May 8: 16.30 - 18.30	May 13: 16.30 - 18.30	May 9: 16.30 - 18.30	May 12: 16.30 - 18.30	May 15: 16.30 - 18.30	May 8: 16.30 - 17.30	May 8: 16.30 - 18.30	May 13: 16.30 - 18.30	May 9: 16.30 - 18.30	May 12: 16.30 - 18.30	May 15: 16.30 - 18.30
Adult: Daytime	401	366	508	584	262	154	7	22	40	31	160	41
In-flight	910	1,020	1,018	633	355	282	2	28	24	11	144	158
Adjusted to 2-hour period	1,820	-	-	-	-	-	4	-	-	-	-	-
Total	2,221	1,386	1,526	1,217	617	436	11	50	64	42	304	199
% in-flight population	82.0%	73.6%	66.7%	52.0%	57.5%	64.7%	18.2%	56.0%	37.5%	26.2%	47.4%	79.4%
Immature: Daytime	68	58	32	27	22	43	0	2	0	4	32	1

In-flight	1	Not counted	21	1	23	27	0	No count	Not counted	1	0	4
Adjusted to 2-hour period	2	-	-	-	-	-	0	-	-	-	-	-
Total	70	> 58	63	28	45	70	0	>2	0	5	32	5
% in-flight population	2.9%	-	33.3%	3.6%	51.1%	38.6	0%	-	-	20.0%	0%	80%

	2015	2016	2017	2018	2019
	Black & Brown Noddy				
	(Note 1)	(Note2)	(Note 3)		(Note 5)
	May 8: 16.30 - 18.30	May 13: 16.30 - 18.30	May 9: 16.30 - 18.30	May 12 16.30 - 18.30	May 15: 16.30 - 18.30
Adult: Daytime	6,856	> 4,421	4,126	2,179	
In-flight	4,678	> 3,500	< 2,066	1,335	
Adjusted to 2-hour period	4,678	-	-	-	
Total	11,534	7,921	6,192	3,514	
% in-flight population	40.6%	44.2%	33.4%	38.0%	
	Black Noddy				
	Adult: Daytime		2,921	1,347	0
	In-flight	(Note 4)	1,461	681	0
	Adjusted to 2-hour period	-	-	-	-
	Total		4,382	2,028	0
	% in-flight population		33.3%	33.6%	0%

	Brown Noddy				
	Adult: Daytime		1,205	832	60
	In-flight	(Note 4)	605	654	19
	Adjusted 2-hour period		-		-
	Total		1,810	1,486	79
	% in-flight population		33.4%	44.0%	24%

Note 1: Predominantly Black Noddy

Note 2: From 16.30 to 17.30 more birds left the islet compared to the number of birds arriving. From 17.30 to 18.00 more birds arrived than left the islet

Note 3: 578 individuals left the islet while 2,644 flew in = 2,066

Note 4: Number extrapolated based on ratio between the numbers of the two species present during daytime

Note 5: 101 birds didn't settled for landing as a results of ongoing construction and reclamation works

Annex 10. In-flight to roost statistics of boobies and noddies on Bird Islet May 2005 to May 2019

Species/ Numbers	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	May 10: 17.00-18.15	Apr 28: 16.30-18.25	May 8: 16.30-18.20	May 7: 16.00-18.00	May 7: 16.30-18.30	May 13: 16.30-18.30	May 9: 16.30-18.30	May 10: 16.30-18.30	May 10: 16.30-18.30	May 9: 16.30-18.30	May 9: 16.30-18.30	May 11: 16:30 – 18.30	May 10: 16.30 – 18.00	May 14: 16.30 – 18.00	May 15:: 16.30 – 18.00
						Red-footed Booby									
Adult:															
Daytime	823	655	631	1,241	686	982	1,011	382	830	950	1,499	248	343	470	362
In-flight	960	1,171	2,082	1,272	1,534	1,259	1,259	1,680	779	813	602	367	527	356	282
Adjusted to 2-hour period	1,012	1,222	2,271	-	-	-	-	-	-	-	-	-	-	-	
Total	1,835	1,877	2,902	2,513	2,220	2,241	2,270	2,062	1,609	1,763	2,101	615	870	826	644
%-in-flight population	55%	65%	78%	51%	69%	56%	55%	81%	48%	46%	29%	25%	25%	43%	44%
Average In-flight (%)	**51.3%**														
Immature:															
Daytime	514	>205	275	239	179	194	106	174	125	61	111	8	29	24	27
In-flight	588	401	295	541	298	483	483	249	149	5	37	17	40	20	34
Adjusted to 2-hour period	941	419	322	-	-	-	-	-	-	-	-	-	-	-	

Total	1,455	>606	597	780	477	677	589	423	274	66	148	25	69	44	61
%-in-flight population	65%	69%	54%	69%	63%	71%	82%	59%	54%	8%	25%	25%	25%	45%	56%
Average In-flight (%)	**51.3%**														
	Brown Booby														
Adult:															
Daytime	629	405	660	691	650	930	1,338	1,060	968	834	1,505	1,920	2,257	1,295	2,212
In-flight	360	225	326	368	368	508	508	819	722	798	848	1,202	1,278	2,072	727
Adjusted to 2-hour period	576	235	356	-	-	-	-	-	-	-	-	-	-	-	
Total	1,205	640	1,016	1,059	1,018	1,438	1,846	1,879	1,690	1,632	2,353	3,122	3,535	3,367	2,939
%-in-flight population	48%	37%	35%	35%	36%	35%	28%	44%	43%	49**%**	36%	25%	25%	62%	25%
Average In-flight (%)	**37.5%**														
Immature:															
Daytime	22	20	21	20+?	22	30+	96	81	30	13	1	25	74	127	187
In-flight	37	6	31	34	39	96	14	59	32	39	25	41	78	105	30
Adjusted to 2-hour period	59	6	34	-	-	-	-	-	-	-	-	-	-	-	
Total	81	26	55	54	61	126	110	140	64	51	26	66	152	232	217
%-in-flight population	73%	23%	62%	63%	64%	76%	13%	42%	50%	76%	96%	62%	51**%**	45%	14%

Average In-flight (%)	**54.0%**														
	Brown Noddy														
Adult: Daytime							618	607	1,004	1,045	1,031	992	2,953	1,984	
In-flight							1,124	525	142	239	378	358	51		
Total							1,742	1,132	1,146	1,284	1,409	1,350	3,004		
%-in-flight population							65%	46%	12%	19%	27%	27%	2%		
Average In-flight (%)	**28.3%**														
	Black Noddy														
Adult: Daytime							421	1,098	2,243	1,506	2,412	711	800	2,445	
In-flight							1,334	1,124	272	318	132	84	9		
Total							1,755	2,222	2,515	1,824	2,544	795	809		
%-in-flight population							76%	51%	11%	17%	5%	11%	1%		
Average In-flight (%)							**24.6%**								

Annex 11. Systematic list of avifaunal records from South Islet, Bird Islet, and Ranger Station from 14 to 18 May 2019.

Breeding species are indicated in bold letters. Taxonomic treatment and sequence follows IOC/Wild Bird Club of the Philippines 2017. Threat status follows Gonzalez, J.C.T. *et al* 2018. Scientific review and update of the National List of Threatened Terrestrial Fauna of the Philippines.

CR – Critically Endangered, EN – Endangered, VU – Vulnerable, OTS – Other Threatened Species, Near Threatened, LC – Least Concern

Tubbataha Reefs Natural Park

Abundance (within Sulu Sea) Threat Status (IUCN and National Red List)	Species name	Number of individuals	Locality	Notes
Resident Uncommon LC	Eastern Cattle Egret *Bubulcus coromandus*	1	Bird Islet	Dead, decomposed
Resident Uncommon LC	Purple Heron *Ardea purpurea*	1	Ranger Station	First record for TRNP
Resident Uncommon LC	**Pacific Reef Heron** *Egretta sacra*	Adults: 4 Nests: 0	Bird Islet	Dark phase
		Adults: 2	Ranger Station	Dark phase
		Adults: 10 Nests: 0	South Islet	Dark phase
Migratory Rare Vulnerable	Chinese Egret *Egretta eulophotes*	2	Bird Islet	Only partial breeding plumage
Migrant Rare CR	Christmas Frigatebird *Fregata andrewsii*	Imm: 1	Bird Islet	2nd year

Migrant Locally uncommon LC	Great Frigatebird *Fregata minor*	Adults: 6	Bird Islet	Adult male 4, female 2
		Adults: 4	South Islet	Adult male 3, female 1
Migrant Locally uncommon LC	Lesser Frigatebird *Fregata ariel*	1	South Islet	3rd year
		3	Bird Islet	Juv 2, 2nd y 1
		2	Ranger Station	Imm/2nd y
	Unidentified Frigatebird *Fregata sp.*	2	South Islet	Distance too far for identification
Extirpated Rare OTS	**Masked Booby** *Sula dactylatra*	Adult: 1	Bird Islet	Male. Same bird as first found in May 2016.
Resident Locally uncommon LC	**Red-footed Booby** *Sula sula*	Adults: 644 Immatures: 61 Pulli/juv.: 14 Nests: 72 Eggs: 16	Bird Islet	More than 20 pairs breeding on the structures for Black Noddy
		Adults: 463 Immatures: 6 Pulli/juv.: 43 Nests: 48 Eggs: 10	South Islet	
Resident Rare EN	**Brown Booby** *Sula leucogaster*	Adults: 2,939 Immatures: 217 Pulli/juv.: 8 Nests: 412 Eggs: 6	Bird Islet	
		Adults: 201 Immature: 1	South Islet	Two pairs (one egg) breeding 18 Feb 2019
Migratory Common LC	Pacific Golden Plover *Pluvialis fulva*	1	Bird Islet	Only 2nd record
Migratory Common NT	Grey Plover *Pluvialis squatarola*	2	Bird Islet	

Migratory Common NT	Grey-tailed Tattler *Heteroscelus brevipes*	2	Ranger Station	
		1	Bird Islet	
Migrant Fairly common LC	Ruddy Turnstone *Arenaria interpres*	8	Bird Islet	Breeding plumage
		4	South Islet	
		1	Ranger Station	
Migrant Uncommon	Sanderling *Calidris alba*	1	Bird Islet	
Resident Locally Rare VU	**Brown Noddy** *Anous stolidus*	Adults: 2,129 Imm: 12 Pullus: 68 Nests: 805 Eggs: 183	Bird Islet	
		Adults: 79 Immatures: 1 Pullus: 0 Nests: 0 Eggs: 0	South Islet	Wiped out due to reclamation and lighthouse construction
Resident Locally Rare EN	**Black Noddy** *Anous minutus*	Adults: 2,072 Pullus: 39 Nests: 1036 Eggs: 254	Bird Islet	All but 92 adult birds were found on the artificial breeding structures
		Adults: 0 Pullus: 0 Nests: 0 Eggs: 0	South Islet	Wiped out due to reclamation and lighthouse construction
Resident Fairly Common VU	**Great Crested Tern** *Thalasseus bergii*	Adults: 14,880 Pullus: 2,610 Eggs: 4,830	Bird Islet	2nd highest number ever recorded; high number of pulli suggest early breeding start for small part of population
		Adults: 7	South Islet	Not breeding
		Adults: 30	Ranger Station	Not breeding
Resident Rare	Bridled Tern *Onychoprion anaethetus*	1	South Islet to Bird Islet	

VU				
Resident Locally Rare VU	**Sooty Tern** *Onychoprion fuscata*	Adults: 4,342 Pulli: 0 Juv: 11 Eggs: 3	Bird Islet	6,978 adults with 3,392 pulli breeding on 13 February. Data from MPRs on 15 August 2019: Adults 3,898, Juv. 251, Pulli-371, Eggs 2,175. Documenting that that the May population was in early stage of the breeding cycle. The annual total, is the hghest ever counted
		Adults: 4	South Islet	Not breeding
Resident Uncommon LC	Black-naped Tern *Sterna sumatrana*	1	Bird Islet	
		3	Ranger Station	
Migrant Uncommon LC	Common Tern *Sterna hirundo*	Adult: 1	Bird Islet	
Migrant Uncommon LC	White-winged Tern *Chlidonias leucopterus*	2	Between South Islet and Bird Islet	
Migrant Uncommon LC	Lanceolated Warbler *Locustella lanceolata*	1	Ranger Station (on the vessel)	
Resident Common LC	**Eurasian Tree Sparrow** *Passer montanus*	2	Bird Islet	
		8	South Islet	
Migrant Rare LC	Forest Wagtail *Dendronanthus indicus*	1	South Islet	Only 2nd record at TRNP

Annex 12. Systematic list of avifaunal records from Cawili Island 17-18 May 2019.

Breeding species are indicated in bold letters. Taxonomic treatment and sequence follows IOC/Wild Bird Club of the Philippines 2018. Threat status follows Gonzalez, J.C.T. *et al* 2018. Scientific review and update of the National List of Threatened Terrestrial Fauna of the Philippines.

CR – Critically Endangered, EN – Endangered, VU – Vulnerable, OTS – Other Threatened Species, Near Threatened, LC – Least Concern

Status and Abundance (within Sulu Sea) Threat Status	**Species name**	**Number of individuals**	**Notes**
Resident, Migratory Common LC	Great Egret *Ardea alba*	38	
Resident, Migratory Common LC	Little Egret *Egretta garzetta*	8	
Migrant Rare CR	Christmas Frigatebird *Fregata andrewsii*	5-6	3 ad female. Very likely more birds were present.
Migrant Locally uncommon LC	Great Frigatebird *Fregata minor*	> 59	Included > 3 adults
Migrant Locally uncommon LC	Lesser Frigatebird *Fregata ariel*	> 31	> 5 adults
	Unidentified Frigatebird *Fregata sp.*	>194	
Resident Locally uncommon	**Red-footed Booby** *Sula sula*	Adults: 6,441	About 300 breeding birds

LC		Immatures: 2,290 Pulli/juv.: > 50 Nests: 150	
Resident Common LC	**Barred Rail** *Gallirallus torquatus*	> 24	Rather strictly associated with old beach forest
Migratory Common NT	Grey Plover *Pluvialis squatarola*	1	
Migratory Common NT	Grey-tailed Tattler *Heteroscelus brevipes*	15	
Migrant Fairly common LC	Ruddy Turnstone *Arenaria interpres*	2	
Migrant Fairly common LC	Sanderling *Calidris alba*	1	
Resident Fairly Common VU	Great Crested Tern *Thalasseus bergii*	Adults: 2	
Migrant Common LC	Whiskered Tern *Chlidonias hybrida*	2	2nd year bird
Resident Common LC	Spotted Dove *Spilopelia chinensis*	8	
Resident Common LC	Common Emerald Dove *Chalcophaps indica*	14	
Resident	Zebra Dove	2	

Common LC	*Geopelia striata*		
Migrant Uncommon LC	Himalayan/Oriental Cuckoo *Cuculus saturatus/ optatus*	1	
Resident Common LC	Collared Kingfisher Todiramphus chloris	17	
Resident Common LC	Black- naped Oriole *Oriolus chinensis*	31	
Migrant Uncommon LC	Gray's Grasshopper Warbler *Locustella fasciolata*	1	
Resident Common LC	Asian Glossy Starling *Aplonis panayensis*	66	
Resident Common LC	Eurasian Tree Sparrow *Passer montanus*	20	
Migrant Common LC	Grey Wagtail *Motacilla cinerea*	1	
Migrant Uncommon LC	Pechora Pipit *Anthus gustavi*	1	

Annex 13. Comparison of the landscape and habitats seen from the Permanent Photo Documentation Sites on Bird Islet and South Islet, May 2004 and May 2019

Bird Islet

Viewing angle for photo: facing NW 180° | Comments: panoramic view | Photo name code: BI 01 | **Photo Doc Site NI No. 01 - 2004**

Film no: 33, 34, 35, 36 | Date: May 7, 2004 | Photo no (camera): 4 shots

Photo name code: B1 01 | Comments: 7 shots (Stitched by Microsoft ICE) | Date: May 18, 2019 | **Photo Doc Site NI No. 01 - 2019**

Photo nos.: DSC_7926 – 32 | Photo credit: Teri Aquino

Viewing angle for photo: facing NE 038º

Film no: 27, 28 Photo no (camera):

Photo name code: BI 02 Photo no (negative):

Comments: 2 shots good angle Date: May 7, 2004

Photo name code: BI 02 Comments: 7 shots **Photo Doc Site NI No. 02 - 2019**

Photo nos.: DSC_7876 - 83 Date: May 18, 2019

Viewing angle for photo: facing S 165°

Comments: 3 shots panoramic view

Photo name code: BI 03

Film no: 22, 23, 24

Date: May 7, 2004

Photo no (camera):

Photo name code: BI 03

Comments: 10 shots stitched (Microsoft ICE)

Photo credit: Teri Aquino

Date: May 18, 2019

Photo no (camera): DSC_7900 - 10

Photo Doc Site NI No. 04 - 2004

Viewing angle for photo: facing E 067°

Film no: 14 Photo no (negative):

Photo name code: BI 04 Photo no (camera):

Comments: 1 shot Plaza Date: May 7, 2004

Photo Doc Site NI No. 04 - 2004

Photo name code: BI 04

Comments: 1 shot Plaza

Date: May 18, 2019

Photo nos.: DSC_7851

Photo Doc Site NI No. 04 – 2019

South Islet:

Viewing angle for photo: facing S 060°

Comments: shot includes view of Parola at the background

Photo name code: SI 01

Film no: 35

Photo name code: SI 01

Date: May 15, 2019

Comments: single shot including new Parola at the background

Photo no (camera): DSC_7851